

**Indo- Nepal Cooperation in Hydro Power Sector**

**A. Basin-wise Theoretical Hydro Electric Potential of Nepal :**

River Basin	Power Potential (MW)		TOTAL (MW)
	Major	Small	
<b>Kosi</b>	18750	3600	22530
<b>Gandak</b>	17950	2700	20650
<b>Karnali (Ghagra)</b>	28840	3170	32010
<b>Mahakali (Sarda)</b>	3840	0320	4160
<b>Southern rivers</b>	3070	1040	4110
<b>Total:</b>	72450	10830	83280

**B. Institutional Mechanism**

The matter relating to the development of Water Resources of Common Rivers with Nepal are under the purview of Nepal-India Joint Committee on Water Resources (JCWR) which is headed by Secretary, MOWR, Govt. of India from the Indian side. However, in pursuance of the decisions taken during the 3<sup>rd</sup> Meeting of JCWR held at Kathmandu on 29.9.2008 and during the 4<sup>th</sup> Meeting of JCWR held on 12-13<sup>th</sup> March, 2009, a three-tier bilateral mechanism as detailed has been recommended/ constituted :

- a) **Joint Ministerial level Commission on Water Resources (JMCWR)** headed by the Ministers of Water Resources of India & Nepal, with Joint Secretary (Hydro), MOP and Chairperson, CEA being the Members amongst others.
- b) **Joint Committee on Water Resources (JCWR)** headed by Secretary, MOWR, Govt. of India from the Indian side, Member (Hydro), CEA being one of the Members and
- c) **Joint Standing Technical Committee (JSTC)** to rationalize technical committees and sub-committees under JCWR that are existing between India & Nepal related to flood management, inundation problems and flood forecasting activities besides project specific committees on hydro power, headed by Chairman(GFCC), Patna from the Indian side with Joint Secretary (Hydro), MOP and Chief Engineer (HP&I), CEA being the Members amongst others.

JCWR also decided to empower the Joint Committee on Koshi and Gandak Project (JCKGP) and to constitute a Joint Committee on Inundation and Flood Management (JCIFM) which will replace the earlier Bilateral Committees in this regard.

**C. Indo-Nepal Cooperation in Hydro Power Development:**

**i) Projects Implemented with Indian Assistance:**

<i>Pokhra</i>	<i>1 MW</i>
<i>Trisuli</i>	<i>21 MW</i>
<i>Western Gandak</i>	<i>15 MW</i>
<i>Devighat</i>	<i>14.1 MW</i>

**ii) Mutual Interest Projects under Discussions:**

<i>Pancheshwar with Rupaligad</i>	<i>5600 + 240 MW</i>
<i>Sapta Kosi High Dam and Sunkosi Diversion cum Storage</i>	<i>3300 MW</i>
<i>Karnali</i>	<i>10800 MW (Not being pursued at this stage)</i>
<i>Naumure</i>	<i>225 MW</i>

Note: Matter relating to the development of Water Resources of Common Rivers with Nepal (except Karnali Multipurpose Project) are being coordinated by MOWR.

**D. Brief Issues Involved:**

**1. Pancheshwar Multipurpose Project (5600 MW)**

Pancheshwar Multipurpose Project is proposed on river Mahakali known as Sarda which forms international boundary between India and Nepal. Development of the project is covered under integrated Mahakali Treaty signed between HMG, Nepal and India in Feb., 1996.

In order to carry out additional investigations and studies required for finalisation of Detailed Project Report (DPR), a Joint Project Office (JPO) of HMG, Nepal and GOI was established in Kathmandu in Dec., 1999 which has since been closed w.e.f. July, 2002. Based on additional investigations and studies carried out by JPO, a draft DPR has been prepared by Indian side in 2002 which is yet to be agreed to by HMG, Nepal. The following two alternative schemes for development of downstream re-regulating dam for Pancheshwar Multipurpose Project have been considered by Joint Project Office:

- i) Pancheshwar (5600 MW) with re-regulating dam at Rupaligad (240 MW) (Energy Benefits – 9304 MU)
- ii) Pancheshwar (5600 MW) with re-regulating dam at Purnagiri (1020 MW) (Energy Benefits – 13609 MU)

The project would have two similar sized power houses each at Pancheshwar and Rupaligad to be located on the either side of the river.

**Cost Estimate Details :**

As per the Draft DPR prepared by Indian Side, the Project Cost at March, 2002 price level in alternative scenarios viz. Pancheshwar (2800/5600 MW) with Rupaligad (240 MW) has been estimated as under :

<b>Alternative Scenario</b>	<b>Total Cost (Rs. Crs.) (Mar., 2002 price level)</b>
Pancheshwar (5600 MW)+Rupaligad (240 MW)	17482
Pancheshwar (2800 MW)+Rupaligad (240 MW)	14342

Based on the updated cost (May, 2011 price level) for the scenario with Pancheshwar (5600 MW) & Rupaligad (240 MW), the project cost Chargeable to Power including interest during construction (IDC) would be Rs.29696 crs. (for 75:25 Cost Apportionment Scenario). Based on the above, the Tariff (at Bus-bars) for implementation of Pancheshwar (5600 MW) & Rupaligad (240 MW) as per CPSU Model would be as under:

	<b>Tariff (Rs./ kWh)</b>
<b>Levelised</b>	5.41
<b>1<sup>st</sup> Year</b>	6.62

**Issues Involved:**

- i) **Finalization of DPR:** Draft DPR for the project with installation of 5600 MW was prepared by Indian side in 2002 which is yet to be agreed to by HMG, Nepal pending resolution of issues like location of re-regulating structure i.e. Purnagiri or Rupaligad, water availability downstream of Pancheshwar, installation and unit size and assessment of power benefits, apportionment of cost between power and irrigation and between India and Nepal.

**Formation of Pancheshwar Development Authority (PDA):** The Terms of Reference (TOR) for establishment of PDA as per the Letters exchanged with the Mahakali Treaty for implementation of the project has since been finalized and PDA has been constituted. It is understood that the first meeting of the Governing body of the PDA was held in Kathmandu on September 22-23, 2014 for finalization and approval of the guidelines for establishment and functioning of the Authority, formation of the Governing Body, Executive Committee and appointment of the Chief Executive Officer (CEO) etc. The Indian delegation was led by Secretary, Ministry of Water Resources, Government of India and the Nepalese delegation was led by Secretary, Ministry of Energy, Government of Nepal. It was decided in the 2<sup>nd</sup> meeting of Governing Body of PDA held during 18-19 Nov., 2014 & as per the approval of the Competent Authority of MoWR, RD & GR, that WAPCOS Ltd. has been awarded the work of preparation of DPR and CEIA study of Pancheshwar Multipurpose project on 18.03.2015.

**2. Sapta Kosi High Dam Multipurpose Project (3300 MW) and Sun Kosi Storage cum Diversion Scheme**

Sapta Kosi High Dam Multipurpose Project would afford irrigation and flood control benefits in Bihar and power generation (15730 MU) of which major portion would be available to India. In addition, development of Inland Waterways through Kosi and Ganga rivers is another important component of the project.

As per inception report, agreed to in the 4<sup>th</sup> meeting of India-Nepal Joint Team of Experts (JTE) held in Kathmandu in Oct., 2001, Sun Kosi Storage cum Diversion Scheme forms an integral part of the project which involves construction of a diversion structure across the river Sunkosi near Kurule to divert waters by means of a 16.6 km long diversion tunnel to a power house near Chisapani, upstream of the existing Kamala Barrage.

**Issues Involved:**

- i) **Preparation of DPR:**

A Joint Project Office was established at Birat Nagar on 17.8.2004 for carrying out detailed investigations/ field works and preparation of DPR in a period of 30 months including 3 months for mobilisation activities. However, due to prevailing Law & Order situation in Nepal, the progress of works has been affected.

In the 13<sup>th</sup> meeting of JTE held from 23-24 Dec., 2012, both sides agreed to the revised work schedule formulated to complete the remaining works for

the project by Feb., 2015, for preparation of the DPR and also agreed to the proposal of extension of tenure of JPO-SKSKI for a further period of two years beyond Feb., 2013. *Administrative approval and expenditure sanction of revised cost estimate of Rs.10477.63 lakhs and extension of time limit for field investigations, studies and preparation of DPR for the project jointly with Govt. of Nepal by 28<sup>th</sup> Feb., 2015 has been conveyed by MoWR vide their letter dated 3.10.2013.* In the 14<sup>th</sup> meeting of JTE held from 29-30 Jan., 2015, both sides agreed to complete the field survey, investigation works and preparation of DPR for the project by Feb., 2017.

### **3. Kamala and Bagmati Multipurpose Projects**

JPO-SKSKI has also been entrusted to carry out the Feasibility Level Study of Kamala Dam Project and Preliminary Study of Bagmati Project, likely to be completed alongwith the preparation of DPR of Sapta Kosi High Dam Multipurpose Project and Sun Kosi Storage cum Diversion Scheme.

### **4. Naumure Storage cum Hydro Electric Project (225 MW)**

Naumure (West Rapti) project is proposed to be located in Pyuthan distt. on West Rapti river, about 2 Kms. downstream from the confluence of its two main tributaries namely Jhimruk Khola and Mari Khola. As per pre-feasibility studies carried out by Nepal in 2001, the project comprises of a 169 m high earth rockfill dam with live storage capacity of 350.8 MCM and an underground power house with annual energy generation as 844.4 MU. The project is estimated to cost 324.42 million US\$ at 2000 price level and the cost of energy is 5.43 US cents.

Subsequently, Pre-Feasibility Report (PFR) of Naumure project, prepared by India has been handed over to Nepalese side during the 2<sup>nd</sup> meeting of JSTC held on 30-31 Mar. 2010. During the 3<sup>rd</sup> meeting of JSTC held on 13-14 September, 2011, it was informed by Nepal that PFR of Naumure project did not meet the requirement of Nepal with respect to their demand for irrigation of Kapilvastu area.

During the **7<sup>th</sup> meeting of JCWR held on 24-25 January, 2013**, Nepalese side made it clear that PFR prepared by CWC is not acceptable in its present form as it does not cater to their demand for irrigation of Kapilvastu region by way of interbasin transfer. CWC had concluded in its report that Rapti Basin does not have sufficient water to meet all the projected demands of India & Nepal. ***MoWR has been asked by MEA in June, 2013 to drop this project from agenda of any bilateral discussion to be held in future with Nepal.***

### **5. Arun - 3 HE Project (900 MW)**

**Arun-3 Project** has been awarded by Government of Nepal to Sutlej Jal Vidyut Nigam Ltd. (SJVNL) on Build-Own-Operate-Transfer basis for a period of 30 years and a Memorandum of Understanding (MoU), in this regard, have been signed on 2.3.2008. According to the MoU, the SJVNL would provide 21.9 % of power (88 MW) to Nepal free of any charge. Further, the SJVNL would pay 7.5 % of its total income as royalty to the Nepal Government. In addition, 0.5 % export tax would also be payable.

**Present Status:**

**i) Finalisation of DPR:**

**CEA accepted the appraisal of DPR of Arun-3 H.E Project (900 MW)** (submitted by SJVN Ltd.), at an estimated cost of Rs. 5667.59 Crores including IDC & FC of Rs. 1250.77 Crores at July, 2013 Price Level on 09.06.2014. The Project would provide design energy benefits of 3924 MU. The Levellised tariff at Bus -bar has been worked out @ INRs. 3.99 per unit. The Commissioning schedule of generating units (from zero Date i.e. 1.04.2016) would be from Dec. 2020 - Mar. 2021.

**ii) Signing of Project Development Agreement with Govt. of Nepal:**

As per available information, SJVNL have established G&D sites and Silt Lab. in Nov., 08. The transmission line license was issued on 28.05.09 and the work for conducting transmission line survey from Diding (Power House) to Dhalkebar in Nepal and upto Muzzaffarpur in India has since been awarded on 24.12.09. **Power development agreement (PDA) has been signed on 25.11.2014.**

6. In addition, as per the available information from various websites, Government of Nepal has awarded **Upper Karnali** hydropower project (300 MW) to a consortium consisting of GMR Group companies and Italian-Thai Development Project Co of Thailand on build-own-operate-transfer basis and a Memorandum of Understanding (MoU) has been signed in this regard in Kathmandu on January 24, 2008. According to the MoU, the GMR, Energy would provide **12 percent of free power** (36 MW) to Nepal. In addition, GMR Energy would also pay **27 percent free equity** to the Nepal Government. It is understood that GMR has already submitted the Detailed Project Report (DPR) for the project with Installed Capacity as **900 MW** in May, 2010. **Power development agreement (PDA) has been signed on 19.09.2014.**

Further, Consortium consisting of GMR Group companies and Italian-Thai Development Project Co of Thailand have also acquired development of **Upper Marsyangdi (600 MW)** in Nepal for which Power development agreement (PDA) is yet to be signed.

Government of Nepal has also signed a Memorandum of Understanding (MoU) with Tata Power & SN Power, Norway on 6.3.2009 to develop **Tamakoshi-3 (690 MW)** for which Power development agreement (PDA) is yet to be signed.

7. In addition, survey licenses have also been issued by the Government of Nepal to a number of Indian companies/ joint ventures for the hydropower projects in Nepal.
8. Further, WAPCOS is providing consultancy for Construction Supervision of Kulekhani III (14 MW) and Rahughat (32 MW) HEPs in Nepal.