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Possible Energy Storage Legislation for New Mexico

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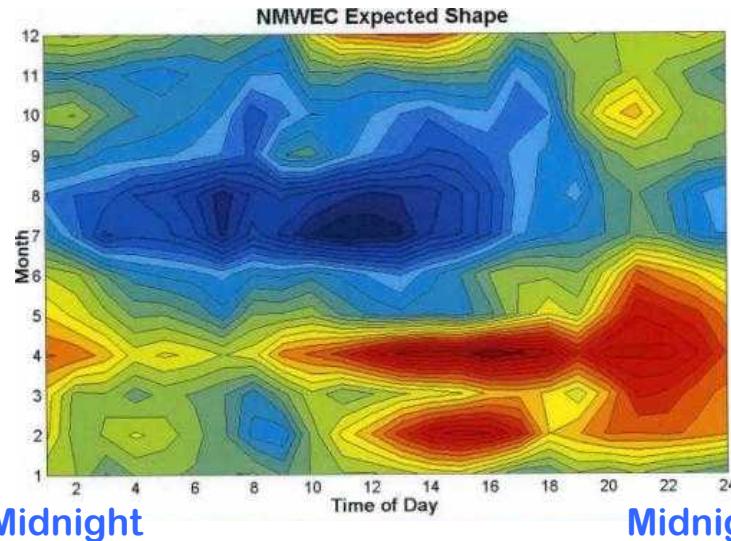
How we got here today

- Energy security is a core component of the national mission of Los Alamos National Laboratory and an emerging initiative, with about \$10M in play now..
- Los Alamos National Laboratory is a leading laboratory for fuel cells, smart grid, wind resource allocation, and biofuels.
- The New Mexico Legislature demonstrates interest and leadership in maximizing all our state's natural energy resources.
- We are here today in response to requests originated by Representative Hall and Chairman Keller for potential legislation for a New Mexico energy storage strategy.
- In preparation for today's testimony, we have accommodated input from a broad spectrum of stakeholders.

What is it we all are trying to do?

- **Increase renewable energy.**
- **Reduce CO₂ emissions.**
- **Reduce dependence on foreign oil.**
- **Keep the grid from crashing.**
- **Keep New Mexico the place to build renewable energy business**

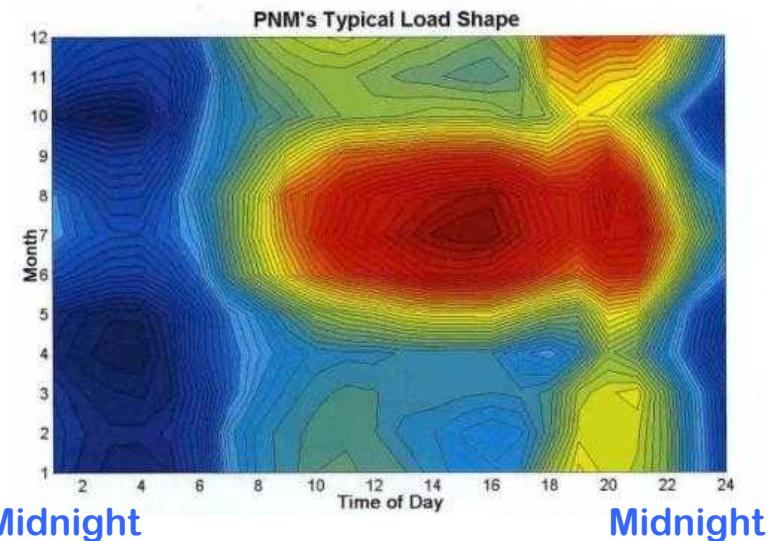
Without energy storage, the renewable energy generation industry will reach market saturation at about 25%



Renewable(wind) availability in New Mexico

December

January



Electrical energy use in New Mexico

•We know how to make electricity from sunlight.

•We know how to make electricity from wind.

•We must advance energy storage to the same maturity level as renewable energy generation.

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What is a utility grid renewable electrical energy storage system(UGRESS)?

A UGRESS stores excess renewable electrical energy from renewable energy sources until needed (solar and wind for example).

It has an **energy capacity** that determines the total amount of energy that can be stored (think of a rain barrel).

It has a **power storage capacity** that determines the rate at which it can accept energy from the utility grid (the size of the gutter feeding the barrel) and a **power delivery capacity** that determines the rate at which it can deliver energy to the grid (the hose that empties it).

It can deliver its stored energy to the utility grid on command. (the valve on the hose)

It must have sufficient energy capacity to accept energy at its power storage capacity for at least an hour and deliver its full energy capacity at its power delivery capacity for at least an hour (the hose and gutter need to be big enough to make sense).

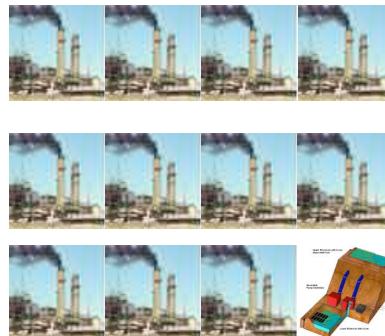
It must hold most of the energy stored for at least a day (no big leaks in the barrel).

The inevitable losses in storing electrical energy (20% to 50% or more) reduce income to the renewable energy producer (think of high winds at night in the spring).

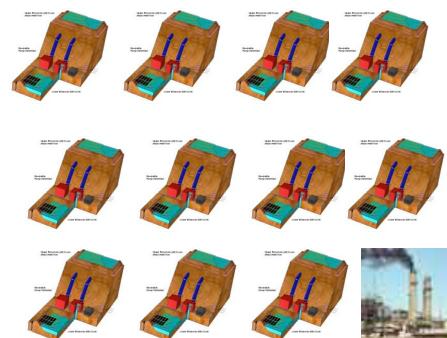
Our goal is to mitigate those losses, and increase the ceiling on renewable energy generation by providing renewable energy certificates (RECs) to qualified energy storage systems.

This will permit a UGReESS to count toward compliance with the renewable portfolio standard (RPS) on the same footing as solar and wind generation (10% today, more tomorrow).

Without new legislation



With new legislation



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Strategy

Today, New Mexico's RPS requires that 10% of the state's electrical energy come from renewable energy *generation*.

This will ramp up to 15% or more.

Our strategy here is to permit energy storage systems to make up some portion of that 15%.

This will require that a UGREESS be issued REC's.

Possible proposals:

(1) Renewable energy certificates be issued to UGEESS based on the UGEESS power delivery capacity.

- Pro: Maximum encouragement for energy storage.
- Con: Only market forces will determine the mix between energy storage and generation in meeting future renewable energy portfolio standards.

(2) *Matching* renewable energy certificates may be issued to UGEESS based on their power delivery capacity up to the capacity of *new* renewable energy generation construction.

- Pro: Preserves legislative requirements for renewable energy generation increases.
- Con: Reduces the rate of energy storage implementation.

(3) *Matching* renewable energy certificates are issued to UGEESS based on their power delivery capacity up to the capacity of new renewable energy generation in place today and in the future.

- Pro: High rate of energy storage implementation immediately.
- Con: Potential to slow construction of new renewable energy generation for immediate future.

But couldn't you store energy from coal and gas too?

Answer: Yes.

- **A UGReESS can serve the same function as a gas-fired peaking plant and so it could be to a utility's benefit to store coal or gas-derived electrical energy. This would, by the way, eliminate any carbon emissions from such a "peaker".**

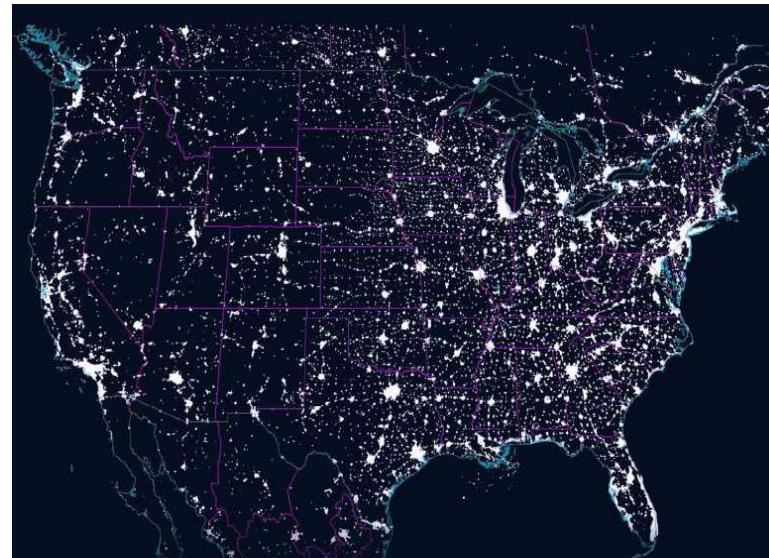
But....

- **Such energy would be ineligible for a REC.**
- **It is expensive to store energy where the fuel costs money (coal and gas) because 20% to 50% of the energy is lost. This will drive the economic case.**
- **Coal and gas can be turned on and off – the need for storage is less urgent.**
- **New legislation can add a very green alternative to natural-gas-powered spinning reserve with the same results on the economy, the environment, and the bottom line as renewable energy generation.**

New legislation for energy storage...

- Improves grid stability,
- Has no *requirement* for a utility to construct energy storage
- Encourages energy storage industries in New Mexico,
- Enhances the case for federal funding in New Mexico,

Try this with your photovoltaics!



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NM renewable energy incentives are extensive most do not include energy storage

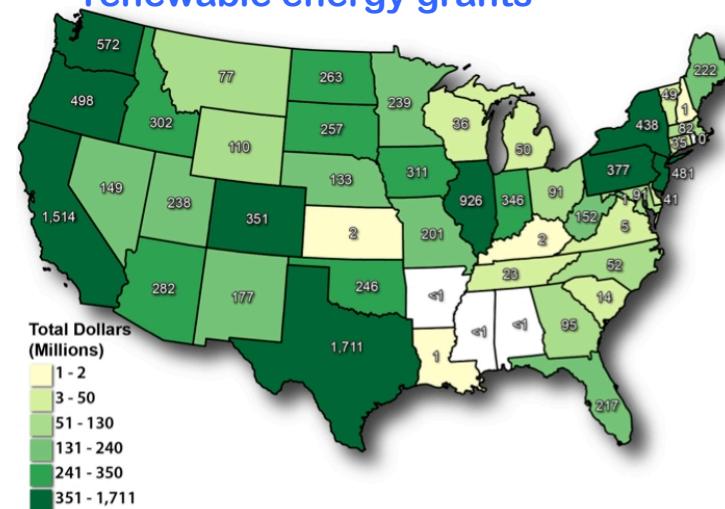
the cost of wind and solar power has fallen sharply — the tax break that ...companies rely on, called the production tax credit, has been in place since 1992 but after repeated extensions is now scheduled to expire at the end of 2012. --- NY Times, 2012

New Mexico Renewable Incentives

- Corporate Tax Credit
- Industry Recruitment/Support
- PACE Financing
- Performance-Based Incentive
- Personal Tax Credit
- Property Tax Incentive
- Sales Tax Incentive
- State Bond Program
- State Loan Program
- Utility Rebate Program
- Building Energy Code
- Energy Efficiency Resource Standard
- Interconnection
- Mandatory Utility Green Power Option
- Net Metering
- Public Benefits Fund
- Renewables Portfolio Standard
- Solar/Wind Access Policy

Now we need to give energy storage the same boost!

Federal Reinvestment Act
renewable energy grants



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Potential technology

Today

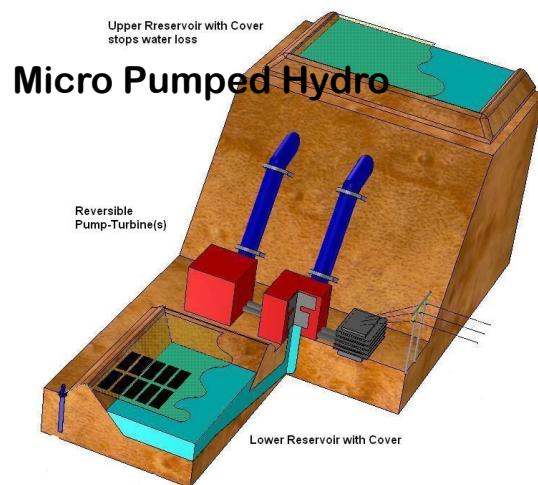


Solar Thermal

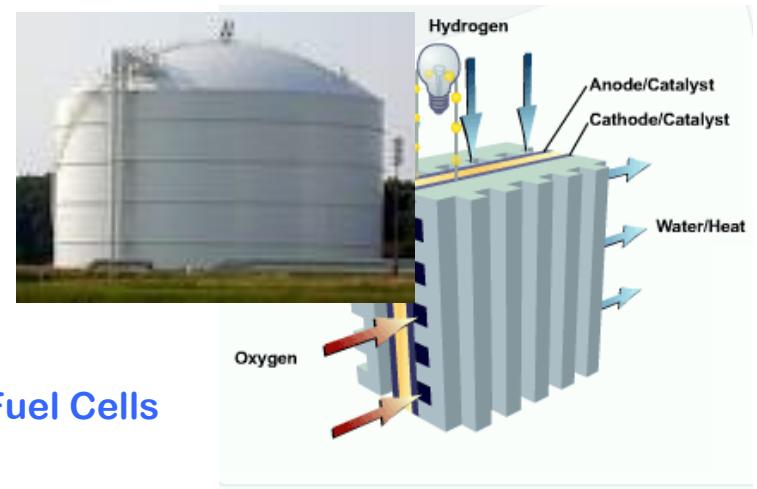
Storage densities

Gasoline: 10 kwh/kg

Best battery: 0.5 kwh/kg



In the future



Fuel Cells

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