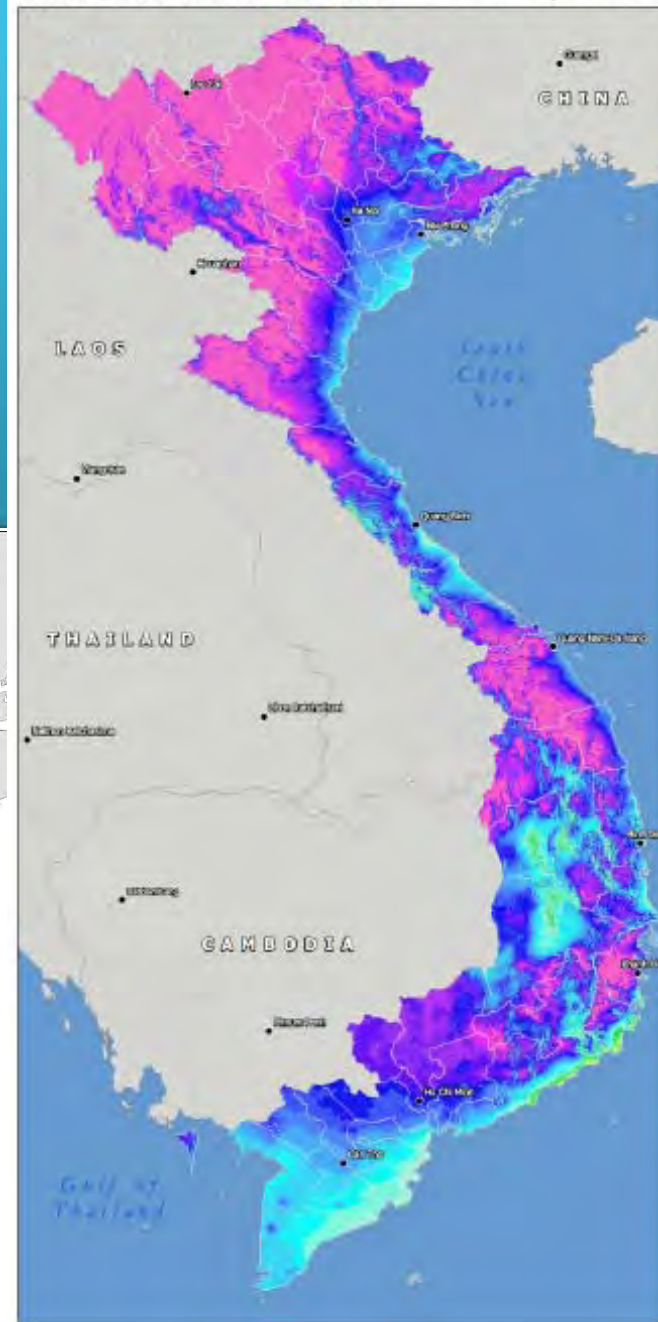


Vietnam Renewable Energy Resources Mapping

WIND RESOURCE OF VIETNAM *Mean Annual Speed at 80 Meters*



MESOMAP
Issue

CONFIDENTIAL

Legend

Mean Annual Speed at 80 m

Color	Speed Range (m/s)
Purple	< 3.00
Dark Purple	3.00 - 3.25
Light Purple	3.25 - 3.50
Blue-Black	3.50 - 3.75
Dark Blue	3.75 - 4.00
Blue	4.00 - 4.25
Light Blue	4.25 - 4.50
Cyan	4.50 - 4.75
Teal	4.75 - 5.00
Green-Teal	5.00 - 5.25
Green	5.25 - 5.50
Light Green	5.50 - 5.75
Yellow-Green	5.75 - 6.00
Yellow	6.00 - 6.25
Light Yellow	6.25 - 6.50
Yellow-Orange	6.50 - 6.75
Orange	6.75 - 7.00
Light Orange	7.00 - 7.25
Orange	7.25 - 7.50
Dark Orange	7.50 - 7.75
Red-Orange	7.75 - 8.00
Red	8.00 - 8.25
Dark Red	8.25 - 8.50
Red	8.50 - 8.75
Dark Red	8.75 - 9.00
Black	> 9.00

Reference

Scale: 0 50 100 200 Kilometers

Scale: 0 50 100 Miles

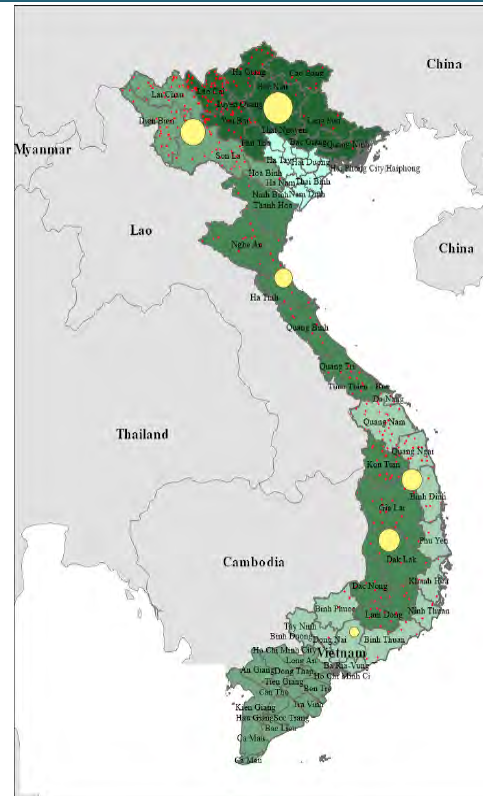
Disclaimer

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Originator

Author: AWS Truepower
Approved: [Signature]
Date: [Date]
Project: [Project Name]

AWS Truepower
www.aws-tp.com



Hanoi Energy Team
April, 2014

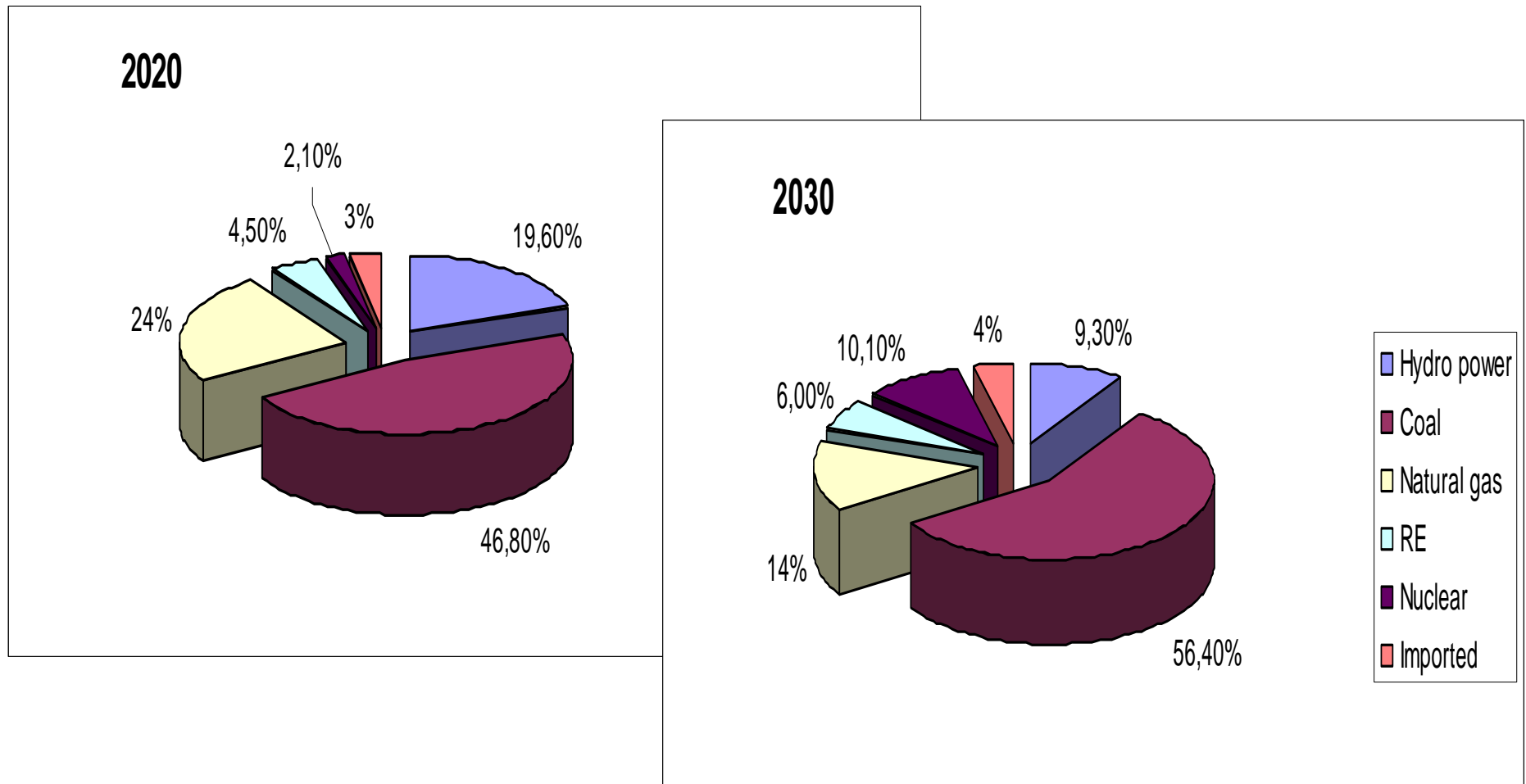
Outline

- RE Development in Vietnam: An Overview
- RE Mapping: Scope of Work
- Project Implementation Status
- Questions and Discussion



RE Development in Vietnam: An Overview

RE targets on generation mix: **4.5% and 6%**
by 2020 and 2030



RE Development in Vietnam: An Overview

Renewable Energy Policy

- ❖ FIT for wind power: *7.8 UScents/kWh (2011)*
- ❖ Avoided cost for RE (2008)
- ❖ Existing RE Share : *3.7%*; Gov. targets *4.5% in 2020; 6% in 2030* (PMP7)
- ❖ Import tax: Exemption for goods which can not yet be produced locally
- ❖ Corporation income tax: *Tax exemption for first 4 years, 50% tax reduction for next 9 years*
- ❖ Land use levy and fee: *free*

RE Development in Vietnam: An Overview

Development Challenges

- High levelised cost
- Scarcity of long term financial sources with suitable financing schemes
- No RE law/decreed regulating investment
- No price based support schemes to promote RE development
- Low tariff
- Slow expansion of transmission grid for RE connection
- Strong technical dependence on foreign experts.
- Lack of domestic production capacities for most RE technologies (import dependence)
- No national planning of RE resources (e.g., wind and solar power planning)
- Lack of reliable information and data on national RE resource potential

Coordinate with other donor-funded programs

Collect and generate geospatial data

Initial outputs inform WB-Client policy dialogue

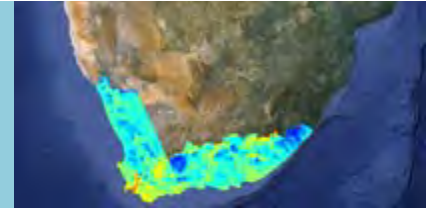
Provide training and capacity building

Build country and global partnerships

Disseminate via open data repository and GIS portal

Phase 1

Scoping and preliminary mapping output based on satellite and global atmospheric and meteorological data



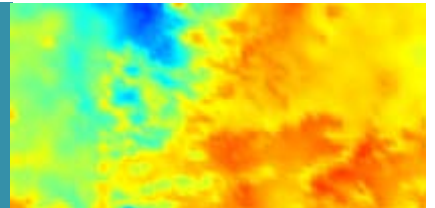
Phase 2

Ground-based data collection (12-24 months)



Phase 3

Production of validated resource atlas based on satellite and ground-based data



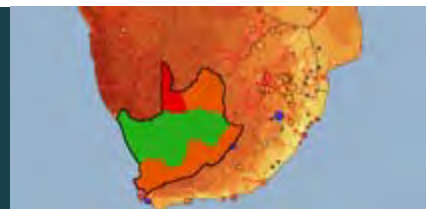
Phase 4

Geospatial planning (GIS) and strategic environmental assessment



Phase 5

Develop and agree policy framework to support investment



Vietnam RE Mapping: Scope of Work

- **Wind Mapping:**
 - Phase 1: Mesoscale modelling, preliminary validation, Interim wind modelling outputs, capacity building.
 - Phase 3: Production of validated wind resource atlas (full validation and revision of mesoscale modelling, final validated wind atlas, nationwide microscale modelling).
- **Small Hydropower Mapping:**
 - Mainly Phase 4: Collecting hydro data, designing and developing national GIS database, developing planning guidelines.
- **Biomass Mapping:**
 - Phase 1-4: Initial resource mapping, potential assessment, ground based data collection, GIS planning.
- **Solar Mapping supported by Spanish Government**
 - Phase 1-5: Radiation Mapping, GIS planning, Development framework

Project Implementation Status

Resources	Key results & next steps
Wind mapping	DTU selected, mesoscale modeling & preliminary validation undergone, phase 1 workshop and training be organized in June 2014.
Hydro mapping	ToR agreed with client, consultants should be on board late May 2014
Biomass mapping	Partnership with FAO, proposal being finalized
Solar mapping	Mesoscale modeling and validation undergone, joint workshop with wind mapping will be organized in June.

Questions and Discussion

- Data collection and **validation**?
- **Opened** data issues?
- Data hosting? Data **maintenance**?
- Data incorporation, data **sharing**?
- **Coordinates** systems, infrastructure GIS data?
- **Capacity** building, what needed?

