



# Public Private Partnership Initiatives in Hydropower in Nepal

## Presented by

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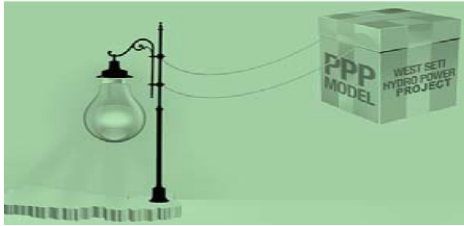
May 2011



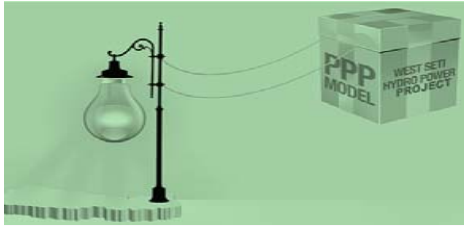
# ***Presentation Outline***



- 1. Present situation of Hydropower***
- 2. Hydropower Policy***
- 3. Hydropower Projects***
- 4. PPP Initiatives***
- 5. Kabeli 'A' Project: A PPP Initiative in Nepal***
- 6. Opportunities and Challenges***



# ***Present situation of Hydropower in Nepal***



# Nepal Profile



## Location:

Southern Asia, between China and India

**Area:** 147, 181 Sq. KM

Water: 2.6% (3820 Sq Km)

**Population:** 29.4 Million (July 2011 est.)

In the World: 41 position

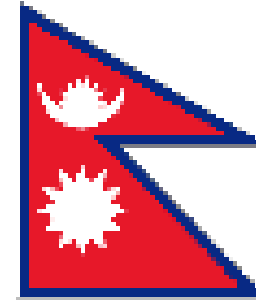
**GDP per head:** US\$536 (2011 IMF )

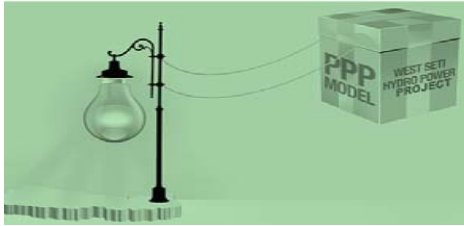
Annual growth: 3% in 2010 estimate (IMF)

**Literacy:** 48.6%

**Major River Basin:** Koshi, Gandaki,  
Karnali, and Mahakali

**Average Annual Precipitation:** 1700mm (May – September)





# Nepal Profile...

## Hydropower sector



There are about six thousand big and small rivers in three major river basins namely Koshi, Gandaki and Karnali

All of the country's rivers drain into the River Ganges. Nepal's rivers account for approximately 40% of the total flow to the River Ganges.

Hydropower projects are under construction from 3000 M High elevation to as low 500 m

100 yrs of History, Farping Hydropower Plant commissioned in 1911

85,000 MW potential capacity, only 1.3% has been harnessed



Nepal Profile...

# About Hydroelectricity



- Estimated Total Annual Average run-off for the countries for more than 600 perennial rivers = 200 billion m<sup>3</sup>
- Estimated water storage potential = 88 billion m<sup>3</sup>
- Estimated theoretically potential hydropower = 85,000MW
- Estimated Technically viable Hydropower = 43,000 MW
- Present Status of Energy
  - Hydro : Installed capacity – 645 MW (GoN 478MW, IPP167 MW)
  - Thermal: Installed Capacity – 53MW (GoN)
  - Solar: 200 Kw (2 x 100)
- Electricity Access to people – 42% of Population



# Nepal Major Rivers





# River Ganges and Nepal Rivers







# Installed Capacity



698 MW is current installed capacity, in dry season only about 200 MW electricity produced, 14 hrs Load shedding in dry season

<i><b>Description</b></i>	<i><b>Capacity (MW)*</b></i>
Total Grid Connected Hydro Power	698
Diesel Plants (Thermal)- Capacity	53
Peaking Capacity	668
Import from India 150 MW (100 regular +50 need based	150
Peak Demand	885
Current deficit -In Wet Season (July-Dec.)	-217 (885-668)
Current deficit – In Dry season (January-June)	-685 (885-200)
Under Construction (possibility within coming 3 yrs)	500
Possibility to come within 6 years (2011-2016)	1422

\* Data updated from last presentation (as per Nepal Electricity Authority Report, 2010)

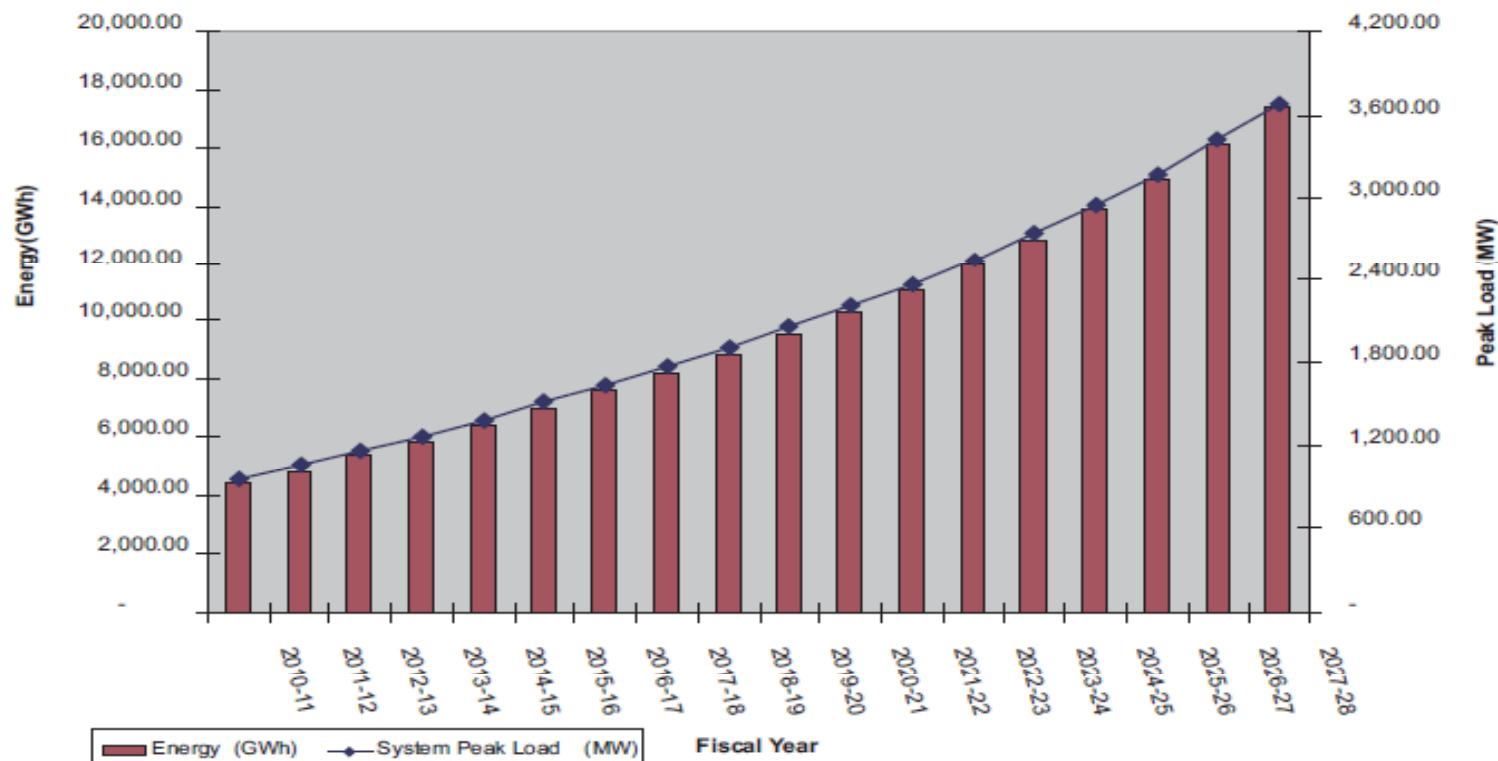


# Load Forecast



Load Forecast-3600 MW in 2027-28

## Load Forecast



Source: NEA Annual Report, 2010



# Hydropower Plants in Operation



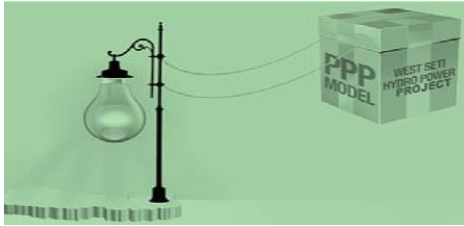
S.N.	Power Plant	Capacity (MW)	Annual Energy (GWh)	Owned by	Type
1	Trishuli	24	292	NEA	ROR
2	Sunkoshi	10	66	NEA	ROR
3	Gandak	15	53	NEA	ROR
4	Kulekhani I	60	164	NEA	STO
5	Devighat	14	13	NEA	ROR
6	Kulekhani II	32	96	NEA	STO
7	Marshyangdi	69	519	NEA	PROR
8	Puwa	6	41	NEA	ROR
9	Modi	15	87	NEA	ROR
10	Kaligandaki	144	791	NEA	PROR
11	Andhikhola	5	38	BPC	ROR
12	Jhimruk	12	81	BPC	ROR
13	Khimti	60	353	HPL	ROR
14	Bhotekoshi	36	246	BKPC	ROR
15	Indrawati	7.5	51	NHPC	ROR
16	Khudi	3.45		KHL	ROR
17	Rairang	0.5		Rairang HP	ROR
18	Baramchi	0.98		Unique Hydel	ROR
19	Thoppal	1.65		Thoppal HP Co.	ROR
20	Syange	0.2	1.2	SHC	ROR
21	Chilime	20	101	CHC	PROR
22	Piluwa	3	18	AVHCO	ROR
23	Sunkoshi	2.6	14.5	SHPC	ROR
24	Chaku Khola	1.5			ROR
25	Small hydro	12.5	26	NEA	ROR
26	Small hydro (Isolated)	6.4		NEA	ROR
27	Microhydro	14.5			
28	Middle Marshyangdi	70		NEA	PROR
	<b>Total</b>	<b>645.28</b>			



## Projects under construction



<b>HEP Project</b>	<b>Capacity (MW)</b>	<b>Status</b>
Chameliya (06/07)	30	40% work completed
Kulekhani – III	14	30% work completed
Rahughat	30	
Upper Trishuli- 3A	60	
Upper Trishuli- 3B	40	
Upper Modi - A	42	
Sanjen Upper	11	
Sanjen	35	
Middle Bhotekoshi	80	
Rasuwagadhi	75	
Kabeli – A	30	Will be commissioned in 2014
Upper Marsyangdi	50	Will be Commissioned in 2014
Nyadi Project	30	
<b>Total</b>	<b>527</b>	

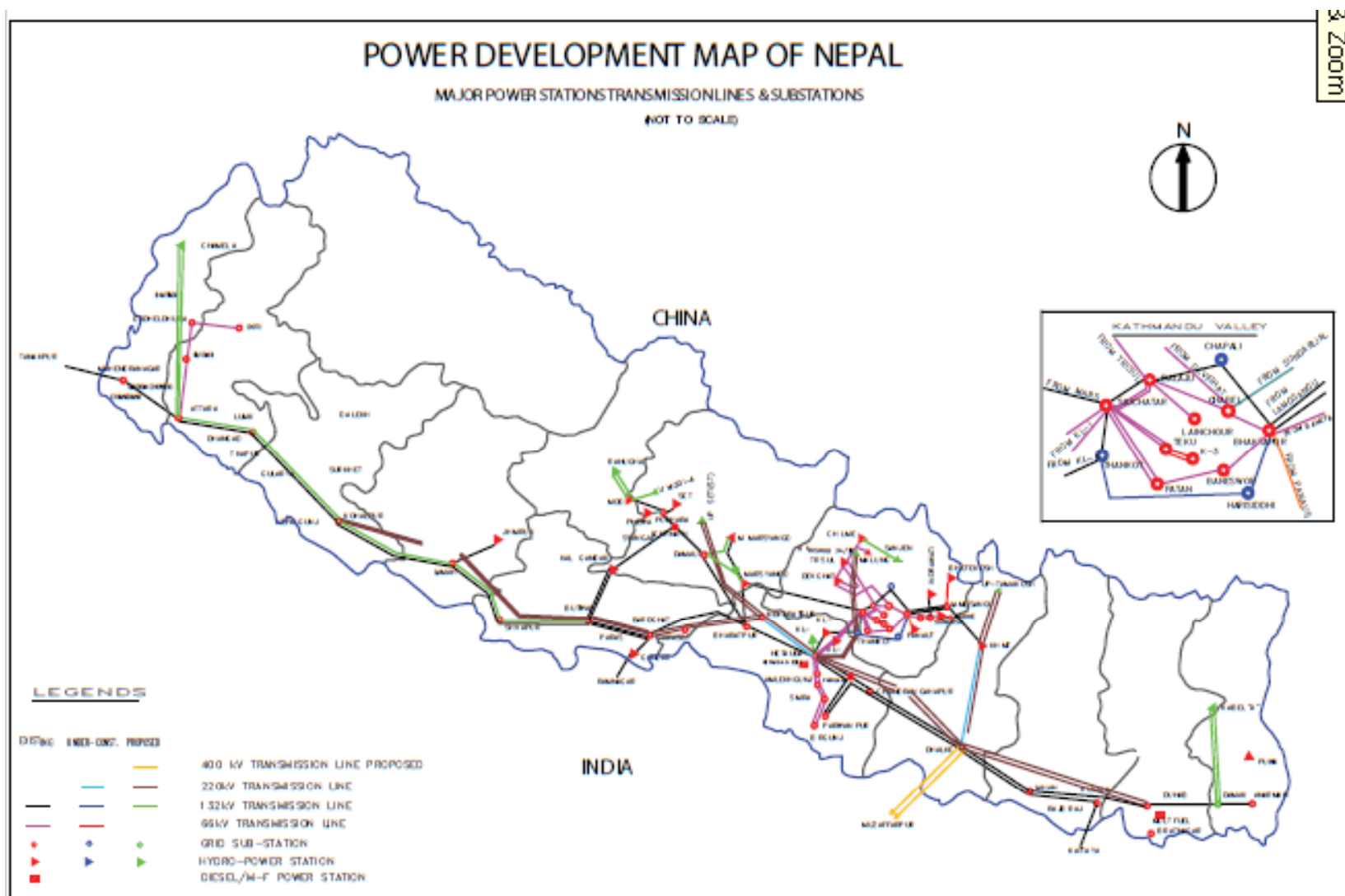
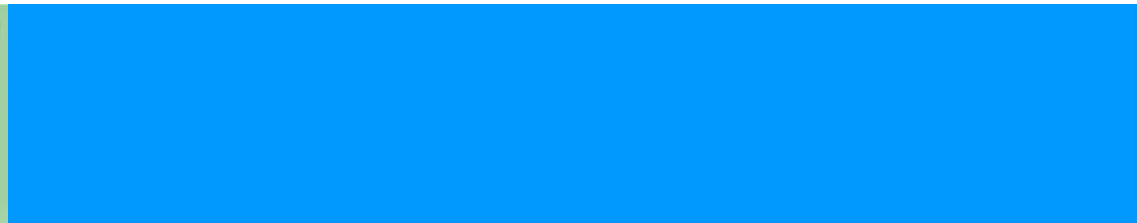


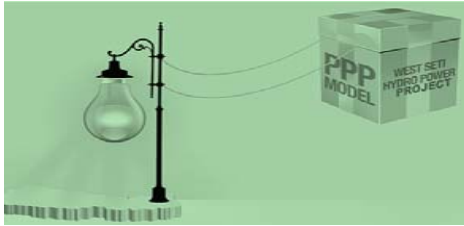
# Proposed Storage Type Projects



<i><b>HEP Project</b></i>	<i><b>Capacity (MW)</b></i>	<i><b>Status</b></i>
Upper Seti	128	Public-Private Model
Nalsyangu Gad	400	
BudhiGandaki	600	
West Seti	750	10% free energy basis
Arun-III	402	
Upper Karnali	300	
Pancheswor	6480	
Multiple project		
<b>Total</b>	<b>9060</b>	

Storage Type Projects are necessary for constant supply of electricity



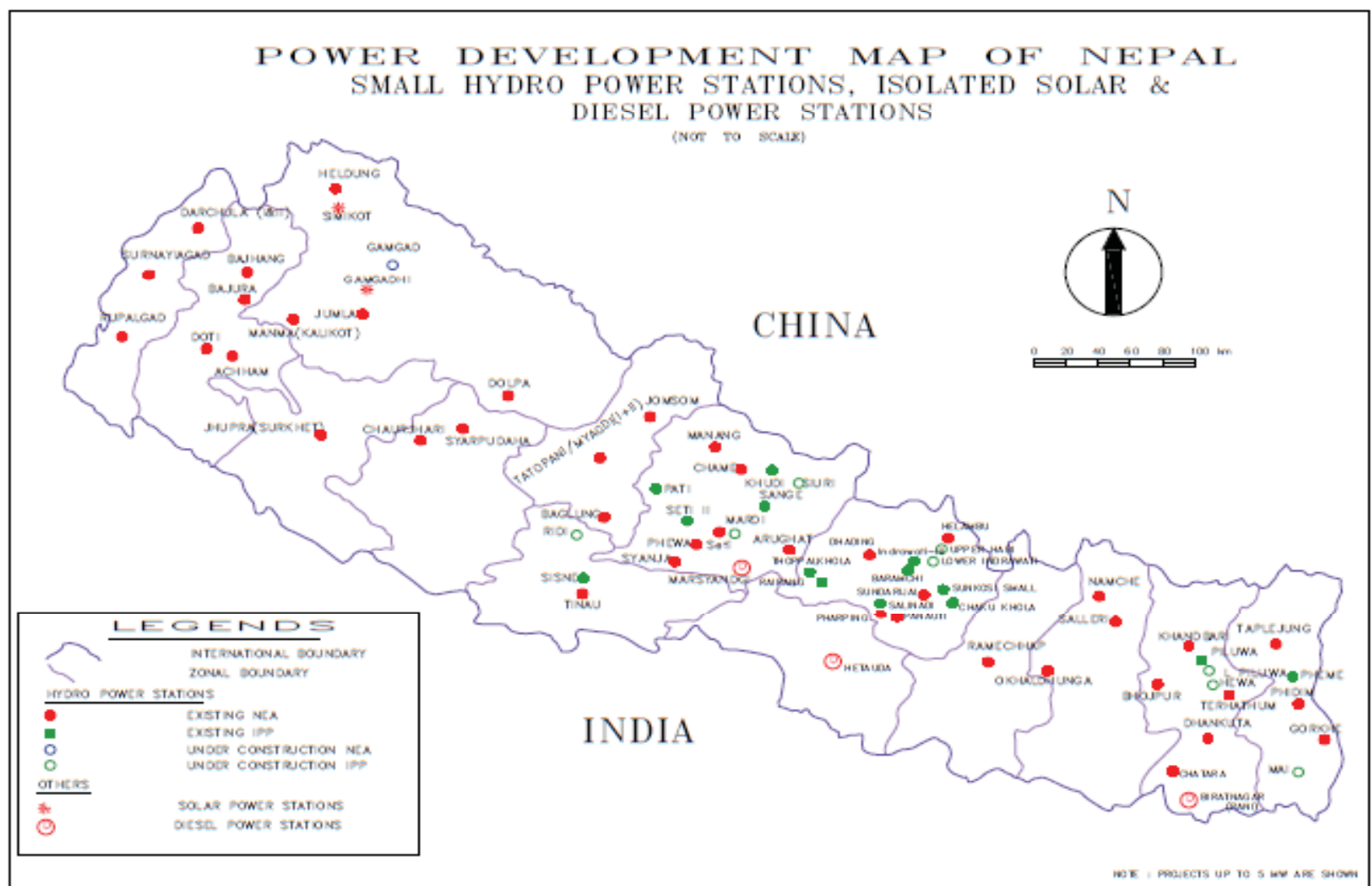


# Types of Hydropower Projects

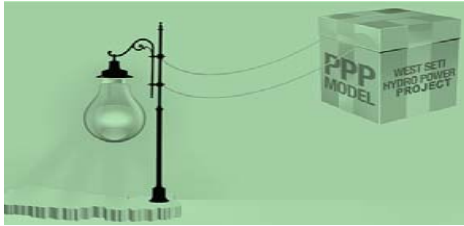


**Three types of HEP projects are in operation in Nepal:**

- **ROR (Run-off-river type)- Very common**
- **PROR (Peaking Run-off-River type)-**
- **Ponding type- Only one project under operation-Kulekhani Project**







# *Nepal Hydro development policy*



# Nepal Hydropower Development Policy



**Until 1990, hydropower development was under the domain of government utility**

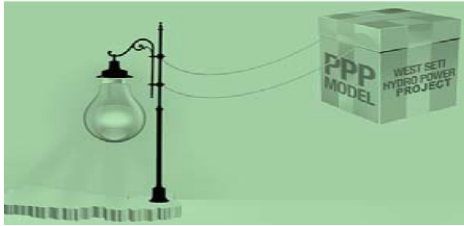
**From 1992, hydropower development was opened for private sector**

**New policy seek investment by private sector and expand electrification within the country and export**

**60 MW Khimti project developed in 2001 with Norwegian Partnership  
36 MW Bhotekoshi in 2001 with US Partnership**

**In 1990, Small Hydropower Master Plan Project initiated, which has contributed 148 MW of power (1 to 10 MW) to Integrated Power system from Private Sector**

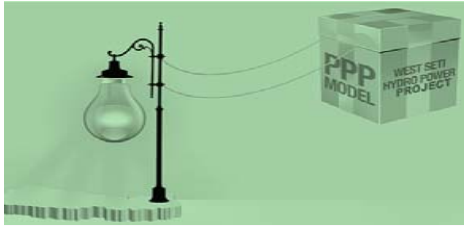
**Nepal Government's policy and plan of 10,000 MW in 10 years (2010-2020) and 25,000 MW in 20 years (2010-2030)**



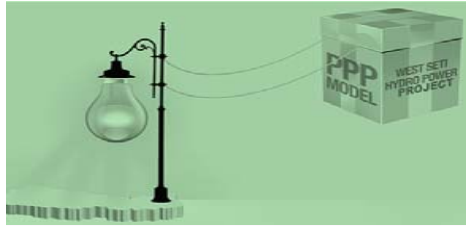
# Hydropower Policy...



- No license required up to 3MW capacity projects.
- Fixed PPA Tariff (up to 25 MW, NRs. 4 (~5.7 USC)/kWh for dry season and NRs. 7 (~10 USC)/kWh for wet season) and negotiable for more than 25 MW
- Implementation of projects on BOOT basis
- Encourage to develop Storage & multi purpose projects, PPP approach
- Mobilization of internal capital market for investment
- Electricity Export
- Encouragement of community /cooperatives / local bodies
- Foreign investment on HP generation/ transmission and distribution
- Private sector establishment not be nationalized during license period
- Exchange facilities to foreign investors, can repatriate the amount in foreign currency at the prevailing rate



# ***Public Private Partnership Initiatives***



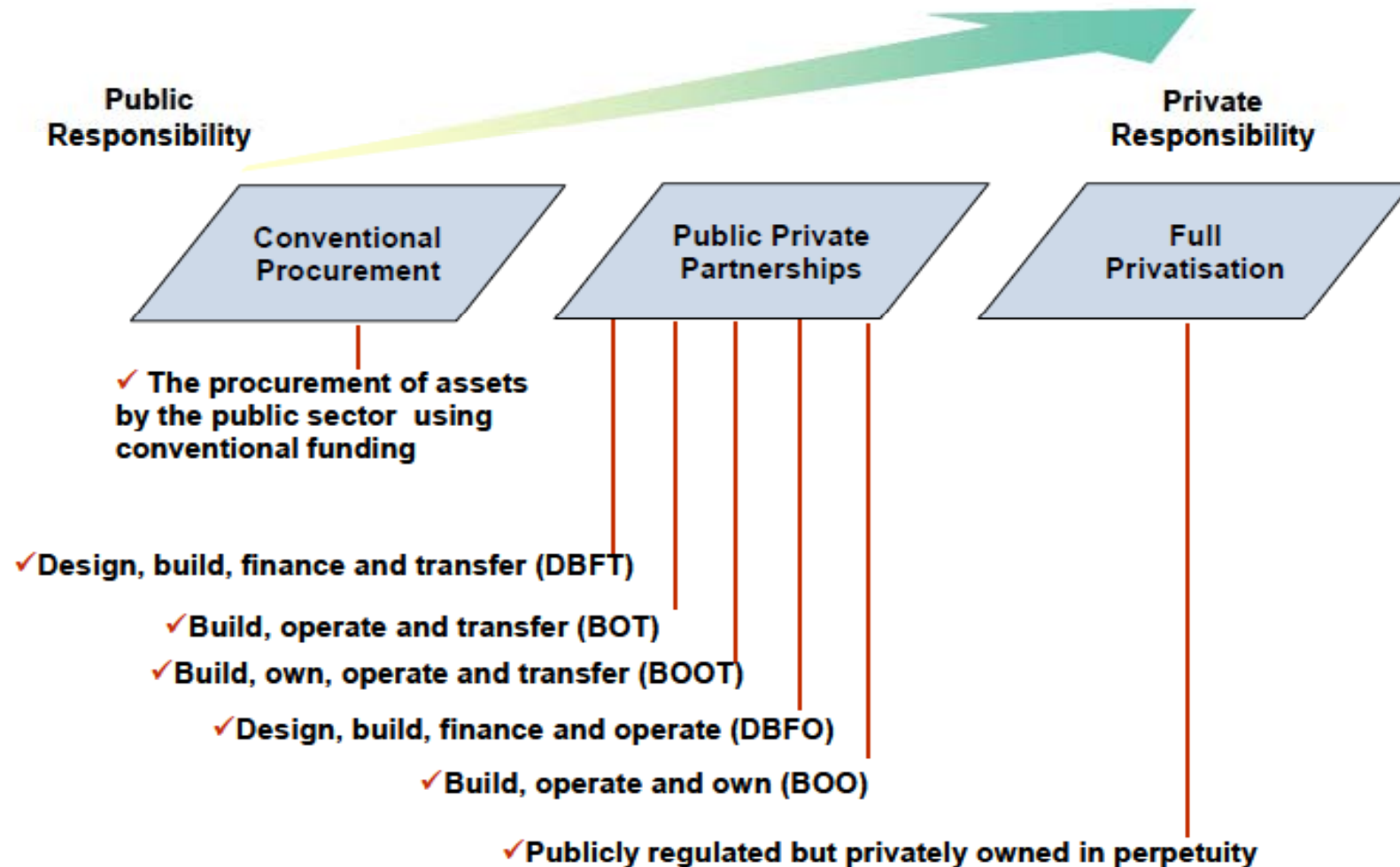
# What is PPP?



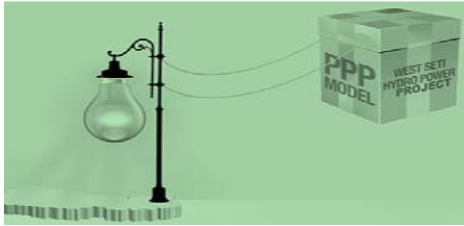
PPP is joint ventures in which: business and government cooperate, each applying its particular strengths, to develop a project more quickly and more efficiently than the government could accomplish on its own.



# Range of PPP Options



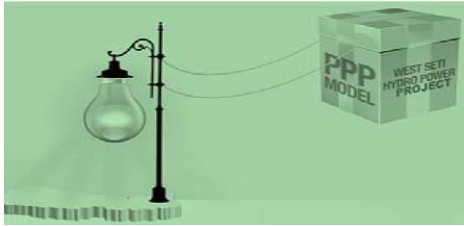
Source: KPMG (2003) and authors own additions



# PPP Initiates in Nepal



- Privatization policy in 1992
- Two projects (60 MW Khimti and 34 MW Bhotekoshi) build under private initiatives
- Govt owned Butwal Power Company privatized in 2003
- Many Small hydropower developers came up
- Contributed about 148 MW (1 to 10 MW) power to Integrated Power System
- Kabeli Project (30 MW) first in PPP model called for development in public private model in 2005
- 8 other projects (altogether 153 MW) called for bidding in PPP model in 2009



# Basics of PPP



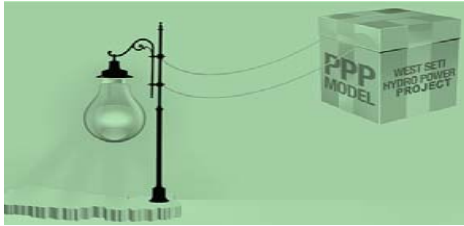
A complete paradigm shift is needed to attract the private sector to work in partnership with Government. That would necessitate:

- (1) the creation of an environment,
- (2) requiring changing of mindsets,
- (3) changing of bureaucratic attitudes and
- (4) above all the changing of legislative, legal and regulatory frameworks.

Four principal roles for the private sector to play in PPP schemes:

- (1) the private sector may provide additional capital;
- (2) alternative management and implementation skills;
- (3) value added to the consumer and the public at large; and
- (4) better identification of needs and optimal use of resources.





# PPP Hydro Projects in South Asia Region



Pakistan has been developing many PPP model projects in hydropower sector

- 496 MW Spat Gah-Indus River ( KfW Germany Funded)
- 15 MW Tangir HEP

In India many hydropower projects has been developed and is being developed under PPP Model

- More than 3.4% to power generation contributed by Private Sector

-114 MW Dagachhu HEP in Bhutan, ADB Bank funded

- Gov. Of India supporting Bhutan for Hydropower development



# PPP in NEPAL



- Bid for development of 30 MW Kabeli A project in 2005 in tariff basis
- Bid Notice for 8 projects (in total 142 MW) in 2009 under high bid basis
- Project Development Agreement (PDA) signed with Project company for Kabeli 'A' project in Jan 2010
- MOU signed with FNCCI for 2.17 MW Mahesh Khola in Sept 2010-(Project Cost :5 MUS\$)
- PDA signed for development of 8 Projects between Government and Project company



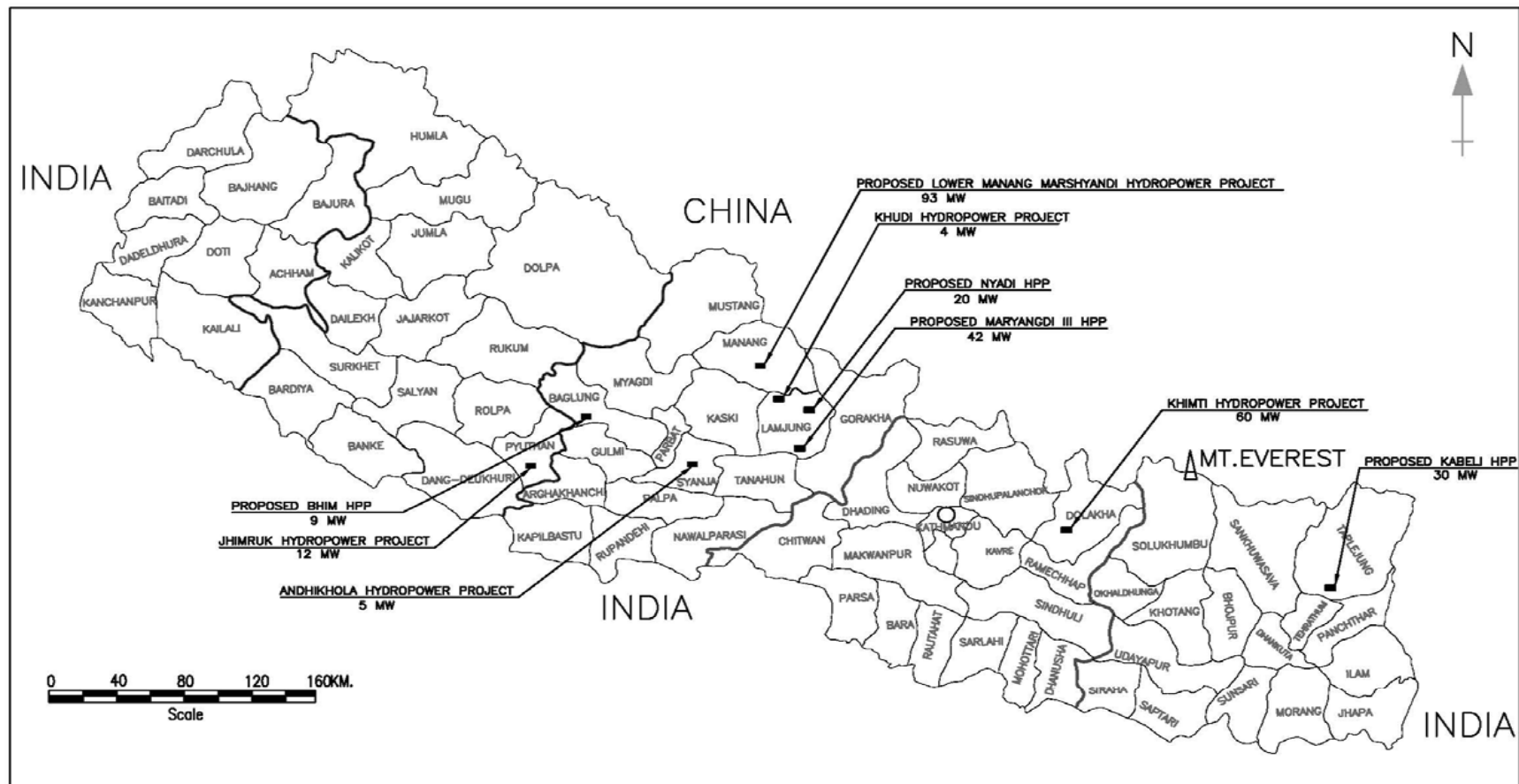
# About BPC

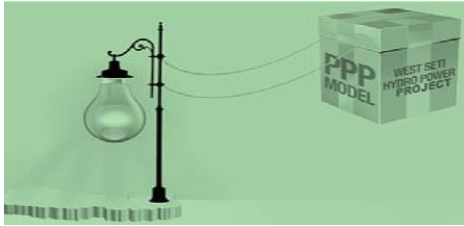


- BPC is a leading Company in Hydropower development in Nepal since 1966
- BPC also owns and operating three projects:
  - 5.1 MW Andhikhola Hydroelectric Plant
  - 12 MW Jhimruk Hydroelectric Plant
  - 4 MW Khudi Hydroelectric Plant
  - 16% stake in 60 MW Khimti Hydroelectric Plant
- BPC is developing following hydropower projects:
  1. 30 MW Nyadi Hydropower Project
  2. 38 MW Kabeli 'A' Hydropower Project
  3. 140 MW Lower Manang Marsyangdi Project
  4. 42 MW Marsyangdi-III Hydropower Project

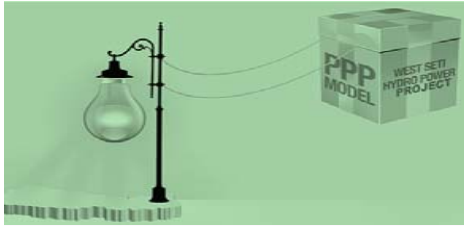


# Maps of BPC's Projects





# ***Kabeli 'A' Hydropower Development: A PPP Initiative***



# Kabeli 'A' Hydropower Project



- Kabeli 'A' Hydroelectric Project-First Initiative in development of hydropower with PPP Model
- A SPV (Special Purpose Vehicle) or Project Company established in Jan 2010-
- Name of Company: Kabeli Energy Limited
- Promoters of company are:
  1. Butwal Power Company Limited, Nepal- 54%
  2. SCP Hydro International, Qubec, Canada-30%
  3. Shangri-La Energy with Khudi Hydropower Ltd, Nepal-11%
  4. Asia Pacific Power Tech P. Ltd. Guangzou, China- 5%



# Project Location in Regional Basis



**Pakistan**

**Project Area**

**China**

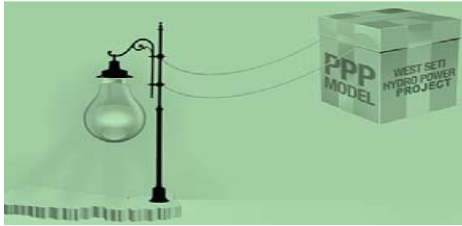
**NEPAL**

**Bhutan**

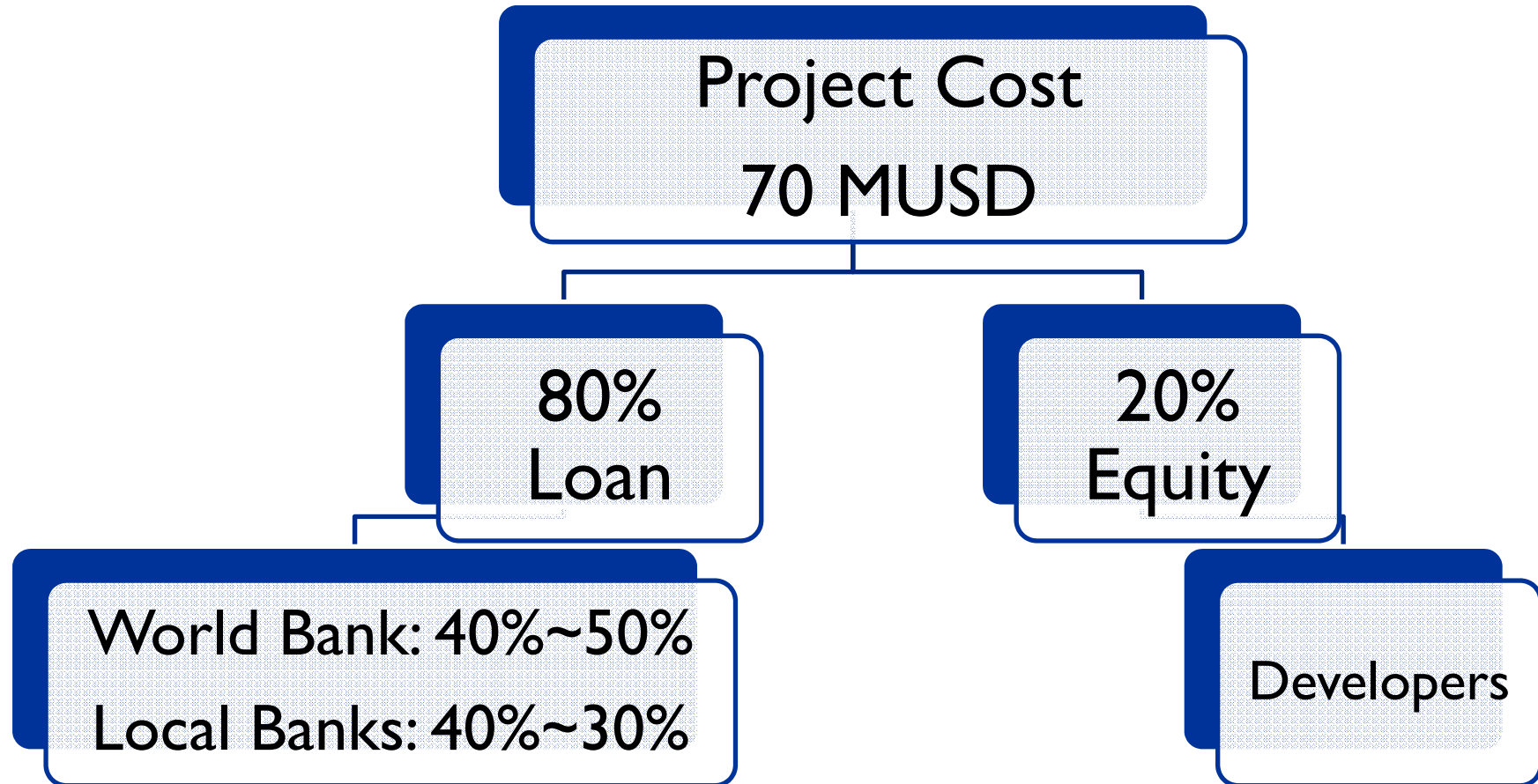
**Bangladesh**

**Myanmar**

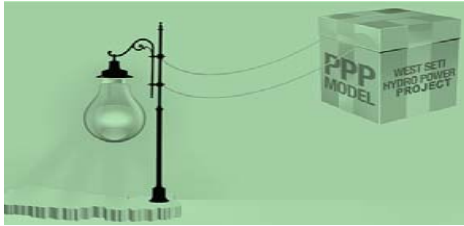




# Funding Arrangement







# Financial Parameters



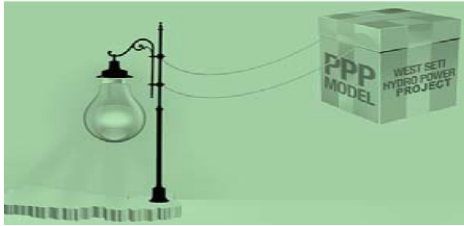
- **World Bank Interest rate:** LIBOR +2.5% (Current rate is 0.46% +2.5%=2.96%)
- **Local Banks Interest rate:** 12%~14%
- **PPA BaseTariff :** 5.766 US Cent/Kwh
- **Payment:** in US \$ (47%) and Nepali Rupees (53%)
- **Escalation :** 3% in US component and 6% in Nepali Component till 10<sup>th</sup> year after COD
- **Flat rate** after 11<sup>th</sup> year
- **Fixed Foreign Exchange Rate:** 1 US\$ = 71.25 NRs.
- **Conseinnure period:** 25 years plus 5 year with 50% ownership of NEA on completion of PPA term



# Government Role



1. **Project Benefits** *Right to possess, use and procure benefits from the Project and Property by the Project Company including the right and sale the generated electricity.*
2. **Water rights** *Govt. cannot issue license for any basin transfer project on Kabeli river.*
3. **Project Facilities** *Own construct, operate, maintain, and repair the project and facilities*
4. **Use of Local Natural resources** *Project company has right to use local material such as stone, sand etc.*
5. **Employment of Expat Project Resources** *Government will expeditiously grant necessary work permits, visas, permits or other employment authorizations*
6. **Import and Export of Materials and Equipment** *1% Custom duty for permanent import and free duty on plants & equipments temporary import*
7. **Use of Foreign Currency and Bank Account** *Right and authority for the Project Company for the duration of the Concession Period to receive, disburse, hold, effect payments, distributions and dividends and to otherwise transact business in and with Foreign Currency*



# Government Role...



**8. Use of Foreign  
Currency and Bank  
Account**

*Right and authority for the Project Company*

**9. Income Tax**

*Prevailing at the time of Signing of PDA*

**10. Against Change in  
Law**

- *Protection after PPA*
- *Change in law before PPA will be reflected in tariff at the time of PPA signing.*

**11. Tax and Royalties**

- *Income Tax rate as applicable at the time of signing of PDA*
- *VAT exemption in equipment and machinery and their spare parts.*
- *Royalties as per Electricity Act, 1992 and Regulation 1993.*

**12. Import of explosives**



# Project Schedule



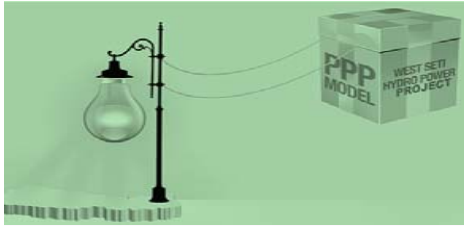
SN	Task	Start Date (MM/DD/YY)	Finish Date (MM/DD/YY)	Status
1	Sign PDA		01/31/10	Completed
2	Survey License	02/01/10	03/19/10	Completed
3	Feasibility study update	03/19/10	09/15/10	Completed (Deadline 03/18/2011)
4	EIA update	09/01/10	12/31/10	Ongoing
5	Approval of Feasibility/ESIA Study from GoN	11/15/10	02/11/11	Ongoing
6	Design/Tender document preparation	10/04/10	02/28/11	Ongoing
7	PPA and Generation License	02/15/11	05/20/11	
8	Financial Negotiation and Closing	03/15/10	06/19/11	
10	Civil Work Contractor/Supplier procurement	03/15/11	06/22/11	Ongoing
11	Main Construction Works	07/13/11	11/06/14	
12	Project Testing and Commissioning	09/28/14	12/15/14	
13	Commercial Operation		12/25/14	



# Project Status



- Survey License received on March 19, 2010
- Feasibility Study Update
  - Study completed – submitted to GoN and World Bank (WB) in Nov. 2010
  - Panel of Expert (POE) reviewed the report as per requirement of WB and
  - Government of Nepal is reviewing the study report
- Environment Impact Assessment/SIA/IEE
  - ToR/Scoping completed– Approval of WB Nepal office received.
  - TOR for IEE approved from GoN
  - IEE/ESIA Study Completed in Nov. 2010
  - Under Review by POEs, preliminary report received on Jan7, 2011
  - Final report will submitted to WB
- World bank appraising the project for loan Agreement



# On going Activities

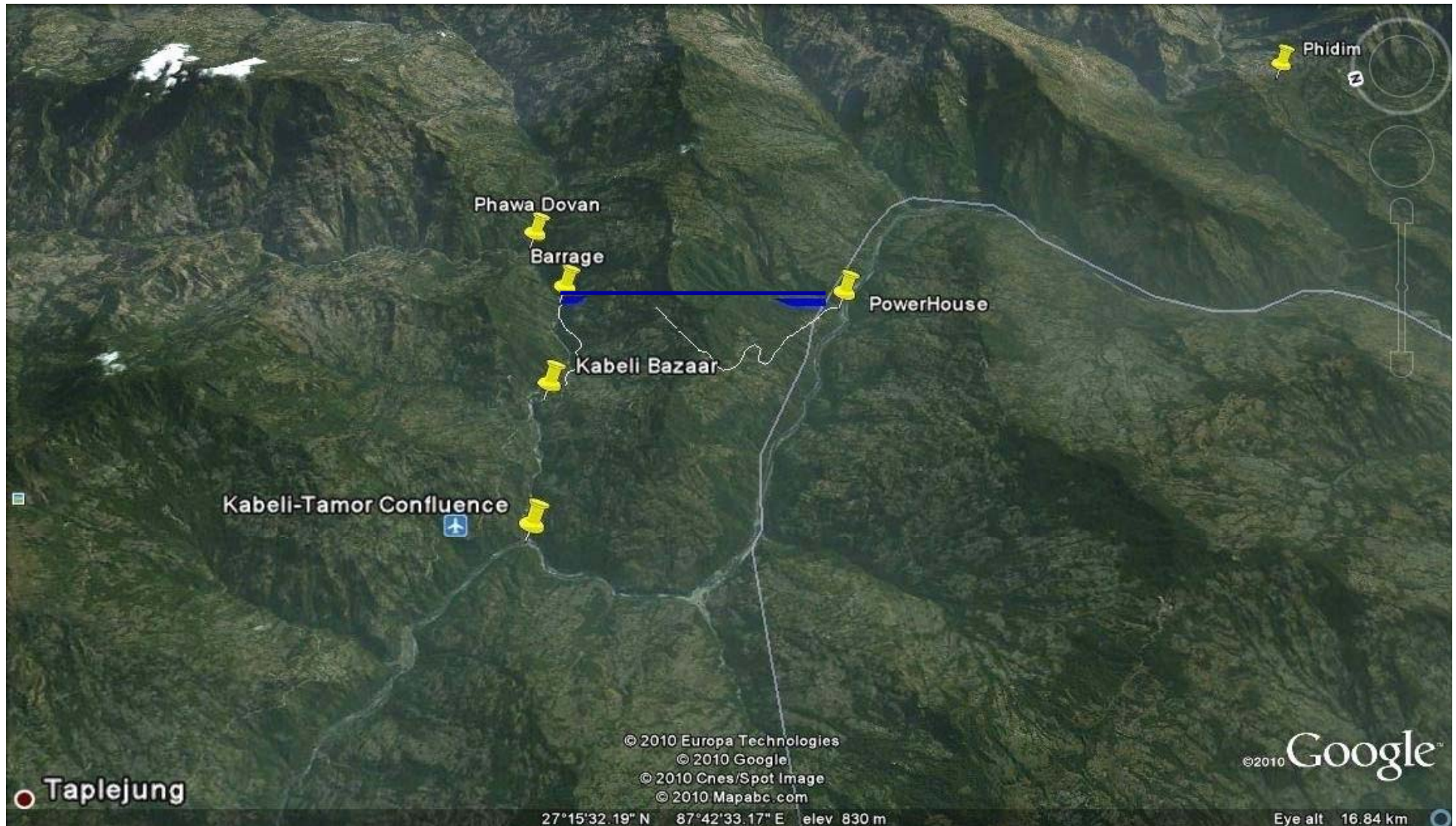


- 10 hectare land purchased
- Prequalification (PQ) process for Civil work contractor/EM-HM Suppliers
- Tender for Test Adit Tunnel
- Tender Documents finalization
- Physical River Modeling
- Detail Design underprocess
- Detail Design Review Consultant recruit process
- Track opening for Access Road
  - Headwork site: 8 KM
  - PH site: 12 KM





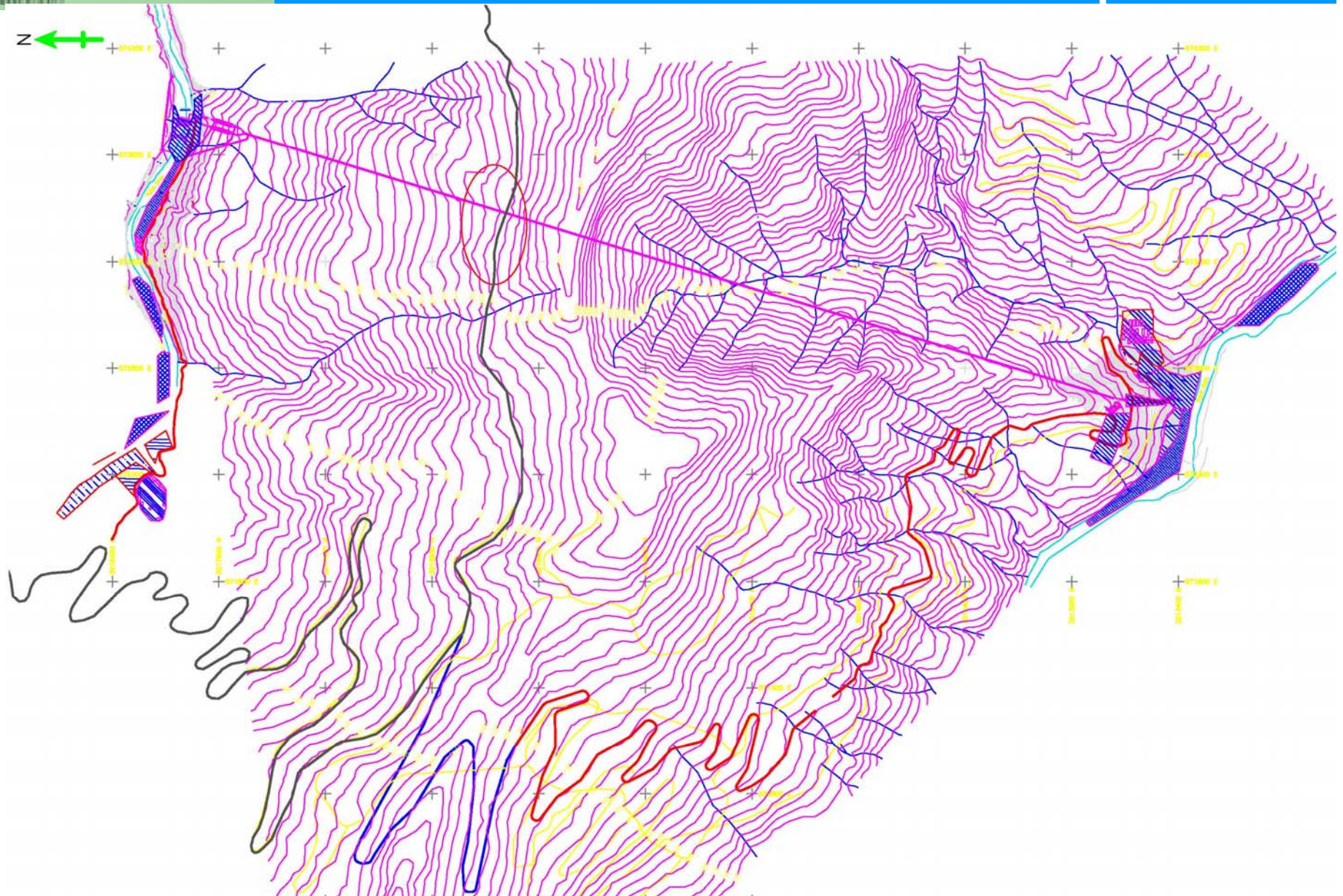
# Google View of Project Site







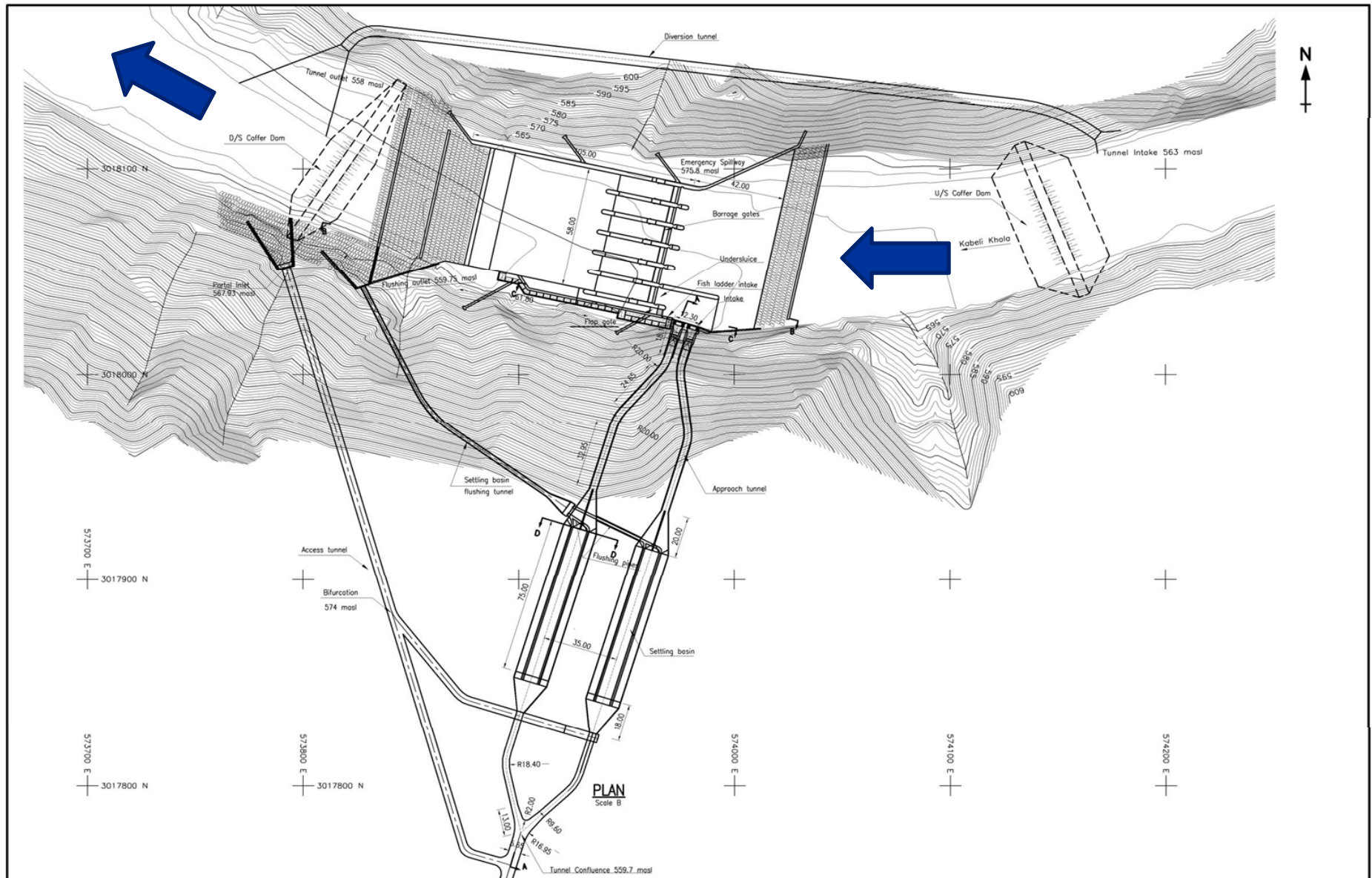
# Project Layout Plan







# Headwork Layout Plan





# Headworks Area







# Power House Area







# Gauge installation

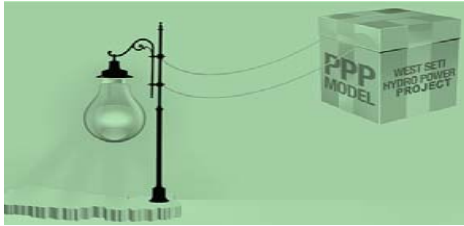




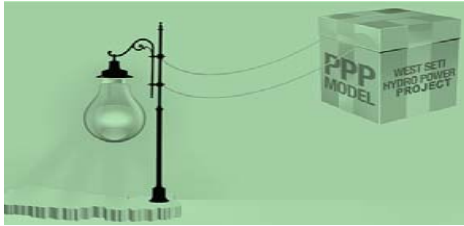
# River Model Photographs



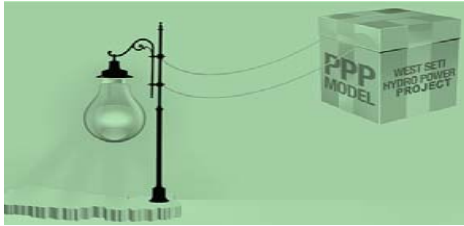














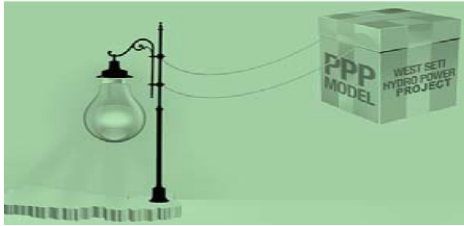




# Salient Features



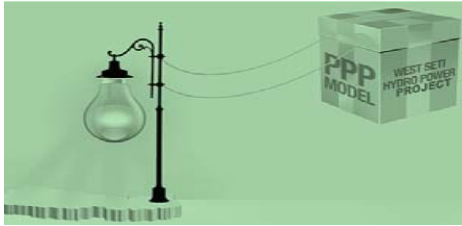
- 6 Radial Gated Barrage type of headworks
- Underground settling basin- 113m x 15.8 m
- Head Race Tunnel-D shaped, 4330 M, 5.65 m dia
- Surge shaft- 51.7 M depth/10 m dia.
- Penstock: 250 M, 3.55 m Int. dia.
- Francis Turbine: 2 Nos., Vertical axis (2 x 19 MW)
- Tailrace: 93 M (4.9 m wide x 4.65 m high Rectangular)
- Power house: Semi Underground
- Gross Head: 117 M
- Design discharge: 37 Cumec
- Construction time: 3.5 Years



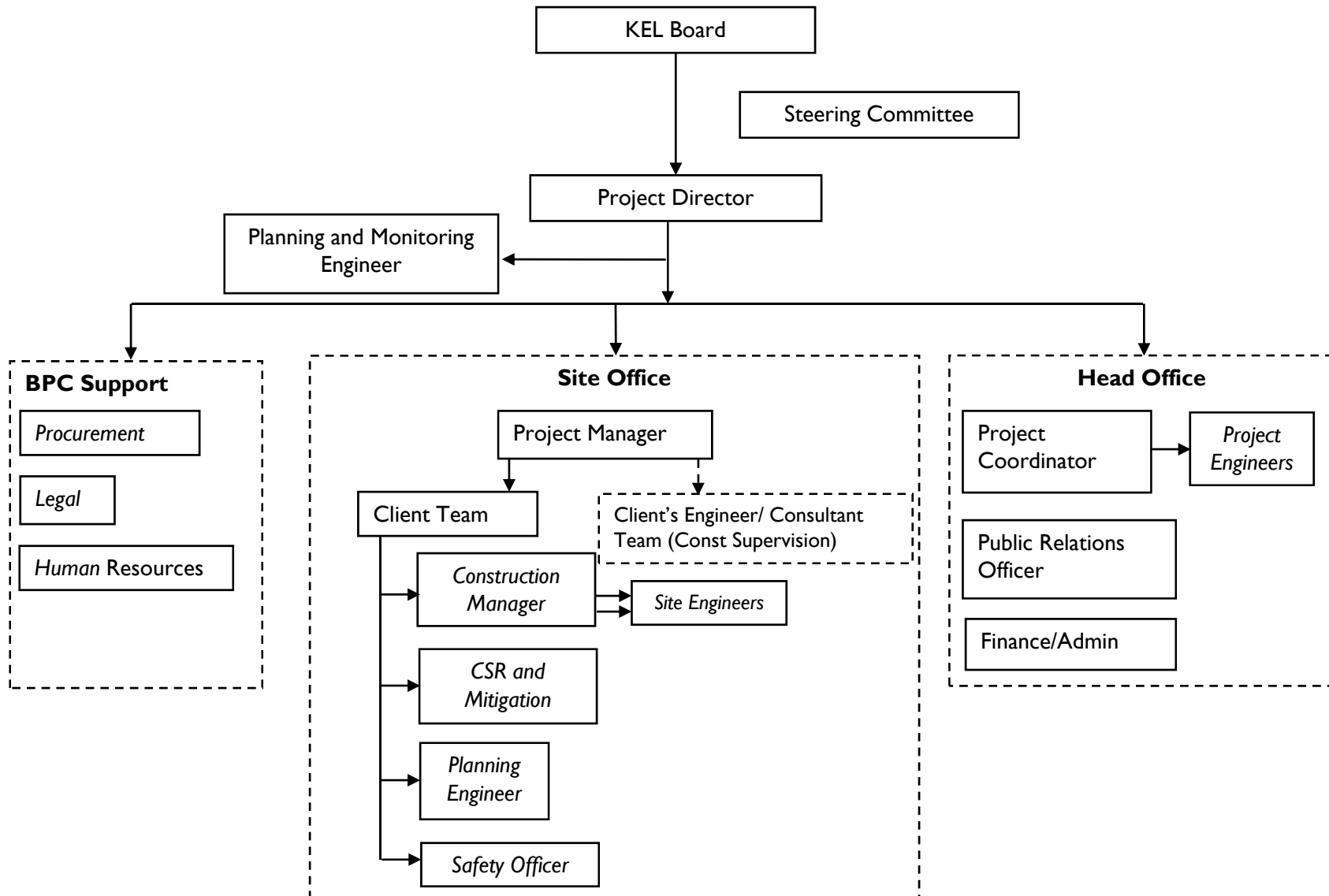
# Project Management

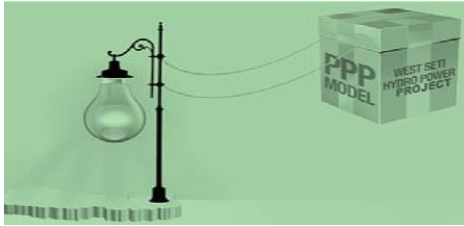


- The project will be managed by CEO/ Project Director.
- The Project Manager is responsible to the Chief Executive Officer for the delivery of the agreed project outputs including the project construction outputs.
- The following corporate documents shall be prepared to guide the project development activities.
  - Code of Ethics
  - Corporate Governance Code
  - Code of Conduct
  - Financial Regulation
  - Personal Manual
  - Procurement Manual

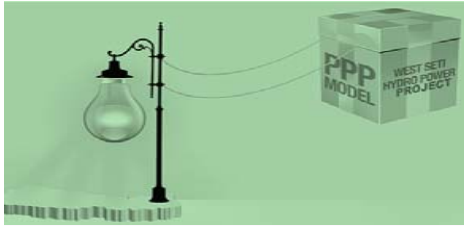


# Project Organization





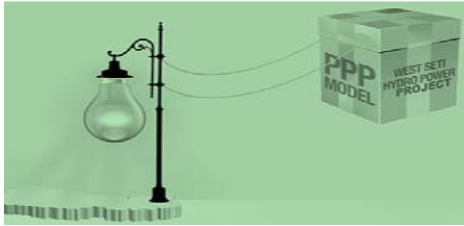
# *Opportunities and Challenges in Hydropower Projects*



# Opportunities



1. Clean energy as hydropower projects are demand of modern world
2. Possibility of High head projects  
Generates much energy in less investment  
456 MW Upper Tamakoshi project-Govt project
3. High potential for Ponding type of Projects:  
Upper Karnali, West Seti, Burhi Gandaki, Pancheswar
4. Interested foreign investors  
Indian investors are interested in developing the projects ranging from 50 MW~1000 MW
5. High flow in rivers  
8 of the 10 snow-capped and highest mountains in the world are located in Nepal. Himalaya is the source of most rivers of Nepal.



# Opportunity...



6. High demand in local market (Electricity based activities)

7. High potential demand in Regional Market

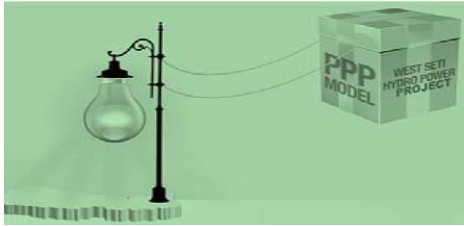
Highly populated areas of India and Bangladesh are located near to Nepal. Electricity market is available. Surplus energy can be exported.

8. Hassle free investment during operational phase

No need of import of raw materials, Low production cost  
Less labor intensive

9. Private/foreign investor favorable policy of Government

10. Environmental risk free after construction



# Challenges



## A. Technical Aspects:

1. Geological condition varies in short span
2. Weak geology : prone to landslides, heavy investment requires to control land slides
3. High Sedimentation: erodes turbine blades significantly
4. High COST in construction of settling basin
5. High Monsoon flood/discharge: need strong (costlier) structures to control a short span problem
6. Limited accessibility: high technology (TBM machines) cannot be used
7. Steep sloped rivers
8. Highly active seismic zone
9. Great data management required (hydrology, geotechnical etc.) during DPR study-Skilled resource





# Challenges...



## 7. Lack of Transmission Line

- Government not been able to construct transmission line to cater private developers
- Lack of planning
- Scattered projects, not near to more demand area

## 8. Local/Managerial/Administrative Aspects

- Local people demand
- ILO 169, which deals specifically with the rights of indigenous and tribal peoples.
- Changing demand of local people
- Multi aspects involvement
  - Road, Housing, environmental mitigation etc.
- Lack of infrastructure facilities: Developers have to build at their own cost
- Resettlement problem and issues for big reservoir projects, resist from local people



# Challenges...

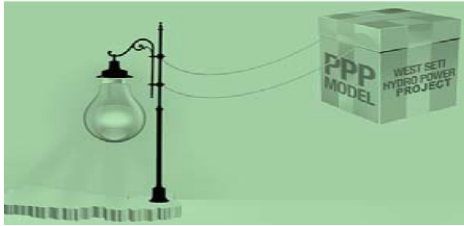


## 9. Financial/Economical Aspects

- Huge initial investment required: Average Investment cost ranges from \$2000-\$4000 per KW. Big financial risks
- National developers do not have enough money to invest
- Lack of fluidity (money) in local Banks: Cannot invest in big Mega Projects
- Local Bank interest rate is high (10%-14%)
- Government buying rate (tariff) is not encouraging (100 VKwh in dry season and 60\ during wet season)
- Government facilitation policy is not favorable: Government does not provide the guarantee to private developers to get loan from the Foreign Banks
- Lack of government fund to invest in hydropower

## 10. Attitude of license capture

- Tendency of capturing of development license by influential people,
- True developers deprived from development of projects



# Challenges...



## 11. Weaknesses of private developers

- Local company does not have organizational strength to implement the mega projects
- Foreign investors want more than 51% stake in the company, weakening local parties
- Some developers have even no capacity to invest equity portion of the project cost

## 12. Instability of the political system

- Leaders' focus is in government formation
- Focus in preparation of Constitution
- Lack of understanding of development in leaders



# Conclusion



- Nepal has potential to generate 85,000 MW of electricity power
- Only able to produce 1.3% of capacity
- Nepal is in shortage of electricity power
- Hydropower policy prepared to facilitate private investment
- Independent Power Producers (IPPs) with private investment coming up
- PPP model has been introduced
- BPC is working under PPP initiatives of Government
- BPC is developing 4 new projects and running 3 power plants
- 38 MW capacity Kabeli 'A' Project is first in PPP model
- Kabeli Project is being financed by World Bank
- Kabeli Project is scheduled to be completed within 2014
- There is a lot of opportunity to develop HEP
- Number of challenges are also existed

