Proposal for electrifying poor rural communities through deploying small-scale wind power systems in Nepal

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Effective Deployment of small Wind Systems in Asian Rural Areas and
The 2nd Meeting of the Energy for All Partnership Working Group on Wind Power
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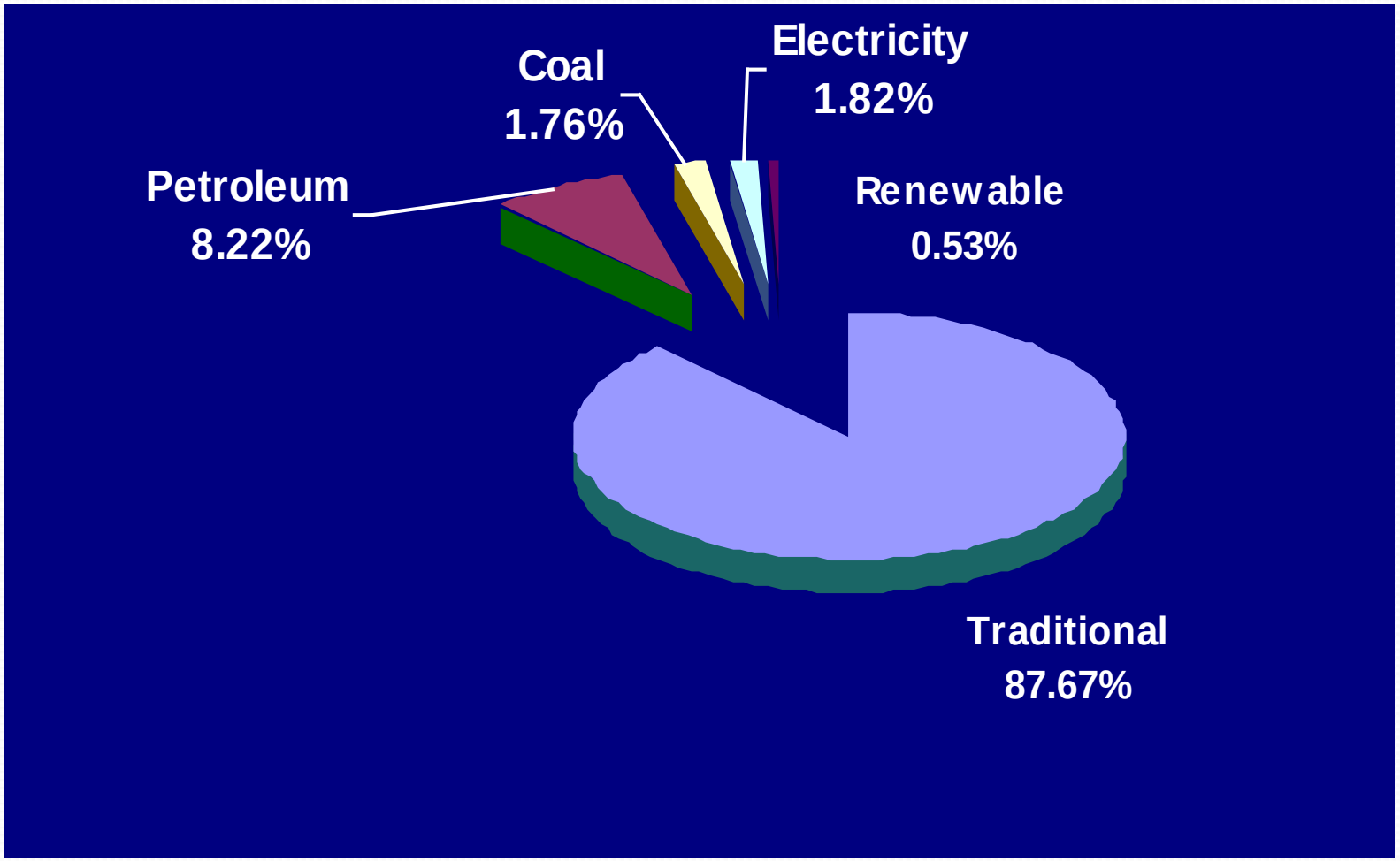
Outline

- Nepal
- Energy Scenario
- Alternative Energy Promotion Centre (AEPC)
- Present Activities
- wind energy- historical background, achievements & status
- Proposal Outline

Nepal


China
Humla
Kanjiroba
Jumla
Jomsom
Dhaulagiri
Annapurna
Manaslu
Nepalgunj
Pokhara
Mt Everest
NEPAL
Namche Bazaar
Kathmandu
0 50 100 km
Scale
India
Biratnagar
TNC

Energy Scenario (Source: WECS 2008)



Consumption of Energy by Sector

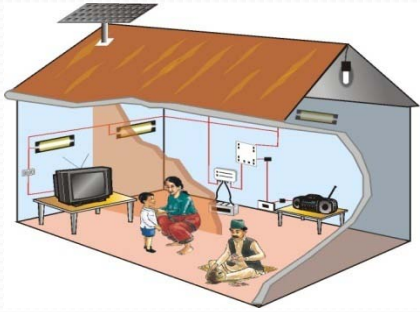
- Residential sector: 89.5%
- Transport sector: 3.44%
- Industrial sector: 5.26%
- Commercial sector: 1.33%
- Agricultural sector: 0.80%
- Others: 0.13%

Alternative Energy Promotion Centre

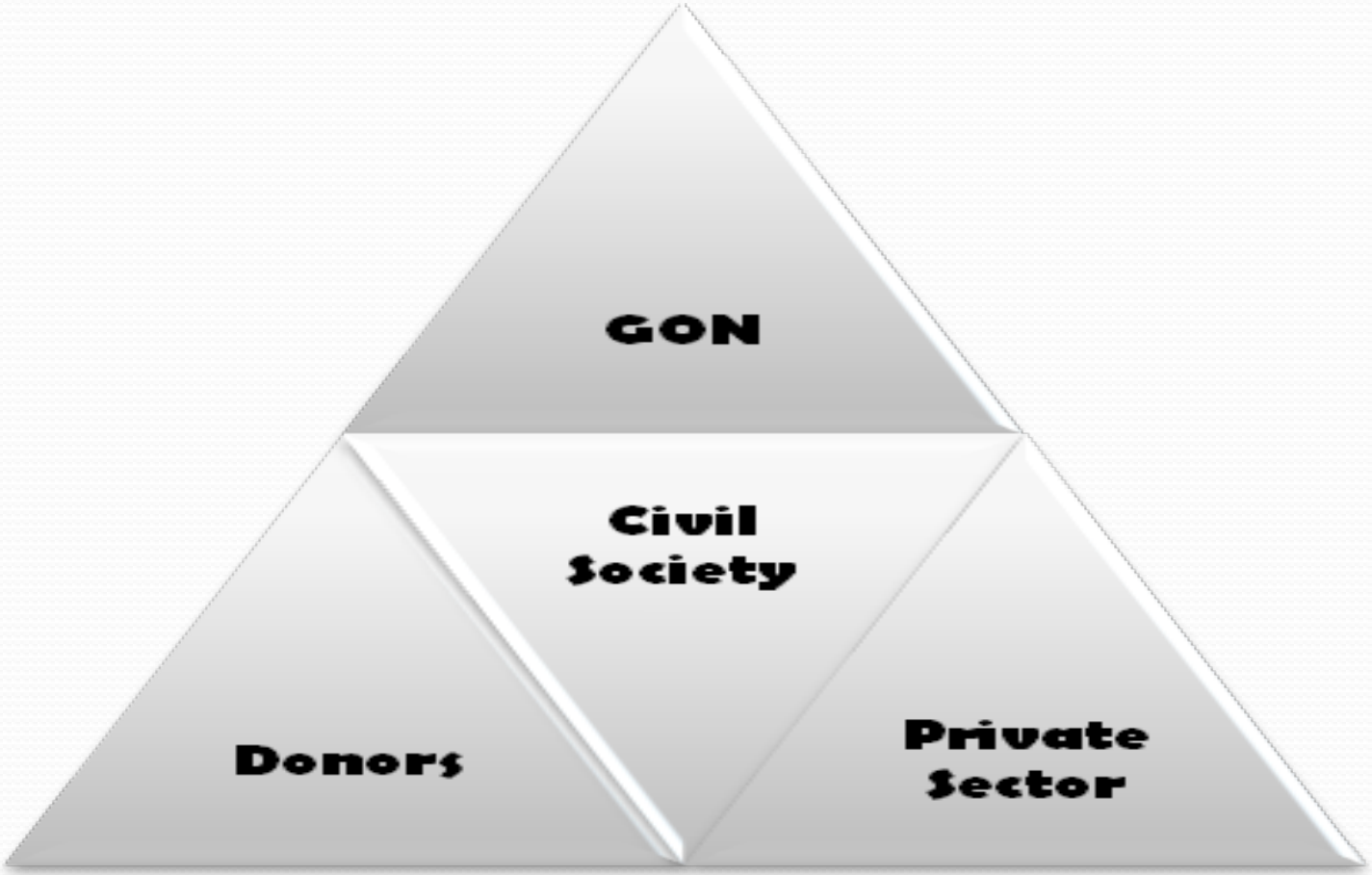
- Established in November 3, 1996
- **National Executing Agency -** RE programmes and projects
- **Government institution under MoE-** semi autonomous status
- **Mandate:** policy and plan formulation, resource mobilization, coordination and quality assurance

Scope of AEPC

- Micro/mini hydro & Improved Water Mills
- Solar energy (PV and thermal)
- Biogas
- Improved cooking stoves
- Wind energy
- Geothermal
- Other RETs (Bio-briquette, Gasifiers, Biofuel etc.)



AEPC's Working Modality



Wind Energy

Historical Background-1

- Early seventies: USAID supported to establish a wind turbine at Rampur in Chitwan District (Southern Plain)
- Late seventies: an individual installed a wind turbine for pumping water in Ramechhap District (Eastern hilly region)
- RECAST: Two wind turbines from India for water pumping
- In 1985, Feasibility study of wind power plant in Mustang and Myagdi

Historical Background-2

- In 1989, Nepal Electricity Authority (NEA), installed and operated two 10kW wind turbine generators (WTG) in Kagbeni of Mustang (Supported by DANIDA)
- From 1990-95, Krishna Grill and Engineering Works (KGEW) fabricated and installed 3 wind pumps in the eastern region of Nepal
- In 2001 WECS has established five anemometer stations to assess the Wind energy potential in Nepal.

SWERA Project: Introduction
SOLAR AND WIND RESOURCE ASSESSEMNT

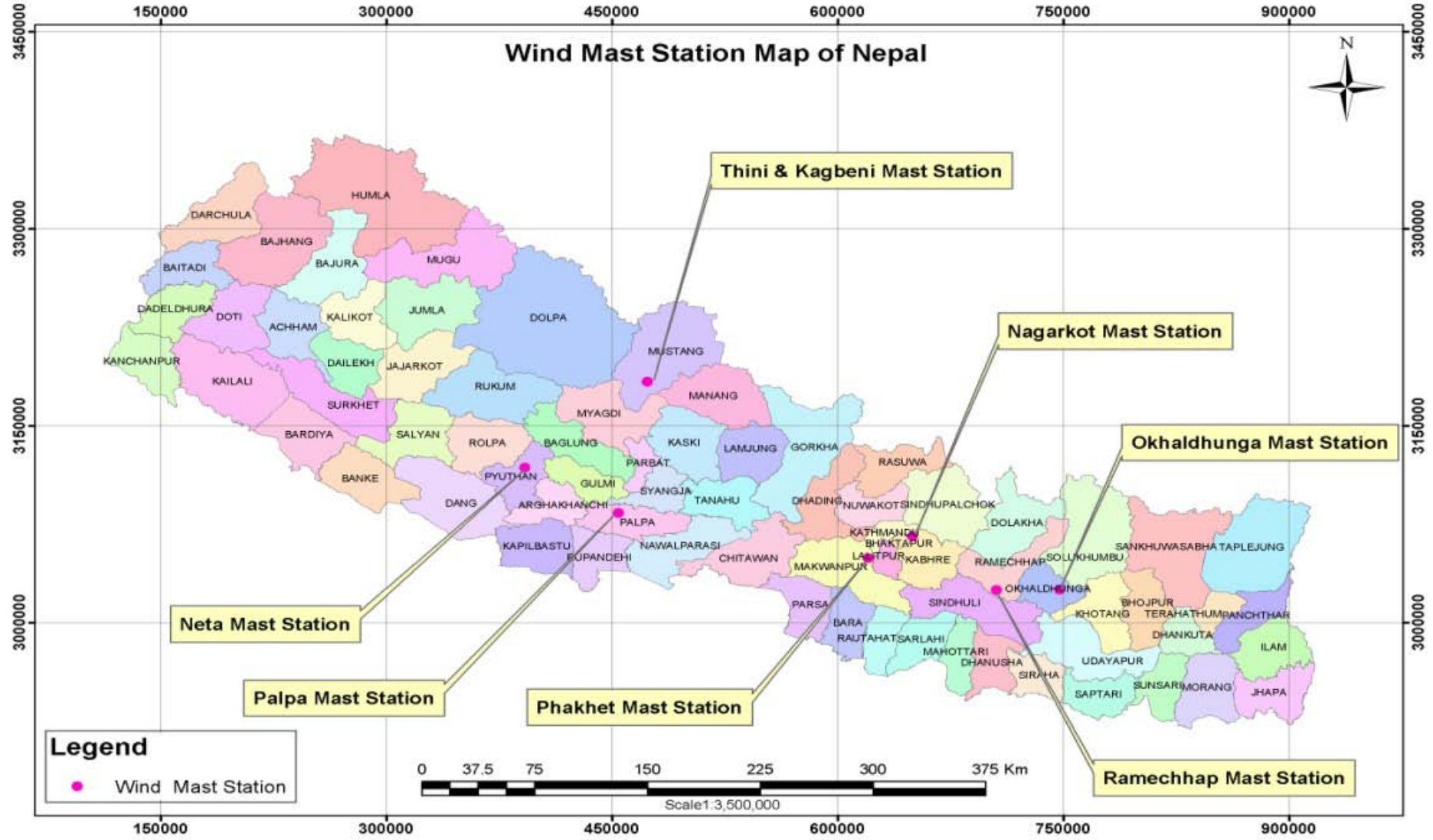
Objectives

- Prepare database and analytical tools on renewable energy resources
- Bring sustainable energy approaches in Nepal through increased investment in the RE sector
- Project Start date : March 2003
- Project End date : December 2008

- Funded by UNEP/GEF

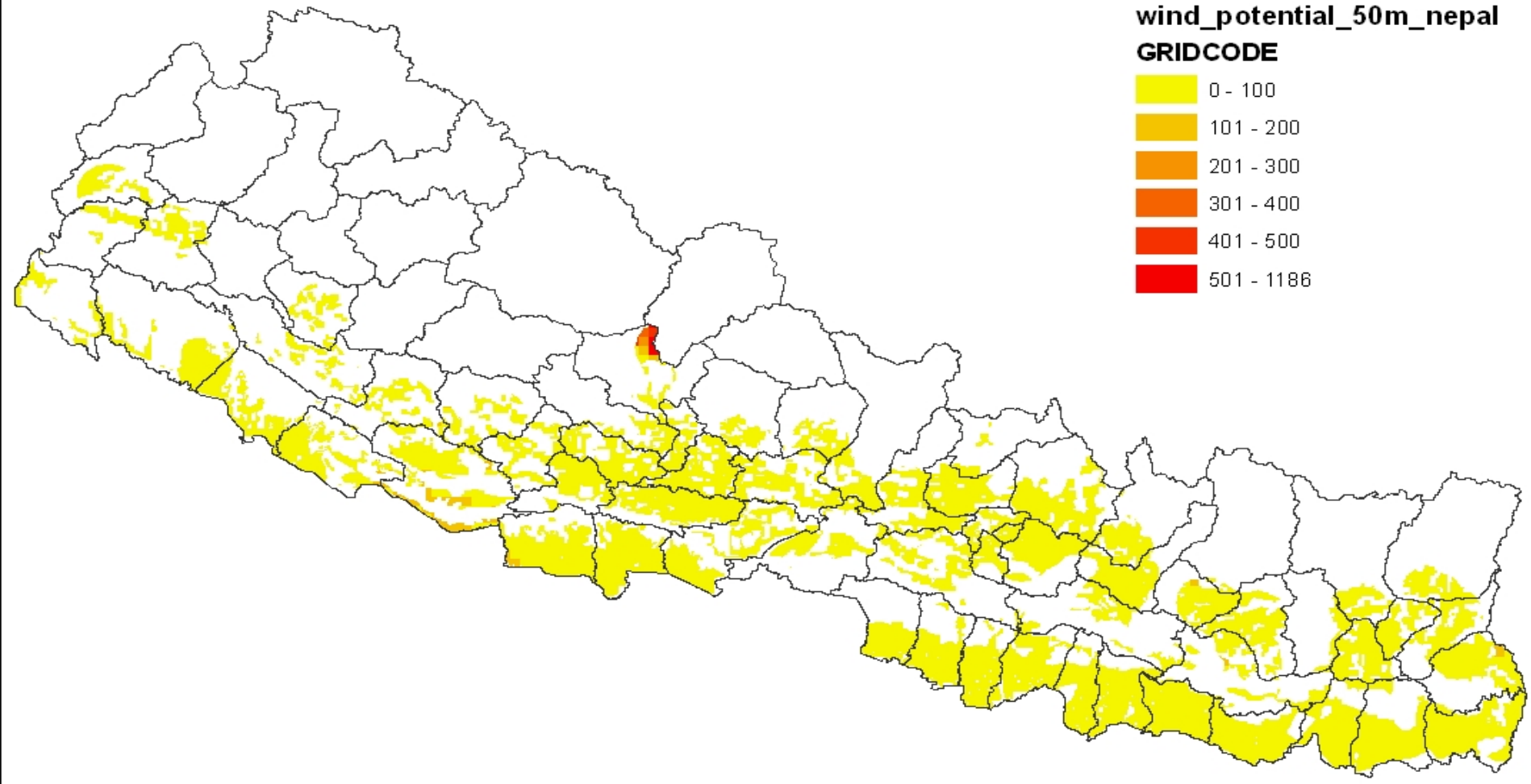
Current Status of the wind measurement stations

• Okhaldhunga	Apr 2001-Aug2005
• Nagarkot (Bhaktapur)	Jun 2001-Apr 2006
• Butwal (Rupandehi)	Mar 2001-Aug2003
• Kagbeni (Mustang)	Apr2001-Feb 2006
• Thini (Mustang)	Apr2001-Oct2007
• Palpa (Palpa)	Sep2003-Dec2007
• Ramechhap	Jul2005-Jul2007
• Phakhel, Makawanpur	Nov2007-Nov 2008
• Neta, Hansapur VDC, Pyuthan	Jan 2008- Dec 2008
• Achham	
• Karnali Chisapani	


Wind Mast Station Map of Nepal
N
Thini & Kagbeni Mast Station
Nagarkot Mast Station
Okhaldhunga Mast Station
Neta Mast Station
Palpa Mast Station
Phakhet Mast Station
Ramechhap Mast Station
Legend
Wind Mast Station
0 37.5 75 150 225 300 375 Km
Scale1:3,500,000
150000
300000
450000
600000
750000
900000
3450000
3300000
3150000
3000000
HUMLA
DARCHULA
BAJHANG
BAITADI
BAJURA
MUGU
DADELDHURA
DOTI
ACHHAM
KALIKOT
JUMLA
DOLPA
KANCHANPUR
KAILALI
DAILEKH
JAJARKOT
RUKUM
MUSTANG
MANANG
SURKHET
MYAGDI
BARDIYA
SALYAN
ROLPA
BAGLUNG
KASKI
LAMJUNG
GORKHA
PARBAT
BANKE
PYUTHAN
GULMI
SYANGJA
TANAHU
DHADING
NUWAKOT
SINDHUPALCHOK
RASUWA
DANG
ARGHAKHANCHI
PALPA
KAPILBASTU
RUPANDEHI
NAWALPARASI
CHITAWAN
KATHMANDU
BHAKTAPUR
LALITPUR
KABHRE
DOLAKHA
RAMECHHAP
SOLUKHUMBU
SANKHUWASABHA
TAPLEJUNG
MAKWANPUR
OKHALDHUNGA
PARSA
SINDHULI
BHOJPUR
KHOTANG
TERAHATHUM
PANCHTHAR
BARA
RAUTAHAT
SARLAHI
DHANKUTA
MAHOTTARI
ILAM
DHANUSHA
UDAYAPUR
SIRAHA
SUNSARI
MORANG
SAPTARI
JHAPA

Out put of SWERA project

Wind power potential of Nepal at buffering distance 15 Km from NEA Grid



Gross wind potential of Nepal

- By considering commercially viable wind power density (WPD) **300 w/m^2**, there is **6074 sq. km area** with power density greater than 300 WPD.

If consider 10% of total feasible area

- about **3000 MW** of total electricity can be generated by wind energy@ 5 MW per sq. km.

Present activities

- wind speed data Collection and expansion of wind station network
- Annual reporting of analyzed data
- Conducting R and D on wind energy technology
- Implementation of small wind power generation projects

Proposal Outlines

Main Objective

The overall objective of the project is to lay the ground work for the wind energy development in Nepal for electrifying poor rural communities through deploying small-scale wind power systems as well as to build demonstration project for grid-connection of wind power system.

Specific Objectives:

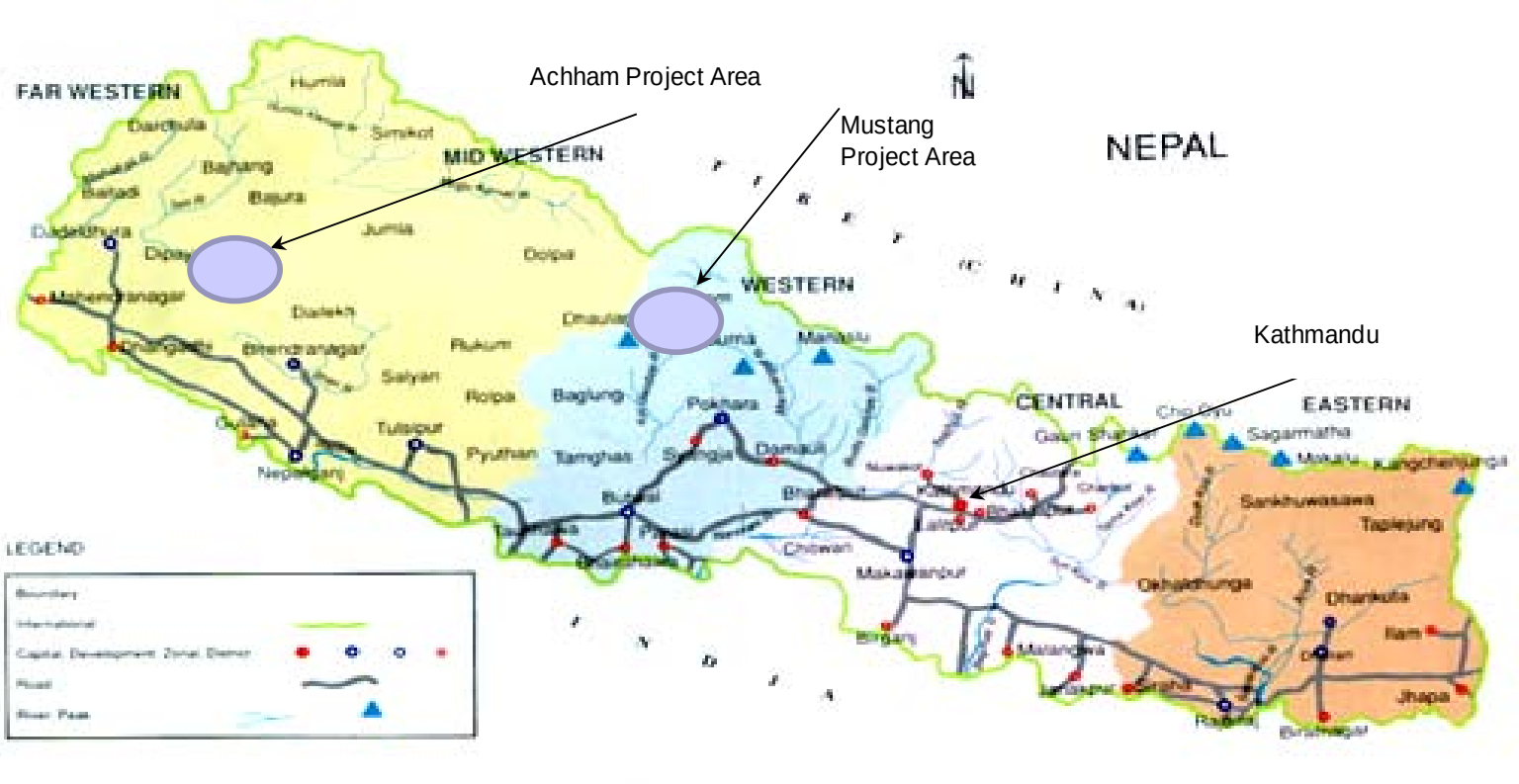
- To implement pilot demonstration projects to serve the purpose of household electrification, irrigation, operating equipments in schools, hospitals etc.
- To carry out the wind energy resource assessment and the feasibility study to implement large scale wind power projects in Nepal.
- To develop capacity of the private sector to manufacture and fabricate small wind systems in the country.

Scope of the Project

- Significant to scaling up the wind energy projects in the country.
- Increase energy access to the community and households in the remote areas for household consumptive and other productive purposes in schools and hospitals.
- Could play an important role to reduce energy crisis in the country within a short period of time.
- Enhance local level manufacturing base and employment opportunities.

Project Areas

Three different districts Mustang, Achham and Kathmandu have been proposed to conduct pilot projects in initial phase.



Brief introduction about project areas

- **Mustang** district is located beyond the Himalayas and falls in the rain corridor but has the highest wind density in Nepal with estimated potential of 200 MW wind power in a 12-km corridor from *Kagbeni* to *Chhusang* that can generate about 500 GWh annually
- **Achham** district lies in the Far Western Region of Nepal and is one of the least developed in Nepal, in terms of the access to energy and other basic services. A data logger has been recently installed in the district to assess the potential of wind energy, based on the recommendations by the local community, and authority. The initial results have been very encouraging. The wind pilot demonstration projects will be small scale off grid decentralised units to fulfil the electricity needs of households/communities
- **Kathmandu** is the capital of Nepal and it is proposed to install a small wind unit near there for the purpose of technology demonstration. The unit will be grid connected, to demonstrate the feasibility of grid connection of wind power.

Methodology

Policy formulation

- Small and large scale wind energy development framework mechanism

Feasibility Study

- Identification of detail locations suitable for wind power development within proposed districts
- Data collection, resource assessment, expansion of wind mast stations, economic & impact study analysis

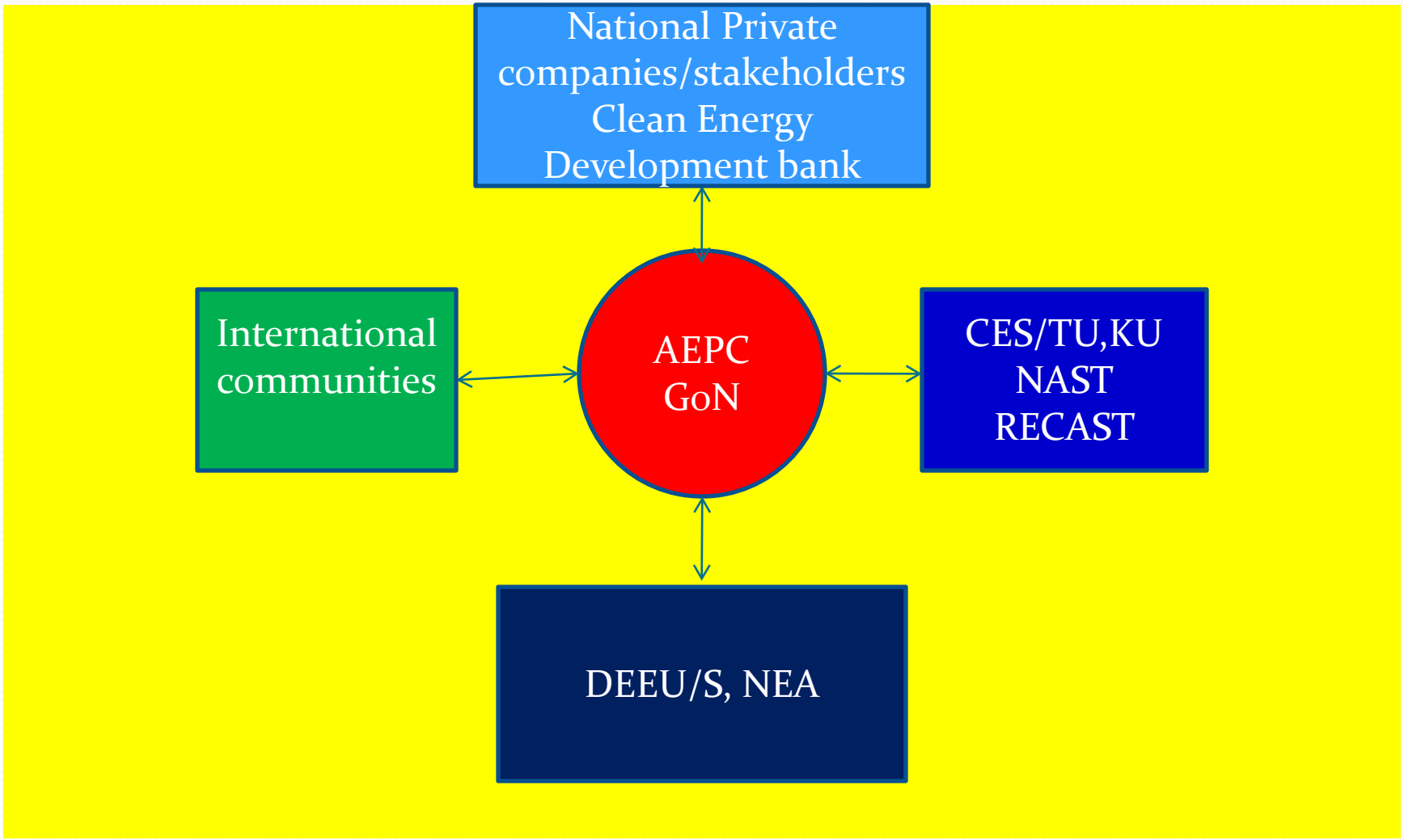
Capacity building

- Technology transfer, Training to workshops/manufacturers/Fabricators, Installers, Designers
- Development of local level entrepreneurship for regular O & M, After Sales Service etc.

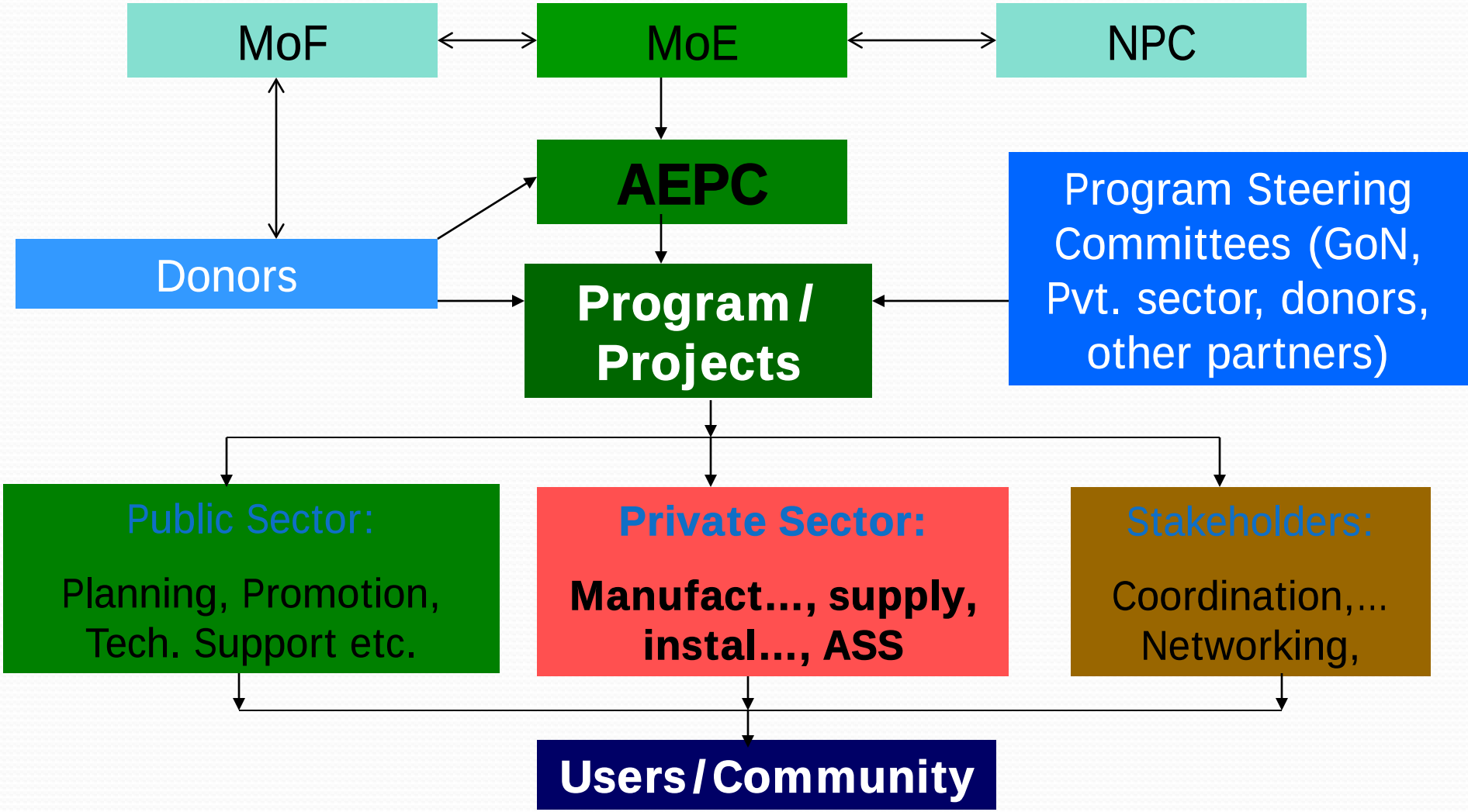
Impementation, M & O

- Pilot projects for electrification
- Monitoring & Evaluation

Formulation of project strategy team



Institutional Set up for conduction of project



Expected Outputs

- Demonstrated use of wind energy for household electricity use as well as other basic services as in schools and hospitals in remote areas
- Established the feasibility of scaling up wind electricity generation through large and small scale power projects in Nepal.
- Demonstrated the technology transfer to manufacture small scale wind turbines and accessories in Nepal.

Time Frame

- The tentative project duration will be 2 years from the initiation of project work

Looking Forward for Your Support!
Looking Forward to Work with You!

Thank You for Your Kind Attention!

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