CLIMATE CHANGE ASSESSMENT

I. BASIC PROJECT INFORMATION

Project Title: Cambodia National Solar Park Project	
Project Budget: $26.71 million	
Project Location(s): Kampong Chhnang and Kampong Speu provinces of Cambodia	
Sector: Energy **Subsector:** Electricity Transmission and Distribution	

BRIEF DESCRIPTION OF THE PROJECT

Objective: The National Solar Park Project aims to demonstrate the ability of large-scale solar power to improve the electricity supply and stability of the Government of Cambodia national grid, and substitute for planned fossil-fuel and hydropower generation in the future. The expansion of solar power generation will help diversify the power generation mix and complement the existing base of hydropower plants to meet daytime peak demand and dry season shortages as well as increase the percentage of clean energy supply in line with the Government's stated greenhouse gas (GHG) emissions reduction targets.[1] The project will support investments for development of a solar park and transmission interconnection infrastructure.

Location: The proposed project is located in Kampong Chhnang and Kampong Speu provinces of Cambodia.[2]

Impact, Outcome and Outputs:
The project is aligned with the following impact: cost of electricity in Cambodia lowered. The project will have the following outcome: increase in private sector investments in solar PV facilitated.

C. Outputs

(i) **Output 1: Solar park and transmission interconnection constructed.** The project will support EDC in constructing a 100 MW solar power park in Kampong Chhnang Province and a transmission interconnection system to grid substation 6 (GS6) near the Phnom Penh demand center to supply power to the national grid. The park will initially consist of 100 hectares (ha) of land; associated construction works (i.e., fencing, roads, and drainage systems); common facilities; and supporting infrastructure to accommodate 60 MW of solar photovoltaic plant capacity. The transmission interconnection infrastructure comprises (i) the 100 MW capacity pooling substation at the solar park, with two 50-megavolt-ampere transformers (and room for two additional transformers); switchgear; an ancillary system; and controls; (ii) a supervisory control and data acquisition system compatible with EDC's requirements, advanced forecasting tools, and expanded information and communication technology applications; (iii) a dedicated 40-kilometer 230-kilovolt double circuit overhead transmission line between the solar park substation and GS6; and (iv) two new bays with switchgear at GS6.[3]

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[1] According to ADB's solar grid integration report (February 2017), 150–300 MW of PV installed between 2020 and 2030 would single-handedly allow the government to meet its emissions reduction targets as stated in the country's Intended Nationally Determined Contribution to the Paris Agreement, without any additional investments. (Source: National Solar Park Project for Cambodia: Pre-Feasibility Study, August 2017).

[2] The solar park infrastructure is located in Tuel Phos district of Kampong Chhnang province. The proposed transmission line will transect through areas of Sameakki Mean Chey district in Kampong Chhnang province and Thpong and Odonk districts in Kampong Speu province. The GS6 is located in Outdong district in Khampong Speu province.

[3] EDC is considering a 10 MW (2-hour) battery storage system for output smoothing to counterbalance intermittent solar power generation. ADB is applying for grant funds to support this component; if available, they will be processed as additional financing. The transmission line will be rated at 230 kilovolts but will be initially operated at 115 kilovolts.

(ii) **Output 2: Capacity of Electricite du Cambodge in solar power plant construction and operation, project design and supervision, grid integration, and competitive procurement strengthened.** The project will strengthen EDC's capacity to design, construct, and operate solar photovoltaic plants and solar parks (including management of environmental and social safeguards issues). The project will also strengthen EDC's capacity to procure solar photovoltaic generation capacity through the private sector, and to adopt energy storage systems and other measures to integrate intermittent renewable energy into the national grid.

Summary of Climate Change Implications:

The project has been screened for climate change risks using the AWARE climate risk-screening tool[4] (Screening results are enclosed as Part 2 of this Appendix IV). The project is classified as being at Medium risk from future climate change impacts.

The screening indicates that the project is located in a region which has experienced recurring major flood events in the recent past; may be at risk from precipitation induced landslide events; and may experience potential increase in incidences of precipitation and temperature, future water stress and change in solar radiation affecting solar power potential.

While climate change impacts are not anticipated to be significant over the design life of the solar park (25 years), project outputs sensitive to climate change were identified along with climate change risk response (mitigation) measures.

Recommendations include adequate engineering design of sites (e.g. project siting at the highest flood level and suitable slope– solar park and transmission tower footings), all weather road pavement and raising embankment height of access roads, strengthening existing drainage canals and building a water retention pond, high design standard transmission line as well as regular maintenance of drainage canals, retention pond and roads.

The key climate vulnerable project components will be subject to further analysis during the project detailed engineering design to ensure they take account of projected increases in flooding; measures that will permanently become part of the solar park infrastructure will be included within the main civil work contract costs (indicative estimate $1.17 million).

II. CLIMATE CHANGE TRENDS AND PROJECTIONS

Cambodia's climate is tropical with characteristically high temperatures and two seasons are recognized: a). Wet season (May-November) arrives with the summer monsoon with the south-westerly winds ushering in clouds and moisture that accounts for between 80-90% of the country's annual precipitation. Mean monthly rainfall at this time of year can be more than 5000 mm in some provinces; and b). Dry season (November-April) with cooler temperatures, particularly between November and January. Average temperatures are relatively uniform across the country (25 to 27°C) and are highest (26-40°C) in the early summer months before the start of the wet season. Yearly variations in climate result from the El Niño Southern Oscillation episodes that influence the nature of the monsoons in the region and generally bring warmer and drier than average winter conditions across Southeast Asia while La Niña episodes bring cooler than average conditions.[5]

(i) Historical Trends and Projected Changes in Temperature

[4] The screening is based on the Aware™ geographic data set, compiled from the latest scientific information on current geological, climate and related hazards together with projected changes for the future where available. These data are combined with the project's sensitivities to hazard variables, returning information on the current and potential future risks that could influence its design and planning.

[5] World Bank's Climate Change Knowledge Portal.

Analysis of historical climate data (1901-2015) suggest that the rate of temperature increase has been most rapid in the drier seasons (December-February and March-May), increasing 0.20-0.23°C per decade; and slower rate of temperature increase in the wet seasons (June-August and September-November), increasing 0.13-0.16°C per decade.

Observed Trends:[6]

- Mean annual temperatures have increased by 0.8°C since 1960.
- The rate of temperature increase is most rapid in the dry seasons, increasing 0.20-0.23°C per decade and is slow in the wet seasons, increasing 0.13-0.16°C per decade.
- The frequency of 'hot' days per year[7] has increased significantly (+46, with maximum increases noted in September-November), as has the frequency of 'hot' nights per year (+63, with maximum increases noted in December-February).
- The frequency of 'cold' days per year[8] has decreased (-19, with maximum decreases noted in December-February).

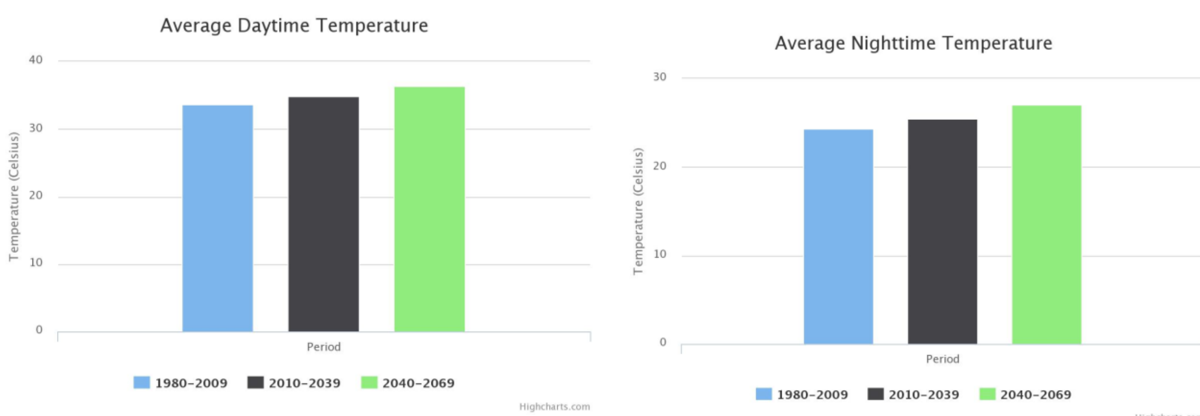
Projected Changes in Temperature

The following insights into future changing climate are derived from a suite of Global Circulation Models (GCMs) used by the Intergovernmental Panel on Climate Change (IPCC).[9]

- Mean annual temperatures are projected to increase across Cambodia by 0.7-2.7°C by 2060s and 1.4-4.3°C by 2090s.
- These projections indicate substantial increases in the frequency of days and nights that are considered 'hot' in current climate, with hot days increasing by 14-49% and 'hot' nights increasing by 24-68% by 2060.
- These projections also indicate decreases in the frequency of days and nights that are considered 'cold,' and these events becoming exceedingly rare.

The projected change in temperature for the project area shows similar trends as outlined below:[10]

Kampong Chhnang:



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[6] World Bank's Climate Change Knowledge Portal.

[7] Hot days or nights are defined as the temperature above which 10% of days or nights are recorded in current climate of that region and season.

[8] Cold days or nights are defined as the temperature below which 10% of days or nights are recorded in current climate of that region or season.

[9] World Bank's Climate Change Knowledge Portal

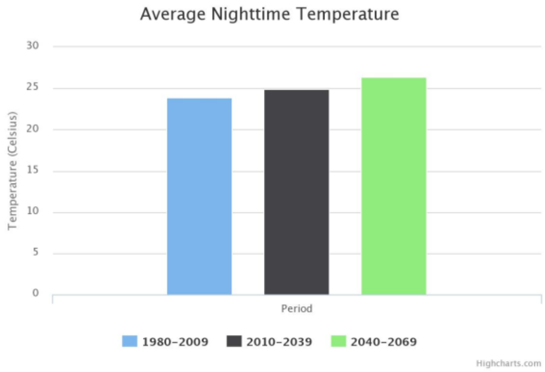
[10] GMS CEP SEA START RC Climate Change Adaptation Platform; http://climatechangeadaptation.gms-eoc.org/home/country

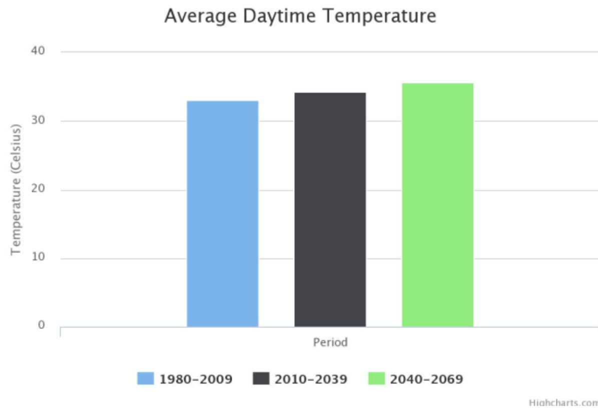
(Scenario Selection: High Temperature Change)

1980 - 2009: 33.7ºC
2010 - 2039: 34.9ºC
2040 - 2069: 36.4ºC

1980 - 2009: 24.4ºC
2010 - 2039: 25.4ºC
2040 - 2069: 27.1ºC

Kampong Speu





(Scenario Selection: High Temperature Change)

1980 - 2009: 33.1ºC
2010 - 2039: 34.3ºC
2040 - 2069: 35.7ºC

1980 - 2009: 23.8ºC
2010 - 2039: 24.9ºC
2040 - 2069: 26.4ºC

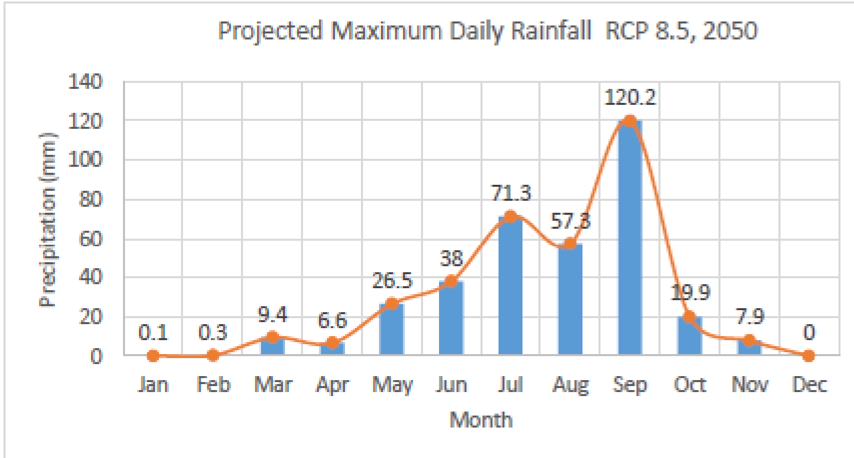
(ii) Historical and Projected Changes in Precipitation

Observed Trends:
Mean rainfall trends in Cambodia are unclear, with some areas experiencing increases and others decreases but these changes are not statistically significant.

Projected Changes in Precipitation:
Climate model projections show that annual average precipitation will increase in the project location, most likely during the wet season.[11]

In the year 2050, the maximum daily rainfall is likely be 120.2 mm at Representative Concentration Pathway (RCP) 8.5[12]

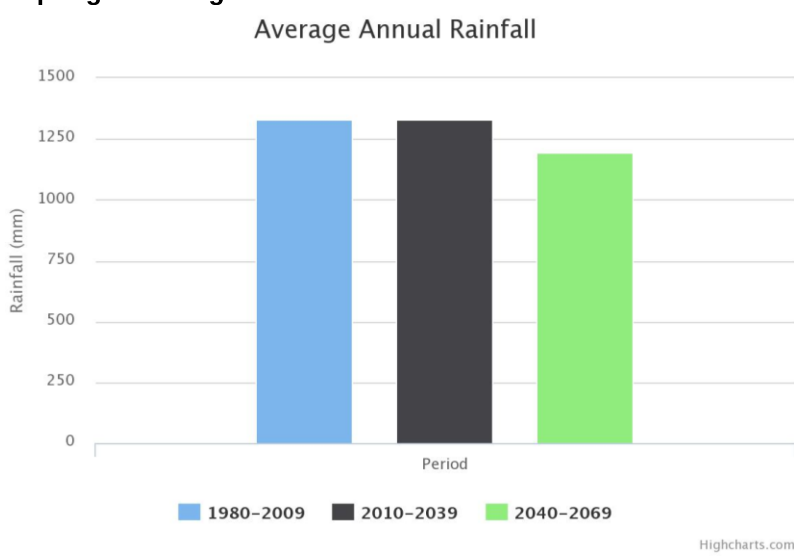
[11] AWARE climate change risk screening tool
[12] Hydrological Study for this project, March 2018 (Work in Progress)



Source: NASA NEX Climate Change data

The projection data for the project areas suggest average annual rainfall increasing until 2039, and then decreasing until 2069.[13]

Kampong Chhnang:

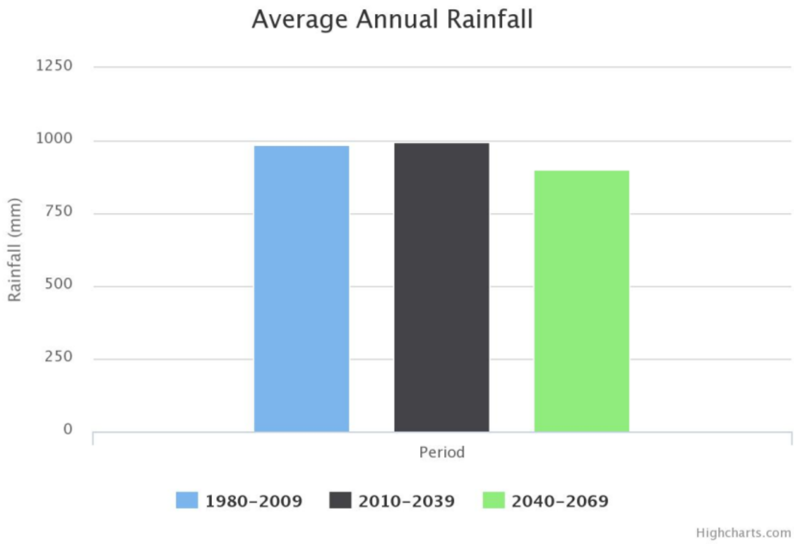


1980 - 2009: 1329.7 mm
2010 - 2039: 1328.3 mm
2040 - 2069: 1193.0 mm

(Scenario Selection: Wet Season)

Kampong Speu:

[13] GMS CEP SEA START RC Climate Change Adaptation Platform; http://climatechangeadaptation.gms-eoc.org/home/country



1980 - 2009: 985.9 mm
2010 - 2039: 995.5 mm
2040 - 2069: 902.5 mm

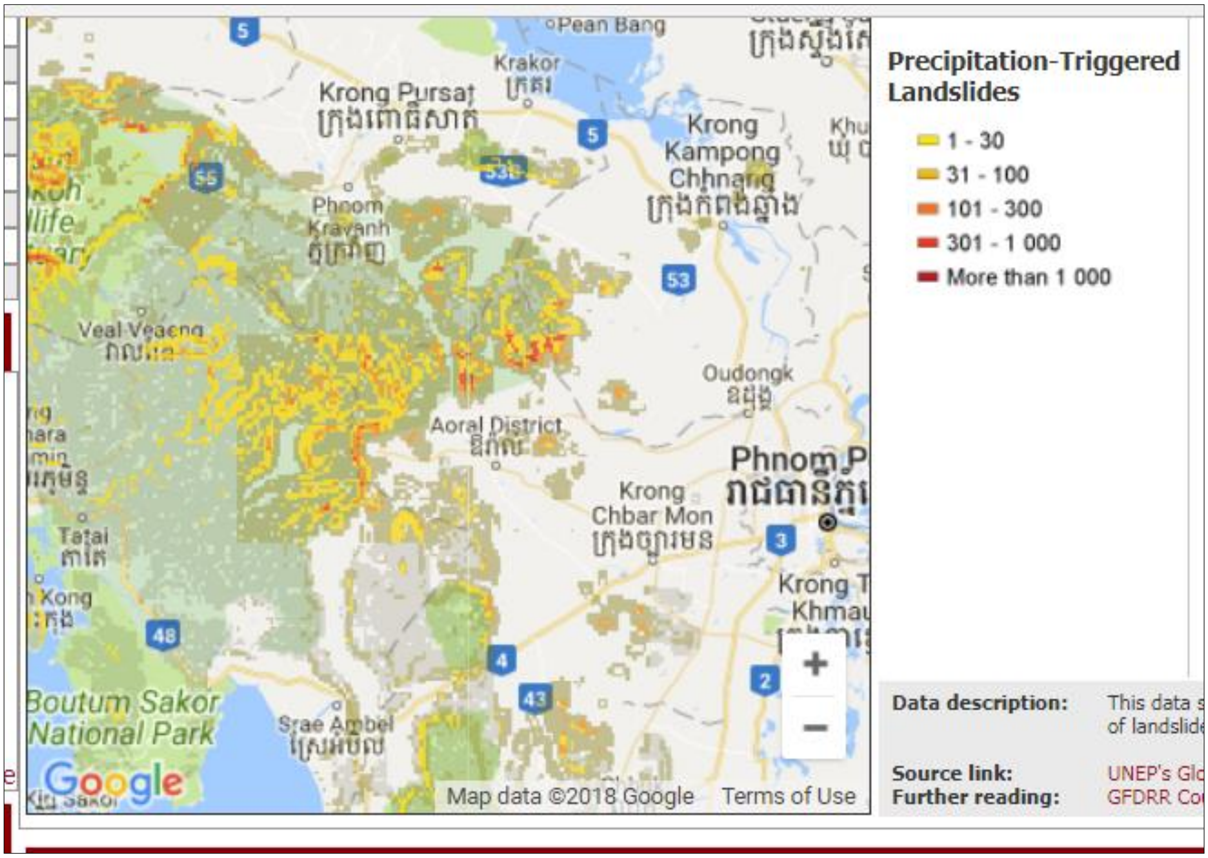
(Scenario Selection: Wet Season)

(iii) Historical and Projected Risk from Precipitation induced Landslide Events

Observed Trends:
Localized landslides are an uncommon hazard phenomenon in the country.[14]

Projected Risk of Landslide Events:
The climate change risk screening results indicate that the project is located in a region that may be at risk from precipitation induced landslide events. Landslide risk is locally influenced by factors such as local slope and vegetation conditions, long term precipitation trends and human actions including excavation of slopes, deforestation, mining, etc. As indicated in Figure 1 below, the landslides triggered by precipitation do not affect the project area. As seen by the red circle in the figure, both sites are outside the landslide areas.

[14] http://thinkhazard.org/en/report/44-cambodia/LS



Precipitation-Triggered Landslides
1 - 30
31 - 100
101 - 300
301 - 1 000
More than 1 000
Pean Bang
Krakor
Krong Pursat
Krong Kampong Chhnang
Phnom Kravanh
Veal Veaeng
Oudongk
Aoral District
Krong Chbar Mon
Tatai
Boutum Sakor National Park
Srae Ambel
Map data ©2018 Google
Terms of Use
Data description:
Source link:
Further reading:

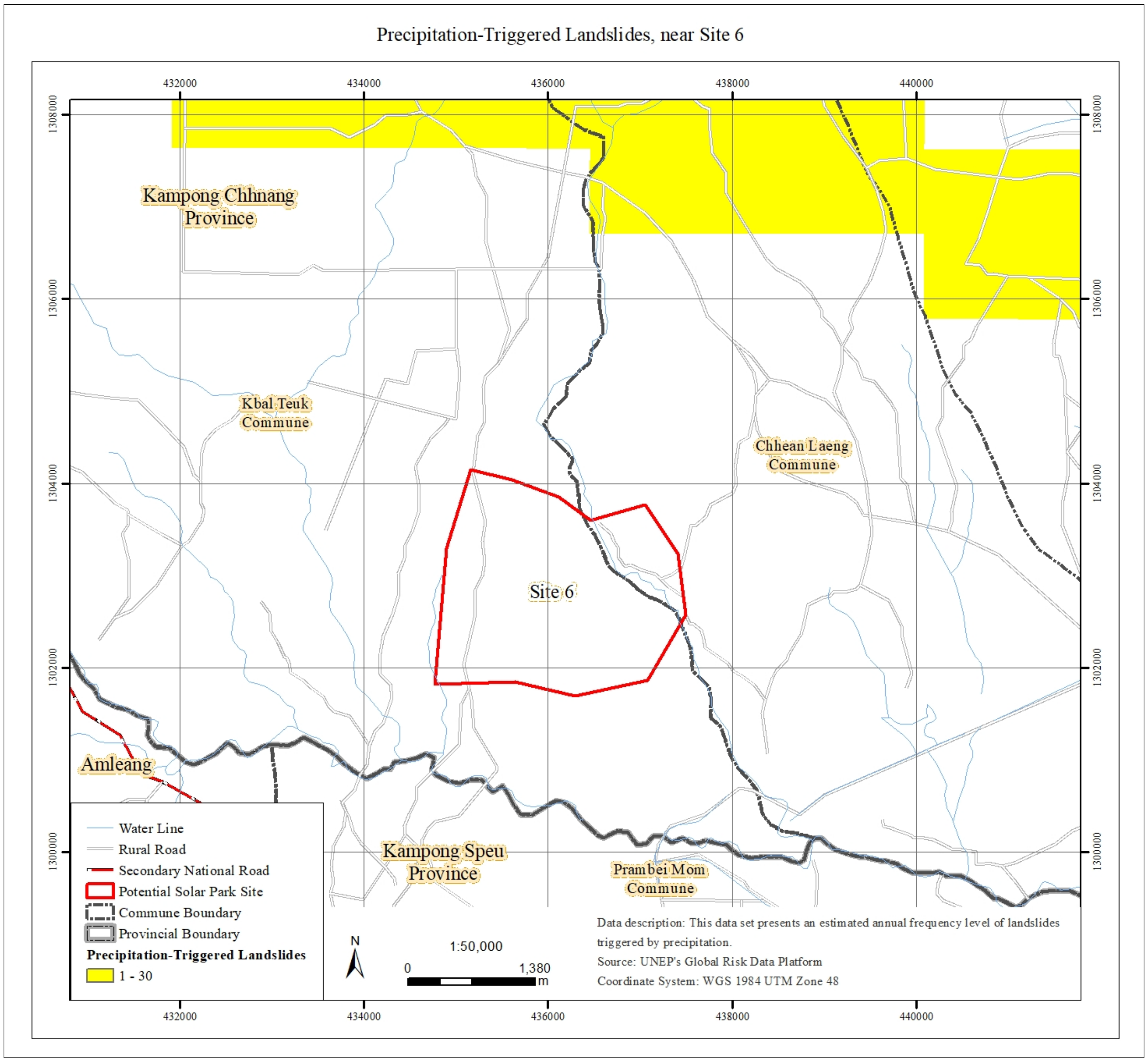


Figure 1
***** The data set presents an estimated annual frequency level of landslides triggered by precipitation.

(iv) Historical and Projected Risk from Flood Events:

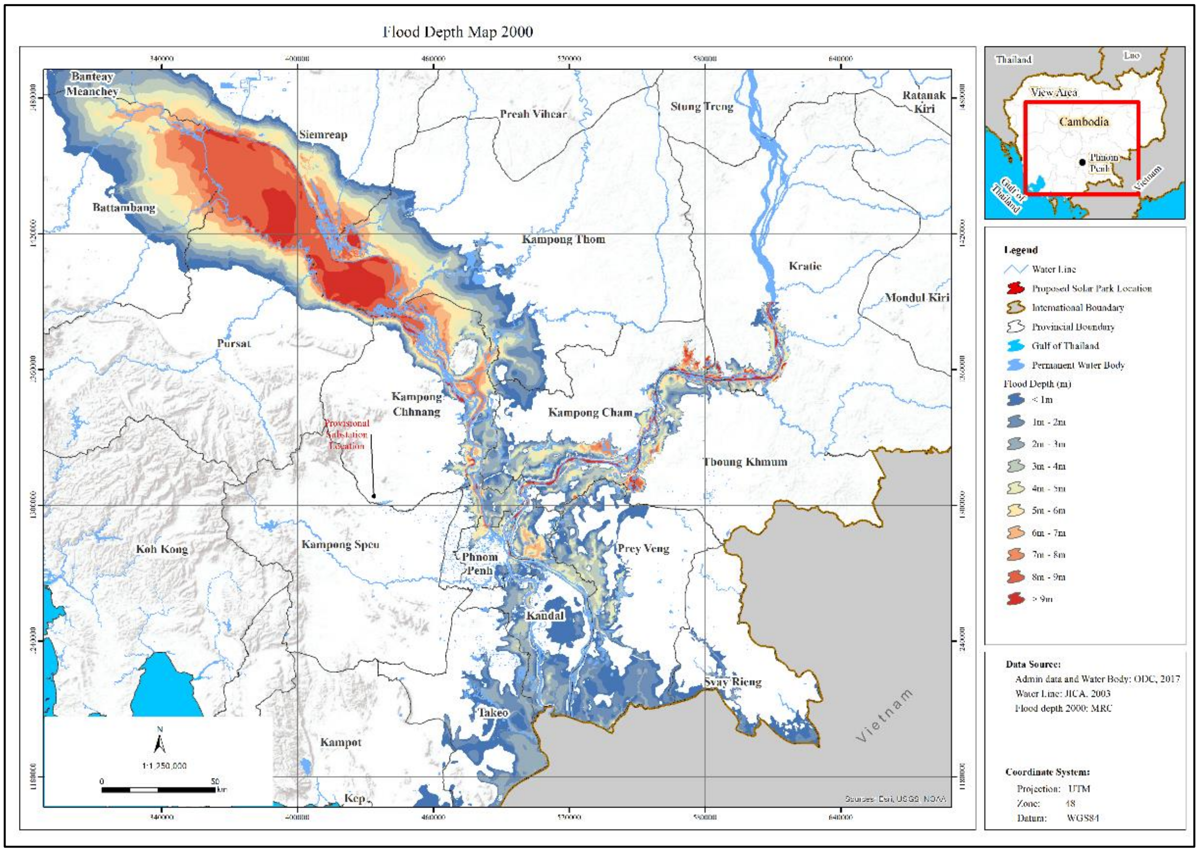
Observed Trends:
There are two flood types in Cambodia: Mekong River flood and flash floods. The southwest monsoon begins in mid-May and lasts through October and contributes to three-quarters of the country's annual rainfall. Approximately 80% of the country's population lives along the Mekong River that is known for large river flow and discharge fluctuations. Mekong floods affect the provinces of Kandal, Kampong Cham, Kratie, Prey Veng, Stung Treng, Svay Rieng and Takeo. Flash floods in tributaries around the Tonle Sap Lake may affect the project provinces. In recent years, a succession of floods has resulted in significant loss of life and economic loss.[15]

[15] EM-DAT | The international disasters database; weblink: https://www.emdat.be/

Disaster Type	Period	Events count	Years of occurrence
Flood	1986- 2000	6	1991, 1994, 1996, 1999 (2), 2000
	2001-2016	11	2001, 2002, 2004, 2005, 2006, 2007, 2010, 2011, 2012, 2013, 2014

Projected Risk of Flood Events:

The climate change risk screening results indicate that the project is located in a region that has experienced recurring major flood events in the recent past. Some parts of Kampong Chhnang and Kampong Speu are prone to flash floods.[16] The maximum flood extent in 2000[17] by the Mekong River flood and the maximum flash flood extent in 2011 and 2013 are shown in Figure 2. As seen in the figure, the proposed project site was out of the flood boundary during these events. The project area communes report heavy precipitation and corresponding floods that affected large areas of rice paddy fields in 2015.



[16] Hydrological Study for Cambodia National Solar Park Project, March 2018 (draft, Work in Progress).
[17] The year 2000 is considered as the worst flood in the recent history of Cambodia.

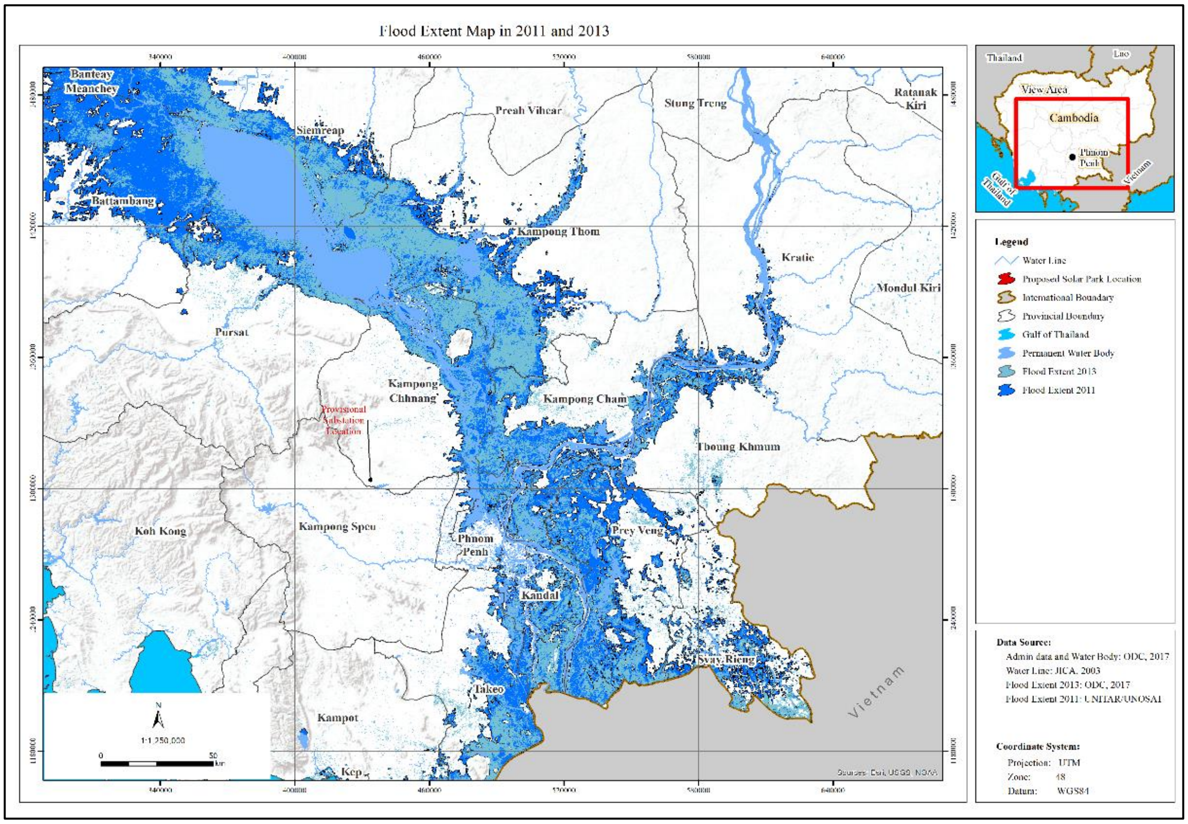


Figure 2

(v) Historical and Projected Changes in Water Availability:

Observed Trends:

Coupled with poor management of water resources including availability, accessibility and quality (of existing water resources) and delays or early ending of the monsoon rains as well as erratic rainfall have contributed to water stress and drought events in Cambodia.[18] For example Svay Reing province is considered one of the most drought prone provinces in the country.

In recent years, a succession of droughts has resulted in significant loss of life and economic loss.[19]

Disaster Type	Period	Events count	Years of occurrence
Drought	1986-2000	2	1987, 1994
	2001-2016	4	2002, 2012, 2015, 2016

As per the National Committee for Disaster Management (NCDM), in 2016 eighteen of Cambodia's twenty-four provinces were affected by drought including Kampong Chhnang province. The drought affected 2.5 million people in 625,000 households. Consultations held with the villagers in project-affected communes suggest no episodes of heavy rains or floods in the last 10 years. On the other hand, the project area communes report droughts as recurring phenomena during the dry season including one episode during January 2002 considered as the worst in two decades by the NCDM; this lasted until the onset of rains in mid-August.

[18] Water stress and drought are different phenomena although they are liable to aggravate the impacts of each other. In some regions, the severity and frequency of droughts can lead to water stress while overexploitation of available water resources can exacerbate the consequences of droughts.

[19] EM-DAT | The international disasters database, web-link: https://www.emdat.be/

Projected Changes in Water Availability:
Climate change is projected to influence water availability. Regions that are already dry may suffer further if future precipitation is projected to decrease. Increased evaporation due to rising temperature will further impact water availability. Seasonal availability of water may also change whereby there may be a shift in the timing of its availability.

(vi) Historical and Projected Changes in Sea Level Rise

The project is located inland and will not be affected by sea level rise.

(vii) Historical and Projected Changes in Solar Radiation

Observed Trends:
Cambodia enjoys some of the highest solar resources in the region, with solar irradiance measuring 1400-1800 kWh/m² per year throughout the country. In the middle of Cambodia, including the load center of Phnom Penh, which is responsible for approximately 70% of national demand, the peak solar resource measures over 1900 kWh/m² per year.

Projected Change in Solar Radiation:
Future projections of regional 'dimming' or 'brightening' are difficult to predict; this is due largely to the large uncertainty surrounding cloud formation under climate change conditions. However, changes in solar radiation will affect the solar power potential.

III. CLIMATE CHANGE RISK AND VULNERABILITY ANALYSIS

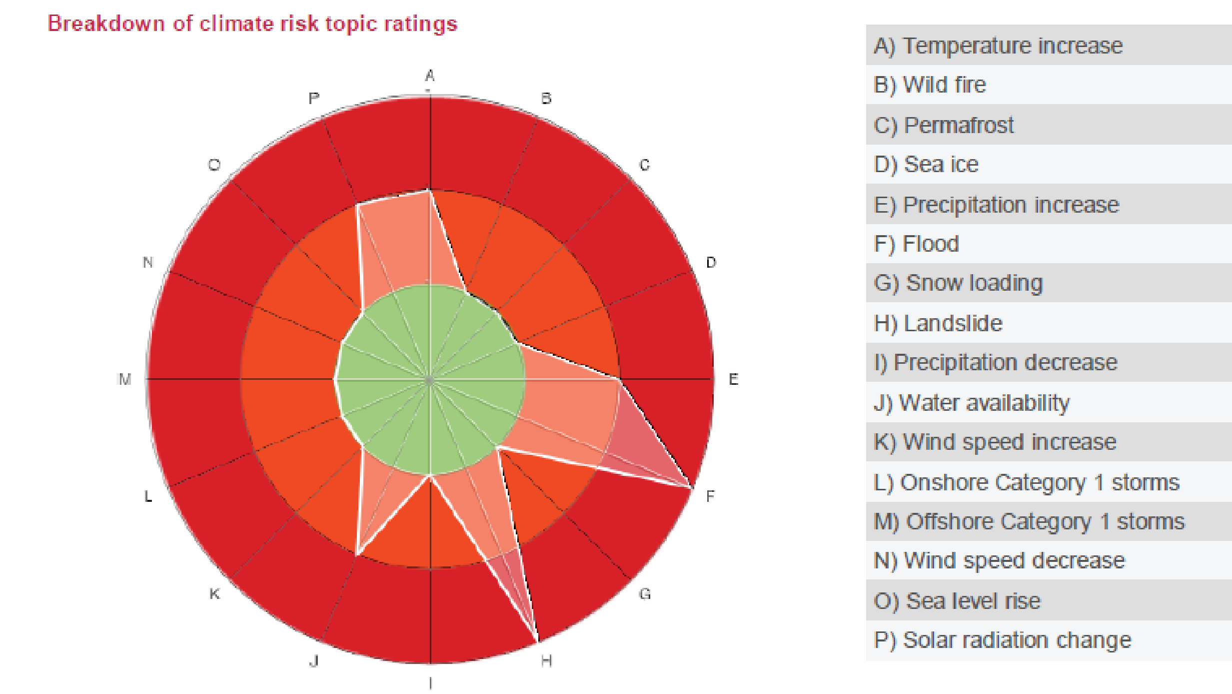
(i) Climate Change Risk Classification as per AWARE

The project has been screened for climate change risks using the AWARE climate risk-screening tool[20] which indicates that the project is located in a region:

- which has experienced recurring major flood events in the recent past
- which may be at risk from precipitation induced landslide events
- which may experience potential increase in incidences of precipitation
- which may experience potential increase in temperature
- which may experience future water stress
- which may experience a change in solar radiation affecting solar power potential

The project region is at low risk for geological hazards such as earthquake, seismic landslide, volcano and tsunami as well as potential decrease in incidences of precipitation. Therefore, these were not further elaborated for the purpose of this assessment. The AWARE report is included in Appendix 1.

[20] The screening is based on the Aware™ geographic data set, compiled from the latest scientific information on current geological, climate and related hazards together with projected changes for the future where available. These data are combined with the project's sensitivities to hazard variables, returning information on the current and potential future risks that could influence its design and planning.



The overall climate change risk classification for the project is Medium. The description of the risks and risk classification for each risk topic (identified by AWARE) are presented below.

S. No	Risk Topic	Description of the Risks	Risk Classification
(i)	Changes in Temperature	Cambodia can expect a projected increase in temperature over longer periods. Heatwaves put stress on infrastructure and buildings. This is not anticipated to be significant over the design life of the solar park (25 years)	Medium
(ii)	Changes in Precipitation	Climate model projections show that annual average precipitation will increase in the project location, most likely during the wet season. This indicates a relatively low degree of uncertainty that precipitation will increase in the region. This may affect the design and operation of the project.	Medium
(iii)	Precipitation triggered Landslide Events	The project is located in a region that is at risk from precipitation induced landslide events. The project site is not located in the area prone to landslides as shown in Figure 1.	High
(iv)	Risk of Flood Events	The project is located in a region that has experienced recurring major flood events in the recent past. Climate change is projected to influence the frequency and intensity of flood events. This may affect the design, construction, operation and maintenance of the project.	High
(v)	Water availability	Climate change is projected to influence water availability. Regions that are already dry may suffer further if future precipitation is projected to decrease. Increased evaporation due to rising temperature will further impact water availability. Seasonal availability of water may also change whereby there may be a shift in the timing of its availability. This	Medium

		may affect the operation and maintenance of the project e.g. for vegetation maintenance, PV panel cleaning, and sanitation.	
(vi)	Changes in sea level	The project is located inland and will not be affected by changes in sea level	-
(vii)	Changes in solar radiation	Future projections of regional 'dimming' or 'brightening' is difficult to predict; this is due largely to the large uncertainty surrounding cloud formation under climate change conditions. This is not anticipated to be significant over the design life of the solar park (25 years)	Medium

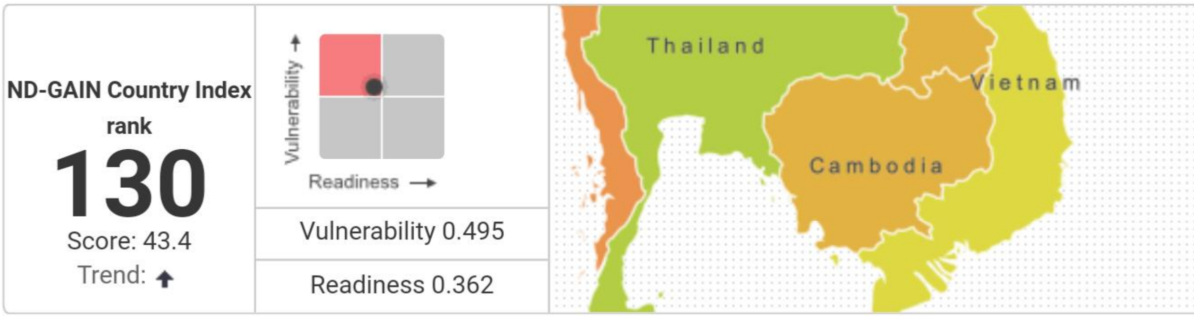
Energy projects are sensitive to projected climate changes such as increases in temperature and precipitation, extreme events such as floods and landslides, stronger / frequent storms and changes in cloud cover (affecting solar radiation). Considering that the lifespan of the solar park is 25+ years, the project investments are not anticipated to be significantly affected by projected climate change impacts.

Description of Output	**Activities Sensitive to Climate / Weather Conditions**
Project Output 1	The project components under output 1 are sensitive to increase in precipitation, flood events and water availability as follows: - The project siting, design and construction of the solar park, Solar PV plants and transmission tower footings are sensitive to increases in precipitation and flood events - Operation and maintenance of the solar park and Solar PV Plants are sensitive to changes in water availability (for example water used for landscaping at the solar park and hedge maintenance along the fenced perimeter and for PV panel cleaning) - Water retention pond / drainage canals are sensitive to increases in precipitation, sedimentation load and floods - Access / approach roads and commune tracks are sensitive to increase precipitation and floods
Project Output 2	These activities do not involve construction of physical infrastructure/ assets on the ground. Hence it is not sensitive to climate risk.

(iii) Vulnerability Assessment (Sensitivity, Exposure and Adaptive Capacity)

The Notre Dame Global Adaptation Initiative (ND-GAIN) Country Index, a project of the University of Notre Dame, summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. It aims to help businesses and the public sector better prioritize investments for a more efficient response to the immediate global challenges ahead.

The high vulnerability score and low readiness score of Cambodia places it in the upper-left quadrant of the ND-GAIN Matrix. It has both a great need for investment and innovations to improve readiness and a great urgency for action. Cambodia is the 51st most vulnerable country and the 56th least ready country.



The Government recognizes Cambodia as one of the most climate vulnerable countries in the world[21]. As a least developed, agrarian country, Cambodia's vulnerability to climate change is mainly due to its geography, high reliance on the agriculture sector and low adaptive capacity including limited financial, technical and human resources.

(iv) Impact assessment (key impacts on the sector and project) and corresponding Adaptation responses

Impact on Sector:
While the exposure and vulnerability to climate will depend upon the nature and type of infrastructure as well as its location, the power sector is one whose output and efficiency are highly dependent on climate conditions. Projected changes in these conditions are expected to impact the sector significantly. The energy sector is vulnerable to projected changes in mean climate conditions such as temperature and precipitation. Climate variability is expected to increase in a warmer climate; and in the frequency and intensity of weather events such as floods and droughts; and changes in sea level.

The project is located inland therefore it will not be impacted by changes in sea level.

Impact on Project Output 1:

Climate Change Factors	Risk Level as per AWARE	Impact
• More frequent and/or Intense extreme weather Events ○ Recurring flood events ○ Precipitation induced landslides	High	• Increased risk of direct flood damage to solar PV plants, substation, drainage canals, access roads and transmission line tower structures • Increased risk of accelerated surface run-off, soil erosion and sedimentation load at site affecting land and drainage • Access / approach roads could be damaged or washed out or segments could be eroded. • Affected life span of solar park infrastructure
• Increase in temperature • Increase in precipitation • Change in solar radiation	Medium	• Increased operating challenges to solar PV Plants such as lower cell efficiency and energy output • Heat waves stress on roads, buildings and other infrastructure • Reduced electricity carrying capacity of transmission lines • Increased losses within the substation and transformers

[21] Government of Cambodia Second National Communication to the UNFCCC, Ministry of Environment (MOE), 13 January 2016.

• Change in water availability		• Increased risk of corrosion of steel infrastructure (lattice towers) with a corresponding increase in humidity • Increased risk of drought episodes and dust damage to solar PV plants • Less water availability for PV panel cleaning and maintenance of vegetation within the solar park

IV. CLIMATE CHANGE RISK MANAGEMENT RESPONSE (Adaptation Measures)

Project Output 1
Key Mitigation Measures

The project will support the upgrade and climate proofing of solar park infrastructure.

The design, operation and maintenance standards for the solar park infrastructure integrate measures to improve flood resilience. Change in temperature and solar radiation are not anticipated to be significant over the design life of the solar park project (+25 years).

The Feasibility Study recommends the following measures to be integrated into detailed design:

To maximize flood resilience and minimize impacts on local drainage patterns

- Consider highest flood level and suitable slope in project detailed design – site preparation and civil works for the solar park, substation and placement of tower footings for the transmission line; and type of road surface (all weather) and embankment height for access road construction
- Design improved flood protection measures for all equipment mounted at ground level
- Strengthen existing drainage canals at the solar park site
- Design water retention pond for controlled inflow and overflow and use for operation and maintenance (e.g. landscaping, washing of PV panels, etc.)
- Where extreme weather conditions are expected, adopt higher design standard for the transmission line including building a resilient high capacity transmission system
- Avoid the construction of transmission tower footings near irrigation canals / dykes
- Consider solar modules with a higher temperature coefficient
- Consider selection of appropriate tilt panel angle to clean dust
- Consider selection of module surface conducive to self-cleaning

V. ADAPTATION FINANCE

Climate adaptation measures have been integrated in the main civil work contract costs, and related costs are about $1.17 million. ADB will finance 100% of adaptation costs.

VI. GREENHOUSE GAS (GHG) EMISSIONS PROFILE (COUNTRY AND SECTOR)

A. Historical Trends of Emissions in the country (based on UNFCCC reports)

GHG emissions in Cambodia are currently extremely low compared to regional and global averages. According to the Second National Communication (SNC) under the UNFCCC (dated 13 January 2016), in 2000 Cambodia emitted 47.6 million tonnes of CO2 equivalent but the forestry sector absorbed 48 million tonnes of CO2 equivalent. Taking into account the important role of forestry in carbon capture, Cambodia was still at a net sink in the year 2000. Over the same period, energy consumption by sector was highest in the transport sector, followed by electricity production, residential and the industrial sectors.

B. Projected emissions by 2030 or 2050

As per estimates in draft SNC, Cambodia's Business As Usual (BAU) per capita emissions in 2050 will be 2.59 tonnes CO2 equivalent. This is less than half of current world per capita emission. **C. Sector-related GHG emissions** As per the Second National Communication to the UNFCCC (13 January 2016): Based on the sectoral approach, the total emissions from fuel combustion are the largest contributing source to energy sector emissions (estimated at 2,767.30 GgCO2-eq) in which the emission of CO2 contributes approximately 74% of total emissions, CH4 only contributes approximately 21% and N2O contributes approximately 5% for this category.

VII. GHG Mitigation Response and Reduction Benefit Assessment
No data is available on an increase in GHG emissions by the project. No GHG emissions reductions will be attributed to the project, which will construct the 100 MW capacity solar park and transmission interconnection infrastructure and facilitate private sector investments in solar PV plants.[22]

VIII. MITIGATION FINANCE
Climate mitigation is attributed to $25.53 million of the project costs. ADB will finance 25.34% of mitigation costs. Details are in the PAM.

[22] Although no GHG emissions reductions are attributed to this project, when the anticipated 100 MW of solar PV capacity is operational, it is expected that these plants will avoid at least 148,650 tons of carbon dioxide-equivalent (tCO2e) annually or approximately 3.864 million tCO_2e over a 25-year project lifetime. These GHG emissions savings will be counted by the project financiers of the solar PV power plants.