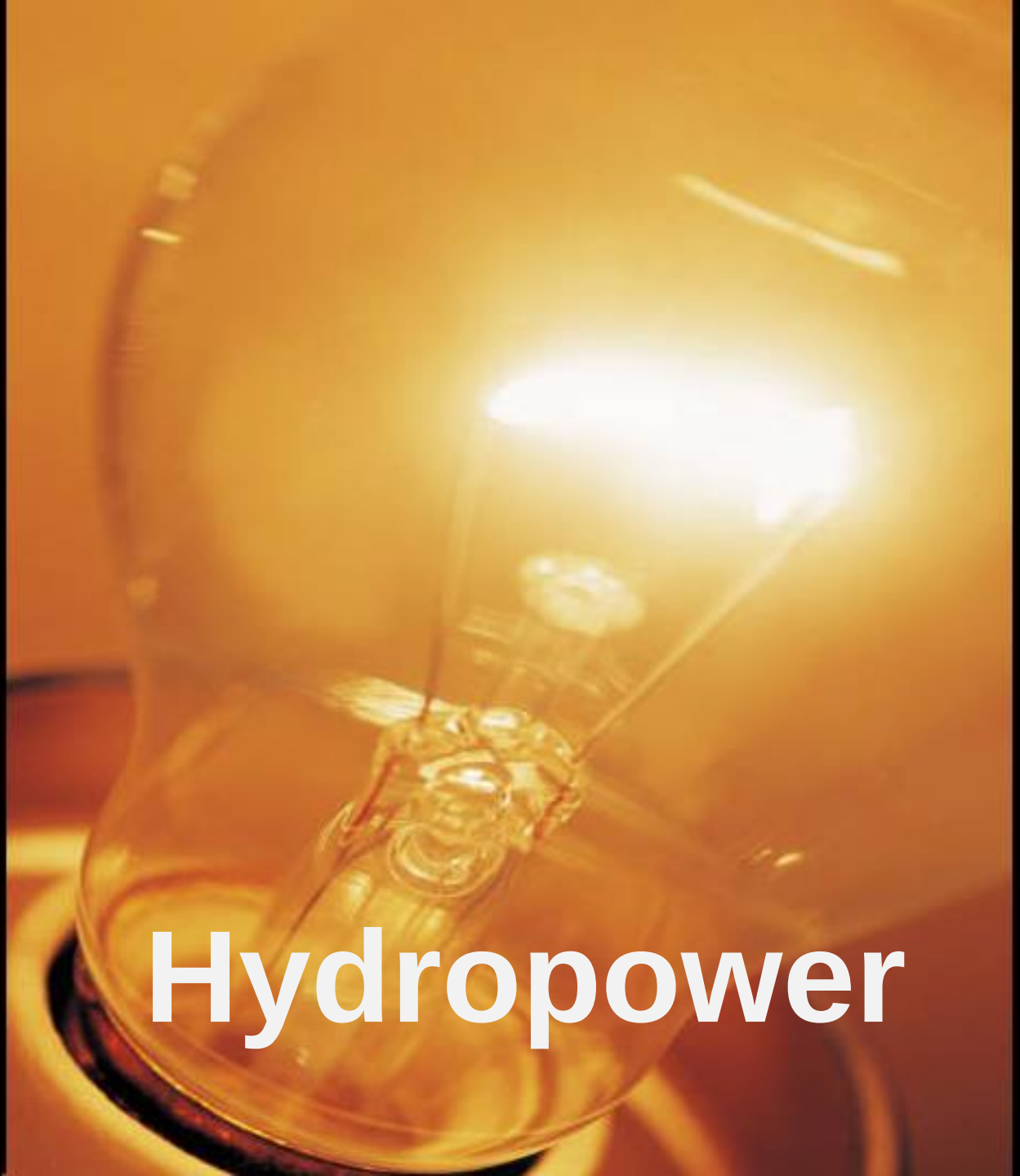
WELCOME

Hydropower


Hydropower

Hydropower

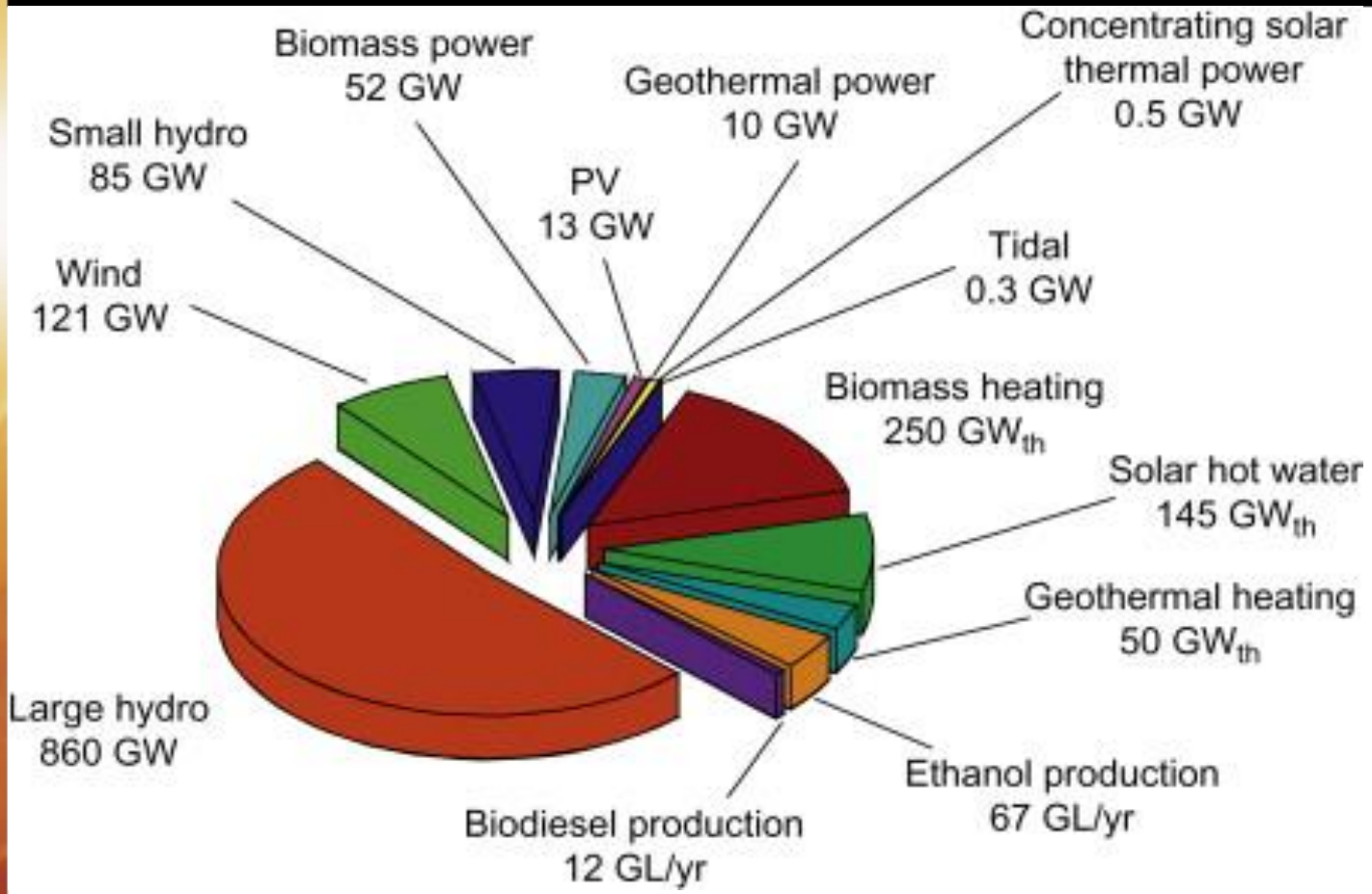
- Hydro energy comes from waves and rivers, it can be used and transformed into electricity.
- Hydropower is a renewable energy, because the water system of earth has continuous cycle.
- Hydropower is a kind of clean, non- polluting energy with low cost operation.

Hydropower

- It is not like solar energy and wind power; it can produce electricity 24 hours per day, and has little impact on the Environment
- All of the Hydropower systems need a long- lasting and continuous flow of water sources.
- Mini and Micro Hydel Plants
    A. Micro Hydel : capacities up to 0.5 MW
    B. Mini Hydel : capacities up to 50 MW

** Water is an inexhaustible, precious natural resource in building Hydropower stations.

World renewable energy supply capacity by the end of 2008 (units: GW)



- **Hydropower supplies about 51.6% of world's electricity among the renewable energy resources that can generate electricity.**

Characteristics of Hydropower

- Can save Natural Resources: coal, oil and uranium, and other valuable non-renewable mineral resources.
- Clean energy source: It does not produce any greenhouse gas emission / it does not emit any harmful gases, dust or ash. It has no nuclear radiation pollution.
- High efficiency:
  - The hydropower efficiency is about 80%
  - The thermal power plants is only 30% - 50%
- Low cost of production: There is no need to purchase, transport and storage the fuel. It just needs less operators, higher labour productivity, simple operation, and higher operational reliability.
- Multi Purpose Use: Hydropower station can be applied in comprehensive utilization, such as flood control, irrigation, shipping, urban and rural life supply water, aquaculture, tourism and other tasks, in order to receive optimal benefits in the development of economy and society.

Development of Hydropower issues

Advantages

a. Economics

The major advantage of Hydropower is elimination of the fuel cost, immune to fossil fuels, such as oil, natural gas and coal with low construction and operating labour cost. The dam serves as multiple purposes.

b. Greenhouse gas emissions

Hydropower station does not burn fossil fuels, they do not directly produce carbon dioxide (a greenhouse gas). While some carbon dioxide is produced during manufacture and construction of the project, this is a tiny fraction of the operating emissions of equivalent fossil-fuel electricity generation.

Development of hydropower issues

Disadvantages

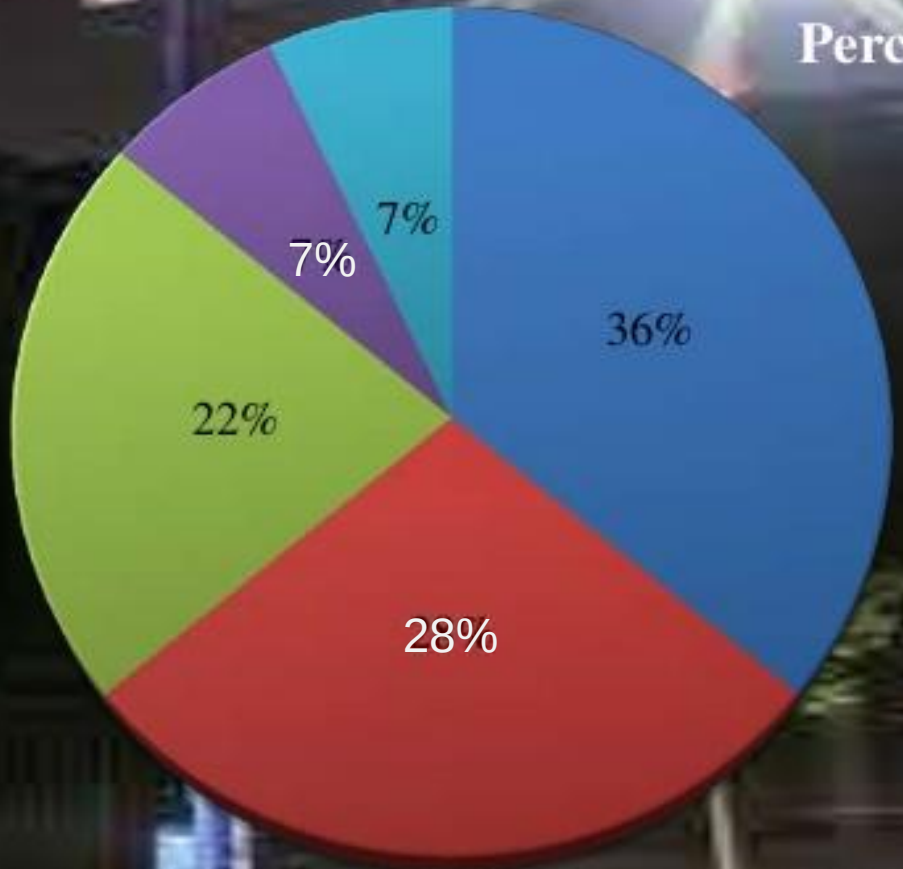
a. Damage to the environment

Hydropower projects can damage surrounding or downstream ecosystems of the plants. It can lead to scouring of river beds and loss of riverbanks. In addition, it also has impact on birds. Since building dam for agricultural and energy use, many native and migratory birds have become increasingly endangered.

b. Population relocation

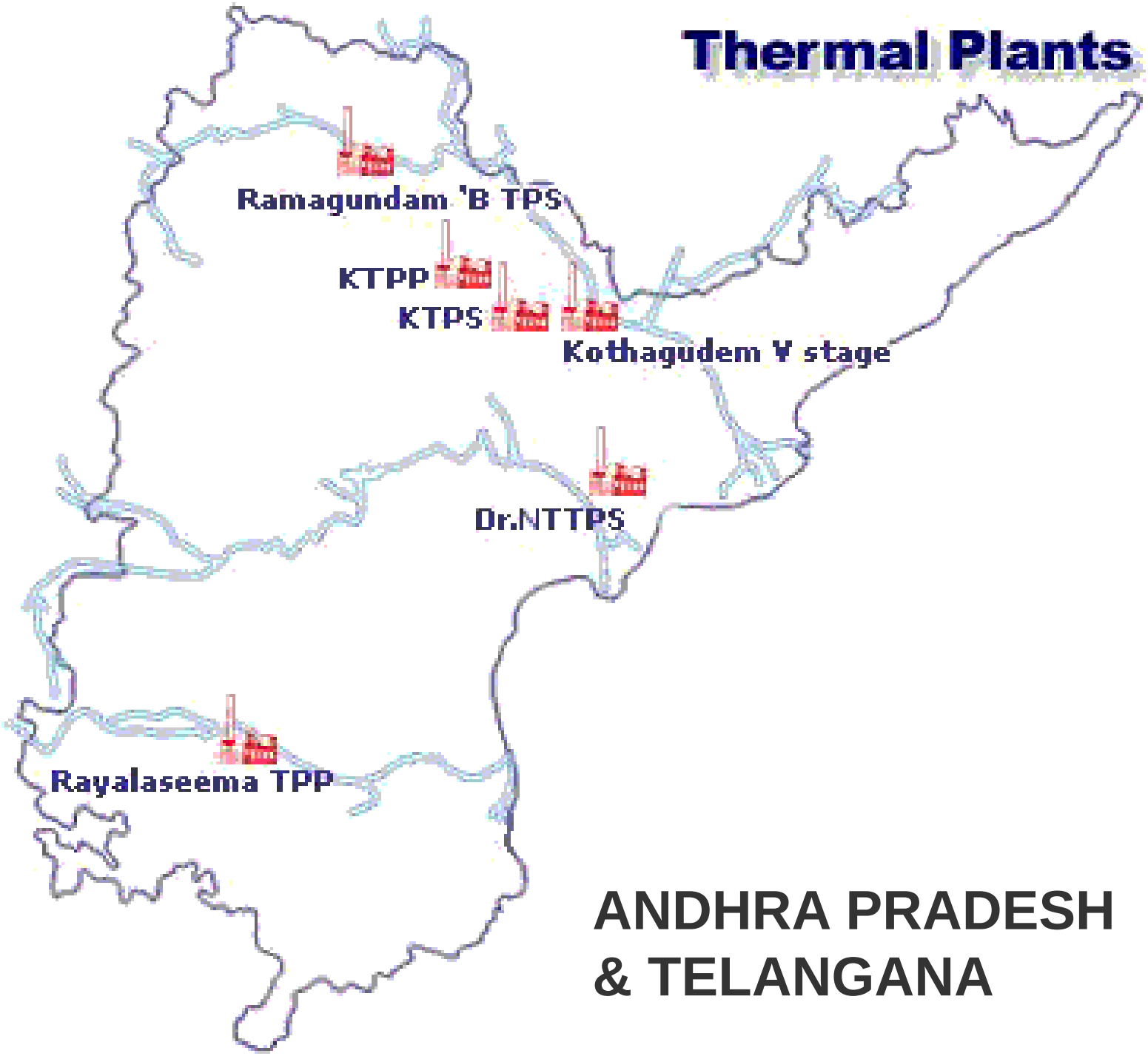
Hydropower station has the need to relocate the native people, whose history and culture sites may be flooded and lost. Such problems have arisen in the Three Gorges project.

Power Usage In Our State

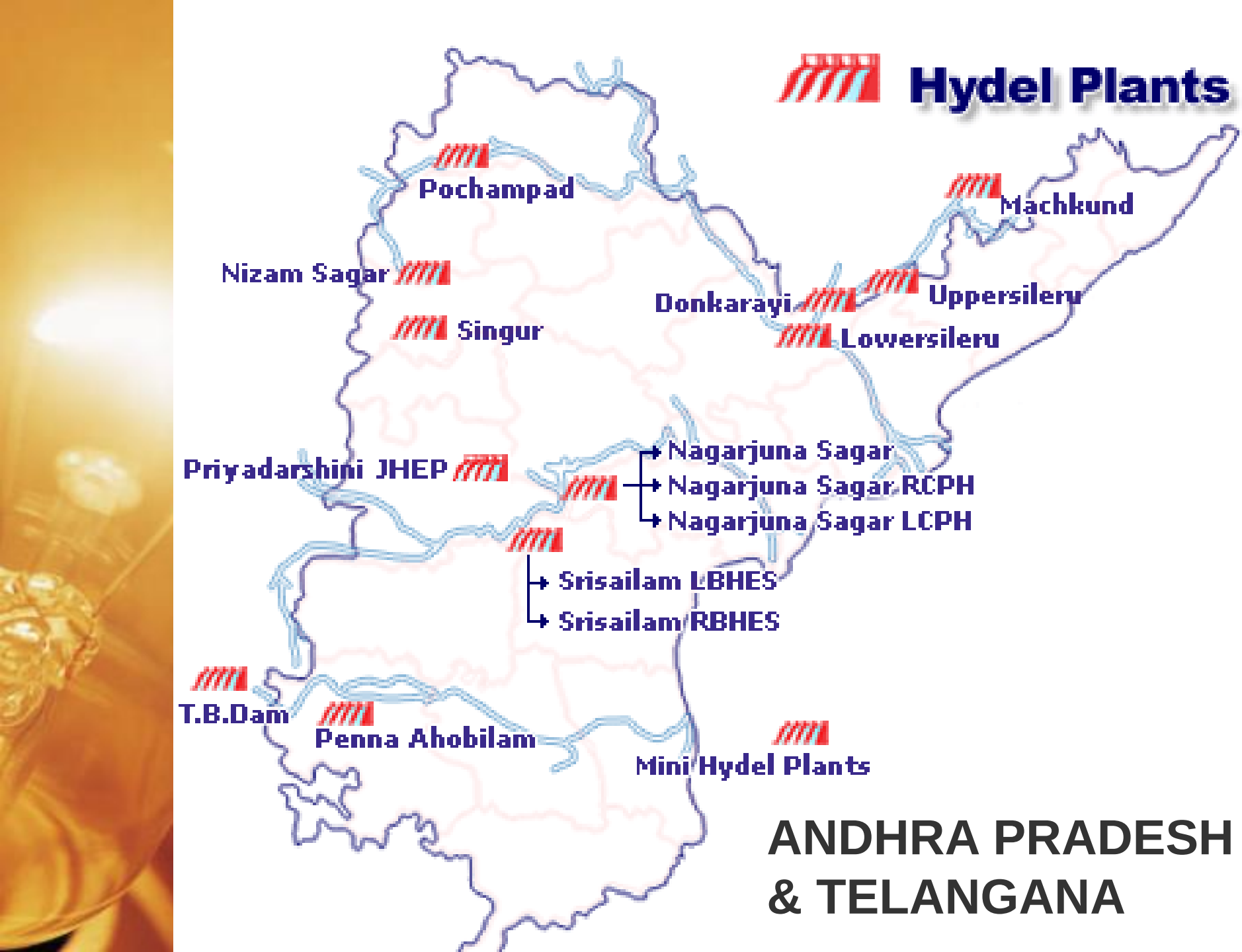


- According to Electric Power Survey report, the demand is increasing by 8.21% per year. But there is no change in the supply.

Thermal Plants



ANDHRA PRADESH & TELANGANA


Hydel Plants
Pochampad
Machkund
Nizam Sagar
Donkarayi
Uppersileru
Singur
Loversileru
Priyadarshini JHEP
Nagarjuna Sagar
Nagarjuna Sagar RCPH
Nagarjuna Sagar LCPH
Srisailam LBHES
Srisailam RBHES
T.B.Dam
Penna Ahobilam
Mini Hydel Plants
ANDHRA PRADESH
& TELANGANA

POWER IN INDIA

- **Resources In India, power generation is largely dependent on coal, gas, and hydroelectric sources.**
- **Non- conventional sources of energy such as wind and solar energy, account for a small share of the total installed capacity.**
- **Our country depends on Thermal power (57%). Next to thermal comes Hydel Power (19%), renewable energy for 12% and natural gas for about 9%**

POWER IN INDIA

- India currently suffers from a major shortage of electricity generation capacity,.
- The **International Energy Agency** estimates India will add between 600 GW to 1200 GW of additional new power generation capacity before 2050
- Continuous usage of natural resources may complete within 200 years. Till now we completed 60% of it.
- Top most developed economies are effectively using Atomic & Hydel Power.

Power Generation Capacity in India by end of 11th Plan

(In MW)

Source	Central	State	Private	Total	Share (%)
Hydro	8654	3482	3491	15627	19.9
Thermal	24840	23301	11552	59693	75.8
Nuclear	3380	-	-	3380	4.3
Total	**36874**	**26783**	**15043**	**78700**	**100**
Share (%)	46.9	34	19.1	100	

MAP OF INDIA

SHOWING

INSTALLED GENERATING CAPACITY
STATEWISE/MODEWISE

Including allocated shares in Joint and Central Sector

(As on 31.03.2011, Figures in MW)

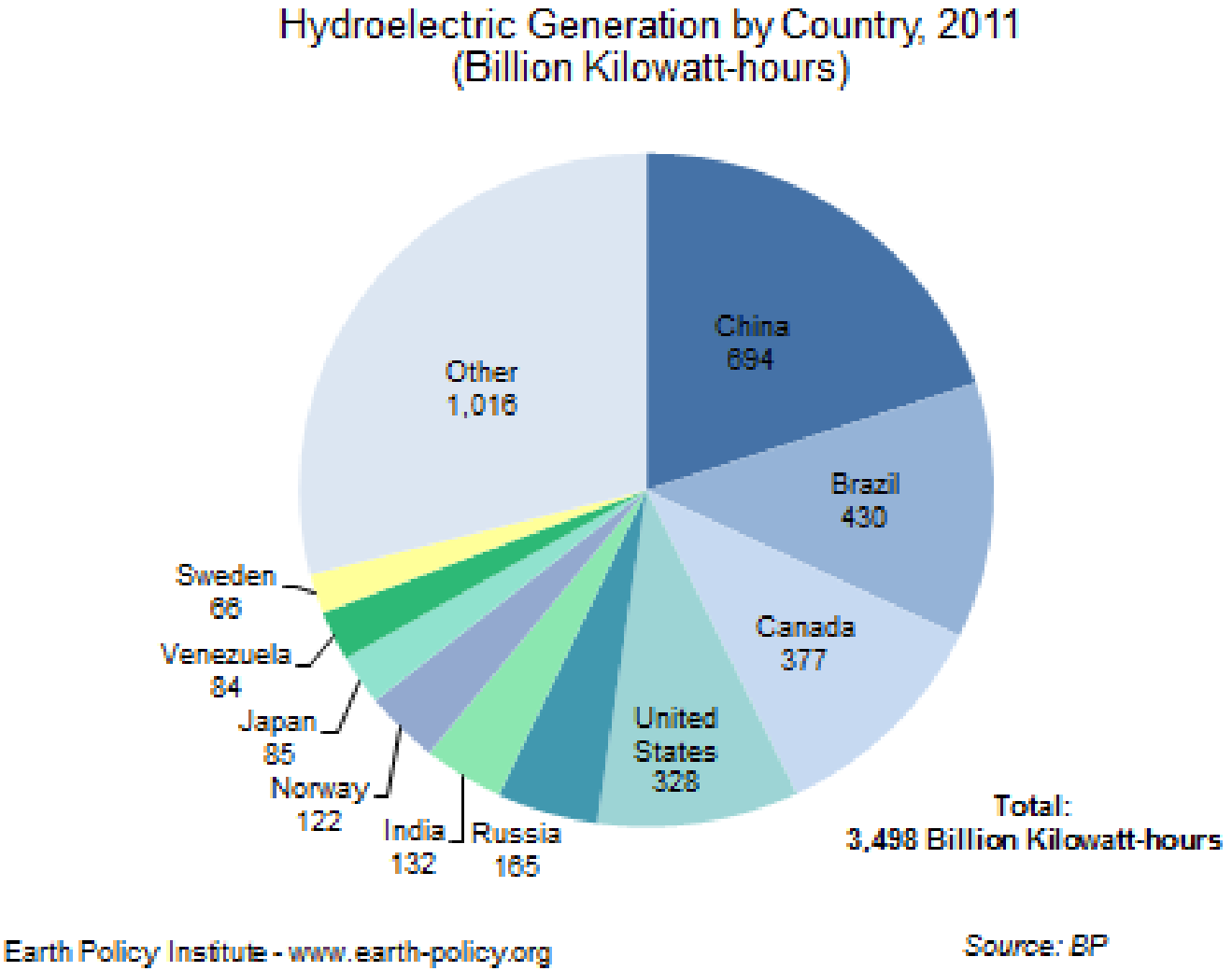
[Map not be scale]

All India Capacity : 1,73,626.40 MW

ALL INDIA

37567.40	HYDRO
112824.48	THERMAL
4780.00	NUCLEAR
18454.52	RES
173626.40	TOTAL

Hydro power in the world



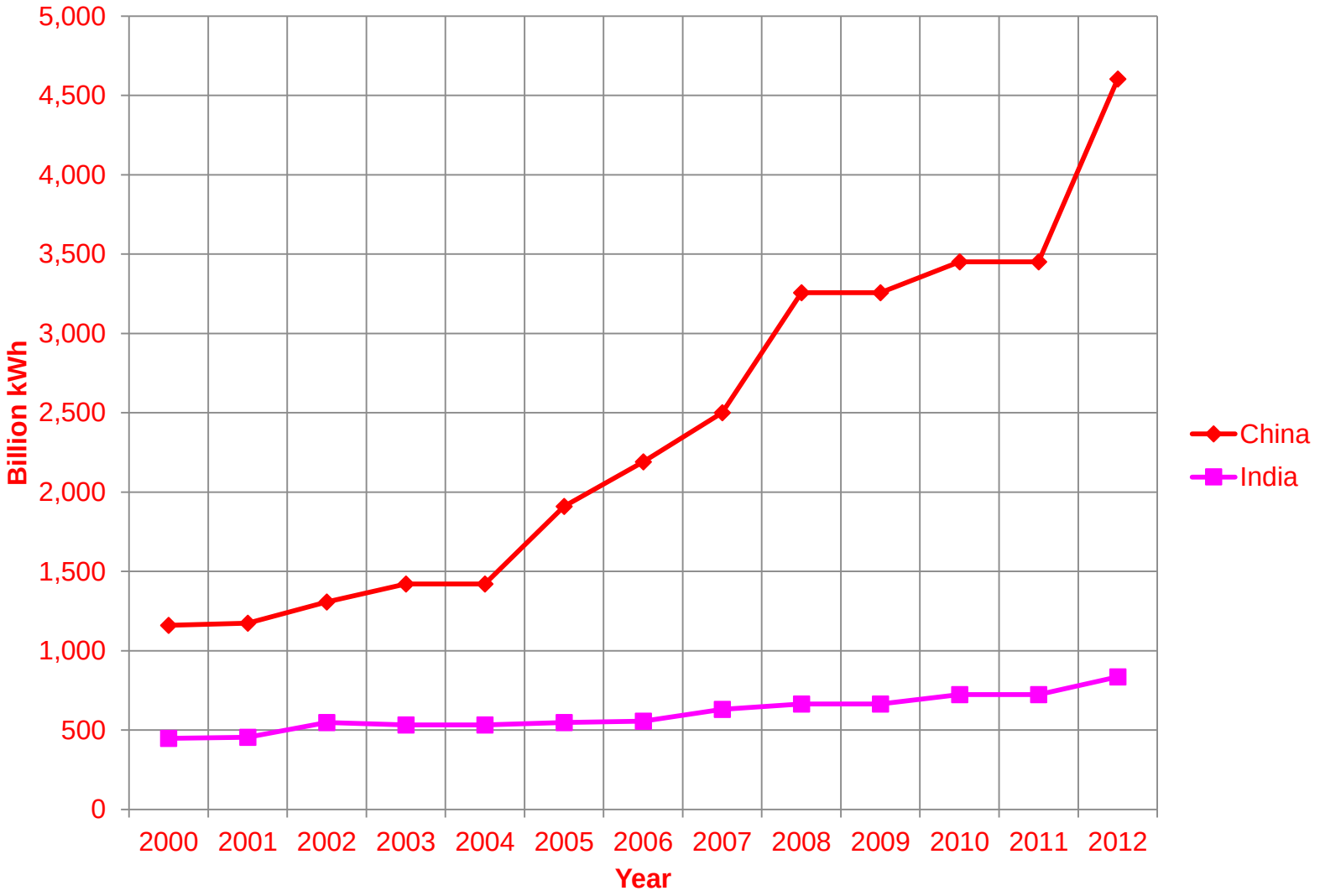
The proportion of hydropower in some countries' total electricity

Year	1950	1960	1970	1980	1990
Country					
Canada	96.3	92.3	76.6	68.4	63.0
Italy	92.7	92.7	37.5	26.7	14.8
Japan	85.2	58.0	22.8	16.0	11.0
France	48.7	55.9	40.2	28.4	13.0
United States	25.9	17.7	15.3	12.0	10.0
Norway	99.7	99.3	99.4	99.8	99.6
Sweden	95.4	89.5	68.5	64.3	50.3
Brazil	91.4	80.4	87.7	87.0	96.0
India	**36.7**	**39.0**	**41.3**	**37.5**	**26.3**
China	**25.9**	**12.5**	**17.7**	**19.4**	**20.3**
World	35.6	29.0	23.5	21.3	18.4

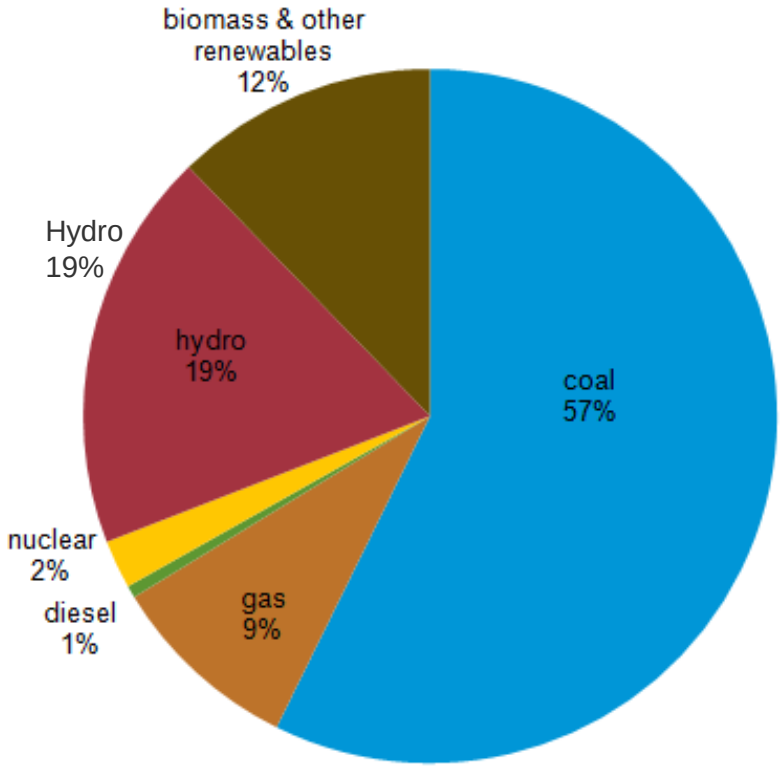
Total Hydro Electricity Generation Vs. Consumption for the year 2010 (Billion Kilowatt hours)

Sl. No	Country	Net Generation	Country	Net Consumption
1	Europe	947.62524	Europe	947.62524
2	North America	841.11901	North America	841.11901
3	**China**	**770.919**	**China**	**770.919**
4	Central & South America	736.09638	Central & South America	736.09638
5	Brazil	432.9282	Brazil	432.9282
6	United States	427.37601	United States	427.37601
7	Canada	366.416	Canada	366.416
8	Eurasia	246.87	Eurasia	246.87
9	Russia	168.101	Russia	168.101
10	**India**	**135.271**	**India**	**135.271**
11	Norway	117.766	Norway	117.766

Growth in hydropower installed capacity in India & China(billion kWh)



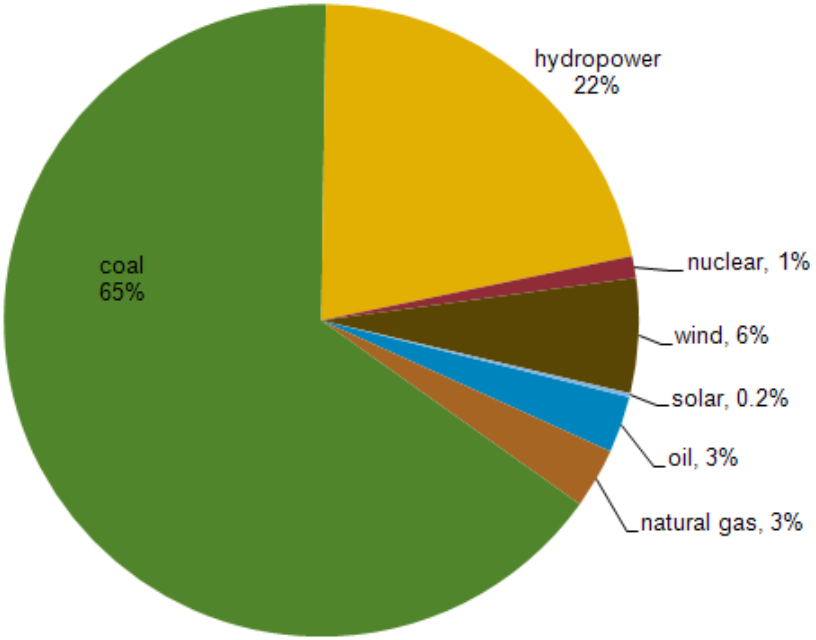
India installed power capacity, 2011



Source: U.S. Energy Information Administration, International Energy Statistics, India Central Electricity Authority

China's installed electricity capacity by fuel, 2011

installed capacity: 1,073 gigawatts



Source: FACTS Global Energy

Chinese exploitable hydroelectric resources take about 378 million kw, which is equivalent to annual generating capacity of 1920 billion kwh, making up 16.7 % of the world's total amount, which is the first in the world.

valley statistics in 2008 (China)

Sl. No	valley	The installed capacity million kW	Annual Generating capacity billion kWh	Nationwide %
1	**Nationwide**	**378.53**	**1923.3**	**100.0**
2	Yangtze River	197.24	1027.4	53.4
3	Yellow River	28.00	116.9	6.1
4	Pearl River	24.85	112.4	5.8
5	The Luanhe River	2.13	5.18	0.3
6	The River of Northeast	13.70	43.9	2.3
7	The River of southeast	13.89	54.7	2.9
8	Coast The River of Southwest International	37.68	209.8	10.9
9	Brahmaputra River and other rivers in Tibet	50.38	296.8	15.4
10	Northern inland and river of Xinjiang	9.96	53.8	2.8

Major Hydropower plants in China

Name	Maximum Capacity(MW)	Country	Construction started	Scheduled completion
Three Gorges Dam	**22,400**	**China**	**1993**	**2009**
Xiluodu Dam	12,600	China	2005	2015
Longtan Dam	6,300	China	2001	2009
Xiangjiaba Dam	6,000	China	2006	2015
Nuozhadu	5,850	China	2006	2017
Jinping Hydropower Station	4,800	China	2007	2014
Laxiwa Dam	4,200	China	2006	2010
Xiaowan Dam	4,200	China	2002	2012
Jinping Hydropower Station	3,600	China	2005	2014
Pubugou Dam	3,300	China	2004	2010

Three Gorges Project

Three Gorges Project

- **The Three Gorges Project** is the largest water conservancy project in the world.
- It is located in the middle of Yangtze River near **Yichang City in Hubei Province.**
- The Project consists of dam, flood release structures, power stations, and navigation structures with the full functions of flood control
- The total storage capacity at normal pool level (NPL) at 175m of the reservoir is 39.3 billion m^3 (**1387 TMC**)

Three Gorges Project

- Started in 1993 and completed in 2009.
- Length of dam 2309.47m
- Height of Dam: 185m
- Spillway Length : 483m
- Bottom Out Lets – 23 Nos (7M x 9M)
- Surface Sluice Gates – 22 Nos. (8M x 17M)
- Type of Dam: Concrete Gravity Dam
- Maximum Discharge Capacity – 1,02,500 m3/sec.

Three Gorges Project

- The installed generating Capacity is **22,400MW, (**the largest hydropower station in the world) (26x 700MW + 6x 700MW).
- Power Plants – 02 Nos. (Left – 26 x 700 MW & Right 6 x 700 MW – Total – 22,400 MW).
- Navigation – Ship Lock: Five Stepped Flight Locks each 280 x 34 x 5m capable of passing 10,000 Ton Barge fleet.
- Ship Lift: One Stage Vertical Hoisting type, capable of carrying 3,000 Ton capacity – Height of Lift – 113M.

Three Gorges Project

Inundation and Resettlement

- The total inundated land by the TGP Reservoir is 632 km^2
- 24.5 Hectares Farm land, 34.596 Million M^2 Housing area and 824.24 km road length existed in the inundated area.
- 846.2 thousand residents with a total population of 1.1 million people had been resettled / relocated.
- In view of the importance of the project the state council made a series of preferential polices to ensure the success of resettlement.
- The development oriented resettlement policy has been adopted by approving 40 Billion – Yuan which counts for about 45% of the total cost of the whole project.

Three Gorges Project

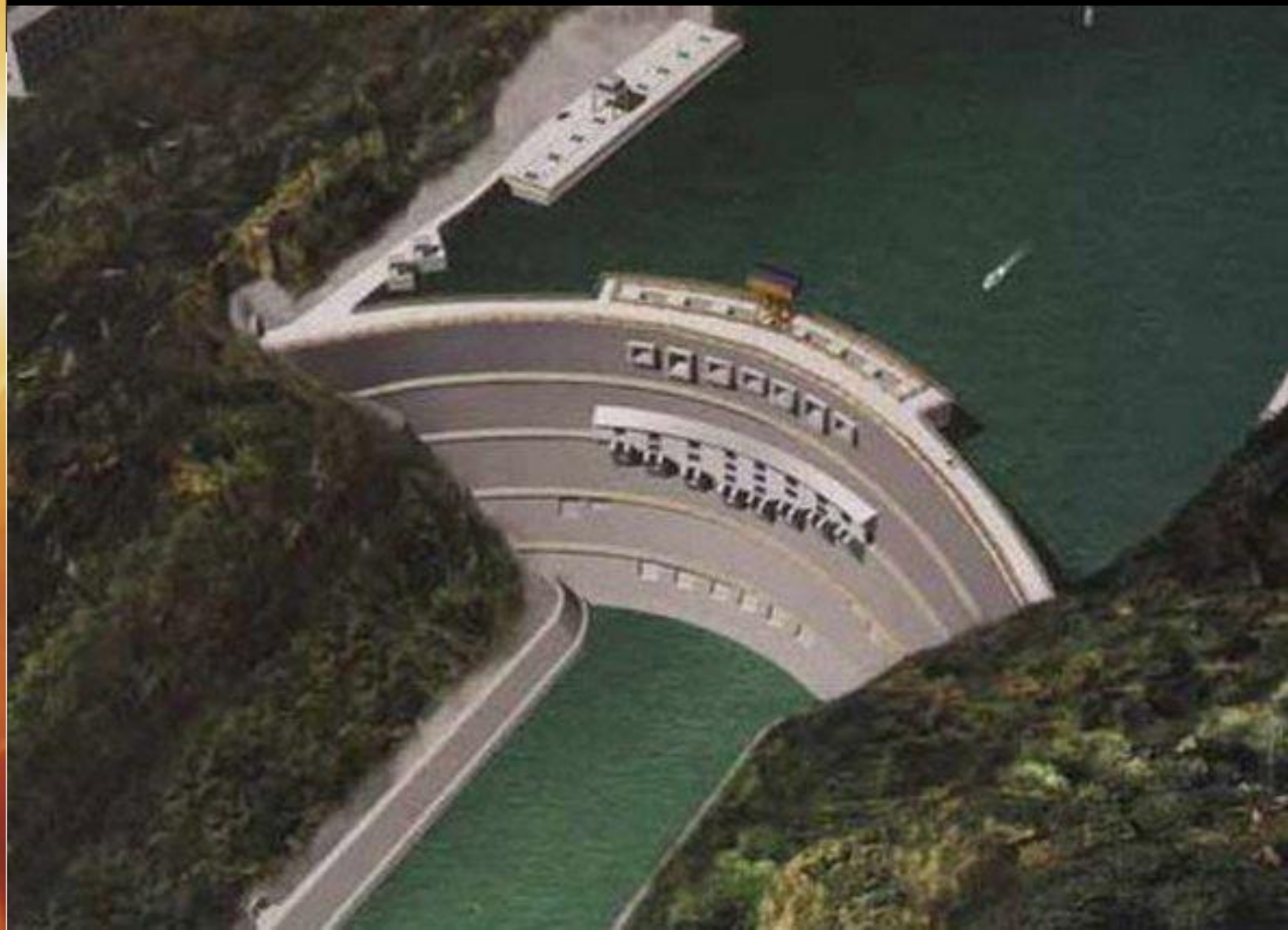
Inundation and Resettlement

- Before starting of the project construction 8-yr pilot works for the resettlement have been carded out with investment of 237 million RMB.
- Based on the experiences got from the pilot works the development orient resettlement policy has been adopted and detailed resettlement planning worked out.
- The resettlement planning has arranged that about 1/3rd people will move out of reservoir area and be settled in different providences.
- After relocation about 60% of rural population will continue with agriculture production and other 40% need to create new job opportunities in industries and tertiary industries.

Three Gorges Project

- The Three Gorges Project is adopted the way of river diversion by stages and three phases in construction.
- Construction and the first stage project needs to be prepared, and cut off realized is the sign during the first phase (1993-97)
- The goal in the second phase (1998-2003) is to realize the initial reservoir stage, power production by the first group of units in the left power plant, and navigation in ship lock
- The goal in the third phase (2004-09) is to realize all units to be put into operation and complete all the construction work.
- The total construction period is 17 years and it is completed in 2009.

Xiluodu Dam



Xiluodu Hydropower Project

- Xiluodu Hydropower Project is located by the Jinsha River.
- It is a huge project with comprehensive benefits of power generation, sediment control, and flood control with downstream navigation improvement.
- Drainage area is 454.4×10^3 km^2, which is 96% of the Jinsha River valley area.
- The normal water level at 600 m of the reservoir has a capacity of 12.67 billion m^3(447 TMC).
- Dam is a concrete arch dam – length of 700 m with the height of 278 m.

Xiluodu Hydropower Project

- It has nine generating units with single capacity of 700 MW. The project has a total installed capacity of 12,600 MW.
- The project of the construction of Xiluodu hydropower station began in December 26th, 2005.
- Total construction period has lasted 36 months to achieve the river closure in 2008.

Longtan Dam

Longtan Hydropower Project

- The Longtan Hydropower Project is located in Red River, Guangxi Autonomous Region.
- The Longtan Hydropower Project is one of the top-ten key projects of the Great Western Development Plan and the strategic projects of “power transmission from west to east”.
- The main function is power generation, incorporated with flood control, navigation, etc.
- It is designed as grade-I project structure. The project has 6300 MW of total installed capacity.

Longtan Hydropower Project

- The Longtan RCC (Roller Compacted Concrete) dam has a maximum dam height, that is 216.5 m, crest length is 849.44 m, and a 3 dam-body concrete volume is 7.67 million m^3.
- RCC volume accounts for 64% in total, and it reaches 4.91 million m^3. This is a construction breaking world record which is much higher than the existing domestic or international dam construction levels.
- It has the total upgrade maximum height of the vertical ship-lifts, the total height of 179.00 m.
- The new technology used in the designation work

Longtan Hydropower Project

- It used RCC dam technology to build 200 m high in seismic areas of high intensity.
- Equipped with 2-steps vertical ship-lifts, which solves the transportation problem.
- The largest span is with minimum spacing, units of the giant hydraulic transition process and so on.
- All are beyond the existing norms, comprehensively using many kinds of ways and means to design studies.

Conclusions

- With the global industrialization, the process of energy production and consumption accelerates in dramatic scale, and it results in serious environmental pollution emissions.
- The world economy can develop with the water resources of 8.8 trillion kWh / year.

  Fully develop and utilize alternative energy to substitute coal would reduce nearly 10 billion tons of carbon dioxide emissions a year.
- In recent years, as people around the world has become concerned about economy, population and environment construction of the hydropower station has played a big roll in the society.

Conclusions

- The development of hydropower is one of the measures to guarantee energy supply today and tomorrow.
- As you know, each coin has two sides, dam construction and hydropower development make people worry about the environmental and ecological impact.
- But the advantages of the development and utilization of water resources still outweigh the disadvantages.
- Scientific utilization of hydropower resources will inevitably make great contributions to the Country’s social, economic, and energy development in the future.

Every body Should feel saving power is their social responsibility. So that it will be helpful for the coming generations

One should remember that
1 Unit of Power Saved
=
2 Units of Power Produced


THANK YOU !!!