



NOAA's Potential to Support Renewable Energy

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Main Message



NOAA could provide the missing observations, weather forecasts & climate inform that are required to allow for large amounts of renewable energy to be incorporated into the U.S. energy system.

Photo courtesy of NREL, Dave Mooney

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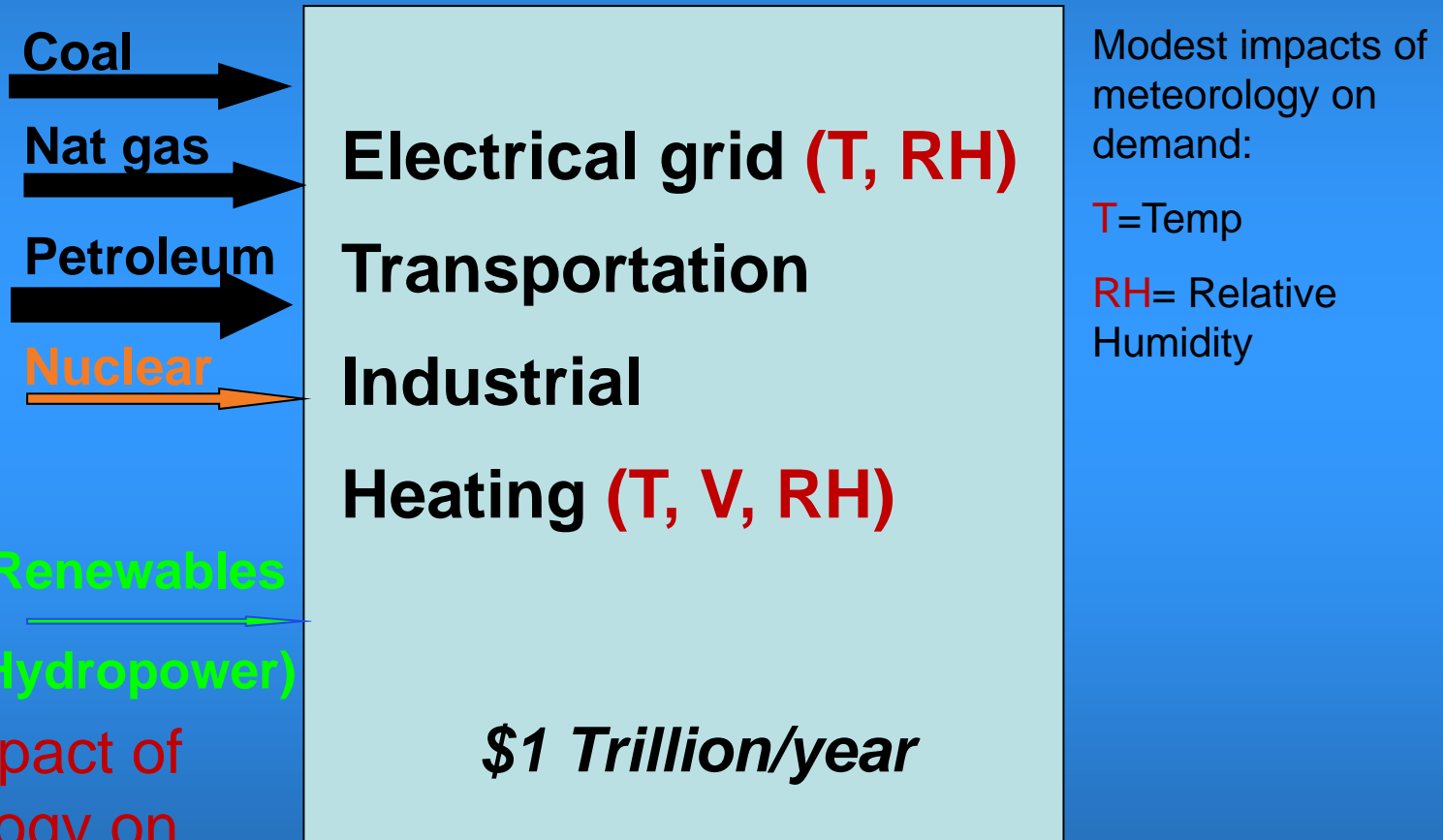
Outline

- Current vs. future energy system
- Wind
- Solar
- Possible ocean energy in the future
- Water issues
- Climate and environmental Factors
- Economic benefits of REs
- NOAA's energy partners



Current vs. Future Energy System

Current Energy System



Trivial impact of meteorology on supply side.



Current vs. Future Energy System

2030 US Energy Flows?



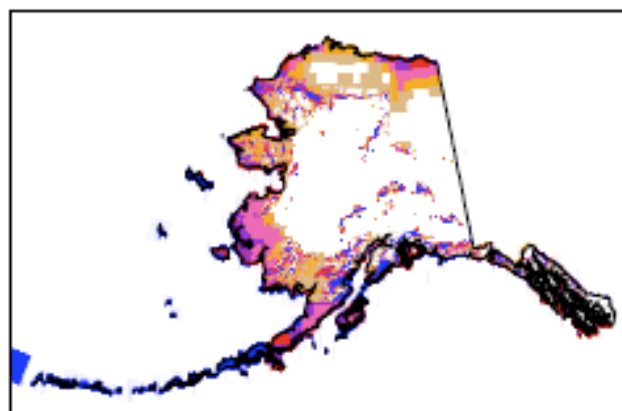
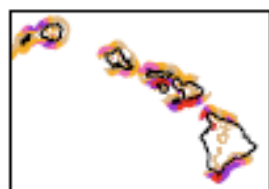
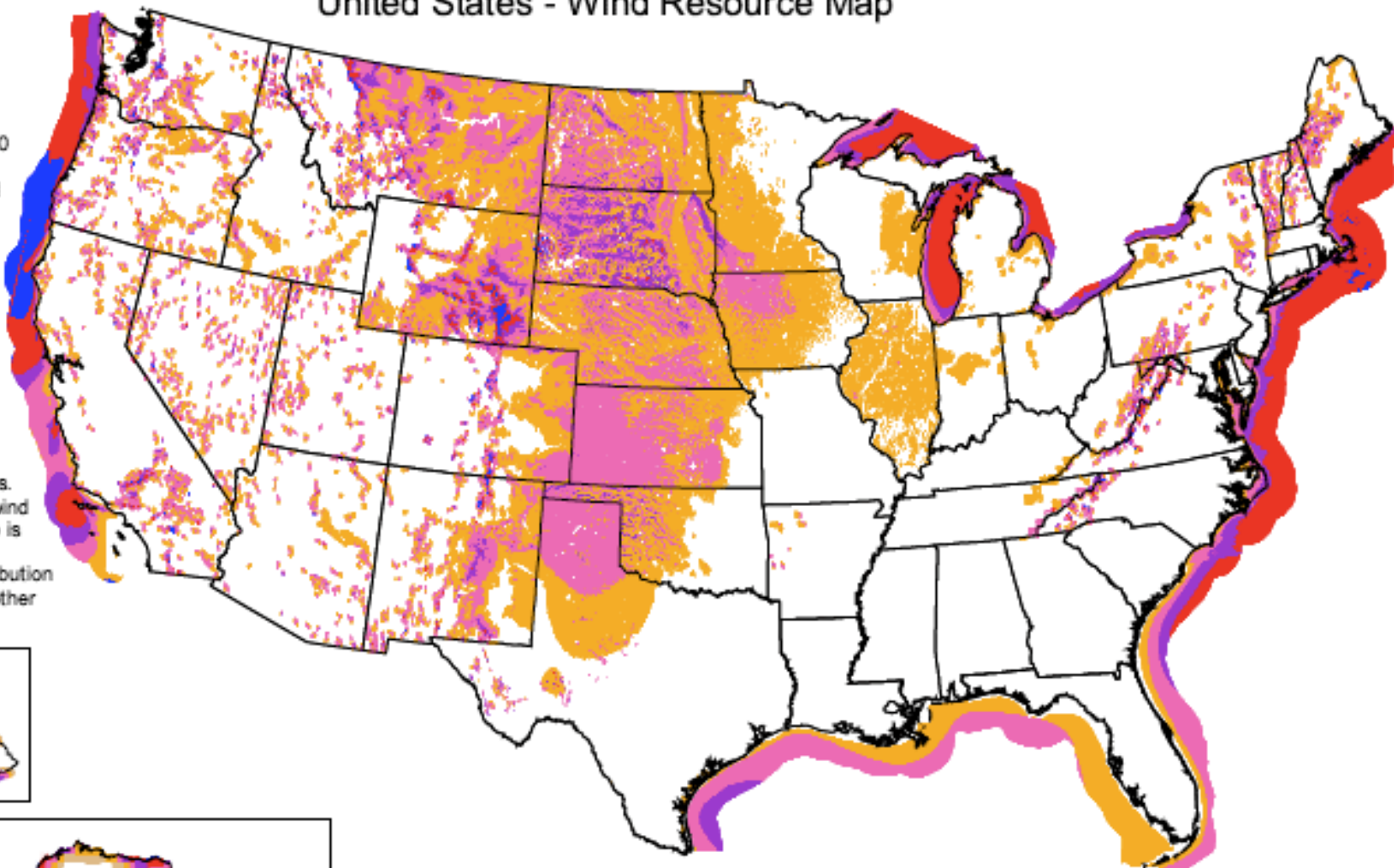
V = Wind Speed
TKE = Turbulent Kinetic Energy

NOAA's FY07 Budget



United States - Wind Resource Map

This map shows the annual average wind power estimates at 50 meters above the surface of the United States. It is a combination of high resolution and low resolution datasets produced by NREL and other organizations. The data was screened to eliminate areas unlikely to be developed onshore due to land use or environmental issues. In many states, the wind resource on this map is visually enhanced to better show the distribution on ridge crests and other features.



Wind Power Classification				
Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m ²	Wind Speed ^a at 50 m m/s	Wind Speed ^a at 50 m mph
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8

^aWind speeds are based on a Weibull k value of 2.0



Wind Energy



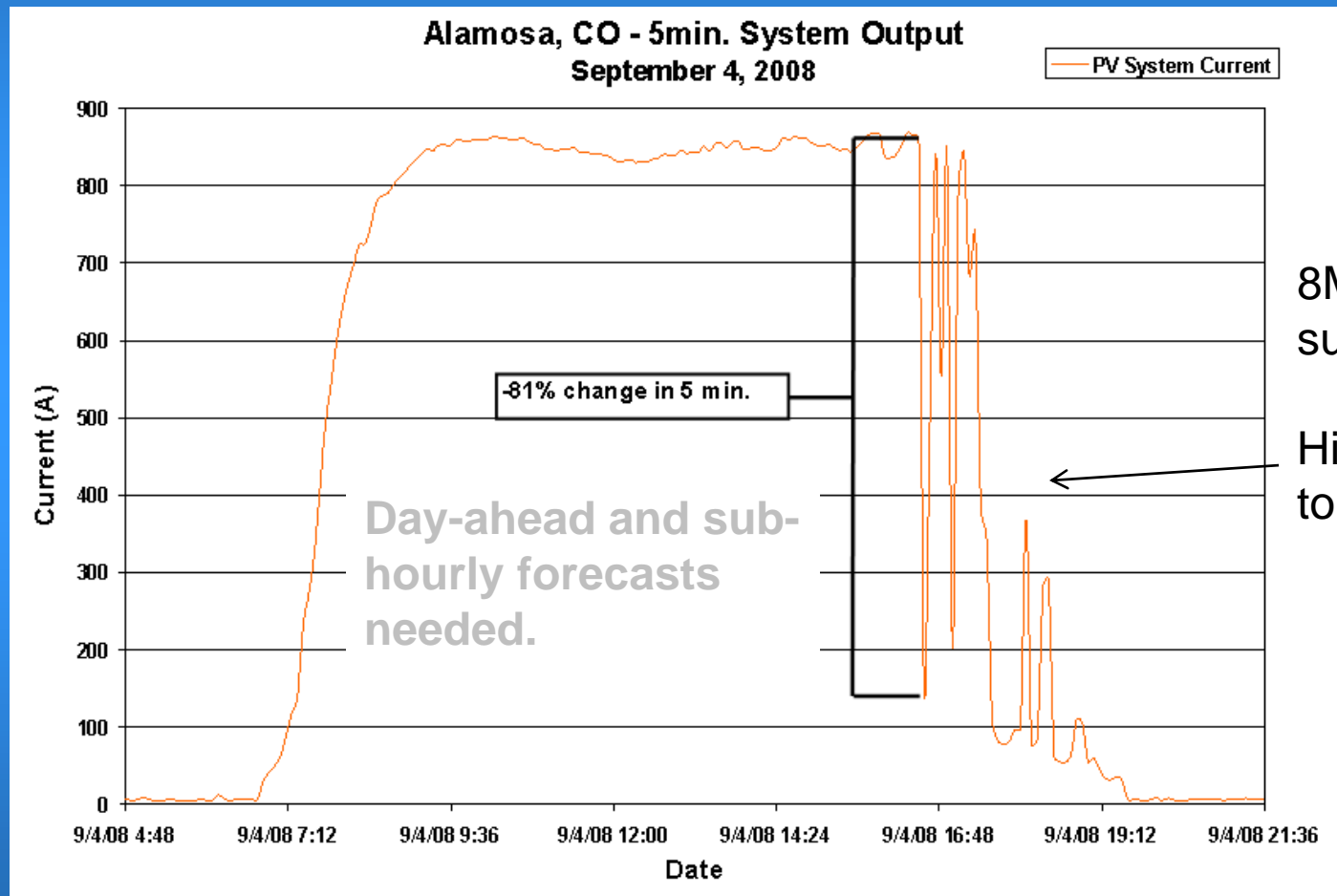
- Relevant observations of wind speed are needed.
- Improved forecasts of wind are needed.

Solar Energy



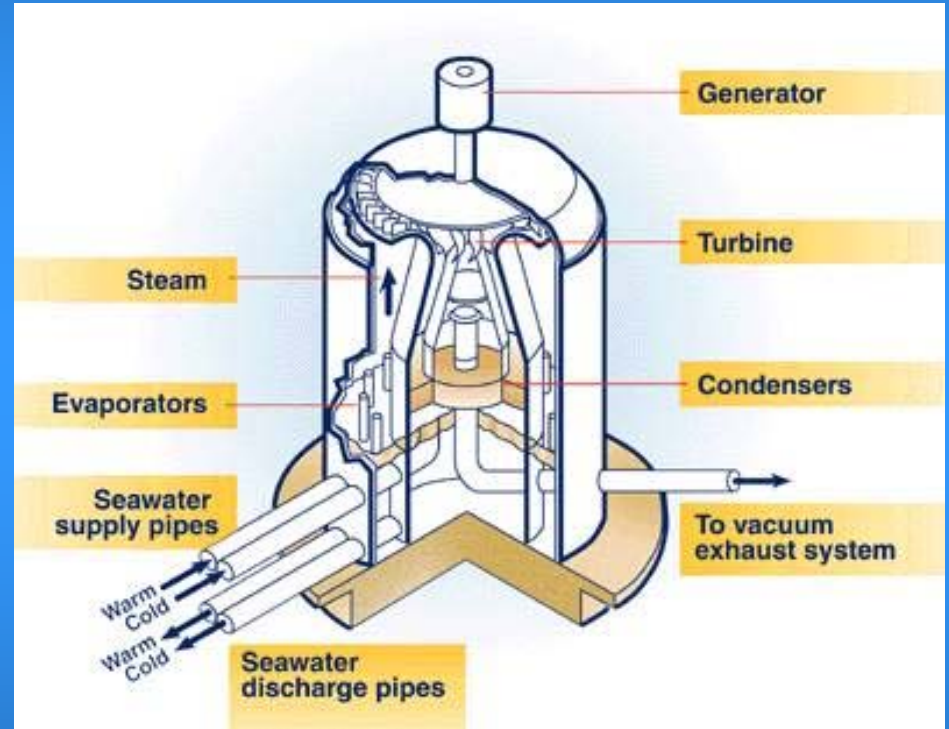
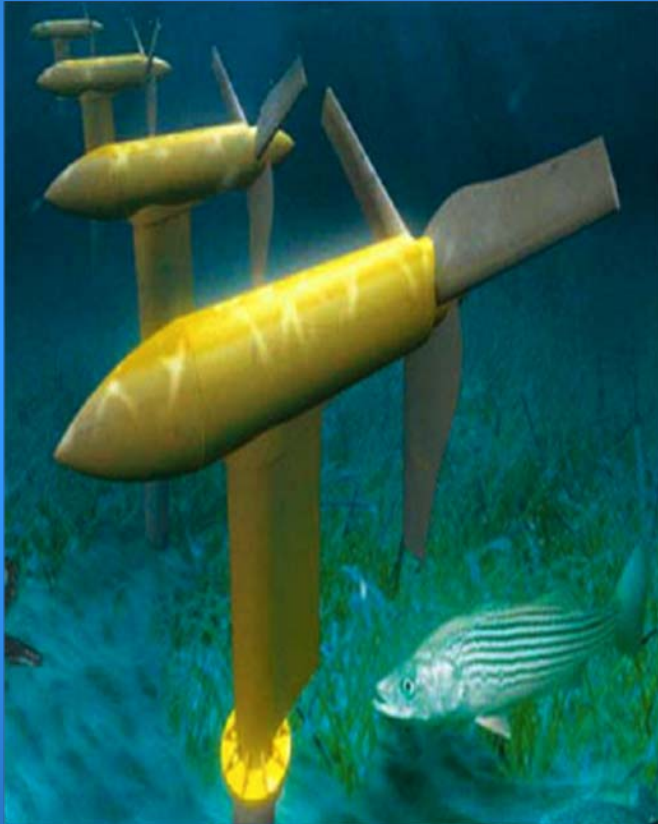
- Few observations of solar radiation. Fewer of direct beam component.
- More observations are needed.
- Improved forecasts of clouds and aerosols are needed.

Example of the Need for Improved Weather Forecasts



Slide courtesy of NREL, Dave Mooney

Possible Ocean Energy in Future



Ocean Thermal Energy Conversion

Hydrokinetics (wave, currents, tides)

Water Issues

- Hydropower makes up majority of current renewable energy.
- Must consider need for water in production of energy.



Environmental Factors



Climate Issues

Ecosystems Impacts



Example of Economic Benefits of Renewable Energy

20% Wind Energy by 2030: Economic Benefits

- During the decade preceding 2030, the U.S. wind industry would create ~ 500,000 jobs good jobs.
- Increase annual payments to rural landowners to > \$600 million in 2030.



NOAA's Mission



To understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet our nation's economic, social, and environmental needs.



Multiple Federal Agencies Will Have to Cooperate to Solve the Energy-Climate-Economic Crisis

- Department of Energy
- Environmental Protection Agency
- Federal Energy Regulatory Commission
- Department of the Interior
- U.S.G.S
- NOAA's mission is to *predict and understand changes in Earth's environment* and conserve and manage coastal and marine resources to *meet our nation's economic, social and environmental needs.*



Summary of Opportunities

NOAA could provide the missing observations, weather forecasts & climate inform that are required to allow for large amounts of renewable energy to be incorporated into the U.S. energy system.



Me

Thank you



- For more info, see:
www.esrl.noaa.gov/research/renewable_energy/
- Monthly Sustainable Energy and Atmospheric Sciences seminar, co-hosted by DOE NREL and NOAA
www.esrl.noaa.gov/research/events/seas/