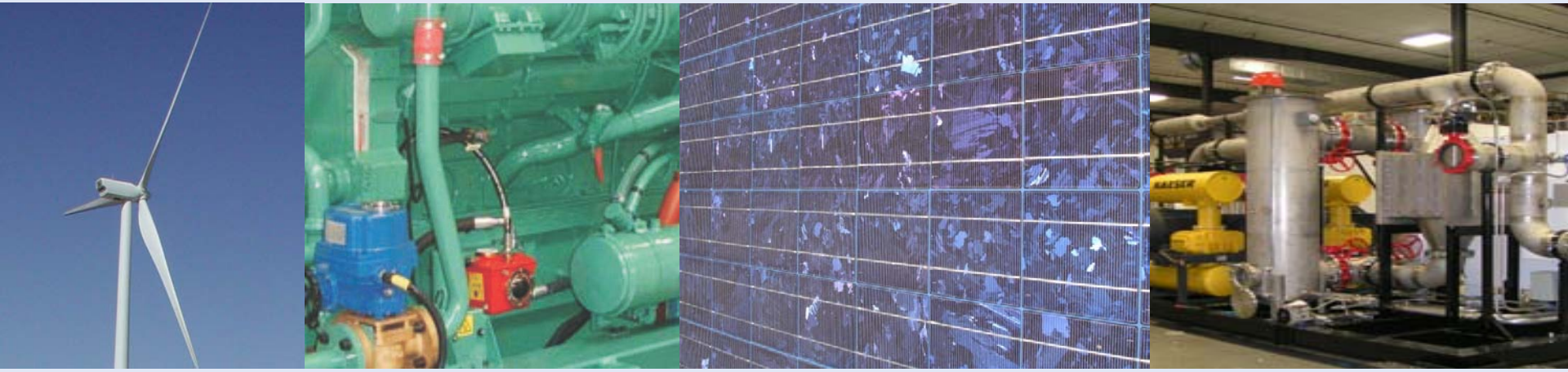

Overcoming Utility Objections to Renewable Energy

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Why do utilities object to renewable energy?

- Intermittency
- Grid Stability
- Cost

Intermittency

Issue: Power output can vary widely, even within the hour and cause grid instability.

Utility Perspective: Intermittent power sources cannot be relied on to meet load. Utility must still generate or purchase sufficient power to meet peak demand.

BUT . . .

Denmark has 20% wind power; will increase to 35% by 2015

Xcel (major utility in US) plans 35% wind on system

- Relies on strategically placed high-efficiency gas turbines for about 6% of the new energy added to the system—this provides the necessary operational flexibility
- Participates in a large regional electric power market

Ways to Mitigate Intermittency

Firm up the power:

- Cogeneration connected to grid
- Hybrid systems to create base load

Site wind in different locations

Effective short-term markets to efficiently balance wind power

Install turbines that regulate voltage and ride-through faults and control power output.

Voltage control regulates grid voltage at the point of interconnection, regulates total wind plant reactive power through control of individual turbines, and minimizes grid voltage fluctuations even under varying wind conditions.

Ride-through capability allows generator to stay online and feed reactive power into grid through system disturbances while meeting transmission reliability standards.

Grid Stability

Interconnection standards – IEEE 1547 and 1547.1

Relevant at lower voltages and effective way to simplify interconnections and protect grid

Cost

Why do utilities care?

- Public face of rate increase
- Some (esp. public) have social aspect/desire to help develop country and bring people out of poverty

Fallacy of Cost?

- Pricing doesn't include externalities
- New environmental laws could decrease difference in price (cap and trade)
- Traditional financial analysis often undervalues future fuel price risks
- Fuel prices rising

Cost Difference in Maharashtra (India)

Increase not large

- Maharashtra regulators believe cost of 6% RPS will increase the consumer tariff 2%.
- Purchased more costly power from energy traders
- Cost of purchasing conventional power at margin was higher than the average 3.32 Rs per unit cost from all renewable energy sources.

Additional Information

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Handbook on Best Practices

http://www.usea.org/Programs/APP/Best_Practices_Handbook_India_HYPERLINKS.pdf