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Education and energy innovation: NSHE's central role in transforming Nevada's economy

James Croce
McDonald Carano Wilson

Education and Energy Innovation:

NSHE's Central Role in Transforming Nevada's Economy

2009 Renewable Energy Symposium
University of Nevada - Las Vegas
August 11, 2009

Jim Croce
President and CEO
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Presentation Agenda

1. NIREC Overview
2. Higher education and Nevada's economy
   – How do we stack up?
3. Renewable energy production exports
   – A strong foundation for Nevada's economy
4. The energy innovation imperative
   – An essential element of Nevada's prosperous future
5. NIREC's energy technology commercialization model
6. Parting thoughts

NIREC
Nevada Institute for Renewable Energy Commercialization

What is NIREC?

- 501(c)(3) nonprofit public-private partnership
- Mission is to enable and accelerate the transformation of ideas into sustainable enterprises in the energy sector
- Focused on renewable energy, energy conservation and energy efficiency
- Today, we do this through:
  1. Funding pre-commercialization development activities
  2. Entrepreneur-In-Residence (EIR) Education Program
  3. Strengthening and leveraging the region's Innovation Ecosystem

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Partnerships

Education - Government - Private Equity - Industry

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Good News … Nevada's Recent Prosperous Growth (2001-2007)

	Rank
%Change in Tot Empl 2001-07	1
%Change in Total Wages 2001-07	2
%Chg in LowEd Ind Wages 01 07	2
%Chg in HiEd Ind Wages 01 07	1
2007 Per Capita Personal Inc. (PCPI)	18

Higher-educational-attainment (knowledge-based industries)

-- Proportion of employees with bachelors degrees or more is at least of 30%

Examples:

Higher-educational-attainment industries - IT, finance, professional & technical services, healthcare, education

Lower-educational-attainment industries - manufacturing, construction, retail, hospitality

Data Source: www.michiganfuture.org

Educational Attainment and Employment: Recent Employment Trends (National Data)…

During the current recession (December 2007 – January 2009):

- Lower-education-attainment industries have suffered job losses of 3,735,000
- Higher-education-attainment industries have added 163,000 jobs

Longer term (January 1990 – January 2009):

- Lower-education-attainment industries employment rose 15.7 %
- Higher-education-attainment industries employment rose 32.4 %

Data Source: www.michiganfuture.org

Some Hard Truths

Nevada's predominant industries and its historically high-wage jobs will continue to be threatened

- Competition
- Next expansion will almost certainly be void of two important sources of "artificial wealth" : housing bubble and highly leveraged financial services

Over the recent past (2001-2007), Nevada's highly prosperous economy seemed to have "beat the odds" (i.e. data indicates significant anomalies relative to much of the country)

Nevada's high concentration of jobs in lower-educational attainment industries is a significant risk to our economic future

Educational Attainment & Prosperity:

How do we stack up against the most prosperous states?

(2007)

	Per Capita Income		% of Pop with Bach+ Degree		% of Wages from HiEd Ind's.	
Top 11 States		**Ranking**		**Ranking**		**Ranking**
District of Columbia	$61,397	1	47.48%	1	86.04%	1
Connecticut	$54,984	2	34.66%	5	64.01%	6
New Jersey	$49,238	3	33.86%	6	63.45%	5
Massachusetts	$49,142	4	37.90%	2	66.42%	3
Wyoming	**$47,038**	**5**	**23.35%**	**41**	**44.78%**	**50**
New York	$46,664	6	31.71%	10	69.98%	2
Maryland	$46,646	7	35.25%	3	64.26%	4
California	$41,580	8	29.50%	14	61.00%	10
Virginia	$41,561	9	33.56%	8	62.98%	8
New Hampshire	$41,444	10	32.51%	9	59.32%	12
Washington	$41,062	11	30.27%	12	57.98%	17
Nevada	**$39,649**	**18**	**21.77%**	**45**	**41.84%**	**51**
US Average	**$38,564**		**27.46%**		**58.00%**	

With very few exceptions, a state's prosperity (high per-capita personal income) is directly correlated with the proportion of adults with bachelors degrees or higher.

Nevada (and Wyoming) seem to have "beat the odds" … at least, for now

Data Source: www.michiganfuture.org

Educational Attainment & Prosperity:

Comparing Nevada to Another Low Educational Attainment State (in Decline) (2007)

	Per Capita Income		% of Pop with Bach+ Degree		% of Wages from HiEd Ind's.	
Top 11 States		**Ranking**		**Ranking**		**Ranking**
District of Columbia	$61,397	1	47.48%	1	86.04%	1
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US Average	**$38,564**		**27.46%**		**58.00%**	
Nevada	**$39,649**	**18**	**21.77%**	**45**	**41.84%**	**51**
Michigan	**$34,342**	**34**	**24.72%**	**35**	**51.29%**	**37**

Although Michigan's low-educational-attainment economy generated prosperity for several decades, the loss of manufacturing to global competition led to a sharp economic decline (metro Detroit region dropped from 15th to 25th from 2005 to 2007 – just 2 years!)

How long can Nevada "beat the odds"?

Data Source: www.michiganfuture.org

Below average educational attainment levels … significant variations in economic outcomes

	Nevada		Michigan
2007 Per Capita Personal Inc. (PCPI)	18		34
%Change in PCPI 2001-07	17		51
%Change in Tot Empl 2001-07	1		51
%Change in Total Wages 2001-07	2		51
%Chg in LowEd Ind Wages 01 07	2		51
%Chg in HiEd Ind Wages 01 07	1		51
% of Pop. with Bach+ Degrees	**45**		**35**

Despite significant efforts to diversify Michigan's economy over the past 20+ yrs, its relatively low educational levels stifled prosperity … once the "golden goose" (manufacturing) left to other states (e.g. Alabama) & regions (e.g. Asia)

What is the fate of Nevada if we don't increase the educational attainment levels of *our* population?

Data Source: www.michiganfuture.org

Below average educational attainment levels … similar economic outcomes

	Nevada		Wyoming
2007 Per Capita Personal Inc. (PCPI)	18		5
%Change in PCPI 2001-07	17		1
%Change in Tot Empl 2001-07	1		3
%Change in Total Wages 2001-07	2		1
%Chg in LowEd Ind Wages 2001-07	2		1
%Chg in HiEd Ind Wages 2001-07	1		2
% of Population with Bach+ Degrees	45		41
% Wages from HiEd Attainment Ind's.	51		50
% of Population with Assoc Degrees	**33**		**3**

Wyoming's lower-educational-attainment economy has benefited from a boom in the production of fossil fuel energy resources

Harnessing and exporting Nevada's vast renewable energy resource base has the potential to sustain our prosperity (for a while)… but, knowledge-based (innovation) jobs must be created too (Renewable Energy provides both!)

Data Source: www.michiganfuture.org

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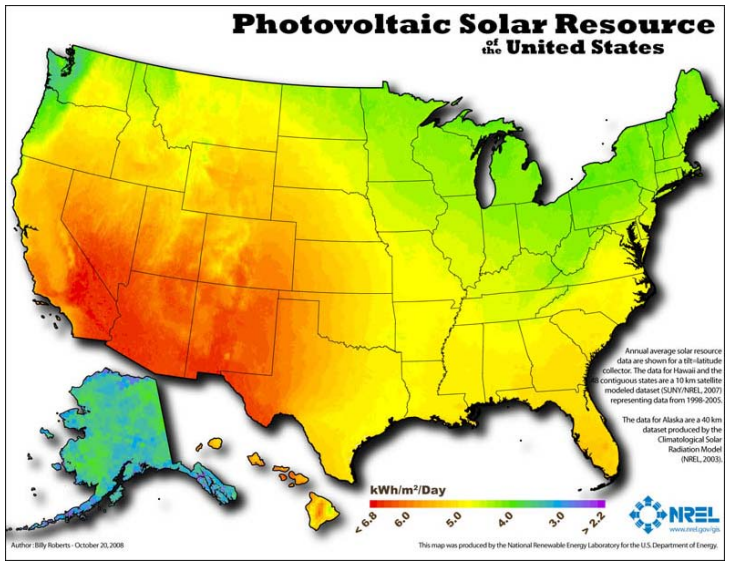
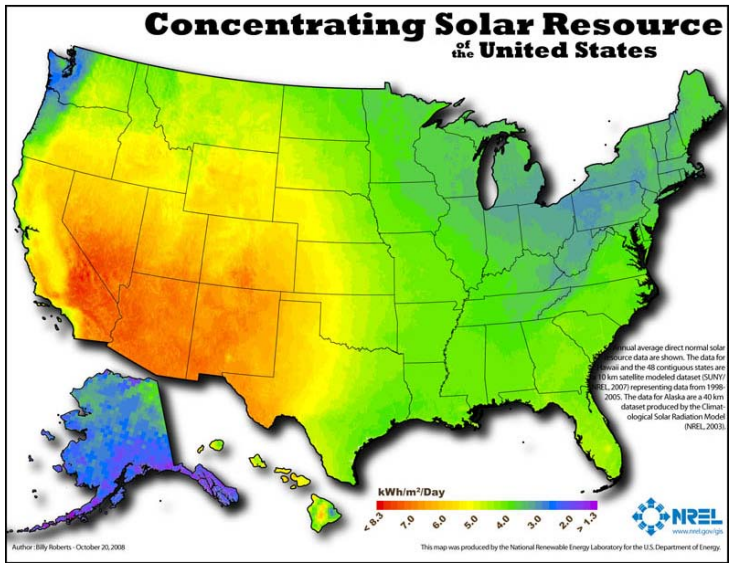
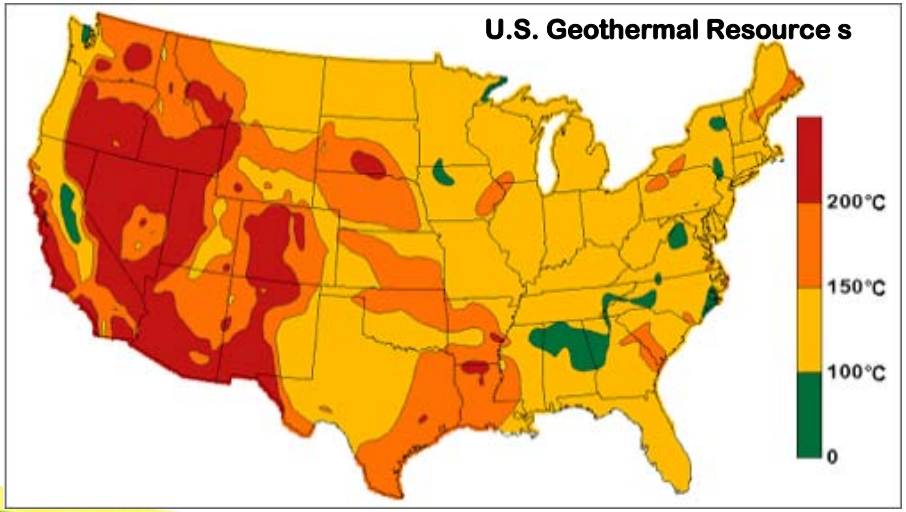
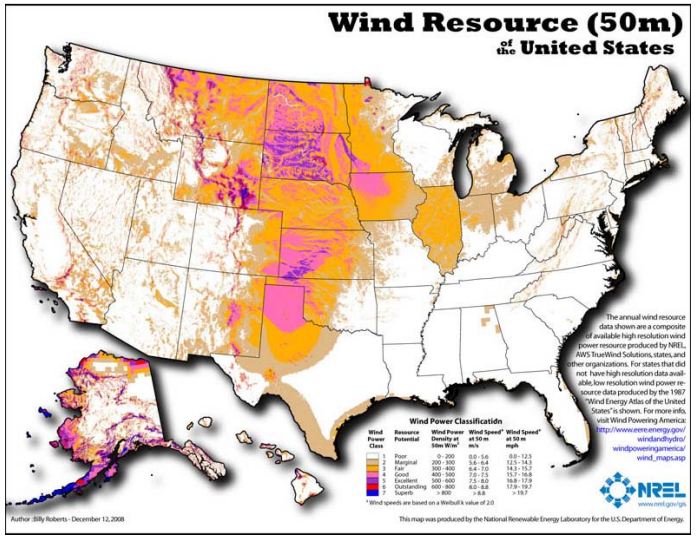
Nevada's Vast Renewable Energy Endowment

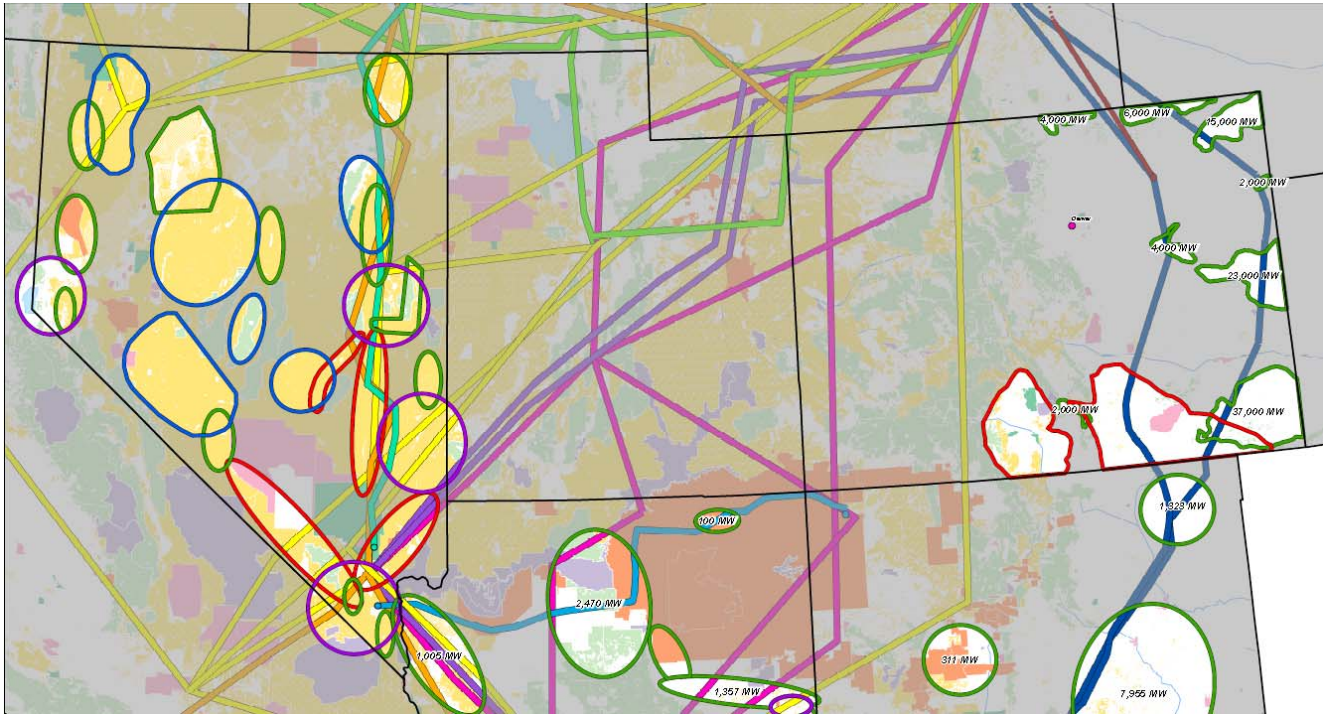








Significant New Transmission Investment Potential



Legend

Renewable Energy Zones †
- Geothermal
- Biomass
- Wind
- Solar

Federal Ownership
- Bureau of Land Management
- US Forest Service
- National Park Service
- US Fish and Wildlife Service
- Bureau of Indian Affairs
- Department of Defense

Routes of Major Transmission Proposals *
- Frontier
- Navajo Transmission Project
- Gateway West
- Gateway South/TransWest Express
- TransWest Express (original proposal)
- Northern Lights Inland Express MT and WY
- High Plains Express
- Mountain States Intertie
- SunZia Southwest Transmission Project
- Southwest Intertie
- Wyoming Colorado Intertie Project (TOT3) (dashed line = possible extension)
- Wyoming Colorado Intertie Project (TOT3) dashed

Sources

* Data on file at Western Resource Advocates.
† Nevada: Renewable Energy Transmission Access Advisory Committee Report (2007) (Phase 1, Figure 2). Colorado: Report of the Colorado Senate Bill 07-091 Renewable Resource Generation Development Areas Task Force (2007).
Arizona and New Mexico: SWAT Renewable Transmission Task Force (May 2008).

USE Utility System Efficiencies, Inc.

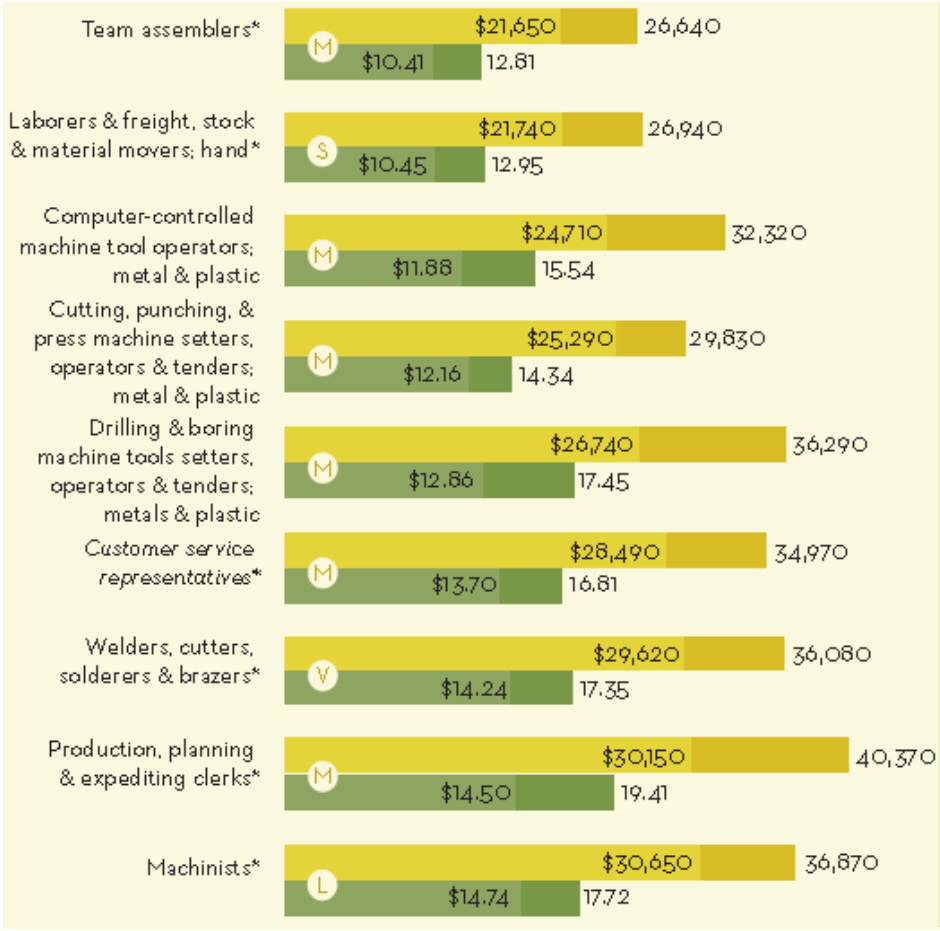
Western Resource Advocates

Date: 07/16/08 **Created By: M. Wood**

Nevada's Clean Energy Production Export Opportunity:

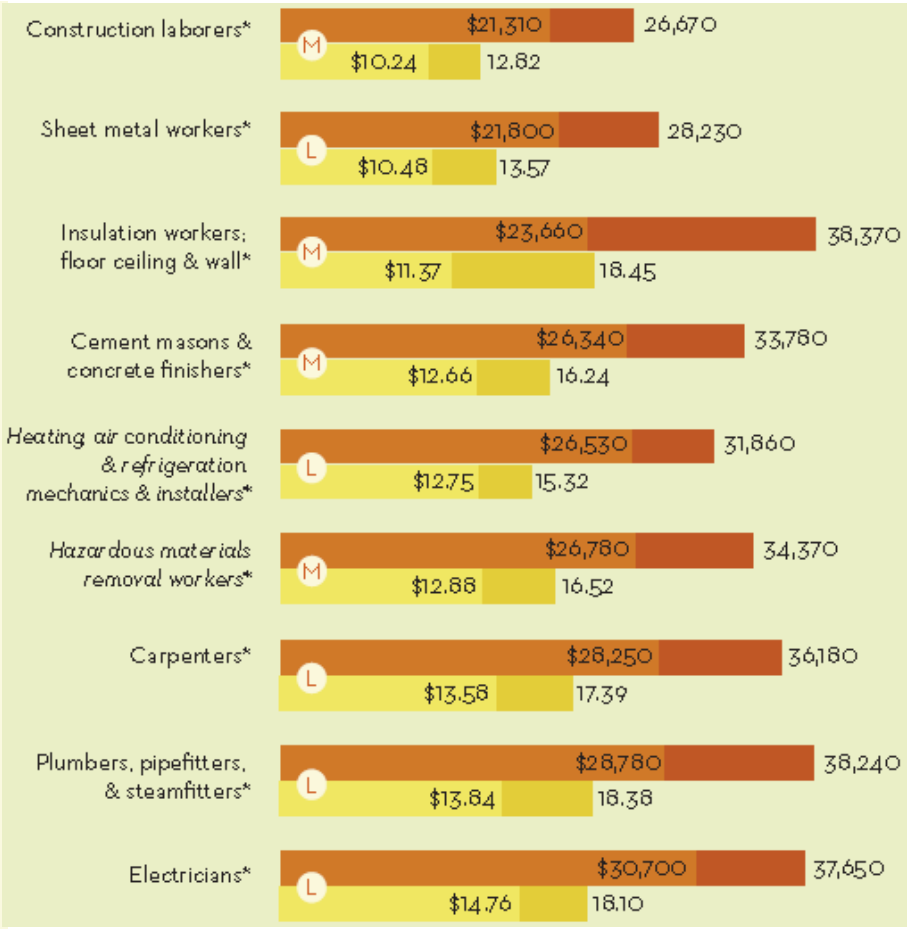
A Significant Role for NSHE's Community Colleges

Wind Energy



National wage data for selected middle-skill occupations in turbine and power transmission equipment industry, which includes producers of critical component parts for wind turbines, such as generators and gearboxes.

Energy Efficiency



National wage data for selected middle-skill occupations in the residential building construction industry.

Source: "Greener Pathways, Jobs and Workforce Development in the Clean Energy" Sarah White & Jason Walsh, Center on Wisconsin Strategy, The Workforce Alliance, The Apollo Alliance, 2008

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Energy, Innovation, and Education
– Our National Imperative

"**Energy and innovation**, healthcare, and **education** – these are the pillars of the new foundation we have to build. "

"In no area will innovation be more important than in the development of new ways to produce, use, and save energy."

-- President Barak Obama, August 5, 2009

"I firmly believe that the Nevada System of Higher Education will be at the forefront in leading the State out of this recession to a better economic future."

-- Chancellor Daniel J. Klaich, July 28, 2009

➔ **NSHE is central to Nevada's infrastructure of innovation (knowledge economy) and our future prosperity!**

Unprecedented Federal Government Commitment

American Recovery and Reinvestment Act of 2009

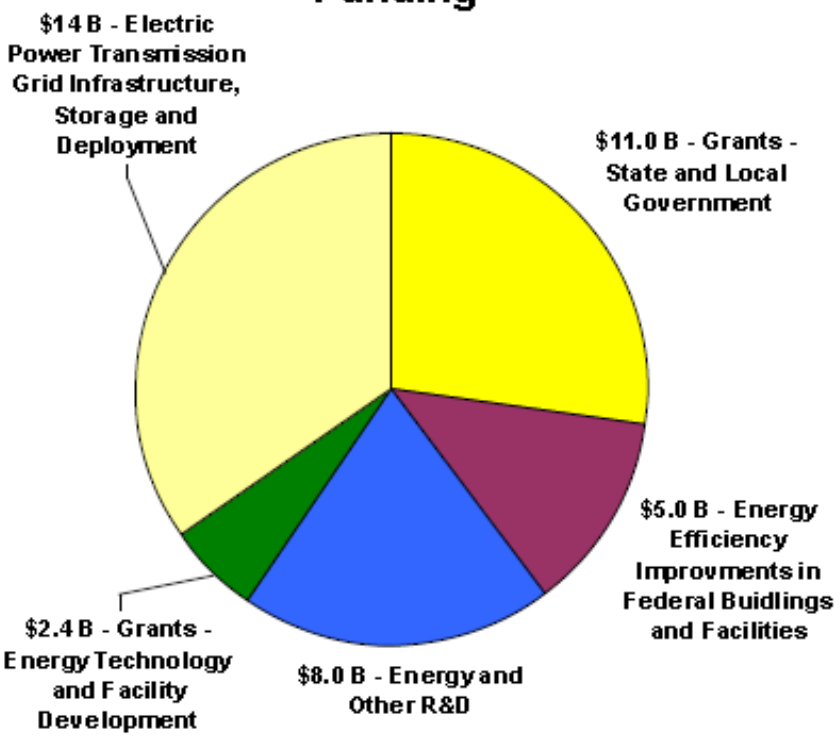
Over $40 billion of the $787 billion recovery plan is allocated for clean energy

Investment focus:

- $16.8 billion for EERE
- $14.0 billion for electric power transmission grid infrastructure, storage and deployment
  - *incl. $6 billion for loan guarantees*
- $9.6 billion for other energy programs
- Expanding workforce training
- Promoting Mass Transit Systems

New and modified clean energy tax incentives are estimated at $20+ billion

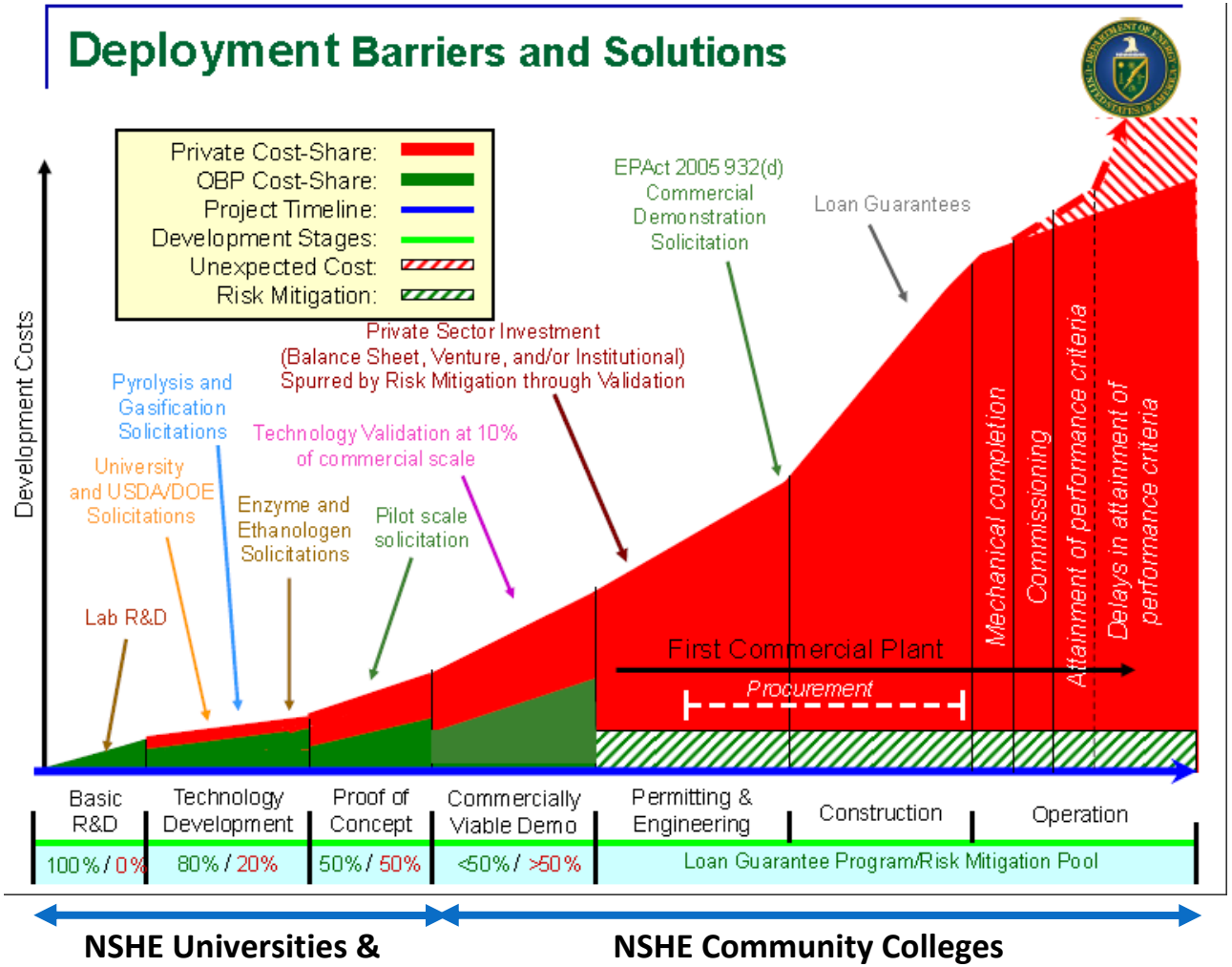
Breakdown of Clean Energy Funding



Funds are supplemental to annual appropriations

Source: Congressional Research Service, "Energy Provisions in the American Recovery and Reinvestment Act of 2009 (P.L. 111-5)"

DOE's Technology Funding Approach the Role of NSHE



To compete, Nevada needs a robust process for commercializing energy technologies

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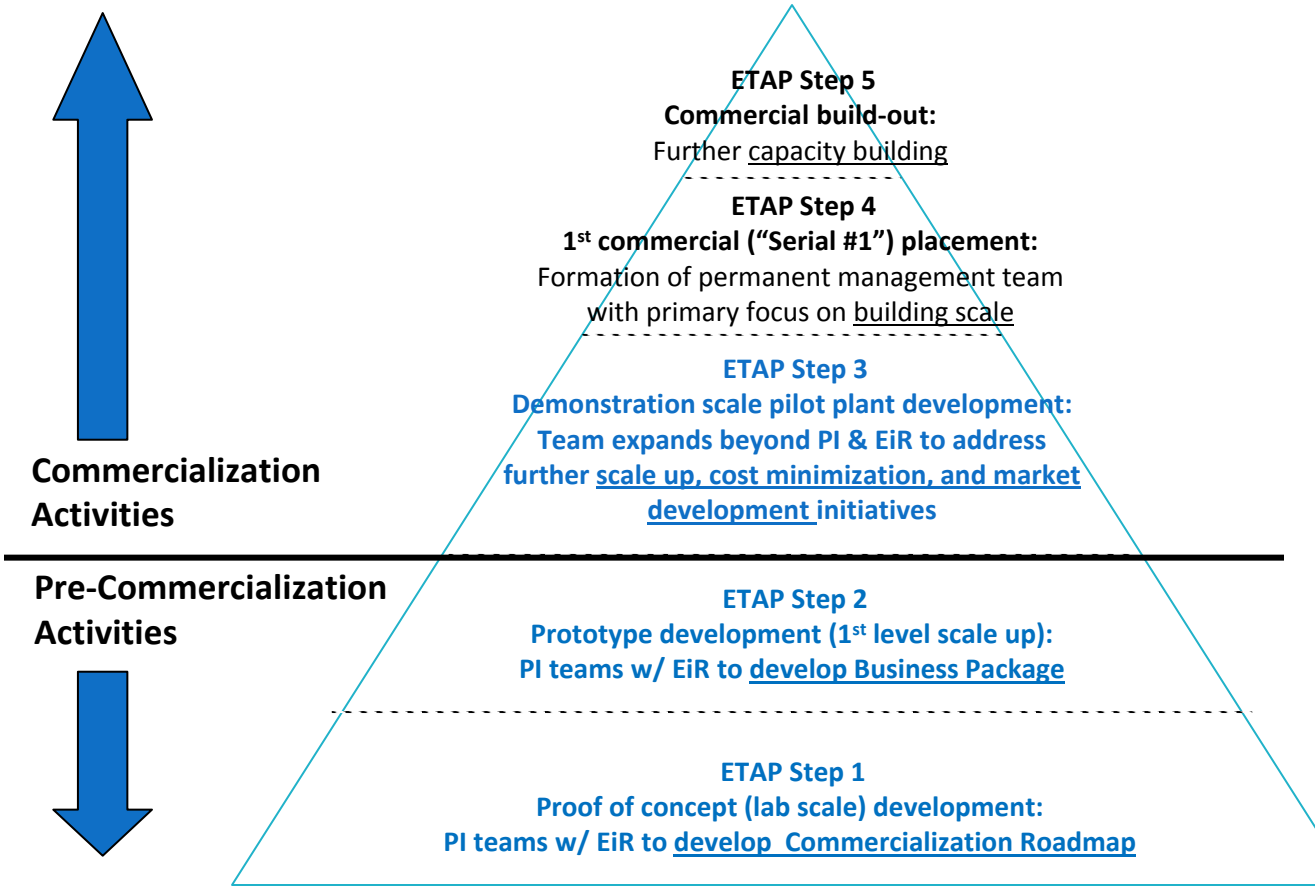
Energy Technology Commercialization Stages



Financial Capital Providers

- Commercial Banks
- Private Equity
- Venture Capital

- Federal Grants (DOE, DOD)
- Venture Capital
- Angel Funds

- Federal Grants (DOE, DOD)
- NIREC Funding Sources*
- Seed/Angel Funds (incl. Future NIREC Sidecar Fund)

- Federal grants (DOE, various SBIR)
- NIREC Funding Sources*
- Pre-seed/Angel Funds

- Federal grants (DOE, various SBIR)
- NIREC Funding Sources*
- Personal savings

[Color Key] Blue type represents primary NIREC services/capabilities

[*] NIREC Funding Sources refer to State and Federal R&D Grants, Foundation Funds and Corporate/Industry Support

NIREC's Commercialization Acceleration Infrastructure

Pre-Commercial Activities | **Commercial Activities**

	ETA Step 1	ETA Step 2	ETA Step 3
NIREC Technology Selection Process	Develop Commercialization Roadmap	Develop Business Package	Execute Commercialization Roadmap

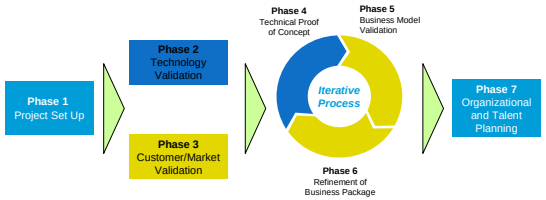
Stakeholders
- TCAB
- EIRs
- DOE/Funders

Stakeholders
- EIRs
- PI & Teams
- Innovation Ecosystem

Stakeholders
- "Promoters"
- PI & Teams

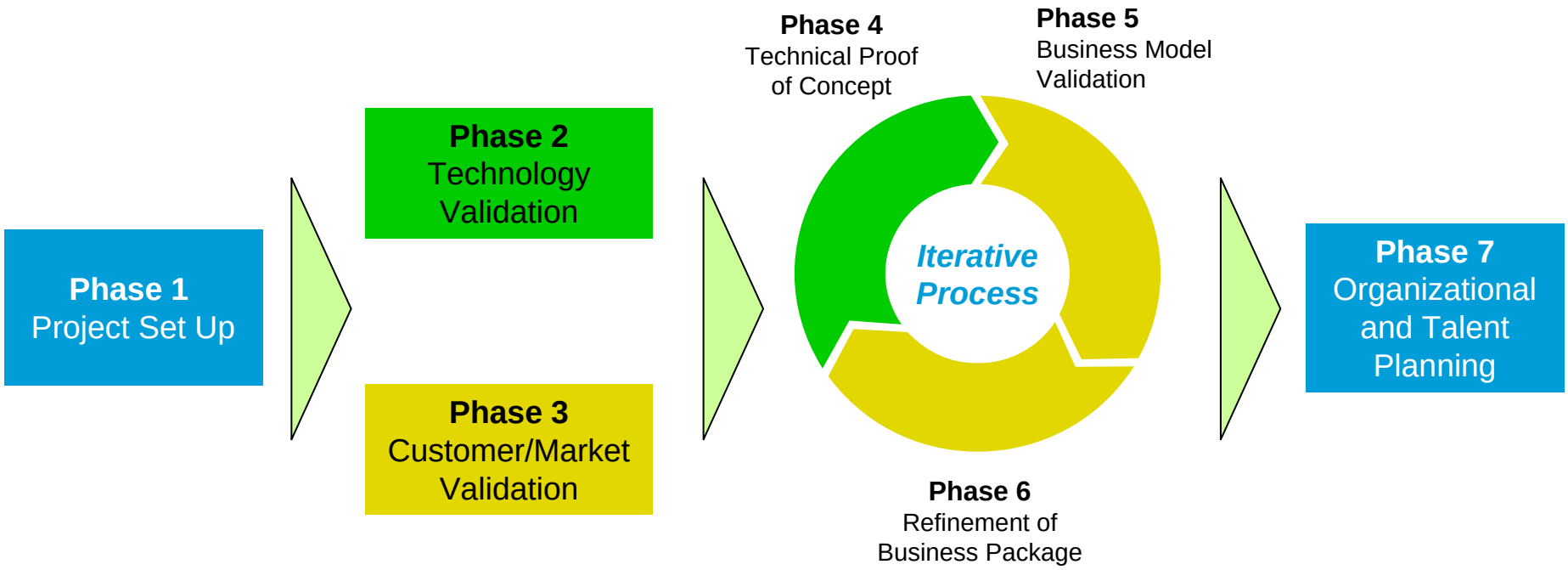
TCAB Selection Process

The EIR Process

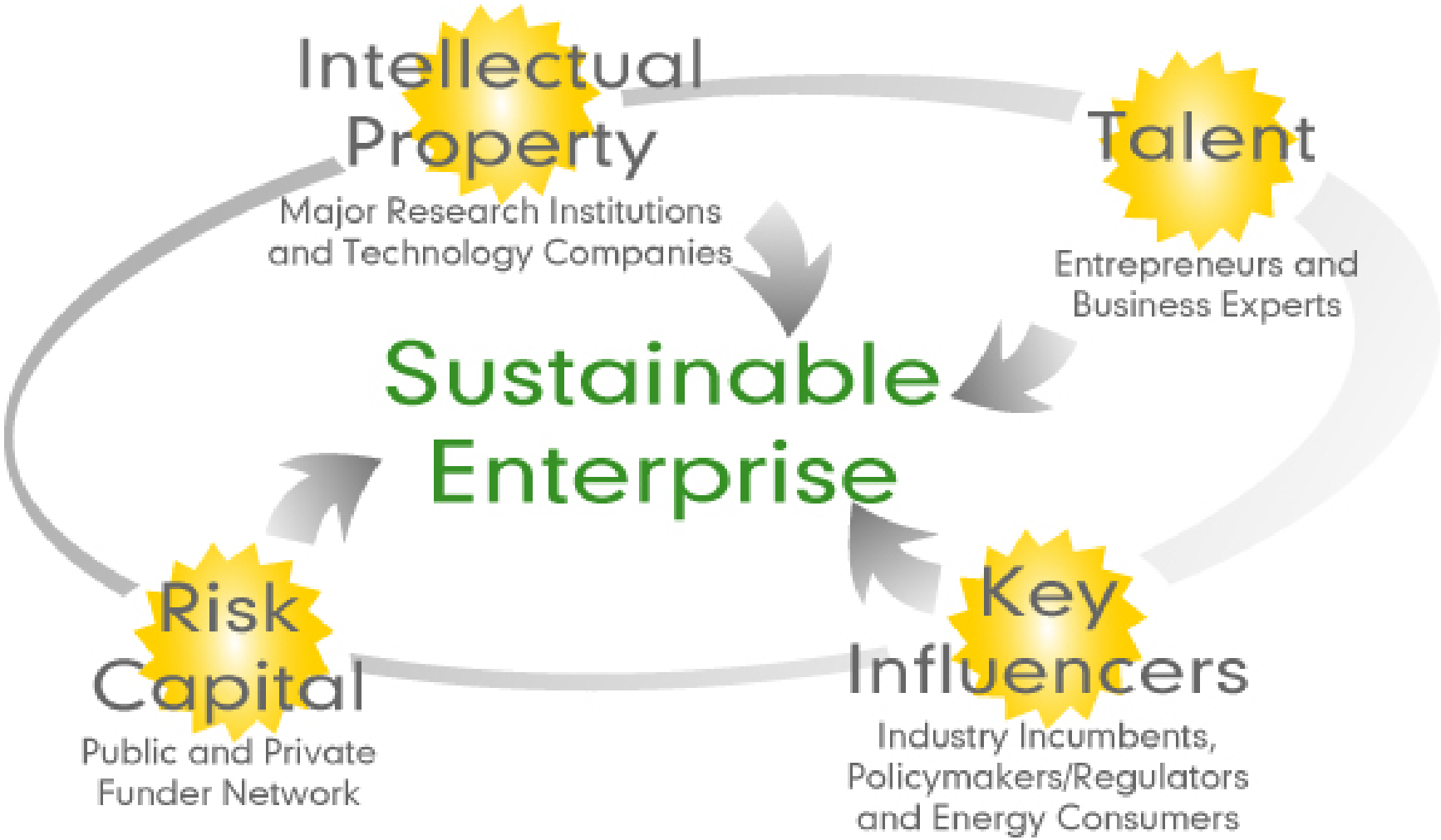


Company-Promotion Program

NIREC's Entrepreneur-in-Residence (EIR) Process



Renewable Energy Innovation Ecosystem



NIREC Funding Program Overview

- NIREC awards up to $100,000 for commercialization of renewable energy technologies
- Awarded competitively through a stringent review process by NIREC's Technology Commercialization Advisory Board
- Call for proposals are announced twice a year, in March and September
- Funds are currently intended for technology validation and technical proof of concept activities in ETA Steps 1 and 2
- Participation in the EIR Program to develop well grounded and compelling Commercialization Roadmaps and Business Packages

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Projects Funded to Date

- Direct Conversion of Sugars, Cellulose, & Cellulosic Biomass into Fuels
- Utility Accountant – An Interactive Tool to Manage Utility Costs
- A Novel Dropwise Condenser for Geothermal Applications

Currently evaluating applications from March 09 RFP round

- 18 applicants, 7 shortlisted
- 4 awardees expected to be announced in Sep.

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Parting Thoughts …

- Nevada's continued prosperity is in question unless we make a significant step towards economic diversification
  - Is our state's competitive position like that of Michigan 20+ years ago?
- Renewable energy production exports offer an excellent source of short term skilled-trades jobs
  - NSHE's community colleges has a significant role in preparing the required workforce
- The production or attraction of higher-educational-attainment (knowledge-based) industries are critical to Nevada's future prosperity
  - Proportion of adults with a bachelors degree is a significant predictor of future prosperity*
- What distinguishes successful regions is their high concentration of talent – knowledge, creativity, and entrepreneurship – critical to Nevada's future*
  - Significant investments are needed to strengthen Nevada's RE Innovation Ecosystem (e.g. NSHE, tech transfer, entrep., etc.)

*www.michiganfuture.org

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"Best place to make a future Forbes 400 fortune? Start with this proposition: The most valuable natural resource of the 21st century is brains. Smart people tend to be mobile. Watch where they go! Because where they go, robust economic activity will follow."

-- Rich Karlgaard, publisher, Forbes Magazine

Thank You!

www.nirec.org