

# The Green Grid

***Making New Mexico a national leader in  
developing and demonstrating  
the next-generation “Green Grid” -  
a smart energy grid with  
variable and intermittent renewable energy***

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(On assignment from Los Alamos National Laboratory)*

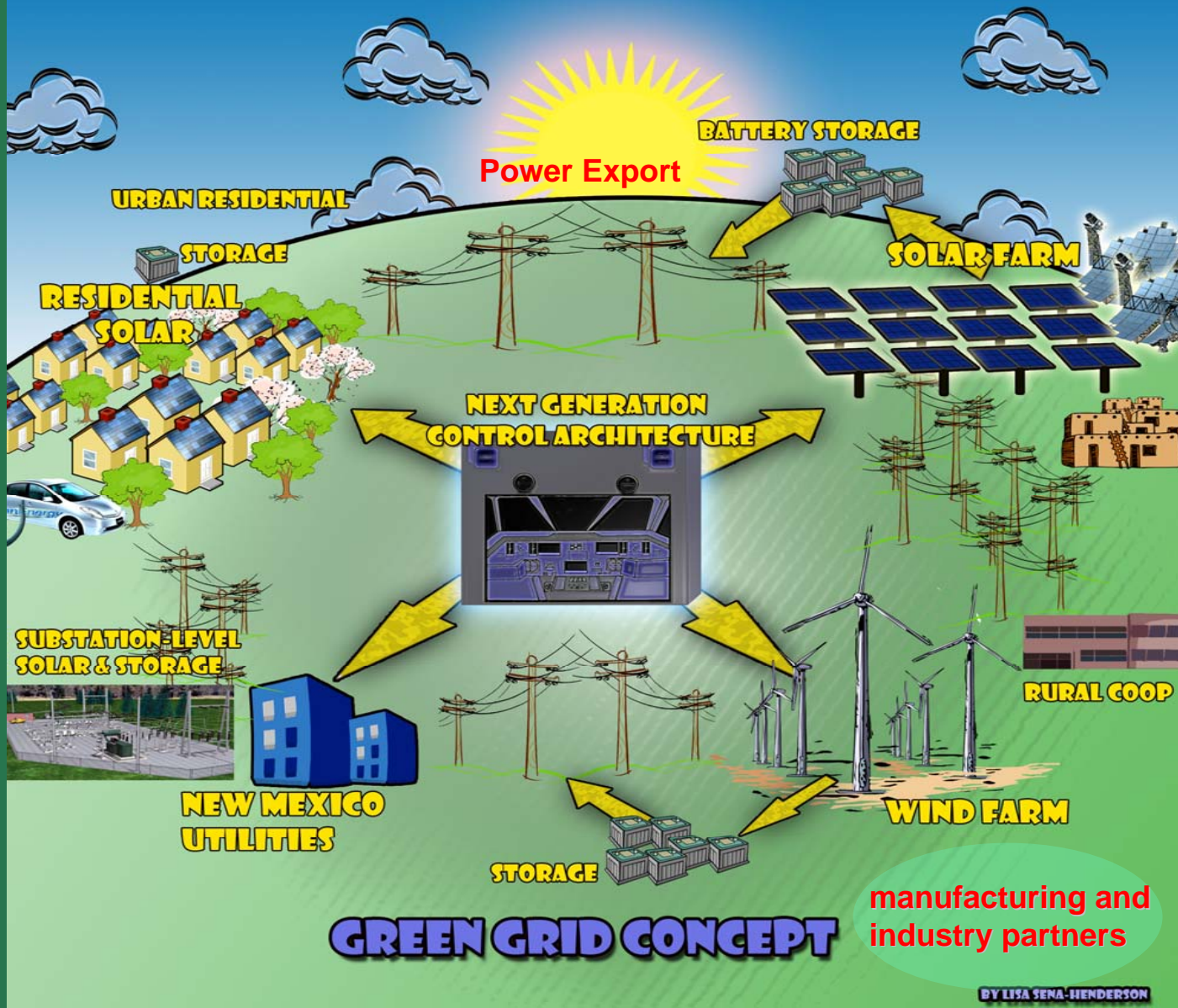
*Japanese-American Green Grid Meeting  
April 13, 2009*

# Why New Mexico?

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New Mexico has all the necessary characteristics to develop and implement the next-generation Green Grid:

- Ability to develop the required new technologies
- An alliance of all the relevant organizations
- Small enough population to make state-wide implementation practical
- Renewable Energy Transmission Authority (RETA - 1<sup>st</sup> in nation)
- Growing VC investment in New Mexico
- Strong leadership in the State
- Good connections nationally and internationally



New Mexico Tech



A fully integrated approach

# Providing Secure Power

## Next Generation Software & Hardware Controls Development

(from Smart Loads through Transmission)



- Microgrid Energy
- Management System including prototype MDM
- Modeling and Simulation
- Feeder protection
- Communications Infrastructure including cyber security



## Central Generation



- Leverage PNM CSP initiative
- Utilize wind and other central generation investments



## Transmission and Communications Control System



## Substation Upgrades



- Large Scale Photovoltaics
- Large Scale Storage
- Smart Inverter
- Controls



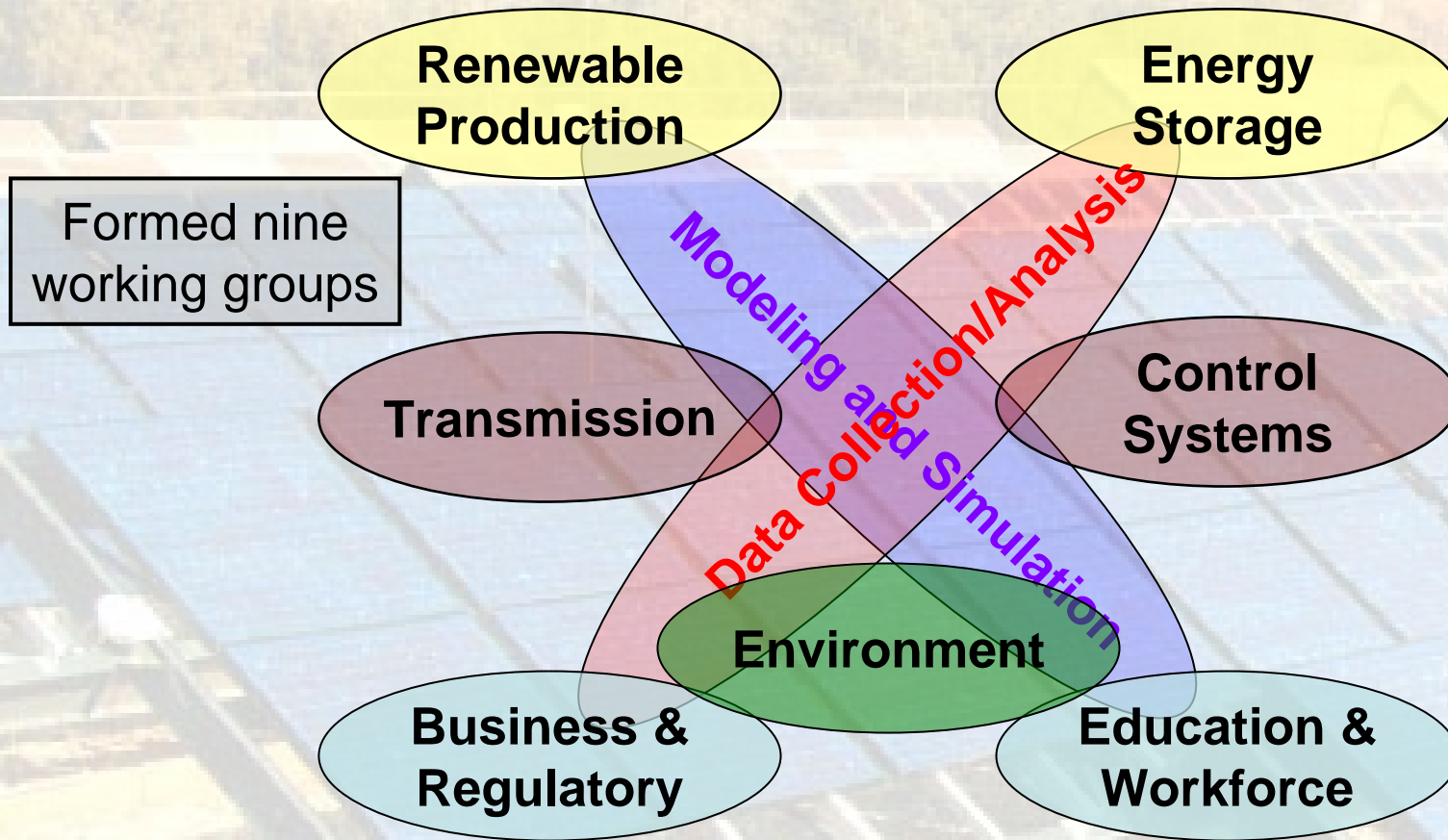
## Residential & Commercial Generation and Infrastructure

- Distributed Photovoltaics
- Smart Inverter
- Smart Residential control gateway/EMS
- Storage
- Load Control
- Electric vehicle interface



# Green Grid Working Groups

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## Partnering Organizations:

Sandia, LANL, UNM, NMT, NMSU, SFCC, PNM, Kit Carson, El Paso Electric, Springer Elec, Xcel, Gov Ofc, EDD, EMNRD, RETA, PRC, CCAE, Arch Venture, Emcore, Energy Control, Intel, Mesa del Sol, Schott, Sentech

# Green Grid Demonstration Project

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# Green Grid Initiative Timeline

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<u>Year</u>	<u>Research and Development</u>	<u>Demonstration Project</u>
1	<i>Develop computer model of grid</i> Analysis of technology gaps	Define technologies for demo project Develop terms of demo project RFI
1-2	<i>Data analysis of existing data</i> Validation of computer model Development of technologies to address gaps	Test demo components at Playas Issue RFI for demo project Select community for demo project
2-3	<b>Green Grid</b> modeling Development of technologies to address gaps	Procure and install equipment Initiate demonstration project
3-4	<i>Refine <b>Green Grid</b> modeling</i> Develop improved technologies	Collect/analyze data from demo project Install improved technologies
4	Develop improved technologies	Validate <b>Green Grid</b> system

# Green Grid Return on Investment

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- Will help consumers with energy costs:
  - *Reduce peak energy generation by 25% by 2025*
  - *Reduce per capita energy usage by 6%*
- Create jobs in New Mexico (*KMAE, EPRI studies*)
  - *Project 1780 construction and 890 steady state jobs*
  - *\$11.5B additional revenue thru 2020*
- Provide clean, secure energy for New Mexico
  - *Provide clean, secure energy for New Mexico*
  - *Export of renewable energy to other states*
  - *Potential incubator/attractor for manufacturers of Green Grid technologies*
  - *Positions NM with business and industry when carbon taxes become a deciding factor in location of facilities*

# Partnership Roles

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- New Mexico State Government through Research Applications Center:
  - Apply for stimulus funding
  - Issue RFI and oversee demonstration project
- New Mexico Municipalities:
  - Contributing partners in Green Grid demonstration projects
- Universities and Laboratories
  - Development and testing of technologies (*including Playas*)
- Federal Agencies:
  - Support major R&D activities for Green Grid technologies
- Utilities, Industry and Venture Capitalists:
  - Utilities partner in analysis, design, & demonstration project
  - Industry partners in demonstration project & statewide Green Grid
    - *This could (should) include Japanese companies*
  - VC provides investment for statewide
- Other organizations (*METI, NEDO*):
  - Development and implementation of Green Grid technologies

# State & Federal Funding - Path Forward

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- Coordinate and fund the Green Grid through the Research Applications Center:
  - A non-profit created by statute with oversight by the NM Economic Development Dept
  - Have ability to partner with business, universities, national labs, utilities, and other entities or any and all of the above
  - Develop specifics for demonstration project
- Will work with Congressional delegations and Federal agencies to secure funding
  - *Possibility of significant stimulus funding*
  - *Possibility of other significant funding*

# ARRA Funding

Program	Estimated ARRA Amount - US (\$K)	Description
<b>Competitive Economic Growth Funds</b>		
<b>SMART GRID</b>		
Electricity delivery and energy reliability	4,310,000	Implement programs authorized under title XIII (Smart Grid) of the Energy Independence and Security Act of 2007 and for other investments that modernize the electricity grid
Electricity delivery, smart grid interoperability	10,000	Smart grid interoperability framework authorized in ESEA 2007
Electricity delivery, worker training	100,000	Worker training related to electricity and energy reliability
Western area power administration borrowing authority	3,250,000	Borrowing authority to construct, finance, facilities, plan operate, maintain, or study construction of new or upgraded electric power transmission lines and related facilities
<b>Subtotal Smart Grid</b>	<b>7,670,000</b>	
Science and research (reduce energy imports)	1,600,000	For research that will reduce imports of energy from foreign countries and energy-related GHG emissions and improve energy efficiency across all economic sectors
High Growth and Emerging Industry Sectors	750,000	\$500m prioritized for research, labor exchange and training in energy efficiency and renewable energy sectors, remaining prioritized for health care sector training

# Conclusions

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New Mexico has many of the necessary characteristics to develop and implement the next-generation Green Grid.

- *A partnership with Japan would allow us to cover all areas needed for the Green Grid*

The American Recovery and Reinvestment Act provides a tremendous to jumpstart the NM Green Grid Initiative

- *This would be followed by DOE funds as part of President Obama's overall plans for the smart grid*

We need to develop a proposal with flexibility to respond to guidance from DOE when it becomes available

We have a great opportunity by partnering with our Japanese colleagues to create a leadership position in the Green Grid