Technical Assistance Consultant’s Report

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Socialist Republic of Viet Nam: Establishing the Wholesale Electricity Market

(Financed by the Technical Assistance Special Fund)

FINAL REPORT (2 of 4)

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For the Electricity Regulatory Authority of Vietnam (ERAV)

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Asian Development Bank
TA 8851: Establishing the Vietnam Wholesale Electricity Market (VWEM)

Task 2: Assessment of the current status of Power Corporations and recommendations for the implementation of new functions required for the VWEM – Final Report

Report for Asian Development Bank

118936-S52759
Executive summary

This report has been prepared as part of Task 2 of the project “TA-8854 VIE: Establishing the Wholesale Electricity Market – 1 Vietnam Wholesale Electricity Market (VWEM) (48328-001)”. In particular, it focuses on the five Power Corporations (PC) in Vietnam and provides updated information and data on their current status, as well as an assessment of their level of preparedness to operate effectively and fulfil their obligations once the VWEM is implemented. It makes recommendations on what is required where there are new functions to be undertaken or critical requirements to be met.

The activities that the PCs can undertake are regulated by their Charters. As well as the core activities of the electricity industry, each of the PCs’ Charters includes a number of additional activities that the companies are permitted to engage in. In order to ensure that management is fully focused on its core roles in the reformed electricity industry it is proposed that these additional items should be deleted unless there are exceptional reasons to retain them.

In regard to electricity, the PCs provide broadly the same functions – mainly distribution and supply – in different parts of Vietnam, although they are of significantly different sizes (in terms, for example, of the number of customers served). Most have established small task forces or working groups focused on maintaining awareness of the VWEM proposals. They are also participating in training courses and international visits as these occur. Some have made organisational proposals related to VWEM to EVN. However, in general, they are indicating that they are waiting for guidance and direction from EVN before taking any further actions. The extent to which management teams are recognising their future responsibility for the operations and financial sustainability of their companies is not clear.

Each of the PCs has been reviewed both in general and in respect of their level of preparedness for the implementation of the VWEM. There is still a great deal to be done. Whilst most of the PCs have set up working groups or small task forces regarding the new market structure, these were generally keeping a “watching brief” on developments rather than adopting a pro-active stance. A response that was often given by the companies was that they were waiting for instructions or guidance from EVN. The overall impression is of a very centrally driven and controlled industry. If the policy intention is to develop one that is competitive, liberal and encourages new entrants and investment, then it will be vital that further power and responsibility is delegated to other industry parties such as the PCs. If this happens it will have a very large impact on their operating methods and management culture.

There are a number of roles that PCs have to fulfil under the VWEM. These include operating a number of businesses such as those of retailer, electricity distribution service provider and meter data management service provider (note that meter provision and maintenance is undertaken by the distribution service provider).

A number of new activities will be required to be undertaken by the PCs – such as risk management, contract negotiation, spot market management, network charging and business separation compliance. Other activities (for example demand forecasting, settlement and regulatory affairs) will need to be significantly enhanced. Progress in preparing to undertake these activities seems fairly limited at this stage – at least partially because the PCs are waiting for guidance and instructions from EVN.

Tasks that will need to be undertaken in order to carry out these new activities effectively include staff recruitment (as some of the skills required are not present within the PCs) and a significant training programme. This training will need to be at both the general awareness level for all staff and at a more detailed and specialised level for certain staff.

Supporting these new activities will require an extensive Information and Communications Technology (ICT) programme which has been described in the Task 3.3 report produced by this project. This indicates a number of new systems, system enhancements and new interfaces that will be required. A
significant programme of activity will be needed at each of the PCs to ensure that these required systems are in place on time.

An important issue is that of business separation. There are a variety of reasons for operating the retail, electricity distribution and meter data management service provider businesses within the PCs separately and ring fencing them from each other. These include:

- the need for equitable treatment – for example, in charging and levels of service - by service providers to competing retailers and generators;
- the protection of confidential information that would give an advantage to one competitor over another; and
- providing confidence to potential new entrants that they will be able to compete fairly with existing incumbents.

Furthermore, NPC, CPC and SPC have generation interests, which will need to be established or maintained as a separate business function and will need to be ring-fenced from the other businesses.

However business separation may be implemented to varying degrees – ranging from accounting separation, which merely occurs in financial ledgers but has little or no practical or organisational impact, to total ownership separation, where even the ultimate owners of the competitive and service provider businesses are different. The need for business separation is substantially driven by the level of competition that is being introduced. In the case of PCs, the level of retail competition is an important consideration because of their role as electricity distribution service provider and meter data management service provider.

The VWEM is introducing a comparatively small element of retail competition at the PC level (i.e. retail competition will result mainly from large transmission-connected customers directly participating in the VWEM). This suggests that full scale legal and ownership separation is unnecessary at this stage (and may not be necessary as a legal requirement at any stage). However there are legal drivers – resulting from Government decisions and the draft VWEM market rules – which are encouraging such separation and these need to be taken into account. These legal requirements can be met by:

- the introduction of accounting separation;
- setting up groups of staff dedicated to the various businesses but in the context of the current overall organisational structure; and
- ring-fencing confidential data so that it is accessible only to staff of the appropriate business.

Accounting separation is an important requirement and should be fully implemented as soon as possible as it will facilitate network charging and the preparations for the next stage of market development - the Vietnam Retail Energy Market (VREM). As part of this, activities need to be allocated to the relevant businesses. EVN has provided some guidance on this by means of EVN Document 414/EVN-TCKT. Some further detail for existing activities is provided in Section 2 of this report whilst Section 6 shows which businesses need to take responsible for the new activities - as described above - that are required as a result of the VWEM.

Whist full legal and ownership separation is not needed for VWEM, some ring fencing of information and staff should be introduced. As a first step ICT systems should be developed or enhanced that keep retail, distribution and meter data management information separate. In parallel with this, individual business-specific groups of staff (i.e. retail, distribution and meter data management) can be established within the existing organisational structure. It will be important to ensure that business-specific commercially confidential information is not provided to staff within the potentially competitive businesses such as retail and generation.
A significantly sized ICT programme will be costly – although there may be some opportunity for certain systems to be developed to meet the needs of all the PCs at once rather than five different developments. Nevertheless there will be some local implementation costs of these systems which will arise at all of the PCs. Multiple applications will mean that each PC will need to manage an overall programme which will also incur costs. There will also be ongoing annual operational costs for the new ICT systems.

As mentioned above, additional staff will be needed to take on the new requirements on the PCs and to provide the skills that the PCs do not currently possess.

In the longer term more extensive business separation may be required. For example if the VREM results in widespread retail competition then fully separate retail, distribution and meter data management organisations may need to be set up both at the PC level and at the level of the provincial (and district) companies. However care will be needed to ensure that this does not result in duplication of resources and additional costs. A possible response to this aimed at obtaining efficiency advantages and maintaining economies of scale may be in adopting a more functionally based rather than geographically based overall organisational structure. However changes of this magnitude are likely to be time consuming to implement and disruptive. At this stage it is suggested that this proposal is studied in detail in the context of full business separation to identify the possible benefits. This should preferably be undertaken either before or as part of the early planning for VREM.

The report includes a proposed Action Plan for the PCs that consists of the following steps:

1. Undertake a high level initial allocation of costs to retail, distribution and meter data management to facilitate subsequent derivation of network charges. We note that this is already underway in some pilot companies that are seeking to implement EVN Decision No. 414/EVN-TCKT “Guiding separation of costs of power distribution segment and power retail segment in Power Corporations”. This can be based on direct costs when business units directly fit into one of the businesses or allocations (e.g. using specific cost drivers – see Task 3.3 Report) when costs are shared. A template for the analysis of internal investment and operating costs associated with VWEM preparation is proposed in Appendix H of this report.

2. In view of the major IT programme required for the VWEM, limit IT developments to those that must be in place to facilitate participation in the market. Wherever possible also put into place arrangements to ring fence Electricity Distribution Service Provider (EDSP) and Metering Data Management Service Provider (MDMSP) databases and information from retail staff.

3. Devise logistical arrangements such that staff wholly dedicated to retail or to generation are allocated separate offices from other PC staff.

4. Devise an action plan for the implementation of an element of organisational business separation, including functional reorganisation within the District and Provincial Power Companies.

5. On the basis of the proposed new organisational structure consider whether a revised financial “chart of accounts” may be necessary. If so, make arrangements to implement this alongside the organisational changes.

6. Use the reporting resulting from the amended chart of accounts to validate or amend the high level initial cost allocation previously undertaken at step 1 and review impact on network charges.

7. Set up two demand forecasting teams in the Business Department – one for retail and the other for distribution. This would involve recruitment, training and support for IT developments. Data should only be exchanged between the two teams based on the VWEM rules and processes.
8. Augment the distribution team with resources and skills to derive network charges (note that a regulatory framework is also required for this).

9. Set up a trading and contracts team within the Business Department but as part of retail. This would involve recruitment, training and support to IT developments. Access to EDSP data should only be permitted based on the VWEM rules and processes.
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Glossary

ADB  
Asian Development Bank

BD  
Business Department

BST  
Bulk Supply Tariff

CEO  
Chief Executive Officer

CfD  
Contract for Differences

CMIS  
Customer Management Information System

CPC  
Central Power Corporation

DAP  
Day-Ahead Plan

DMS  
Distribution Management System

DPC  
District Power Company

DSP  
Distribution Services Provider (or EDSP, Electricity Distribution Services Provider)

DTG  
Direct Trading Generator

EMS  
Energy Management System

EDSP  
Electricity Distribution Service Provider

EPTC  
Electric Power Trading Corporation

ERAV  
Electricity Regulatory Authority of Vietnam

EU  
European Union

EVN  
Electricity Vietnam

HCMPC  
Ho Chi Minh City Power Corporation

HPC  
Hanoi Power Corporation

HR  
Human Resources

HV  
High Voltage

ICT  
Information and Communications Technology

IPP  
Independent Power Producer

IT  
Information Technology

ITG  
Indirect Trading Generator
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JSC</td>
<td>Joint Stock Company</td>
</tr>
<tr>
<td>KPIs</td>
<td>Key Performance Indicators</td>
</tr>
<tr>
<td>LDC</td>
<td>Load Distribution Centre</td>
</tr>
<tr>
<td>LLC</td>
<td>Limited Liability Company</td>
</tr>
<tr>
<td>LV</td>
<td>Low Voltage</td>
</tr>
<tr>
<td>MAP</td>
<td>Month-Ahead Plan</td>
</tr>
<tr>
<td>MDMSP</td>
<td>Meter Data Management Service Provider</td>
</tr>
<tr>
<td>MO</td>
<td>Market Operator</td>
</tr>
<tr>
<td>MOIT</td>
<td>Ministry of Industry and Trade</td>
</tr>
<tr>
<td>NLDC</td>
<td>National Load Dispatch Centre</td>
</tr>
<tr>
<td>NPC</td>
<td>Northern Power Corporation</td>
</tr>
<tr>
<td>NPTC</td>
<td>National Power Transmission Corporation</td>
</tr>
<tr>
<td>OMC</td>
<td>One Member Company</td>
</tr>
<tr>
<td>PC</td>
<td>Power Corporation</td>
</tr>
<tr>
<td>PCO</td>
<td>Power Company (unit of a PC)</td>
</tr>
<tr>
<td>PDP</td>
<td>Power Development Plan</td>
</tr>
<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
</tr>
<tr>
<td>PPMB</td>
<td>Power Project Management Board</td>
</tr>
<tr>
<td>PR</td>
<td>Public Relations</td>
</tr>
<tr>
<td>PTC</td>
<td>Power Transmission Corporation</td>
</tr>
<tr>
<td>RF</td>
<td>Radio Frequency</td>
</tr>
<tr>
<td>RLDC</td>
<td>Regional Load Dispatch Centre</td>
</tr>
<tr>
<td>SCADA</td>
<td>Supervisory Control and Data Acquisition</td>
</tr>
<tr>
<td>SMO</td>
<td>System and Market Operator</td>
</tr>
<tr>
<td>SO</td>
<td>System Operator</td>
</tr>
<tr>
<td>SOE</td>
<td>State-Owned Enterprise</td>
</tr>
<tr>
<td>SPPA</td>
<td>Standard Power Purchase Agreement</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>SPC</td>
<td>Southern Power Corporation</td>
</tr>
<tr>
<td>TOR</td>
<td>Terms of Reference</td>
</tr>
<tr>
<td>TSP</td>
<td>Transmission Services Provider</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>VCGM</td>
<td>Vietnam Competitive Generation Market</td>
</tr>
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<td>WAP</td>
<td>Week-Ahead Plan</td>
</tr>
<tr>
<td>YAP</td>
<td>Year-Ahead Plan</td>
</tr>
</tbody>
</table>
1 Introduction

1.1 General

This Final Report has been prepared to meet the requirements of part of Sub-Task 2.1 (“Assessment of current situation of Vietnam power sector, status of NLDC and PCs”) and Sub-Task 2.2 (“Recommendation on the implementation of new functions of Power Corporations and NLDC (SMO)”) of the Asian Development Bank (ADB) project entitled “TA-8854 VIE: Establishing the Wholesale Electricity Market – 1 Vietnam Wholesale Electricity Market (VWEM) (48328-001)”.

In particular, it focuses on the five Power Corporations (PCs) and provides the following Task 2 deliverables:

- A report which synthesises updated information and data on the current status of the PCs, and
- A report on assessment of the current status and critical requirements on PCs.

A separate report addresses the requirements for National Load Dispatch Centre (NLDC) as the System and Market Operator (SMO).

The objective of this deliverable is to assess the level of preparedness of the PCs to operate effectively and fulfil their obligations once the Vietnam Wholesale Electricity Market (VWEM) is implemented and to make recommendations where there are new functions to be undertaken or critical requirements met. In the case of PCs, consideration must also be given to the various roles that need to be undertaken by a PC and the level of business separation that will be required in order to ensure that all parties are seen to be treated equitably. The roles that the PC will fulfil are those of Retailers, Electricity Distribution Service Providers (EDSPs) and Meter Data Management Service Providers (MDMSPs). In view of the uncertainty regarding the role of the electricity wholesaler this has not been further considered in this report.

Whilst only a very small number of electricity customers will be able to select their electricity retailer in the VWEM, it is intended that such retail competition will be extended in the next phase - the electricity retail market (VREM). Therefore, wherever possible it is intended that the enhancements and modifications proposed support moves to more general retail competition.

This Final Report incorporates modifications made in the light of comments received from the PCs and ERAV. This includes the outcomes of questions and discussion raised at the Task 2 Workshop that was held in Hanoi on 26 September 2017. A record of the comments received and the Consultant’s responses is contained in Appendix I.

1.2 Power Corporations (PCs)

This report concentrates on the five PCs. These are as follows:

- Northern Power Corporation (NPC), responsible for electricity distribution and retail in Northern Vietnam including 27 cities and provinces (but excluding the capital city Hanoi);
- Central Power Corporation (CPC), responsible for electricity distribution and retail in Central Vietnam, including 13 cities and provinces;
- Southern Power Corporation (SPC), responsible for electricity distribution and retail in Southern Vietnam, including 21 cities and provinces (excluding Ho Chi Minh City);
Hanoi Power Corporation (HPC), responsible for electricity distribution and retail in the capital city Hanoi; and

Ho Chi Minh City Power Corporation (HCMPC), which is responsible for electricity distribution and retail in Ho Chi Minh City.

1.3 Previous Reports

A number of the previous reports developed by this project are relevant to this deliverable including one produced under Task 2.1 and two from Task 3, as follows:


- Task 3: Report 3: Assessment of Current Status and Recommendation for Upgrading the ICT Infrastructure of PCs for the VWEM.

The Task 2.1 report presented a review of the legal and regulatory basis for the development of the VWEM and provided a detailed explanation of the functions and responsibilities of the PCs (as well as NLDC in its proposed function as the SMO). The purpose of the report was to provide a frame of reference for later work on Task 2.2 (described in this report and the further report produced in parallel on the SMO).

Task 3: Report 1 was focused on the high-level requirements for both the NLDC/SMO and PCs (as well as other participants) in the Long Term VWEM. This was based on some basic assessments of existing ICT system infrastructure and a detailed review and assessment of the EVN VWEM ICT Conceptual Design report.

Task 3: Report 3 differed from Report 1 in that it focused on the following:

- Documenting the existing state of the ICT systems at the PCs;

- Setting out the requirements for the VWEM 2019 and Long Term VWEM for the PCs;

- Assessing the adequacy of the existing infrastructure at the PCs to satisfy the VWEM requirements; and

- Providing a set of enhancements/investments for the ICT systems of the PCs to satisfy the VWEM requirements.

The focus of the Task 3: Report 3 report is therefore on the current status of the PC ICT systems, with comments on their adequacy for operations in the VWEM and identification of enhancements and investments that will be needed to allow PCs to operate effectively in the VWEM. Note that unlike NLDC who takes the role of SMO, the PCs will undergo some level of functional separation in the VWEM:

- Part of the PC’s business will participate in the VWEM as a retailer. It will have financial exposure to the wholesale market and will need to make commercial decisions around the purchase of electricity.

- Another part of the PC’s business will need to operate as an EDSP, essentially being responsible for the operation, management and planning of the distribution network.
Additionally consideration will need to be given to the extent that the role of the MDMSP (which can be regarded as associated with distribution activities) will need to be separated at this stage.

A number of other reports and documents have been taken into account in producing this deliverable and these include:

- The Vietnam Electricity Law and relevant decrees and decisions that implement the law;
- Prime Minister’s Decision 63/2013/QD-TTg on the Road Map, Conditions and Power Sector Organisation Structure for Vietnam Power Market Stages Formation and Development;
- MOIT Decision No 6463/QD-BCT approving the Conceptual Design of the VWEM;
- MOIT Decision No 8266/QD-BCT approving the Detailed Design of the VWEM;
- VWEM Detailed Design Finalisation Revised Final Report (IES and SW Advisory, updated 30 June 2016);
- VWEM Market Rules – Final (IES and SW Advisory, 9 June 2016); and

1.4 Background

In this the report the focus is on the changes that will need to be made by the PCs in Vietnam to enable them to function effectively in the VWEM and the extent to which activities may need to be separated between a number of business streams, together with an assessment of the impact that this may have on them.

The earlier report, mentioned above, covering Task 3.3, “Assessment of Current Status and Recommendations for Upgrading the ICT Infrastructure of Power Corporations for the VWEM” has outlined the ICT needs for PCs in the new market. In this report we will examine the broader organisation, resources, skills and other implication that will need to be addressed. In doing this it will take account of the material included in the previous Task 3.3 deliverable.

In the sections below some further information about the PCs is provided, as well as a description of the generic activities within the electricity value chain, together with the separate business streams to which they can be ascribed. Also examined is the extent to which business separation between these business streams may be implemented and potential alternative approaches. A high level description of the existing market in Vietnam is then presented together with how this is planned to be changed as part of a journey to a fully competitive electricity sector. The implications of this for the PCs are then discussed.
1.5 Structure of this report

The structure of the rest of this report is as follows:

Section 2 – this provides some further information about the existing PCs including their current roles and responsibilities;

Section 3 – examines the road map for Vietnamese electricity market reform and the sequence of market structures which are anticipated;

Section 4 – outlines the current status of the PCs with more detailed information on them in Appendices B to F;

Section 5 – reviews market structure and organisational aspects of the proposed changes including business separation and the various ways that this may be implemented;

Section 6 – describes the impact of the implementation of the VWEM on PCs including the additional skills and functions that will be required;

Section 7 – provides some further analysis on the impact of the VWEM on the PCs and recommendations on how this should be approached.
2 Current Roles and Responsibilities of the PCs

2.1 Further Information on PCs

Section 1.2 of this report lists the five PCs and indicates the regions in which they operate. The five PCs differ significantly in terms of their operating scale and service areas. The largest PC in terms of energy sales is SPC, which is more than three times larger in terms of sales compared to CPC, which is the smallest PC. The service areas of HPC and HCMPC are largely urban. In contrast, NPC, CPC, and SPC serve a mix of rural and urban areas.

Table 1 below shows customer numbers and sales by customer category for each of the PCs in 2013.

Table 1: PC Customers (2013) and Sales (2016)

<table>
<thead>
<tr>
<th></th>
<th>NPC</th>
<th>CPC</th>
<th>SPC</th>
<th>HPC</th>
<th>HCMPC</th>
</tr>
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<tbody>
<tr>
<td><strong>Customer numbers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td>25,618</td>
<td>26,339</td>
<td>98,216</td>
<td>4,824</td>
<td>5,925</td>
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<tr>
<td>Industry and construction</td>
<td>264,899</td>
<td>85,919</td>
<td>97,916</td>
<td>66,081</td>
<td>57,687</td>
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<tr>
<td>Commercial</td>
<td>72,646</td>
<td>83,866</td>
<td>119,367</td>
<td>40,233</td>
<td>78,281</td>
</tr>
<tr>
<td>Residential</td>
<td>7,067,773</td>
<td>2,901,224</td>
<td>5,802,944</td>
<td>1,921,194</td>
<td>1,798,077</td>
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<tr>
<td>Other</td>
<td>108,506</td>
<td>41,397</td>
<td>70,365</td>
<td>22,558</td>
<td>37,320</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>7,539,442</td>
<td>3,138,745</td>
<td>6,190,821</td>
<td>2,054,890</td>
<td>1,977,317</td>
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<td><strong>Sales (GWh)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Agriculture</td>
<td>488</td>
<td>311</td>
<td>2,628</td>
<td>113</td>
<td>74</td>
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<tr>
<td>Industry and construction</td>
<td>31,985</td>
<td>6,192</td>
<td>33,351</td>
<td>4,735</td>
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<tr>
<td>Commercial</td>
<td>1,410</td>
<td>1,291</td>
<td>1,859</td>
<td>1,223</td>
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<tr>
<td>Residential</td>
<td>16,050</td>
<td>6,442</td>
<td>15,230</td>
<td>8,435</td>
<td>8,804</td>
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<tr>
<td>Other</td>
<td>1,210</td>
<td>653</td>
<td>1,890</td>
<td>945</td>
<td>1,365</td>
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<tr>
<td><strong>Total</strong></td>
<td>51,144</td>
<td>14,889</td>
<td>54,960</td>
<td>15,451</td>
<td>21,888</td>
</tr>
</tbody>
</table>
2.2 Roles and Responsibilities

PCs own and operate the majority of the distribution networks from 110 kV and below (except for a small number of 110 kV lines that are owned and operated by NPTC which owns and operates the transmission system), the local distribution networks, and the connections to end-users. There are also a small number of local distribution units, particularly in remote areas, which are independently owned. It is understood that these are gradually being absorbed into appropriate PCs for reasons of economies of scale and to ensure financial sustainability.

The main responsibilities of PCs are listed below and can be organised into three main types of activity related to the role of PCs as distribution service providers, retail suppliers of electricity and other activities. In the VWEM, retail supply is expected to become a contestable activity where it relates to customers connected to the 110 kV network who will become eligible to choose their supplier. This is likely to represent a small number of large customers. Hence the vast majority of customers will not be contestable and will continue to be supplied by the retail supply wing of the relevant PC. Distribution services will remain non-contestable.

Table 2 provides a high level list of the activities currently undertaken by PCs and how these could be functionally separated between those which would be undertaken by the EDSP, the retail business, other businesses that have been developed or undertaken at the request of the Government, and common activities and support services. Note that at this stage those activities that fall within the MDMSP have not been separately identified, nor has the extent to which business separation between these functions is required at the VWEM stage been considered. Both of these aspects will be further examined later in this report.

Table 2: Roles, responsibilities and activities of PCs.

<table>
<thead>
<tr>
<th>Electricity Distribution Service Provider (EDSP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan, expand, upgrade and renovate the distribution network</td>
</tr>
<tr>
<td>Connect new users to the distribution network and provide higher capacity connections to existing users of the network including distributed generation</td>
</tr>
<tr>
<td>Distribution of electricity – operations and control</td>
</tr>
<tr>
<td>Repair, maintain, and overhaul the distribution system</td>
</tr>
<tr>
<td>Management of faults</td>
</tr>
<tr>
<td>Testing, calibration of electrical equipment</td>
</tr>
<tr>
<td>Meter provision, installation and repair</td>
</tr>
<tr>
<td>Training and development of human resources for all aspects of the management, operation and repair of the distribution grid</td>
</tr>
</tbody>
</table>
### Retail

<table>
<thead>
<tr>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase electricity from the Electricity Power Trading Corporation (EPTC) under the bulk supply tariff</td>
</tr>
<tr>
<td>Purchase electricity from small distributed generators in the PCs region</td>
</tr>
<tr>
<td>Set up electricity accounts for new customers (or those whose arrangements change)</td>
</tr>
<tr>
<td>Meter reading and data collection</td>
</tr>
<tr>
<td>Billing</td>
</tr>
<tr>
<td>Cash collection</td>
</tr>
</tbody>
</table>

### Other Activities

Implement business activities for profit – it is understood that recently PCs have been encouraged to concentrate on their core activities and that those that are perceived not to be in this category are being reduced or discontinued

### Other business activities upon request from EVN and the Government

- Investment and development in small and medium hydropower projects

### Common activities and support services

- Support services such as IT, telecommunications, finance, property management and other administrative activities
- Invest in its subsidiaries and affiliates; govern subsidiaries based on the percentage of charter capital according to the law and its Charter
- Fulfil the rights and responsibilities of owners on the percentage of charter capital invested in subsidiaries and affiliates

### 2.3 PC Structure

The PCs themselves are internally structured as holding companies with a number of dependent units and subsidiaries. Generally, the operation and maintenance of the 110 kV network and system control is undertaken by the high-voltage network and system operation companies (organised as dependent units - which are “profit centres” with some degree of legal, management, and financial autonomy including the right to sign contracts) under each PC. Responsibility for retail sales to 110 kV-connected customers varies between the PCs.

Operation and maintenance of lower voltages and retail supply to end-users connected to these voltages is the responsibility of smaller provincial (or, in urban areas, district) distribution utilities referred to as Power Companies (PCOs). The majority of these PCOs are dependent units. However, a small number are one member companies (OMCs), which are corporate legal entities the ownership of which is restricted to a single shareholder who thus has greater control than would be the case for a joint stock company (JSC) with multiple shareholders. There is also one example of a JSC as a result of the absorption by the PCs of some existing separate entities.
Investment planning and implementation is the responsibility of power project management boards (PPMBs), which are dependent units under the PCs. These transfer the projects to the PCs’ high-voltage network companies and PCOs on completion.

Whilst there are differences in the legal and organisational structures of the five PCs there are also significant similarities. The structure for HCMPC (or EVN HCMC) which is shown below as Figure 1 is typical of the high-level structure of the PCs, however at the district level each organisation is organised slightly differently, and the range and number of subsidiary companies within each PC varies depending on its range of business activities. A full listing of the various subsidiaries of each PC can be found in Annex A1 of the report from the Resident Advisor for Viet Nam Power Market Development (TA-7262 VIE) Sector Structure Assessment Report (4 May 2015).

In the case of HCMPC there are 15 PCOs which, as previously mentioned, are responsible for local distribution systems. Other categories of organisations are management boards, centres and companies. Regarding the former, there are three management boards which are responsible for various aspects of project development - electricity system, buildings and offices. In the case of centres there are two – one covers customer contact and the other load dispatch. There are a number of companies which are responsible for the high voltage (HV) system, IT and electrical testing among other activities.
Figure 1: Structure of HCMPC  (Source: HCMC PC)
3 Vietnam Electricity Reform

3.1 Roadmap

The terms of reference (TOR) for this project make it clear that economic development in Vietnam has driven strong growth in electricity demand, with the system barely being able to keep pace. Hence the most important challenge facing the power sector is to ensure that sufficient new electricity generation and network capacity is made available quickly to meet continuing rapid demand growth. To help mobilise new investment, a large-scale reform programme is underway. Vietnam’s Electricity Law, which was passed in November 2004 and went into effect in July 2005, sets out the framework for the introduction of a competitive power market, restructuring of the incumbent public owned utility, Vietnam Electricity (EVN) and its various units and subsidiaries, and the establishment of a separate regulatory unit – Electricity Regulatory Authority of Vietnam (ERAV). This was intended to assist the Ministry of Industry and Trade (MOIT) to develop and implement the regulatory framework to implement the Electricity Law, develop the power market design and rules, and to implement power sector restructuring for power market development.

The Electricity Law provides for the transition to a market-oriented power sector through three successive market phases. In Decision No 63/2013/QD-TTg dated 8 November 2013 the Prime Minister approved the power market roadmap establishing the overall plan for the market development consisting of three major stages of reform:

- A generation competitive market introducing generation competition to sell to a wholesale Single Buyer (the Vietnam Competitive Generation Market or VCGM), for the period 2011-2015;
- A wholesale competitive market (the VWEM), period 2015-2021; and
- A retail competitive market, from 2021 onwards (VREM).

Figure 2 below illustrates this Roadmap. In effect this is an implementation plan for gradually transforming Vietnam’s electricity industry into one that allows for competitive wholesale and retail electricity markets.

The original timeline for the Competitive Wholesale Market implementation was modified in the MOIT Decision No. 8266/QD-BCT “Approval of the Detailed Design of the Wholesale Electricity Market of Vietnam (VWEM)” as follows, and this is reflected in Figure 2:

1. Preparation step (to the end of 2015)
2. First step of Pilot VWEM in 2016 (paper market)
3. Second step of Pilot VWEM in 2017-18
4. Full VWEM from 2019.\(^1\)

\(^1\) MOIT Decision No. 8266/QD-BCT Approval of the Detailed Design of the Wholesale Electricity Market of Vietnam (VWEM) Article 2
At present Vietnam is in the process of moving from the competitive generation market (or VCGM) stage to the wholesale electricity market (VWEM) stage. In the Roadmap, each stage commences with a pilot period, with a number of constraints defined, which is subsequently followed by a “full operation” period.

The key characteristics of the existing VCGM are described in the section below and those of the VWEM and VREM in the sections after that.

3.2 Key characteristics of the Vietnam Competitive Generation Market (VCGM)

The VCGM commenced full commercial operation on 1 July 2012. The intent of the VCGM was to establish the rules and procedures for a single-buyer, cost-based electricity market, to start to unbundle and restructure EVN, and to develop the systems and infrastructure necessary to support the operation of an electricity market. The key idea behind the VCGM was to facilitate competition in generation but largely retain the existing arrangements for the PCs and customers. This was done by having a single buyer, the Electricity Power Trading Corporation (EPTC), purchasing all power from the generators and providing power to the PCs under the Bulk Supply Tariff and the PCs selling power to end use customers based on the uniform retail tariffs.

The VCGM trading arrangements are illustrated in Figure 3 below.
Not all generators have been competing in this market - around 50% of installed capacity is not traded directly in the VCGM – which covers only those that are classified as being Direct Trading Generators or DTGs. Indirect Trading Generators (ITGs) are scheduled by the SMO which also manages the Strategic Multipurpose Hydropower Plants, and that are also regarded as ITGs.

The DTGs have Standardised Power Purchase Agreement (SPPA) contracts with the EPTC. Even though these contracts are called “Standardised Power Purchase Agreements” they are in fact simple contracts for differences i.e. they are financial contracts and do not involve the physical purchase or sale of power.

### 3.3 Key characteristics of the Vietnam Wholesale Electricity Market (VWEM)

The proposed trading arrangements for the VWEM are designed to have the PCs contract directly with generators and change the role of the Single Buyer (EPTC) in the market. The VWEM, also allows for wholesalers to enter the market and contract with generators and then sell to PCs (i.e. contract with PCs). The MOIT’s approved VWEM design allows for the possibility of having eligible customers being allowed to contract directly with generators or PCs other than their current PC. An eligible customer is either an existing or new customer that is connected (or that would connect) to the transmission network and hence needs to be considered as part of the wholesale market. Eligible customers would be subject to transmission charges. All other customers would be considered at this stage as part of retail market and could only be supplied by the relevant PC. The introduction of competition for these customers is an issue for the VREM. The design for the VWEM also allows for new retailers to enter the market and sell to eligible customers.
The intended result of the VWEM over time is for:

- PCs to enter into contracts directly with generators such that their total contract portfolio should largely match their load profiles; and
- Where mismatches between their contracts and actual demands occur, PCs will face some spot market exposure.

For this stage transmission charges and possibly some elements of distribution charges will need to be unbundled. Thus the power costs for a PC over time will change from the current bulk supply tariff (BST) approach to a combination of transmission charges, contract for difference payments (SPPAs) and spot market payments. These arrangements are illustrated in Figure 4.

**Figure 4: Outline of VWEM Trading Arrangements**

The “Detailed Design of the Wholesale Electricity Market of Vietnam” describes the VWEM Detailed Design and the transition from the VCGM to the Long Term VWEM Detailed Design via the Pilot VWEM and the Full VWEM.

Figure 5 below repeats Figure 4 but with indications of where the major changes to business processes are occurring. These are shown by the red ovals. As can be seen there are significant implications for the PCs.

Previous reports (for example that covering Task 3.3: Assessment of Current Status and Recommendations for Upgrading the ICT Infrastructure of Power Corporations for the VWEM) have outlined the existing ICT framework together with recommending the changes that are required in order for the PCs and the SMO can fulfil the requirements that are being placed upon them.
3.4 Key characteristics of the Vietnam Electricity Retail Market (VREM)

Whilst identifying the additional skills that are needed and business processes to be undertaken by the PCs in the VWEM it is important to have a vision of the arrangements that are planned to occur following it. In particular, the next stage of electricity industry reforms is to introduce the Vietnam Retail Electricity Market (VREM) which is intended to operate in parallel with the VWEM with the objective being to facilitate retail competition. Whilst detailed arrangements for the VREM remain to be fully developed (including any phasing of its introduction), contestable customers – however defined - are likely to be able to contract with any PC or indeed to directly participate in the spot market. Further new retailers, are expected to be able to enter the market and contract with contestable customers.

To facilitate these arrangements both the transmission costs and the distribution costs will be unbundled and the retail business of the PCs will probably need to be further separated from the distribution part of the business – in both an accounting sense and an organisational sense. Other changes may also need to be considered including company governance and how the different businesses interact with end-use customers. This separation process will have started during the VWEM stage and the legal background to it is examined in Section 7.4 of this report. The VWEM market design refers in Section 11.8.4 to the ring fencing and separation of retailing businesses from distribution service providers, in Section 11.9.4 to the ring fencing of MDMSPs, and in Appendix D to the importance of accounting separation for the setting of network charges.
The contract price for a contestable retail customer who changes retail supplier will include costs for energy, transmission and distribution. These arrangements are illustrated in Figure 6.

As far as possible the changes required by the PCs for the VWEM should be framed as a path towards the VREM so that the disturbance to organisational and staff arrangements are consistent and minimised and ICT costs are optimised.

Figure 6: Outline of the VREM Trading Arrangements
4. Current Status of the Power Corporations

4.1 Introduction

An important requirement within Task 2.1 of the TOR for this project is the need to summarise the current status of the PCs. This review focuses on the following factors:

- Functions and duties;
- Human resources and training;
- Business model and organisational structure including decision making processes;
- Budgeting and financial management;
- Infrastructure systems including metering system, SCADA/DMS, SCADA/EMS and IT software, hardware systems.

Note that some elements of matters related to infrastructure systems such as IT and communications have been covered under Task 3.

A questionnaire was developed and submitted to the PCs to gather the required information. A copy of this is provided as Appendix A. Whilst all of the PCs responded, the level of detail delivered was limited in some cases and significant similarities were noted between the answers applying to different PCs.

As well as reviewing the completed questionnaires, visits were arranged to some PCs to obtain further information.

In the sections below some of the overall conclusions regarding the PCs. Information about each individual PC is provided in Appendices B to F.

4.2 PCs – Business Objectives

Three core business objectives which are common to all of the PCs were identified. These are:

- Supplying power to customers on a safe, stable and continuous basis;
- Selling electricity to customers; and
- Preparing IT infrastructure, HR, etc. for the VWEM introduction.

The first two of these are the fundamental distribution and retail functions which have been described in more detail previously.

The core business lines of each of the PCs are defined in their Charter documents. These define a core set of activities that are common for each PC, as follows:

- Production, distribution and trading electricity;
- Import and export of electricity;
• Investment in and development of the distribution grid and medium and small hydropower projects;

• Management, operation, production, repair, maintenance, overhaul, repair, renovation, upgrading of electrical, mechanical, control and automation power grid projects of 110 kV grid and 220 kV distribution-related assets;

• Testing, calibration of electrical equipment;

• Training and development of human resources for management, operation, and grid repair.

Each PC also has a limited range of other specific activities which it is empowered under its Charter to carry out, in support of its main lines of business, although in general they have focused on their core business, which means that not all of the activities that are permitted in their Charters have been pursued. Exceptions are construction, engineering consulting (SPC), testing (all of the PCs), and meter manufacture (CPC).

Some PCs (NPC, CPC, SPC) have generation interests and these will need to be established or maintained as a separate business function and will need to be ring-fenced from the other businesses.

4.3 PCs – Organisation

The organisational structure of the PCs has been determined by EVN and this is replicated, as appropriate, in the provincial and district power companies although the extent to which responsibilities are devolved varies.

Typically the provincial and district power companies are responsible for customer interfaces where the customer is connected at less than 110 kV.

In SPC and CPC a central business department deals with those large customers connected at 110 kV.

Conversely in NPC a central business department is responsible for contracting with 110 kV customers but the provincial companies deal with metering and billing.

NPC also devolves responsibilities for connections involving less than 30 MW of generation to provincial companies whereas CPC allocates responsibility for these to a separate High Voltage company. EVNCPC has clarified that the PC oversees the connection of all independent power producers (IPPs), but that the High Voltage Grid Company (CGC) or the District Power Company manages the connection, depending on the voltage level. (GCG manages connections at 110 kV).

In general, central Finance and Billing Departments handle the necessary interfaces with EPTC.

Responsibilities also vary depending on ownership. For example, NPC has 24 provincial subsidiaries and 3 one member limited liability companies (LLCs, sometimes OMCs). The LLCs have considerable autonomy.

Most PCs have separate High Voltage and Testing companies that are responsible for network assets.

Figure 7 shows a typical organisational structure for a PC. This indicates a number of central departments covering centralised planning and technical functions, business and finance with a range of devolved activities undertaken at the provincial and district power company level. There are also central departments providing corporate and shared services such as Human Resources (HR), Information Technology (IT), Public Relations (PR) and other general administration.
4.4 PCs - Key Business Processes

A number of key business processes undertaken by the PCs were identified. These include:

- **Demand forecasting** – this is carried out for technical planning and operational purposes, but not for commercial purposes;

- **Network planning** – these are developed based on the EVN Long Term Power Development Plan (PDP);
  - Typically a distribution planning process is operated with a five year planning horizon and including annual updates;
  - Network extension requirements for the below 110 kV system are identified and planned by the provincial and district companies;

- **Network operation & maintenance**;
  - Activities are largely carried by out in-house or by subsidiary companies;
  - There is only a limited use of contractors – mainly for major overhauls of specialised equipment;

- **Metering and data collection**;

- **Procurement** – this is undertaken in compliance with national procurement rules for governmental organisations and utilising EVN procedures;

- **Commercial settlement** - in accordance with an EVN decision, payments are made to EPTC five times per month.

Some of these processes will be significantly affected by the implementation of the VWEM, particularly in the areas of demand forecasting and commercial operations such as settlement.
4.5 PCs - Demand Forecasting

Demand forecasting will be substantially affected by the move to the VWEM, with a much increased set of requirements and processes such as risk management being highly dependent on a good understanding of the level of reliance that can be placed on such forecasts.

As a result of this, particular emphasis has been placed on obtaining a good understanding of the existing situation in regard to forecasting in the PCs.

Table 3 gives a summary of the current approach in each of the PCs and indicates that significant enhancement of this activity will be required. The columns in orange and green indicate those PCs that have adopted the most advanced approach to demand forecasting.

Table 3: Demand Forecasting

<table>
<thead>
<tr>
<th>Demand Forecast</th>
<th>HCMC PC</th>
<th>SPC</th>
<th>CPC</th>
<th>HNPC</th>
<th>NPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>Historical data Extrapolation Weather data Monthly demand/consumption</td>
<td>Historical data and Extrapolation Seasonal factors/weather Future requirements of industrial power zones and very large customers, Regression analysis based on GDP.</td>
<td>Based on historical data Seasonal factors/weather Provincial Companies liaise with industrial power zones</td>
<td>Hourly forecast aggregated into annual figures Weather data and hourly load data from NRLDC is referred to</td>
<td>Based on historical data, economic growth rates and data on large consumers from Provincial Companies Forecast revised twice per year</td>
</tr>
<tr>
<td>Monthly</td>
<td>Historic data Daily load shapes for weekday/weekend/public holidays</td>
<td>As above</td>
<td>As per annual forecast and comparing with the same month across the last five years</td>
<td>Previous month’s demand incremented by average growth rate for the month over the past 5 years</td>
<td>Monthly forecast developed from previous month, but no inclusion of weather effects</td>
</tr>
<tr>
<td>Weekly</td>
<td>Based on comparison with similar historical weeks Updated for weather</td>
<td>Previous week’s forecast Updated for weather</td>
<td>Based on previous week updated for weather and system events Comparison with similar past weeks</td>
<td>Extrapolating trends over the last four weeks</td>
<td>N/A</td>
</tr>
<tr>
<td>Daily</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Daily forecast updates based on weather forecast</td>
<td>N/A</td>
</tr>
<tr>
<td>Commercial/operational</td>
<td>Operational</td>
<td>Operational</td>
<td>Operational</td>
<td>Commercial pilot, Operational</td>
<td>Operational</td>
</tr>
</tbody>
</table>

4.6 PCs - Financial Processes: electricity sales/purchases

Another activity that will be impacted by the VWEM is the process by which PCs pay generators or others for the electricity that they supply to end-use customers. For the small number of large customers that become contestable at this stage (either because they are both connected at 110 kV to PC systems and meet the necessary criteria or are otherwise declared to be suitable) the arrangements by which they pay for electricity and the supporting industry processes will also change.

As a first step to understanding this and identifying the resulting changes, Figure 8 provides a simplified diagram of the existing physical (i.e. electricity) and financial flows. This shows the current main industry participants and the flows between them.
Note: SPC has advised that in the case of energy exports to EDC in Cambodia, and sales to 110 kV customers, with one exception, revenues flow directly to SPC’s account rather than through the Provincial/District power company that hosts the relevant physical connection.

**Figure 8: Financial Processes – electricity sales/purchases**

4.7 PCs – Metering

As with the process by which PCs pay generators or others for the electricity that they supply to end-use customers, the supporting metering and data collection flows will also be affected by the VWEM.

Figure 9 shows the current metering arrangements for generators and the interfaces between the various industry participants.
Table 4 shows for each of the PCs how various metering responsibilities are allocated between business units. Whilst there is considerable consistency between the companies a number of differences have also been identified. In the course of discussing these processes with the PCs, a lack of clarity emerged in some areas (indicated by the orange and red sections of the table below) as to how responsibilities are currently allocated.

Table 4: Metering responsibilities

<table>
<thead>
<tr>
<th></th>
<th>HCMC PC</th>
<th>SPC</th>
<th>CPC</th>
<th>HNPC</th>
<th>NPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provision of metering equipment</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Testing and certification</td>
<td>D</td>
<td>D</td>
<td>T</td>
<td>D</td>
<td>T</td>
</tr>
<tr>
<td>Meter reading</td>
<td>D/R</td>
<td>R</td>
<td>R</td>
<td>D/R</td>
<td>R</td>
</tr>
<tr>
<td>Data collection</td>
<td>D</td>
<td>R</td>
<td>D</td>
<td>D/R</td>
<td>R</td>
</tr>
<tr>
<td>Storage/checking</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D/R</td>
<td>D</td>
</tr>
<tr>
<td>Error correction</td>
<td>D</td>
<td>D</td>
<td>D/R</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Settling generator payments</td>
<td>R</td>
<td>R</td>
<td>D/R</td>
<td>D?</td>
<td>B</td>
</tr>
<tr>
<td>Settling customer bills</td>
<td>R</td>
<td>R</td>
<td>D/R</td>
<td>R</td>
<td>D/R</td>
</tr>
</tbody>
</table>

D=Distribution  R=Retail  T=Testing  B=Business
The following points are noted relating to Table 4:

- metering investments have to be undertaken in accordance with the regulations contained in MOIT Circular No. 42/2015/TT-BCT, “Regulation on Electricity Metering in the Electrical System”;

- at present the Distribution and Retail businesses within the PCs are not separated, and the table therefore refers to the lead departments internally within the companies that are involved in each area of work;

- regarding meter reading, responsibilities in SPC are split according to the voltage level of the customer connection, as follows:
  - meters connected to the 22 kV distribution system are read by the provincial/district power companies;
  - meters connected to the 110 kV distribution system are read by the High Voltage Grid Company;
  - all meter readings are then input and managed in SPC’s metering data management system.

- in SPC, the Accounting and Finance Department is responsible for energy payments.

4.8 PCs - Training

From the questionnaires that have been received and other interactions with the companies it is clear that all PCs have recognised the need to increase their skills in understanding and responding to the implications of preparing for the VWEM implementation and its subsequent operation. Some of this has been addressed by the training that is being provided by this project although it will be important to ensure that this is sustained into the future.

One particular concern relates to the lack of experience of the companies in regard to establishing a strategic approach to the portfolio of contracts for electricity purchasing and risk management that will need to be entered into and the process of contract negotiation required to actually put them into place.

Section 4.5 refers to the increased need for demand forecasting by the PCs to meet the requirements of the VWEM skills. Hence the skills to undertake this need to be developed. Aspects that will need to be managed include:

- Spatial demand forecasting
- Daily/hourly forecasting
- Matching contractual cover to forecast demand

It is clear that there is going to be a substantial and ongoing training need within the PCs in order to deal with these issues.

Figure 10 and
Figure 11 show assessments by the PCs of their current capabilities in a number of relevant fields. Whilst the companies appear reasonably confident regarding settlement and payment processes for bulk energy purchases (although this should be subject to verification when the scale of the changes required by the VWEM are clear to the PCs), there appears to be concern regarding a number of other activities including contract negotiation, interfacing with the SMO, and demand forecasting. As previously mentioned these needs have started to be addressed but a comprehensive and continuing training programme is likely to be required.

Figure 10: Training needs - Core business skills
4.9 Key findings from PCs review

An important finding from the review of the preparations that the PCs are making for the VWEM are that taking a largely reactive role regarding its implementation. Broadly, whilst generally they have appointed teams to monitor developments, they seem to be awaiting instructions from EVN before taking more pro-active actions.

Notable exceptions to this are HPC which is developing and organisational design for business separation and NPC which is considering setting up a Power Market department.

PCs feel that there is a lack of commercial incentive to participate in the VWEM and refer to their inability to design new tariffs.

At present the EPTC through the BST socialises certain costs. It will be important to identify the extent to which this will continue as it will define the extent to which cost messages (via tariffs) are passed to industry participants and end-use customers as this can be expected to impact on their behaviour with a consequential effect on the PCs.

There are a number of aspects of the VWEM that will require careful consideration, the results of which will impact on the PCs. These include:

- the treatment of small generators embedded in the systems of the PCs;
- metering and settlement arrangements for international exports and inter-PC transfers (such transfers are currently netted off EPTC purchases but future intentions are not known).

An important issue discussed in detail later in this report is the extent to which the activities of the PCs should be separated into different businesses and the nature of such separation in the VWEM. Such ring-fencing or business separation has been considered by some of the PCs who have submitted preliminary plans to EVN, but they are awaiting responses and expect a “top-down” decision to direct
future steps. One element that may need to be considered as part of this is whether there should be greater integration of the activities undertaken by the PCs and their respective provincial and district company activities in order to maintain and enhance effectiveness and efficiency.
5 Organisation and Business Separation

5.1 Introduction

In this section the businesses and activities that generally make up the electricity value chain are identified and categorised. The reasons why it is sometimes decided to restructure the industry to reflect these categorisations are explained and the options for the level of the resulting business separation – legal, organisational, financial – are examined. These issues are initially examined generically and then finally some thoughts are provided on the implication of this for the development of the industry in Vietnam and in particular for the implementation of the VWEM.

5.2 Electricity Value Chain - Activities

The activities that are undertaken in the electricity value chain can be separated into a number of categories or businesses such as generation, transmission, distribution and retail/supply. Further granularity can be introduced by including some additional categories such as metering (which may be just its provision or meter reading/data collection or both), system operator, market operator and others.

These categories of activities can also be regarded as separate businesses with different characteristics. Additionally, and as a result of these differing characteristics, the approach to regulation – including the extent to which there is price regulation – can vary substantially between such businesses. Such differences in business characteristics, market opportunity and regulation will lead - if permitted legally and by regulation - to differing choices between business owners as to which businesses they wish to be involved in. These decisions will reflect many things, including the attitude of such businesses (and their own owners and shareholders) to risk and the financial targets that they are seeking to achieve.

For example, network businesses, which tend to be heavily regulated, conservatively managed and consisting of a large quantity of tangible assets, can often be attractive to a business owner who is seeking a relatively low level of risk but a predictable income flow. This could be, for example, a pension fund with responsibilities for paying its pensioners. Note that this is just one example and there are many other reasons why investors seek particular types of businesses.

Separating the electricity industry into different types of businesses raises the possibility of corporate activity, i.e. the separation of such businesses into different legal entities (if not already done and perhaps required by regulators) and their sale and purchase. Assuming this is legally permissible, it can raise many issues and be challenging to regulators who need to ensure that end use customers are protected in regard to the services that they are provided with and the prices that they are charged.

Table 5 shows the major activities that fall within each of the main businesses that make up the electricity industry. It should also be recognised that current and future changes to the industry are also impacting on these market structures. These include the emergence of larger amounts of distributed generation embedded at relatively low voltage levels, the fact that such generation may be intermittent (for example, PV whose output is zero at night and varies with weather and other conditions during the day), the potential use of energy storage at both the customer and grid level, and new wide-spread uses for electricity, such as electric vehicles and others. These factors may affect possible legal, market and regulatory arrangements as well as their technological impacts and thus have the potential to influence the businesses that make up the overall industry.
### Table 5: Businesses in the electricity supply value chain

<table>
<thead>
<tr>
<th>Business</th>
<th>Major Activities</th>
<th>Market Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation</strong></td>
<td>• Construction or procurement of generation plant&lt;br&gt;• Fuel purchase&lt;br&gt;• Plant operation&lt;br&gt;• Maintenance</td>
<td>There is opportunity for competition between generators.</td>
</tr>
<tr>
<td><strong>Transmission</strong></td>
<td>• Transmission network planning&lt;br&gt;• Construction&lt;br&gt;• Maintenance&lt;br&gt;• Fault management&lt;br&gt;• System operations</td>
<td>This is a “natural” monopoly with competition generally limited to the provision and possible subsequent ownership of new lines cable and plant.</td>
</tr>
<tr>
<td><strong>System and Market Operation</strong></td>
<td>• Operate the power system&lt;br&gt;• Source ancillary and reserve services&lt;br&gt;• Administer contract and spot markets&lt;br&gt;• Operate settlements system</td>
<td>These services must be provided by a party that is independent of generation and retail businesses. They are often delivered by a ring-fenced organisation within a transmission business.</td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>• Distribution network planning&lt;br&gt;• Construction&lt;br&gt;• Operations&lt;br&gt;• Maintenance&lt;br&gt;• Fault management</td>
<td>This is a “natural” monopoly with competition generally limited to some small independently owned and operated networks within the operating area of a large distributor.</td>
</tr>
<tr>
<td><strong>Metering</strong></td>
<td>• Meter purchase and installation&lt;br&gt;• Meter maintenance&lt;br&gt;• Meter reading (this can sometimes be undertaken by distribution or retail)&lt;br&gt;• Communications for remote reading</td>
<td>Whilst these services can be delivered on a monopoly basis, generally from distribution, some or all of them could be provided competitively.</td>
</tr>
<tr>
<td><strong>Retail/Supply</strong></td>
<td>• Power purchasing&lt;br&gt;• Product design and marketing&lt;br&gt;• Customer management&lt;br&gt;• End use customer billing</td>
<td>There is the opportunity for competition between retailers in selling electricity to the end user.</td>
</tr>
</tbody>
</table>
Each of these businesses will also need corporate and/or support services such as finance, IT, HR, and legal.

Metering may fall either within distribution or retail/supply. Alternatively, it could be split, with meter reading in retail/supply and meter provision and operation in distribution, or it may be a separate business in its own right (as shown in Table 5) with potential competition in service provision.

Market and system operation could be located in transmission or operated from a separate unit (again as shown in Table 5).

5.3 Reasons for business separation

Often several (or sometimes even all) of these business activities are carried out within the same organisation. For example, generation and transmission may be handled by the same body and initially almost always distribution and retail/supply will be handled by the same organisation.

However when it is decided to reform the industry, probably in the context of liberalising market structures and introducing competition and elements of private ownership into certain parts of the value chain, the issue arises as to whether there should be elements of separation in the businesses that are carrying out the activities in these different categories.

There are a number of reasons why the issue of separation of activities arises. In particular those businesses which are essentially monopolies may have, or be perceived to have, some advantages compared to participants who are only involved in competitive activities. Examples of this could be:

- providing preferential network access to generation projects which are being developed by the same organisation that owns the network;
- creating barriers to network access to new generators not owned by the network operator;
- preferential access to sensitive commercial information (for example, in regard to energy use by customers where there is retail competition) that gives an advantage in making subsequent business decisions; or
- potential cross-subsidies between monopoly and competitive activities such that certain costs are recovered in the monopoly business thus helping to lower costs for the competitive business and improving its market competitiveness.

It should be made clear that it is not being suggested that these actions will inevitably arise if business separation does not occur, but that the potential exists.

Further there can be historical advantages that accrue to an incumbent that has been operating for a considerable time as a monopoly provider which reduce the attractiveness of entering the market to new entrants. At the retail level this can relate to issues such as the branding of the incumbent and the continued impression that it fully operates the industry, leading to a suggestion that there is increased risk of choosing an alternative.

The implementation of the VWEM (and the subsequent intention to introduce retail competition via the VREM) means that these matters are of increasing concern and the implications for the PCs should be considered.
5.4 Business separation – alternatives

Based on the reasons for business separation outlined in the previous section the question arises as to what business separation really means – and what extent of such separation is required during the various phases of the reform of the industry in Vietnam.

It is not clear that the existing legal framework has already determined this in detail so there are benefits in examining the potential options.

Business separation in the United Kingdom (UK) developed as retail competition became established. Subsequently requirements have been imposed by the European Union (EU) across all EU members in the form of a Directive\(^2\). Article 26 of this states, among other things, that

- Where a distribution system operator (which is broadly equivalent to an EDSP in Vietnam) is part of a vertically integrated undertaking, it should be independent at least in terms of its legal form, organisation and decision making from other activities not relating to distribution.

- However this does not require the separation of the ownership of assets of the distribution system operator from the vertically integrated undertaking i.e. there is no requirement for the distribution system operator business to be sold to an entirely different owner and some form of holding company arrangement would be sufficient.

- Member States (i.e. Governments) should ensure that where the distribution system operator is part of a vertically integrated undertaking its activities are monitored by regulatory authorities or other competent bodies so that it cannot take advantage of its vertical integration to distort competition.

So an important issue to consider is whether it is necessary to have business separation (within a single overall ownership) or total ownership separation. In the electricity sector in the UK there has not been a requirement for there to be ownership separation between distribution and retail. However this has substantially (although not completely) occurred. This has happened for various commercial and strategic reasons – some of which were referred to in the previous section – but not as a regulatory requirement.\(^3\)

As well as ownership separation a further aspect to consider is the extent to which there should be separation of governance between distribution and retail. Two possible options are presented below:

- There could just be separate regulated accounts within a single legal entity – which was the initial approach with electricity in the UK (a brief explanation of the introduction of retail and generation competition and approach to business separation in the UK together with the move of most of the sector to the private sector is briefly described in Appendix G and recent progress in Europe is summarised in Section 5.5). There seems to have been some movement towards such separate accounting already in Vietnam in some pilot companies. This is based on the principles defined in EVN Decision No. 414/EVN-TCKT “Guiding separation of costs of power


\(^3\) Some interesting background is that a current issue in the UK relates to the ownership and operation of the dominant telecommunications system which is run by a division of British Telecom called Openreach. The regulator, Ofcom, is currently in negotiation with the company regarding a much greater level of business separation and control although final decisions have not yet been reached. Controversial issues include the costs and level of disruption, whether investment levels in the system will be maintained (and, indeed, increased), the treatment of a large deficit in the pension fund, and the degree of independence of the Openreach board within the overall British Telecom group.
distribution segment and power retail segment in Power Corporations“, which seeks to separate costs of distribution and retail functions. Retail activities are broadly defined as those taking place “behind the meter”. Whilst this is useful – especially before any major introduction of retail competition – it provides limited assurances to external parties about activities within the industry and leaves incumbents in a very powerful position.

- Another alternative would be a separate legal entity for each EDSP with its own licence, board of directors etc. but within the overall ownership of a group. Appropriate regulation would be needed (either through laws or regulatory licences) to ensure that appropriate levels of separation were achieved. Questions would still remain about the level of independence that had actually been achieved but these are generally manageable although the issues emerging in the British telecoms industry³ demonstrate that they can be challenging.

In order to examine the issues that can arise in more detail it is assumed that an approach where EDSPs are established as separate legal entities but common ownership in a group with, say, retail/supply, generation, transmission or indeed other activities is permitted. The sort of matters that could arise include:

- What services are “ring-fenced” to each of the business? Which can be shared?
- Which staff are allocated to each business and which remain corporate and provide shared services?
- Where services are shared, how do cross charging arrangements work?
- What data can be shared and which is confidential and must be kept with only one of the businesses?
- To what extent are separate IT system required?
- How are offices handled? Are staff “banned” from one another’s offices?
- Separate logos?
- Should there be a requirement for a compliance officer (and team) in each EDSP?

To enforce whichever requirement may be decided on there will need to be, as previously mentioned, a suitable legal and regulatory structure (probably best established in a licence between the regulator and the EDSP – this is likely to include a wide range of aspects including price controls on network charges, performance and planning requirement and may others; it should also include reasonably extensive business separation obligations on the EDSP).

One route that has been used to enforce the requirements of licences or other legal instruments is to require monopoly businesses – in this case, the EDSPs - to appoint Compliance Officers (and teams) who specifically deal with business separation. Activities would include:

- producing an annual report on business separation compliance;
- developing and implementing an employee business separation code of conduct and supporting staff in making decisions on how the requirements should be applied;
- responding to complaints (from within or outside the business) that obligations were not being followed; and
• other related tasks.

The terms under which staff are employed would also need to be amended such that breaching the employee business separation code of conduct (which, for example, stipulated that certain actions such as providing information to another business but still in the group was not permitted) were disciplinary offences.

It should also be noted that implementing business separation comes with a cost – new or amended IT systems, changes to business processes, new customer facing processes, possible activity duplications, additional staff requirements, and compliance costs are examples. Whilst these costs can be minimised they cannot be eliminated and a judgement needs to be made as to how much cost customers should be asked to meet to do this. This is also likely to be controversial with the PC claiming that business separation is making the business significantly more expensive because of the loss of economies of scale and increased duplication.

To summarise, business separation can take a wide range of forms – from total ownership separation to financial reporting that occurs in financial ledgers but has little or no practical or organisational impact. Often an industry may step through these different level as it is reformed and restructured. Table 6 below provides information on this starting from limited separation to complete separation of ownership and the provision of all services.

**Table 6: Levels of Business Separation**

<table>
<thead>
<tr>
<th>Level of Separation</th>
<th>Characteristics</th>
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</table>
| Accounting separation | • No or very limited organisational change so activities delivered from a shared organisation.  
• No separate management of the businesses and no recognition within the utility (and perhaps externally) that they should be separately managed.  
• One regulatory licence may cover all of the relevant businesses although separate business licensing also possible.  
• Rule based allocation of revenue and costs allocated to different businesses.  
• Separate allocation based financial reporting. |
| Elements of managerial separation with many shared services | • Initial recognition of the separate businesses although limited organisational change with many activities delivered from a shared organisation.  
• An emerging managerial responsibility for separate businesses but with limited clarity and continuing dominant role for group management.  
• One regulatory licence may cover all of the relevant businesses although separate business licensing also possible.  
• Rule based allocation of revenue and costs allocated to different businesses.  
• Separate allocation based financial reporting. |
## 5.5 Business separation – Unbundling in the European Union

A brief explanation of the introduction of retail and generation competition and approach to business separation in the UK together with the move of most of the sector to the private sector is given in Appendix G. The UK has introduced a considerable amount of unbundling and business separation but has also permitted market forces to determine a number of the corporate outcomes. This is described in more detail in Appendix G.

<table>
<thead>
<tr>
<th>Level of Separation</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| Increased managerial separation with limited shared services  | • Increased recognition of the separate businesses and some initial organisational change with a reducing but still significant number of activities delivered from a shared organisation.  
• Clearer managerial responsibility for the separate businesses but with continuing dominant role for group management.  
• Separate IT systems and business processes start to be developed.  
• One regulatory licence may cover all of the relevant businesses although separate business licensing also possible.  
• Rule based allocation of revenue and costs allocated to different businesses but starting to be replaced with direct identification of the revenue and costs of the separate businesses.  
• Financial reporting becomes a mixture of direct revenue and costs and allocation. |
| Separate legal entity within common ownership with some continuing shared services | • Separate company with separate board and organisational structure but some service delivered from a shared organisation using service agreements.  
• Significantly clearer managerial responsibility for the separate businesses but within a group management system.  
• Some separate IT systems and business processes but others are group provided.  
• Separate regulatory licences for each business.  
• Direct identification of the revenue and costs of the separate businesses.  
• Financial reporting based on direct revenue and costs. |
| Separate ownership                                            | • Legal entities carrying out different businesses cannot share common ownership so complete ownership separation.  
• All interactions between industry participants are at “arms-length” and commercially based.  
• Separate IT systems and business processes.  
• Separate regulatory licences for each business. |
More widely in the EU, the Directives of the 3rd Energy Package have introduced unbundling requirements resulting - subject to some exceptions – in the separation of the various stages of the electricity supply chain (generation, transmission, distribution and supply). However, each country in the EU has some discretion in the implementation of the Directives such that, for example, only the Netherlands has legally required full ownership unbundling. Other countries have (where relevant) limited themselves to legal and functional separation.

Important issues that have arisen relate to possible confusion arising from branding and communication policies where in some cases national regulators have intervened.

Another important area has been compliance programmes designed to ensure that separation is effectively implemented. These seem to have been successfully introduced.

In April 2016 the Council of European Energy Regulators produced a report on the Status Review on the Implementation of Distribution System Operators’ Unbundling Provisions of the 3rd Energy Package. This is available online and provides a useful summary of the progress on such unbundling within the EU.

5.6 Implications for the PCs

5.6.1 General

At present PCs have organisational structures that combine the functions of retailing, distribution and meter data management. As a result, the business processes that have been developed and the supporting ICT systems have evolved without regard to there being any boundaries between these functional areas not only within the PCs but also throughout the subsidiary Provincial and District Power Companies. Under the different stages of the VWEM, the PCs (and their subsidiaries or any other legal structure that may arise) will need to separate the functions of retailing, distribution and meter data management – initially via ring-fencing and possibly at a later stage, with full legal separation. This will need to be reflected not only in legal and organisational terms but also in the design of business processes and ICT systems where functional boundaries and, in some cases, restrictions on shared infrastructure will need to be taken into account.

Business separation for utilities such as the PCs has generally been driven by the introduction of retail competition. In the case of the VWEM such competition is likely to be broadly restricted to a small number of large customers connected at 110 kV. Hence the case for the full-scale implementation of such separation at this stage is limited. Nevertheless Table 6 above shows that there are a range of forms of separation and in the context of the introduction of the VREMs leading to retail competition in the future, starting the process of setting up and operating separate businesses (even if they are not legally separate) at this stage is likely to be beneficial over time.

5.6.2 PC Subsidiaries

Each of the PCs is legally and structurally complex with a large number of subsidiary companies sometimes using different types of companies and including some where there is only partial ownership.

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(although this often exceeds 50%). As previously mentioned, many of the subsidiaries are Provincial or District Power Companies.

However despite this, it is noticeable that these Provincial or District Power Companies have limited decision making powers and follow the policies and requirements of the PC. Similarly the budgets and plans of these subsidiaries are subject to PC approval. In fact, even the PCs appear to be extremely dependent for policies, decisions, processes, systems and future development on EVN – which is the ultimate owner. Despite the large number of companies and subsidiaries the overall impression is of a very centrally driven and controlled industry. If the policy intention is to develop the industry so that it is competitive and liberal and encourages new entrants and investment then it will be vital that further power and responsibility is delegated to other industry parties such as the PCs. This will have a very large impact on them.

The nature of the Provincial and District Power Companies raises questions about how business separation should be introduced into the PCs whilst ensuring that overall efficiency is maintained. If each of these is to be a fully functioning separate business then this could be costly. Whilst this aspect must start to be addressed now it will be more sharply brought into focus by the implementation of the VREM when retail competition becomes far more prevalent. However greater clarity at this stage will reduce the risk of making changes that may subsequently need to be amended, or developing IT systems that will become stranded. As part of these changes consideration may need to be given to major internal restructuring within the PCs including an examination of the PC and Provincial or District Power Company structure.

In order to obtain efficiency advantages and to maintain economies of scale there may be benefits in adopting a more functionally based rather than geographically based overall organisational structure. One option would be to reorganise a PC and all of its subsidiaries into a holding company with three or four subsidiaries – retail, distribution, meter data management and possibly generation in some cases. Corporate functions and some shared services would be located within the holding company whilst each of the subsidiaries would take responsibility for its business. Within each business, activities would be organised on a functional basis - such as, for example, distribution operation and maintenance activities previously undertaken within provincial companies would be managed by a single management unit wherever such activities were located in a PC’s area. Changes of this magnitude are likely to be time consuming to implement and it may be that this should be staged so that the overall timetable of the VWEM implementation may be achieved.

5.6.3 Functional Separation

The existing organisational structures of the PCs have been briefly summarised in the first paragraph of Section 5.6.1 above and described in more detail in preceding sections. The legislation and other documents listed in Section 1.3 require some level of separation and ring fencing between the various parties that are defined in the draft VWEM market rules. However the detailed steps for implementing this in the PCs have not been formally defined. Nevertheless it seems clear that the internal organisation and operation of the PCs will be different in the VWEM than was previously the case, as they move to become wholly business separated organisations.

The legislation and supporting documentation broadly require that the functional structure of the PCs after the implementation of the VWEM should resemble that illustrated as part of Figure 12 in Section 6.2 of this report. This shows three entities within the PCs as follows:

- **Retailer Units** - Retailer Units within PCs are set up as separate entities that are commercially responsible for electricity purchases from the spot market and negotiation, entering into and managing a portfolio of bilateral contracts with the generators, generator traders or both. Some level of separation will need to be in place to keep the commercial activities of the retailers separate from the service provider roles that PCs will take (distribution – EDSP and MDMSP).
- **Distribution Units** - Distribution Units are within PCs. The name of the entity under the VWEM rules undertaking this function is the EDSP. In this report distribution unit, distributer, electricity distributer service provider, DSP and EDSP are used interchangeably and all mean the same unit. As a service provider entity, the EDSPs under the VWEM must not have any involvement in commercial activities – i.e. such units can have no involvement in the buying and selling of electricity. EDSP functions should be separated from the other functions that the PC takes on. Many of the core engineering functions of the EDSP will be relatively simple to separate from retailing activities although there will be some aspects where it is more difficult in particular where the VWEM places some obligations on the EDSP.

- **Meter Data Management Units** - The MDMSP type of organisation is defined in the VWEM design and rules. Essentially, the MDMSP unit within the PCs must undertake the collection of meter data for the meters for which the PC is responsible and provides such data to a centralised MDMSP which manages all the metering data that the SMO requires in order to compute settlements. Note that MDMSP is a role that the EDSP can take, but it has been assumed in this report that the functions implemented by the MDMSP are separate from those of the EDSP. In relation to MDMSP entities in the PCs, their responsibility in the VWEM would be to collect and manage the PCs metering data, supplying it, as appropriate to the PCs retailer entity and to the central MDMSP so that market settlements can be computed. As both MDMSP and the EDSP entities are service providers it should be recognised that these must be independent from commercial activities in the VWEM (such as retailing or generation) to avoid conflicts of interest. For the avoidance of doubt, it is noted that until such time as the VREM is implemented, the MDMSP will not have responsibilities for meter data management relating to retail customers. Meter data management services for retail customers will continue to be provided by the distribution service provider of each PC directly, rather than through the MDMSP function.

5.6.4 Ring Fencing Requirements for PCs in the VWEM

In addition to the functional structure that was described in the previous section, there are a number of ring-fencing requirements that have been specified for the three entities that would be functionally separated under the PCs. This adds additional requirements and structure around the functional separation. This section summarises proposed ring-fencing arrangements for each of the three entities within the PCs.

**Ring Fencing between Retailers and EDSPs**

The VWEM detailed design proposes that to ensure adequate competition in generation and retailing in the long term for the VWEM, the PCs should be allowed to retain both the retail function (retail business) and the distribution function (distribution service provider) provided they are suitably ring fenced.

For the VWEM the retail functions for PCs will not need to be fully separated out of the PCs (which, if implemented to the fullest extent, would imply separate ultimate ownership). The retailing function only needs to be fully ring fenced from the PCs’ distribution functions. This could be defined as requiring at least some of the provisions listed below.

In the longer term, the ring fencing of retailing and distribution functions and costs will require:

- Accounting separation and reporting of the two functions;
- Clear allocation of costs to the distribution, retailing and other functions such as MDMSP;
- Limitations on the flow of information between the ring fenced areas;
• Physical, staffing and functional separation between the ring fenced areas;

• Non-discrimination of distribution services for customers being served by the PCs own retailer or another retailer; and

• Processes be put in place for compliance and reporting.

**Ring Fencing Requirements for MDMSPs**

The VWEM detailed design also provides ring-fencing requirements for the MDMSPs. The MDMSP activities of each of the PCs should be ring fenced from the retail and EDSP activities of the PCs (and indeed those of any other industry participant) and be independent of any generation. The ring fencing of MDMSP entities will need to adhere to the following guidelines:

• Accounting separation and reporting of the MDMSP function;

• Reasonable allocation of costs between the distribution, retailing, MDMSP and other functions;

• Limitations on the flow of information between the ring fenced areas;

• Physical, staffing and functional separation between the ring fenced areas; and

• Processes put in place for compliance and reporting.

**5.6.5 Competition Issues**

In the VWEM, suitably licenced retailers can compete for eligible customers alongside the PCs. Some PCs have suggested that it may be difficult for them to compete because of the regulatory requirements that they have to comply with as a regulated business, and the obligations placed on the company to supply customers that are expensive to service, for example those in remote locations.

It is important that the regulatory requirements on all retailers competing to supply customers who are permitted to change their supplier are broadly aligned. This means that PCs should not be required to provide a different level of service to such customers from their competitors and should not need to charge them more than costs reflective costs in order to cross subsidise other customers who are expensive to service.

Regarding transmission and distribution business costs all retailers (PC’s and others) should be charged the same use of system charges for supplying the same customer. Hence even if such charges were not cost reflective all retailers would face the same costs. Thus, important initial steps for the introduction of retail competition are the accounting separation of the businesses (distribution, MDMSP and retail for the PCs) and the use of these distribution – and relevant transmission - separated costs for the setting of use of system charges.

One further issue is that non-PC retailers may be concerned that retail costs that should be charged to customers in the competitive sector are recovered elsewhere – i.e. from the monopoly distribution business or from retail customers that cannot be competed for (during VWEM, the vast majority). This, again, supports the early introduction of accounting separation between distribution and retail and clear legal and regulatory requirements on PCs that their retail charges should be cost reflective other than in circumstances publicly approved by the regulator.

It is appreciated that from a public policy viewpoint there may still be a need for some cross subsidies to exist within the retail sector (although whether this is required for the large transmission and 110 kV connected customers who, it is understood, are the only retail customers who are eligible for competition
at the VWEM stage is more questionable). Three possible ways that this could be addressed are as follows:

1. The additional costs of expensive-to-service customers could be shared only among other customers who are not subject to competition.
2. The additional costs could be met by a levy on all retailers depending on their share of the market and shared appropriately.
3. Direct Government subsidy.

5.6.6 Generation

It is noted that some of the PCs have ownership (usually not 100%) of generation plant. These are in separate companies within the PC group but it will be important to ensure that distribution and generation interests are managed at arm’s-length, i.e. separate board membership (e.g. within a PC no member of the board of a generation company should have responsibility for the distribution or meter data management functions) and management teams. Also, interactions between generation and distribution should be contractually based and there should be no difference between those cases where the PC is a part owner and where there is no PC ownership at all.

For the avoidance of doubt, these principles should also apply in situations where the PC owns 100% of a generating business (e.g. the Suoi Vang and Loc Phat power plants belonging to SPC).

5.7 Transition Path for PCs

Whilst Section 5.5 outlines an approach to functional business separation and to the requirements of ring fencing referring to certain activities as being independent there is limited coverage of what this means in practice. This is examined in more detail in this section and in Section 6 and 7.

The planned main stages of the VWEM development are a pilot period from 2017 to 2018, VWEM 2019 in 2019; and Long Term (LT) VWEM in 2020.

During these periods, it is anticipated that the PCs will undergo changes in organisation and operations to meet business separation, ring fencing and independence requirements. Such changes will facilitate adherence to the VWEM market rules but must also be achievable and proportionate to the circumstances being addressed. The main development stages are summarised in Table 7, which has been extracted from the updated version of this project’s Task 3.3 report. It should be noted that these are the Consultant’s suggested changes and subject to further discussion, revision and approval.

Further detail on this approach is provided in Section 6 and in Section 7.
Table 7: Possible VWEM Development Path

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<tbody>
<tr>
<td><strong>PC Retailer organisational changes</strong></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• PCs should form an internal unit that would take the retailer function and where necessary duplicate any functions that cannot be “shared” under the ring-fencing requirements.</td>
<td></td>
<td>The PC Retailer units should be operating according to the VWEM rules with ring-fencing in place to ensure independent operation.</td>
<td>There should be little change to Retailers in this phase.</td>
<td>Perhaps longer-term full legal separation.</td>
</tr>
<tr>
<td></td>
<td>• This unit should be separated from other EDSP and MDMSP units at the PC.</td>
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<tr>
<td></td>
<td>• Ring-fencing requirements of the VWEM should be in place before VWEM 2019 starts.</td>
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<tr>
<td><strong>EDSP organisational changes</strong></td>
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<td></td>
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<tr>
<td></td>
<td>• PCs should form an internal unit that would take the EDSP function and where necessary duplicate any functions that cannot be “shared” under the ring-fencing requirements.</td>
<td></td>
<td>The EDSP units should be operating according to the VWEM rules with ring-fencing in place to ensure independent operation.</td>
<td>There should be little change to EDSPs in this phase.</td>
<td>Perhaps longer-term full legal separation.</td>
</tr>
<tr>
<td></td>
<td>• This unit should be separated from other retailing units at EDSP.</td>
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<tr>
<td></td>
<td>• Ring-fencing provisions should be phased in to ensure EDSPs operate independently.</td>
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<tr>
<td><strong>MDMSP organisational changes</strong></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• PCs MDMSPs units identified &amp; implementation started.</td>
<td>• PCs MDMSPs infrastructure in place.</td>
<td>PC MDMSPs operate according to the VWEM rules with ring-fencing in place to ensure independent operation.</td>
<td>There should be little change to MDMSPs for this phase.</td>
<td>Perhaps longer-term consolidation of the different MDMSPs.</td>
</tr>
</tbody>
</table>
6 PCs: VWEM Preparations – Key issues

6.1 Introduction

This section reviews changes that will be required by the PCs as a result of the VWEM in respect of their charters and objectives, business registration, legal status, functions, business model, financing, budgeting, information and communication technology (ICT – although this is mainly dealt with in the Task 3 reports), retrenchment and training requirements. Comments on action plans and costs are also provided.

Initially the main responsibilities of the PCs in the VWEM are examined and then the additional tasks are identified that will be required to be undertaken by them as retailers/suppliers, distribution service providers, meter data management service providers and in other roles. Next, the overall implications for PCs in general for each of the topic areas mentioned in the previous section are examined.

6.2 Responsibilities of the PCs in the VWEM - General

In an earlier Ricardo Energy & Environment report developed under this project (Task 2.1: Report on assessment of the Draft VWEM Design, Market Rules and Legal and Regulatory Framework) the various roles that the PCs are required to fulfil in the VWEM are shown, together with the resulting detailed requirements on a function by function basis.

These roles include being the buyer of electricity from generators and the seller to end-use customers. In principle, the Prime Minister’s Decision 63/2013/QD-TTg states that “Power Corporations (…) are eligible to buy power from generators, wholesale electricity sellers through bilateral contracts and from the spot market”. Power Corporations, “besides of rights and obligations of a distributor and retailer (…), are requested to execute rights and obligations of a wholesale seller”. There is uncertainty surrounding the definition of the wholesale seller role, and hence the practical implications of how this role would be implemented are not given further consideration in this Report.

The main responsibilities of PCs in the VWEM are summarised below, structured into the relevant separate businesses that are likely to be established (See Section 5) in due course:

Retail/Supply

- Spot Market Participant;
- Buyer through negotiated bilateral and allocated vesting contracts;
- Retailer of Electricity to Customers;
- Participant in Contract Auctions;
- Become Ancillary Services Provider (e.g. by providing interruptible load, subject for example to tariff schemes compensating customers accepting a higher level of flexibility);
- Engage in low-voltage International Trading activities (as a buyer or a seller).

Distribution

- Distribution Operator;
- Owner of Distribution Assets and in charge of Distribution Network Expansion.

**Meter Data Management Service Provider** (Note that this can also be regarded as part of Distribution)

- Remote and manual meter reading and verification.

Historically the PCs have developed organisational structures that combine these functions and the supporting business processes and IT systems have not recognised any such organisational boundaries. This is applicable to the PCs and to their subsidiary provincial and district power companies. As previously mentioned, through the VWEM (and more significantly through the VREM) there will need to be increasing operational - and possibly legal - separation between these functions (or businesses).

Table 8 below provides a brief description of these functions in the context of the roles that they are undertaking in the VWEM.

**Table 8: VWEM – PCs’ role and functions**

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Retailers</strong></td>
<td>PC retailers will be set up as separate entities that are commercially responsible for electricity purchases from the spot market and for the negotiation, agreement and management of a portfolio of bilateral contracts with generators and possibly traders. Hence, the business process and ICT system requirements for retailers are likely to be similar to those of retailers that operate in other wholesale electricity markets that are of similar design to the VWEM. There will need to be some separation to keep the commercial activities of the retailers separate from the service provider roles that PCs also provided (as distribution - electricity distribution service provider - and as the meter data management service provider).</td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>As service provider entities, the distributors or electricity distribution service provider must not have involvement in the buying and selling of electricity. The distribution activities will need to be separated from the other functions that the PC undertakes. The business process and ICT system requirements for this will therefore be based on those of typical distribution utilities or distribution network service provider from other markets. However, the VWEM places some obligation on distributors which will need to be planned for and provided.</td>
</tr>
<tr>
<td><strong>Meter Data management</strong></td>
<td>The MDMSP entity is defined in the VWEM design and rules. Essentially MDMSPs within the PCs are responsible for the provision of meter data to the SMO. The SMO in turn also adopts an MDMSP. Note that MDMSP is a role that the EDSP could undertake but it is also important to consider the implications of the role being undertaken separately from that of the distributor but still within the PC.</td>
</tr>
</tbody>
</table>

The descriptions and assumptions summarised in Table 8 are illustrated in Figure 12 below in comparison with the pre-VWEM position.
The VWEM structure shown in Figure 12 is the one that is assumed for recommendations for the PCs in this report.

Sections 6.3, 6.4, 6.5, and 6.6 below provide a summary of the functions that each of these businesses will need to undertake in the VWEM.

### 6.3 Responsibilities of the PCs in the VWEM for Retail/Supply

Table 9 provides a list of the responsibilities of the PCs in the VWEM for retail/supply.

#### Table 9: List of Responsibilities of the PCs in the VWEM for Retail/Supply

<table>
<thead>
<tr>
<th>List of Responsibilities of PCs in the VWEM for Retail/Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration as Market Customer</td>
</tr>
<tr>
<td>Spot Market Trading</td>
</tr>
<tr>
<td>Bilateral Trading – termed contracts</td>
</tr>
<tr>
<td>Bilateral Trading - Vesting Contracts</td>
</tr>
<tr>
<td>Bilateral Trading - Contract Auction</td>
</tr>
<tr>
<td>Bilateral Trading - Settlement</td>
</tr>
</tbody>
</table>

Table 10 below is based on material the previous report produced for Task 3.3 and is used to provide a more detailed description of these responsibilities.
Table 10: Detailed responsibilities of the PCs in the VWEM - Retail/Supply

<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities/Obligations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration as Market Customer</td>
<td>The PC, as a retailer, must register as a Market Customer</td>
</tr>
<tr>
<td></td>
<td>• In order to do this the PC must:</td>
</tr>
<tr>
<td></td>
<td>   o Nominate a contact person who will be responsible for the Market Customer’s trading in the VWEM;</td>
</tr>
<tr>
<td></td>
<td>   o Specify all the connection points for which it will be responsible for the loads in the VWEM spot market;</td>
</tr>
<tr>
<td></td>
<td>   o Satisfy the SMO that each connection point has appropriate metering that satisfies the Grid Code and Metering Code and for each of the connection points the meter or meters have been registered by the SMO;</td>
</tr>
<tr>
<td></td>
<td>   o Satisfy the communication and market system requirements set out in the VWEM Rules, including having appropriate market systems for settlements, accessing and interrogating metering data and accessing market information;</td>
</tr>
<tr>
<td></td>
<td>   o Satisfy the criteria for being a VWEM participant including any updated prudential requirements due to its registration as a Market Customer.</td>
</tr>
<tr>
<td></td>
<td>• A Market Customer must register each of the customer facilities that it is responsible for in the VWEM, including all the distribution connection points to the transmission system that it is responsible for in the VWEM. To register a Customer Facility, the Market Customer must satisfy the SMO that the Customer Facility and its connection point comply with the relevant technical requirements set out in the Grid Code, VWEM Rules, Distribution Code and Metering Code, including but not limited to the following:</td>
</tr>
<tr>
<td></td>
<td>   o The SMO has been provided the relevant electrical diagrams and technical specifications of the Customer Facility and connection point as required by Chapter 5 of the Grid Code;</td>
</tr>
<tr>
<td></td>
<td>   o Connected equipment must be equipped with circuit breakers and associated protection and control systems that satisfy the requirements of the Grid Code;</td>
</tr>
<tr>
<td></td>
<td>   o The Customer Facility satisfies the SCADA and communication capabilities requirements of the Grid Code;</td>
</tr>
<tr>
<td></td>
<td>   o The connection point has appropriate metering that satisfies the Grid Code and Metering Code and the meter or meters have been registered by the SMO.</td>
</tr>
<tr>
<td>From these provisions, it will clearly be important to define the extent of each PCs physical systems accurately, as part of the process of registering them in the market.</td>
<td></td>
</tr>
<tr>
<td>Organisationally, the PC will need to set up resources both to make the initial registration and also to ensure that the requirements for such registration continue to be met.</td>
<td></td>
</tr>
</tbody>
</table>
Spot Market Trading

The PC, as a retailer, must be able to undertake spot market trading. This will involve trading between electricity sellers (likely to be generators and possibly traders) and electricity buyers (mainly retailers) via the SMO. Electricity buyers must provide some form of payment guarantee in order to participate in the spot market. Should a buyer not make the payments under the rules of the spot market, then the SMO will utilise the funds from this guarantee to make payments in accordance with the VWEM Rules. Market Customers must make bids for individual dispatchable loads. Each PC will need to ensure that it has the required capability internally to organise spot market trading including staff resources, organisation, business processes and ICT systems. Also the necessary measures to enable trading of dispatchable load must also be put in place.

Bilateral Trading – termed contracts

The retail function of the PC must also be able to undertake bilateral trading using termed contracts:

- Bilateral contracts involve buyers and sellers negotiating and agreeing on strike prices and contract quantities and enter into a bilateral contract for difference (CfD). This would be required from the introduction of the full VWEM.

- Termed contracts on electricity purchase and sale must be made in writing and contain the following contents: Contractual parties; Use purpose; Service standards and quality; Rights and obligations of the parties; Electricity prices, payment modes and time; Conditions for contract termination; Liabilities for contractual breaches; The contractual term; Other contents agreed upon by the two parties.

Each PC will require a business unit with the skills necessary to take responsible for contract negotiations. This will represent a significant step change in the level of commercial competence of the PCs.

Bilateral Trading - Vesting Contracts

The PC will also be required to manage bilateral vesting contracts:

- Vesting contracts will be used to allocate the existing CfD contracts portfolio (which are between generators and EVN/EPTC) to PCs based on the following principles:
  - The average contract purchasing cost of a PC is similar to other PCs.
  - The strike price and contract quantities match the forecast load profile of the PCs customers and comply with the constraints specified in the generator’s contract.
  - The commitments specified in the contract between the generator and EVN/EPTC are maintained.
  - The allocation will become effective from the introduction of the full VWEM.

PCs will be responsible for monitoring the performance of the vesting contracts, meeting their commitments under these contracts, and optimising the procurement of energy to complement the quantities purchased under the vesting contracts. Appropriate arrangements must be made by the PC to enable this.
| **Bilateral Trading - Contract Auction** | Retailers must be able to participate in contract auctions:
- There will be a centralised contract auction with participants offering for sale or bidding to buy an amount of contract quantity on a centralised exchange in accordance with the VWEM Rules. This contract auction is designed to deal with the difference between retailers’ contract quantities and their actual demand or availability.
- The trading of contracts will be a new area of work for the PCs and will require specialised skills to be developed within the energy purchasing function. |
| **Bilateral Trading - Settlement** | The PCs retail function must be able to settle the payments that are associated with their contract portfolio.
- The buyer and seller will directly manage payments in accordance with the specification in their contract.
- Financial settlement of contracts is part of the work currently undertaken by the PCs, although this role generally takes the form of checking the settlement calculations performed by EPTC. This will become of much greater importance and significance in the future and it should be expected that the PCs increase their focus on this role, as the number of contracts being settled increases. |
| **Retailing – Rights and Duties** | The PCs will have both the right and duty as retailers to conduct electricity retailing activities according to their electricity activity licences including the obligation to sell electricity strictly according to the volume, quality and at prices agreed upon in contracts.
The fundamental role of electricity selling will be core to the Retail Business of each PC. |
| **Retail – Licence obligations** | Retailers must adhere to various licensing requirements
- Organisations and individuals registering for activity in the electricity sector must satisfy the following conditions:
  - Persons directly involved in electricity retail must have intermediate diplomas or higher in electricity, economic, financial or similar branches and worked in the field of electricity trading for at least five years.
  - Persons directly involved in operations must be trained in electricity or possess certificate of training in electricity granted by vocational establishments, trained in electricity safety as prescribed.
  - Must have a suitable information technology infrastructure in line with requirements of electricity market.
- Organisations and individuals granted electricity activity licences must:
  - Pay fees for the grant of electricity activity licences;
  - Submit fees for the appraisal of applications for electricity activity licences.
The regulatory compliance of the PCs Retail Business should be ensured by a unit that is sufficiently independent of that function to avoid conflicts of interest. |
Retailers must be able to set retail tariffs:

- Retailers have a range of obligations including:
  - to determine electricity prices based on the average electricity retail price framework, the price adjustment mechanism and the electricity retail price table structure set by the Prime Minister;
  - to formulate and submit to the provincial-level People's Committees for approval the retail electricity prices for rural areas, mountainous regions, and islands, where the electricity production and supply costs under the market mechanism cannot offset the expenditures incurred by retailers;
  - to display at their offices and payment locations the approved electricity price tables; documents explaining the procedures for electricity supply, measurement, metering, invoicing, electricity charges collection and termination of electricity services; licence contents and technical criteria applicable to licenced retailers; information on new connections to the electric system; regulations on electricity supply cessation or reduction.

- Understand cross-subsidy arrangements between PCs:
  - The scope of cross-subsidy is to adjust for the differences in distribution cost and the PCs' retail customer mix.
  - EVN is responsible for the implementation of the cross-subsidisation arrangements between PCs in accordance with Government regulations.

The role of the Minister and EVN in defining electricity tariffs will pose a constraint on the PCs' ability to balance receipts from electricity sales with the costs of purchases in the VWEM. The commercial function within the PCs will therefore have to analyse carefully the way in which costs of contracts with generators are negotiated and the degree of exposure they risk in the spot market, to ensure that the financial viability of the PCs is maintained.

Further consideration will need to be given to this for the VREM implementation perhaps limiting cross subsidisation arrangements to network charges.
The retailer must settle its contracts:

- The retailer, as an electricity buyer, must pay fully and on time the payments due to electricity sellers. These sums due shall be paid at the headquarters of the electricity buyers or as agreed in the electricity purchase and sale contracts.

- Electricity buyers must pay interest on any on the late payments to electricity sellers.

- Electricity sellers that receive excess revenue must reimburse this to the electricity buyers plus appropriate interest.

- Interest payable on late payments or excess revenue should be agreed by the parties in the contracts. However, this must not exceed the highest lending interest rates of the banks where the electricity sellers hold their accounts.

- Electricity buyers may request the electricity sellers to check invoices submitted for electricity sales within fifteen days. Where buyers continue to disagree with invoices submitted by electricity sellers, they may suggest a conciliation process, or initiate lawsuits at courts according to the law provisions on civil procedures. Pending settlement, electricity buyers pay the invoice and electricity sellers must not cease to provide an electricity supply.

- Where electricity buyers do not pay the sums due even though they have been twice notified of the payment by the electricity sellers, fifteen days after the first notification, the electricity sellers may stop supplying the electricity. The electricity sellers must notify the time for stopping the electricity supply to the electricity buyers 24 hours in advance and will not be responsible for the damage caused by the electricity supply stoppage.

- Invoices are based on cyclic meter readings. The form for notification of electricity charge payments should be agreed by the parties in the contract for electricity purchase and sale.

- Payment of electricity accounts is to be encouraged via the bank system, at locations collecting electricity charges of the electricity seller.

- Agencies and organisations competent to organise conciliation on disputes on payment of electricity charge are the provincial Departments of Industry and Trade or other agencies or organisations as agreed upon by the two parties.

The arrangements outlined above reflect the current principles of financial settlement in the market detailed in the Electricity Law. However these will need to be developed by the PCs in line with the settlement procedures defined in the Electricity Law. This will require a more extensive set of processes and procedures than currently exists for PCs participating in the VCGM.
Retail - safety

Retailers must advise customers on electricity safety.

It is important to note that the responsibility for advising consumers on electricity safety is defined in the Electricity Law as an obligation of the retailer, rather than the distribution service provider. In the business separation process it will be important to ensure that the part of the retail business responsible for customer relations has sufficient technical knowledge and adequately close links with the Distribution Business to be able to obtain the information needed regarding electricity safety to advise customers.

Retail - reporting

Retailers must provide information on retailed electricity volumes to competent state bodies, if required.

Further definition of regulatory reporting requirements will be needed for both the PCs’ distribution service provider and retail businesses. Such reporting will certainly be required although there will be significant differences between them.

Wholesaling

As previously mentioned, in view of the uncertainty regarding the approach to wholesaling and its linkage to retail this has not been further examined.

### 6.4 Responsibilities of the PCs in the VWEM for Distribution

Table 11 provides a list of the responsibilities of the PCs in the VWEM for distribution.

#### Table 11: List of Responsibilities of the PCs in the VWEM for Distribution

<table>
<thead>
<tr>
<th>List of Responsibilities of PCs in the VWEM for Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence Compliance</td>
</tr>
<tr>
<td>Network Expansion Planning</td>
</tr>
<tr>
<td>Quality of Supply</td>
</tr>
<tr>
<td>Interruption/Reduction of Power Supply</td>
</tr>
<tr>
<td>Operation</td>
</tr>
<tr>
<td>Planning and Forecasting</td>
</tr>
</tbody>
</table>

Table 12 below is based on material contained in the first report produced for Task 2 and is used to provide a more detailed description of these responsibilities. These have been identified from an assessment of the following electricity sector regulatory documents:

- Vietnam Electricity Law and Amendments;
- AD-VEL: Decree 137/2013/ND-CP- Implementation of a number of articles of the Electricity Law;
- PMD: The Prime Minister’s Decision 63/2013/QD-TTg on the Roadmap and Conditions to establish and develop the levels of the power market in Vietnam;

as well as the Market Rules and Detailed Market Design for the VWEM.
### Table 12: Detailed responsibilities of the PCs in the VWEM - Distribution

<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities/Obligations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence Compliance</td>
<td>PCs as distribution service providers must continue to be appropriately licenced.</td>
</tr>
<tr>
<td></td>
<td>• PCs as distribution service providers must, among other things, satisfy the following conditions:</td>
</tr>
<tr>
<td></td>
<td>o Have the technological equipment, means, workshops and buildings (which have been built, installed and tested to meet prescribed need) to meet the requirements of operating, maintaining, and repairing the distribution power grid, substations and synchronous devices attached to it including systems of fire prevention and fighting;</td>
</tr>
<tr>
<td></td>
<td>o Persons directly involved in the technical management and operation of the distribution system must have university diplomas in electrical engineering and have worked in the field of electricity distribution for at least five years. Persons directly involved in operations must generally be trained in electricity or possess certificate of training in electricity granted by vocational establishments, and have been tested in operational processes and safety regulations;</td>
</tr>
<tr>
<td></td>
<td>o For organisations and individuals involved in electricity distribution in rural areas persons directly involved in its technical management and operation must be trained in electricity and have worked on power grids for at least three years. Persons directly involved in electricity operation and repair must be trained in electricity or possess certificate of training in electricity granted by vocational establishments, and re-trained and tested on electricity safety and granted a card of electricity safety.</td>
</tr>
<tr>
<td>Category</td>
<td>Responsibilities/Obligations</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Licence Compliance (contd.)</td>
<td>• Each of the Electricity Transmission Service Providers (ETSPs) and Electricity Distribution Service Providers (EDSPs) must register with the SMO as a Network Service Provider.</td>
</tr>
<tr>
<td></td>
<td>o Network service providers can be registered as an ETSP or an EDSP.</td>
</tr>
<tr>
<td></td>
<td>o To register as a Network Service Provider, the EDSP must:</td>
</tr>
<tr>
<td></td>
<td>o Satisfy the relevant technical requirements set out in the Grid Code, VWEM Rules, Distribution Code and Metering Code;</td>
</tr>
<tr>
<td></td>
<td>o Satisfy the communication, control system and market system requirements set out in the VWEM Rules and Grid Code; and</td>
</tr>
<tr>
<td></td>
<td>o Satisfy the criteria for being a VWEM participant.</td>
</tr>
</tbody>
</table>

Ensuring ongoing compliance with the requirements of electricity licences is an important function, and the PCs will need to ensure that they have an appropriate regulatory affairs unit (or depending on the level of business separation, units) focused on ensuring ongoing compliance.
<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities/Obligations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Expansion Planning</td>
<td>As a distribution service provider the PC must fulfil certain obligations, as follows:</td>
</tr>
<tr>
<td></td>
<td>• EDSPs (along with units engaged in electricity generation and transmission) must invest in the construction of sub-stations, meters and lines connecting to off-take meters;</td>
</tr>
<tr>
<td></td>
<td>• EDSPs (as well as other organisations or individuals that build, renovate, or expand electricity works must use modern technical equipment and technologies suitable to the technical standards, sector standards, as well as Vietnamese standards set by authorised state bodies; and</td>
</tr>
<tr>
<td></td>
<td>• EDSPs shall has the obligation, among others to prepare plans for investment in the development of the electricity distribution grids and to subsequently make such investments to meet the electricity demands under electricity development plan and to invest in meters and transmission lines to meters for electricity buyers, unless otherwise agreed with the electricity buyers.</td>
</tr>
<tr>
<td></td>
<td>• The development of network expansion plans is part of the current core business of the PCs, and this will continue to be a key responsibility of the distribution business in each PC in the future.</td>
</tr>
<tr>
<td>Category</td>
<td>Responsibilities/Obligations</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Quality of Supply</td>
<td>Further obligations of the EDSPs are:</td>
</tr>
<tr>
<td></td>
<td>• To ensure the:</td>
</tr>
<tr>
<td></td>
<td>o Safe, stable and reliable operation of the electricity grids and electricity distribution equipment; and</td>
</tr>
<tr>
<td></td>
<td>o The provision of electricity distribution services for electricity customers, electricity retailing units, electricity wholesaling units are</td>
</tr>
<tr>
<td></td>
<td>up to the technical standard, service quality and safety required under relevant contracts, except where the electricity distribution grids</td>
</tr>
<tr>
<td></td>
<td>have been certified as overloaded by the electricity regulator.</td>
</tr>
<tr>
<td></td>
<td>• To ensure the:</td>
</tr>
<tr>
<td></td>
<td>o Compatibility of voltages and electric current frequencies with Vietnamese standards; and</td>
</tr>
<tr>
<td></td>
<td>o The contractual electricity output, electric power and electricity supply duration.</td>
</tr>
<tr>
<td></td>
<td>Where there are failures to ensure the standards of voltage, electric current frequency, output, electric power and electricity supply duration in</td>
</tr>
<tr>
<td></td>
<td>accordance with signed contracts, resulting in damage to the electricity buyers, the electricity sellers must pay compensations to the electricity</td>
</tr>
<tr>
<td></td>
<td>buyers according to law provisions. This may result in further obligations on the EDSP.</td>
</tr>
<tr>
<td></td>
<td>Responsibility for maintaining technical quality of supply is a core distribution function and is a requirement that will remain with the distribution</td>
</tr>
<tr>
<td></td>
<td>businesses of the PCs.</td>
</tr>
</tbody>
</table>
### Interruption/Reduction of Power Supply

<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities/Obligations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCs, as EDSPs, will continue to have responsibility for managing supply interruptions:</td>
</tr>
<tr>
<td></td>
<td>• The obligations of the EDSPs includes to handle electricity incidents. In the case of danger threatening human lives and equipment safety to cease or reduce the electricity distribution if there is no other alternative; to restore electricity supply within two hours from the detection of incidents or receipt of reports from the electricity buyers; in cases where the EDSP is unable to fulfil supply restoration within the above time limit, to immediately notify the electricity buyers of the causes and the estimated time for electricity supply resumption.</td>
</tr>
<tr>
<td></td>
<td>• In the case of non-urgent cessation or reduction of electricity supply, except in circumstances relating to the non-payment of electricity bills, the electricity sellers must notify the electricity buyers at least five days before the time of electricity supply cessation or reduction by announcement in the media or in other forms of information.</td>
</tr>
<tr>
<td></td>
<td>• In the case of urgent cessation or reduction of the electricity supply due to incidents or force majeure events, which are beyond the electricity sellers' control and threaten to cause safety issues to people or equipment or are due to electricity shortage which threatens the integrity of the electricity system, the EDSP (or electricity generating or transmitting unit) may cease or reduce the electricity supply to the electricity buyers but must within 24 hours notify the electricity buyers of the causes and the estimated time for resumption of electricity supply.</td>
</tr>
<tr>
<td></td>
<td>• In cases where the electricity buyers fail to comply with various legal provisions electricity sellers may cease to provide the electricity supply to the electricity buyers.</td>
</tr>
</tbody>
</table>

The provisions of the Electricity Law in relation to the curtailment of electricity suppliers are worded in relation to electricity sellers and buyers. In the VWEM, the PCs are the buyers of electricity acquired from generators or wholesalers. Clarification is required however as to whether the provisions of these aspects of the electricity law extend to the rights of the PCs’ retail businesses to request the PCs’ distribution businesses to disconnect customers for non-payment of bills. This process would require close interaction between the EDSP of the PC and the retail business.
<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities/Obligations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>EDSPs have the obligation to implement the national target programmes on management of electricity demands; abide by the operation modes, commanding orders and direction by the national electricity operator.</td>
</tr>
</tbody>
</table>
| Planning and Forecasting | • Each Market Participant must undertake their own planning of outages of their facilities in coordination with the SMO. The Market Participant has the right to determine the timing of an outage unless there is a system security or reliability issue identified by the SMO.  
• Retailers must inform the SMO about material changes in future loads.  
Interaction will be needed between the planning function of the retail business and the distribution business to ensure that load projections are correctly incorporated into network plans. |
| Reporting           | Among the EDSP’s obligations are to report on operational readiness, the reserve capacity of electricity grids and electricity distributing equipment, and electricity demand when requested by various competent industry and State bodies. |
| Safety              | The PC, as a EDSP, must adhere to a range of safety requirements.                                                                                                                                                               |
| Metering            | (See Section 6.5)                                                                                                                                                                                                                                                                      |
| General             | The EDSP has a number of rights including that of proposing amendments or supplement to regulations, standards, and techno-economic norms for the delivery of distribution services to competent state agencies.                                |

### 6.5 Responsibilities of the PCs in the VWEM for Metering

Table 13 provides a list of the detailed responsibilities of the PCs in the VWEM for metering.

**Table 13: Detailed responsibilities of the PCs in the VWEM - Metering**

<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities/Obligations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metering</td>
<td>• EDSPs (along with electricity generators and transmission and units) are required to invest in and install all electricity metering equipment as well as auxiliary equipment for electricity metering, except as otherwise agreed by the parties but complying with the relevant legal regulation.</td>
</tr>
</tbody>
</table>
The meter must ensure that the technical measurement requirements are met and be tested and calibrated as prescribed by the law on measurement.

Electricity meters must be installed in areas under the electricity buyers' management, except as otherwise agreed by the parties but complying with the relevant legal regulation. The installation positions and installation of meters must ensure safety, amenity and convenience for electricity buyers to check the meter readings and the electricity sellers must record the meter readings.

Electricity buyers must protect the meters installed in areas under their management and promptly notify the electricity sellers of the loss or damage of meters. The electricity sellers shall have to protect meters installed outside areas under the electricity buyers' management.

The requirements for metering, in common with the registration requirements, require a clear definition of the boundary points of each PCs supply responsibility and confirmation of the metering points at these locations.

In addition to the above, each PC will have the responsibility of creating an MDMSP within its Distribution business. The Detailed Design of the VWEM defines the role of the MDMSP as follows:

“Meter Data Management Service Providers (MDMSPs) will be responsible for the collection of metering data from each metering installation for which it is responsible, the processing of that data and the reliable delivery of the processed data to the SMO’s metering database and to parties entitled to that data such as the market participant, SMO, ETSP, EDSP, MDMSP and ERAV. The MDMSP is responsible for maintaining the accuracy of metering data during the process of data collection, transfer and management.”

As a general operating practice, the different parties should only be entitled to the level of data that is necessary to enable them to fulfil their obligations. Thus network companies, for example, may need access to maximum demand data and load profiles to enable them to plan and operate their networks adequately. It is likely that ERAV would require information about parties registering meters, together with meter sealing records, in order to ensure that electricity companies are operating in compliance with their licence obligations, the Electricity Law and associated Decrees and Circulars. Retail companies should be entitled to receive meter data relating to their own customers’ energy consumption, however the confidentiality of this data and the integrity of the processes for transmitting confidential data to the permitted recipients will need to be carefully managed.

### 6.6 Other responsibilities of the PCs in the VWEM

Table 14 provides a list of some other responsibilities of the PCs in the VWEM.

**Table 14: Other responsibilities of the PCs in the VWEM**

<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities/Obligations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancillary services provider - Eligibility</td>
<td>Shown below are some responsibilities of the PC if it wishes to operate as an ancillary services provider.</td>
</tr>
<tr>
<td>• An EDSP (as well as generators or customers) that provides ancillary services in the VWEM must register as an ancillary services provider.</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Responsibilities/Obligations</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------</td>
</tr>
</tbody>
</table>
| • To register as an ancillary services provider, the EDSP (or generator or customer) must:  
  o Nominate a contact person who will be responsible for the ancillary service provider’s trading in the VWEM spot market;  
  o Register each of the ancillary service facilities that it plans to operate in the VWEM;  
  o Satisfy the communication and market system requirements set out in the VWEM Rules, Grid Code and the SMO Methodology Document which specifies the detailed registration requirements including having the appropriate market systems so that it can make offers, receive dispatch targets and market information;  
  o Satisfy the criteria for being a VWEM participant including any updated prudential requirements due to its registration as an Ancillary Service Provider.  
| • To register an ancillary service facility, the ancillary service provider must:  
  o Classify each of the ancillary service facilities it owns, operates or controls in terms of what services it can provide:  
    ▪ Frequency control ancillary services (reserves including interruptible loads): Regulating FCAS; Fast contingency FCAS; Slow contingency FCAS; and Delayed contingency FCAS;  
    ▪ Network control ancillary services;  
    ▪ Voltage control;  
    ▪ System restart ancillary services;  
  o Satisfy the SMO that the ancillary service facilities and their connection points comply with the relevant technical requirements set out in the Grid Code, VWEM Rules, Distribution Code and Metering Code;  
  o Satisfy the communication, control system and market system requirements set out in the VWEM Rules and Grid Code for the particular ancillary services that the facility will provide.  
A review is required of the potential role of retailers in ancillary services provision, to assess whether it is feasible for services such as demand reduction to be offered in a co-ordinated way and if so to define more clearly how the PCs’ retail businesses might organise this activity. |

Ancillary Services provider - Planning

• Generators, market customers managing dispatchable loads and ancillary service providers must provide the SMO with their two year ahead plans for any planned outages and notify any material changes in outage plans.  
• As the actual time when outages are planned approaches, generators, dispatchable loads, ancillary service providers and the ETSP must provide the SMO with any changes in timing of outages and the SMO must incorporate these tentative changes into its YAP, MAP and WAP modelling and approve the changes or negotiate other suitable times based on the modelling from the projections.
<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities/Obligations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancillary services provider - Trading</td>
<td>• Ancillary service providers must make offers for individual ancillary service facilities that are traded in the spot market.</td>
</tr>
<tr>
<td></td>
<td>• The trading of Ancillary Services is a highly specialised activity and one which will require a range of technical and commercial skills which would need to be available within the PCs’ retail businesses.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Market Structure, Business Management and</td>
<td>• Power companies which are currently reporting under power corporations shall be restructured into independent accounting units, which shall in their turn conduct a separation of their own distributing and retailing units in terms of business management and accounting regimes.</td>
</tr>
<tr>
<td>Accounting Regimes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity Building for the VWEM</td>
<td>Market participants are responsible for:</td>
</tr>
<tr>
<td></td>
<td>• Preparing facilities within their boundary which are required for their participation in the VWEM in accordance with the approved VWEM design; ensuring that changes to their IT systems to meet VWEM requirements are approved;</td>
</tr>
<tr>
<td></td>
<td>• Prepare capacity building plans in accordance with the plan approved by the Government including arranging budgets for implementing suitably approved training plans;</td>
</tr>
<tr>
<td></td>
<td>• Prepare human resources by participating in training programmes and arranging a budget for capacity building for meeting the requirements of the VWEM;</td>
</tr>
<tr>
<td></td>
<td>• Complete all preparation facilities required by the VWEM in line with the timetable as it may be amended, for participating, operating in the VWEM in accordance with the specified plan.</td>
</tr>
</tbody>
</table>

6.7 VWEM Implications for PCs – Retail

Section 6.3 above outlines the implications of the implementation of the VWEM for PCs in regard to retailing. Whilst the number of formal requirements are relatively modest the implications for the PC and, as business separation is implemented, for the retailing company are very significant indeed. These relate to the skills that are required – some of which are currently very limited – and the cultural changes needed to move from an entity which is substantially directed centrally to one in which there are elements of business separation and which takes full responsibility for its financial sustainability.

Table 15 below identifies the main formal VWEM requirements (with which retailers would need to comply to be rules-compliant), provides some further detail as to what is included within these, and recommends some of the steps that will be necessary in order for the PCs to be prepared to effectively operate as a retailer in the VWEM. There are, of course, other activities (for example, customer billing) that a retailer would need to undertake but these can be assumed to already substantially to be in place.

Table 15: VWEM Implications for PCs - Retail

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Detail</th>
<th>Recommendations for PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration</td>
<td>Lodge application to ERAV to register as a participant and notify the</td>
<td>Undertake registration process and</td>
</tr>
<tr>
<td></td>
<td>SMO of the intention to</td>
<td>ensure any future</td>
</tr>
<tr>
<td>Requirement</td>
<td>Detail</td>
<td>Recommendations for PC</td>
</tr>
<tr>
<td>-------------</td>
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<td>------------------------</td>
</tr>
<tr>
<td>cease being a participant if the business ceases to fill this role. Lodge application to SMO to register a facility (such as dispatchable load or ancillary service facility) or notify the SMO of the intent to cease.</td>
<td>registration cessation or addition is made. Continuing oversight that registration requirements are being maintained. Identify business unit and staff to take responsibility for this.</td>
<td></td>
</tr>
<tr>
<td>PCs will initially have only 5% and then 10% of their loads exposed to the market and hedged with vesting contracts. The balance of their load is supplied via the BST. Subsequently it is intended that the PCs load will be fully exposed to the market and supported by a full allocation of vesting contracts. Vesting contracts are then scheduled to taper down to zero over a period of ten years and be replaced by bilateral contracts in line with the PCs risk management policy. Experienced and competent trading teams needed. Experienced and competent settlement teams needed. Risk management systems, policies and procedures required.</td>
<td>Develop trading team – likely to be a mixture of existing staff and recruitment. Enhance existing settlement team to deal with increased role – again likely to be a mixture of existing staff and recruitment. Undertake training. Develop of risk management systems, policies and procedures. Identify business unit to take responsibility for this.</td>
<td></td>
</tr>
<tr>
<td>Retailers must inform the SMO about material changes to future loads and provide corresponding demand forecast. Retailers must provide demand forecasts to the SMO for inclusion in the Year Ahead Plan (YAP) and Month Ahead Plan (MAP) when required. Accurate forecasts will also be required for risk management purposes.</td>
<td>Develop forecasting team – likely to be a mix of existing staff and recruitment. Undertake training. Develop forecasting process. Purchase or develop IT software to support the forecasting process. Collect data. Identify business unit to take responsibility for this.</td>
<td></td>
</tr>
<tr>
<td>Submit to the SMO planned outage schedule for ancillary service facilities as and when outages become known.</td>
<td>Identify business unit and staff to take responsibility for this. Develop appropriate business processes.</td>
<td></td>
</tr>
<tr>
<td>Provide offers / bids for any dispatchable loads or ancillary service facilities for WAP, DAP (Day Ahead Plan) and RTD.</td>
<td>Identify business unit and staff to take responsibility for this.</td>
<td></td>
</tr>
</tbody>
</table>
Table 15 provides some information on the changes that will be required to facilitate the effective participation of the PC as a retailer in the VWEM. This includes the allocation of tasks to staff, staff recruitment, training, IT and business process development, organisational implications etc.

Section 5 has indicated that the level of business separation that can be implemented is quite wide and that the degree of it that is necessary is significantly driven by the extent of retail competition. As this is very limited for the VWEM the amount of legal and organisational separation that is required could also be quite limited.

Nevertheless there are a number of reasons why the need for separation needs to be taken account of and start to be implemented at this stage. These include the following:

- Whilst separation may strictly not be needed for competition or other reasons, there are still legal requirements to be met and the need to adhere to the VWEM market rules. Section 7.4 examines this in more detail. This shows that there is a clear requirement in electricity sector legislation that business separation of a PC’s retailing and distribution activities must be achieved, although it does not define the level of such separation. This could vary from just accounting separation or the more intensive extents outlined in Section 5. However accounting separation does seem to represent the minimum level of such separation that is required. Business separation is also mentioned in the draft market rules but again without being precise about the extent of it that is required at this stage.

- As business separation is implemented there will be increasing limitations on the flow of information between the different businesses. IT systems and business processes need to recognise this as they are being developed otherwise they will need to be modified at a later stage, increasing implementation costs and timescales.

- Accounting separation and reporting is being implemented to some degree now and clear cost allocation between the various entities will be needed. This will facilitate network charging as well as starting to develop the "identities" of the distribution businesses. As there is greater organisational separation, there will be a greater element of direct costs incurred rather than cost sharing through accounting allocations.

- In implementing new activities for retail (and indeed the other functions) account will need to be taken of the required level of business separation.

### 6.8 VWEM Implications for PCs – Distribution

Section 6.4 above outlines the implications of the implementation of the VWEM on PCs in regard to distribution. As for retail, whilst the number of formal requirements are relatively modest, the implications for the PC and, as business separation is implemented, on the distribution company are very significant indeed, requiring each PC to take a much greater responsibility for its financial sustainability.

Table 16 below identifies the main formal VWEM requirements, provides some further detail as to what is included within these, and recommends some of the steps that will be necessary in order for the PCs to be prepared to effectively operate as a distributor in the VWEM. There are, of course, other activities that a distributor would need to undertake but these can be assumed to already substantially to be in place. These include:
• planning, constructing, maintaining and operating the distribution system;

• facilitating the connection of new customers – planning and constructing physical connections to new customers’ premises should be an activity undertaken by the Distribution business of the PC, liaising with the MDMSP and Retail businesses as required in relation to arrange for the provision, sealing and reading of appropriate meters;

• interfacing with the transmission system; and

• in some cases, interfacing with the distribution systems of other PCs or with the systems of entities in other countries.

These are very significant activities that are already undertaken and will need to continue broadly as at present. However care will be needed where appropriate to ensure that information that is currently shared with others in the PC is protected from other entities, such as the retail company.

Table 16: VWEM Implications for PCs - Distribution

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Detail</th>
<th>PC Recommendation</th>
</tr>
</thead>
</table>
| Registration         | • Notify SMO to register any meters the distribution service provider is responsible for (i.e. those metering connections between distribution systems and distribution customers participating in VWEM);  
                       • Notify the SMO to deregister a meter;  
                       • Notify the SMO of connection points;  
                       • Notify the SMO of connection point de-registration.                                                                                     | Identify business unit and staff to take responsibility for this.  
                                                                                Recruitment additional staff.  
                                                                                Develop IT systems and business processes to make these notifications.  
                                                                                Training.                                                                                                                                  |
| Forecasting          | • Distribution service providers must provide the SMO with their distribution load forecasts for each connection point to the transmission system annually for inclusion in the YAP and MAP. This essentially means that distribution service providers need to provide: monthly demand forecasts for all connection points for up to two years ahead.  
                       • Provide the SMO with the likely timing of any commissioning of new large loads or embedded generation or their decommissioning over a period of four years ahead.                                                                 | Develop forecasting team – likely to be a mix of existing staff and recruitment.  
                                                                                Undertake training.  
                                                                                Develop forecasting process.  
                                                                                Purchase or develop IT software to support the forecasting process.  
                                                                                Collect data.  
                                                                                Identify business unit to take responsibility for this.                                                                                     |
| Outage planning      | • Submit SMO planned outage schedule for ancillary service facilities as and when outages become known.                                                                                                    | Identify business unit and staff to take responsibility for this.  
                                                                                Develop appropriate business processes.                                                                                                    |
Table 16 provides some information on the changes that will be required to facilitate the effective participation of the PC as a distribution service provider in the VWEM. This includes the allocation of tasks to staff, staff recruitment, training, IT and business process development, organisational implications etc. As previously mentioned many distribution activities are already in place and account should also be taken of the comments of business separation at the end of the previous section.

### 6.9 VWEM Implications for PCs – Meter Data Management Service Provider

A MDMSP is responsible for the collection of metering data from each metering installation for which it is responsible, the processing of that data and the reliable delivery of the processed data to the SMO’s metering database and to parties entitled to that data such as other market participants including the SMO itself, transmission and distribution service providers, other MDMSPs and ERAV.

Table 17 below indicates the proposed arrangements for MDMSP responsibilities in the VWEM. This shows that the PC as a distributor will be responsible for installing and maintaining meters with end-use customers whether or not they are participating in the VWEM and for connections between distribution systems. In the case of inter-distribution system connections and for customers participating in the VWEM the distributor is also responsible for collecting, processing and delivering metering data to the SMO.

Table 17 also shows the role of the MDMSP in providing contract data communication links.
The role of the MDMSP can be taken by a number of parties including the SMO, the transmission company and the PC within its distribution business. Figure 13 illustrates the expected responsibilities of each in the VWEM. As can be seen that PCs are seen as being the MDMSP for customers who are participating in the VWEM. Although not explicitly stated it is also assumed that PCs would fulfill the role for inter-distribution system connections. This implies that the MDMSP requirements for a PC apply to a relatively small number of meters in the VWEM.

Note that the MDMSP role of delivering metering data to the SMO is not applicable for end-use customer metering (other than those participating in the VWEM) in the VWEM. However it should be recognised that this is likely to be required in the VREM.

The roles defined above are broadly compatible with the responsibilities defined in MOIT Circular No. 42/2015/TT-BCT, “Regulation on Electricity Metering in the Electrical System”. This identifies roles and responsibilities for metering which are allocated to Generators, Transmission Service Providers,

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Distribution Service Providers, Distribution/Retail Service Providers and Customers. The Circular gives broad rights and responsibilities to Transmission, Distribution and Distribution/Retail business units to invest in, install, operate and manage metering systems and the associated data collection systems, at the following interfaces:

- Transmission – Distribution;
- Distribution – Distribution; and
- Transmission or Distribution - Customers.

The provisions of the Circular appear sufficiently general to support the allocation of responsibilities shown in Table 17.

We note that there will be a requirement for close cooperation between the MDMSP, Retail and Distribution functions in relation to the development of new connections that involve metering, as the planning of new connections and physical installation of meters will be the responsibility of the Distribution business.

**Figure 13: Arrangements for MDMSPs in the VWEM**

The formal requirements on MDMSPs under the market timetable of the VWEM Rules are as follows:

- Responsibility:

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In the VWEM, MDMSPs are responsible for the management of metering data from each metering installation for which it is responsible;

MDMSPs are responsible for the collection of metering data from each metering installation for which they are responsible, the processing of that data and the reliable delivery of the processed data to the SMO’s metering database and to parties entitled to access that data such as the market participant, SMO, transmission companies and distribution service providers, other MDMSPs, and the regulator;

Satisfy the relevant technical requirements set out in the Grid Code, VWEM Rules, Distribution Code and Metering Code;

Satisfy the communication, control system and market system requirements set out in the VWEM Rules, Grid Code, Distribution Code and Metering Code; and

Note that each meter must be allocated to a MDMSP.

Maintaining a register of all connection points, nodes and meters which, for each meter, identifies the following:

- the node and connection point associated with the meter;
- the Meter Provider responsible for the meter;
- the MDMSP responsible for the data management of the meter;
- if a market facility connects at the connection point or is associated with the node, the Market Participant responsible for the spot market transactions of the facility; and
- MDMSP is responsible for maintaining the accuracy of metering data during the process of data collection, transfer and management.

Registration:

- Notify SMO to register any meters the MDMSP is responsible for;
- Notify the SMO to deregister a meter; and
- Each meter must be allocated to a MDMSP.

Market Network Model:

- Provide SMO with plans for network expansion, changes to connection points and changes to meters.

Meter Reading, Data Processing and Checking:

- Prior to 15:00 of day D+1, the MDMSP must provide the SMO with the electricity metering data of each trading interval of day D. That is the MDMSP will remotely read all meters for which it is responsible, process and check the meter data and provide the data to the SMO by 15:00 of day D+1.

Access to metering data:

- The following entities are to be provided with access to the metering data associated with a connection point:
➢ Participants who have a financial interest in the metering installation or the energy measured by that metering installation;
➢ Metering Providers who have an agreement to service the metering installation;
➢ ETSP;
➢ EDSPs associated with the connection point;
➢ MDMSP for that metering installation;
➢ SMO; and
➢ ERAV.

• SMO requirements for meter data:
  o Meter Data Processing and Checking:
    ➢ The SMO must develop its own automatic validation tools that will check the metering data that MDMSPs have provided to its metering database. In particular, the validation tools must cross check the half hourly figures with reasonable maximums and minimums, historical values and the corresponding estimates based on the use of raw SCADA values and state estimated values.
  o Meter Data Storage for settlements:
    ➢ SMO must manage its own meter database;
    ➢ SMO must store the metering data and related information for at least 5 years; and
    ➢ MDMSPs may need to have their own metering databases in addition to the SMO’s metering database.

The PC will need to identify a responsible business unit, and put into place arrangements in respect of organisation, staff, IT systems, business processes and other aspects to fulfil these obligations.
7  VWEM - Recommendations for the PCs

7.1  Charter

The PC Charters, as well as defining the statutory, legal and financial structure of the PCs and their relationship to EVN, define the core business functions and operational objectives of each. These are broadly similar for each PC.

The common elements of the PCs’ activities are:

**Functions**

- Carry out investment activities to develop the distribution network, sign contracts with local and international organisations and individuals to ensure electricity supplies for social/economic development;
- Implement business activities for profit based upon the law. Economic relations between the PC and its subsidiaries and affiliates are to be established through contracts;
- Invest in its subsidiaries and affiliates and govern its subsidiaries based on the percentage of charter capital in accordance with the law and its Charter;
- Implement the rights and responsibilities of the owner based on the percentage of charter capital invested in subsidiaries and affiliates;
- Other business activities as may be requested by EVN and the Government;
- Develop and implement approaches and plans for operational coordination in the PC prescribed by the Charter.

**Main responsibilities**

- Production, distribution and trading electricity;
- Import and export of electricity;
- Investment in and development of the distribution grid and medium and small hydropower projects;
- Management, operation, production, repair, maintenance, overhaul, repair, renovation, upgrading of electrical, mechanical, control and automation power grid projects of 110 kV grid and 220 kV distribution-related assets;
- Testing, calibration of electrical equipment;
- Training and development of human resources for management, operation, and grid repair.

Each of the PCs’ Charters includes a number of additional activities that the companies are permitted to engage in. It is proposed that items that these items should be deleted so that PCs are fully focused on their roles in the reformed electricity industry.

There may also be benefit in redefining the relationship between EVN and the PCs so that the appropriate authority for operating independently and being responsible for both operational aspects
and financial performance and sustainability is clarified. This may also impact on the powers that are delegated to the PCs management although care will need to be taken that there are sufficient “checks and balances” to ensure that the PC continues to operate in the interests of its owners, customers and other stakeholders.

7.2 Objectives

The PCs have currently generally defined their core business objectives as follows:

- Supplying power to its customers on a safe, stable and continuous basis;
- The generation (generally from small hydro power plants), distribution and retailing of electricity; and
- Preparing its IT infrastructure, HR, etc. for the VWEM introduction – subject to the instructions of ERAV and EVN.

Most of them appear to be developing sets of KPIs which, it is assumed, will be designed to support both these objectives and how they may evolve as the VWEM and VREM are implemented.

It should be the responsibility of each PC to define its own objectives. However it is recommended that after the implementation of the VWEM the structure of these should follow the entities that make up the market i.e. generation (where applicable), distribution (distribution service provider), retail, and meter data management service provider.

Examples of what such objectives could be are:

- Distributing power to the customers of retailers on a sustainable, secure, affordable and non-discriminatory basis;
- Selling electricity as a retailer to customers economically and with high levels of customer service;
- Operating an effective and efficient meter data management service; and
- Generating and selling electricity as effectively as possible.

Note that the final objective relates only to those PCs with ownership or part ownership of generation plant.

7.3 Business Registrations

Under the VWEM market rules, market participants are required to register their roles with the SMO.

For PCs this means that they should register as a Market Customer – Retailer, Electricity Distribution Service Provider, and Meter Data Management Service Provider. In addition, certain of the PCs may

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7 CPC has commented that this activity could better be referred to as an operation being carried out within the PCs, rather than a “business objective”. In a number of the discussions held with PCs it is clear that they regard preparing systems and processes as a current business objective, and are dedicating resources to this accordingly. Given the strategic nature of the actions that are required to prepare businesses for full participation in the VWEM, it is reasonable to regard this as a current “business objective”, although clearly this would become a more operational aspect of the PCs’ work once the VWEM is fully functional.
wish to register as an Ancillary Services Provider and as a generator (probably as an Indirect Trading Generator).

### 7.4 Legal Status

Table 18 below summarises some legal decisions that have been made regarding business separation.

These indicate that there is a clear requirement in the electricity sector legislation that business separation of a PC’s retailing and distribution activities must be achieved although it does not define the level of such separation. This could either be at an accounting level, through separation of ownership, or at one of the levels of separation outlined in Section 5. However accounting separation does seem to represent the minimum level of such separation that is required.

**Table 18: Legal decisions referring to business separation**

<table>
<thead>
<tr>
<th>Decision</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision 63, Article 8</td>
<td>State that “Eligible Power Corporations/companies selected to participate in the pilot VWCM shall conduct a transparent separation of their own distributing and retailing units in terms of business management and accounting regimes”. This is a key requirement that will influence the way in which activities are allocated to different functions of the PCs in the later aspects of this project.</td>
</tr>
<tr>
<td>MOIT Decision No 6463/QD-BCT</td>
<td>This permits PCs to act as Electricity Distribution Service Providers (EDSPs)(^8) but also requires EVN to develop options for separating the distribution functions from the retail functions within the PCs(^9).</td>
</tr>
</tbody>
</table>

In Section 5 and elsewhere in this report it is explained that there are not competition arguments for requiring extensive legal and operational separation of the retail and distribution businesses at this stage. However, some elements of operational separation and ring fencing are required to adhere to VWEM market rules and decisions. It is recommended that whilst it is necessary for some separation and ring fencing to be implemented as part of the VWEM, the current legal structure of the PCs and the provincial or district power companies should be retained at this stage.

However it should be emphasised that accounting separation and reporting must certainly be implemented (and has already been initiated to some extent) and other organisational and operational changes will also be needed. Further steps towards legal and operational separation may well be needed as part of the implementation of the VREM.

Each of the PCs has a number of subsidiary Provincial or District Power Companies. It is recommended at this structure is retained at this stage. However as retail competition is extended and further business separation is required, the question arises of whether separate retail and distribution companies at this level will also be needed. If so, this will result in a large number of subsidiaries with complex inter-relationships and it is recommended that consideration is given to a more functionally based

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\(^8\) MOIT Decision No. 6463/2014/QD-BCT Approval of the conceptual design of the Vietnam Wholesale Electricity Market of Vietnam Article 1 Clause 2(d)  
\(^9\) MOIT Decision No. 6463/2014/QD-BCT Approval of the conceptual design of the Vietnam Wholesale Electricity Market of Vietnam Article 3 Clause 2(c)
organisation, which could result in merely one distribution company and one retailing company for each PC area. However this is a matter for further investigation in the preparations for the VREM rather than at the VWEM implementation stage.

Licences are currently relatively high level documents and this is likely to be sufficient for the VWEM. Again, this may need to be reviewed for the VREM where separate distribution and retailing licences may be appropriate and where there may also be a requirement for more extensive licence conditions.

7.5 Business Model and Organisation

A typical existing high level PC organisation chart is provided as Figure 7.

In previous sections it has been explained that this structure will not meet business separation requirements, particularly as retail competition increases. Eventually a fully legally separated, functionally based organisation is likely to be needed in order to meet legal requirements, to establish suitable and appropriate accountabilities within the PC and to be able to provide economic and efficient services to other industry participants and to end-use customers. However establishing such an organisation is a major time consuming and potentially disruptive enterprise and it could be argued may not be proportionate for the level of retail competition that is expected in the VWEM.

It is therefore recommended that the PCs implement business separation using an indicative organisation that is illustrated in Figure 14. This is based on the existing PC structure but sets up retail, distribution and MDMSP units within it. Staff in these units will be regarded as staff of the particular business and will, as appropriate, be restricted from receiving information relating to other businesses. As soon as practicable they should be located in separate office space from other staff. In particular staff in the commercial and potentially competitive retail business should be separated from those in service provide businesses.

Figure 14 shows this and also indicates that there will be functional links between the various groups of staff working within the same business.

There are certain support activities that could be provided out of a shared services organisation or by staff specifically dedicated to the relevant business. In Figure 14 shared services provide IT, HR and other such services to the various businesses whilst certain aspects of finance are provided by dedicated staff. The balance of this depends on individual circumstance and would need to be considered as more detailed plans are developed. There are also a number of corporate services that can only be sensibly provided centrally – such as direct support to the board of directors and similar activities.

To implement this approach for the initial stages of VWEM (starting from the typical existing PC organisation shown in Figure 7) responsibility for the Planning and Technical departments should be merged into a new Distribution Unit and include a new separately managed MDMSP Unit within it (based on current knowledge of the activities within these two existing departments it is assumed that none of these activities should be allocated to the Retail business). The Business and Finance & Accounting departments should be restructured such that there are individually managed distribution, retail and MDMSP teams within them. As mentioned previously, the HR, IT, Administration and any other corporate departments can be considered as providing services to the main businesses and do not require restructuring at this stage.

At the Provincial and District power companies level, separately managed Distribution and Retail teams should be established based on the tasks undertaken. In view of the limited number of customers who will be eligible for competition in the VWEM, the small number of other meters from which data would need to be collected, and the fact that responsibility for meter reading and data collection for non-competitive customers rests with the Distribution Unit, there is no need for separate MDMSP units at this level at this stage. It should also be noted that meter provision and maintenance are not the
responsibility of the MDMSP. Such services are provided by the Distribution Unit. Any services required by the MDMSP Units at the Provincial or District Company level can be sourced from those companies’ Distribution Units.

This organisation (including restrictions on information sharing) together with accounting separation and reporting can be regarded as meeting the requirements for ring fencing required in the VWEM.

In summary the steps to putting this approach in place could be as follows:

1. Based on the functions outlined in this report, allocate all activities at both the PC and the provincial/district power company level to the following categories – retail, distribution, meter data management, generation, any other businesses (e.g. meter manufacture, telecoms etc.), shared services and corporate functions.

2. Each PC (possibly co-ordinated by EVN) should undertake an organisational review to restructure itself in line with the VWEM market rules, take account of the results of the allocations that result from the previous action, the indicative organisation shown in Figure 14, the very limited retail competition at this stage and the need to limit cost increases resulting from losses of economies of scale. No legal separation is required at this time.

Experience of this restructured organisation gained during the VWEM 2019 phase will provide guidance as to when there is a need to move to a more separated organisation. This is certainly likely to be required in the VREM as retail competition develops, and may therefore also be applicable during the long-term VWEM period. An indicative ultimate organisational structure is shown in Figure 15. This would also facilitate legal separation of the businesses which, in turn, would allow alternative ownership models should Government wish to utilise these.

To implement the Figure 15 organisation (starting from that shown in Figure 14) it would be necessary to establish a fully functionalised organisation that merged responsibilities for the Distribution Business, Retail Business and MDMSP activities into separate departments covering both the PC and the Provincial and District Power Companies. Hence for the Distribution Business, activities in the proposed Distribution department should be merged with those undertaken by the distribution teams in the Business and Finance & Accounting departments (noting that to ensure appropriate corporate governance there should continue to be a functional link for finance activities with the central corporate finance department).

Similarly, the Retail Business activities in the proposed Retail department should be merged with those undertaken by the retail teams in the Business and Finance & Accounting departments (again retaining a functional link for finance activities with the central corporate finance department).

Finally, the MDMSP unit within the Distribution department should be merged with the MDMSP teams in the Business and Finance & Accounting departments (once again retaining a functional link for finance activities with the central corporate finance department).

As previously mentioned, the HR, IT, Administration and any other corporate departments can be considered as providing services to the main businesses and may not require restructuring. However, consideration should also be given to devolving some of such activities to the three businesses.
It is recognised that there are considerable differences in the physical size of the PCs. This may mean that in the organisational structure shown in Figure 15 for those PCs (other than HPC and HCMPC) which cover a large area, some aspects of geographical organisation may need to be retained. This should not need to be the case for HPC and HCMPC. It is also recognised that there are currently some differences in the governance of the Provincial and District power companies between HPC and HCMPC. However in the fully functionalised organisation shown in Figure 15 it is assumed that full responsibility and accountability is vested in the PC in each case.
Figure 14: Indicative PC organisational structure for the VWEM

Chairman and General Director

Deputy General Director

Deputy General Director

Deputy General Director

Deputy General Director

Provincial and District Power Companies

Distribution

Planning

Projects

Technical

Meter Data Management

Business

Distribution

Meter Data Management

Retail

Shared Services

Finance & Accounting

Distribution

Retail

Meter Data Management

Shared and corporate services

HR

IT

Admin

PR

International

Legal

Internal Supervision

e tc

Other member companies and affiliates

Other businesses – for example

generation, meter manufacture etc.

Key to Businesses

Retail

Distribution

Metering

Functional Links
Figure 15: Possible Target PC for full business separation

Chairman and General Director

- Deputy General Director - Retail
- Deputy General Director - Distribution
- Deputy General Director - Meter Data Management
- Deputy General Director - Finance
- Deputy General Director (s) – Shared services and corporate functions
- Deputy General Director – Generation or other businesses*

- Demand Forecasting
- Power purchasing
- Contracts
- Settlement
- Product design and marketing
- Customer management
- End use customer billing
- Pricing and finance
- Regulation
- At both PC and provincial/district company level

- Network planning
- Construction
- Maintenance
- Operations
- Fault management
- Meter provision
- Meter maintenance
- Demand forecasting
- Network charging
- Pricing and finance
- Regulation
- At both PC and provincial/district company level

- Data collection
- Meter reading
- Validation and storage
- Pricing and finance
- Regulation
- At both PC and provincial/district company level

- Financial Accounts
- Management Accounts
- Treasury and banking
- Investments
- Corporate Funds
- Investor Relations
- Regulation
- Tax
- At both PC and provincial/district company level

- HR
- IT
- Admin
- PR
- Legal
- Compliance
- International Relations
- Compliance

* If applicable
7.6 Functions

Many of the functions of the businesses that make up the electricity value chain in Vietnam will be unaffected by the implementation of the VWEM and can clearly be allocated to one of the constituent resulting businesses. This has been examined in Section 5.2 above as well as in other parts of this report. However a number of new or enhanced activities are required as a result of the VWEM with differing impacts on the various businesses. These have been described in Section 6, with the resulting recommendations for the PCs outlined in Table 15, Table 16 and Section 6.9. Actions that will need to be taken include organisational change (see Section 7.5), staff identification for particular tasks recruitment, training, development of new and enhanced IT systems with suitable ring fencing (see Section 7.10), business process design, locational changes to staff etc.

Particular areas where functions will need to be developed or enhanced (sometimes in more than one business) are:

- Business registrations;
- Forecasting;
- Trading strategy;
- Risk management;
- Negotiation and agreement of contracts;
- Settlement;
- Market operations – spot market;
- Outage planning (although this should substantially be in place);
- Network charging;
- Registration and management of metering and meter data; and
- Accounting separation and the reporting of separate financial information for each of the businesses.

There are some activities where the future situation is not clear, for example energy pricing to end use customers. At present a system of cross subsidisation is in place which aims to result in broadly similar prices to end-use customers. If such an arrangement is duplicated in the VWEM (and recognising that very few customers are contestable in the VWEM) then the pricing and tariff setting activity should not be substantially disturbed. At this stage how these arrangements may change once the VREM is implemented is not clear. If this were to result in price competition in some or all of the market this would require a much larger pricing team as well as the development of marketing and sales functions.

The items discussed above, of course, do not represent all of the activities making up the businesses but other such activities should already be in place and operating.

Also certain services that all businesses need such as finance, HR, IT etc. are likely to be provided by a mixture of dedicated staff and from shared services departments. Finance teams dedicated to each of the businesses concentrating on planning, budgets and reporting are particularly important. Accounting services such as payroll, paying invoices etc. can be shared. However the finance activity
in the separate businesses are likely to still to be co-ordinated and overseen by the central finance team.

It should be noted that organisations are not necessarily designed to wholly follow the business structure as appeared to be determined by regulation – and in this case the requirements of business separation. Where this does not appear effective from a business point of view then other arrangements – such as cross charging and other means of sharing – can be used. This can lead to some lack of clarity in the early stages of reform and competition but should become clearer after greater levels of business separation requirements are implemented although accountabilities can sometimes continue to be obscured.

### 7.7 Financing

Extra funding will be required by the PCs for the costs for preparing for the implementation of VWEM and the additional costs of operating following implementation. Also it should be noted that the draft VWEM market rules contain prudential requirements such that where a market participant does not meet the acceptable credit criteria, the SMO may require the participant to provide suitable credit support which could take the form of bank guarantees. The SMO’s credit criteria are not available to the consultant but should bank guarantees be required then there would be a consequential cost.

### 7.8 Budgeting

A budgeting procedure that is already in place in the PCs as part of an overall industry wide process. This will need to be restructured so that planning of the separate businesses – retail, distribution, and meter data management – can be undertaken. This will follow the accounting separation work that will need to be carried out. As previously mentioned whilst this will initially contain a significant amount of cost allocation this should, in time, be replaced by the identification of direct costs and more arms-length contracts or service level agreements with internal service providers.

There are a range of new costs that will need to be identified and taken account of in budgets for both preparing for the implementation of the VWEM and its subsequent operation. Such costs will include:

- ICT development costs, including project and programme management;
- ICT on-going operational costs;
- Staff recruitment costs;
- Additional salary and related costs;
- Training costs;
- Property costs; and
- Prudential costs.

### 7.9 Staffing

This section undertakes an initial of the additional staff that will be needed by the PCs in operating the VWEM. It is difficult to make precise forecasts of these staffing impacts at this stage so they should be regarded as indicative and subject to change as the level of understanding of the requirements matures. Table 19 below provides an estimate of the additional staff required by the PCs as a result of the implementation of the VWEM split between the separate businesses and the required activities for each
PC and for all of the PCs. In general the required activities are not driven by the size of the PC and, although these vary significantly, it has been assumed that broadly the same number of additional staff will be required by each. Note that, in practice, staff may well be deployed in more than one activity and that some of the extra staff are in addition to those already in place and undertaken similar duties including, for example, already existing forecasting and bulk supply settlement teams.

These figures assume that activity in the market for contested customers is small as there is only a small number of such customers. The approach and numbers of required staff will need to be re-visited as more information becomes available about the VREM.

Table 19: Indicative number of additional staff required by PCs for the VWEM

<table>
<thead>
<tr>
<th>Business</th>
<th>Activity</th>
<th>Number of additional staff for one PC</th>
<th>Number of additional staff for all PCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail</td>
<td>Demand Forecasting</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Risk Management</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Contract negotiation</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Settlement</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Spot market operations</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Regulation</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Compliance</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><strong>Retail Total</strong></td>
<td><strong>20</strong></td>
<td><strong>100</strong></td>
</tr>
<tr>
<td>Distribution</td>
<td>Registration</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Demand Forecasting</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Network charging</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Regulation</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Compliance</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><strong>Distribution Total</strong></td>
<td><strong>11</strong></td>
<td><strong>55</strong></td>
</tr>
<tr>
<td>Metering</td>
<td>Registration</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Meter data validation</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td><strong>Metering Total</strong></td>
<td><strong>3</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td></td>
<td><strong>PC(S) TOTAL</strong></td>
<td><strong>34</strong></td>
<td><strong>170</strong></td>
</tr>
</tbody>
</table>
7.10 ICT Hardware and Software

This aspect has been covered in reports produced under Task 3. In particular, the Task 3.3 report provides a detailed examination of the IT applications and communication links needed for each of the businesses (taking account of ring fencing requirements) and the current situation of the PCs. It proposes a prioritised programme of developments aimed at meeting the ITC needs of each of the relevant businesses within PCs.

7.11 Retrenchment

It is assumed that this refers to possible staffing and cost reductions. This is not anticipated for the PCs at this stage of the reform of the industry.

7.12 Training Requirements

Training requirements have been referred to in a number of the previous sections. Training is likely to consist of a number of elements:

- General awareness training – this should be provided to all staff to explain the changes to the industry and to the PC. It should also explain the limitations on the exchange of information that should be in place and ensure that it is fully understood that breaches of such restrictions would be treated as a disciplinary matter. This training would be quite short – probably no more than one to two hours, but reinforced by material on the PCs internet and or intranet sites.

- IT system and business process training – this should be provided to staff whose daily duties are affected by changes to the IT systems that they use or the business processes that they operate. The scale of this would depend on the level of change that needs to be explained. The number of staff involved would be much less than the general awareness training which would be for everyone but the timing could be significantly longer – perhaps half a day or a day, with repetition if necessary. Written and internet/intranet material should also be provided.

- Specialist training – in energy purchasing markets, demand forecasting, contracts, contract negotiations, legal aspects of contracts, detailed understanding of VWEM and other similar topics. Whilst it is recognised that some training has been provided under this project it is likely that this will need to be substantially extended. Courses will take at least one and probably several days and could be residential. Certain courses may be provided outside Vietnam. However the number of staff to be trained will be much smaller.

7.13 Other Business Separation Aspects

Each of the retail, distribution and meter data management businesses should appoint a business separation compliance team of probably two staff. Their responsibilities will include to:

- Develop and communicate a compliance manual;
- Ensure that conditions of employment are amended such that breaches of business separation requirements can be treated as a disciplinary matter;
- Deal with staff queries regarding compliance;
- Respond to and investigate complaints where it is alleged that the business separation requirements have not been followed; and
• Produce an annual compliance report on all aspects of the PCs performance regarding business separation over the relevant period. This would be for submission to the management of the particular business, senior management of the PC and ERAV.

In some cases in other countries retail and distribution businesses with the same ultimate owner have been required to apply different branding, i.e. different names and logos, in order to balance the advantages of the incumbent. This is not relevant for the VWEM but should be reviewed as part of preparations for the VREM.

7.14 Action Plan

The following key steps are proposed as an action plan to be pursued by the PCs in preparation for playing their full role in the VWEM 2019. The tasks identified should be tailored to the requirements of each PC. We note that the PCs themselves have advised that they are awaiting instructions from EVN as to the structures and business process that should be introduced in preparation for the implementation of the VWEM. One of our core recommendations however is that the senior management teams in the PCs themselves should be encouraged to take greater responsibility for the organisation and performance of their businesses, and we would therefore commend the following steps to be developed by each PC internally, and then discussed with the central management of EVN.

We have noted that in preparation for increasing business separation, consideration should be given to reorganising the District and Provincial Power Companies, which are subsidiaries of the PCs themselves, along functional rather than geographical lines. This in practice means a clear identification of those activities that are undertaken at the district and provincial level that align with retail or distribution activities. It also requires a move away from the replication of the central PC structure in each of the District and Provincial Power Companies, and the reorganisation of these as local offices of the central PC distribution and retail divisions.

One option would be to reorganise a PC and all of its subsidiaries into a holding company with three or four subsidiaries – retail, distribution, meter data management and possibly generation in some cases. Corporate functions and some shared services would be located within the holding company whilst each of the subsidiaries would take responsibility for its business. Within each business, activities would be organised on a functional basis - such as, for example, distribution operation and maintenance activities previously undertaken within provincial companies would be managed by a single management unit wherever such activities were located in a PCs area. If this approach were to be adopted, PCs would then consider exactly what roles are needed in each geographical office. For example, does each office need a design team looking at 22 kV connections and below? Or could design activities be centralised in the PC and only those functions that actually require presence on the ground in a specific location be based in the District/Provincial offices? (E.g. teams required to fix overhead line problems or install new connections).

Specific actions that we propose are as follows:

1. Undertake a high level Initial allocation of costs to retail, distribution and meter data management – to facilitate subsequent derivation of network charges. We note that this is already be underway in some pilot companies that are seeking to implement EVN Decision No. 414/EVN-TCKT “Guiding separation of costs of power distribution segment and power retail segment in Power Corporations”. This can be based on direct costs when business units directly fit into one of the businesses or allocations (e.g. using specific cost drivers – see Task 3.3 Report) when costs are shared. A template for the analysis of internal investment and operating costs associated with VWEM preparation is proposed in Appendix H.
2. In view of the major IT programme required for the VWEM, limit IT developments to those that must be in place to facilitate participation in the market. Wherever possible also put into place arrangements to ring fence EDSP and MDMSP databases and information from retail staff.

3. Devise logistical arrangements such that staff wholly dedicated to retail or to generation are allocated separate offices from other PC staff.

4. Devise an action plan for the implementation of an element of organisational business separation, including functional reorganisation within the District and Provincial Power Companies.

5. On the basis of the proposed new organisational structure consider whether a revised financial “chart of accounts” may be necessary. If so, make arrangements to implement alongside the organisational changes.

6. Use the reporting resulting from the amended chart of accounts to validate or amend the high level initial cost allocation previously undertaken at step 1 and review impact on network charges.

7. Set up two demand forecasting teams in the Business Department – one for retail and the other for distribution. The need for two separate teams derives from the different requirements of the two businesses (with distribution focused on network planning and retail on power purchasing although both will also have revenue planning and financial forecasting activities that must be supported) and the increasing levels of organisational business separation. This would involve, recruitment, training and support for IT developments. Data should only be exchanged between the two teams based on the VWEM rules and processes.

8. Augment the distribution team with resources and skills to derive network charges (note that a regulatory framework is also required for this).

9. Set up a trading and contracts team within the Business Department but as part of retail. This would involve, recruitment, training and support to IT developments. Access to EDSP data should only be permitted based on the VWEM rules and processes.
Appendices

Appendix A: Detailed Questionnaire for PCs
Appendix B: Northern Power Corporation (NPC)
Appendix C: Central Power Corporation (CPC)
Appendix D: Southern Power Corporation (SPC)
Appendix E: Hanoi Power Corporation (HPC)
Appendix F: Ho Chi Minh City Power Corporation (HCMPC)
Appendix G: Private Ownership, Generation and Retail Competition, and Business Separation in the UK Electricity Industry – A Brief Case Study
Appendix H: PC Costs Template
Appendix I: Comments received from PCs and ERAV
Appendix A

A Detailed Questionnaire for PCs
DETAILED Questionnaire for Power Corporations
The following questionnaire should be filled in by each Power Corporation separately.

**Questionnaire**

1) Name of Power Corporation:

2) Person Responsible for filling the form:
   a. Name:
   b. Function:
   c. Email Address:
   d. Phone Number:

3) Capacity:

<table>
<thead>
<tr>
<th>Name</th>
<th>Estimated Maximum Demand in 2016 (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC [n]</td>
<td></td>
</tr>
</tbody>
</table>

4) Electricity purchases from Electric Power Trading Company (EPTC) to date:

<table>
<thead>
<tr>
<th>Name</th>
<th>Volume of transactions with EPTC in 2014 (GWh)</th>
<th>Volume of transactions with EPTC in 2015 (GWh)</th>
<th>Revenues from buying and selling 2014 (USDm)</th>
<th>Revenues from buying and selling 2015 (USDm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC [n]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5) Please list all the Power Companies that are Subsidiaries of your PC, including details of their number of consumers, annual energy consumption (MWh) and connected generation capacity (MW):

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Company Name</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6) Details of total electricity sales and purchase by Power Corporation
<table>
<thead>
<tr>
<th></th>
<th>No. of customers in 2014</th>
<th>No. of customers in 2015</th>
<th>kWh sold in 2014</th>
<th>kWh sold in 2015</th>
<th>kWh purchased from EPTC in 2014</th>
<th>kWh purchased from EPTC in 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential consumers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial consumers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other: (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other: (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Revenue from sales in 2014 (USDm)</th>
<th>Revenue from sales in 2015 (USDm)</th>
<th>Cost of purchases from EPTC in 2014 (USDm)</th>
<th>Cost of purchases from EPTC in 2015 (USDm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Industrial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other: (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other: (please specify)</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
7) Provide a brief description of the responsibilities/activities of executive management and each organisational area, department or division

<table>
<thead>
<tr>
<th>Management Position</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td></td>
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</tr>
</tbody>
</table>

8) Please provide a breakdown of each operating business unit, division or department in your organisational structure, detailing the name of the unit, its key functions and the number of staff employed within it.

<table>
<thead>
<tr>
<th>Unit/Division</th>
<th>Activities</th>
<th>Staff Number in 2015 (FTE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Professional*:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technicians:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administrative:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professional:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technicians:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administrative:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professional:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technicians:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administrative:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professional:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technicians:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administrative:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professional:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technicians:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administrative:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professional:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technicians:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Administrative:</td>
</tr>
</tbody>
</table>

- Professional staff: those qualified to at least first degree level from a recognised University

Total Staff Number in 2015: _______________

9) Please answer the following questions regarding the Operational Objectives of your business.
a. Please describe key elements of your current business model. Specifically:

- What are the core objectives of your business? What additional activities are you engaged in, beyond those specified in the Charter for your PC?

- Are there any areas of activity defined in your charter that you are not currently engaged in?

- What are the key performance indicators (KPIs) you use to monitor the performance of the business in each of the key areas of activity?

- Please describe how your company has performed in relation to these KPIs over the last three years.

b. How do you think your current business model will need to be adapted to align with your new role in the VWEM? Specifically:

- How do you think your current objectives will vary, and what would you need to change to meet these objectives?

- How will your key performance indicators change?

c. Please comment on anticipated gaps between your current skill set needed to operate in the VWEM. Some important business functions of a PC in the VWEM will include:

- Settlement of financial obligations to generators and EPTC.
- Moving from a single buyer to purchases from multiple power producers
- Managing a portfolio of contracts – mixture of short term and long term.
- Developing a purchasing and settlement strategy - Negotiating contracts directly with generators or generator traders.
- Managing financial risks associated with matching load profiles and contracts with generators.
- Managing the activities of your subsidiary companies

How well equipped are you to undertake these roles, and where do you think the gaps are?

10) Current Organisational Structure
a. Please provide a diagram of your current organisational structure - this should align with the responses given in question 5 above i.e. unit/division and management positions

b. Please provide a revised illustration to highlight how your current organisational structure may change to align with your role in the VWEM. In particular, please highlight those departments or functions which are responsible for activities relating to both electricity distribution and energy sales, and highlight how the differentiation of these activities may be approached.
11) Describe business processes in place for each of the following activities, and explain whether you think they would change as part of the transition to the VWEM.

   a. Long-Term Demand Forecasting (> 1 year)

   b. Medium-Term Demand Forecast (> 1 month)

   c. Short-Term Demand Forecast (< 1 month)
d. Metering of power sales to end customers and provision of bulk metering data to the VCGM. Please explain in detail how meter data is collected, processed and stored today, and which other organisations receive meter data from you, and how this is transmitted.

Please include in your answer details of how distribution-connected generation is treated. How is metered output obtained and processed?

How is energy supplied by subsidiary power companies metered, and how is the data collected and processed?

How will these processes change under the VWEM?

e. Handling payments and settlement processes under the VCGM.

Please explain in detail how payments are made to EPTC and any other organisations for energy purchased by your PC. Please all explain the billing processes adopted for your end customers and for energy supplied to subsidiary power companies.

How will these processes change under the VWEM?
f. Dispute resolution concerning payments under the VCGM.

How are disputes raised and settled today, between your PC and EPTC, or between your PC and subsidiary companies?

12) Please comment on the accuracy of the following representation of the way in which meter data is handled in the VCGM.

![Diagram of meter data handling](image-url)
13) Please describe the following aspects of your budgeting and financial management procedures.

a. Please outline your current budgeting and financial management procedures and related skill sets. How are departmental and company budgets currently set? How are budgets for electricity purchasing defined and monitored?
   Where are the gaps between current skill set and new role in VWEM? How can these new skills be developed/sought?

b. Please describe any processes and procedures you may have in place for forecasting electricity prices. How would you propose to modify these for operation within the VWEM?

c. Please describe the processes and systems you have in place to deal with:
   - Customer billing
   - Maintaining customer records
   - Processing revenue collection from electricity consumers
   - Dealing with invoices for energy received from EPTC
   - Processing other payments for electricity sector services (please define what these are, which electricity sector company or organisation provides them, and explain how they are paid for).

d. Please explain what With regards to network services i.e. network planning, network construction, system operations, faults, control room, network telecom, system.

C.5) Energy purchasing activities, the commercial relationships, the contractual relationships, et.c

Want to ascertain ability to deal with large amounts of data, and complex software, spreadsheets, highly numerate, engineers (dealing with transmission organisation & the system will be changing).

Generation activities?

Decision making process:

6.1) Provide details on the decision making process for the process listed in section 6 above.
   (move this to question 6) 
   - We what to know who they do it (question 6 asks this).

14) In anticipation for the implementation of the Wholesale Market, do you already have internal capabilities for:
15) Describe any previous training programmes undertaken in relation to your future participation in the Wholesale Market?

16) Self-Assessment. Mark your own internal capability from 0 to 5 on the following topics, where 0 means no capability or knowledge, and 5 means full capability with no further training needs. Tick when appropriate.

<table>
<thead>
<tr>
<th>Topic</th>
<th>0</th>
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<tr>
<td>Day-ahead demand forecasting</td>
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<tr>
<td>Negotiating Contracts for Differences with generation companies</td>
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<tr>
<td>Handling settlement and payment processes for bulk energy purchases</td>
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</tr>
</tbody>
</table>

**Human Resources and Training:**

D1) Looks like a lot of this is already covered in the questions above. This is good.
Infrastructure:

E1) To what extent do you have the resources/IT systems/skills to fulfil new role in the VWEM? Please expand on:
- Please list and describe all metering systems that are in place?
- Please list describe all IT software currently utilised and its application/function
- Please list describe all hardware systems currently utilised and their application/function.
- SCADA/DMS, SCADA/EMS?

E2) Please discuss current levels of transmission losses. What methods/technologies are in place to reduce these losses? Are transmission losses socialized? Or are they nodal or regional?

E3) Is theft of electricity an issue? How is this currently being dealt with?

Do we want to think about ring-fencing in this questionnaire? What do we mean by ring-fencing?

Please fill in the following table.

<table>
<thead>
<tr>
<th>Voltage (kVA)</th>
<th>Network Length (km)</th>
<th># Transformers</th>
<th># Switch gear</th>
<th>Other?</th>
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<tbody>
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</tbody>
</table>
Appendix B

B Northern Power Corporation (NPC)

Redacted
Appendix C

C Central Power Corporation (CPC)

Redacted
Appendix D

D Southern Power Corporation (SPC)

Redacted
Appendix E

E Hanoi Power Corporation (HPC)

Redacted
Appendix F

F  Ho Chi Minh City Power Corporation (HCMPC)

Redacted
Appendix G

G Business Separation in the UK Electricity Industry – A Brief Case Study

The introduction of

- Private Ownership;
- Generation and Retail Competition; and
- Business Separation.

in the UK electricity industry is described below. Initially the restructuring of the industry and the sale of most of it to the private sector is outlined. This is followed by an explanation of the implementation of generation and retail competition and how the process of business separation was undertaken.

Ownership Changes

The electricity supply industry was under public ownership from 1948 to 1990. For most of this period in England and Wales (the structures in Scotland and Northern Ireland were somewhat different), a single company, the Central Electricity Generating Board (CEGB), operated virtually all generation and transmission as a vertically integrated statutory monopoly, while twelve area boards acted as regional distribution monopolies operating distribution networks and supplying end-use customers.

In March 1990 the industry was restructured. The CEGB was divided into four successor companies. These were as follows:

- National Power and PowerGen - which took ownership of the thermal generation plant;
- National Grid Company or NGC - which was allocated the transmission network operating at 400 kV and 275 kV; and
- Nuclear Electric - which inherited the nuclear power stations).

At the same time the twelve area boards were also corporatized and renamed regional electricity companies or RECs. The REC’s also became the owner of NGC, with each one holding a stake proportionate to its size.

A process was then initiated by the UK Government of selling these companies to the private sector. In December 1990 the RECs were sold by a public stock market flotation. 60% of National Power and Powergen were similarly floated in March 1991 followed by two successor companies that had been established in Scotland (Scottish Power and Scottish Hydro-Electric) in June 1991. The remaining 40% of the generation companies (other than, at the time, a special Government owned share) were sold in March 1995. Also in December 1995 the RECs ceased to own National Grid and its shares were separately listed and traded on the Stock Exchange.

Subsequently the nuclear industry was restructured. The more modern nuclear power stations were sold as British Energy in June 1996, leaving only the aging first generation Magnox stations and the fuel reprocessing facilities in the public sector.

Since then there have been numerous corporate changes as well as new entrants to the industry.
Generation and Retail Competition

There were a number of drivers for the restructuring of the industry and the transfer of the vast majority of it to the private sector but one important factor was the introduction of competition into the industry. This required the breaking of vertical linkages to facilitate such competition. However some such integration remained. The RECs were established as integrated distributors and suppliers and were also initially allowed limited involvement in generation of up to 15% of their sales volume. National Power and Powergen were also allowed to supply to some customers directly although generally via the distribution networks owned and operated by the RECs.

In 1990 to liberalise entry into the generation market and to facilitate generation competition an electricity pool was established. This was one of the first mechanisms of its kind and was based mainly on the merit order previously operated by the CEGB. The pool was set up to facilitate a competitive bidding process between generators that set the price paid for electricity each half hour of the day and established which generators would run to meet forecast demand. The pool was an unincorporated association of its members. Its members, wholesale buyers and sellers of electricity, controlled how the pool was run and decided if and how the pool should change. The NGC operated the pool and administered the pool’s settlement system on behalf of pool members.

As pool prices could be peaky and volatile and to hedge against pool price uncertainty, the bulk of electricity was sold through bilateral financial contracts with suppliers – contracts for differences (CfDs) - negotiated directly between the parties.

In 2001 the pool approach to generation competition was reformed by the introduction of the New Energy Trading Arrangements or NETA which implemented direct trading between generators and suppliers together with a balancing mechanism. This was originally only applied in England and Wales but was subsequently extended to Scotland when BETTA or British Electricity Trading and Transmission Arrangements which also established a single system operator the whole area.

Although continually being refined this structure of generation broadly remains in place. Changes that are currently being implemented are substantially driven by the emergence of intermittent renewable generation some of which is deeply embedded in distribution networks and the closure of large fossil fuelled generation plant which are jointly causing technical, commercial and regulatory challenges to the industry.

Also in 1990 retail competition was introduced into electricity supply. At the time this was a fairly novel concept and there was much to be worked out. The basic approach was that a licenced supplier could purchase energy from generators (initially via the pool) and pay NGC and the relevant REC to “transport” it over transmission and distribution networks to end-use customers. This is, of course, a commercial description of what was happening rather than the actual physical flow of energy.

Retail competition was implemented on a phased basis as shown in Figure G-1 below. Initially this was to sites where the maximum demand (or peak load) exceeded 1 MW – amounting to about 5000 sites representing about 45% of the non-domestic market - which was introduced in 1990. In 1994 this was extended to those sites where the maximum demand exceeded 100 kW – a further 50,000 customers. In 1999 it was further extended to all end-use customers whatever their size – approximately 23 million customers at the time which has now grown to more than 26 million customers.

The phased approach to opening customers to competition resulted for a number of reasons – not least to manage the risks of what was, as previously mentioned, a very novel and innovative approach where there was very little experience for previous implementations elsewhere in the world. It should also be recalled that this was being undertaken – certainly at the beginning of the implementation period - at the same time that the new pool generation competition approach was being introduced and the majority of the industry was moving to the private sector. In addition there was a considerable amount of preparation that was required including setting up an appropriate legal, regulatory and industry governance structure, establishing a suitable set of central business processes and systems to manage settlements and related activities, organisational changes to support both competitive and service provider roles, the development of local (i.e. for individual RECs and so second tier suppliers (see below)) IT systems and business processes and in the case of the 1 MW and 100 kW markets the installation and testing of new metering and remote collection equipment, This had to be supported by
staff recruitment and training, which included the recognition that these changes would have a significant impact on the cultures of the organisations.

To summarise, the phased introduction of retail competition was intended to allow the time for the necessary preparations and to reduce the risk of failure or of unexpected or unintended consequences.

Each of the REC’s could supply those customers within their areas but to supply contestable customers located in the areas of the other RECs they had to be granted second tier licences. In addition in order to compete for contestable customers the generation companies – National Power and Powergen – also required and were granted second tier licences and competed for contestable customers. In theory other organisations could also seek second tier licences to provide added competition and although, this did occur it was some time before this happened on any scale. The licencing regime for both distribution and supply was subsequently revised and more information on this is provided below.

Figure G-1: Phased Introduction of Retail Competition into the UK electricity industry

Business Separation

In the UK the regulator (initially OFFER and, subsequently and remaining, OFGEM) has supervised the industry through extensive and comprehensive licences which have placed obligations and requirements of various sorts on licensees.

In 1990 RECs were granted Public Electricity Supply Licences which covered both their distribution and supply (or retail) activities i.e. there was one integrated licence.

Business separation requirements were limited although fairly powerful. These included:

- Each REC had to produce separate regulatory accounts for its distribution and supply activities;
- In setting charges (including network charges which in the UK are called use of system charges) a licensee was required not to show undue preference for or discrimination against any customer or class of customers and hence to other suppliers; and
In order to construct regulatory accounts the distribution must charge its own supply business for supplying non-contestable (called franchise in the UK) customers in that REC’s area and also for those contestable in the area which it also supplies. These charges must be published in a statement and for any individual site the charge that the distribution business makes must be the same whether it is supplied by the supply business associated with that distributor or by a second tier supplier.

As retail competition was extended so were the licence obligations for business separation and then in 2000 the Utilities Act 2000 Act required that there should be separate licensing of electricity supply and distribution, and that there should be a bar on supply and distribution licences being held by the same legal person. Note that this did not extend to the ultimate owners of the companies holding these licences not being the same i.e. distribution and supply could be in the same group of companies and share the same ultimate owner.

Since then there have been many sales of both distribution and supply companies but these have been driven by strategic and commercial objectives and not as a result of a legal or regulatory requirement.

The distribution and retail licences are very significant and extensive documents running to hundreds of pages. In general because of its service provider role the Distribution Licence is of most interest in regard to business separation. Shown below are some of the most significant provisions in regard to this topic in the current version of the standard conditions:

- The licensee’s must not abuse its special position and should manage the Distribution Business to ensure that it does not restrict, prevent, or distort competition in the supply of electricity and in a range of associated activities;
- It must ensure in carrying on its activities that it does not give any cross-subsidy to, or receive any cross-subsidy from, any other business of the licensee or related undertaking of the licensee;
- Regarding both use of the system, connection to the system and other associated services the licensee must not discriminate between any person or class or classes of persons. Specifically the licensee must not make charges which differ from the charges for such provision to others except to reasonably reflect differences in costs.
- Similarly in implementing, maintaining and complying with the Distribution Code and in complying with the licensee must not show undue preference or discrimination between persons.
- There are restrictions on the activities of the distribution business and also financial ring fencing requirements which must be adhered to.
- The licensee must put in place and at all times maintain managerial and operational systems that prevent other related (i.e. some form of shared ownership) companies that have a licence in a competitive activity (such as retail or generation) from gaining access to customer related information that is not available to all.
- Compliance Statement must be in place that describes the practices, procedures, and systems which the licensee is adopting to ensure compliance with the previous bullet point.
- This Compliance Statement must set out how the licensee will:
  - maintain the full managerial and operational independence of the Distribution Business from anyone with whom it shares ownership and holding a licence holder in a competitive area;
  - maintain the branding of the Distribution Business so that it is fully independent from the branding used by a licence holder as described above; and
  - manage the transfer of employees from the Distribution Business to a licence holder a licence holder as described above.
• This statement must also explain what arrangements are in place to ensure the protection of confidential information where there is shared access or use of premises and or IT systems by licensees other than the Distribution Business.

• The licensee must appoint a Compliance Officer to provide relevant advice and guidance on a range of topics including the following:
  o maintaining the independence of the Distribution Business;
  o restricted use of confidential information;
  o ensuring that there is no abuse of the licensee’s special position including the prohibition of discrimination between any person or class or classes of persons when providing Use of System or connections and other related activities
  o monitoring the effectiveness of the practices, procedures, and systems adopted by the licensee in accordance with the Compliance Statement;
  o advising whether, to the extent that the implementation of such practices, procedures, and systems requires the co-operation of any other person, they are designed so as reasonably to allow the required co-operation;
  o investigating any complaint or representation made available to him;
  o recommending and advising on the remedial action that any such investigation has demonstrated to be necessary or desirable; and
  o reporting annually to the licensee’s directors about his activities.

• The licensee must ensure that the Compliance Officer is sufficiently independent to undertake the required duties and is provided with the necessary resources and access.

• The licensee must give the Compliance Officer a copy of any complaint or representation that it receives from any person about a relevant matter.

• The Licensee’s should use the report from the Compliance Officer to produce its own comprehensive Compliance Report which should be forwarded to the regulator and published on the licensee’s website.

• The Licence defines “sufficiently independent directors” and requires at least two of these to be on the board of the licensee.

• Regulatory accounts must be produced.

Corporate Activity

There has been considerable corporate activity in this sector which has resulted in a consolidation in the number of major retailers. Originally each of the fourteen RECs (twelve in England and Wales, and two in Scotland) plus the two generators and shortly afterwards a number of new entrants were retailers. However, this has now reduced to six major players (two of whom are currently seeking regulatory approval to merge their businesses). These retailers supply about 80% of the market (noting that in the domestic sector that the biggest supplier is British Gas, which was not originally an electricity sector party) with the remaining 20% supplied by a large number of recent entrants.

Similarly, in the distribution sector, initially each of the fourteen REC’s had a distribution licence and managed the distribution activities in their own region. Whilst the fourteen individual licences are still in place the ownership of the networks has substantially consolidated and there are now only six groups who are managing the fourteen licences as shown below (note that this map also covers Northern Ireland and the Republic of Ireland):
Each of the groups tends to have organisations that manage its networks together although licence requirements still require separate reporting of each of the licence areas.

These corporate transactions have, in some cases, separated the ultimate ownership of retail and distribution businesses in the same area (noting that there is no longer any franchise supply in the UK so all customers are contestable). Hence there are some commercial groups whose interests and ownership in the electricity industry are limited only to distribution whilst others have separate companies that participate in the distribution, retail, and transmission markets.
## Appendix H

### H PC Cost Template

**Retail**

IT Development and Annual Operating Costs

<table>
<thead>
<tr>
<th>Investment/ Upgrade/Enhancement</th>
<th>Development or purchase costs including installation</th>
<th>Annual Operating Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Networks - Establish separate (and redundant) communication links to the VWEM WAN</td>
<td></td>
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<tr>
<td>Metering Systems - Establish an independent customer information and metering database</td>
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<tr>
<td>Demand Analysis and Forecasting Tools - Load Research System</td>
<td></td>
<td></td>
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<tr>
<td>Demand Analysis and Forecasting Tools - Demand Forecasting System Established and Compliant with VWEM demand forecasting requirements</td>
<td></td>
<td></td>
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<tr>
<td>Demand Analysis and Forecasting Tools - Demand Forecasting System for Retailer load modelling / load forecasting in place</td>
<td></td>
<td></td>
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<tr>
<td>Tools for VWEM Commercial Operations - Settlement and contracts database</td>
<td></td>
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<tr>
<td>Tools for VWEM Commercial Operations - VWEM database (for housing all key data for the VWEM that is published by the SMO)</td>
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<tr>
<td>Tools for VWEM Commercial Operations - Settlement checking &amp; settlement calculation system</td>
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<tr>
<td>Tools for VWEM Commercial Operations - Contract management system</td>
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<tr>
<td>Tools for VWEM Commercial Operations - Risk management system</td>
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<tr>
<td>Tools for VWEM Commercial Operations - Billing and settlements system</td>
<td></td>
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<tr>
<td>Tools for VWEM Commercial Operations - Wholesale spot price forecasting system</td>
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<tr>
<td>Interface to transfer metering data from MDMSP unit to Retailer unit</td>
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</tbody>
</table>
Interface to transfer metering data from Centralised MDMSP to Retailer unit

Interface to transfer customer information (existing and planned) to Retailer unit

Market Participant Interface

Interface - Access to Climate Station Information Tracked

Interface - Has Access to Weather Forecast Information

Interface - Relevant SCADA information transferred to Retailer unit

Ring-fencing measures in place for shared / pooled hardware and software resources

Access to physical asset management system

Electronic funds transfer system

Billing system for invoicing / billing of customers

TOTAL 

Training Costs

<table>
<thead>
<tr>
<th>Type of Training</th>
<th>Cost</th>
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<tbody>
<tr>
<td>General awareness</td>
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<tr>
<td>IT system and business process</td>
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<tr>
<td>Specialised</td>
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Staff Costs

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<th>Activity</th>
<th>Annual Cost per PC</th>
<th>Annual Cost all PCs</th>
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<tr>
<td>Retail</td>
<td>Demand Forecasting</td>
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<tr>
<td></td>
<td>Risk Management</td>
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<td>Contract negotiation</td>
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<td>Settlement</td>
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<td>Spot market operations</td>
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Other costs

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<td>Share of programme management costs</td>
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<td>Contingency</td>
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<td>Total</td>
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Distribution

IT Development and Annual Operating Costs

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<th>Annual Operating Cost</th>
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<tr>
<td>Communication Networks - Separate physical redundant communication link to the VWEM WAN</td>
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<tr>
<td>Metering Systems - Customer Information &amp; Metering Database</td>
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<td>Demand Analysis and Forecasting Tools - SCADA/DMS in place to monitor 110 kV networks and embedded generators &gt;= 30</td>
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<td>Demand Analysis and Forecasting Tools - SCADA historical database in place</td>
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<td>Demand Analysis and Forecasting Tools - Load Research System</td>
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<td>Demand Analysis and Forecasting Tools - Demand Forecasting System Established and Compliant with VWEM demand forecasting requirements</td>
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<tr>
<td>Power Engineering Tools - AC power flow analysis software</td>
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<tr>
<td>Power Engineering Tools - Tools for the management of distribution network data</td>
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<tr>
<td>Power Engineering Tools - Outage management tools (for distribution networks and larger customers)</td>
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<tr>
<td>VWEM Tools - VWEM database</td>
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<tr>
<td>Interface to Retailer for transfer outages and customer information (i.e. new customers and deregistration of existing customers)</td>
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</tbody>
</table>
### Interface to SMO for transfer outages and customer information (i.e. new customers and deregistration of existing customers)

### Formal interface to MDMSP unit for transfer of all meter data to EDSP

### Access to Climate Station Information Tracked

### Has Access to Weather Forecast Information

### Formal interface in place to transfer key SCADA data to Retailer unit

### Formal interface in place to transfer key SCADA data to SMO / NLDC

### Market Participant Interface

### Ring-fencing measures in place for any shared / pooled hardware and software resources

### Access to physical asset management system

### TOTAL

### Training Costs

<table>
<thead>
<tr>
<th>Type of Training</th>
<th>Cost</th>
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<td>General awareness</td>
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<td>Specialised</td>
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### Staff Costs

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<td>Network charging</td>
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<tr>
<td></td>
<td><strong>Distribution Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Other costs

<table>
<thead>
<tr>
<th>Type</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property costs</td>
<td></td>
</tr>
<tr>
<td>Share of programme management costs</td>
<td></td>
</tr>
<tr>
<td>Contingency</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
</tr>
</tbody>
</table>

### Metering

**IT Development and Annual Operating Costs**

<table>
<thead>
<tr>
<th>Investment/ Upgrade/Enhancement</th>
<th>Development or purchase costs including installation</th>
<th>Annual Operating Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Networks - Separate physical redundant communication link to the VWEM WAN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metering Systems - Customer Information &amp; Metering Database</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metering Systems - Transfer of metering data to Metering Database from all meters (directly or indirectly)</td>
<td></td>
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</tr>
<tr>
<td>Metering Systems - VEE performed on all metering data managed by the PC MDMSP unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metering Systems - Meter data backup system in place</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metering Systems - Register of all meters for each meter managed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metering Systems - Register of connection points and nodes</td>
<td></td>
<td></td>
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<tr>
<td>Metering Systems - Meter readings done in time to be consistent with the VWEM timetable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interface to Centralised MDMSP to retrieve additional meter data (e.g. meters that are managed by NPT)</td>
<td></td>
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</tr>
<tr>
<td>Interface to Centralised MDMSP (SMO) to provide meter data required for settlements</td>
<td></td>
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<tr>
<td>Interface - Remote meter reading for VWEM meters required for settlements in the VWEM</td>
<td></td>
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<tr>
<td>Interface to Retailer unit for transfer of meter data for Retailer’s customers</td>
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<tr>
<td>Interface to EDSP unit</td>
<td></td>
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<tr>
<td>Ring-fencing measures in place for any shared / pooled hardware and software resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to physical asset management system</td>
<td></td>
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<tr>
<td>TOTAL</td>
<td></td>
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</tbody>
</table>

**Training Costs**

<table>
<thead>
<tr>
<th>Type of Training</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>General awareness</td>
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</tr>
<tr>
<td>IT system and business process</td>
<td></td>
</tr>
<tr>
<td>Specialised</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
</tr>
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</table>

**Staff Costs**

<table>
<thead>
<tr>
<th>Business</th>
<th>Activity</th>
<th>Number of additional staff for one PC</th>
<th>Number of additional staff for all PCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metering</td>
<td>Registration</td>
<td></td>
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<tr>
<td></td>
<td>Meter data validation</td>
<td></td>
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</tr>
<tr>
<td><strong>Metering Total</strong></td>
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<td></td>
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</tbody>
</table>

**Other costs**

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<thead>
<tr>
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<tr>
<td><strong>TOTAL</strong></td>
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</tr>
</tbody>
</table>
TOTAL COSTS
Development or purchase costs including installation

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Retail</th>
<th>Distribution</th>
<th>Metering</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Costs</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Training Costs</td>
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<td></td>
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<tr>
<td>Staff Costs</td>
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<tr>
<td>Other</td>
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<tr>
<td>Total</td>
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</tbody>
</table>

Annual Operating Cost

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Retail</th>
<th>Distribution</th>
<th>Metering</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Costs</td>
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<tr>
<td>Training Costs</td>
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<tr>
<td>Staff Costs</td>
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<tr>
<td>Other</td>
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<td>Total</td>
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</tbody>
</table>
Appendix I

I  Comments received from PCs and ERAV
### NPC COMMENTS

<table>
<thead>
<tr>
<th>Comment</th>
<th>Response</th>
<th>Action in report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision 63 Article 8 requires the PCs to achieve accounting and organisational separation of businesses. The Task 2 report only discusses functions, not costs. NPC have been working on the separation of costs for MV/LV systems and retail. It is important to identify which assets are being used for which purposes.</td>
<td>Yes, it is agreed that accounting separation is an important component of overall business separation, and is referred to in a number of places in the Task 2 report. It was certainly intended that the report should apply to both functions and costs which is part of the reasoning for the references to accounting separation at various locations within it. It is also agreed that part of accounting separation requires the identification of which assets are used for which purposes. It is to be expected that the vast majority of assets - although not quite all - will be allocated to the distribution and MDMSP businesses noting that in certain cases (for example, IT systems to the extent that they are capitalised) some assets may be shared between different businesses and some form of allocation may be required.</td>
<td>No changes required</td>
</tr>
</tbody>
</table>
Approximately 75% of NPC’s staff costs are associated with distribution activities and 25% retail, but some staff currently work in both sectors. In addition, activities like central IT support are shared services. This makes implementing Decision 63 difficult.

<table>
<thead>
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<th>Response</th>
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<tbody>
<tr>
<td>It is suggested that a survey is undertaken to assess the time that shared resources are used to support individual businesses. The resulting information can then be used either for an allocation of staff costs or to form the basis of service level agreements between the central support department and the businesses, as appropriate. The survey should be repeated on a regular basis.</td>
<td>The following has been added as the new fourth paragraph of Section B.3.4.1 of Appendix B: “NPC has reported that approximately 75% of its staff costs are associated with distribution activities and 25% retail, but some staff currently work in both sectors. In addition, activities like central IT support are shared services, commenting that this makes the implementation of Decision 63/2013/QD-TTg difficult. An approach to resolving these difficulties could be to undertake a survey to assess the time that shared resources are used to support individual businesses. The resulting information can then be used either for an allocation of staff costs or to form the basis of service level agreements between the central support department and the businesses, as appropriate. The survey should be repeated on a regular basis.”</td>
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<td>Comment</td>
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<tr>
<td>The split between services and regional activities is a challenge for the current organisation.</td>
<td>It is assumed that this comment is suggesting that the introduction of business separation is a challenge because of the split between services and regional activities in the current organisation. This is recognised and it is likely that some organisational restructuring will be required. The Task 2 report refers to this in the second complete paragraph on the third page of the Executive Summary where the potential of a more functionally than geographically based organisation is raised. Although we are not clear about the definitions of “services” and “regional activities” that are referred to here, it may be that this restructuring could change the balance between these. This would need to be considered by each PC to identify the most effective approach in their individual circumstances.</td>
<td>The following has been added as the new third paragraph of Section B.3.4.1 of Appendix B: “NPC has also commented that the split between services and regional activities is a challenge for the current organisation”.</td>
</tr>
<tr>
<td>As ERAV licences Retailers who can compete for customers alongside the PCs in Industrial zones, it becomes difficult for NPC to compete. This is because of the regulatory requirements with which NPC has to comply as a regulated business, and the obligations placed on the company to supply customers that are expensive to service, e.g. those in remote locations.</td>
<td>The Consultant is requested to comment on this issue from experience elsewhere (e.g. the UK). It is important that the regulatory requirements on all retailers competing to supply customers who are permitted to change their supplier are broadly aligned. This means that PCs should not be required to provide a different level of service to such customers from their competitors and should not need to charge them more than costs reflective costs in order to cross subsidise other customers who are expensive to service.</td>
<td>The following has been added as the new Section 5.6.5: “During VWEM suitably licenced retailers can compete for eligible customers alongside the PCs. Some PCs have suggested that it may be difficult for them to compete because of the regulatory requirements that they have to comply with as a regulated business, and the obligations placed on the company to supply customers that are expensive to service, for example those in remote locations.”</td>
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<tr>
<td>Comment</td>
<td>Response</td>
<td>Action in report</td>
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<tr>
<td>Regarding transmission and distribution business costs all retailers (PC’s and others) should be charged the same use of system charges for supplying the same customer. Hence even if such charges were not cost reflective all retailers would face the same costs. Thus, important initial steps for the introduction of retail competition are the accounting separation of the businesses (distribution, MDMSP and retail for the PCs) and the use of these distribution – and relevant transmission - separated costs for the setting of use of system charges. One further issue is that non-PC retailers may be concerned that retail costs that should be charged to customers in the competitive sector are recovered elsewhere – i.e. from the monopoly distribution business or from retail customers that cannot be competed for (during VWEM, the vast majority). This, again, supports the early introduction of accounting separation between distribution and retail and clear legal and regulatory requirements on PCs that their retail charges should be cost reflective other than in circumstances publicly approved by the regulator. It is appreciated that from a public policy viewpoint there may still be a need for some cross subsidies to exist within the retail sector (although whether this is required for the large transmission and 110 kV connected customers who, it is understood, are the only retail customers who are eligible for competition at the VWEM stage is more questionable). Three possible ways that this could be addressed are as follows:</td>
<td>It is important that the regulatory requirements on all retailers competing to supply customers who are permitted to change their supplier are broadly aligned. This means that PCs should not be required to provide a different level of service to such customers from their competitors and should not need to charge them more than costs reflective costs in order to cross subsidise other customers who are expensive to service. Regarding transmission and distribution business costs all retailers (PC’s and others) should be charged the same use of system charges for supplying the same customer. Hence even if such charges were not cost reflective all retailers would face the same costs. Thus, important initial steps for the introduction of retail competition are the accounting separation of the businesses (distribution, MDMSP and retail for the PCs) and the use of these distribution – and relevant transmission - separated costs for the setting of use of system charges. One further issue is that non-PC retailers may be concerned that retail costs that should be charged to customers in the competitive sector are recovered elsewhere – i.e. from the monopoly distribution business or from retail customers that cannot be competed for (during VWEM, the vast majority). This, again, supports the early introduction of accounting separation between distribution and retail and clear legal and regulatory requirements on PCs that their retail charges should be cost reflective other than in circumstances publicly approved by the regulator. It is appreciated that from a public policy viewpoint there may still be a need for some cross subsidies to exist within the retail sector (although whether this is required for the large transmission and 110 kV connected customers who, it is understood, are the only retail customers who are eligible for competition at the VWEM stage is more questionable). Three possible ways that this could be addressed are as follows:</td>
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</tr>
<tr>
<td>1. The additional costs of expensive to service customers could be shared only among other customers who are not subject to competition. 2. The additional costs could be met by a levy on all retailers depending on their share of the market and shared appropriately. 3. Direct Government subsidy.</td>
<td>retail charges should be cost reflective other than in circumstances publicly approved by the regulator. It is appreciated that from a public policy viewpoint there may still be a need for some cross subsidies to exist within the retail sector (although whether this is required for the large transmission and 110 kV connected customers who, it is understood, are the only retail customers who are eligible for competition at the VWEM stage is more questionable). Three possible ways that this could be addressed are as follows: 1. The additional costs of expensive to service customers could be shared only among other customers who are not subject to competition. 2. The additional costs could be met by a levy on all retailers depending on their share of the market and shared appropriately. 3. Direct Government subsidy.</td>
<td></td>
</tr>
<tr>
<td>It was requested that the Consultant would revisit the recommendation about the ring-fencing of the MDMSP function within the PC distribution businesses.</td>
<td></td>
<td>Clarification to the 11th bullet point in Section 1.3 -- delete “part of” and replace with “associated with”</td>
</tr>
</tbody>
</table>

NPC noted that it will not be able to decide for itself how/whether the MDMSP role is ring-fenced within the organisation. NPC agrees that the MDMSP should be a distribution-related role however, because the distribution business is responsible for managing the boundary with the customer.

We have considered this point further in the light of the requirements in the Detailed Market Design, which specifies (Section 11.8.3) that “The provision of meters and MDMSP functions will be ring fenced businesses associated with each PC’s distribution business.”
<table>
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<tr>
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<tbody>
<tr>
<td>The rationale for ring-fencing the MDMSP from distribution is largely because of the confidential and commercially sensitive nature of the data that the MDMSP retrieves and stores, and the need to ensure that this is only released to other parts of the PC’s business by transparent agreement with the SMO as the market operator. Meter provision, as a principally technical activity, is less commercially sensitive and can be retained with the core distribution network business. On balance therefore we propose to retain the recommendation that the MDMSP role is ring-fenced from the rest of the Distribution function, as a separate business unit.</td>
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<tr>
<td>NPC is very active in its preparations for the implementation of the VWEM, but it is dependent on decisions from EVN as to how the subsidiaries will be organised. They consider themselves to be very proactive as a company.</td>
<td>Noted – although the Task 2 report emphasises the need for individual PCs to be given and to take greater responsibility for preparing for the proposed market changes.</td>
<td>The following has been added as the final paragraph of Section B.3.4.1 of Appendix B: The PC states that it is very active in its preparations for the implementation of the VWEM, but it is dependent on decisions from EVN as to how the subsidiaries will be organised. They consider themselves to be very proactive as a company.</td>
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<tr>
<td>Comment</td>
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<tr>
<td>Regarding the functional vs. regional split of the organisation, EPCNPC can see cost savings if they were to establish one retail organisation across all the regions, rather than having separate regional organisations.</td>
<td>This is a useful and important comment. The Task 2 report refers to this more generally in the second complete paragraph on the third page of the Executive Summary where the potential of a more functionally than geographically based organisation is raised.</td>
<td>The following has been added as the new last paragraph of Section C.5.1 of Appendix C: “The PC has also commented that regarding the functional vs. regional split of the organisation, CPC can see cost savings if they were to establish one retail organisation across all the regions, rather than having separate regional organisations”.</td>
</tr>
<tr>
<td><strong>CPC Comments</strong></td>
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<tr>
<td>CPC commented that the workshop is important for helping the PCs to identify the systematic steps that will be needed to prepare for the VWEM. The consultants’ work was considered now to be close to recognising the reality of the PCs’ situations.</td>
<td>This comment is appreciated and welcomed.</td>
<td>No changes required</td>
</tr>
<tr>
<td>The boundary between retail and wholesale activities will need to be clearly defined, and this will require clear regulations on boundaries and access to customers, meters etc.</td>
<td>Agreed. However, the Task 2 report states that “In view of the uncertainty regarding the role of the electricity wholesaler this has not been further considered in this report”.</td>
<td>No changes required</td>
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<tr>
<td>Comment</td>
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<tr>
<td>CPC would like to have established a Power Market Department but have not to date been permitted to do so by EVN. They do not currently have the staff in place with a full understanding of the VWEM, but are nevertheless trying to approach this proactively. They note that trying to decide which staff should be an EVN decision – it is only EVN policy decisions that can drive internal restructuring within the PCs, not decisions by the PCs themselves. CPC has established an internal working group in the meantime.</td>
<td>We are unclear why PCs are unable to take forward their own responses to these future changes. This will enable different PCs to innovate and experiment leading to the development of different approaches. Over time this will allow the emergence of those which are most effective. The Task 2 report emphasises the need for individual PCs to be given and to take greater responsibility for preparing for the proposed market changes. The setting up of a working group is an important first step.</td>
<td>The following has been added as the second paragraph of Section C.5.1 of Appendix C: “It has commented that it would like to have established a Power Market Department but has not to date been permitted to do so by EVN. The PC does not currently have the staff in place with a full understanding of the VWEM, but are nevertheless trying to approach this proactively. The PC has noted that trying to decide which staff are required should be an EVN decision – it is only EVN policy decisions that can drive internal restructuring within the PCs, not decisions by the PCs themselves. CPC has established an internal working group in the meantime”.</td>
</tr>
<tr>
<td>CPC would like to a clear view of the target organisational structure to be developed by MOIT, ERAV and EVN and then to adopt a “top down” approach to redesign their organisation accordingly.</td>
<td>See previous response</td>
<td>No changes required</td>
</tr>
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Compared with organising the IT arrangements and staffing structures associated with VWEM implementation, CPC considers metering to be less of a priority issue. Regarding the MDMSP, however, management of assets should be undertaken by operational departments.

<table>
<thead>
<tr>
<th>Comment</th>
<th>Response</th>
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<tbody>
<tr>
<td>The PCs have established a steering committee and associated working groups, to gain familiarity with the market.</td>
<td>Noted The following has been added as the second sentence of the third paragraph of Section C.5.2 of Appendix C: “The PCs have established a steering committee and associated working groups, to gain familiarity with the market”.</td>
<td>No changes required</td>
</tr>
<tr>
<td>In the proposed Market Design, it is clear that the MDMSP is a service provider to the market and that very strict procedures will be required for data management by the MDMSP.</td>
<td>Agreed No changes required</td>
<td></td>
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<tr>
<td>Comment</td>
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<td>Action in report</td>
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</tbody>
</table>
| SPC have attended many training sessions and have                     | The Task 2 report emphasises the importance of the PCs developing power purchasing and risk management expertise and, when appropriate recruiting staff with the necessary skills. It may be necessary to stimulate the creation of a suitable hedging market and utilise this to achieve a suitable level of risk which provides sufficient financial security. | The following has been added as the new third paragraph of Section D.6.2 of Appendix D: “The PC comments that it has attended many training sessions and has been implementing business separation in accordance with ERAV’s requirements (referring to EVN Decision 414/2016)”.
| been implementing business separation in accordance with ERAV’s     |                                                                                                                                                                                                          |                                                                                                                                 |
| requirements (referring to EVN Decision 414/2016)                     |                                                                                                                                                                                                          |                                                                                                                                 |
|                                                                        |                                                                                                                                                                                                          | The following has been added as the new third paragraph of Section D.6.2 of Appendix D: “In addition, the company states that it is concerned about participating in the VWEM, because experience with the paper market has shown them that their financial position is not secure”.
|                                                                        |                                                                                                                                                                                                          |                                                                                                                                 |
| SPC is concerned about participating in the VWEM, because experience  |                                                                                                                                                                                                          |                                                                                                                                 |
| with the paper market has shown them that their financial position    |                                                                                                                                                                                                          |                                                                                                                                 |
| is not secure.                                                        |                                                                                                                                                                                                          |                                                                                                                                 |


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<tr>
<td>SPC has undertaken the splitting of its retail and distribution functions, and is now looking to combine its retail activities into a “Retail Service Company”. SPC referred to the EVN document No. 414/2016 “Guiding separation of costs of power distribution segment and power segment in Power Corporations.”</td>
<td>Noted – although it is assumed that this is only applicable to costs.</td>
<td>The following has been added as the new second paragraph of Section D.6.1 of Appendix D: “SPC has undertaken the splitting of its retail and distribution functions, and is now looking to combine its retail activities into a “Retail Service Company”. SPC referred to the EVN document No. 414/2016 “Guiding separation of costs of power distribution segment and power segment in Power Corporations.”</td>
</tr>
</tbody>
</table>

**HCMPC Comments**

HCMPC understand the roles that are defined in the VWEM design, but are unclear as to the level of business separation that is required. In particular, they wish to understand why the Consultant has proposed full business separation. The Task 2 report was intended to indicate the various possible levels of business separation and the routes by which such separation can be implemented. The reasons for introducing such separation are also outlined in the report. It is appreciated that different jurisdictions decide to require differing levels of such separation due to their particular circumstances, market development and choices. | No changes required |
In fact full business separation has not been proposed at this stage. The Task 2 Report (Executive Summary) explains this and the reasons why, as follows:

“The VWEM is introducing a comparatively small element of retail competition at the PC level (i.e. retail competition will result mainly from large transmission-connected customers directly participating in the VWEM). This suggests that full scale legal and ownership separation is unnecessary at this stage (and may not be necessary as a legal requirement at any stage). However there are legal drivers – resulting from Government decisions and the draft VWEM market rules – which are encouraging such separation and these need to be taken into account. The conclusions are that these legal requirements can be met by:

- the introduction of accounting separation;
- setting up groups of staff dedicated to the various businesses but in the context of the current overall organisational structure; and
- ring-fencing confidential data so that it is accessible only to staff of the appropriate business”.

Table 7 of the report indicates a possible VWEM development path.

The extent to which further separation will be beneficial will depend on the approach taken for the VREM and should be re-assessed once this is clear.
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Metering could be located within either the distribution or the retail business – EVN has instructed that it should be a distribution activity. Under Decision 414/2016 of EVN, PCs have been instructed that Distribution is also responsible for purchasing energy from generators.</td>
<td>Whilst it is agreed that metering could be located within either the distribution or the retail business, it seems clear from the VWEM market design that it is envisaged that it should form part of the MDMSP business which would be associated with the distribution business. ERAV and the Consultant are clear that energy purchasing is a Retail activity and not one for the Distribution side of the PC’s business to be engaged in.</td>
<td>No changes required</td>
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</tbody>
</table>
| The report should mention how customer metering is to be handled. The MDMSP role defined for the SMO is clear, and if this is ringfenced it may be better for the Retail companies. PCs are only providing “boundary metering” data to the SMO. | As the Task 2 report is focused on the VWEM which means that the impact at the PC level regarding customer metering is relatively limited. However, the following requirements are set out in the VWEM market design, which are also set in the report: 11.8.3 PCs’ Metering and MDMSP Functions The provision of meters and MDMSP functions will be ring fenced businesses associated with each PC’s distribution business. Each PC’s metering and MDMSP function and will manage:  
  - The provision, installation and maintenance of metering installations in the PC’s distribution network; and  
  - The collection of metering data from each metering installation for which it is responsible, the processing of that data and the delivery of | No changes required                  |
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<td>the processed data to the retailer or for eligible customers the SMO’s metering database.</td>
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<td>And 11.9.4 Ring Fencing of MDMSPs: The MDMSP activities of the SMO, NPT and each of the PCs, should be ring fenced from any retailer, distribution, transmission or SMO functions and be independent of any generation. The SMO, NPT and each PC should set up an MDMSP entity within their organisations to carry out the role of MDMSP. The ring fencing of MDMSP entities should adhere to the following guidelines:</td>
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<td>• Accounting separation and reporting of the MDMSP function;</td>
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<td>• Reasonable allocation of costs between the distribution, retailing, MDMSP and other functions;</td>
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<td>• Limitations on the flow of information between the ring fenced areas;</td>
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<td>• Physical, staffing and functional separation between the ring fenced areas; and</td>
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<td>• Processes put in place for compliance and reporting.</td>
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There is a question about how to handle customers in the model with distribution and retail separated. The concern is that there could be something missing in the model:

- If Retail and Distribution are separated, but the MDMSP is located with Distribution, then Retail will be responsible for managing the customer interface but Distribution will effectively control customer behaviour.
- How will retail be made aware if there is a distribution supply issue?

There are two different issues here – and it is not clear that the impact of these is significant when retail competition is limited to large transmission connected or 110 kV customers (as is the case in the VWEM which is the focus of the Task 2 report). Dealing with each in turn:

- Neither distribution or retail really control customer behaviour so the issue raised here is uncertain. Information may need to flow from the MDMSP to retailers regarding, for example, meter readings but appropriate business processes can be built to deal with this.
- It is assumed that “distribution supply issue” means faults and similar incidents. Firstly, there is a need to establish whether retail needs to be made aware of such distribution supply issues. In fact, it may not be required. However, if such needs can be confirmed then again suitable systems and business processes may need to be built.

As previously mentioned these should not be significant issues in VWEM when competition is limited to a small number of large customers and organisational business separation is more limited.

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<td>There are two different issues here – and it is not clear that the impact of these is significant when retail competition is limited to large transmission connected or 110 kV customers (as is the case in the VWEM which is the focus of the Task 2 report). Dealing with each in turn: Neither distribution or retail really control customer behaviour so the issue raised here is uncertain. Information may need to flow from the MDMSP to retailers regarding, for example, meter readings but appropriate business processes can be built to deal with this. It is assumed that “distribution supply issue” means faults and similar incidents. Firstly, there is a need to establish whether retail needs to be made aware of such distribution supply issues. In fact, it may not be required. However, if such needs can be confirmed then again suitable systems and business processes may need to be built. As previously mentioned these should not be significant issues in VWEM when competition is limited to a small number of large customers and organisational business separation is more limited.</td>
<td>No changes required</td>
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Separating costs of Distribution, Retail and Metering would seem like a desirable step when approaching the competitive retail market (VREM). For the Provincial Companies, it would be important to... It should be emphasised that the Task 2 report mainly focuses on the VWEM although attempts to avoid establishing barriers to the VREM – noting that there still... | No changes required |
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| benchmark their metering costs against the MDMSP businesses of the Distribution companies. | significant aspects of the design of the latter which are not yet clear.  
More information would be required to respond further to this point. | |

**HPC Comments**

The Consultants should note that HPC and HCMCPC do not have Provincial Companies, but have Power Companies instead. HPC classes these as 3 x Regional PCs and 2 x City PCs.

| HPC Comments | Noted | The following has been added as the new last paragraph of Section E.4.1 of Appendix E:  
“HPC does not have Provincial Companies, but have Power Companies instead. It classes these as 3 x Regional PCs and 2 x City PCs”. |
|--------------|--------|--------------------------------------------------|

HPC has prepared its staff in readiness for the VWEM 2018. Regarding the recommendation that two demand forecasting teams would be required, one for the Distribution business and one for the Retail business, however, is this an essential recommendation?

| HPC has prepared its staff in readiness for the VWEM 2018. Regarding the recommendation that two demand forecasting teams would be required, one for the Distribution business and one for the Retail business, however, is this an essential recommendation? | The Consultant explained that this is because the forecasts produced by Distribution and Retail are required for different purposes and are likely to be focused on different parameters.  
The forecast used by Distribution will have two different purposes. One will be related to network planning and developing plans for reinforcing or replacing the network at all voltage levels. The second purpose will be for financial planning and revenue forecasting (including the implications for use of system charging)  
Similarly, the forecast used by Retail will be used for determining the business’s power purchases in the | The following to item 7 has been added in Section 7.14:  
“The need for two separate teams derives from the different requirements of the two businesses (with distribution focused on network planning and retail on power purchasing although both will also have revenue planning and financial forecasting activities that must be supported) and the increasing levels of organisational business separation.” |
short, medium and possibly long-term (depending on the risk management policies adopted) and also again for revenue forecasting and planning and will inform tariff and contract pricing decisions.

These different requirements and the increasing organisational separation between distribution and retail has resulted in the proposal for two separate forecasting teams.

HPC and ERAV indicated that the recommendations should be reviewed carefully for implications for city PCs compared with Provincial Companies.

[This issue was discussed with ERAV and further notes will be added.] – See Official ERAV comments below

HPC indicated that differentiating tariffs by voltage level could have different implications for city vs. regional companies.

This point is noted although tariff reform issues are beyond the scope of the VWEM project.

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<td>HPC and ERAV indicated that the recommendations should be reviewed carefully for implications for city PCs compared with Provincial Companies.</td>
<td>[This issue was discussed with ERAV and further notes will be added.] – See Official ERAV comments below</td>
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<td>HPC indicated that differentiating tariffs by voltage level could have different implications for city vs. regional companies.</td>
<td>This point is noted although tariff reform issues are beyond the scope of the VWEM project.</td>
<td>No changes required</td>
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ERAV comments

ERAV noted that they think the stakeholders are confused about the role of the MDMSPs, because they think they provide the metering equipment as well as doing the metering reading and data collection. Whereas the meters themselves are provided by the distribution businesses. We are asked to clarify this point in the report.

See report addition

The following has been added at the end of para. 5 of the Executive Summary:

(note that meter provision and maintenance is provided by the distribution service provider)
### Additional comments from ERAV

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<td>• Assumptions about the levels of subsidies required in the power sector will need to be developed in the future.</td>
<td>Agreed but that is not within the scope of this report</td>
<td>No changes required.</td>
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<td>• Regarding the full separation of ownership between distribution and retail businesses, it needs to be remembered that the retail business would not have any assets. Retailers would be under pressure in various directions, particularly for cash flow. This would affect both retailers and generators.</td>
<td>It is agreed that where the distribution and retail businesses are fully ownership separated that the vast majority of assets (probably not quite all) would be allocated to the distribution business. This would have financing implications – although businesses with few assets are not unknown.</td>
<td>No changes required.</td>
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<td>• Bank guarantees would be required, possibly supported by the asset base of the distribution business in some way. Some retailers are backed by consortia of retail companies.</td>
<td>The ability of these businesses to attract finance would depend on a range of factors including the perceived quality of the management, the likely rates of return, expected cash flows and the level of risks associated with both costs and revenue.</td>
<td>No changes required.</td>
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<td>• In reality, retail and distribution businesses will need to be kept close to each other.</td>
<td>This is not always the case. UK has seen examples of completely separate and independent retail and distribution businesses although this has resulted from commercial and business need as much as from legal or regulatory requirement.</td>
<td>No changes required.</td>
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<tr>
<td>• Each PC can only practically be expected to have one retail organisation, to maintain its financial sustainability.</td>
<td>Agreed – and similar arguments probably apply to distribution and metering.</td>
<td>No changes required.</td>
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- The PCs cannot currently organise a permanent revised structure, without EVN’s approval. ERAV has written to EVN to encourage progress, and a reply is awaited.

  This seems inappropriate and will stifle innovation and the appropriate allocation of responsibilities.  
  No changes required.

- In ERAV’s view, the MDMSP accounts should be separate from those of the other parts of the businesses.

  Agreed - it is assumed that this is because these are monopoly businesses providing services to multiple retailers (including those who also own other electricity businesses) and that protections are needed to prevent cross subsidy and possible market abuse.  
  No changes required.
Official comments from ERAV

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<td>The consultant is requested to supplement the report with international practices on principles and requirements for unbundling the distribution and retail functions (regarding to facility, activity and human resource) that previously belonged to one large company as well as unbundling progress if available. Besides, the consultant should give advice on the establishment of new retail company which should be under mother corporation or provincial company in the context of VWEM.</td>
<td>The principles and requirements of distribution and retail unbundling are described in Section 5 (particularly 5.3 and 5.4) of the Task 2 report. This also covers alternative approaches that can be adopted. Appendix G provides a brief outline of the restructuring of the electricity industry in the UK since around 1990. In particular it describes the business separation requirements that have been placed on distribution businesses. In addition, we have made the following amendments to the Task 2 report: A new Section 5.5 added – “Business separation – Unbundling in the Europe Union (EU) As previously mentioned, a brief explanation of the introduction of retail and generation competition and approach to business separation in the UK together with the move of most of the sector to the private sector is given in Appendix G. The UK has introduced a considerable amount of unbundling and business separation but has also permitted market forces to determine a number of the corporate outcomes. This is described in more detail in the Appendix. More widely in the EU, the Directives of the 3rd Energy Package have introduced unbundling requirements resulting - subject to some exceptions – in the separation of the various stages of energy supply (generation, transmission, distribution and supply). However, each country in the EU has some discretion in the implementation of the Directives such that, for example, only the Netherlands has legally required full ownership unbundling. Other countries have (where relevant) limited themselves to legal and functional separation. Important issues that have arisen relate to possible confusion arising from branding and communication policies where in some cases national regulators have intervened. Another important area has been compliance programmes designed to ensure that separation is effectively implemented. These seem to have been successfully introduced. In April 2016 the Council of European Energy Regulators produced a report on the Status Review on the Implementation of Distribution System Operators’ Unbundling Provisions of the 3rd Energy Package. This is available here and provides a useful summary of the progress on such unbundling within the EU.“</td>
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<td>Proposed structure of Power Corporations should be given for 2 periods, VWEM 2019 and long-term VWEM, in which the consultant is requested to clarify which department should be unbundled or newly established or merged into the others. When proposing new structure, the consultant also needs to take into account the differences between City Power Corporation (Hanoi, Ho Chi Minh) and Regional Power Corporation (North, Center and South) in terms of existing governance structure and management area. In addition, the consultant should make assessment on the suitability of the proposed structure with the new functions of Power Corporation in VWEM 2019 and long-term VWEM.</td>
<td>In multiple locations “metering” has been amended to “Meter Data Management” or “MDMSP” and in some cases “Distribution Business” to “Distribution Service Provider” in order to provide greater clarity over roles. The following has been added to Section 7.5 (and some other minor drafting changes made): “To implement this approach for the initial stages of VWEM (starting from the typical existing PC organisation shown in Figure 7) responsibility for the Planning and Technical departments should be merged into a new Distribution Unit and include a new separately managed MDMSP Unit within it (based on current knowledge of the activities within these two existing departments it is assumed that none of these activities should be allocated to the Retail business). The Business and Finance &amp; Accounting departments should be restructured such that there are individually managed distribution, retail and MDMSP teams within them. As mentioned previously, the HR, IT, Administration and any other corporate departments can be considered as providing services to the main businesses and do not require restructuring at this stage. At the Provincial and District power companies level, separately managed Distribution and Retail teams should be established based on the tasks undertaken. In view of the limited number of customers who will be eligible for competition in the VWEM, the small number of other meters from which data would need to be collected, and the fact that responsibility for meter reading and data collection for non-competitive customers rests with the Distribution Unit, there is no need for separate MDMSP units at this level at this stage. It should also be noted that meter provision and maintenance are not the responsibility of the MDMSP. Such services are provided by the Distribution department. Any services relating to customers for which the Provincial /District companies are responsible that are required by the MDMSP units at the PC level can be sourced from Provincial and District power companies’ Distribution Business units as needed.” And “Experience of this restructured organisation gained during the VWEM 2019 phase will provide guidance as to when there is a need to move to a more separated organisation. This is certainly likely to be required in the VREM, as retail competition develops, and may therefore also be applicable during the long-term VWEM period. An indicative ultimate organisational structure is shown in Figure 15. This would also facilitate legal separation of the businesses which, in turn, would allow alternative ownership models should Government wish to utilise these.</td>
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<td>To implement the Figure 15 organisation (starting from that shown in Figure 14) it would be necessary to establish a fully functionalised organisation that merged responsibilities for the Distribution Business, Retail Business and MDMSP activities into separate departments covering both the PC and the Provincial and District Power Companies. Hence for the Distribution Business, activities in the proposed Distribution department should be merged with those undertaken by the distribution teams in the Business and Finance &amp; Accounting departments (noting that to ensure appropriate corporate governance there should continue to be a functional link for finance activities with the central corporate finance department).</td>
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<td>Similarly, for the Retail Business activities in the proposed Retail department should be merged with those undertaken by the retail teams in the Business and Finance &amp; Accounting departments (again retaining a functional link for finance activities with the central corporate finance department).</td>
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<td>Finally, the MDMSP unit within the Distribution department should be merged with the MDMSP teams in the Business and Finance &amp; Accounting departments (once again retaining a functional link for finance activities with the central corporate finance department).</td>
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<td>As previously the HR, IT, Administration and any other corporate departments can be considered as providing services to the main businesses and may not require restructuring. However, consideration should also be given to devolving some of such activities to the three businesses.</td>
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<td>It is recognised that there are considerable differences in the physical size of the PCs. This may mean that in the organisational structure below that shown in Figure 15 for those PCs (other than HPC and HCMPC) which cover a large area that some aspects of geographical organisation may need to be retained. This should not need to be the case for HPC and HCMPC. It is also recognised that that there are currently some differences in the governance of the Provincial and District power companies between HPC and HCMPC. However in the fully functionalised organisation shown in Figure 15 it is assumed that full responsibility and accountability is vested in the PC in each case.</td>
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<td>Figures 14 and 15 have been amended.</td>
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<td>The following has been added to Appendix G (and some other minor drafting changes made):</td>
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Corporate Activity
There has been considerable corporate activity in this sector which has resulted in a consolidation in the number of major retailers. Originally each of the fourteen RECs (twelve in England and Wales, and two in Scotland) plus the two generators and shortly afterwards a number of new entrants were retailers. However, this has now reduced to six major players (two of whom are currently seeking regulatory approval to merge their businesses). These retailers supply about 80% of the market (noting that in the domestic sector that the biggest supplier is British Gas, which was not originally an electricity sector party) with the remaining 20% supplied by a large number of recent entrants.

Similarly, in the distribution sector, initially each of the fourteen RECs had a distribution licence and managed the distribution activities in their own region. Whilst the fourteen individual licences are still in place the ownership of the networks has substantially consolidated and there are now only six groups who are managing the fourteen licences as shown below (note that this map also covers Northern Ireland and the Republic of Ireland):

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<td><strong>Figure G-3: Electricity Distribution in the UK and Ireland – 2018</strong></td>
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**Electricity Distribution**

![Electricity Distribution Map](image)

Source: Energy Networks Association
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<td>Each of the groups tends to have organisations that manage its networks together although licence requirements still require separate reporting of each of the licence areas. These corporate transactions have, in some cases, separated the ultimate ownership of retail and distribution businesses in the same area (noting that there is no longer any franchise supply in the UK so all customers are contestable). Hence there are some commercial groups whose interests and ownership in the electricity industry are limited only to distribution whilst others have separate companies that participate in the distribution, retail, and transmission markets.</td>
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TA 8851: Establishing the Vietnam Wholesale Electricity Market (VWEM)

Task 2: Assessment of the current status of NLDC and recommendations for the implementation of new functions required for the SMO in the VWEM – Final Report

Report for Asian Development Bank
118936-S52759
Executive summary

This report is the third report delivered under Task 2 of the Asian Development Bank Technical Assistance TA 8851: Establishing the Vietnam Wholesale Electricity Market (VWEM).

It presents an assessment of the current role and structure of the National Load Dispatch Centre (NLDC) and considers the functions that it will be required to undertake in the VWEM in its role as the System and Market Operator (SMO).

The analysis of business functions that the SMO will need to undertake in order to deliver its responsibilities in the VWEM has shown a number of areas where enhanced capacity will be required within NLDC compared with its current activities. These include:

- Additional responsibilities for demand forecasting, building on Power Corporations’ (PCs’) forecasts and developing an increased number of scenarios to enable accurate forecasting, including reserves;
- Enhanced forecasting of non-dispatchable and semi-dispatchable generation outputs, including renewable generation;
- The co-optimisation of reserves and energy in the market will require enhanced functionality in the Day Ahead (DA) Scheduling process;
- New market registration processes that will be undertaken by the SMO, which will link with the registration of metering points by Metering and Data Management Service Providers (MDMSPs);
- A whole set of new processes will need to be put in place and administered relating to financial settlements. These include the following:
  - Settlement bank account with Electronic Funds Transfer (EFT) facility will have to be set-up and managed by the SMO;
  - Settlement statements will have to be issued;
  - Settlement statement queries from market participants will have to be responded to;
  - Payments from market participants are received via EFT and this will require additional staff to ensure payments are received and correct;
  - Payments to market participants via EFT have to be done and this will require additional staff;
  - Financial settlements will need to be undertaken for new categories of reserve services.

For the Long Term VWEM, additional functions will include:

- Conducting the Annual Contract Auction (ACA) and Quarterly Contract Auction (QCA), under which the sale and purchase of energy financial contracts (contracts for differences or CfDs) and Financial Transmission Rights (FTRs) will take place;
- Producing a 5-minute-ahead forecast for at least the next half hour: This will require an additional function and staff in the control room;
- Monitoring and recording of 5-minute dispatch instructions;
- Settlement of spot market based on locational prices;
- Enhanced market surveillance activities.

It is recommended that the team within NLDC which currently runs the ITRON metering system should form the nucleus of the SMO MDMSP function, but that this organisation should be ring fenced from the rest of the SMO operation, in order to ensure full transparency of its functions.

The VWEM Detailed Design proposes that “Consideration should be given to transferring EPTC’s staff who are currently engaged in managing the settlements and payments in the VCGM to the SMO for the VWEM.” This is an appropriate recommendation, since the role of EPTC in the VWEM will change significantly with the disappearance of the Single Buyer function.
A review of the operations carried out by EPTC suggests that staff from the Market Trading, Technical and Accounting departments within EPTC in particular will have skills that are particularly relevant for the SMO, and that transferring these departments into EPTC would be desirable.

A review of the NLDC Charter suggests that the range of activities that NLDC will undertake in its capacity as the SMO is broadly supported by the existing Charter, although it is lacking in detailed coverage of the functions that the SMO will fulfil in the buying and selling of electricity on the spot market. Consideration will therefore be required by ERAV, EVN and MOIT as to whether a change to the NLDC Charter is needed in the area.

A series of steps are recommended to work towards the full separation of NLDC from EVN as the SMO. Initially this should involve ring fencing the SMO as a state-owned single member limited company of EVN. For the introduction of the VWEM therefore, it is proposed that:

- The SMO should be legally separated from all other industry participants other than its ultimate owner.
- It should have its own governing body (a Members’ Council or board of directors). The members of this body should not have responsibilities in companies that are participating in the generation, retail or ancillary service markets, nor should they sit on the board of EVN. There should also be a number of directors (two or three) who are wholly independent of EVN.
- The SMO board should have a compliance committee focusing on ensuring that business separation requirements are complied with and that SMO decisions are non-discriminatory.
- The SMO should have a separate licence covering its role.
- It should produce its own accounts, ensure that it establishes and maintains an appropriate credit rating, and has access to suitable financial resources.
- SMO staff should be wholly employed on SMO activities (although certain shared services may be exempted from this).
- The staff of the SMO should be located in offices that are separate from any other industry participant including its ultimate owner.

A modified organisational structure for the SMO is proposed to enable NLDC to fulfil its functions in the VWEM 2019 and in the Long Term VWEM. The key functions within NLDC that will require enhanced capabilities are as follows:

- The Power System Analysis Department should have a section for demand forecasting including the forecasting of non-dispatchable generation.
- The System Operations Department Day Ahead Scheduling and Dispatch Section and National Load Dispatch Centre (referred to within NLDC as A0) will require enhancing and more staff to implement VWEM 2019. Note that as the Scheduling and Dispatch moves to real-time it is proposed that this falls under System Operations rather than under the Market Operations Department. This is proposed for discussion, due to the constant interaction required with the control room.
- The Market Operations Department will require a Market Administration Section and an Ancillary Services Section.
- The Metering and Settlements Department will have to enhance the Settlements Section for implementation of VWEM 2019. As noted above, this is likely to be achieved by transferring key functions from EPTC into NLDC.
- The Market Reporting and Analysis Department will be a new department and is proposed to have three sections for Market Surveillance, Market and Stakeholder Information and Market Audit.
- The Information Technology and SCADA Department will have to be enhanced to support all the new hardware, software and information requirements to implement VWEM 2019.

Further enhancements to this structure are proposed for the Long Term VWEM. Of these, the most significant is a proposal to replace the DA Scheduling and Dispatch unit with a Real-Time Scheduling and Dispatch function within the System Operations Department.
NLDC has proposed an alternative organisational structure that seeks to retain much of the existing structure in order that work flows are not unduly interrupted, particularly in the short term.

Whilst it is considered that the proposed organisational structures for NLDC in its role as the SMO suggested by the Consultants have merits in terms of their compatibility with international experience and the efficiencies they could potentially offer, we recognise NLDC’s concerns about maintaining the efficiency of work flows, particularly in the short term. We recommend that if it is decided that NLDC should pursue the organisational structures set down in its revised proposals, these be kept under close review to assess whether they are operating effectively.

Training and capacity building within the SMO will be important to ensure that existing and new staff are fully familiarised with the role and functions that the SMO is required to fulfil in the VWEM. A structured approach to developing future training is proposed, in which:

- knowledge is transferred first from consultants and senior NLDC staff to a dedicated team of SMO specialists;
- the dedicated team of staff will then become the source of expertise to cascade new learning down throughout the organisation.

A formal budgeting process will be required within the SMO, covering the following typical set of functions:

- Salaries;
- IT/Communications;
- Facilities and Insurance;
- Professional fees;
- General and Administrative;
- Corporate Services.

Experience in international system and market operation organisations suggests that the first two categories of costs, covering staff and ICT systems, typically account for in excess of 75% of the annual budget for SMO activities.
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Glossary

ADB  Asian Development Bank
AEMO  Australian Electricity Market Operator
BOT  Build-Operate-Transfer
BST  Bulk Supply Tariff
CAN  Capacity Add-On (payment in VCGM)
CBM  Cost-Based Market
CEO  Chief Executive Officer
CfD  Contract for Differences
CPC  Central Power Corporation
DA  Day Ahead
DAP  Day-Ahead Plan
DIM  Dispatch Instruction Management
DSP  Distribution Services Provider (or EDSP, Electricity Distribution Services Provider)
DTG  Direct Trading Generator
EFT  Electronic Funds Transfer
EPTC  Electric Power Trading Corporation
ERAV  Electricity Regulatory Authority of Vietnam
EVN  Electricity Vietnam
FCAS  Frequency Control Ancillary Services
FTR  Financial Transmission Rights
GDE  General Directorate of Energy
Genco  Generation Company
HAP  Hour-Ahead Plan
HCMPC  Ho Chi Minh City Power Corporation
HPC  Hanoi Power Corporation
ICT  Information and Communications Technology
IPP  Independent Power Project
IT  Information Technology
ITG  Indirect Trading Generator
ITO  Independent Transmission Operator
JSC  Joint Stock Company
LT  Long Term
MAP  Month-Ahead Plan
MDMSP  Metering Data Management Service Provider
MMS  Market Management Systems
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>MO</td>
<td>Market Operator</td>
</tr>
<tr>
<td>MOF</td>
<td>Ministry of Finance</td>
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<td>MOIT</td>
<td>Ministry of Industry and Trade</td>
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<td>MPI</td>
<td>Ministry of Planning and Investment</td>
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<tr>
<td>MR</td>
<td>VWEM Market Rules</td>
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<td>NLDC</td>
<td>National Load Dispatch Centre</td>
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<tr>
<td>NPC</td>
<td>Northern Power Corporation</td>
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<td>NPTC</td>
<td>National Power Transmission Corporation</td>
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<tr>
<td>OMC</td>
<td>One Member Company</td>
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<tr>
<td>PC</td>
<td>Power Corporation</td>
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<tr>
<td>PCO</td>
<td>Power Company (unit of a PC)</td>
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<td>PMD</td>
<td>Power Markets Department</td>
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<tr>
<td>PMP</td>
<td>Power Master Plan</td>
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<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
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<tr>
<td>PPMB</td>
<td>Power Project Management Board</td>
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<tr>
<td>PTC</td>
<td>Power Transmission Corporation</td>
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<tr>
<td>Qc</td>
<td>Contract Quantity</td>
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<td>RLDC</td>
<td>Regional Load Dispatch Centre</td>
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<tr>
<td>RTD</td>
<td>Real Time Dispatch</td>
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<td>RTO</td>
<td>Regional Transmission Organisation</td>
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<tr>
<td>SB</td>
<td>Single Buyer</td>
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<tr>
<td>SEMO</td>
<td>Single Electricity Market Operator (for Ireland and Northern Ireland)</td>
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<tr>
<td>SMHP</td>
<td>Strategic Multi-Purpose Hydro Power Plant</td>
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<td>SMO</td>
<td>System and Market Operator</td>
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<tr>
<td>SO</td>
<td>System Operator</td>
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<td>SOE</td>
<td>State-Owned Enterprise</td>
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<td>SPPA</td>
<td>Standard Power Purchase Agreement</td>
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<td>SPC</td>
<td>Southern Power Corporation</td>
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<tr>
<td>TOR</td>
<td>Terms of Reference</td>
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<tr>
<td>TSO</td>
<td>Transmission System Operator</td>
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<tr>
<td>TSP</td>
<td>Transmission Services Provider</td>
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<tr>
<td>VCGM</td>
<td>Vietnam Competitive Generation Market</td>
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<td>VEL</td>
<td>Vietnam Electricity Law</td>
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<td>VREM</td>
<td>Vietnam Retail Electricity Market</td>
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<tr>
<td>VWEM</td>
<td>Vietnam Wholesale Electricity Market</td>
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<tr>
<td>WAP</td>
<td>Week-Ahead Plan</td>
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<tr>
<td>YAP</td>
<td>Year-Ahead Plan</td>
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1 Introduction

This report is the second report under Task 2 of ADB TA 8851: Establishing the Vietnam Wholesale Electricity Market (VWEM). Task 2 addresses Recommendations on the Implementation of the New Functions of the PCs and NLDC for the VWEM, and consists of two sub-tasks:

**Sub-Task 2-1:** Assessment of current situation of Vietnam power sector, status of NLDC and PCs;

**Sub-Task 2-2:** Recommendation on the Implementation of New Functions of Power Corporations and NLDC (SMO).

The report presents new functions and responsibilities of the National Load Dispatch Centre (NLDC) in its proposed function as the System and Market Operator (SMO).

There are three report deliverables defined in the Terms of Reference for the project associated with Task 2:

1. Report on assessment of the draft VWEM design, market rules and legal and regulatory framework;
2. Report on assessment of the current status and new functions and critical requirements of PCs;
3. Report on assessment of the current status and new functions and critical requirements of SMO.

This document is the third of the above reports and focuses on the context within which the SMO will operate within the WEM. This report is a follow-on to the preliminary work done in report 1 and this work is repeated in this document for completeness of this report as a stand-alone document.
2 Vietnam Electricity Reform

2.1 Roadmap

Figure 2-1 illustrates the Roadmap for the implementation of a competitive power market as set out in PM’s Decision No. 63-2013-QD-TTg in 2013. It is an implementation plan for gradually transforming Vietnam’s electricity industry into one that allows for competitive wholesale and retail electricity markets.

The Roadmap outlines three major stages of reform:

- Vietnam Competitive Generation Market (VCGM);
- Vietnam Wholesale Electricity Market (VWEM); and
- Vietnam Retail Electricity Market (VREM).

The original timeline for the Competitive Wholesale Market implementation was modified in the MOIT Decision No. 8266/QD-BCT “Approval of the Detailed Design of the Wholesale Electricity Market of Vietnam (VWEM)” as follows, and this is reflected in Figure 2-1:

1. Preparation step (to the end of 2015)
2. First step of Pilot VWEM in 2016 (paper market)
3. Second step of Pilot VWEM in 2017-18
4. Full VWEM from 2019.1

Figure 2-1: Electricity Industry Reform Roadmap (2013)


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1 MOIT Decision No. 8266/QD-BCT Approval of the Detailed Design of the Wholesale Electricity Market of Vietnam (VWEM) Article 2
At present Vietnam is at the Competitive Generation Market or VCGM stage. In the Roadmap, each stage commences with a pilot period, with a number of constraints defined, which is subsequently followed by a “full operation” period.

The key characteristics of the existing VCGM are described in the section below and that of the Electricity Wholesale Market or VWEM is the section after that.

2.2 Power sector restructuring

Prime Minister’s Decision No. 168/QD-TTg dated 7 February 2017, on the Approval of the Project for Restructuring Vietnam Power Sector in 2016-2020 period and orientation to 2025, sets down a number of provisions relating to the structure of the power sector and the allocation of responsibilities during the restructuring process that is proposed over the period to 2025. This sets down a number of high level requirements that have an impact on NLDC, including the following:

- Article 1 Clause II.1(d): NLDC will continue to fulfil the functions of operating the power system and operating the power market. This therefore defines NLDC’s responsibilities as the combined System and Market Operator – the SMO.

- Article 1 Clause II.1.(dd) – first bullet: NLDC will be responsible for managing metering data in the wholesale electricity market. It should be noted that this clause is in the section that relates to the period 2016-2018, however the Decision is silent on the responsibility of NLDC thereafter. It is also important to note that managing metering data in the wholesale market implies taking responsibility for the final metering data that is used for settlement purposes. It does not suggest that NLDC is the sole party involved in metering, and indeed the second half of the clause clarifies this, as below.

- Article 1 Clause II.1 (dd) – second bullet: NPTC, the PCs, EPTC and EVN IT and Telecommunications are given responsibilities for collecting, managing and storing metering data within their scope of activity defined by MOIT. Decision 168/QD-TTg is not explicit about how these responsibilities are defined, however the VWEM detailed design makes it clear that NPTC, the PCs and NLDC are expected to fulfil the specific functions of an MDMSP.

- A series of provisions relating to the gradual ring-fencing and moving towards full independence of NLDC from other power sector entities. This is spelt out in a series of steps, with timescales as follows:
  - o 2016-18: Developing a project for transferring NLDC to a one member limited liability company, as an independent accounting unit under EVN;
  - o 2019-20: Implementing the transition of NLDC into a one member limited liability company, and aiming to complete this before the full operation of the VWEM in 2019;
  - o 2021-25: Planning and implementing the transition of NLDC as the SMO to be fully independent of any shared interests with buyers and sellers of electricity, with the State holding 100% of its charter capital.

NLDC has noted the significance of Decision No. 168/QT-TTg in defining NLDC’s responsibility not only for operating the power system and the power market, but also for managing metering data in the VWEM. We note in this report the emphasis both in the VWEM design and in good industry practice on the need for parties with responsibility for metering data to be fully independent of those buying and selling electricity, and we explore the related issues further regarding their implications for NLDC in Section 5.5.

Nothing in the VWEM Market Design prevents NLDC from fulfilling its role as a responsible party for metering data, however, and the design appears fully compatible with the provisions of Decision No. 168/QD-TTg. It envisages that NLDC as the SMO will have responsibilities for metering data as part of its Market Operator role, and in its own capacity as an MDMSP processing meter data from generators participating directly or indirectly in the VWEM.

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2 VWEM Detailed Design Finalisation Revised Final Report (IES and SW Advisory, updated 30 June 2016) p.88
2.3 Key characteristics of the Vietnam Competitive Generation Market (VCGM)

The VCGM commenced full commercial operation on 1 July 2012. The intent of the VCGM was to establish the rules and procedures for a single-buyer, cost-based electricity market, unbundle and restructure EVN, and to develop the systems and infrastructure necessary to support the operation of an electricity market. The key idea behind the VCGM was to facilitate competition in generation but largely retain the existing arrangements for the PCs and customers. This was done by having a single buyer, the Electricity Power Trading Corporation (EPTC), purchasing all power from the generators and providing power to the PCs under the Bulk Supply Tariff and the PCs selling power to end use customers based on the uniform retail tariffs.

The VCGM trading arrangements are illustrated in Figure 2-2 below.

In the event not all generators have been competing in this market - around 50% of installed capacity is not traded directly in the VCGM – which covers only those that are classified as being Direct Trading Generators or DTGs. Indirect Trading Generators (ITGs) are scheduled by the System and Market Operator which also manages the Strategic Multipurpose Hydropower Plants, and that are also regarded as ITGs.

The DTGs have Standardised Power Purchase Agreement (SPPA) contracts with the EPTC. Even though these contracts are called Standardised Power Purchase Agreements they are in fact simple contracts for differences (CfDs) i.e. they are financial contracts and do not involve the physical purchase or sale of power.
2.4 Key characteristics of the Vietnam Wholesale Electricity Market (VWEM)

The proposed trading arrangements for the VWEM are designed to have the PCs contract directly with generators and change the role of the Single Buyer (EPTC) in the market. The VWEM, also allows for wholesalers to enter the market and contract with generators and then sell to PCs (contract with PCs). The MOIT’s approved VWEM design allows for the possibility of having eligible customers being allowed to contract directly with generators or PCs other than their current PC. An eligible customer is either an existing or new customer that is connected (or that would connect) to the transmission network and hence needs to be considered as part of the wholesale market. Eligible customers would be subject to transmission charges. All other customers would be considered as part of retail market, an issue for the VREM. The design allows for new retailers to enter the market and sell to eligible customers.

The intended result of the VWEM over time is for:

- PCs to enter into contracts directly with generators such that their total contract portfolio should largely match their load profiles; and
- Where mismatches between their contracts and actual demands occur, PCs will face some spot market exposure.

For this stage transmission charges and possibly distribution charges will be unbundled. Thus the power costs for a PC over time will change from the bulk supply tariff (BST) to a combination of transmission charges, contract difference payments (SPPAs) and spot market payments. These arrangements are illustrated in Figure 2-3.

*Figure 2-3: Future VWEM Trading Arrangements*
The “Detailed Design of the Wholesale Electricity Market of Vietnam” describes the VWEM Detailed Design and the transition from the VCGM to the Long Term VWEM Detailed Design via the Pilot VWEM and the Full VWEM.

The document has various processes for entities and the processes related to SMO have to be translated to specific functions to be undertaken by the SMO.

2.5 VWEM Functions of the SMO

The SMO will fulfil two of the roles defined in the Electricity Law within the VWEM:

1. the National Electricity System Operator; and
2. the Electricity Market Operator.

Decision 63 further defines the role of NLDC as “the power market trading operator”, which “provides services for power load dispatch and operation of power market transactions.”

Prime Minister’s Decision No. 168/QD-TTg states that in the restructured electricity sector, “National Load Dispatch Centre continues performing the function of operating the power system and power market.”

These functions will be broadly based on the existing role of the NLDC, however the role of Electricity Market Operator will bring with it additional responsibilities for overseeing financial settlements, which are beyond the scope of the current role of NLDC. The implications of this are highlighted in the VWEM Detailed Design, which states that:

“The SMO will be based on NLDC but in order to improve NLDC’s capacity to manage settlements for the spot market we suggest transferring EPTC’s staff, who manage the market settlements and payments in the VCGM, to the SMO for the Full VWEM.”

The VWEM Detailed Design describes the functions of the SMO within the market in some detail, and these are summarised below under the various categories of activity that will need to be undertaken.

2.5.1 VWEM Market Administration

The SMO will be responsible for:

- administering the VWEM spot market;
- administering the registration of VWEM participants, service providers, generation units and power stations, dispatchable loads and ancillary service resources;
- maintaining and publishing a register of all VWEM participants and updating and publishing the register whenever a person or entity becomes or ceases to be a VWEM participant or service provider;
- maintaining and publishing a register of all VWEM generation units and power stations, dispatchable loads and ancillary service resources;
- maintaining a register of all connection points and meters, which identifies for each meter which MDMSP is responsible and, for each load or generation connection point, which participant is responsible for the VWEM spot market transactions;
- maintaining a history of its registers for participants, service providers, generation units and power stations, dispatchable loads and ancillary service resources, connections points and meters;

---

2 The Prime Minister's Decision 63/2013/QD-TTg on the Roadmap and Conditions to establish and develop the levels of the power market in Vietnam, Article 5.
3 Prime Minister’s Decision No. 168/QD-TTg dated 7 February 2017, on the Approval of the Project for Restructuring Vietnam Power Sector in 2016-2020 period and orientation to 2025: Article 1 Clause II.1.(d)
4 VWEM Detailed Design Finalisation Revised Final Report (IES and SW Advisory, updated 30 June 2016) p.89
5 VWEM Detailed Design Finalisation Revised Final Report (IES and SW Advisory, updated 30 June 2016) pp. 90-91
• establishing processes, including consultation with participants, for developing “SMO Process and Methodology” documents that outline the details of how the SMO plans to fulfil specific functions and obligations under the VWEM Rules and the Grid Code; and
• allocating resources to enable the SMO to efficiently and effectively operate and administer the Full VWEM on a non-profit basis.

2.5.2 VWEM Market Operation
The SMO will be responsible for:
• operating the VWEM spot market;
• for ancillary services not managed in the VWEM spot market, determining the market’s requirements for these ancillary services and procuring these services via a competitive, non-discriminatory and transparent process;
• operating and administering the smart auction and the auction and management of FTRs;
• operating and administering the market settlements; and
• collecting and providing information necessary to enable the market to operate efficiently and transparently.

The above responsibilities include managing the metering data that is used for market settlement purposes. Prime Minister’s Decision No. 168/QD-TTg states that NLDC is responsible for managing meter data in the wholesale market, which can be taken to refer primarily to the management of settlement metering data. The SMO settlement function will be required to work with MDMSP organisations that are to be set up in the SMO itself, in NPTC and in the PCs to coordinate the collection and validation of meter data.

2.5.3 VWEM Monitoring and Reporting
The SMO will be responsible for:
• providing information and other services to facilitate efficient decisions for operations and investment;
• monitoring the trading activities in the market;
• monitoring the spot market, smart auction, FTR auction, the market systems and the SMO’s own activities to identify areas where these could be improved;
• publishing performance indicators annually in order to monitor the SMO’s performance in respect of its functions; and
• procuring annual independent audits of the SMO’s market operations, financial accounts, financial systems, dispatch and pricing systems, general IT systems and IT security.

2.5.4 Power System Operation
The SMO will be responsible for:
• operating the power system in a secure manner;
• scheduling and dispatching generating units, loads, ancillary services and the transmission system; and
• providing projections of system reliability and system adequacy.
3 Roles and responsibilities of the NLDC/SMO in the VWEM

3.1 Market Operation

The main mission of the SMO with regards to market operation is to “regulate, coordinate activities of energy transactions and ancillary services in the electricity market” (Vietnam Electricity Law VEL, 20). Table 3-1 summarises the key responsibilities of the SMO in the VWEM in relation to market operation.

The following acronyms are used in the tabulation of the SMO’s functions.

- VEL: Vietnam Electricity Law and Amendments
- AD-VEL: Decree 137/2013/ND-CP- Implementation of a number of articles of the Electricity Law
- PMD: The Prime Minister’s Decision 63/2013/QD-TTg on the Roadmap and Conditions to establish and develop the levels of the power market in Vietnam
- MOIT1: MOIT’s Decision No 6463/QD-BCT approving the conceptual design of the VWEM
- MOIT2: MOIT’s Decision No 8266/QD-BCT approving the detailed design of the VWEM
- MR: VWEM Market Rules

Example of nomenclature used in Table 3-1: (VEL, 21) refers to the Article 21 of the Vietnam Electricity Law.

Table 3-1: Key responsibilities of the SMO in the VWEM in relation to market operation.

<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities</th>
</tr>
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</table>
| Reporting     | • Publicising the spot market prices and ancillary services prices (VEL, 21);  
• Reporting on activities, operation of the electricity market to the electricity regulator (VEL, 21).                                                                                                                   |

The reporting required in the VWEM will need to be defined and assigned as a duty to an appropriate function within the SMO, drawing on the experience of both NLDC and EPTC in this process.

| Monitoring    | • Controlling transaction activities of the market participants to ensure that the market is operated strictly according to the regulations (VEL, 21);  
• Monitoring the trading activities in the market (MR, 7-6);  
• Monitoring the spot market, smart auction, FTR auction, the market systems and the SMO’s own activities to identify areas where these could be improved (MR, 7-6). |

The monitoring activities to be undertaken by the SMO represent a significant increase in complexity compared with the current work of either NLDC or EPTC. Internal audit functions will also need to be defined and allocated within the SMO.
<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settlement</td>
<td>• Providing transaction services and making payment invoices (VEL, 21); &lt;br&gt;• SMO calculates settlement amounts and manages payment process in the spot market (MOIT1, 1-3); &lt;br&gt;• SMO collects system and market operation charges to recover their investment cost and operating cost (MOIT1, 1-3); &lt;br&gt;• Transmission owners are paid according to transmission price approved by MOIT to ensure full recovery of costs and a reasonable profit for investment and development transmission grid as planned (MOIT1, 1-3); &lt;br&gt;• Operate and administer the market settlements (MR, 7-6).</td>
</tr>
<tr>
<td>Market Participants</td>
<td>• Receiving and handling proposals related to electricity trading transaction activities (VEL, 21); &lt;br&gt;• Administer the registration of VWEM participants, service providers, generating units and generating systems, dispatchable loads, ancillary service facilities and any private networks that connect to the transmission system (MR, 7-6); &lt;br&gt;• Maintain and publish a register of all VWEM generating units and generating systems, dispatchable loads and ancillary service facilities (MR, 7-6); &lt;br&gt;• Maintain a history of its registers for participants, service providers, generating units and generating systems, dispatchable loads and ancillary service facilities, connections points, nodes and meters (MR, 7-6).</td>
</tr>
</tbody>
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The management of payment processes in the VWEM will be a new function for NLDC. This is an area of activity that is closely aligned to the settlement functions currently carried out by EPTC, and the organisation of this is likely to require a combination of skills from the existing teams in NLDC and EPTC to enable it to function correctly.
### Category | Responsibilities
--- | ---
**Operation** - **Spot Market** | • Market model: Cost-Based Pool (MOIT2, 1-3);  
  - Trading interval: 30 minutes (MOIT2, 1-3);  
  - Dispatch interval: 30 minutes (MOIT2, 1-3);  
  - Bidding interval: In D – 1 day, generators will submit their offer for the 48 trading interval of D day to the SMO. In D day, generators are allowed to re-submit their offer 06 hours before the actual operation (MOIT2, 1-3);  
  - Generation offer: generation companies prepare their offer complying with the specification of bid cap/floor for their generators’ available capacity. Bid cap of thermal generator is determined in accordance with the VWEM Rules. Bid cap of hydro generator is set following water value calculated by SMO. Generator’s offer includes 10 couples (at maximum) of price ((đ/kWh) and quantity (MW) for each trading interval (MOIT2, 1-3);  
  - Demand bidding: the following demand-side entities are allowed to bid in the VWEM: i) Pump-Storage; and ii) Interruptible load – bid for provide reserves (MOIT2, 1-3);  
  - Water valuation: SMO calculates weekly water value for hydro generators in power system; declares bid cap of each hydro generator. Generators may self-calculate their water value for their bidding strategy. SMO publishes input data outcomes of water valuation to market participants. Eater valuation model used by SMO needs to be audited in accordance with the VWEM Rules (MOIT2, 1-3);  
  - Trading day: The trading day starts at 12:00 am (midnight) and finishes at 12:00 am the following day (MR, 46);  

  The SMO will need to develop internal operating procedures that ensure its full compliance with the above timetable.

**Operation Others** | • Operate and administer the smart contract and FTR auction and any FTRs or contracts resulting from the auction (MR, 7-6).  

  The operation of the smart contract auction also represents a significant new activity to be undertaken by the SMO over and above the work that it currently undertakes. The Market Operations function within the SMO will need to address this as a separate activity from the Spot Market.

**Planning** | • Provide projections of market prices and dispatches (MR, 7-6);  
  - Provide a range of market projections on a rolling basis for a variety of timeframes to assist the SMO and participants with their own planning (MR Chapter 6);  
  - The SMO must provide year ahead projections of possible market and system reliability and adequacy outcomes (MR, 71);  
  - The SMO must combine the projected assessments of system reliability and system adequacy (PASAs) and the market projections into several integrated processes which are run on a quarterly basis (MR, 71).  

### 3.2 System Operation

The main mission of the SMO with regards to system operation is to “ensure safe, stable and economical operation of the national electric system” (VEL, 20). The role of the System Operator function within the SMO encompasses broadly the same range of functions currently undertaken by
NLDC, however a detailed assessment of these has been carried out. Table 3-2 summarises the key responsibilities of the SMO in the VWEM in relation to system operation.

Table 3-2: Key responsibilities of the SMO in the VWEM in relation to system operation.

<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities</th>
</tr>
</thead>
</table>
| Quality of Supply and System     | • The national electricity system operator shall (comply with) the national electric system frequency standards and voltages (obligations) (VEL,42);  
                                     | • To report in time to the electricity-regulating unit on, and to notify the electricity market operator of, emergency or abnormal circumstances seriously threatening the safe and reliable operation of the national electric system (VEL,42);  
                                     | • Operate the power system in a secure manner (MR, 7-6);  
                                     | • Provide projections of system reliability and system adequacy (MR, 7-6);  
                                     | • Coordinate the planning of generating unit and transmission line outages (MR, 7-6);  
                                     | • Coordinate Generator outages with Market Generators (MR, 38);  
                                     | • Develop network outage plans in conjunction with the ETSP (MR, 38);  
                                     | • Develop SMO Methodology Documents, which have been specified in the VWEM Rules, Grid Code, Metering Code and Distribution Code (MR, 7-6);  
                                     | • The SMO must develop and publish, as an SMO Methodology Document, its detailed requirements for registration data that must be supplied by Generators, Market Customers and Ancillary Service Providers for each generating unit or generating system, dispatchable load and ancillary service facility that they manage or control in the VWEM (MR, 28). |
| System Reliability               |                                                                                                                                                                                                                 |
| Generation Scheduling            | • Generation scheduling: SMO prepares generation schedule following the principles of security constraints optimisation. Application of modelling power system by 03 nodes representing 03 zones (North, Central, South) of power system for generation scheduling and dispatch (MOIT2, 1-3);  
                                     | • To formulate and implement modes of operating the national electric system based on plans, modes of mobilising capacities of power plants and support services publicised by the electricity market operator (VEL,42);  
                                     | • Maintain a register of all connection points and meters (MR, 7-6).                                                                                                                                              |
| Real-time Dispatching            | • The SMO is responsible for the real time dispatch (RTD) of generating units and management of the transmission system in the VWEM 2019 (MR, 86);  
                                     | • The SMO must develop and publish an SMO Methodology Document to describe the RTD in the VWEM 2019 (MR, 87);  
<pre><code>                                 | • Until the SMO has a RTD system that can meet the RTD requirements set out in Section 6, the SMO must attempt to dispatch generating units to provide energy and FCAS in a way that: Best matches the most recent half hour ahead projected schedules produced by DAP and the day ahead schedules for FCAS, Is compatible with any ancillary service contracts; Maintains the power system security; and Where generators’ dispatches are changed from the projected schedules this is done in a way that aims to minimise the total dispatch costs for that time period (MR, 87). |
</code></pre>
<p>| Co-ordination                    | • To notify the mobilised capacities, outputs and support services to the electricity                                                                                                                                 |</p>
<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>with Market Operations</td>
<td>market operator for the latter to make payments (VEL,42).</td>
</tr>
</tbody>
</table>
| Load Forecasting                 | • Develop load forecasts suitable for all the projections (MR, 7-6);  
• The SMO must develop load forecasts for all of the market projections and real time dispatch using the appropriate forecasting methodologies for each forecast timeframe and projection requirement (MR, 34);  
• The SMO must determine all of the inputs, processing and modelling required for planning and co-ordination according to the market processes and timetable specified in Chapter 17 (MR, 34);  
• The SMO must specify the details of all the inputs that it requires from participants for the SMO to undertake its two year ahead planning (Article 35), Annual Plan (Article 36), outage planning (Article 38), load forecasting (Article 39), year ahead and month ahead projections (Section 1 and Section 2) in one or more SMO Methodology Documents (MR, 34);  
• The SMO must publish all of results and information required for planning and co-ordination according to the market processes and timetable specified in Chapter 17 (MR, 34);  
• The SMO must develop nodal: load, non-dispatchable and semi-dispatchable generation forecasts for all of the market projections and the dispatch processes (MR, 39);  
• For the YAP, MAP, WAP, DAP and RTD forecasts, SMO must use an automated forecasting system which can use different forecasting approaches for different timeframes to produce the required nodal forecasts. The forecasting system may use input from the SMO to select similar days or other inputs (MR, 34);  
• Horizon, Granularity and Frequency: must comply with Appendix 1 of the MR.  
• The SMO must periodically evaluate the accuracy of its forecasts and make refinements to the methodologies used if the refinements are likely to improve their accuracy (MR, 34);  
• The YAP system must be designed to meet annual planning requirements for the SMO and participants and projections of system reliability and system adequacy (PASA) requirements as stated in Article 71 (MR, 73). |
| Operational Planning - Year Ahead| • Year Ahead Operational Planning: SMO calculates year ahead operational planning (12 months) combined with calculations of operational planning and power system security assessment. Year ahead operational planning is updated quarterly and calculated for next 12 months and take into account the next 12 months later. Output of the year ahead planning includes generation schedule of the generators, market price and other necessary parameters (MR, 35);  
• The SMO must determine a year ahead operational plan (MR, 34);  
• As part of determining the year ahead operational plan, the SMO must undertake an assessment of system reliability including a Projected Assessment of System Adequacy (PASA) (MR, 34);  
• The SMO must combine the projected assessments of system reliability and system adequacy (PASAs) and the market projections into several integrated processes which are run on a quarterly basis (MR, 71);  
• The SMO must incorporate these (outage) plans into its Year Ahead Operational Plan and use its outage scheduler to suggest improvements to the integrated generation and outage plan in light of any potential problems identified in the Year Ahead Projections (YAPs) (MR, 34);  
• (see detailed contents of YA operational plan in MR 34). |
<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational Planning - Month Ahead</strong></td>
<td>• Month Ahead Operational Planning: SMO calculates month ahead operational planning. All of the works for calculating month ahead planning are similar to works in year ahead planning calculation, including input data to be updated for next month.</td>
</tr>
<tr>
<td><strong>Operational Planning - Week Ahead</strong></td>
<td>• Week-ahead operation planning: SMO prepares week-ahead market operation planning which is combined with short-term (weekly) projected assessment of system adequacy (PASA) where the calculation period is 14 days for the scenario of basic/low/high demand.</td>
</tr>
<tr>
<td><strong>Operational Planning - Day Ahead</strong></td>
<td>• Day Ahead Operational Planning: SMO updates input data, daily bidding from generators, transmission service provider, and calculates day ahead operational planning.</td>
</tr>
</tbody>
</table>
| **Ancillary Services**                       | • For frequency control ancillary services (including frequency regulation, spinning reserve): being traded in the spot market. In case of applying the ex-ante market pricing arrangement, the co-optimisation of energy and frequency control ancillary services will be implemented (MOIT2, 1-5);  
  • For other ancillary services: SMO purchase by entering to contract with ancillary services providers who are selected through competitive tender or appointed by SMO (MOIT2, 1-5);  
  • For ancillary services not managed in the VWEM spot market, determine the market's requirements for these ancillary services and procure these services via a competitive, non-discriminatory and transparent process (MR, 7-6);  
  • Determine ancillary service requirements on a periodic basis, at least once per year (MR, 34);  
  • In the VWEM, ancillary services will be categorised into the following areas: Frequency control ancillary services (FCAS), which are the services used to manage the frequency of the power system; Network control ancillary services (NCAS), which are the services used to manage voltage levels and network loading before and after any credible contingency; and System restart services, which are the services used to restart (re-energise) the power system following a partial or full system blackout. The services which are required to restore power supply in a sub-network of the power system following a major power disruption (MR, 97). |
| **Reporting**                                | • The SMO must provide an annual plan for ERAV and MOIT to approve. The plan must provide projections for the next year of key aspects of the market and consist of: (MR, 36)  
  o Load forecasts for Vietnam for each month for:  
    ▪ Energy;  
    ▪ Peak demand; and  
    ▪ Minimum demand;  
  o Available generation capacity; and  
  o Any indications of potential supply shortfalls, that is, any projections of unmet load or shortages of FCAS (reserves). |

### 3.3 General functions and obligations

Table 3-3 summarises the functions and obligations of the SMO which neither fall into market operation nor system operation categories.

Table 3-3: Functions and obligations of the SMO which neither fall into market operation nor system operation categories.
<table>
<thead>
<tr>
<th>Category</th>
<th>Responsibilities/Obligations</th>
</tr>
</thead>
</table>
| Accounting           | • In the VWEM, NLDC is reformed as an independent accounting unit under EVN (MOIT2, 1-2d).  
  It should be noted that independence of financial accounting should not require further structural changes within NLDC, which is already established as an independent operating unit within EVN. |
| Auditing             | • Annually, procure independent audits of the SMO’s market operations, financial accounts, financial systems, projection, dispatch and pricing systems, general IT systems and IT security in accordance with Chapter 22 (MR, 7-6). |
| Funding              | • The SMO’s costs must be (MR, 7-5):  
  o Recovered via market fees charged to Market Generators and Market Customers;  
  o Regulated by ERAV; and  
  o Set at a level that allows the SMO to:  
    ▪ undertake all of its functions,  
    ▪ pay market based salaries for its staff,  
    ▪ pay auditors’ and consultants’ fees as required,  
    ▪ make capital investments in areas such as IT and communication systems as required; and  
    ▪ make any other payments necessary for the SMO to effectively operate the VWEM. |
| Reporting            | • Publish, annually, performance indicators in order to monitor the SMO’s performance in respect of its functions (MR, 7-6).                                                                                                           |
| Capacity Building for the VWEM | • Preparing facilities within their boundary which are required for their participation in the VWEM in accordance with the approved VWEM design; ensure the adaptation with VWEM IT system approved (MOIT2,3-3);  
  • Prepare capacity building plan in accordance with the plan approved by the MOIT; arrange budget for implementing training plan approved by the MOIT (MOIT2,3-3);  
  • Prepare human resources; participate in training program; arrange budget for capacity building for meeting the requirements of the VWEM (MOIT2,3-3);  
  • Complete all preparation facilities required by the VWEM before December 2015 for participating, operating in the VWEM in accordance with the plan specified in Article 2 of this Decision (MOIT2,3-3). |
4 Current Role and Responsibilities of the Power System Operator

4.1 System Operator Structure and Main Functions

The current System Operator (NLDC) structure has Board of Directors, 7 departments and 3 load dispatch centres. There is a total of 135 staff members. The main functions for each department are shown in Table 4-1.

Table 4-1: NLDC main functions for each department

<table>
<thead>
<tr>
<th>NLDC Department</th>
<th>Main Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power System Operation Department (Dispatching Department)</td>
<td>• Operating the National Power System to ensure the system security, stability, reliability in compliance with operational procedures and regulations issued</td>
</tr>
</tbody>
</table>

7 System Operator response to detailed questionnaire document Detailed_questionnaire_NLDC v3_17_08.docx
<table>
<thead>
<tr>
<th>NLDC Department</th>
<th>Main Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>by the National authorities.</td>
<td></td>
</tr>
<tr>
<td><strong>Power System Analysis and Planning Department</strong></td>
<td></td>
</tr>
<tr>
<td>• Operational planning for power system and electricity market.</td>
<td></td>
</tr>
<tr>
<td>• Setting relay protection and automation system.</td>
<td></td>
</tr>
<tr>
<td>• Conducting medium and long term development research on National power system.</td>
<td></td>
</tr>
<tr>
<td>• Managing, operating and maintaining EMS applications of SCADA / EMS system, incidents locating and recording system, Fault Recorder and wide area protection WAMS.</td>
<td></td>
</tr>
<tr>
<td><strong>Power market operation department</strong></td>
<td></td>
</tr>
<tr>
<td>• Operating national electricity market in a fair and transparent manner in compliance with operational procedures and regulations issued by the national authorities.</td>
<td></td>
</tr>
<tr>
<td>• Preparing electricity market settlement statements.</td>
<td></td>
</tr>
<tr>
<td>• Daily and weekly power system operation planning.</td>
<td></td>
</tr>
<tr>
<td><strong>Information Technology &amp; SCADA Department</strong></td>
<td></td>
</tr>
<tr>
<td>• Developing, managing and operating the information technology infrastructure system and</td>
<td></td>
</tr>
<tr>
<td>Department</td>
<td>Main Functions</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>NLDC Department</strong></td>
<td>telecommunication system, specialising in servicing of power system and electricity market operation, including:</td>
</tr>
<tr>
<td></td>
<td>o SCADA / EMS system;</td>
</tr>
<tr>
<td></td>
<td>o Fire protection systems and equipment;</td>
</tr>
<tr>
<td></td>
<td>o Self-administered power systems and UPS;</td>
</tr>
<tr>
<td></td>
<td>o Office information systems.</td>
</tr>
<tr>
<td><strong>Human Resources Department</strong></td>
<td>• Advising and assisting the Director on the organisation and human resources, labour, wages, remuneration/rewards, security and national defence.</td>
</tr>
<tr>
<td><strong>Planning Department</strong></td>
<td>• Advising and managing capital planning, asset management, construction investment management and procurement management.</td>
</tr>
<tr>
<td><strong>Financial &amp; Accounting Department</strong></td>
<td>• Advising and assisting the Director on the finance, accounting, management and use of funds and assets of EVNNLDC to ensure the balance of capital for production and business activities, investment in construction, overhaul,</td>
</tr>
</tbody>
</table>
4.1 NLDC Detailed Functions Currently Undertaken

This section reviews the NLDC functions currently undertaken which have a material bearing on the future market functions to be undertaken as a SMO.

4.1.1 Power System Operation Power Functions

NLDC is responsible for operating the National Power System to ensure the system security, stability, reliability in compliance with operational procedures and regulations issued by ERAV.

The System Operator Dispatch Process is as follows:

- System operator sends dispatch instruction from the hour ahead schedule to all generators via Dispatch Instruction Management (DIM) system or hotline.
- ITGs and BOTs and other generators are dispatched via the DIM or hotline.

4.1.2 System Analysis and Planning Functions

NLDC undertakes projections of system reliability and system adequacy (Project Assessment of System Adequacy - PASA) in Year Ahead Planning, Month Ahead Planning, Week Ahead Planning and also Day Ahead Scheduling.

NLDC is responsible for scheduling the generation unit outages of all power plants (including DTGs, ITGs, BOTs, SMHPs) based on their submitted outage plans, in order to maintain the system reliability and security at least cost.

As for generation unit outages, NLDC is also responsible for schedule of transmission line outages based on the submitted outage plans of the transmission service provider (ETSP) and coordinates the transmission line outages with generation unit outages.

The year ahead, monthly and weekly planning process is as follows:

- PCs provide hourly load forecasts of typical days for each month to NLDC.
- NLDC forecasts the national load based on the top-down method (where the national load equals the sum of region forecast loads).
• The year ahead planning is a deterministic solution and performed once a year. However, NLDC run regular checks on the forecasts with actual data and update load forecasts within the month ahead, week ahead and day ahead schedule.
• The operational plan is derived from the SDDP calculation results to meet the forecast demand with the resolution of 5 block/week.
• NLDC run projection assessments of system adequacy for year ahead, month ahead and week ahead.

The day-ahead planning process is as follows:
• The day ahead scheduling is a deterministic solution and undertaken every day.
• NLDC updates load forecast every day.
• The operational plan is a fully constrained solution derived from the AREVA e-terracommit and e-terramarketclearing platforms.

4.1.3 Power Market Operation Functions

Day Ahead Scheduling

NLDC is responsible for day-ahead scheduling process in VCGM and process is as follows:

• DTGs submit offers for day ahead scheduling. Updated hourly offers are submitted if incidents occur which affect the generation output of the DTGs. The SMO schedules day ahead generation based on these offers. SMO schedules hour ahead generation based on updated offers for dispatch.
• ITGs and BOTs declare day ahead capacity available to SMO as one of the inputs for generation scheduling, and the SMO schedules these generators based on available capacity, contract price and energy limits for hydro power plants (refer to process time table in Figure 4-2).

Figure 4-2: Current Day Ahead Scheduling Process in NLDC
In the VWEM, SMO will have the responsibility to co-optimise between energy and ancillary services (regulation, spinning) and will have to publish information relating to regulation requirements, spinning reserve requirements to ensure that frequency is maintained within acceptable limits, and publish the scheduled capacity of each unit for each service to market participants. However, the other processes of monitoring and supervising still remain as in VCGM.

NLDC ensures and demonstrates compliance with the relevant technical regulations. Schedules and reports for annually, monthly, weekly and daily basic are submitted to EVN and ERAV. Settlement and metering data are compared and checked between related parties.

NLDC is responsible for generation scheduling for DTGs, ITGs and BOTs. However, NLDC prepares generation forecast for some ITGs (for example small hydro power plants).

NLDC calculates the generation dispatch schedule based on the offers, and schedules prepared based on security constrained economic dispatch (SCED) to meet the forecasted load. Generation schedule is prepared for hour ahead and the next 3 hours.

NLDC is responsible for scheduling Frequency Control Ancillary Services (FCAS) from one or more suppliers.

**Metering and Settlements**

NLDC is responsible for Remote Meter Data Acquisition System. NLDC currently receives metering data from 2 sources: directly from meter and from generators (main and back up).

NLDC is responsible for determining the market price and calculating spot market settlement amount receivable by market participants. NLDC provides EPTC and market participants with the detail of settlement statements. The current settlement process is prescribed as follows:

- **Day D+2**: NLDC provides EPTC and market participants with the market price for each trading period of Day D.
- **Before the day D+ 4**: MO prepares and publishes the preliminary settlement statement for trading day D for EPTC and DTGs.
- **Before the day D+ 6**: DTGs and EPTC are responsible for verifying Preliminary settlement statement; and notifying the MO of errors in the statement (if any).
- **On day D+ 6**: MO prepares and publishes the Final settlement statement for day D to EPTC and DTGs.
- **Within 10 working days since the last trading day of the settlement period**: MO creates and issues the settlement statement for the previous month.

NLDC adopts the following process with regard to transmission losses:
• NLDC models the transmission losses as a linear function in the optimisation process.
• Losses are not integrated into bidding activities on the VCGM.
• EPTC (EVN) purchases energy from the generator at the delivery point. All transmission losses on the VCGM are purchased by EPTC (EVN).

4.1.4 Information Technology & SCADA Functions

NLDC’s ICT and SCADA functions have been analysed in detail in the reports presented under Task 3 of this TA, and no further consideration of these is included in this report.
5 Analysis of new functions for the SMO

5.1 Introduction

This section reviews the new functions to be undertaken by the SMO in the following two stages: (1) VWEM 2019, and (2) LT VWEM. The design features of each are briefly summarised in the subsections that follow.

5.1.1 VWEM 2019 Design Features

The VWEM 2019 is intended as a continuation of the VCGM with the following being the main changes:

- VWEM categories of market participant come into effect, the role of Single Buyer ceases and Retailers under each PC are responsible for purchasing power. There is increased participation on the generation side of the market as well – all generators >= 30 MW directly participate.
- Trading interval and dispatch interval set to 30 minutes.
- A limited reserves market would be introduced.
- System Marginal Price based on an unconstrained schedule would be determined ex-post.
- General enhancements to YAP, MAP and WAP – where more simulations would be run and the simulations would be run more frequently.
- Day Ahead Schedule (DAS) would run every 6 hours and there would be a high and low demand sensitivity executed.
- SPPAs of the VCGM would cease – generators and retailers will have vesting contracts and bilateral contracts, if they so wish.
- Settlements would consist of:
  - SMP;
  - Customer SMP (C-SMP);
  - CAN;
  - Constrained on/off payments; and
  - Limited reserves market settlements.
- There would be a transition from a cost-based market to a price-based market.

5.1.2 Long Term VWEM Design Features

The following are the main LT VWEM design features:

- VWEM categories of market participant come into effect, the role of Single Buyer ceases and Retailers under each PC are responsible for purchasing power. There is increased participation on the generation side of the market as well – all generators >= 30 MW directly participate.
- Trading interval of 30 minutes and a dispatch interval of 5 minutes.
- A spot market for frequency control ancillary services would be put into operation.
- Locational marginal pricing determined on an ex-ante basis.
- General enhancements to YAP, MAP and WAP – where more simulations would be run and the simulations would be run more frequently.
- DAS would run every 30-minutes and there would be a large number of sensitivity cases run.
- Integrated FTR and smart contract auction process in place.
- SPPAs of the VCGM would cease – generators and retailers will have vesting contracts, bilateral contracts, FTRs and smart contract auction contracts as cleared by the SMO.
- Settlements would consist of:
5.1.3 Implications of proposed market design

In discussion with NLDC, a key issue that has been raised concerns the possible need for a contract auction as part of the VWEM 2019 market design. The VWEM will be set up with Vesting Contracts, but there is not a detailed legal framework proposed at this stage to support other forms of bilateral trading. The long-term VWEM design proposes a “smart contract” auction, however the implementation of this will depend on an ICT system procurement as a precursor. There is therefore a concern that the VWEM will not in the short term facilitate contracting between the participants.

If a formal contract auction process were to be established in 2019, this could potentially be introduced ahead of a full implementation of a derivative market. NLDC have suggested that a Contract Auction system could be established using the AREVA software that is currently being used by NLDC. This is an appropriate platform for short term (day ahead) trading activities, but the contracting approach implies longer term risk management over a period of months to years ahead. It is not clear therefore that a contract auction could be implemented successfully using existing software.

In addition, the introduction of a contract auction would require a change to the Market Rules, and should not be implemented without a formal amendment to the Market Design and the Market Rules being agreed. A modification to the Market Rules would need to be formally requested through ERAV and this would be considered in accordance with the relevant market governance procedures.

5.1.4 Transition Path of SMO

The following are the main stages of VWEM development:

- Pilot period from 2017 to 2018;
- VWEM 2019 in 2019; and
- LT VWEM in 2020.

During this period, it would be anticipated that the SMO and PCs will undergo some changes in their structure. The potential changes to the PCs’ structure are presented in the parallel Task 2 report “Assessment of the current status of Power Corporations and recommendations for the implementation of new functions required for the VWEM”. The main development stages proposed for the SMO are summarised in Table 5-1. It should be noted that these are the Consultant’s suggested changes and not necessarily those set out any regulations.
Table 5-1: Possible SMO/MDMSP Development Path

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SMO organisational changes</td>
<td>• SMO set up as an independent entity (which can still be owned by EVN)</td>
<td>• Ring-fencing provisions should be phased in to ensure SMO operates independently</td>
<td>• Implement settlement systems suitable for VWEM 2019</td>
<td>• Set up Centralised MDMSP (&quot;SMO MDMSP&quot;) for meter data management in the market</td>
<td>VWEM 2019 commences and is operated by SMO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>All necessary ICT systems should be in place for VWEM 2019</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Start LT VWEM (a major upgrade to the VWEM 2019)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SMO should eventually be a fully independent combined system and market operator</td>
</tr>
<tr>
<td>MDMSP organisational changes</td>
<td>• SMO MDMSP unit identified &amp; implementation started</td>
<td>• SMO MDMSP entity in place &amp; receiving all metering data required for settlements</td>
<td>• PCs MDMSPs units identified &amp; implementation started</td>
<td>• PCs MDMSPs infrastructure in place</td>
<td>All MDMSPs operate according to the VWEM rules with ring-fencing in place to ensure independent operation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>There should be little change to MDMSPs for this phase</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Perhaps longer-term consolidation of the different MDMSPs</td>
</tr>
</tbody>
</table>

5.2 SMO Market Operation Functions

A significant number of the market functions required under the VWEM are new to the SMO. The functions and processes are listed in the VWEM Detailed Design Finalisation final report⁸ are described below.

5.2.1 Functions and Responsibilities of the SMO

The SMO will have the following functions and responsibilities. It must operate and administer the market in accordance with the VWEM Rules and Grid Code, in particular the SMO must:

- Operate and administer the VWEM spot market;
- Operate the power system in a secure manner;
- Determine the market’s requirements for ancillary services that are not managed through the VWEM spot market, and procure these services via a competitive, non-discriminatory and transparent process;
- Schedule and dispatch generating units, loads, ancillary services and the transmission system, noting that the SMO cannot schedule or dispatch plant that are not traded in the VWEM;
- Provide projections of system reliability and system adequacy;
- Operate and administer the smart auction and the auction and management of FTRs (in the full VWEM);

• Administer the registration of VWEM participants, service providers, generation units and power stations, dispatchable loads and ancillary service resources;
• Fulfiling a range of registration functions in the market, including the following aspects:
  o Maintain and publish a register of all VWEM participants, updating and publishing the register whenever an organisation becomes or ceases to be a VWEM participant or service provider;
  o Maintain and publish a register of all VWEM generation units and power stations, dispatchable loads and ancillary service resources;
  o Maintain a register of all connection points and meters which identifies the MDMSP responsible for each meter and the VWEM participant responsible for each load or generation connection point;
 o Maintain a history of its registers;
• Operate and administer the market settlements – this represents a significant change from the MO’s current role, which is limited to the preparation of settlement statements;
• Collect and provide information necessary to enable the market to operate efficiently and transparently, and to enable efficient decisions to be taken by market participants about operational and investment matters;
• Monitor the trading activities in the market, including the spot market, smart auction, FTR auction, the market systems and the SMO’s own activities to identify areas where these could be improved;
• Establish processes, including consultation with participants, for developing “SMO Process and Methodology” documents detailing how the SMO plans to fulfil specific functions and obligations under the VWEM Rules and the Grid Code;
• Allocate resources to enable the SMO to efficiently and effectively operate and administer the Full VWEM on a non-profit basis;
• Publish annually performance indicators in order to monitor the SMO’s performance in respect of its functions; and
• Annually, procure independent audits of the SMO’s market operations, financial accounts, financial systems, dispatch and pricing systems, general IT systems and IT security.

5.2.2 VWEM Registration
There are two aspects of the registration processes in the VWEM as described below.

1. The registration of participants and their roles in the VWEM:
   o Generator,
   o Market Customer,
   o Ancillary Service Provider,
   o Service Provider.

2. The registration of generating units, dispatchable loads and ancillary service provider plant.
The registration of participants and their roles relates specifically to entities or organisations, while the registration of generating units, dispatchable loads etc. relates to the registration of physical equipment.

5.2.3 Spot Market
In the VWEM, a number of processes will need to run regularly in order to produce the required projections of market operation. These are defined in the VWEM Detailed Design:
1. **Year Ahead Projection (YAP)** that will provide an integrated projected assessment of system adequacy (PASA) and market outcomes for a range of random scenarios for inflows, loads and forced outages. This will be run every quarter and make projections for two years ahead.

2. **Month Ahead Projection (MAP)** that will provide an integrated projected assessment of system adequacy (PASA) and market outcomes for a range of random scenarios for inflows, loads and forced outages. This will assist the SMO with its month ahead operational planning and provide information for market participants and the ETSP to undertake their own. The MAP will run every week and make projections for one month ahead.

3. **Week Ahead Projection (WAP)** that will be used to assist the SMO with its week ahead operational planning and for market participants and the ETSP to undertake their own planning.

4. **Day Ahead Projection (DAP)** that will be used to assist the SMO with its market and system operations functions and its management of system security over the next day and market participants to manage their operations and risks over the next day.

5. **Real Time Dispatch (RTD)** that will be used to dispatch generators, dispatchable loads and reserve providers in real time.

6. **Spot Market Prices** will be ex ante prices in the long term VWEM and calculated from the outputs of RTD each dispatch interval and published in near real time. Spot market prices for energy and reserves will be determined from the shadow prices (marginal costs) of the nodal energy balances and the reserve requirement constraints in RTD.

7. **Annual Contract Auctions (ACAs) and Quarterly Contract Auctions (QCAs)** that will enable the integrated sale and purchase of energy financial contracts (CfDs) and financial transmission rights (FTRs).

8. **Settlements** that will be run on a weekly basis and be used to settle all spot market transactions, FTRs and any contracts bought or sold in the contract auction.

Table 5-2 summarises the timetable within which the above processes will need to be completed, as defined in the VWEM Detailed Design.

### Table 5-2: Market Processes and Timetable

<table>
<thead>
<tr>
<th>Process</th>
<th>Horizon</th>
<th>Granularity</th>
<th>Frequency</th>
<th>Participant Inputs</th>
<th>Time for change to be incorporated into the market process</th>
</tr>
</thead>
<tbody>
<tr>
<td>YAP</td>
<td>2 Years</td>
<td>Half hour</td>
<td>Quarterly</td>
<td>Quarter - 1 week Thursday, 5:00 PM (main annual plan inputs updated November)</td>
<td>Next YAP</td>
</tr>
<tr>
<td>MAP</td>
<td>1 Month</td>
<td>Half hour</td>
<td>Weekly</td>
<td>Week - 1 day, 5:00 PM</td>
<td>Next MAP</td>
</tr>
<tr>
<td>WAP</td>
<td>1 Week</td>
<td>Half hour</td>
<td>Daily</td>
<td>Day - 1, 4:00 PM to provide / update offers</td>
<td>Next WAP</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Process</th>
<th>Horizon</th>
<th>Granularity</th>
<th>Frequency</th>
<th>Participant Inputs</th>
<th>Time for change to be incorporated into the market process</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAP including sensitivities</td>
<td>24 hours</td>
<td>Half hour</td>
<td>Half Hourly</td>
<td>Day - 1, 4:00 PM to provide / update offers. Offers updated any time with material changes</td>
<td>As soon as IT systems allow (no longer than 6 hours initially and less than a few minutes long term)</td>
</tr>
<tr>
<td>Real Time Dispatch</td>
<td>Dispatch interval</td>
<td>Dispatch interval</td>
<td>Every dispatch interval</td>
<td>Offers updated any time with material changes</td>
<td>As soon as IT systems allow (no longer than 6 hours initially and less than a few minutes long term)</td>
</tr>
<tr>
<td>ACA</td>
<td>4 Years</td>
<td>Half hour</td>
<td>Annually</td>
<td>Quarter - 1 week Thursday, 5:00 PM (main annual plan inputs updated November)</td>
<td>Next ACA</td>
</tr>
<tr>
<td>QCA</td>
<td>1 Year</td>
<td>Half hour</td>
<td>Quarterly</td>
<td>Quarter - 1 week Thursday, 5:00 PM (main annual plan inputs updated November)</td>
<td>Next QCA</td>
</tr>
<tr>
<td>Settlements</td>
<td>1 Week</td>
<td>Half hour</td>
<td>Weekly</td>
<td>See section 22.11</td>
<td>See section 22.11</td>
</tr>
</tbody>
</table>
5.2.4 Ancillary services

The SMO is responsible for the complete Ancillary Service processes of specification, registration, testing, procurement, performance monitoring and settlements.

The ancillary services procurement arrangements for the VWEM will be as follows:

- **Frequency control** ancillary services (regulation and contingency reserves) will be co-optimised with energy and included in the spot market dispatch and pricing processes.
- **Network control** ancillary services will be procured by the SMO using a competitive tender process. This will be applied for the various network control ancillary services, which will be required at different locations and where there is likely to be some competition in service provision. For those services where there is a lack of competition in supply, the SMO will adopt a negotiated contract approach.
- **System restart** ancillary services will be procured by the SMO using a competitive tender process, for services in locations where there is likely to be some competition. For the services where there is a lack of competition, the SMO will adopt a negotiated contract approach.

5.2.5 Settlements

The settlement process described in the VWEM detailed design will be as follows:

1. The SMO will determine the settlement amounts payable or receivable by market participants;
2. The SMO will ensure that an electronic funds transfer (EFT) facility is provided and made available for all VWEM participants for the purposes of facilitating settlements and the collection and payment of all market fees;
3. The SMO will settle the market on a weekly basis;
4. All settlement statements will be available electronically and all errors or disputes will be notified electronically;
5. The SMO will prepare a weekly market settlement statement for each market participant which sets out their market transactions;
6. The settlement statements issued by the SMO will include supporting data for all amounts payable sufficient to enable each market participant to audit the calculation of the amount payable by or to them;
7. Before week W + 4 days, the SMO will prepare draft market settlement statements for week W for all market participants;
8. Before week W + 6 days, all market participants will be responsible for reviewing their settlement statements for week W and shall notify the SMO of any errors or disputes with the draft W week settlement statement;
9. The SMO will review all notified errors or disputes with the draft settlement statements and if the SMO considers that a draft statement contains an error or discrepancy then the SMO will correct the error in final statements;
10. Before week + 10 days, the SMO will finalise the settlement statements for week W;
11. Before week + 14 days, the market participant will pay the SMO any amount owing for week W by EFT, even if the final settlement statement is in dispute; and
12. Before week + 14 days, the SMO will pay any amount owing to the market participant for week W by EFT.
5.2.6 Market Monitoring and Analysis

A series of market monitoring and analysis outputs is defined in the VWEM Detailed Market Design. These include:

1. Providing data that ERAV requests for the purpose of market monitoring;
2. Performing real-time market monitoring and reporting the outcomes to ERAV;
3. Providing ERAV with the complete set of electricity market outcomes, through replicating a subset of the MMS Database to ERAV’s own market database; and
4. Computing any of the market monitoring indices or market monitoring benchmarks that ERAV requires the SMO to compute.

The SMO is obliged to:

1. Inform ERAV of circumstances that may require market intervention;
2. Inform ERAV of circumstances that may require market suspension and seek ERAV’s approval prior to suspending the market;
3. Issue warnings to market participants who are observed to be failing to comply with the market rules;
4. Inform ERAV of instances of market participants who fail to comply with the market rules;
5. Inform ERAV of any observed instances of market behaviour that is collusive, anti-competitive or that has caused or could cause financial or physical harm to other participants;
6. Provide ERAV with any additional data or information that may be reasonably requested by ERAV in order to better understand market outcomes;
7. Provide ERAV with explanations, answers to questions or otherwise assist in the process of investigating market issues;
8. Support ERAV in conducting audits of market systems and in conducting interviews with key staff in support of an investigations process; and
9. Work with ERAV in identifying inefficiencies and enhancing the market rules and market procedures, in order to reduce likelihood of being in breach of the electricity market rules and to enhance market efficiency.

5.3 Additional Functions Required for Implementation of VWEM 2019

VWEM 2019 requires the taking over of a few functions from the current single buyer (EPTC) but essentially there are more participants, more schedules to run, new reserve market operations and a significant increase in settlements and metering requirements.

A gap analysis has been undertaken looking at the future role that NLDC will be required to fulfil as the SMO and assessing this against the organisation’s current role and capabilities. In the following tables, this is broken down into the key functional areas of System Analysis and Planning, Power System Operation, Power Market Operations, and Settlements.
### Table 5-3: Additional functions required for System Analysis and Planning

<table>
<thead>
<tr>
<th>Identified additional functions not currently performed or requiring enhancement for System Analysis and Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demand forecasting</strong></td>
</tr>
<tr>
<td>PCs produce demand forecast. The demand forecast is firstly provided by the PCs and the SMO is responsible for aggregation of forecasts.</td>
</tr>
<tr>
<td>SMO to produce more load forecasts. The SMO will still be required to produce its own demand forecast firstly to check PCs’ forecasts and secondly to ensure sufficient reserves are available for inaccuracy in the PCs’ forecasts. The other differences from current practice are (a) that the number of scenarios to be explored will be increased (b) probability distributions are required for reserve allocations (c) forecasts need more spatial zones (d) the forecasts are required to be updated more frequently.</td>
</tr>
<tr>
<td><strong>YAP, MAP and WAP</strong></td>
</tr>
<tr>
<td>More forecasts are required and more frequently. More staff will be required to perform these extra activities.</td>
</tr>
<tr>
<td><strong>Forecasting non-dispatchable and semi-dispatchable generation output</strong></td>
</tr>
<tr>
<td>Non-dispatchable and semi-dispatchable generation forecasts for all of the market projections and the dispatch processes are required. SMO will have to improve weather forecasting functions for wind and solar power output projections.</td>
</tr>
</tbody>
</table>

### Table 5-4: Additional functions required for Day-Ahead Scheduling and Real-time Operations

<table>
<thead>
<tr>
<th>Identified additional functions not currently performed or requiring enhancement for Day-Ahead Scheduling and Real-time Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DAS</strong></td>
</tr>
<tr>
<td>Day Ahead Schedule (DAS) would run every 6 hours and there would be a high and low demand sensitivity executed. This will require scheduling staff and functionality in the control room.</td>
</tr>
<tr>
<td><strong>Price based offers</strong></td>
</tr>
<tr>
<td>Cost based offers do not change regularly at present and thus schedule is predictable making dispatching easier. Price based offers can change regularly and schedulers and dispatchers will require more functions and perhaps more staff to dispatch economically.</td>
</tr>
<tr>
<td><strong>Reserves market</strong></td>
</tr>
<tr>
<td>New reserve categories will require calculation of reserve quantities, registration of providers, performance monitoring criteria etc. Reserve market will introduce a new function to Day-ahead Scheduling and real time dispatch. Providers of reserve can potentially change every schedule period and SMO will have to improve processes in real time to manage dispatch.</td>
</tr>
<tr>
<td><strong>Dispatch instructions</strong></td>
</tr>
<tr>
<td>Issuing of dispatch instructions needs to be more automated and auditable in price based markets. Prices are more volatile than cost based offers and more disputes could arise if instructions are not clear and auditable. This might require additional people in the control room at this stage or in preparation for the Spot Market.</td>
</tr>
</tbody>
</table>

### Table 5-5: Additional functions required for Metering

<table>
<thead>
<tr>
<th>Identified additional functions not currently performed or requiring enhancement for Metering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Registration of new participants</strong></td>
</tr>
<tr>
<td>PC’s and more generators have to be added to metering data base.</td>
</tr>
<tr>
<td><strong>Metering Information to settlements</strong></td>
</tr>
<tr>
<td>More detailed information has to be provided to settlements including metering of reserve provision.</td>
</tr>
</tbody>
</table>
### Table 5-6: Additional functions required for Settlements

<table>
<thead>
<tr>
<th>Identified additional functions not currently performed or requiring enhancement for Settlements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price based Market</strong></td>
</tr>
<tr>
<td>▪ Price based markets will require settlements to be enhanced with more information flowing from DA schedule.</td>
</tr>
<tr>
<td>▪ Dispatch instructions will need to be checked more thoroughly. There are more instructions with dispatch period going to 30 minutes.</td>
</tr>
<tr>
<td>▪ More disputes are probable and dispute resolution process will require enhancement.</td>
</tr>
<tr>
<td><strong>Settlement Statements and Payments</strong></td>
</tr>
<tr>
<td>▪ Settlement bank account with EFT facility will have to be set-up and managed by the SMO.</td>
</tr>
<tr>
<td>▪ Settlement statements will have to be issued and this is an additional function.</td>
</tr>
<tr>
<td>▪ Settlement statement queries from market participants will have to be responded to.</td>
</tr>
<tr>
<td>▪ Payments from market participants are received via EFT and this will require additional staff to ensure payments are received and correct.</td>
</tr>
<tr>
<td>▪ Payments to market participants via EFT have to be done and this will require additional staff.</td>
</tr>
<tr>
<td><strong>Reserves market</strong></td>
</tr>
<tr>
<td>▪ Additional settlements require for new reserve categories.</td>
</tr>
</tbody>
</table>

### Table 5-7: Additional functions required for Market Reporting and Analysis

<table>
<thead>
<tr>
<th>Identified additional functions not currently performed or requiring enhancing for Market Reporting and Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bilateral contracts and CfDs</strong></td>
</tr>
<tr>
<td>▪ Reporting of bilateral contracts’ and CfDs’ average prices, market share and participants exposure is important information. This will be an additional function to be provided by SMO.</td>
</tr>
<tr>
<td><strong>DA Schedule Prices</strong></td>
</tr>
<tr>
<td>▪ Price based markets will require more information to be provided to market participants and stakeholders. This will be an additional function to be provided by SMO.</td>
</tr>
<tr>
<td><strong>YAP, MAP and WAP</strong></td>
</tr>
<tr>
<td>▪ Information from these schedules will need to be provided to participants for entering into bilateral contracts and participants understanding exposure to DA market.</td>
</tr>
<tr>
<td><strong>Market Surveillance</strong></td>
</tr>
<tr>
<td>▪ Conducting market surveillance is a new function and either report to regulator or market rules committee.</td>
</tr>
<tr>
<td>▪ Support and where necessary administer dispute resolution processes between participants.</td>
</tr>
<tr>
<td><strong>Stakeholder information</strong></td>
</tr>
<tr>
<td>▪ The move to a price based market and allowing bilateral contracts will require a significant increase in information to be provided to stakeholders.</td>
</tr>
</tbody>
</table>
5.4 Additional Functions required for Implementation of LT VWEM

The LT WVEM requires the operation of the Spot and Ancillary Services markets with the day ahead market becoming indicative. Essentially there is complex processes, nodal pricing, FTR’s, more participants, more schedules to run, and a significant increase in settlements and metering requirements.

In the tables below, gap analysis is broken down into the key functional areas of System Analysis and Planning, Power System Operation, Power Market Operations, Reporting and Settlements.

Table 5-8: Additional functions required for System Analysis and Planning

<table>
<thead>
<tr>
<th>Identified additional functions not performed or require enhancing for System Analysis and Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand forecasting</td>
</tr>
<tr>
<td>• SMO to produce more load forecasts. The SMO will still be required to produce its own demand forecast firstly to check PC’s forecast and secondly to ensure sufficient reserves are available for inaccuracy in the PC’s forecast: The other gaps are (a) the number of scenarios explored is increased (b) probability distributions are required for reserve allocations (c) forecasts need more zones (d) the forecasts are required to be updated more frequently.</td>
</tr>
<tr>
<td>YAP, MAP and WAP</td>
</tr>
<tr>
<td>• More forecasts are required and more frequently. More staff required to perform these extra activities.</td>
</tr>
<tr>
<td>Forecasting renewable and non dispatchable generation output</td>
</tr>
<tr>
<td>• Non-dispatchable and semi-dispatchable generation forecasts for all of the market projections and the dispatch processes is required. SMO will have to improve weather forecasting functions for wind and solar power output projections specifically the forecasting over the next 15 minutes for real time schedule.</td>
</tr>
</tbody>
</table>

Table 5-9: Additional functions required for Annual / Quarterly Contract Auction and Real-time Operations

<table>
<thead>
<tr>
<th>Identified additional functions not performed or require enhancing for Day-Ahead Scheduling and Real-time Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Contract Auction (ACA) and Quarterly Contract Auction (QCA)</td>
</tr>
<tr>
<td>• Annual Contract Auction (ACA) and Quarterly Contract Auction (QCA) functionality required. This auction function could be a dedicated function and section.</td>
</tr>
<tr>
<td>Real Time Dispatch (RTD)</td>
</tr>
<tr>
<td>• SMO is to produce a 5 minute ahead forecast for at least the next half hour. This will require an additional function and staff in the control room.</td>
</tr>
<tr>
<td>• RT tool is expected to run and dispatch automatically but this will require significant oversite by control room staff.</td>
</tr>
<tr>
<td>• Additional technical staff required to be in control room to analyse when the RTD does not solve.</td>
</tr>
<tr>
<td>• Additional function to ensure supervisory control and data acquisition (SCADA) data for the current state estimates of generating units, loads and the transmission is continuously available and produces a usable solution for RTD.</td>
</tr>
<tr>
<td>Dispatch instructions</td>
</tr>
<tr>
<td>• Issuing of dispatch instructions is to be fully automated but will still require constant monitoring by the Dispatchers. Checking instructions are correct and adhered to will</td>
</tr>
</tbody>
</table>
require additional people in the control room at this stage or in preparation for the Spot Market.

Table 5-10: Additional functions required for Metering (to be performed by the SMO MDMSP)

<table>
<thead>
<tr>
<th>Identified additional functions not performed or require enhancing for Metering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Registration of new participants</strong></td>
</tr>
<tr>
<td><strong>Metering Information to settlements</strong></td>
</tr>
</tbody>
</table>

Table 5-11: Additional functions required for Settlements

<table>
<thead>
<tr>
<th>Identified additional functions not performed or require enhancing for Settlements</th>
</tr>
</thead>
</table>
| **Spot Market** | ▪ Settlements to be based on Spot market nodal prices which is more complex and require more functions.  
▪ Dispatch instructions will need to be checked more thoroughly. There are more instructions with dispatch period going to 5 minutes.  
▪ More disputes are probable and dispute resolution process will require enhancement. |
| **Ancillary Services** | ▪ Additional settlements required for new Ancillary Service arrangements. |

Table 5-12: Additional functions required for Market Reporting and Analysis

<table>
<thead>
<tr>
<th>Identified additional functions not performed or require enhancing for Market Reporting and Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nodal pricing</strong></td>
</tr>
<tr>
<td><strong>Spot Market</strong></td>
</tr>
<tr>
<td><strong>Annual Contract Auction (ACA) and Quarterly Contract Auction (QCA)</strong></td>
</tr>
<tr>
<td><strong>Market Surveillance</strong></td>
</tr>
<tr>
<td><strong>Stakeholder information</strong></td>
</tr>
</tbody>
</table>
5.5 Metering Services

Two metering roles are defined in the VWEM:

- **Meter Providers**, who are responsible for the procurement, installation and maintenance of physical metering equipment; and

- **Meter Data Management Service Providers (MDMSPs)**, who are responsible for the collection of metering data from those metering installations for which they have a contractual responsibility. They are required to process the metering data, checking for errors, missing data, etc., and the onward transmission of the meter data to the SMO’s metering database. They are also required to share this data with the market participants to whom it relates, and other stakeholders who need the information for system operational purposes (e.g. the SMO, ETSP, EDSP, and ERAV).

Full details of these roles are provided in the VWEM Detailed Design report and Figure 5-1 summarises these. In principle, multiple different MDMSPs may evolve as the electricity sector participants look for opportunities to diversify into other business areas. For the purposes of this report, however, the key issue concerns the MDMSP role that is currently being fulfilled by NLDC as the SMO and whether this should be located elsewhere.

**Figure 5-1: Indicative arrangements for MDMSPs in the VWEM**

The VWEM Detailed Design specifies that “The MDMSP activities of the SMO, NPT and each of the PCs should be ring fenced from any retailer, distribution, transmission or SMO functions and be independent of any generation.” The definition of ring fencing proposed in the VWEM Detailed Design is for:

- accounting separation and separate reporting of the MDMSP function;
- the allocation of costs between transmission/distribution, retailing, MDMSP activities and other functions on an equitable basis;
- restrictions on the flow of information that is permitted between the ring fenced businesses;

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• separation between the ring fenced businesses, including separate staff, physical separation and separation of business functions; and
• putting in place of processes for checking compliance and reporting.  

From discussions with NLDC it is clear that the organisation has the relevant technical skills and IT systems to act as an MDMSP, coupled with considerable experience of providing MDMSP services. NLDC makes the point that currently the software that is used for meter data acquisition (which has an ITRON system at its source) is tightly integrated into the other software that is used for operating the VCGM, and there would be complexity involved in separating these systems. It is important to note that in the VWEM design, the role of the SMO and that of the MDMSP are clearly differentiated. Steps will therefore be required to ring fence the operation of the ITRON system and the maintenance of its databases into a clearly defined SMO MDMSP unit, which is independent of the other aspects of the SMO functions. The reasons for this are primarily connected with confidentiality of data and the need to ensure that the SMO does not make use of information to which it has access relating to market participants’ commercial behaviour via meter data for purposes other than VWEM operation and settlement.

If the System Operator function of the SMO were to have access to settlement metering data without a formal agreement being in place governing its right to information, this could raise concerns that it could take operational decisions based on privileged information about the commercial behaviour of customers and generators. Whilst it may be acceptable for this information to be made available to the System Operator, this should happen transparently under an agreement with the MDMSP and not merely by virtue of their being located in the same organisation.

In addition, it will be helpful for the costs of the MDMSP function to be clearly separable from the other costs of market operation and settlement, in order that these can be overseen by the regulator and aligned with any incentives that may be applied relating to a future SMO agreement.

At present, NLDC indicates that they take an integrated approach to the registration of metering systems and market participants. A key element of the SMO’s activity will consist of market participant registration, which will include recording details of the MDMSP that is responsible for the metering systems at each market participant’s generation or demand facilities. NLDC has noted that at present a complex and integrated process of registering market participants and meters is undertaken. We would anticipate that changes will be required to this, so that the registration of meters is handled by the MDMSPs and the SMO runs the settlement process based on data that is submitted to it by the MDMSP under a set of agreed operating procedures. NLDC has expressed the view that its metering function should be located within the Market Operations Department, in order to minimise disruption to work flows. We would recommend however, that its budget and operating processes are separated from the rest of the Market Operations Department in order that the costs of metering and data collection can be clearly identified and to maintain the independence and integrity of the metering function. This will ensure that all parties have maximum confidence in the commercial confidentiality of metering data.

The unit within NLDC that is currently responsible for the ITRON system could usefully form the nucleus of the SMO MDMSP organisation, but this should operate as a ring fenced activity from the rest of the SMO function.

5.6 Settlements

As noted earlier, a key function for the SMO will be that of financially settling spot market trades in the VWEM, together with the settlement of Financial Transmission Rights (FTRs) and contract auctions in the Long Term VWEM implementation.

Settlement in the VCGM is currently undertaken by EPTC, in the sense that EPTC prepares financial statements relating to the trades which it oversees as the Single Buyer and distributes these to electricity buyers and sellers. Financial flows between market participants are administered centrally by EVN.

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11 VWEM Detailed Design Finalisation Revised Final Report, Intelligent Energy Systems and SW Advisory for ERAV and the World Bank, updated 30 June 2016, Section 11.9.4
The VWEM Detailed Design proposes that “Consideration should be given to transferring EPTC’s staff who are currently engaged in managing the settlements and payments in the VCGM to the SMO for the VWEM.” This is an appropriate recommendation, since the role of EPTC in the VWEM will change significantly. EPTC will represent those generators that do not trade directly in the VWEM, which will be a significantly smaller role than it currently undertakes as the Single Buyer. The existing departments within EPTC comprise the following:

- Organisation & Staff department;
- Planning department;
- Market Trading department;
- Accounting department;
- Power Purchasing department;
- Technical department;
- Legislation department;
- Power Selling department; and
- Communication technology group.

Of these, the Market Trading department takes responsibility currently for the spot market settlement process. This is assisted by the Technical department, which provides support for specification and testing of metering systems. The Accounting department will also have important skills in relation to the reconciliation of financial statements associated with electricity trades, which will be exportable into the new VWEM settlement arrangements. The process of settling FTRs will involve the calculation of settlement surplus based on differences between nodal prices, and this will require relatively sophisticated calculations to be undertaken drawing on a combination of nodal market prices, metered data and contract information. The Market Trading and Accounting departments are the most likely to have staff who would transfer to the SMO.

The settlement of bilateral contracts between generators and PCs will take place outside the VWEM settlement process, and will not therefore be a responsibility of the SMO directly. This will require careful consideration in any reorganisation of EPTC, because EPTC will still be responsible for settling the trades entered into by the BOTs and SMHPs that it represents in the market. It will therefore need to retain sufficient staff and skills to undertake these functions effectively.

The VWEM Detailed Design and the associated Market Rules define a comprehensive set of tasks that the SMO must fulfil in order to enable market settlement to take place successfully. The key elements of this are the following:

- The SMO must determine the settlement amounts payable or receivable by market participants – this will involve the reconciliation of metered data and market prices to compute settlement statements;
- The SMO must ensure that an electronic funds transfer (EFT) facility is set up and made available to all VWEM participants to facilitate settlement of energy sales and purchases and the payment of market fees;
- The SMO must set up a separate settlement account which is used only for settlement transactions – this aspect of the settlement process is likely to require significant alterations from the current payment processes, in that NLDC and EPTC are not currently involved in handling cash flows directly;
- Settlements will be processed on a weekly basis;
- The settlement system must make settlement statements available electronically and facilitate electronic notification of disputes or errors;

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12 VWEM Detailed Design Finalisation Revised Final Report, Intelligent Energy Systems and SW Advisory for ERAV and the World Bank, updated 30 June 2016, Section 22.1
13 VWEM Market Rules, Final Version, 9 June 2016, Article 172
• The SMO must prepare a weekly market settlement statement for each market participant which sets out their market transactions – this will be similar to the kind of activity that ETPC is currently undertaking in the VCGM.

The SMO must also monitor the payments made by market participants, and relate these to the credit cover held by participants to ensure that trading positions are not exceeding the levels of cover that each participant provides.

If EPTC staff and departments do transfer into the SMO to fulfil the sort of functions described above, it will be essential to ensure that they do not continue to provide services into the remaining EPTC organisation, except in the same “arm’s length” way that they will support other market participants. The SMO’s settlement function needs to be fully independent of any generation or supplier interests.

From our review of the functions and structure of EPTC, we are supportive of the proposal contained in the VWEM Detailed Design that settlement functions be transferred from EPTC into NLDC as part of the process of establishing the SMO.

6 SMO Business Setup

6.1 SMO Charter, Objectives and Mission

6.1.1 Charter

The current Charter for NLDC is defined in EVN Decision 40/QD-EVN dated 13 February 2015. This sets down the assigned functions and responsibilities of NLDC as follows:\textsuperscript{14}:

1. Dispatch, control generators, transmission units, distribution units following the national power system operation schedule.

2. Power market operation.

3. Manage, operate and maintain the SCADA/EMS/MMS of the Vietnamese power system and the communication system, the specific information technology for power system and power market operation.

4. Training human resources for power market and power system operation and management.

5. Implement experiments to correct the SCADA/EMS/MMS; relay protection system; measuring, controlling, automation system; specific computer systems; communication – information technology for power system and power market operation.

6. Provide consulting services on project evaluation, development, surveys and management; supervising construction, constructing, setting and maintaining relay protection systems, measurement and automation of the power system, SCADA/EMS/MMS, specific computer systems, information systems, other related services on data and power system analysis, electricity equipment, application of control/ information technology, power transmission and distribution.

7. Purchase and sale of materials, equipment, tool for power system and power market analysis, control and operation.

8. Import and export of materials, equipment and tools for power system and power market analysis, control and operation.

\textsuperscript{14} EVN Decision 40/QD-EVN, and see Sector Structure Assessment Report: Main Report (FINAL), Resident Advisor for Vietnam Power Market Development (TA-7262 VIE), 25 March 2015
9. Other functions upon request from EVN and in compliance with the law.

The Charter does not specify in detail the full range of activities that NLDC will be required to undertake to act as the combined SMO in the VWEM 2019 and the Long Term VWEM. Whilst it could be assumed that in item 2 above, “power market operation” covers all of the required services that the SMO is to provide, we note that financial settlement is a specific function that implies responsibilities for financial transactions that may not currently be supported by NLDC’s Charter.

At present, EPTC has the primary responsibility for the purchase and sale of electricity, in its role as the Single Buyer. The EPTC Charter states the following as the EPTC assigned functions and objectives:

1. Buy electricity from Generators in accordance with the law and upon request from EVN;
2. Sell electricity to Power Corporations;
3. Import and export electricity at voltage level not less than 110kV;
4. Sell electricity for large customer at voltage not less than 220kV;
5. Train human resources for power market operation;
6. Other functions upon request from EVN and in compliance with the law.

Points 1 and 2 in the EPTC charter indicate that electricity sale and purchase is a defined activity which has to be explicitly addressed. For the operation of the VWEM, the SMO will effectively be the counterparty for sales and purchases of electricity through the gross pool, and consideration will therefore be required by ERAV, EVN and MOIT as to whether a change to the NLDC Charter is required to reflect this.

6.1.2 Objectives and Mission

The core objectives of the NLDC business were identified in discussions with NLDC as the following:

- Ensuring safe and continuous power supply;
- Ensuring the stable operation of the entire National power system;
- Ensuring power quality;
- Ensuring the most economical operation of national power system; and
- Operating the electricity market to ensure fairness, transparency, non-discrimination with market participants.

For the SMO the core business objectives are fundamentally the same and no changes are therefore required.

6.2 SMO Legal Status

NLDC is currently set up as an accounting subsidiary of EVN with limited management and financial autonomy. In the VWEM the intention is that “NLDC will be reformed as an independent accounting unit under EVN.”

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16 Ref: Ricardo/ED62088/Issue Number 4
It will be essential that NLDC is given full accounting separation from EVN to ensure that its decisions are taken independently of any interests of EVN in generation and retail activities. This is particularly important in relation to NLDC’s dispatch and market settlement responsibilities, which need to be fully transparent and not discriminate in any way against non-EVN owned market participants.

In its SMO function, NLDC is required to take decisions fully independently of all buyers and sellers.\(^\text{17}\) In the long term, the SMO should be fully separated from EVN. However, this raises complex questions regarding its ownership and governance which will be most effectively addressed as part of the move to a fully competitive industry (supported by regulated monopoly service providers) which results from the introduction of the VREM.

It is extremely important at this stage to provide confidence to existing - or potential - industry parties that are (or could be in the future) competing with each other that there are no actual or perceived conflicts of interest in the organisation tasked with acting as the system and market operator. For example, in the competitive generation market, participants must be confident that they are competing on a level playing field. If there is any suggestion that this is not the case, then there is a significant risk that potential investors in new power generation plant will be discouraged.

Hence, prior to becoming fully separated the SMO’s first step in the process should be to become ring-fenced as a state-owned single member limited company of EVN and to meet a number of resulting obligations. As long as these arrangements are sufficiently robust, they should be sufficient to provide the level of confidence required at this stage.

This independence will become increasingly important as the VREM is introduced.

Currently the Regional Load Dispatch Centres (RLDCs) are dependent subsidiaries of NLDC. The nature of their activities and their need for close interaction with NLDC suggest that they should remain subsidiaries of NLDC, once NLDC is established as a state-owned single member limited company. Establishing each RLDC as an independent company in its own right is unlikely to deliver additional benefits in terms of independence from trading activities, given the limited remit of the RLDCs compared with NLDC itself.

Additionally, demand side response is likely to have a growing role in the future management and operation of the system. This could be by providing ancillary services (such as reserve and frequency response) to the system or by being explicitly traded in the spot market. The SMO will need to procure such ancillary services and will also be operating the spot market, hence the need for independence and the ability to demonstrate the absence of conflicts of interest in respect to these activities.

Separation will also allow the SMO to play a proactive role planning for the many changes that are likely to occur in system and market operation and in managing an increasingly flexible electricity system.

\(^{16}\) VWEM Detailed Design Finalisation Revised Final Report, Intelligent Energy Systems and SW Advisory for ERAV and the World Bank, updated 30 June 2016 Section 3.3

\(^{17}\) VWEM Detailed Design Finalisation Revised Final Report, Intelligent Energy Systems and SW Advisory for ERAV and the World Bank, updated 30 June 2016 Section 12
Whilst the goal should be establishing the SMO as fully independent of any entity that has interests (whether directly or via subsidiary companies) in competitive generation, retail or other markets (e.g. metering or ancillary services), at the stage of the introduction of the VWEM sufficient separation may be achieved by a more incremental approach. Thus for VWEM the SMO should meet the following conditions:

- The SMO should be legally separated from all other industry participants other than its ultimate owner.
- It must be managed in such a way as to be completely separate from any participant which has a role in a competitive market.
- Whilst its ultimate owner could be EVN it should have its own governing body (a Members’ Council or board of directors). None of the members of this body should have responsibilities in companies that are participating in the generation, retail or ancillary service markets, nor should they sit on the board of EVN. There should also be a number of directors (two or three) who are wholly independent of EVN.
- The SMO board should have a compliance committee focusing on ensuring that business separation requirements are complied with and that SMO decisions are non-discriminatory.
- The SMO should have a separate licence covering its role.
- There should be transparent arrangements by which the SMO could levy charges on industry participants to cover its costs, both operational and capital. These should be regulated by ERAV with the aim of running it as a “not for profit” organisation. It must be ensured that this provides financial independence from EVN.
- It should produce its own accounts, ensure that it establishes and maintains an appropriate credit rating, and has access to suitable financial resources.
- An undertaking should be obtained from EVN that it will refrain from any action that would cause the SMO to act in a way that showed preference to or was discriminatory against any other industry participant.
- SMO staff should be wholly employed on SMO activities although certain shared services may be exempted from this.
- Any incentive arrangements for SMO staff should be wholly based on the performance of the SMO (and not take account of that of EVN as a whole or any other subsidiary of EVN).
- Information that the SMO has as a result of undertaking its activities should not be shared with others – unless it is made publicly available to all or it directly relates to, for example, the assets of a party.
- The staff of the SMO should be located in offices that are separate from any other industry participant including its ultimate owner.
- The SMO should operate in line with pre-determined market rules, Grid Code and associated procedures and ensure that this is no suggestion of potential bias by the SMO towards industry participants that are also owned wholly or partially by EVN or any of its other subsidiaries.
- The SMO’s activities should be subject to regular independent audit and hence its systems and procedures should be established such that its activities and decisions are recorded and can be replicated.

6.3 SMO Structure

This section proposes a future structure for the SMO for the implementation of VWEM 2019 and LT VWEM.

The purpose is to show the progression required from current structure to incorporate the new market functions from the current structure.
6.3.1 SMO structure for VWEM 2019

Figure 6-1 shows the proposed structure for SMO to implement VWEM 2019. The blocks that are highlighted are either new sections or sections requiring enhancement.

The Power System Analysis Department should have a section for demand forecasting including the forecasting of non-dispatchable generation. This section provides the forecasts required for the planning section and also provides the tools and information for DA Scheduling and the National Load Dispatch Centre for re-running schedules in real time.

The System Operations Department DA Scheduling and Dispatch section and National Load Dispatch Centre (A0) will require enhancing and more staff to implement VWEM 2019. Note that as the Scheduling and Dispatch moves to real time it is proposed that this falls under System Operations rather than under the Market Operations Department. This is proposed for discussion, due to the constant interaction required with the control room. The National Load Dispatch Control Room will have more functions to perform for the VWEM 2019 and is likely to require more staff to implement VWEM 2019.

The Market Operations Department will require enhanced Market Administration and Ancillary Services Sections. It is not clear if a separate Ancillary Services Section already exists but the proposal is to create a separate section with complexity of long term contracts for ancillary services not forming part of scheduling and dispatch in the System Operations Department.

The Metering and Settlements Department will require a new Settlements Section for the implementation of VWEM 2019.

The Market Reporting and Analysis Department will be a new department and is proposed to have three sections for Market Surveillance, Market and Stakeholder Information and Market Audit. Who does the current reporting to Regulator and Stakeholder/s is not entirely clear in the information provided so this will be an enhancement of that section into a separate department.

The Information Technology and SCADA Department will have to be enhanced to support all the new hardware, software and information requirements to implement VWEM 2019.

Figure 6-1: Proposed structure for SMO for implementation of VWEM 2019.
The structure shown in Figure 6-1 is based on the disaggregation of functions associated with market operations into three separate departments:

- the Market Operations Department, which would deal with the core functions of administering the VWEM and include a dedicated function for the management of ancillary services contracts;
- the Metering & Settlements Department, which would deal separately with the role of the MDMSP function and the financial settlement processes; and
- a Market Reporting & Analysis Department that would handle the significant requirements of market surveillance, to give participants confidence in the operation of the VWEM.

NLDC has proposed a variant of this model, which is based on the existing structure shown in Figure 4-1. This has the following features:

- all the functions associated with market operation, day ahead scheduling, metering, ancillary services, market planning and the handling of contract auctions (if these were to be implemented in the VWEM 2019) would be located in an expanded Power Market Operation Department;
- the Regional Load Dispatch Centres would continue to report separately to the Board of Directors, rather than being grouped with the NLDC Control Room;
- power system planning functions would continue to be located in the Power System Analysis & Planning Department.

This alternative arrangement is shown in Figure 6-2.

**Figure 6-2: Alternative organisational structure for the VWEM 2019 proposed by NLDC.**
NLDC has pointed out that a number of these modifications are intended to minimise disruption to the current workflows that take place within NLDC. We understand that for a transitional period it may be appropriate to retain existing structures as far as possible, however we note that one of the difficulties with this is that it creates a Power Market Department that is quite difficult to manage – the proposal creates some 7 new functions within that department, which could be challenging to manage and could increase the complexity of work flows quite significantly.

NLDC has proposed that the DA Scheduling function should be retained within the Power Market Operation Department, rather than transferring it to the Power System Operation Department, as per our recommendation. We had proposed this for the reason of maximising the degree of operational interaction between the scheduling and dispatch functions. NLDC suggests that close cooperation is also needed between DA Scheduling and the market operation control room in order to achieve a high level of operational efficiency. This is to some extent a moot point, and whilst international experience would tend to suggest that locating the scheduling and dispatch functions within the power system control centre is desirable, we accept NLDC’s arguments for leaving it in the Power Market Operation Department in order to minimise work flow adjustments on the transition from the VCGM to the VWEM.

In addition, we would note the importance of the independence of the Market Reporting and Surveillance function from the operational aspects of the market, and the need to recognise the scale of the work that is to be undertaken by that department. We would therefore recommend that consideration is given to separating out the Market Reporting & Analysis Department from the Power Market Operations Department at an early stage, in order to provide a strong foundation for its further development in the Long Term VWEM. Similarly, given the importance of assuring VWEM participants of the independence of the MDMSP function, it is important to establish the Metering & Settlements Department as a separate business unit from the Market Operations Department.

Our recommendation for the structure of the SMO for the VWEM 2019 is shown below in terms of reporting lines, distinguishing between existing functions, enhanced functions and new functions. Operationally, close cooperation is required:

- between the National Load Dispatch Centre (A0) and the regional centres (A1 – A3); and
- between the Day Ahead Scheduling & Dispatch Section under the Market Operations Department.

It is recommended that NLDC keeps the final structure that it chooses to adopt for the VWEM 2019 under careful review, so that any lessons emerging from operating experience can be fully captured.
Figure 6-3: Recommended organisational reporting lines for the SMO in the VWEM 2019.
6.3.2 SMO structure for LT VWEM

Figure 6-3 shows the proposed structure for SMO to implement LT VWEM. As indicated in the legend of the figure, blocks with blue and yellow fill are sections requiring enhancement from VWEM 2019 structure and new functions respectively.

The Power System Analysis Department Demand and Non-dispatchable Forecasting Section will be required to be enhanced for real-time forecasting requirements proposed for LT VWEM. It is proposed that the section also does the DAP as this is now indicative and replaced by RTD.

The System Operations Department RT Scheduling and Dispatch section replaces the DA Scheduling and Dispatch Section. Both the RT Scheduling and Dispatch section and National Load Dispatch Control Room will require significant enhancing and more staff to implement LT VWEM with it complex 5 minute ahead dispatch and nodal pricing. 3-4 people are required per shift for generation dispatch in the NLDC Control Room, i.e. a total of 15-20 people dedicated to this function. This compares with the 1-2 people per shift who are doing this currently, i.e. 5-10 people across an assumed five shift teams.

The Market Operations Department will have to enhance the Market Administration Section and Ancillary Services Section to implement LT VWEM. It will also require a new Contracting section to deal with the auctioning of Smart Contracts and the trading of Financial Transmission Rights (FTRs).

The Metering and Settlements Department will have to enhance the Settlements and Metering Sections to implement LT VWEM.

The Market Reporting and Analysis Department will have to enhance Market Surveillance, Market and Stakeholder Information and Market Audit Sections to implement LT VWEM. It will be important to ensure that the Market Surveillance function has a direct reporting line into the board of NLDC.

The Information Technology and SCADA Department will have to be enhanced to support all the new hardware, software and information requirements to implement LT VWEM.

NLDC’s proposed alternative structure is shown in Figure 6-4. It has a number of features that are similar to its proposal for the VWEM 2019, however it has recognised the importance of separating the market surveillance function from the market operation functions.
The same separation is maintained between the market planning and system planning functions, with the former being concentrated in the Power Market Operation Department.

We note that our proposals for both the VWEM 2019 and the LT VWEM sought to combine the regional load dispatch centres under the System Operations Department, and whilst we recognise the point about existing work flows and reporting lines being maintained, we suggest that the existing reporting structure is maintained, but the potential for closer working between the A1, A2 and A3 Dispatch Centres and the National Load Dispatch Control Room (A0) is explored. This could mean that in practice, the organisation is structured such that A1, A2 and A3 are represented at the Board of Directors level, but the work flows associated with the system operation are more tightly coupled with NLDC’s activities.

Figure 6-5 shows the current structure of the Regional Load Dispatch Centres, which under the VWEM have responsibilities for the dispatch of generators below 30MW capacity.
An alternative structure has been proposed by NLDC, which is shown in Figure 6-6.
Figure 6-6: Alternative organisational structure for the LT VWEM proposed by NLDC
Whilst it is considered that the proposed organisational structures for NLDC in its role as the SMO suggested by the Consultants have merits in terms of their compatibility with international experience and the efficiencies they could potentially offer, we recognise NLDC’s concerns about maintaining the efficiency of work flows, particularly in the short term. We recommend that if it is decided that NLDC should pursue the organisational structures set down in its revised proposals, these be kept under close review to assess whether they are operating effectively. If changes are implemented and reporting lines modified, it will be important to ensure that the required procedures for data exchange and operational interactions are fully tested and introduced step by step, to ensure that a smooth transition is achieved.

We note that NLDC is due to develop its own recommendations to EVN regarding the organisational structure of the SMO by June 2018, and is currently working on both a framework for this report and the investigation of an appropriate organisational model. We understand that as part of this process, NLDC will compare its proposals with those recommended by the Consultant.

Our modified proposal for the organisational reporting lines in the SMO for the LT VWEM is shown in Figure 6-7.
**Figure 6-7: Recommended organisational reporting lines for the SMO in the LT VWEM**

[Diagram showing recommended organisational reporting lines for the SMO in the LT VWEM]
### 6.3.3 Mapping of VWEM Responsibilities on to Operational Departments

Table 6-1 shows the proposed mapping of the SMO functions detailed in Section 5.2.1 onto the SMO operational departments that are shown in Figure 6-7.

**Table 6-1: Mapping of VWEM Functions onto SMO Operational Departments**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Responsible Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Operate and administer the VWEM spot market</td>
<td>Market Operations Department</td>
</tr>
<tr>
<td>• Operate the power system in a secure manner</td>
<td>System Operations Department</td>
</tr>
<tr>
<td>• Determine the market's requirements</td>
<td>Market Operations Department</td>
</tr>
<tr>
<td>for ancillary services that are not managed through the VWEM spot</td>
<td>(Inputs from System Operations Department and Power System Analysis/Planning Department)</td>
</tr>
<tr>
<td>market, and procure these services via a competitive, non-discriminatory</td>
<td></td>
</tr>
<tr>
<td>and transparent process</td>
<td></td>
</tr>
<tr>
<td>• Schedule and dispatch generating units, loads, ancillary services and</td>
<td>System Operations Department</td>
</tr>
<tr>
<td>the transmission system, noting that the SMO cannot schedule or</td>
<td>(Interfacing with Regional Dispatch Centres as required)</td>
</tr>
<tr>
<td>dispatch plant that are not traded in the VWEM</td>
<td></td>
</tr>
<tr>
<td>• Provide projections of system reliability and system adequacy</td>
<td>Power System Analysis and Planning Department</td>
</tr>
<tr>
<td>• Operate and administer the smart auction and the auction and</td>
<td>Market Operations Department</td>
</tr>
<tr>
<td>management of FTRs (in the full VWEM)</td>
<td></td>
</tr>
<tr>
<td>• Administer the registration of VWEM participants, service providers,</td>
<td>Market Operations Department</td>
</tr>
<tr>
<td>generation units and power stations, dispatchable loads and ancillary</td>
<td></td>
</tr>
<tr>
<td>service resources</td>
<td></td>
</tr>
<tr>
<td>• Operate and administer the market settlements – this represents a</td>
<td>Metering &amp; Settlements Department</td>
</tr>
<tr>
<td>significant change from the MO’s current role, which is limited to the</td>
<td></td>
</tr>
<tr>
<td>preparation of settlement statements</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Responsible Department</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>• Collect and provide information necessary to enable the market to operate efficiently and transparently, and to enable efficient decisions to be taken by market participants about operational and investment matter</td>
<td>Market Reporting &amp; Analysis Department</td>
</tr>
<tr>
<td>• Monitor the trading activities in the market, including the spot market, smart auction, FTR auction, the market systems and the SMO’s own activities to identify areas where these could be improved</td>
<td>Market Reporting &amp; Analysis Department</td>
</tr>
<tr>
<td>• Establish processes, including consultation with participants, for developing “SMO Process and Methodology” documents detailing how the SMO plans to fulfil specific functions and obligations under the VWEM Rules and the Grid Code</td>
<td>Market Operations Department (Liaising with other departments as required, depending on specific processes being set up.)</td>
</tr>
<tr>
<td>• Allocate resources to enable the SMO to efficiently and effectively operate and administer the Full VWEM on a non-profit basis</td>
<td>Corporate Planning Department, Finance &amp; Accounting Department, SMO Board of Directors</td>
</tr>
<tr>
<td>• Publish annually performance indicators in order to monitor the SMO’s performance in respect of its function</td>
<td>Market Reporting &amp; Analysis Department</td>
</tr>
<tr>
<td>• Annually, procure independent audits of the SMO’s market operations, financial accounts, financial systems, dispatch and pricing systems, general IT systems and IT security</td>
<td>Marketing Reporting &amp; Analysis Department</td>
</tr>
</tbody>
</table>

6.3.4 Involvement of the SMO in Smart Contract/FTR Auctions

In the future, ERAV foresees a possible need for the Contracting Section to be fully ringfenced to permit it to trade in financial markets. The experience of other international electricity markets shows that as the sophistication of the trading environment increases, trading platforms evolve from being tightly coupled with the physical trading of energy to more focused on the financial instruments that are traded in the derivatives market.
6.3.4.1 International Experience

In Europe today the electricity financial derivatives markets are organised as part of a separate organisation rather than being part of the physical market operator. In the two dominant markets (Nord Pool and EPEX/EEX\(^\text{18}\)) there is now a clear distinction between the operators:

- In the Nordic/UK/Baltics, Nord Pool is the physical market operator for the short-term electricity markets (Day-ahead and intraday), while Nasdaq is operating the Financial derivatives market for the same underlying geographical area with the Nord Pool DAM price as the underlying price for its financial contracts;
- In Germany/France/Benelux, EPEX Spot is the similar physical market operator for the short term electricity markets while EEX is their financial market operator.

However, this has been an evolution; in both cases, the two markets were operated as part of one market operator (Nord Pool for the Nordics; EEX in Germany) and the split has been made later. There were clear benefits, especially in the beginning, to having the two markets closely operated together as they are so highly interlinked.

The main reason for organising the trading of financial contracts outside the physical market outside is due to the clearing arrangements, where are different from a pure physical energy settlement. Also, as longer term contracting is allowed, the capital requirements will become larger. This is essentially the main reason why Nord Pool’s financial market was sold to Nasdaq; with the TSOs as owners, as it is not feasible for them to put up the huge capital base required of a clearing house.

6.3.5 Settlement Responsibilities

The two departments in the proposed SMO organisation that will be most directly involved in the processes of financial settlement in the VWEM are the Accounting & Finance and the Metering & Settlement departments.

The most significant difference between the roles of these departments relates to whether they are externally-facing or internally-facing activities. The Accounting & Finance department is primarily concerned with supporting the corporate functions of the SMO, whereas the Metering & Settlement department should take responsibility for the externally-facing activities of market settlement, including supervising Electronic Funds Transfer (EFT) tasks. The SMO will require increased staff numbers and skills to operate the EFT functions, and it is recognised that it may be appropriate to transfer staff from EPTC as the current single-buyer organisation into the SMO to give the SMO access to the appropriate skills and experience.

6.4 Human resources and training

One of the key success factors in the evolution of the VWEM will be the management of the human resources and the transition from the current organisational structure into a new one set up to meet the needs of the VWEM. It is expected that this transition will take place in several steps following the development of the market itself.

In addition to the changes required in the staffing of the various departments of the SMO, there is an ongoing requirement for training of the people in the organisation. To ensure the smooth transition into the new organisation, a plan for training the different human resources in the different departments will be important.

In the two subsections below, these two important topics are discussed. The recommendations are based on international best practices and there are also some references to similar processes from other markets.

Two reference markets were used for this part of the report: SEMO from Ireland and AEMO from Australia. These two markets are suitable benchmarks for the VWEM SMO since both operate in a market model where the Market Operator and System Operator functions are within same entity.

\(^{18}\) EPEX: European Power Exchange; EEX: European Energy Exchange
However, it should be noted that for Ireland the SEMO will soon become a legacy model as they move to European Target Model. The Single Electricity Market (SEM) for Ireland and Northern Ireland are currently being changed to become in line with the EU Target model and move away from their current Gross Mandatory Pool. This project is called I-SEM (Integrated Single Electricity Market). One of the changes that follows this reorganisation of their market arrangements will be that the SEMO, to become a NEMO (National Electricity Market Operator) under the EU regulation for Capacity Allocation and Congestion Network Code (CACM), will have to be unbundled from EirGrid. There will be a clear separation of the trading in Forward, Day-ahead and Intraday timeframes organised by SEMO, whilst the balancing market will stay with EirGrid as the TSO.

6.4.1 Human resources requirement

Most of the human resources for VWEM System and Market Operator should be transferred directly from current NLDC, with some from EPTC for settlement tasks. Based on the questionnaire, the current head count in the NLDC organisation is 135, distributed as shown in Table 6-2.

Based on the two reference markets described in Sections 6.4.1.1 and 6.4.1.2 (Ireland and Australia respectively), the proposed organisational structure in Chapter 6.3 is in line with existing practices. In addition, the current NLDC structure shown in Table 4-1 seems to cover most of the requirements for staffing. The most important organisational parts needing capacity building are the Metering & Settlement Department and the Market Reporting and Analysis Department. Both departments need multiple employees in order to carry out all the required tasks. In the VWEM perspective about half of the required headcount for SMO can be recruited directly from NLDC and then additional resources should be drawn from EPTC (e.g. for settlement tasks) and broader recruitment.

It is noted from Table 6-2 that the headcount descriptions in NLDC do not make it clear where the core staff for the MDMSP function would be derived from; this issue requires further discussion with NLDC.

Table 6-2: Current NLDC Organization Structure and head count.

<table>
<thead>
<tr>
<th>Unit/Division</th>
<th>Activities</th>
<th>Labour structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power System Operation Department (Dispatching Department)</td>
<td>Operating the National Power System to ensure the system security, stability, reliability in compliance with operational procedures and regulations issued by the National authorities.</td>
<td>Managers Staff</td>
</tr>
</tbody>
</table>
| Power System Analysis and Planning Department     | - Operational planning for power system and electricity market;  
- Setting relay protection and automation system;  
- Conducting medium and long term development research on National power system;  
- Managing, operating and maintaining EMS applications of SCADA / EMS system, incidents locating and recording system, Fault Recorder and wide area protection WAMS. | 3 18             |
| Power market operation department                 | - Operating National Electricity market in a fair and transparent manner in compliance with operational procedures and regulations issued by the National authorities;  
- Preparing electricity market settlement;  
- Daily and weekly power system operation planning. | 3 18             |
<table>
<thead>
<tr>
<th>Unit/Division</th>
<th>Activities</th>
<th>Labour structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Technology &amp; SCADA Department</td>
<td>Developing, managing and operating of the information technology infrastructure system and telecommunications system specialised in servicing of power system and electricity market operation; SCADA / EMS system; Fire protection systems and equipment, self-administered power systems and UPS; office information systems.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Human Resources Department</td>
<td>Advising and assisting the Director on the organization and human resources, labour requirements, wages, security and national defence.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Planning Department</td>
<td>Advising and managing capital planning, asset management, construction investment management and procurement management.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Financial &amp; Accounting Department</td>
<td>Advising and assisting the Director on the finance, accounting, management and use of funds and assets of NLDC to ensure the balance of capital for production and business activities, investment in construction, overhaul, investment and development of NLDC activities.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Office of administration</td>
<td>Advising and assisting the Director in administration management, secretarial assistance, occupational safety and fire prevention, disaster prevention, external affairs and communication, medical support and legal matters.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

### 6.4.1.1 Reference market – Ireland SEMO

The Single Electricity Market (SEM) is the wholesale electricity market operating in Ireland and Northern Ireland. As a gross mandatory pool market operating with dual currencies and in multiple jurisdictions, the SEM represents the first market of its kind in the world. The Single Electricity Market Operator (SEMO) facilitates the continuous operation and administration of the Single Electricity Market. SEMO is a joint venture between EirGrid plc and SONI Limited. The organisation is managed as a contractual joint venture between EirGrid (the Transmission System Operator (TSO) for Ireland) and SONI (the TSO for Northern Ireland). SEMO is licensed and regulated cooperatively by the Commission for Energy Regulation (CER) in Ireland and the Utility Regulator for Northern Ireland (UREG, previously named NIAUR). The SEMO organisation is divided into separate business functions. Most importantly for the VWEM SMO, it can be seen that the market operations and system operation & planning are separated into their own divisions. In addition to these two business functions, there are also some supporting functions required to run the business. The organisational structure and more detailed task listings are shown in the Figures below.

![Figure 6-8: SEMO organisation functions (Source: EirGrid/SONI)](source: EirGrid/SONI)
In 2015 there were roughly 350 employees in the whole EIR Group and 53 in the SEMO organisation, shown in the Table below. It should be noted that in EIR Group some of the VWEM SMO future tasks are carried out by EIR Grid TSO and SONI & SEMO jointly. In addition, the tabulation below shows some staff who are engaged specifically in new capital projects or interconnection projects (EWIC being the East-West Interconnector linking Ireland to Great Britain).
Table 6-3: Average number of persons employed by business activity.\(^{19}\)

<table>
<thead>
<tr>
<th>Business Activity</th>
<th>Year to 30 Sep 2015</th>
<th>Year to 30 Sep 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>EirGrid TSO</td>
<td>251</td>
<td>234</td>
</tr>
<tr>
<td>SONI TSO</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>SEMO</td>
<td>53</td>
<td>62</td>
</tr>
<tr>
<td>EWIC</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Capital projects</td>
<td>73</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>480</td>
<td>460</td>
</tr>
</tbody>
</table>

6.4.1.2 Reference market – AEMO

The Australian Energy Market Operator (AEMO) is an independent organisation working in the long-term interests of Australian energy consumers by developing markets that offer affordable, safe and reliable energy supplies. AEMO carries out the electricity functions previously undertaken by the National Electricity Market Management Company (NEMMCO) with respect to the NEM and the planning responsibilities of the Electricity Supply Industry Planning Council (ESIPC, South Australia). Within the functional work stream the organisational structure reflects a distinction between three types of organisational roles - day to day operations, short term market development and transmission services, and long term strategic planning. These distinctions reflect the shared focus of operations within each energy market and allows for integration of common services and efficiency in engagement with multi-market participants. Currently, there are approximately 500 employees within the AEMO organisation, including the gas business.\(^{20}\)

6.4.2 Training

The introduction of a VWEM will create a training need and a requirement for capacity building within the new organisation. Throughout the entire implementation phase there will be a need for training activities and thus also a need for coordination of personnel attending the different training activities. The consultants’ experience is that during this implementation phase the personnel of the SMO will

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\(^{19}\) EIR Group Annual Report 2015

\(^{20}\) AEMO Annual Report 2014
face time constraints as well as different needs for training. The training will have as a key objective to train a sufficient number of persons in the SMO organisation to a degree that makes them skilled to operate the VWEM SMO functions. The training has to ensure that all involved functions, which are operating within the VWEM SMO, have adequate knowledge to fulfil the tasks they are required to undertake.

This high level plan for the capacity building activities for VWEM SMO is based on the objective to ensure that the VWEM environment will be able to operate successfully once the new systems and procedures have been implemented.

The knowledge transfer will take place in two phases:

- Phase 1: Consultants and experienced NLDC resources will be the source for knowledge and experience.
- Phase 2: Dedicated SMO staff will partly take over as the source of relevant expertise and in this way will gain experience in passing on knowledge and expertise to participants.

There will need to be a core training group identified that will function as an intermediary between the trainer and the wider group of trainees within the SMO. During the implementation process, there will normally be only a limited number of employees from new SMO organisation having the opportunity to attend the training as a whole. There must therefore be an appointed SMO group responsible for ‘internal training’ (meaning training of the internal staff by the core training group) in order to ensure the success of the training and to run programmes for new starters at later stages of the SMO’s development. The core training group is assumed to be responsible for this task within the new SMO organisation.

**Figure 6-11: Proposed training methodology**

The training and capacity building content will need to be designed based on the identified knowledge gaps and needs. If the existing NLDC and EPTC resource can be utilised efficiently, then the System Operation and Settlement operation knowledge should be at a relatively high level from the beginning. In this case, the training can focus mainly on the business side of the new SMO organisation as well as for the new Market Operation functions.
The overall scope of the training should include:

1. Establishing the stakeholders’ as well as SMO’s expectations as to how the new market should function.
2. Managing the required changes to the business framework of the markets, ‘selling’ the new changes and implementing them in a way that ensures that the goals for any change are met.
3. Informing all required stakeholders, including potential market participants, of the required changes.
4. Preparing new SMO staff for operation of the VWEM and to fully understand the business framework for the market to assist market participants in their participation.
5. Training the market operators on how to effectively administer the systems and deal with 1st and 2nd line support issues.
6. Preparing SMO staff and market participants for participation in the VWEM markets – including technical training and preparation for administering new market procedures.

6.5 Business model

In order to determine the optimal business model for VWEM SMO, some successful international experiences should be evaluated. For this purpose both AEMO from Australia and SEMO from Ireland have again been investigated. The high-level recommendation for VWEM SMO is that cost recovery should be fee-based, as defined in the VWEM Market Rules. However, it should be considered in future whether market operation should be a fully regulated activity, or if the operation shall be allowed to be also for profit. Based on the two international references given below, the SMO market fees should be split between Generators and Customers/Retailers.

6.5.1 International experience - Australia

In Australia AEMO operates on a cost recovery basis as a company limited by guarantee under the Corporations Act (2001). AEMO fully recovers its operating costs through fees paid by participants. AEMO has a broad range of functions and each is underpinned by a fee structure developed in consultation with stakeholders and in line with requirements under the National Electricity Rules (NER).\(^\text{21}\)

The NEM fees are calculated in accordance with the current NEM fee determination that became effective from 1 July 2011 for a five-year period to 30 June 2016. In summary, the NEM fee determination requires the annual revenue requirement to be allocated as shown in the following figures.

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Figure 6-13: AEMO revenue recovery model (Source: AEMO)

Table 6-4: AEMO revenue requirement and fee schedule (Source: AEMO)
6.5.2 International experience - Ireland

SEMO profitability levels have been based on the regulatory price controls agreed in 2013 and cover the period from 2013-2016. Table 6-4 shows the charges that SEMO is collecting from each point of service chain to recover their costs. The cost recovery is sourced from both Suppliers and Generators.

It is notable that in Ireland, generators only pay a fixed charge for SEMO services, i.e. none of the charges are related to the quantity of energy generated. On the supplier side, however, a combination of fixed and variable energy-related charges are applied.

Table 6-5: SEMO cost recovery (Source: SEMO)
6.5.3 Fixed vs. Variable Payments

The examples quoted above involve a combination of fixed and variable charges being applied to generators and suppliers, with the different market examples using different approaches.

In general terms, four types of fee can be levied on market participants, in order to recover the costs of the Market Operation function:

- Trading Fees are charged per MWh of generation or demand traded in the market.
- Settlement Fees may be charged again per MWh of traded energy, but designed to recover the costs of running the financial settlement process.
- Annual Fees may be charged once per year, and could for example vary according to the type and size of the market participant's organisation.
- Entrance Fees could be charged for organisations when they join the market initially – we would note, however, that for a market that is a mandatory pool, in which there is no choice for participants as to whether they join or not, Entrance Fees may not be the most appropriate charging mechanism to apply.

The VWEM Market Rules draw on a combination of these principles and make ERAV responsible for defining the SMO's fees, which will consist of market fees charged on a VND/kWh basis for market participants based on metered quantities of energy traded. Other "Interested Parties" who are not engaged in trading can pay annual fixed fees to obtain information about the market.

The Market Rules stress the importance of these fees covering only the direct costs that the SMO incurs in market and system operation activities, i.e. they must not be used to cover costs of energy or ancillary services procurement.

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22 VWEM Market Rules, Final Version, 9 June 2016, Article 171
6.6 Budgeting and Financial management

The basis for VWEM budgeting and financial management should reflect the international best practices. Budgeted expenditures for both Ireland SEMO and Australian AEMO are described below.

6.6.1 SEMO

In Ireland the SEM Price Control is a very transparent process of determining SEMO’s budget and expenditures. The Price Control is approved by the Regulatory Authority (RA). SEMO’s operational and capital costs are recovered through Market Operator tariffs and fees, which are levied on market participants.

Tariffs will be calculated to enable SEMO to recover its allowance based on forecasted market demand. Any difference between forecasted and actual market demand will necessitate a balancing of the resultant over or under recovery experienced by SEMO, when finalising tariffs for the following year.

Table 6-5 shows the summary of SEMO actuals over the past few years. Clearly, the biggest expenditure for the SEMO has been the payroll expenditures, followed by IT & Communications which are the most crucial parts for the robust Market and System operations.  

Table 6-6: Summary of SEMO costs (Source: SEMO)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Payroll</td>
<td>4.53</td>
<td>3.32</td>
<td>2.92</td>
<td>10.77</td>
</tr>
<tr>
<td>Total IT &amp; Communications</td>
<td>2.39</td>
<td>2.61</td>
<td>2.53</td>
<td>7.53</td>
</tr>
<tr>
<td>Total Facilities and Insurance</td>
<td>1.11</td>
<td>0.80</td>
<td>0.65</td>
<td>2.56</td>
</tr>
<tr>
<td>Total Professional Fees</td>
<td>0.34</td>
<td>0.27</td>
<td>0.31</td>
<td>0.92</td>
</tr>
<tr>
<td>Total General and Administrative</td>
<td>0.15</td>
<td>0.06</td>
<td>0.22</td>
<td>0.31</td>
</tr>
<tr>
<td>Total Corporate Services</td>
<td>0.84</td>
<td>1.00</td>
<td>0.52</td>
<td>2.36</td>
</tr>
<tr>
<td>Total</td>
<td>9.37</td>
<td>7.95</td>
<td>7.15</td>
<td>24.46</td>
</tr>
<tr>
<td>Cost of Capital</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation*</td>
<td>5.03</td>
<td>TBC</td>
<td>TBC</td>
<td>TBC</td>
</tr>
<tr>
<td>WACC*</td>
<td>0.70</td>
<td>TBC</td>
<td>TBC</td>
<td>TBC</td>
</tr>
<tr>
<td>Total</td>
<td>15.10</td>
<td>TBC</td>
<td>TBC</td>
<td>TBC</td>
</tr>
<tr>
<td>Licence Requirement Allowance (PCC)</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.90</td>
</tr>
<tr>
<td>Total Revenue Requirement</td>
<td>15.40</td>
<td>TBC</td>
<td>TBC</td>
<td>TBC</td>
</tr>
<tr>
<td>CAPEX Submission (incorporated in Depreciation Charge above)</td>
<td>3.05</td>
<td>1.02</td>
<td>1.31</td>
<td>5.88</td>
</tr>
</tbody>
</table>

SEMO’s payroll consists of:
- Salaries
- Bonuses
- Employer’s PRSI
- Employer’s pension contribution
- On call/Shift/Overtime
- Car Other Benefits

6.6.2 AEMO

In Australia a period of flat growth for electricity is forecast, and this is placing pressure on the fees that the AEMO can charge to market participants. The AEMO seeks to control total operating costs, where possible, to reduce the impact of fee increases on market participants. As a result, most fees are in line with or lower than prior year published estimates, except for the Electricity Full Retail Contestability (FRC) fee. AEMO key fees and expenditures are shown in Table 6-6 and Figure 6-11 respectively, with the change between budget figures for 2016-17 and the current 2015-16 charges shown.

Table 6-7: Key fees of AEMO (Source: AEMO)

<table>
<thead>
<tr>
<th>Function</th>
<th>Budget 2015-16</th>
<th>Current 2015-16</th>
<th>Change</th>
<th>Prior year published estimate 2015-16</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEM</td>
<td>$0.50</td>
<td>$0.50</td>
<td>-4%</td>
<td>$0.50</td>
<td>$MWh</td>
</tr>
<tr>
<td>FRC - Electricity</td>
<td>$0.061</td>
<td>$0.040</td>
<td>-53%</td>
<td>$0.053</td>
<td>$MWh</td>
</tr>
<tr>
<td>National Transmission Planner</td>
<td>$0.000</td>
<td>$0.000</td>
<td>-22%</td>
<td>$0.02421</td>
<td>$MWh</td>
</tr>
<tr>
<td>VIC TNSP - TOUS Fees</td>
<td>$496,648</td>
<td>$512,254</td>
<td>-2%</td>
<td>$515,647</td>
<td>$KWh</td>
</tr>
<tr>
<td>WEM</td>
<td>$1,000</td>
<td>$1,008</td>
<td>0%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Figure 6-14: Total AEMO expenditure by category (excluding depreciation and finance costs) (Source: AEMO)

6.6.3 Comparison of Key Budget items

From the above analyses it is possible to assess the typical budget breakdown that may be expected between key elements of SMO expenditure. From the examples of the SEMO in Ireland and the AEMO in Australia, it is clear that salary costs and IT/communications line items combined account for over 75% of the budget of both organisations. The level of expenditure on professional fees will vary.

depending on the amount of outsourced activity, and it may be expected that this expenditure would be higher in the initial years of market operation.

**Figure 6-15: Comparison of SEMO and AEMO budget elements**

For the SMO in Vietnam, budgets will need to be prepared taking account of the ICT requirements identified in Task 3 of this project, and after a full assessment of staffing levels, including the transfer of staff into the SMO from EPTC.

### 6.7 SMO Agreements

#### 6.7.1 Introduction

A review has been conducted of examples from international electricity market jurisdictions of the types of agreements that are in place between System/Market Operators and Market Participants. This has been undertaken in response to queries from ERAV about the possible need for such an agreement in Vietnam and the aspects of the SMO interface with market participants that should be covered by such an agreement.

A review has been carried out of the key features of agreements in place in the following markets:

- Australia;
- Nord Pool;
- Great Britain; and
- Ireland.

From this, the possible implications for Vietnam have been identified.

The main objectives of the market operator agreement are to identify clearly the roles and responsibilities of the Market Operator and the Market Participants. It typically covers the following key requirements:
• defines the legal, technical and commercial relationships between the electricity sector agents;
• defines the fees payable by market participants;
• cross-refers to other documents as required, including:
  o Licences;
  o Grid Code;
  o Market Operating Procedures;
• aligns with rights and obligations that are specified at different levels in the national legal hierarchy, e.g.:
  o in the Electricity Law;
  o in a Market Code or Market Rules;
  o through Market Participant agreements.

There are a variety of different models for these market operator agreements in use internationally. A key issue concerns the level at which the rights and obligations of the Market Operator and the Market Participants are defined in legislation.

The following sections provide examples that have been identified from international practice.

6.7.2 Australia

In Australia, the Australian Energy Market Operator’s (AEMO’s) electricity functions are defined in the National Electricity Law (NEL).

The National Electricity Rules, which are referred to under the NEL, define the procedures and processes that are applicable for:

• market operations;
• power system security management;
• network connection and access;
• pricing for network services in the National Electricity Market (NEM); and
• national transmission planning.

The National Electricity Rules are enforceable under the National Electricity Law, and are binding on all parties.

The indicative structure of the legislation is shown in Figure 6-15. In this and the subsequent illustrations, the following abbreviations are used:

MO – Market Operator
G – Generator
R – Retailer
TSO – Transmission System Operator

Figure 6-16: Conceptual structure of Australian electricity legislation
6.7.3 Nord Pool

In the Nordic electricity market, the interaction between the Market Operator and Market Participants is based on a market code plus a bilateral agreement.

Nord Pool has a unified “Rulebook”, which is valid from 3 July 2017, and applies across all the markets – including those where they are a Nominated Electricity Market Operator. Market Participants sign a Participants Agreement which binds them to comply with the Rulebook.

The Rulebook includes key sections covering:

- General Terms
- Specific Market Regulations
- Clearing Rules
- Market Conduct Rules
- Fee Schedules, covering payments to Nord Pool AS as the market operator.

A set of General Terms is defined in the Rulebook which covers the following set of headings, as shown in Table 6-8.
The Rulebook includes provisions for the payments of fees and taxes that are applicable, including VAT.

Within the Rulebook, Nord Pool is required to make representations and warranties to each member of the market that it has the required powers to undertake the duties assigned to it and that its activities will always be undertaken in accordance with the applicable laws. Each Market Participant signs a Participant Agreement which commits it to comply with the terms of the Rulebook, including the Market Conduct Rules. Market Participants themselves are required to give warranties regarding their legal authorisation to carry out electricity trading activities. They are also required to adhere to confidentiality rules.

The relationship between the Rulebook, as the Market Code for the Nord Pool market, plus a separate bilateral agreement between the Market Operator and the market participants is shown in Figure 6-17.
6.7.4 Great Britain and Ireland

Great Britain and Ireland operate similar models for determining the relationship between the Market Operator and Market Participants.

6.7.4.1 Great Britain

In Great Britain, the Balancing & Settlement Code (BSC) defines the basis for interactions between ELEXON as the Balancing & Settlement Code Company (BSCCo) and the trading parties who are participating in the balancing mechanism. The participants include ELEXON itself, the National Grid Company as the transmission system operator, and the holders of licences for generation and supply who have balancing responsibilities.

The high level obligations on the BSCCo are defined in a section of the BSC that defines the constitution of the BSCCo, its powers and functions, the relationship between the BSCCo and other parties, and the requirements for setting a business strategy and an annual budget.

A further section of the BSC addresses cost recovery and participation charges, which defines the basis on which charges are calculated and applied to different participants.

Detailed provisions on the processing of payments are included in the BSC, including the procedures for recovering and paying Value Added Tax from and to market participants. These are contained in a separate code chapter on “Clearing, Invoicing and Settlement”.

6.7.4.2 Ireland

In Ireland the Single Electricity Market Operator (SEMO) and Market Participants are required to comply with the Trading & Settlement Code, which states a number of key objectives:

- to facilitate the efficient discharge by the Market Operator of the obligations imposed upon it by its Market Operator Licences;
- to facilitate the efficient, economic and coordinated operation, administration and development of the Single Electricity Market in a financially secure manner;
• to facilitate the participation of electricity undertakings engaged in the generation, supply or sale of electricity in the trading arrangements under the Single Electricity Market;
• to promote competition in the single electricity wholesale market on the island of Ireland;
• to provide transparency in the operation of the Single Electricity Market;
• to ensure no undue discrimination between persons who are parties to the Code; and
• to promote the short-term and long-term interests of consumers of electricity on the island of Ireland with respect to price, quality, reliability, and security of supply of electricity.  

The Code is supported by a series of Agreed Procedures (APs), which cover specific aspects of the operation of the market. These include a specific AP on Invoicing, which covers the provisions associated with the recovery and payment of Value Added Tax.

We note that reforms of the Irish electricity market are due to be introduced in 2018, so the above arrangements could be subject to some reorganisation.

6.7.4.3 Overview of GB and Ireland agreement structure

The structure of the rules defined in Great Britain and Ireland is summarised in Figure 6-18.

Figure 6-18: Conceptual structure of GB and Ireland market agreements

6.8 Possible approach for the VWEM

A review of the current legal documents defining the VWEM indicates that there is no direct mention of type of agreement that is needed between the SMO and the VWEM participants.

Some of the laws make reference to the importance of the independence of the SMO from any electricity trading organisations, including Prime Minister’s Decision No. 168 /QD-TTg (On the approval of the project for restructuring Vietnam power sector in 2016-2020 period and orientation to 2025) and Prime Minister’s Decision No. 63/2013/QD-TTg (Road Map, Conditions and Power Sector Organization Structure for Vietnam Power Market Stages Formation and Development). The nature of the service agreement between the SMO and other power sector participants is not explicitly addressed however.

Source: https://www.semcommittee.com/trading-and-settlement-code
In the VWEM Market Rules, the following article defines the obligations on registered market participants in the VWEM:

“Article 12. Registered Participants are bound by the Rules

1. All registered participants operating in the VWEM must abide by the VWEM Rules, Grid Code, Distribution Code, Metering Code and any regulations or procedures derived from these documents.”

The Roles and Functions of the SMO are defined at a high level in Article 7 of the Market Rules, the key requirements of which are summarised in the box below.

**Article 7. Roles and Functions of SMO**

1. The SMO must be a legal entity which is independent of all Market Participants in particular Market Customers (buyers) and Generators (sellers).
2. The VWEM must have a combined market and system operator, the System and Market Operator (SMO).
3. The SMO must manage the market and system operations according to the VWEM Rules and the Grid Code. The SMO is responsible for both the operation of the market and power system security.
4. The SMO must be run as a not for profit organisation.
5. The SMO’s costs must be:
   a. Recovered via market fees charged to Market Generators and Market Customers;
   b. Regulated by ERAV; and
   c. Set at a level that allows the SMO to:
      i. undertake all of its functions,
      ii. pay market based salaries for its staff,
      iii. pay auditors’ and consultants’ fees as required,
      iv. make capital investments in areas such as IT and communication systems as required; and
      v. make any other payments necessary for the SMO to effectively operate the VWEM.
6. The SMO must operate and administer the market in accordance with the VWEM Rules and Grid Code...

In addition, reference is made to the basis on which the SMO’s operating costs can be recovered, as follows.

**Section 20. SMO’s Market Fees**

**Article 171. SMO Market Fees**

1. ERAV must determine the SMO market fees on a VND/kWh basis for Participants and an annual fixed fee for Interested Parties, where the fee is commensurate with any additional costs the SMO incurs in providing the interested party access to this information.
2. The SMO must charge market fees to all market participants (Generators, Market Customers and Interconnector Managers) based on metered quantities.
3. Market fees are charged on a weekly basis and are part of the weekly settlement process.
4. The SMO’s market fees must not include any costs for ancillary services, energy or other aspects of the market. They must only be for the direct costs of the SMO’s market and system operations (Article 7, clause 5).

From the review of the Market Rules, many of the provisions cover aspects of the relationship between the SMO and the Market Participants. We recommend that consideration is given to implementing a separate SMO Agreement that would define specifically the principles of the relationship between the SMO and the Market Participants. This should clearly define the rights and
responsibilities of the SMO and the Market Participants, and cross-refer as appropriate to the Market Rules and other documents (e.g. a statement of the SMO charging structure).

The SMO agreement would need to be carefully drafted to ensure that it is fully compatible with the other electricity sector legislation, and to ensure that it is fully compatible with the Market Rules.
7 Recommendations for the SMO

7.1 Summary of key roles and responsibilities in the VWEM

The key requirements for NLDC acting in the role of the SMO in the VWEM have been discussed in this report and are summarised as follows:

- The primary role of NLDC in the VWEM will be to run the VWEM as the SMO, whilst also ensuring the delivery of security and quality of electricity supply by running the national power system.
- A key requirement for transparency in the operation of the VWEM is for the SMO to act with full independence from buyers and sellers in the electricity market.
- The Detailed Market Design develops the requirements for the independence of the SMO, and proposed that in the long term the SMO should be a full separate entity from EVN. It is proposed that in the initial stages of VWEM implementation the SMO be ring-fenced as a state-owned single member limited company under EVN ownership.
- There is a requirement for clear functional independence of the SMO from other organisations, which should be achieved by the transparent definition of the SMO’s functions and responsibilities in the Market Rules, Grid Code documentation and other procedures.
- The management of financial settlement processes in the VWEM will be a new function for NLDC. This is an area of activity that is closely aligned to the settlement functions currently carried out by EPTC.
- The operation of the smart contract auction also represents a significant new activity to be undertaken by the SMO over and above the work that it currently undertakes. The Market Operations function within the SMO will need to address this as a separate activity from the Spot Market.

7.2 New requirements to be fulfilled by the SMO

The analysis of business functions that the SMO will need to undertake in order to deliver its responsibilities in the VWEM has shown a number of areas where enhanced capacity will be required within NLDC compared with its current activities. These include:

- Additional responsibilities for demand forecasting, building on PCs’ forecasts and developing an increased number of scenarios to enable accurate forecasting, including reserves.
- Enhanced forecasting of non-dispatchable and semi-dispatchable generation outputs, including renewable generation.
- The co-optimisation of reserves and energy in the market will require enhanced functionality in the DAS process\(^\text{26}\).
- New market registration processes will be undertaken by the SMO, which will link with the registration of metering points by MDMSPs.
- The SMO will be required to set up an MDMSP function itself, which will handle meter data processing as part of the operation of the VWEM.
- A whole set of new processes will need to be put in place and administered relating to financial settlements. These include the following:
  - Settlement bank account with EFT facility will have to be set-up and managed by the SMO;
  - Settlement statements will have to be issued;

\(^\text{26}\) Whilst in principle the Market Rules require the implementation of a co-optimised energy and reserves market from the start of the operation of the VWEM 2019, in practice, as was noted in the Task 3.2 report, implementing the co-optimisation of reserves and energy would be difficult to achieve with the existing IT systems. Given that the Long Term VWEM will require a significant investment in new IT systems, it would not be cost-effective to seek to introduce the co-optimisation of energy and reserves using the existing systems. The implementation of this aspect of the VWEM could therefore be left until a later stage of development, however it will be very important for the efficiency of the market as a whole to ensure that this co-optimisation process is implemented in full in the Long Term VWEM.
For the Long Term VWEM, additional functions will include:

- Conducting the Annual Contract Auction (ACA) and Quarterly Contract Auction (QCA), under which the sale and purchase of energy financial contracts (CfdS) and Financial Transmission Rights (FTRs) will take place.
- Producing a 5 minute ahead forecast for at least the next half hour. This will require an additional function and staff in the control room.
- Monitoring and recording of 5-minute dispatch instructions.
- Settlement of spot market based on locational prices.
- Enhanced market surveillance activities.

7.3 SMO MDMSP function

It is recommended that the team within NLDC which currently runs the ITRON metering system should form the nucleus of the SMO MDMSP function, but that this organisation should be ring-fenced from the rest of the SMO operation, in order to ensure full transparency of its functions. This is important to ensure the integrity and confidentiality of the meter data handling processes, and to enable the costs of the meter data processing function to be understood.

7.4 SMO Settlement function

The VWEM Detailed Design proposes that “Consideration should be given to transferring EPTC’s staff who are currently engaged in managing the settlements and payments in the VCGM to the SMO for the VWEM.” This is an appropriate recommendation, since the role of EPTC in the VWEM will change significantly with the disappearance of the Single Buyer function.

A review of the operations carried out by EPTC suggests that staff from the Market Trading, Technical and Accounting departments within EPTC in particular will have skills that are particularly relevant for the SMO, and that transferring these departments into EPTC would be desirable. If the restructuring of EPTC does happen in this way, it will be essential to ensure that the staff and departments that transfer into the SMO organisation do not continue to provide services to ETPC, as this will breach the independence of the SMO from organisations having generation interests.

7.5 SMO Charter

A review of the NLDC Charter suggests that the range of activities that NLDC will undertake in its capacity as the SMO is broadly supported by the existing Charter, although it is lacking in detailed coverage of the functions that the SMO will fulfil in buying and selling electricity on the spot market. Consideration will therefore be required by ERAV, EVN and MOIT as to whether a change to the NLDC Charter is needed in the area.

7.6 SMO Legal Status

A series of steps are recommended to work towards the full separation of the SMO from EVN. Initially this should involve ring fencing the SMO as a state-owned single member limited company of EVN. For the introduction of the VWEM therefore, it is proposed that:

- The SMO should be legally separated from all other industry participants other than its ultimate owner.
- It should have its own governing body (a Members’ Council or board of directors). The members of this body should not have responsibilities in companies that are participating in the generation, retail or ancillary service markets, nor should they sit on the board of EVN. There should also be a number of directors (two or three) who are wholly independent of EVN.
- The SMO board should have a compliance committee focusing on ensuring that business separation requirements are complied with and that SMO decisions are non-discriminatory.
- The SMO should have a separate licence covering its role.
- It should produce its own accounts, ensure that it establishes and maintains an appropriate credit rating, and has access to suitable financial resources.
- SMO staff should be wholly employed on SMO activities (although certain shared services may be exempted from this).
- The staff of the SMO should be located in offices that are separate from any other industry participant including its ultimate owner.

7.7 SMO Structure

A modified structure for the SMO is proposed to enable NLDC to fulfil its functions in the VWEM 2019 and in the Long Term VWEM. This is shown in Figure 7-1, where the highlighted blocks represent new or enhanced units within the organisation.

Figure 7-1: Proposed SMO Structure for VWEM 2019

The key functions within NLDC that will require enhanced capabilities are as follows:

- The Power System Analysis Department should have a section for demand forecasting including the forecasting of non-dispatchable generation.
- The System Operations Department DA Scheduling and Dispatch section and National Load Dispatch Centre Control Room (A0) will require enhancing and more staff to implement VWEM 2019. Note that as the Scheduling and Dispatch moves to real time it is proposed that
this falls under System Operations rather than under the Market Operations Department. This is proposed for discussion, due to the constant interaction required with the control room.

- The Market Operations Department will require a Market Administration Section and an Ancillary Services Section.

- The Metering and Settlements Department will have to enhance the Settlements Section for implementation of VWEM 2019. As noted above, this is likely to be achieved by transferring key functions from EPTC into NLDC.

- The Market Reporting and Analysis Department will be a new department and is proposed to have three sections for Market Surveillance, Market and Stakeholder Information and Market Audit.

- The Information Technology and SCADA Department will have to be enhanced to support all the new hardware, software and information requirements to implement VWEM 2019.

Further enhancements to this structure are proposed for the LT VWEM. Of these, the most significant is a proposal to replace the DA Scheduling and Dispatch unit with a Real Time Scheduling and Dispatch function within the System Operations Department.

NLDC has proposed an alternative organisational structure that seeks to retain much of the existing structure in order that work flows are not unduly interrupted, particularly in the short term. This is shown in Figure 7-2.

**Figure 7-2: NLDC’s proposed organisational structure for the VWEM 2019**

Our recommendation for the structure of the SMO for the VWEM 2019 is shown in Figure 7-3 in terms of reporting lines, distinguishing between existing functions, enhanced functions and new functions. Operationally, close cooperation is required:

- between the National Load Dispatch Centre (A0) and the regional centres (A1 – A3); and
between the Day Ahead Scheduling & Dispatch Section under the Market Operations Department.

Figure 7-3: Recommended organisational reporting lines for the SMO in the VWEM 2019

Whilst it is considered that the organisational structures that we have proposed for NLDC in its role as the SMO have merits in terms of their compatibility with international experience and the efficiencies they could potentially offer, we recognise NLDC’s concerns about maintaining the efficiency of work flows, particularly in the short term. We recommend that if it is decided that NLDC should pursue the organisational structures set down in its revised proposals, these be kept under close review to assess whether they are operating effectively.

7.8 Training Plan

Training and capacity building within the SMO will be important to ensure that existing and new staff are fully familiarised with the role and functions that the SMO is required to fulfil in the VWEM. A structured approach to developing future training is proposed, in which:

- Knowledge is transferred first from consultants and senior NLDC staff to a dedicated team of SMO specialists; and
- The dedicated team of staff will then become the source of expertise to cascade new learning down throughout the organisation.

7.9 Budgeting and Financial Management

A formal budgeting process will be required within the SMO, covering the following typical set of functions:

- Salaries;
Experience in international system and market operation organisations suggests that the first two categories of costs, covering staff and ICT systems, typically account for in excess of 75% of the annual budget for SMO activities.

7.10 SMO Agreement

A review of international practice has revealed different approaches to the definition of the roles and responsibilities of the Market Operator and Market Participants in different electricity markets. In some cases the Market Rules and an associated Market Code define these requirements, and in others a separate Market Operator Agreement is used.

From the review of the VWEM Market Rules, many of the provisions cover aspects of the relationship between the SMO and the Market Participants. We recommend, however, that consideration is given to implementing a separate SMO Agreement that would define specifically the principles of the relationship between the SMO and the Market Participants. This should clearly define the rights and responsibilities of the SMO and the Market Participants, and cross-refer as appropriate to the Market Rules and other documents (e.g. a statement of the SMO charging structure).

The SMO agreement would need to be carefully drafted to ensure that it is fully compatible with the other power sector legislation, and to ensure that it is fully compatible with the Market Rules.
A Comments received from NLDC and ERAV

### NLDC Comments

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<tr>
<td>Are there any specific recommendations for the way the SMO deals with semi-dispatchable plant?</td>
<td>The Detailed Market Design Report explains that there are no special arrangements in the VWEM spot market for the treatment of semi-dispatchable technologies (e.g. wind plants with the ability to reduce output, or solar farms with control systems or storage facilities that enable a degree of control of output levels.) Semi-dispatchable plants will be price-takers in the VWEM spot market, and must be registered as such by the SMO. The SMO is required to take the output of semi-dispatchable plant into consideration in carrying out the load forecasting associated with the YAP, MAP, WAP, DAP and organising real time dispatch. The SMO is responsible for monitoring the compliance of semi-dispatchable generating plant with its dispatch instructions.</td>
<td>No changes required.</td>
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<td>EVN has instructed NLDC to establish the SMO, and they expect to complete a report on this in June 2018. An outline will be prepared by the end of 2017. NLDC is looking at the alternative models that are available, and will propose a framework to EVN initially.</td>
<td>The Consultant noted this.</td>
<td>Comment added in Section 6.3.2: We note that NLDC is due to develop its own recommendations to EVN regarding the organisational structure of the SMO by June 2018, and is currently working on both a framework for this report and the investigation of an appropriate organisational model.</td>
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<td>NLDC emphasised that there must be a smooth transition to any new structure, in order to minimise the impact on existing work flows.</td>
<td>The Consultant agrees with this approach, and will emphasise this in the report.</td>
<td>The following text has been added in Section 6.3.2: “Whilst it is considered that the proposed organisational structures for NLDC in its role as the SMO suggested by the Consultants have merits in terms of their compatibility with international experience and the efficiencies they could potentially offer, we recognise NLDC’s concerns about maintaining the efficiency of work flows, particularly in the short term. We recommend that if it is decided that NLDC should pursue the organisational structures set down in its revised proposals, these be kept under close review to assess whether they are operating effectively. If changes are implemented and reporting lines modified, it will be important to ensure that the required procedures for data exchange and operational interactions are fully tested and introduced step by step, to ensure that a smooth transition is achieved.”</td>
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<td>NLDC are happy with the approach to training that has been proposed in the document.</td>
<td>The Consultant appreciates this affirmation.</td>
<td>No changes required.</td>
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<td>It was suggested that NLDC should go through a process of comparing their proposals with those of</td>
<td>The Consultant noted this and agrees with this approach, and will ensure that the comments made in</td>
<td>The following text has been added in Section 6.3.2:</td>
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<td>the Consultants.</td>
<td>the discussion are taken into account in the report.</td>
<td>“We understand that as part of this process, NLDC will compare its proposals with those recommended by the Consultant.”</td>
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<tr>
<td>It was noted that the Consultant had missed off the Corporate Planning Department from the NLDC organisation structures shown in the report.</td>
<td>This will be corrected.</td>
<td>Changes made to the organisation charts shown in Section 6 of the report.</td>
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<tr>
<td>It was noted the Regional Dispatch Centres are structured in the same way as NLDC, but on a smaller scale. The Consultant should separate the organisational reporting lines of the Regional Control Centres from the way that work flows are organised.</td>
<td>The organisation charts should emphasise that the Regional Control Centres have a direct line of reporting to the NLDC Board, whilst operationally they are required to work closely with the NLDC Control Room for operating the power system.</td>
<td>Amendments made in Figures 6-3 and 6-7 in the report, and a new Figure 6-5 inserted to show the structure of the Regional Load Dispatch Centres.</td>
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<tr>
<td>Would it be possible for the Market Surveillance function to sit inside the MDMSP?</td>
<td>The Market Surveillance function is required to have oversight of all the VWEM operations. The accuracy of the settlement process is significantly influenced by the correct application of meter data collection, validation and processing by the MDMSP and the MDMSP’s activities should be subject to scrutiny by the Market Surveillance function as an independent unit.</td>
<td>No changes required.</td>
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<td>There needs to be a comment about cyber security requirements in the reports.</td>
<td>The Consultant will check the Task 3 report and add a comment on this if appropriate.</td>
<td>No further comments are proposed in the Task 2 report.</td>
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<td>Why is the Ancillary Services function located in the Power Market department? Should this function be a System Operations department instead?</td>
<td>The Ancillary Services (AS) function is located in the Power Market department because of the way that in the VWEM rules it is intended that co-optimisation of reserves and energy is carried out. There will be a need for close coordination between the System Operations function and the Power Market department in determining the levels of AS that are required, but as the provision of AS becomes more competitive (including the procurement of network services through commercial tendering), the Power Market department will need to be more actively involved.</td>
<td>No changes required.</td>
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<td>Can we propose a mapping of the functions of the SMO onto the different departments?</td>
<td>A mapping of the VWEM responsibilities of the SMO onto the proposed operational departments will be prepared.</td>
<td>A new Section 6.3.3 has been added to the report, containing a mapping of VWEM activities onto the operational departments responsible for undertaking them.</td>
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<td>The Consultant should use the organisational structures proposed by NLDC as the basis for a stable transition to the VWEM. In relation to this, NLDC would propose keeping the Day Ahead Scheduling activity as a market function rather than a system operations function.</td>
<td>This refers to the recommendation that in the LT VWEM the Day Ahead Planning activity transitions from being a market function to an activity under the Power System Planning and Analysis department, with Real Time Scheduling and Dispatch being established in the System Operations department. We propose that this transition is retained for the LT VWEM, because of the close linkage between system operation and Real Time scheduling/dispatch activities. Also because the DA process moves from being a scheduling activity to a planning activity over time, it seems more appropriate to locate this in the Power System Planning and Analysis department in the future. The Consultant concurs with NLDC’s view, however, that there should be as smooth a transitional process as possible.</td>
<td>No changes required.</td>
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<td>The Consultant should indicate the connection between the Accounting &amp; Finance section and the Metering &amp; Settlement function.</td>
<td>The most significant difference between the roles of the Accounting &amp; Finance and Metering &amp; Settlement departments relates to whether they are externally-facing or internally-facing activities. The Accounting &amp; Finance department is primarily concerned with supporting the corporate functions of the SMO, whereas the Metering &amp; Settlement department should take responsibility for the externally-facing activities of market settlement, including supervising Electronic Funds Transfer (EFT) tasks. The SMO will require increased staff numbers and skills to operate the EFT functions, and it is recognised that it may be appropriate to transfer staff from EPTC as the current single-buyer organisation into the SMO to give the</td>
<td>New Section 6.3.5 added detailing Settlement Responsibilities as per these comments.</td>
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<td>SMO access to the appropriate skills and experience.</td>
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<td>The Power System Operations department is an important link between the present situation and the VWEM 2019.</td>
<td>The Consultant agrees that the Power System Operations department has a vital role to play in the implementation of the VWEM 2019 and that the transition period needs to draw fully on the expertise of this department going forward.</td>
<td>No changes required.</td>
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<tr>
<td>The Consultant should clarify NLDC’s role in the settlement of the Spot Market and Contracts for Differences.</td>
<td>NLDC, in its capacity as the SMO, has a responsibility to carry out financial settlement of the Spot Market in the VWEM 2019 and LT VWEM. This represents a significant increase in its responsibilities. Contracts for Differences, in contrast, are purely financial instruments that are put in place between generators and buyers of electricity. Payments due under CfDs should be invoiced by the buyer or seller in accordance with the terms of the contract, and settled directly between these parties.</td>
<td>No changes required.</td>
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<td>EVN noted that the PCs cannot legally invoice generators under Vietnamese law currently, so this could act as a constraint on the settlement of CfDs where money is owed from Generators to PCs if the spot market price is higher than the CfD strike price.</td>
<td>It will be important to ensure that the parties to CfDs are able to invoice each other and make/receive payments in accordance with these contracts. It is beyond the scope of the current consultancy assignment to address this issue, other than to note that legal advice will be required in the implementation of the VWEM 2019 and the LT VWEM to ensure that</td>
<td>No changes required.</td>
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<td>the market participants have the necessary rights in law to fulfil their obligations under the Market Rules.</td>
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<td>EVN queried who ultimately pays the costs of the SMO function?</td>
<td>The SMO will recover its costs through a structure of fees charged to all market participants. Article 171 of the VWEM Market Rules explains that the SMO fees will be set on a VND/kWh basis for trading parties (plus an annual fixed fee for other Interested Parties). Market participants (comprising Generators, Market Customers and Interconnector Managers) will be charged fees based on the metered quantities of energy traded in the market. Ultimately, the costs of operating the VWEM will be borne by electricity customers, as the overhead costs incurred by generators and market customers will be recovered through end-user tariffs, on the assumption that cost-reflective tariffs can be recovered by electricity retailers.</td>
<td>No changes required.</td>
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<td>Regarding ringfencing, it was noted that enterprise law in Vietnam makes ringfencing difficult – if a company is 100% owned by its parent, then the parent has full control over the staff of the subsidiary.</td>
<td>The ring-fencing that is described in the Task 2 report primarily relates to the MDMSP function of NLDC, and is intended to ensure transparency in the financial reporting of the costs of metering activities and to enable the commercial confidentiality of meter data to be maintained.</td>
<td>No changes required.</td>
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<td>Is it possible to add any more international references to the report?</td>
<td>International references have been added relating to the way in which trading of financial contracts is organised, and looking at models relating to Market Operator agreements.</td>
<td>New material added in Section 6.3.2, and new section 6.7 added.</td>
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## Official Comments from ERAV

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<td>The consultant is requested to correct some mistakes in the figures on</td>
<td>These errors have been corrected in the report, noting that whilst the reporting lines for the regional dispatch centres may be directly into the Board of Directors, work flow activities are likely to require considerable interaction between the regional load dispatch centres and the National Load dispatch Centre (A0).</td>
<td>Modifications made to Figures 6-1 and 6-4 to insert the Corporate Planning Department. New Figures 6-3 and 6-7 added to distinguish between organisational reporting lines and work flow arrangements.</td>
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<td>proposed structure of SMO in VWEM 2019 and long-term VWEM. These figures</td>
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<td>should include the “Corporate planning department” and note that 3 regional dispatch centers to report directly to Board of directors.</td>
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<td>For contract auction function in long-term VWEM, ERAV suggests that SMO</td>
<td>The main reason for organising the trading of financial contracts outside the physical market outside is due to the clearing arrangements, where are different from a pure physical energy settlement. Also, as longer term contracting is allowed, the capital requirements will become larger. This is essentially the main reason why Nord Pool’s financial market was sold to Nasdaq; with the TSOs as owners, as it is not feasible for them to put up the huge capital base required of a clearing house.</td>
<td>A new Section 6.3.4 has been added in the report, describing the arrangements for trading financial contracts in the Nordic and European electricity markets, and explaining the circumstances leading to splitting the organisation responsible for trading these contracts away from the Market Operator.</td>
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<td>may need independent department to handle the transaction in contract</td>
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<td>market, which could be merged into stock market in the future.</td>
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<td>In addition, use of colour to emphasize the new and existing departments</td>
<td>Colours have been added to new Figures 6-3 and 6-7 to show the departments and functions that are either new or require enhancement.</td>
<td>See new Figures 6-3 and 6-7.</td>
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<td>should be changed in the way that can indicate new functions and enhanced</td>
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<td>functions of these departments in VWEM 2019 and long-term VWEM.</td>
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<td>Relating to issues on ring-fencing of SMO within</td>
<td>Section 6.2 of the report proposes that in the long term No changes required.</td>
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<td>EVN, the consultant is requested to clarify the principles and requirements which should be met in VWEM 2019 to establish a fully functional and independent SMO for market operation.</td>
<td>NLDC, as the SMO, should be fully separated from EVN. Prior to becoming fully separated it is proposed that the SMO should become ring-fenced as a state-owned single member limited company of EVN. NLDC is currently a dependent subsidiary of EVN. It is considered that the level of accounting separation associated with the creation of NLDC as a state-owned single member limited company beneath EVN will be sufficient to ensure NLDC’s independence in the operation of the VWEM 2019.</td>
<td>Paragraphs added to Section 6.2 on the proposed legal status of the RLDCs, and Section 6.3.2 on the operational interface between the RLDCs and NLDCs.</td>
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| Besides, structure of each regional dispatch center should also be clarified in terms of independence (ring-fenced company or subsidiary), business model (structure of departments, relationship with national center), control rights in generation and network operation (note that regional dispatch centers still have right to dispatch generators, which are not market participants, with installed capacity lower than or equal to 30MW). | Currently the Regional Load Dispatch Centres are dependent subsidiaries of NLDC. The nature of their activities and their need for close interaction with NLDC suggest that they should remain subsidiaries of NLDC, once NLDC is established as a state-owned single member limited company. Establishing each RLDC as an independent company in its own right is unlikely to deliver additional benefits in terms of independence from trading activities, given the limited remit of the RLDCs compared with NLDC itself. For the avoidance of doubt, the RLDCs will retain responsibility for:  
  - Controlling the 220kV transmission system;  
  - Dispatching generators which are not participants in the VWEM, and which have a | Paragraphs added to Section 6.2 on the proposed legal status of the RLDCs, and Section 6.3.2 on the operational interface between the RLDCs and NLDCs. |
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<td>The consultant is requested to supplement the report with some international practices on agreement between SMO and each participant for providing system &amp; market operation services in wholesale market, especially for issuing GST/VAT invoice. In some markets, the scope of this agreement is broad including connection agreement, metering, dispatching and payment services, etc. Thus, the consultant should give some advices on the scope of service agreement and requirements for the implementation of the agreement following international convention.</td>
<td>A review of international practice has revealed different approaches to the definition of the roles and responsibilities of the Market Operator and Market Participants in different electricity markets. In some cases the Market Rules and an associated Market Code define these requirements, and in others a separate Market Operator Agreement is used. From the review of the VWEM Market Rules, many of the provisions cover aspects of the relationship between the SMO and the Market Participants. We recommend, however, that consideration is given to implementing a separate SMO Agreement that would define specifically the principles of the relationship between the SMO and the Market Participants. This should clearly define the rights and responsibilities of the SMO and the Market Participants, and cross-refer as appropriate to the Market Rules and other documents (e.g. a statement of the SMO charging structure). The SMO agreement would need to be carefully drafted to ensure that it is fully compatible with the other power sector legislation, and to ensure that it is fully compatible with the Market Rules.</td>
<td>A new section 6.7 has been added to the report summarising international experience in the area of Market Operator Agreements and drawing appropriate conclusions for the SMO in the VWEM.</td>
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