Trade and Environment Pillar

Fostering Renewable Energy in North America

June 27, 2006 Washington, DC

Council, 2006, JPAC presentation

Outline

- 2006 activities
- RE Mapping Report
- Follow up Mapping Activities

2006 RE Activities

1. Support the RE Expert Committee
2. Support information, technology development and transfer and capacity building for assessing RE resources
3. Document best practices for financing small-scale RE projects
4. Supplement the database of existing and planned RE capacity with existing laws and policies in each state and province related to RE
5. Document programs for fostering Renewable Electricity
6. Develop a web-based tool to calculate the environmental benefits of RE
7. Facilitate the integration of RE resources into the grid

Reviewing Gaps in Resource Mapping for Renewable Energy in North America

Prepared for:

The Commission for Environmental Cooperation

Prepared by:

The Delphi Group

with

The Instituto de Investigaciones Electricas (IIE)

April 11, 2006

Why RE Mapping is Important?

- RE resources capacity is geographically dependent
- Narrows down potential sites to conduct feasibility verification phase of a project, and
- RE resource maps allow project developers to determine expected economic returns and performance of a project sited in a particular location

Information Included

- Overview of the resource
- Method used to map the resource
- Limitations of existing methods
- Discussion of necessary map resolution and reliability
- Regional coverage of existing maps
- Regional gaps
- Overall summary of regional status and coverage and technical gaps.

For which RE Resources?

1. Wind
2. Geothermal
3. Solar
4. Biomass
5. Small Hydro
6. Ocean (Wave/Tidal)

E.g. WIND

Why is it important?

- Validating a site is time consuming (minimum 1 year required by financers).

Wind resource basics

- Wind is caused by uneven heating of the earth's surface by the sun.
- Wind power density is dependent on wind speed cubed.

Wind modeling practices

- Mesoscale modeling simulate with reasonable accuracy (greater than 1 km resolution), complex wind flows in areas where surface direct measurements are not possible, used with weather data

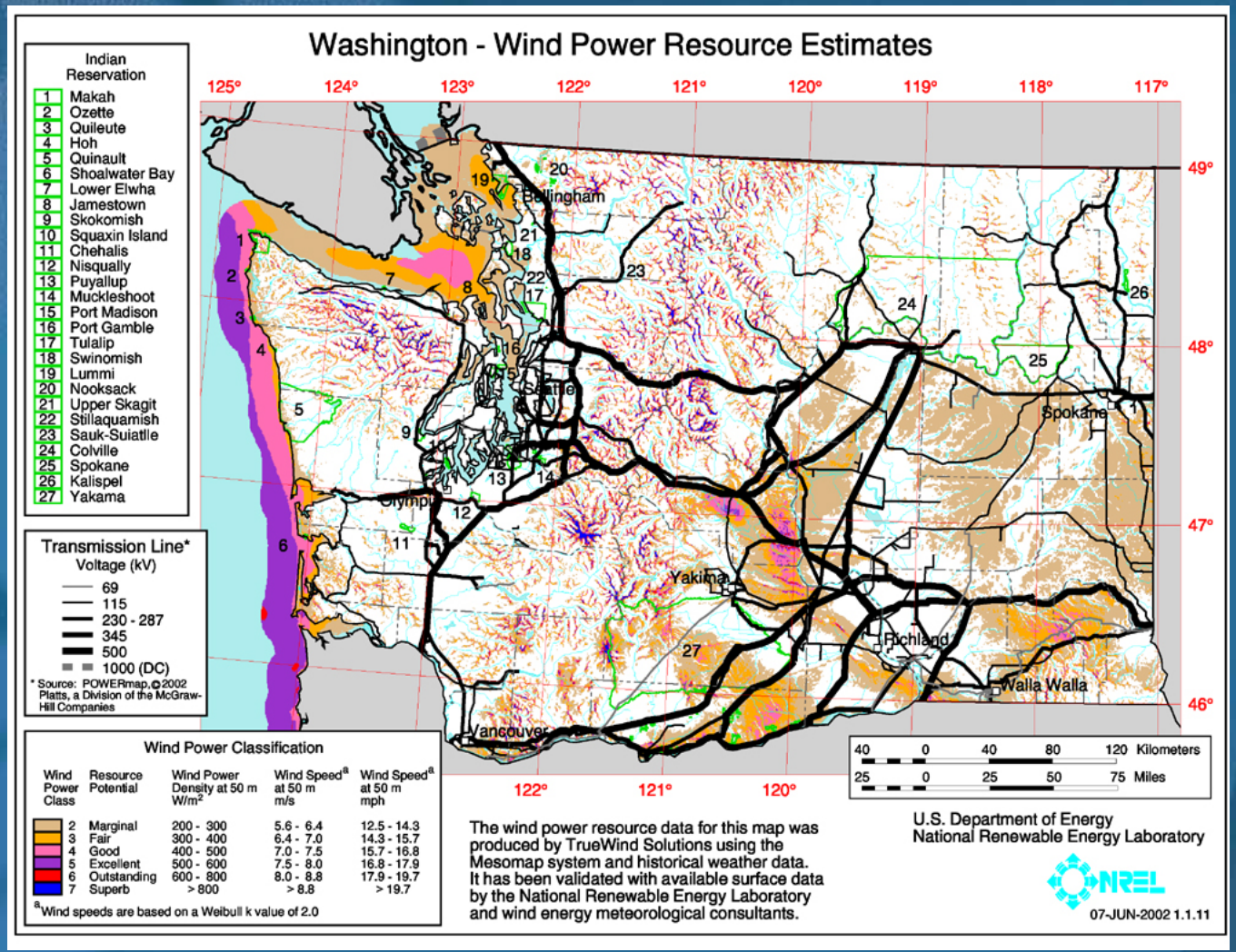
Limitations to modeling

- Grid resolution of the mesoscale and microscale runs
- Uncertainty in land cover and surface roughness
- Sparse meteorological data in some regions

Regional coverage

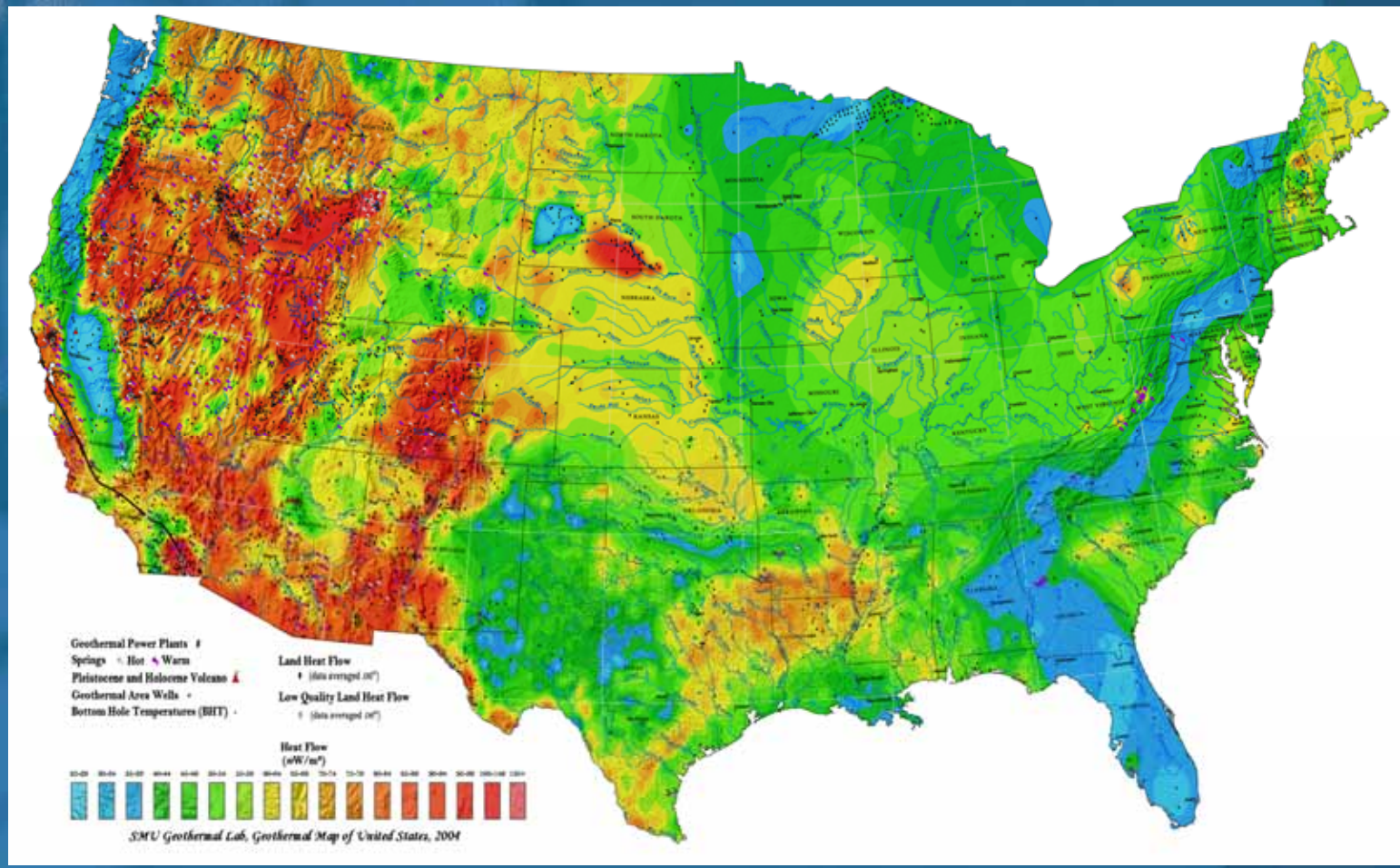
- Better than 1 km^2 resolution and 5-7% error for most of the **US** with the exception of several states; West better.
- 5 km resolution and error of ~7% for all of **Canada**, with 5 provinces (e.g. Quebec and Ontario) having mapped resources at 1km or better.
- Mexico has some regions mapped by NREL, Helimax (CEC) and IIE.

Wind Resource Mapping



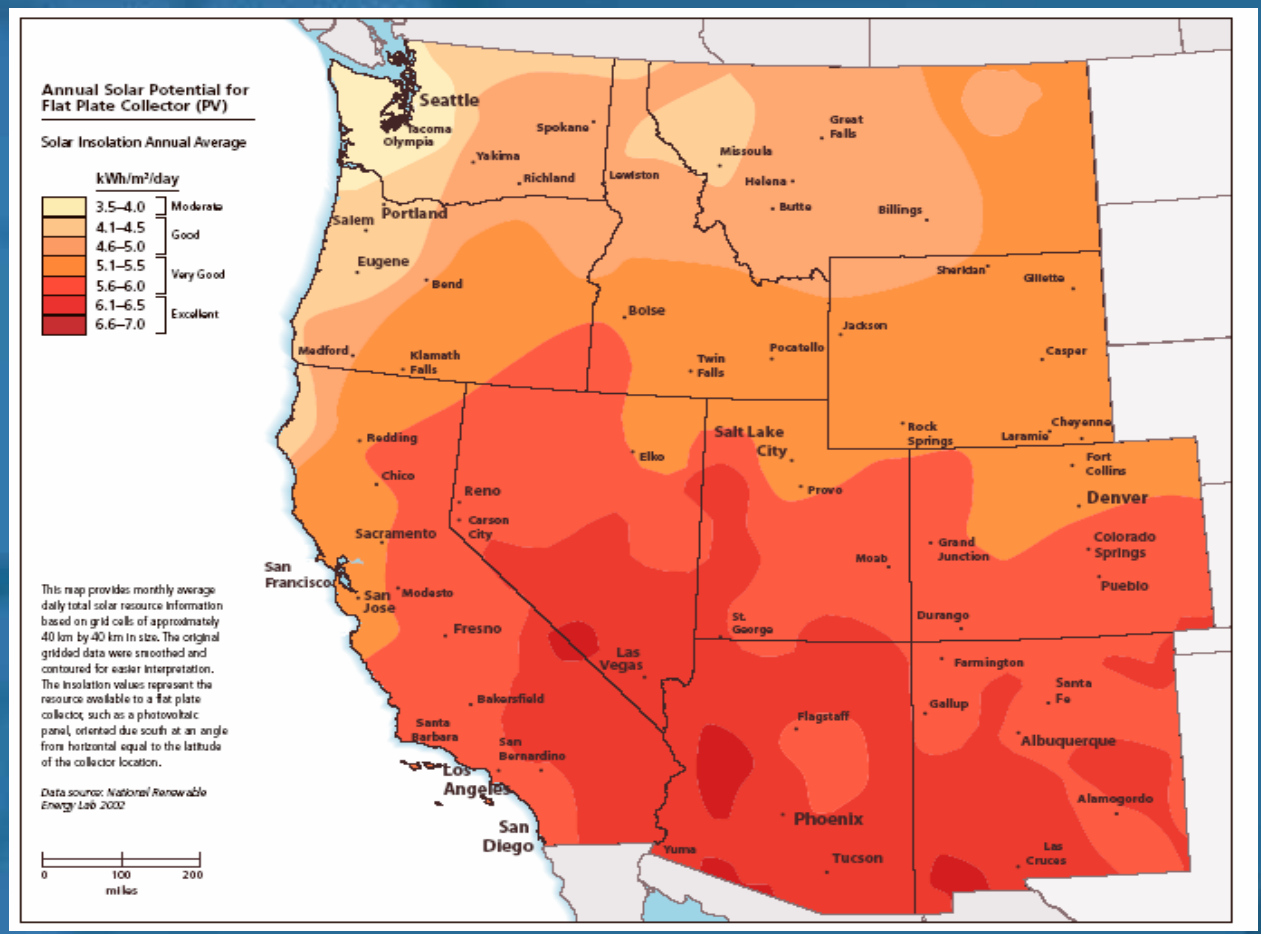
Geothermal Resource Mapping

Figure 2.2.1: US Geothermal Resource Map; Source: Southern Methodist University (SMU) Geothermal Research Lab



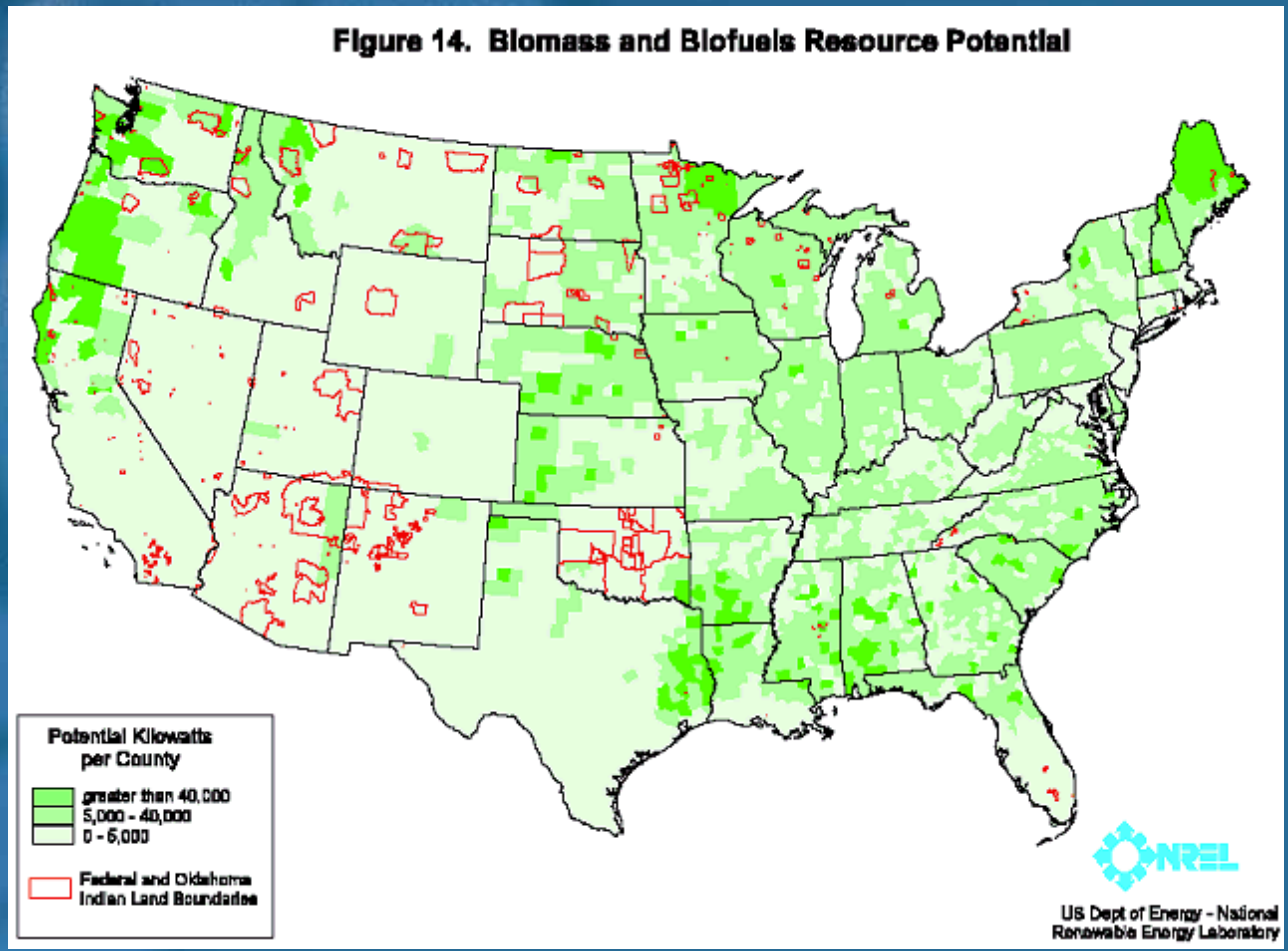
Solar Resource Mapping

Figure 2.3.2: Average Daily Radiation for the Western United States; Source: The Renewable Energy Atlas of the West



Biomass Resource Mapping

Figure 2.4.1: Biomass and Biofuels Resource Potential in the United States; Source: http://www.eia.doe.gov/cneaf/solar.renewables/ilands/fig14.html



Wave Power

Example panel from Canadian study

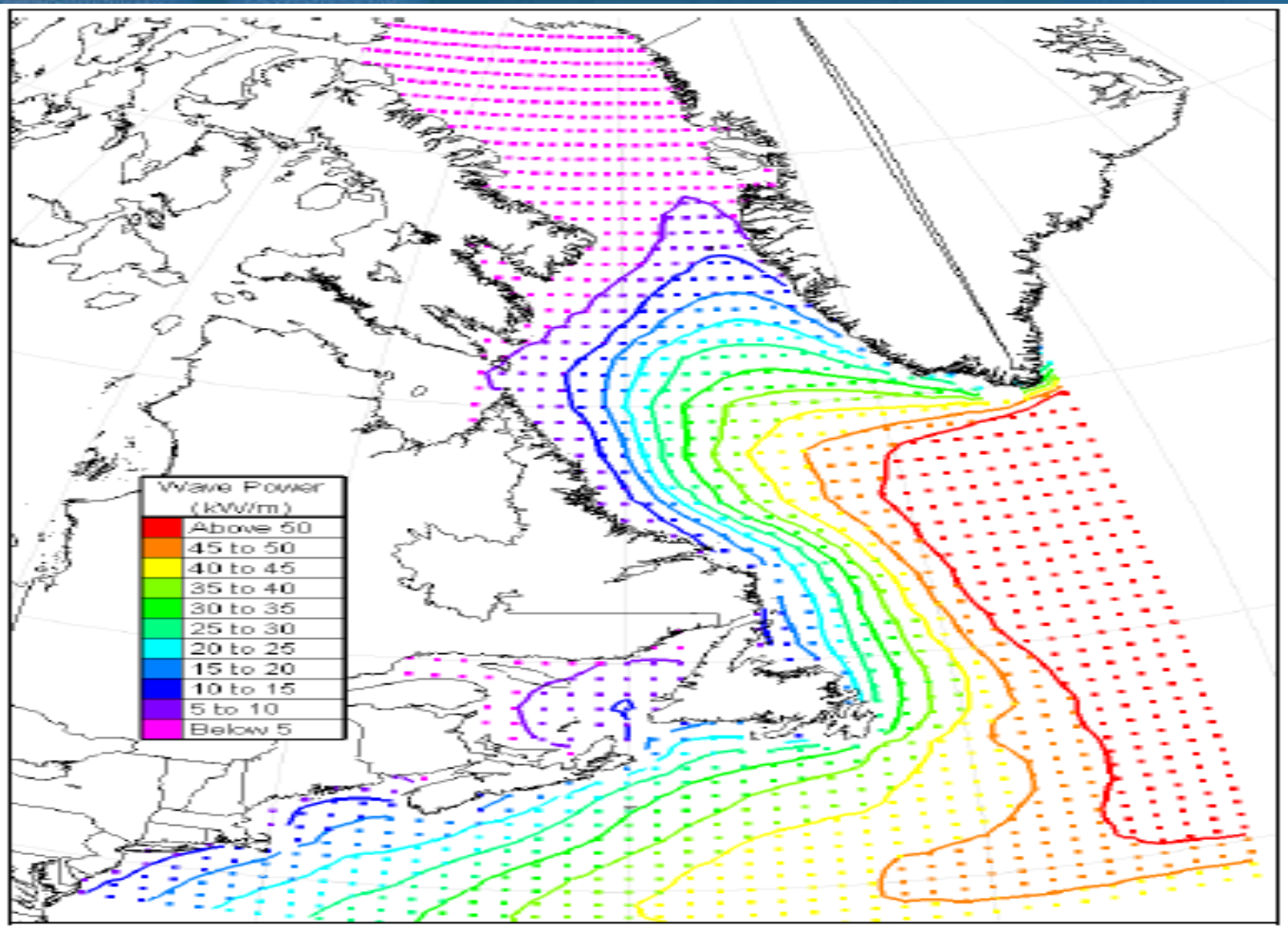


Figure 2. Mean annual wave power derived from AES40 hindcast data.

Path Forward

- Cuernavaca Meeting (Feb 2006) of the REEC
- Decision to create 3 mapping subgroups
  - Wind
  - Biomass
  - Solar
- To remove existing gaps in mapping of these resources as needed
- Homologate resource assessment techniques
- Develop best practices, etc.
- All information in one-stop web CEC link