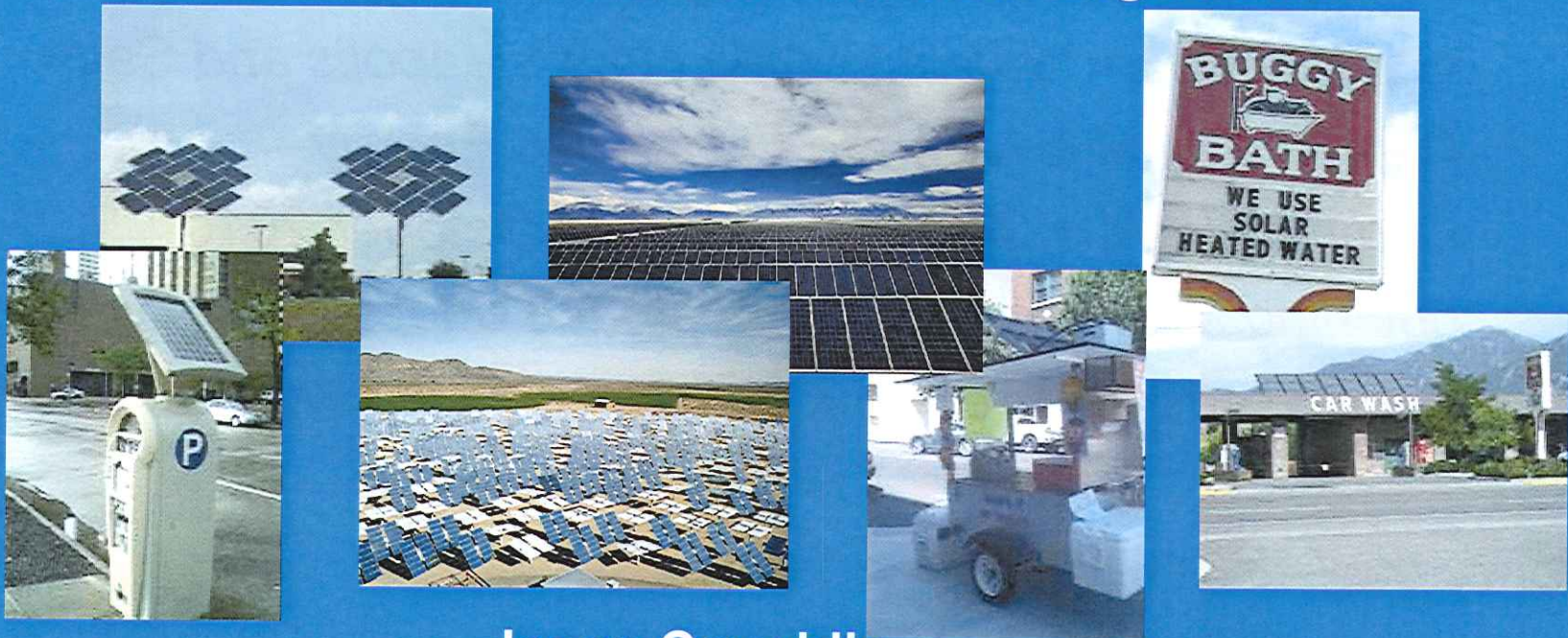


# Solar Energy Policies and Finance Creating a Successful Market Presentation for the Minnesota State Legislature



**Jason Coughlin**  
**NREL Technical Lead for the Twin Cities  
Solar America Cities Program**  
**October 2009**

# Solar America Cities Reporting

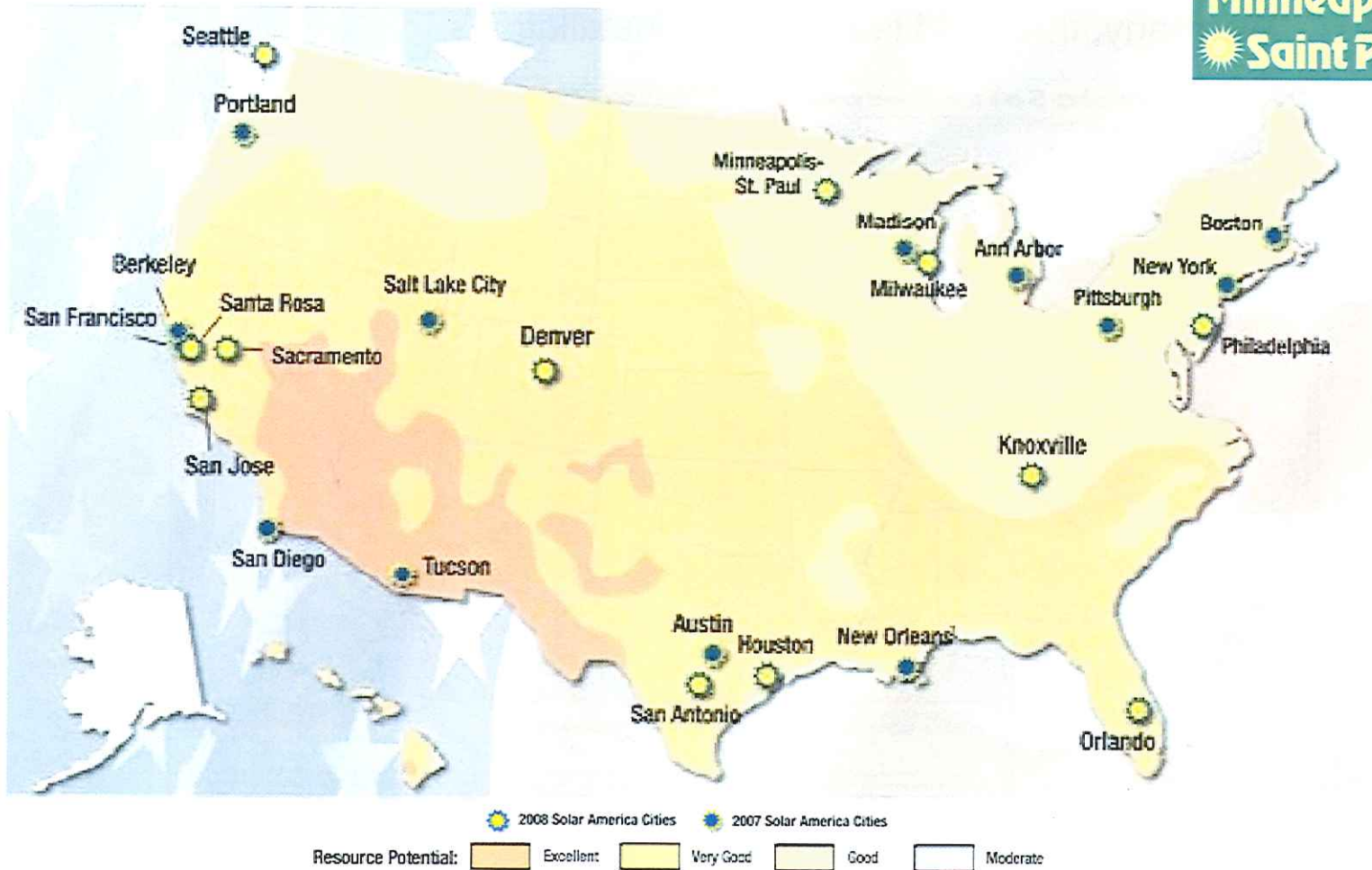
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*2009 Minnesota Energy Policy Omnibus (S.F. 550) requires Solar America Cities of Minneapolis and Saint Paul to submit a report to Legislative Energy Commission on October 2009 and October 2010 outlining strategies to accelerate the adoption of solar thermal and solar electric technologies in Minnesota.*



# DOE Solar America Cities Initiative

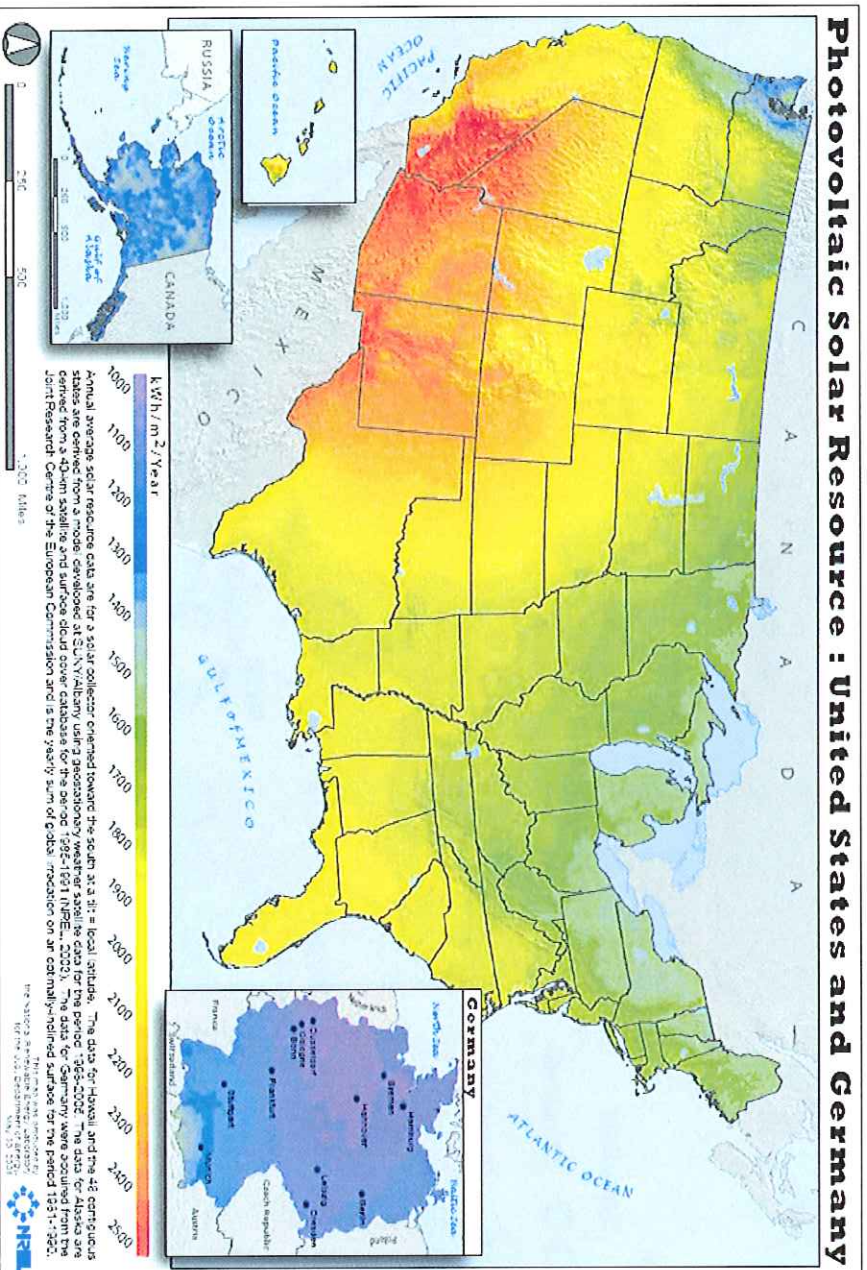
Twin Cities is one of 25 cities at the forefront of solar development in the country



# Solar Myths

**Myth:** Minnesota does not get enough sun to use PV technologies.

**Fact:** Yes it does. In fact, the U.S. in general gets more sun than Germany, the world leader in PV installations.





# Solar Myths

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**Myth:** The technology is still being developed.

**Fact:** PV technology, while continuously being improved, is effective enough to use now.



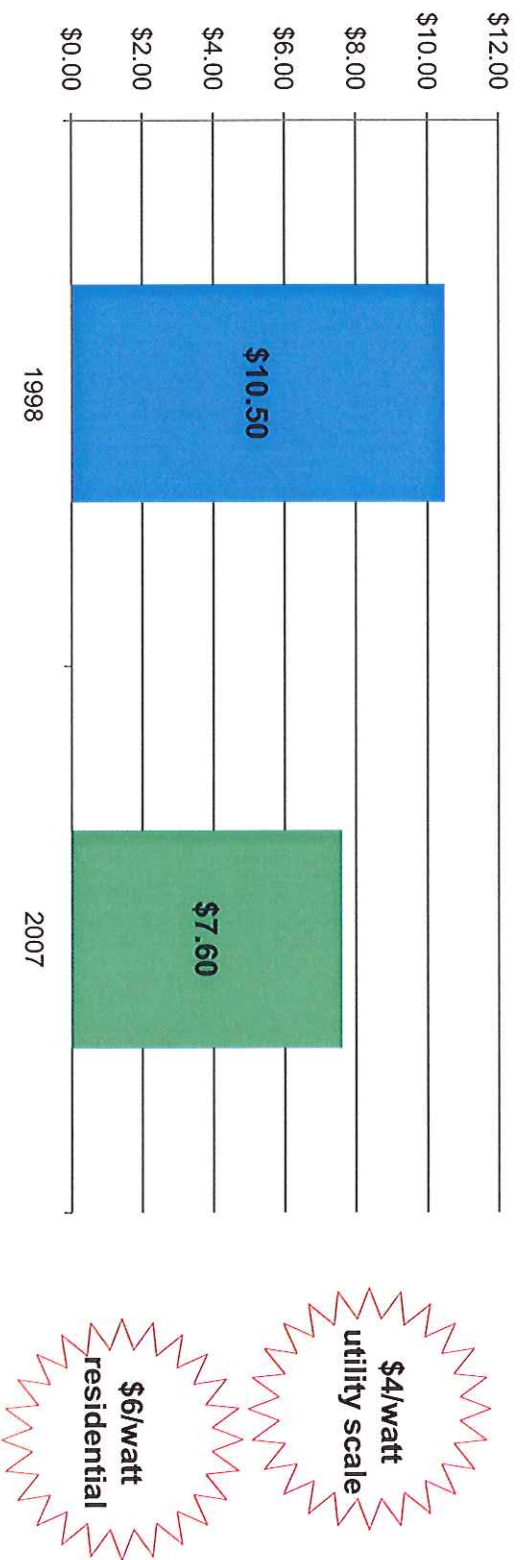
Photo courtesy of NREL

# Solar Myths

**Myth:** Solar is just too expensive.

**Fact:** Declining PV equipment prices, innovative financing structures such as Power Purchase Agreements (PPA), and state/federal incentives are making solar affordable in many areas.

Installed costs per watt are falling.



Source: Tracking the Sun: The installed costs of photovoltaics in the US from 1997-2008  
Lawrence Berkeley National Laboratory. February 2009.  
<http://eetd.lbl.gov/ea/emp/reports/lbnl-1516e-ppt.pdf>

# But why solar?

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- Unlimited resource which can be used to generate electricity, heat homes and water, and power automobiles.
- Can site solar systems close to demand reducing transmission losses and lowering transmission and distribution costs.
- Can be combined with batteries or other storage mechanism to deploy on demand.
- Increasingly cost-competitive.



# A number of barriers still exist

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- 1. Regulatory Issues**
  - State policies to promote solar energy installations
  - Interacting with utilities
- 2. Financial Hurdles**
  - Upfront investment can still be significant
- 3. Lack of Public Awareness especially in cold climates**
  - Solar is a proven technology with minimal operating risk
- 4. Procedural Issues**
  - Building Codes and Standards
  - Protecting Solar Access
- 5. Qualified Workforce**
  - Lack of qualified solar installers
- 6. Reaching new market segments**
  - Utility Scale Solar
  - New Market Participants
  - Community Solar



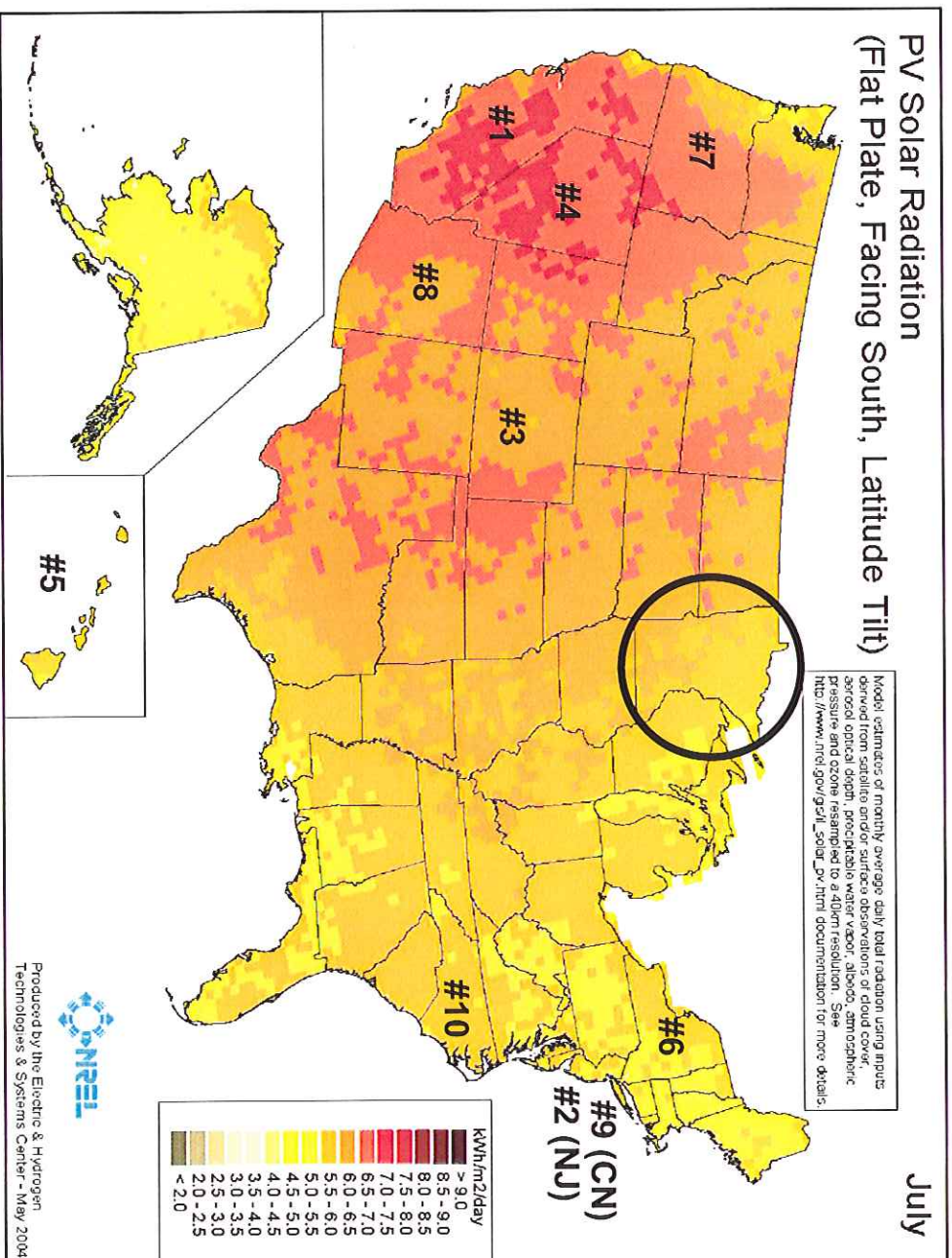
# State Policy Environment

1. Policies at the state level make a **tremendous difference on the level of installed capacity of solar energy.**
2. **Consistency** of these policies is key so people can develop projects with greater certainty.
3. Quality of a state's **solar resource** not necessarily correlated to installed.
4. Renewable Portfolio Standards\* with a **carve-out for solar energy** creates the opportunity for solar to compete against cheaper renewable energy technologies such as wind and biomass.
5. **Solar Renewable Energy Certificates (SRECs)** in certain states, such as New Jersey and Colorado, can be worth \$150-300/MWh.

	<u>2006</u>	<u>2007</u>	<u>2008</u>
<u>State</u>			
California	71	87	178.6
New Jersey	18	17	22.5
Colorado	.9	12	21.6
Nevada	2.6	15	13.9
Hawaii	n/a	2.4	11.3
New York	2.7	4.4	7.0
Oregon	.5	1.1	6.6
Arizona	2.1	2.1	6.4
Connecticut	.5	1.8	5.3
North Carolina	n/a	n/a	4.0
Others	1.5	4.4	15.3
<b>Total</b>	<b>102</b>	<b>150</b>	<b>292</b>

Megawatts (MW) of new annual installed PV capacity  
 Solar Energy Industry Association & Prometheus Institute  
[http://www.seia.org/Year\\_in\\_Review\\_2008\\_lr.pdf](http://www.seia.org/Year_in_Review_2008_lr.pdf)

# Top ten states for installed capacity

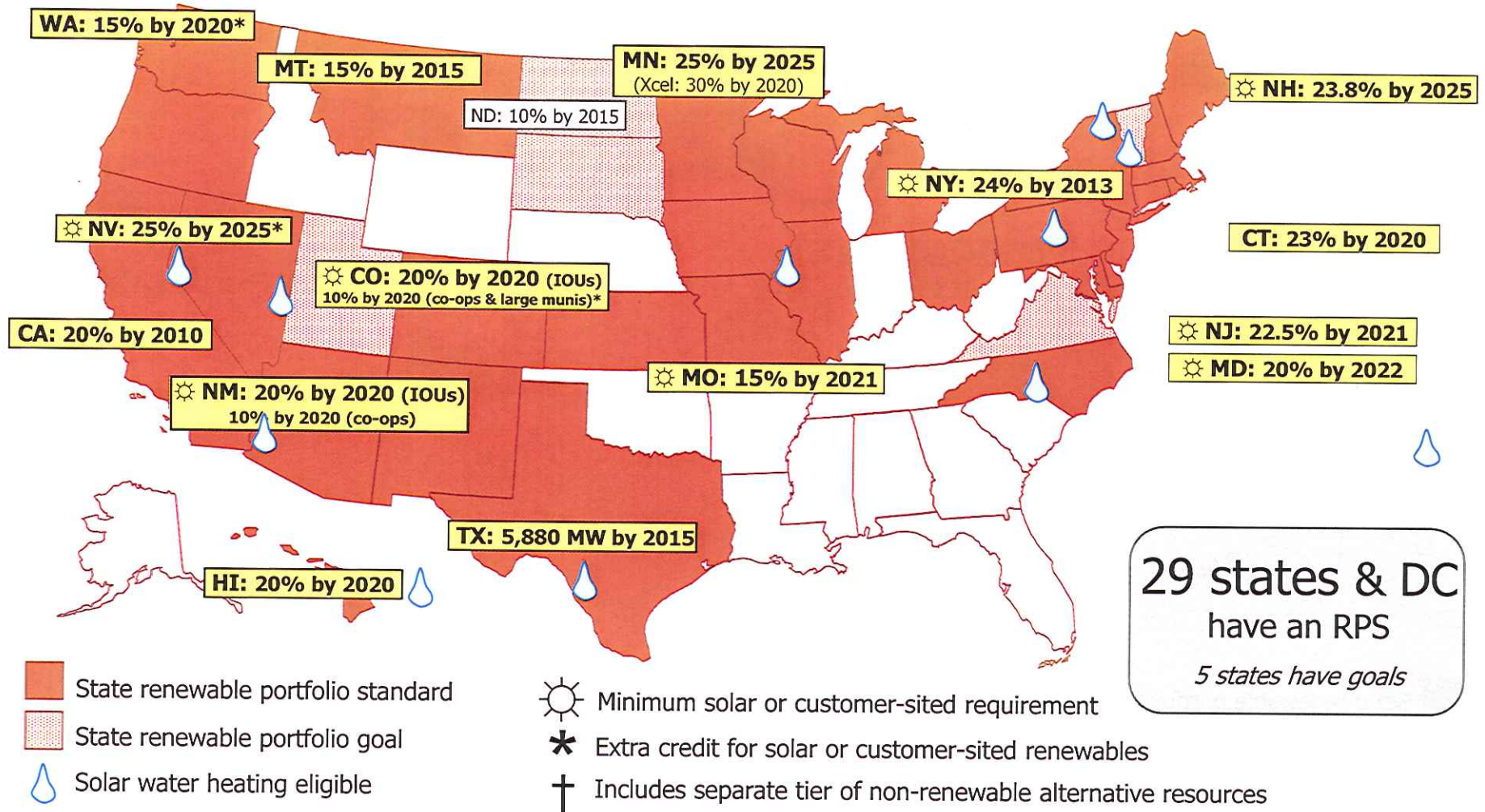


Minnesota's resources at least as good as NJ, NY, CN and NC



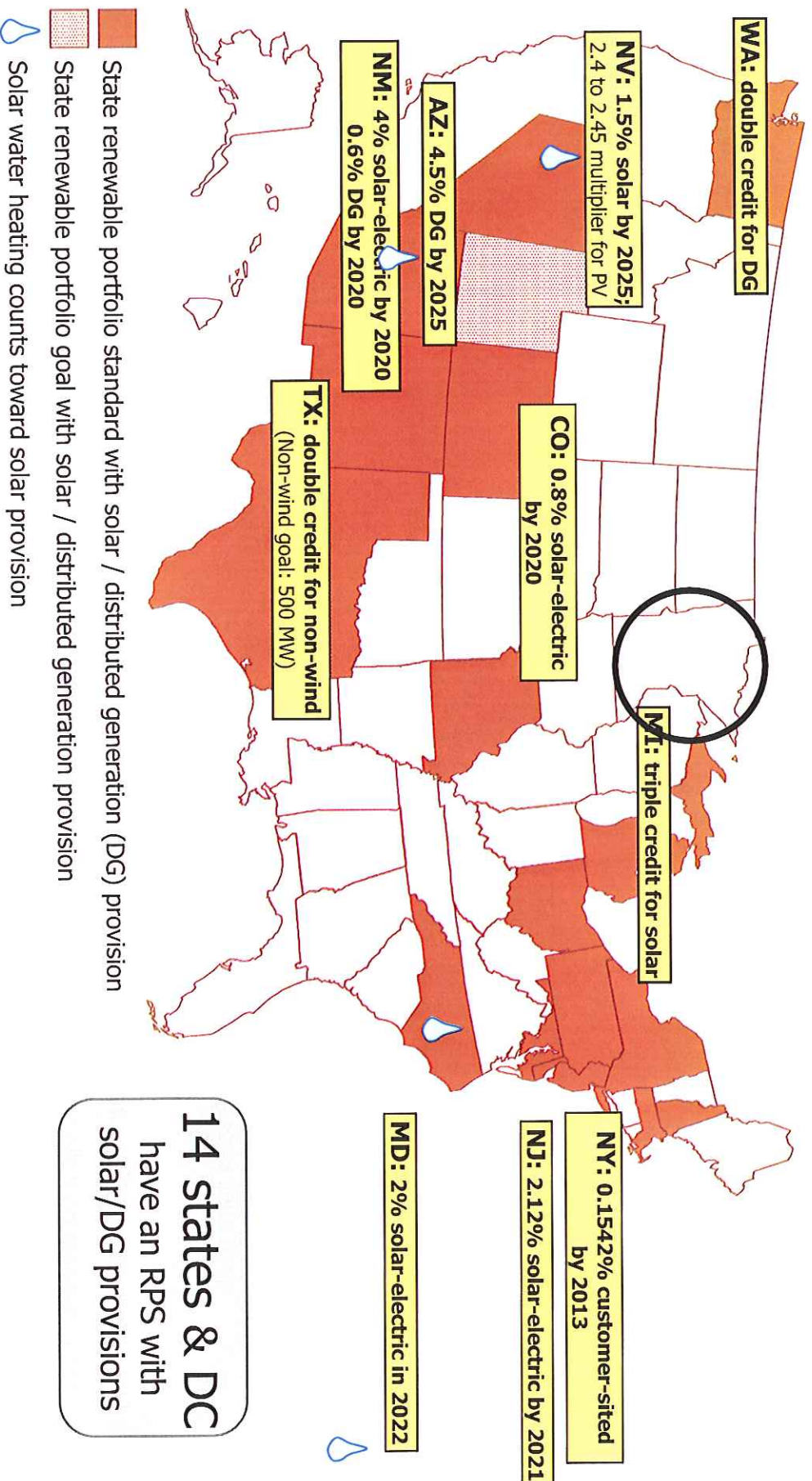
# Renewable Portfolio Standards

[www.dsireusa.org](http://www.dsireusa.org) / July 2009



# RPS Policies with Solar/DG Provisions

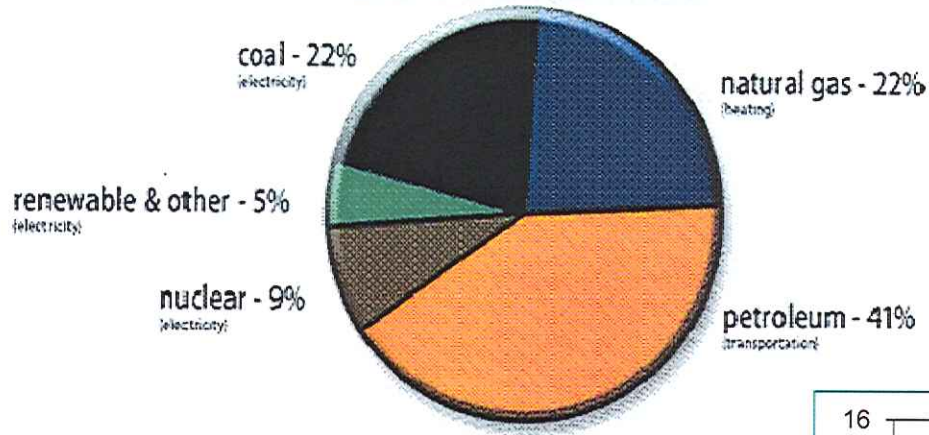
[www.dsireusa.org](http://www.dsireusa.org) / July 2009





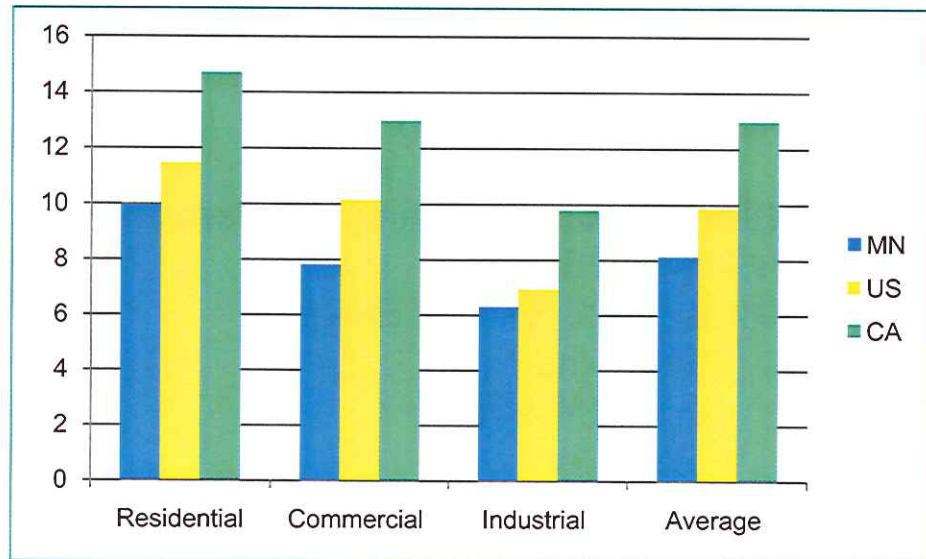
# The Minnesota Energy Landscape

*where it comes from...*



*Energy Mix*

*Electricity prices*



Source: Energy Information Administration, DOE. June 2009 data

# The Minnesota Solar Landscape

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According to the MN State Energy Office, Minnesota receives more solar energy in one day than the energy consumed by the state in an entire year.

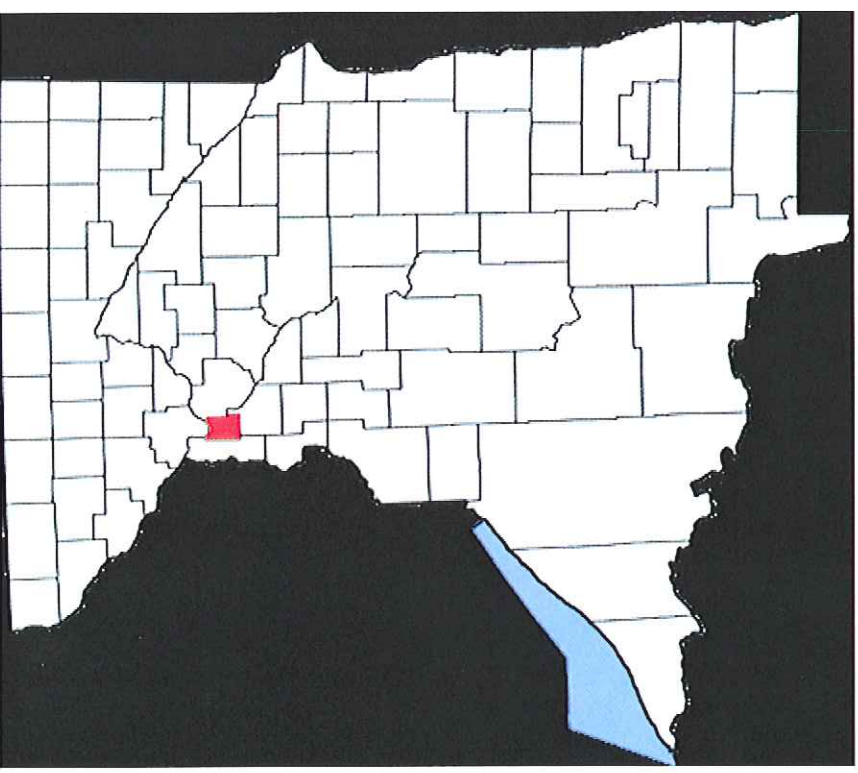
## Installed PV capacity in the state

- 313 PV installations in MN (avg. 4.6 kW)
- 1.4 MW of PV installed capacity in MN
- Largest system is 100 kW

Installed **SHW capacity in the state** is unknown but approximately 28 systems were installed since July 2009.

## MN Renewable Portfolio Standard

- 25% by 2025
- 30% by 2020 for Xcel Energy
  - 24% wind
  - up to 1% solar
  - 5% other



An area of solar PV within a footprint the size of Ramsey County would produce an equivalent amount of electricity as is consumed in Minnesota on an on-going basis. Map credit: David Benbennick.



# Regulatory Issues - Utility Policies



Photo credit: AmericanProgress.org

1. **Net Metering: “Spinning the meter backwards”**
  - The ability to net meter
  - Compensation for net metering
  - Minnesota authorizes net metering and utilities pay retail rates
2. **Setting the net metering cap**
  - a low cap can penalize larger systems that would benefit from economies of scale and force customers to undersize their systems.
  - Minnesota’s net metering cap is 40 kW per system
3. **Setting the maximum amount of distributed generation permitted within the utility’s territory**
  - No maximum established in Minnesota
4. **REC Ownership**
  - RECS are critical to getting projects financed in many markets
  - In Minnesota, ownership of RECs varies between utility and system owner.
5. **Streamlining the interconnection process**
  - Systems up to 10 MW can interconnect in Minnesota
  - MN interconnection process is rated unfavorably\*
6. **Feed in tariffs**

\*Freeing the Grid, October 2008. Produced by New Energy Choices, &IREC  
[http://www.newenergychoices.org/uploads/FreeingTheGrid2008\\_report.pdf](http://www.newenergychoices.org/uploads/FreeingTheGrid2008_report.pdf)

# Financial Barriers

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## High upfront costs limit the size of the solar energy market

- Before incentives, a 4 kW residential PV system can cost \$30,000-\$40,000 in Minnesota
- The unsubsidized cost of electricity on a per kWh basis can be as much as \$0.25-0.30 cents in certain locations.
- While much cheaper (in MN, \$10-12,000) most solar hot water systems are competing against very low natural gas prices.

## To combat this high upfront cost, policy makers and utilities offer a number of financial incentives

- Federal Investment Tax Credits and Cash Grants
- Accelerated Depreciation for Commercial Systems
- Many states and utilities offer upfront rebates (up to 50% of the cost of the system)
- Ongoing payments based on electricity produced.
- State income tax credits
- Property tax exemptions
- Sales tax exemptions

**In addition, creative new financial mechanisms are expanding the market.**



# Minnesota Financial Incentives for Solar

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## State Incentives

- Solar PV Rebates
  - \$1.75-\$2.00/watt
    - Up to 5 kW for a residential system
    - Up to 10 kW for small business system
- Solar Water Heating Rebates
  - Amount of rebate per system TBD
  - Draft guidelines
  - \$25/sq foot for residential with a \$2,000 maximum
  - \$15/sq ft for commercial/multi-family dwelling with a \$20,000 maximum

## Various Utility Grants and Loan Programs

- Xcel Energy's Renewable Development Grant Fund is one example

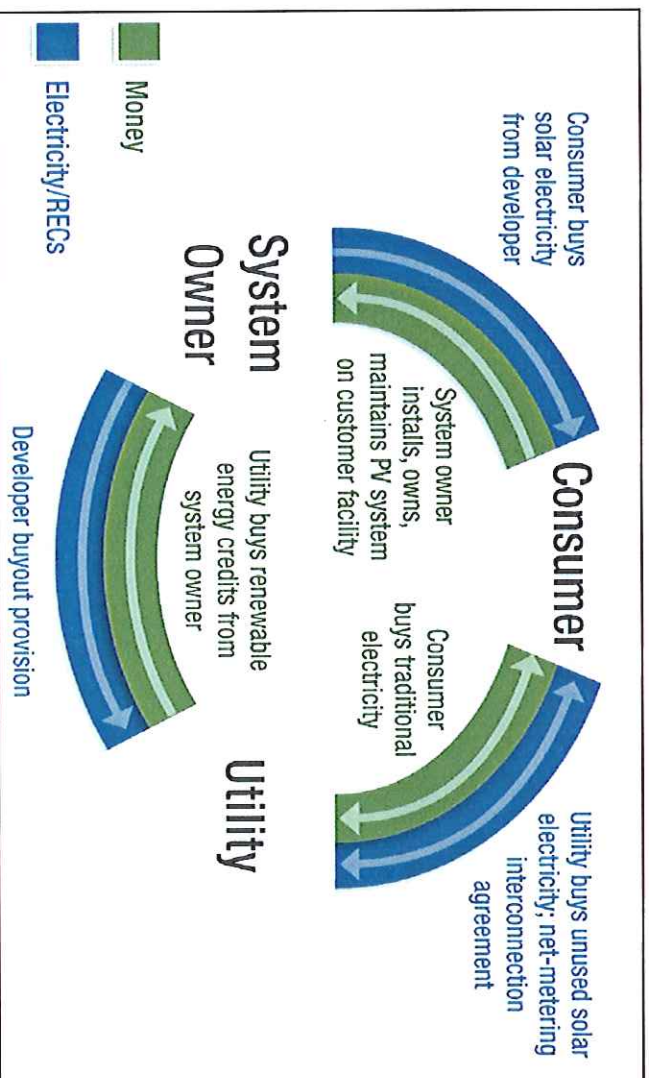
## Various Utility Rebates

- Usually a \$/watt rebate with a cap on system size and/or amount
- Utility may take ownership of RECs in return for rebate
  - **Minnesota Power**
    - \$2 per watt through 2010 with a 2kW maximum
  - **Great River Energy Coop**
    - \$2 per watt through Dec 31, 2009 with a 2 kW maximum

# Power Purchase Agreements

## Third party financed power purchase agreements (PPA)

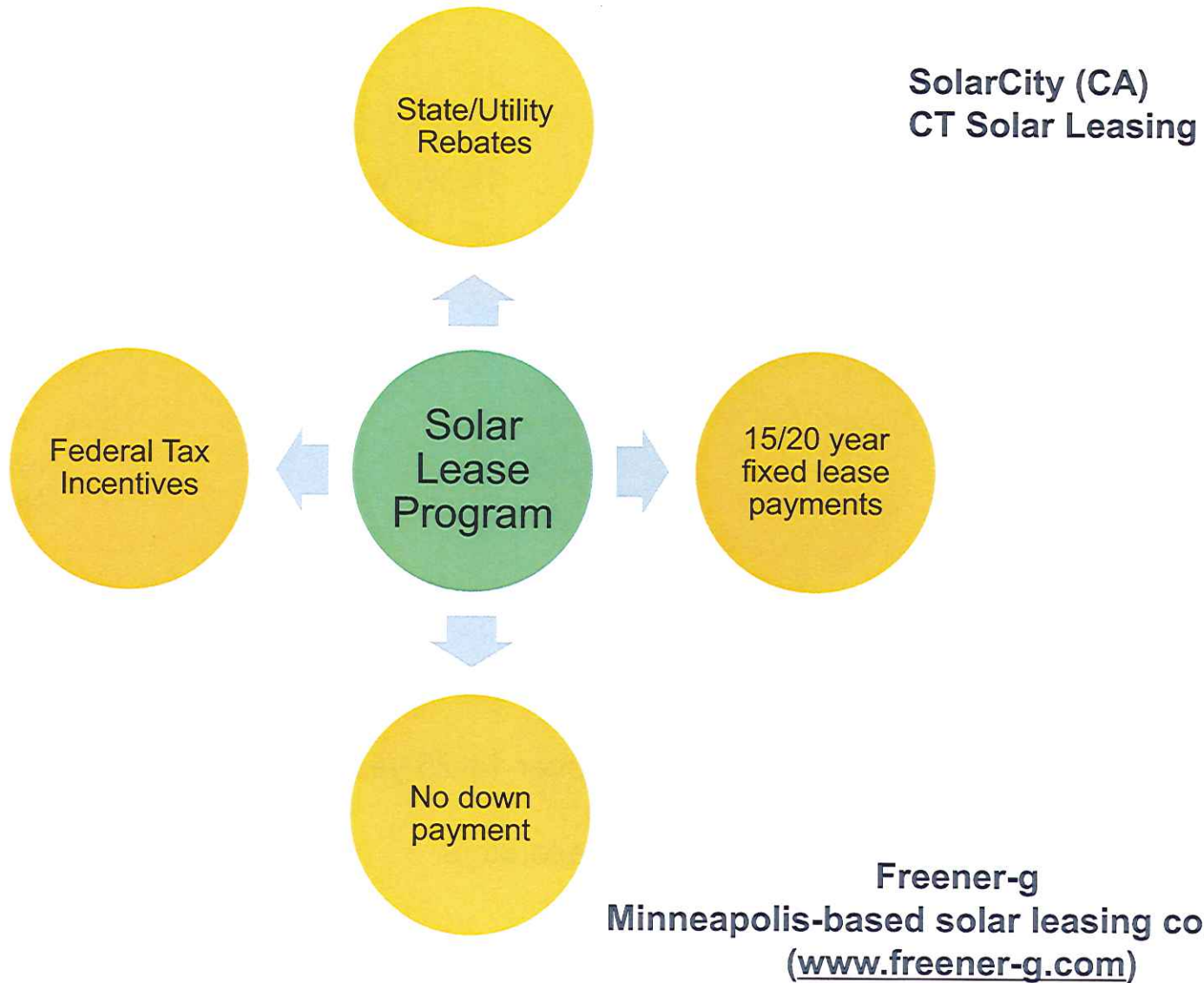
- Outside investor owns system and sells electricity to the host
- PV system is usually on the host's rooftop
- Hosts can be commercial entities, public entities, non-profits or homeowners
- More efficiently allocates and monetizes tax benefits
- No upfront capital cost for the host





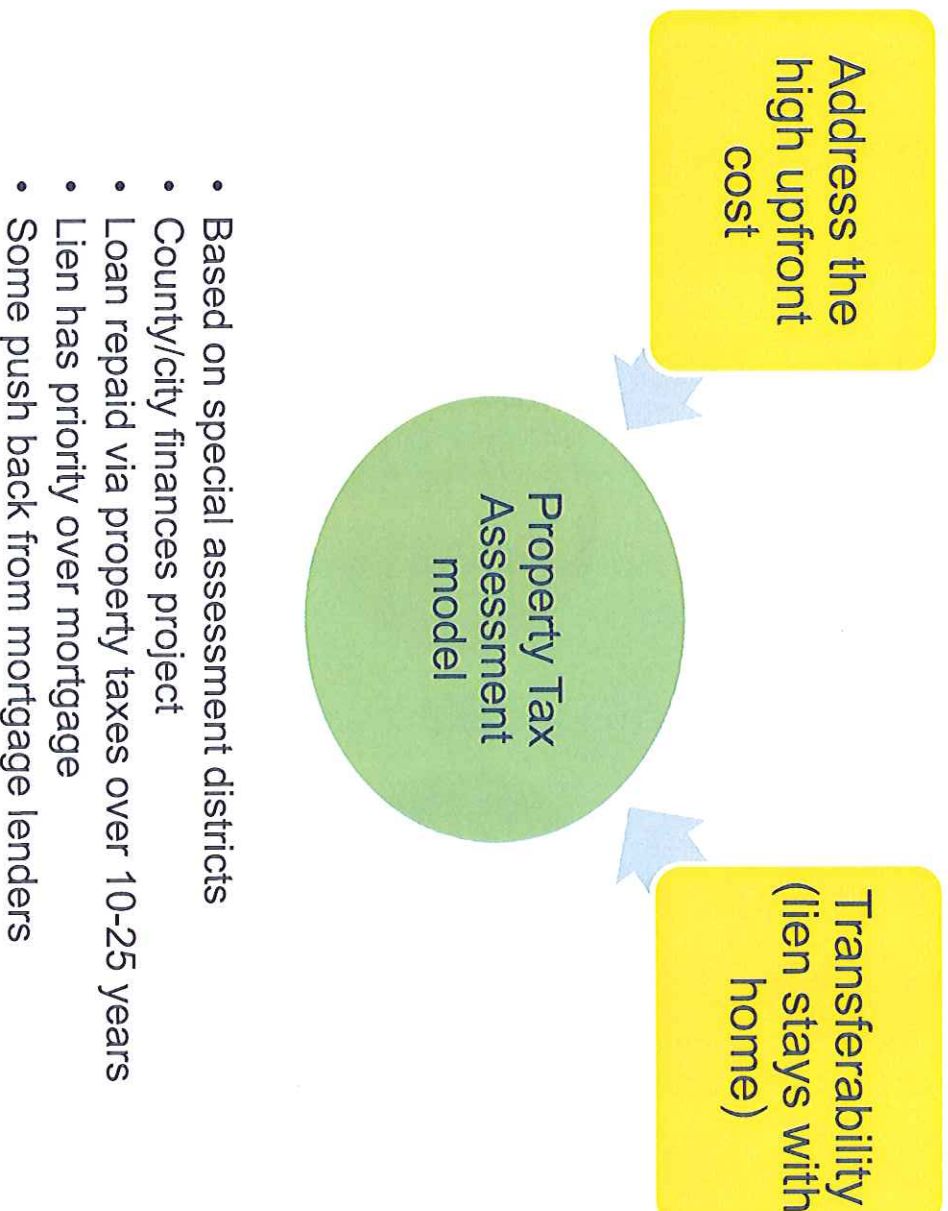
# Residential Solar Leasing

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# Property Tax Assessment Model

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- Based on special assessment districts
- County/city finances project
- Loan repaid via property taxes over 10-25 years
- Lien has priority over mortgage
- Some push back from mortgage lenders

## Enabling Legislation

- Arizona\*
  - California
  - Colorado
  - Florida
  - Hawaii
  - Illinois
  - Louisiana
  - Maryland
  - Nevada
  - New Mexico
  - New York\*
  - Ohio
  - Oklahoma
  - Oregon
  - Texas
  - Vermont
  - Virginia
  - Wisconsin
- \*pending



# Improving public awareness

Continued emphasis on outreach and education to communicate that solar is a low risk, commercial technology experiencing material reductions in the cost to purchase and install systems.

- High visibility demonstration projects
- Websites
- K-12 Renewable Energy Curriculum
- Solar Kiosks
- Solar Tour of Homes and Businesses
- Greater media coverage (TV, print, radio)
- Partnering with market allies – trades, corporations,
- Fact Sheets
- Solar Conferences and Workshops
- Solar America Cities Program
- Solar Decathlon



Photos courtesy of the Solar America Cities program and DOE

# Procedural Issues – Codes and Standards

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## Creating a Solar-Friendly Environment

- Implementing “Solar-Ready” building codes
- Revising **building codes and standards**, with input from the solar community, to increase the use of best practices in solar installations.
- **Streamlining** and standardizing the permitting process within and across jurisdictions
- Reducing or eliminating **solar permit fees**, particular for small installations
- Passing **solar access** ordinances
- Preventing **Home Owner Associations** from discriminating against solar installations.
- Educating **building code officials** about solar
- Creating policies to allow solar on **historic buildings** while still preserving the integrity of such sites.

**But don't ignore energy efficiency**

**In fact, consider making it a requirement**

# Workforce Development

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- Domestic renewable energy production offers significant job creation opportunities
- As the market expands rapidly in its early stages, a lack of qualified solar installers can lead to higher costs and quality issues.
- This creates the need for a number of training-related outreach activities

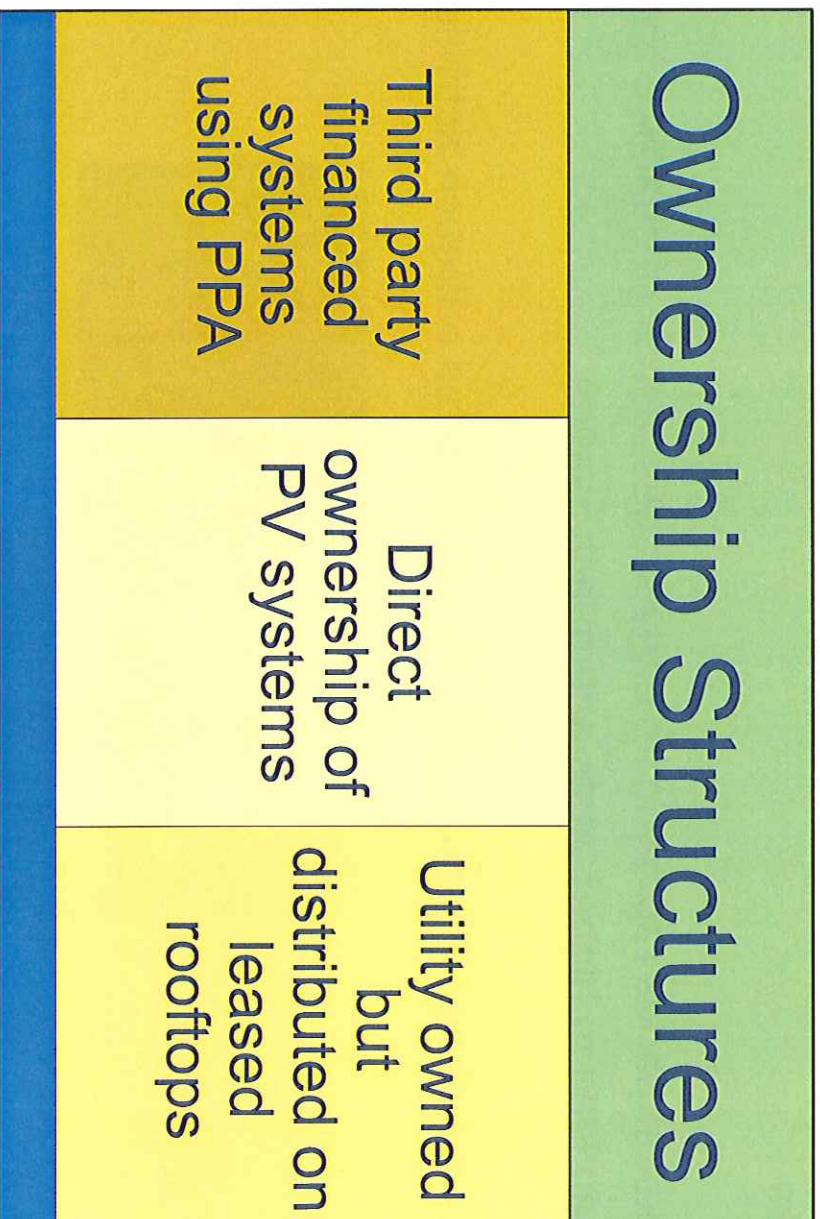


Photos courtesy of the Solar America Cities program



# Utility Trends

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# Opportunities for Utility Scale PV Systems

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Source: SunEdison and NREL. Alamosa Colorado. 8.2 MW



# New Participants in Facilitating Change

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It is important to consider solar energy applications across a wide range of activities rather than a niche solution for homeowners

- Solar energy as a component of all infrastructure planning
- Local governments working with the community to develop solar programs
- Incorporating solar into district energy systems
- Attracting solar manufacturing to Minnesota
- Solar as a component of Urban Renewal initiatives
- Solar Recharging for Plug-in Vehicles
- Solar and Affordable Housing



# Community Solar

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1. **This is not a Windsource program**
2. **One large PV system with many participants or subscribers**
  - Option for those who want to do more than participate in a voluntary green power program but who can't afford to install their own PV system.
  - Option for building owners with poor solar resources (e.g. trees in the way)
  - Option for renters and condo owners
3. **Benefit from cost savings due to the economies of scale of larger projects**
4. **More states are enacting policies to promote community solar by allowing participants to benefit from certain state tax credits (Utah) and electricity production incentives (Washington).**



St. George, Utah

Ellensburg, WA



# Summary

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- **Solar is ready today**
- **State driven marketplace with lots of models to learn from**
- **Technology constantly being enhanced**
- **Costs continue to fall**
- **Solar will benefit from any future carbon policies**
- **It is an industry that creates domestic jobs**





The U.S. Department of Energy's  
**National Renewable Energy Laboratory**

[www.nrel.gov](http://www.nrel.gov)

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