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Hydro Power Energy Development

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ABSTRACT:
Hydropower energy is a renewable energy source which is used in the most parts of the world. Hydropower is very clean source of energy, which does not consume but only used the water and again make it available for other uses. Major part of energy is taken by hydro energy. Hydro-electric power stations are generally located on high height areas (hilly areas) where dams can be built convents and large water can be stored or available. The water turbine captures the energy in the falling water and changes the hydraulic energy into mechanical energy at turbine. Hydropower contributes the major share of the power requirement in the India. It is consequence of the low share of hydropower in the total generation in India during off-peak hours the generators are averse to back down generation for techno-commercial reasons resulting in increase in the system frequency and during peak hours the generators are not able to meet the demand thereby reducing the frequency. Hydropower development plays a very important role in development of total energy. The paper discusses the power development scenario, hydropower development related issues, advantages of hydropower, role of hydropower in the energy.

KEYWORDS: Hydropower generation, Hydropower development

INTRODUCTION:

Hydropower is a renewable energy source currently used in most parts of the world to supplement with electricity needs. India is endowed with rich hydro power potential; it ranks fifth in the world in terms of usable potential. However, less than 25% has been developed or taken up for development. The basic principle of hydropower follows that; if water can be piped from a certain level to a lower level, then the resulting water pressure can be used to do work. Hydropower captures the energy produced by moving water. The method for harnessing this power is remarkably simple: Falling water possesses energy.

When water falls downward, its static energy (P=mgh) is converted into kinetic energy (K.E.=0.5mv^2). The kinetic energy is transferred to the turbine and the turbine rotates. If the turbine is connected to a generator, electricity can be generated. This is the basic principle of hydroelectricity: using falling water to generate

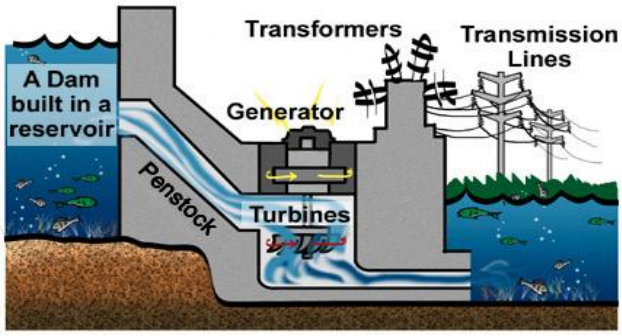

Fig.1. A schematic diagram of hydro power plant

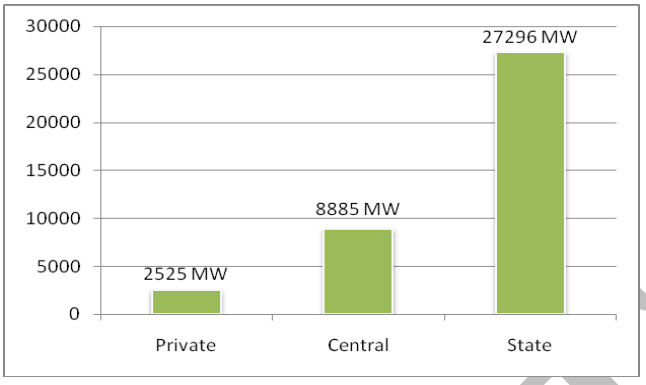

Fig. 2 Total Installed Hydro Capacity – 38,706 MW (As on 30th September 2011) Source: CEA

A water turbine is a rotary engine that takes energy from moving water. The prime mover converts these sources of energy into mechanical energy that in turn is converted to electrical energy by synchronous generators. Different types of turbine are used in hydro power plant. These are classified as:

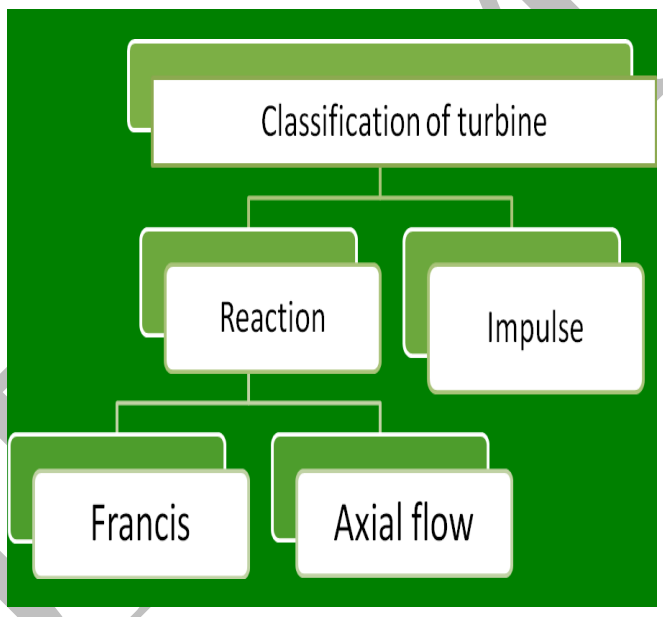

Fig. 3 Classification of turbine used in Hydro power plant

REFORMS IN THE ELECTRICITY SECTOR IN INDIA:

The new Electricity Act-2003 deals with the laws relating to generation, transmission, distribution, trading and use of electricity. The Act has specific provisions for the promotion of renewable energy including hydropower and cogeneration. It has been made mandatory that every state regulatory commission would specify a percentage of electricity to be purchased from renewable by a distribution licensee. The National Electricity Policy announced in 2005 aims at access of electricity by all households and per capita availability of electricity to be increased to 1000 units by 2012. The Policy underlines that renewable energy potential needs to be exploited and private sector would be encouraged through suitable promotional measures.

These changes facilitated the removals of barriers to investment, improved the functioning of the system and resulted in additional generation of power much in excess of that achieved in the earlier plans. Ministry of New & Renewable Energy (MNRE) Government of India is the nodal ministry for small hydropower development in India.

POLICY ON HYDROPOWER DEVELOPMENT:

Hydro Power is a renewable source of clean energy and is used to supplement the base load provided by thermal power plants and storage for wind energy through pumping. Central Electricity Authority (CEA) has issued various hydroelectric related reports and guides are available through web.

Table 1: Major central sector utilities- Hydro installed capacities

UTILITY NAME	GENERATING CAPACITY	CAPACITY UNDER DEVELOPMENT	
		11^{th} PLAN	12^{th} PLAN
NHPC	5295 MW	1080 MW	4467 MW
BBMB	2866 MW	NIL	NIL
SJVNL	1500 MW	412 MW	348 MW
THDC	1000 MW	400 MW	1444 MW
NEEPCO	755 MW	600 MW	180 MW
DVC	144 MW	NIL	NIL
NTPC	NIL	1920	555 MW

The 12th five year plan also suggests that for projects held up for environment and forest problems, efforts may be made by the concerned State Govt. / developer to get the timely E&F clearances. Problems such as local agitation (law & order), land acquisition etc. need to be resolved by the concerned State Government. Tendency of converting storage projects (as identified by CEA) to Run-of-River projects should be discouraged. Project developer should seek long term open access by indicating at least the region(s) in which they intend to supply their power to enable development of transmission system. The above liberalization measures did not provide expected impetus to hydropower development; it also did not generate much interest in private sector participation in hydropower development. Based on a review of the situation, the Government brought out a policy on hydropower development in 1998, which, inter alia, laid down several policy instruments like full budgetary support to ongoing projects, establishment of a power development fund, a mechanism to resolve interstate issues, favourable tariff formulation, etc. The National Policy on Resettlement and Rehabilitation for Project-Affected Families, 2003 (NPRR, 2003) notified by the Ministry of Rural Development (MORD) is expected to provide a better appreciation of the issues as well as the obligations and risks on the part of developers.

POLICY ON HYDROPOWER DEVELOPMENT :

There is no worldwide consent on definitions, mainly because of different development policies in different countries. Based on installed capacity of hydropower projects, classification of hydropower varies differently in various countries. A general classification may be taken as:

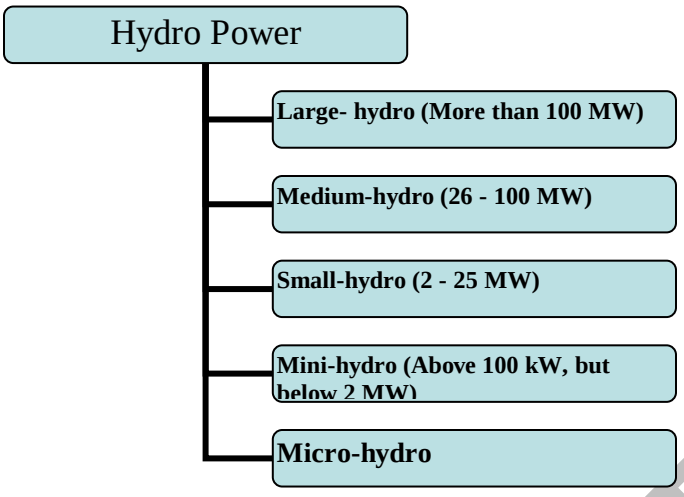

Fig.4 Classification of Hydro power

DEVELOPMENT OF HYDRO POWER:

Hydro power is a renewable economic, non-polluting source of energy. Hydropower plants have inherent ability for instantaneous starting, stopping, load variations. Hydro power plays a very important role in development of energy. Hydropower plant provides cheap energy so as to lower the cost of power system. Development of hydro power resources is important for energy security of the country. It takes about 10 years for developing a large size hydro project from planning to commission. With the aim to accelerate the development of Hydropower, the Ministry of Power (MoP), introduced the National Policy on Hydropower Development in 1998. To achieve the ambitious program of hydro capacity addition in the 12th Plan period, shelf of hydro power projects with aggregate installed capacity of 58,573 MW were identified by CEA. The new Electricity Act-2003 deals with the laws relating to generation, transmission, distribution, trading and use of electricity. The Act has specific provisions for the promotion of renewable energy including hydropower and cogeneration.

Table 2: Plan for Hydropower Development

Plan for hydropower development	End of year	Total capacity (MW)	Hydropower plant capacity (MW)	Hydro power with respect total Power (%)
-	1947	1361.76	508.13	37.31
1st	1955-56	2886.14	1061.44	36.78
2nd	1960-61	4653.05	1916.66	41.19
3rd	1965-66	9027.02	4123.74	45.68
4th	1973-74	16663.56	6965.30	41.80
5th	1978-79	26680.06	10833.07	40.60
6th	1984-85	42584.72	14460.02	33.96
7th	1989-90	63636.34	18307.63	28.77
8th	1996-97	85319.31	21644.80	25.46
9th	2001-02	103329.21	26261.23	25.40
10th	2006-07	132329.21	34653.77	26.19
11th	2007-2008	143061.01	35908.78	25.10

CONCLUSION:

Energy sufficiency is the latest catchword for the wellbeing of a country, particularly for India where economy is growing at 8-9 percent annually. In 2010, hydro comprised about 80% of all of the renewable electricity capacity in the world, and accounted for about 20% of global electricity production capacity. Hydropower is also the most efficient means we know of to convert energy into electricity. Hydropower plant offers several advantageous It is totally environmental friendly and can also provide a more stable price regime over a long period of time. It has remarkably higher efficiency (over 90%) compared to thermal (35%) and gas (around 50%).Generation cost is not only inflation free but it also reduces with time. Development of hydropower projects is also in many cases associated with irrigation, drinking water, flood control, navigation, recreation and tourism benefits. India is blessed with immense amount of hydro-electric potential and ranks 5th in terms of exploitable hydro-potential on global scenario.

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