

The Small Hydro Segment

India has an identified small hydro (up to 25 MW) potential of nearly 10,000 MW distributed over 4,000 sites. It is estimated there is still an unidentified potential of almost 5000 MW. Nearly 1,500 MW of potential has already been tapped and projects amounting to around 600 MW are under construction. Table 5 shows state-wise details of potential and existing and ongoing projects.

Table 5: State-wise Details of Small Hydro Development

State/Union Territory	Potential		Existing Projects		Ongoing Projects	
	No. of Sites	Capacity (MW)	No. of Sites	Capacity (MW)	No. of Sites	Capacity (MW)
Andhra Pradesh	286	254.63	52	158.26	9	23.85
Arunachal Pradesh	492	1,059.03	51	36.37	26	47.64
Assam	46	118	3	2.11	8	51.00
Bihar	92	194.02	4	44.90	10	15.00
Chattisgarh	47	57.90	3	3.50	3	15.50
Goa	3	2.6	1	0.05		
Gujrat	290	156.83	2	7.00		
Haryana	22	30.05	4	48.30		
Himachal Pradesh	323	1,624.78	44	93.54	10	67.20
Jamuna & Kashmir	201	1,207.27	27	102.24	9	13.31
Jharkhand	89	170.05	6	4.05	8	34.85
Karnataka	230	625.61	40	211.68	16	79.10
Kerala	198	466.25	10	72.02	10	73.00
Madhya Pradesh	85	336.325	7	38.96	4	26.40
Mahafashtra	234	599.47	27	207.08	4	15.75
Manipur	96	105.63	8	5.45	3	2.75
Meghalaya	98	181.5	3	30.71	9	3.28
Mizoram	88	190.32	16	14.78	3	15.50
Nagaland	86	181.39	8	20.47	6	12.40
Orissa	161	156.76	6	7.30	7	40.97
Punjab	78	65.26	21	108.40	1	2.70
Rajasthan	49	27.26	10	23.85		
Sikkim	68	202.75	12	355.60	5	15.20
Tamil Nadu	147	338.92	11	76.40	2	7.90
Tripura	8	9.85	3	16.01		
Uttaranchal	354	1,478.24	72	65.20	29	32.42
Uttar Pradesh	211	267.061	8	21.5	1	3.60
West Bengal	145	182.62	18	92.28	5	5.62
Andaman and Nicobar	6	6.40	1	5.25		
Total	4,233	10,324.37	478	1,553.26	188	604.94

Source: Powerline, 2005.

Small hydropower projects (SHPs) are generally developed in the potential regions by the SEBs/ state renewable energy development agencies.²⁵ Most of these SHP projects are grid-connected. However, there are some projects that are decentralized and are managed by local communities/ NGOs. The Micro and Pico hydropower projects come under the social sector which are set up under rural electrification programs and are mostly stand-alone/mini grid systems feeding power to the under-privileged population living in remote areas.

The Ministry of Non-conventional Energy Resources (MNES), which is overseeing the development of small hydropower, has set a target of tapping around 2,000 MW till 2012. Various physical and financial incentives are being extended to develop this sector. The focus of the SHP program at MNES is now toward commercialization through private sector participation. Some of the important initiatives taken by MNES are discussed below.

Salient Features of UNDP-GEF Project

In 1995 MNES took up a project with support from the Global Environment Facility (GEF) and United Nations Development Programme (UNDP), aimed at optimal utilization of small hydro resources.²⁶ Salient features are in Box 3. This project was completed in 2004.

Provision of Incentives

MNES is also providing financial support to states for (a) identification of new potential sites and preparation of a perspective plan, (b) detailed survey and investigation and preparation of DPRs, (c) project implementation, and (d) for implementation of off-grid micro hydro projects up to 999 kW for rural electrification development in their respective state. The level of support being provided is shown in Tables 6–9.

Table 6: MNES Support for Assessment of Potential Preparation of Perspective Plan

State/Union Territory	Identification of up to 50 New Sites (Rs lakhs)	Identification of More Than 50 New Sites (Rs lakhs)
North-Eastern Region, Sikkim, Jammu and Kashmir, Himachal Pradesh, and Uttaranchal (Special Category States)	22.50	30.00
Other States/Union Territories	15.00	22.50

Table 7: MNES Support for Preparation of Detailed Project Reports

Area	Up to 1 MW (Rs lakhs)	Above 1 MW and up to 10 MW (Rs lakhs)	Above 10 MW and up to 25 MW (Rs lakhs)
North-Eastern Region, Sikkim, Jammu and Kashmir, Himachal Pradesh, and Uttaranchal (Special Category States)	1.75	3.00	5.00
Notified hilly regions of all other states and islands	1.50	2.50	4.00
Plain and other regions of all states	1.25	2.00	3.00

²⁵ In states like Andhra Pradesh, Himachal Pradesh, Punjab, Orissa and Uttaranchal private players have also come forward.

²⁶ The project had an approved outlay of Rs450 million (\$5 million) shared through GEF inputs of \$7.5 million and Government inputs of Rs224.8 million. The project was executed by MNES and monitored by UNDP.

Table 8: MNES support for Project Implementation

	Area	Below 500 kW	500 kW up to 1 MW	Above 1 MW and up to 5 MW	Above 5 MW and up to 15 MW	Above 15 MW and up to 25 MW
Interest subsidy for commercial projects	Plain		5.00%	2.50%	2.00%	1.50%
	Hilly and North-Eastern Region		7.50%	5.00%	3.00%	2.00
Capital subsidy for government projects	North-Eastern Region and Sikkim	90% cost of the project up to Rs 75,000/-kW	90% cost of the project up to Rs 60,000/-kW	75% cost of the project up to Rs45,000/-kW	Equipment Cost+ 25% of Civil cost limited to Rs22.50 crores/project	Nil
	Middle Himalayas, Ladakh, and Andaman & Nicobar Islands	Equipment Cost+ 50% of Civil Cost up to Rs45,000/kW		Equipment Cost+ 25% of Civil Cost up to Rs3.00 crores/MW	Equipment Cost+ 25% of Civil Cost limited to Rs15 crores/project	Nil
	Other areas (only notified hilly regions)	Equipment Cost+ 50% of Civil Cost up to Rs30,000/kW		Equipment Cost+ 25% of Civil Cost up to Rs1.5 crores per MW	Equipment Cost+ 25% of Civil Cost limited to Rs7.5 crores/project	Nil
Renovation and modernization of projects		Up to Rs2 crores/MW			Limited to Rs10 crores/project	Nil
Development/Upgradation of water mill						
Mechanical mode Mechanical/electrical mode			Rs30,000 Rs60,000			

Table 9: MNES Support for Off-grid Micro Hydro Projects for Rural Electrification

Region	Up to 100 kW	Above 100 kW & up to 999 kW
For North-Eastern Region, Sikkim, Jammu and Kashmir, Himachal Pradesh, and Uttaranchal	90% of the project cost limited to Rs60,000/kW	Rs60 lakhs + Rs43,250/kW
Notified hilly regions of other states and islands	90% of the project cost limited to Rs60,000/kW	Rs60 lakhs + Rs43,250/kW
Plain and other regions of all other states	90% of the project cost limited to Rs45,000/kW	Rs45 lakhs + Rs29,250/kW

Barriers in Development of Small Hydro Segment

The barriers perceived in development of the small hydro segment are technical, procedural and cost-related in nature. The technical barriers include factors such as accessibility to the sites and risks involved in transporting heavy equipments to the sites. The procedural issues primarily relate to the number of clearances required before taking the project. Typically, a developer is required to get a project allotment from the state nodal agency, obtain clearance from MOEF where forestland is involved (in projects costing more than Rs100 crores), clearance from the Irrigation/Water Resources Department, clearance from the state government on land availability, etc. In the absence of any provision for a single window clearance, the process of obtaining these clearances/approvals may take a long time. In some areas security problems are also experienced due to insurgency. On the cost front, it is a matter of some concern that equipment prices are not going down due to the limited number of players.

State-level Policies

As mentioned earlier the development of small hydro has been largely governed by state-level policies. The regulatory commissions are now looking into these policies. A few of the regulatory commissions have come out with their orders which cover buy-back rate, wheeling and banking conditions, which varies from state to state. For example, the buy-back rate in Uttar Pradesh is Rs3.39 /kWh compared to Rs2.69/kWh in Karnataka. Similarly the limit for banking surplus energy is 2.5% in Karnataka, whereas it is 10% in Maharashtra. Since electricity is a concurrent subject as per the Constitution of India, these variations could be expected. However, considering the renewed thrust being given for renewable energy in Electricity Act 2003, it is likely that there may be some harmonization of approaches with increased incentives aimed at expanding the share of renewable sources in the power procurement portfolio of distribution companies.