Michigan Public Service Commission

Grid Tied Solar Photovoltaic

Commissioner Orjiakor N. Isiogu

The Value of Grid-Connected Photovoltaics

- PV Value Components
  - **Energy and Generation**
    - Offset of fuel and O&M from other plants
  - **Capacity**
    - Reduce need to run high cost plants during peak
  - **Transmission and Distribution**
    - Distributed PV reduces infrastructure and losses
  - **Reactive Power Support**
    - Eliminates the need for capacitors to support VAR
  - **Environmental Benefits**
  - **Other**
    - Disaster recovery (black-start) and other ancillary benefits

Overview of U.S. Solar Policies

- Net Metering
- Feed in Tariffs
- Renewable Portfolio Standard – Solar Carve Out
- Community Solar
- Federal Tax Credit

Basic Net Metering

- Customer is billed based on net usage
- Customer receives a credit equal to the full retail rate for all excess kWh
- Credit is applied to kWh charges in future months and unused credits carry forward indefinitely
- Customer will pay monthly customer charge or system access fees

Feed-In Tariff Definition

- **Feed-in Tariff (FIT)*:** A renewable energy policy that typically offers a guarantee of:

1. **Payments** to project owners for the total amount of renewable electricity they produce;
2. **Access to the grid**; and
3. Stable, **long-term contracts** (15-20 years)

- **This revenue may pay for:**
  - Electricity sales, or
  - Electricity sales + RECs

* Also called fixed-price policies, minimum price policies, standard offer contracts, feed laws, renewable energy payments, renewable energy dividends, advanced renewable tariffs and standard offer contracts.

Detroit Edison Phase I SolarCurrents Pilot Program

- Available to DTE retail customers
- Solar PV only
- Limited to 5 MW capacity
  - At least half reserved for residential customers
  - System size limited to between 1 and 20 kW
  - Fully subscribed in May 2011
- Contract term of 20 years
- Pre-payment for ½ RECs
  - Company will pay $2.40/Watt (~half of installed cost)
- Production based payment for remaining RECs
  - Ongoing payments of $0.11/kWh
- Add-on to net metering; only category 1 net metering systems qualify (20 kW or less).

Detroit Edison Phase II SolarCurrents Pilot Program

- Program Same as Phase I except:
- Limited to 2 MW capacity
  - Awarded through four 500 kW random selection tranches
- Contract term of up to 16.5 years
- Residential
  - Pre-payment for ½ RECs
    - Company will pay $0.20 Watt
  - Production based payment for remaining RECs
    - Ongoing payments of $0.03/kWh
- Non-Residential
  - Pre-payment for ½ RECs
    - Company will pay $0.13 Watt
  - Production based payment for remaining RECs
    - Ongoing payments of $0.02/kWh

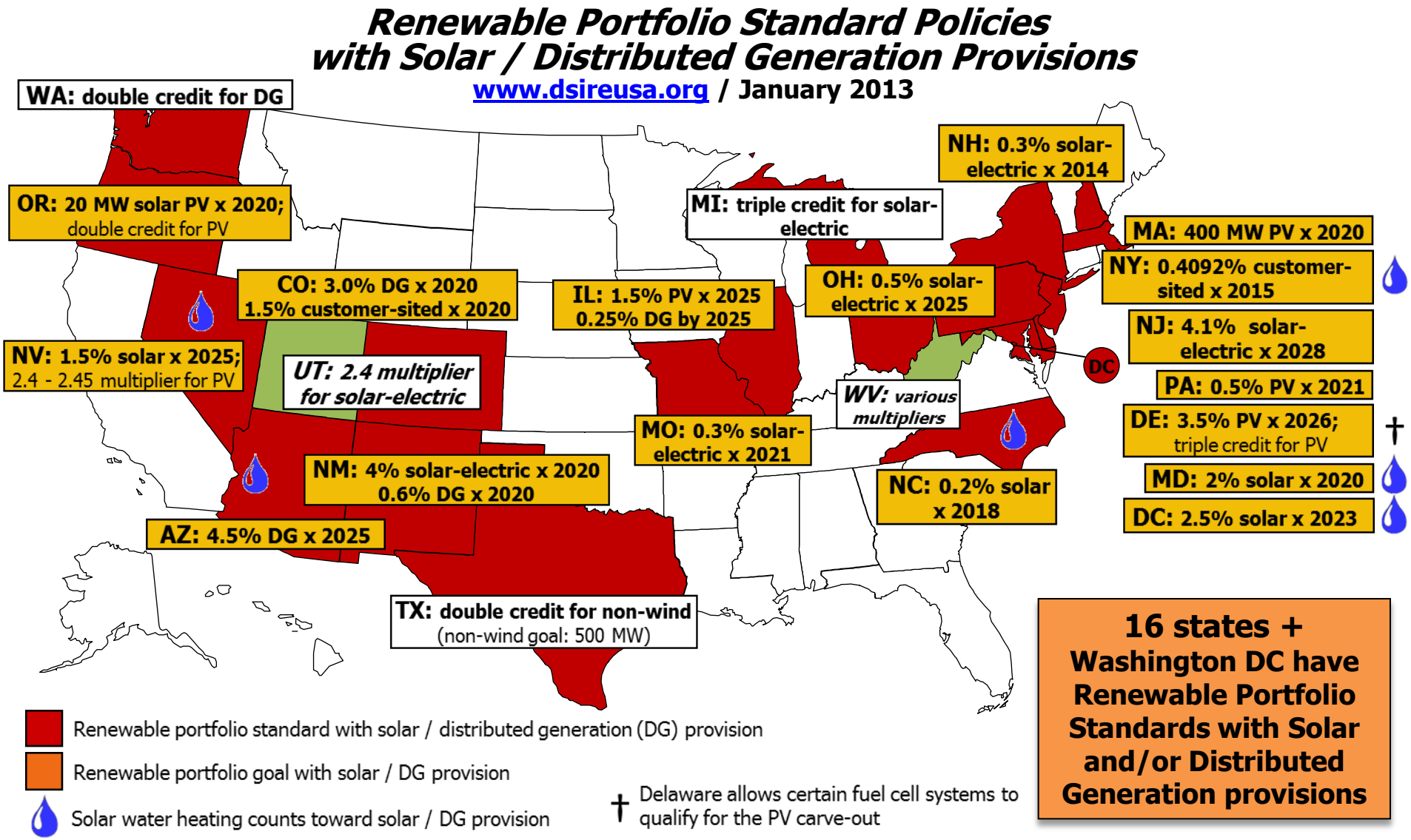
Consumers Energy
Experimental Advanced Renewable Program

- Available to CE Retail Customers
- Similar to SolarCurrents limited to Solar PV only
- Limited to 2 MW capacity
  - Fully subscribed in the first month
- Contract term of up to 12 years
- Prices vary based on customer class and when system is available (range: 65 to 37.5¢/kWh)
- No net metering. Separate generation meter.
- Consumers will own energy, capacity and RECs.

Consumers Energy Expanded Experimental Advanced Renewable Program

- Available to CE Retail Customers
- Solar PV only
- Limited to 3.25 MW capacity
  - Awarded through random selection tranches
- Contract term of up to 15 years
- Prices dynamic and responsive to previous tranche interest
  - Range: $0.26/kWh to $0.20/kWh
  - Bonus: $0.01/kwh for Michigan labor Michigan material
- No net metering. Separate generation meter
- Consumers will own energy, capacity and RECs.

RPS Solar Carve Out



Michigan's Renewable Energy Standard

2008 PA 295, cited as the Clean, Renewable and Efficient Energy Act (Act), requires Michigan electric providers to provide customers with at least ten percent of their electricity from renewable energy sources by 2015.

- Electric providers will meet these requirements through the purchase and/or production of Renewable Energy Credits (RECs).
- The Act provides for 2 Bonus Incentive RECs for Solar installations.
- The Renewable Energy Standard also applies to alternative electric suppliers.

What is Community Solar and Why?

A voluntary program in which multiple community members own or receive other benefit from a solar installation. (Some models may be considered “remote” or “virtual” net metering)

1. Individuals rent their homes
2. Associations prohibit solar
3. No desire to perform maintenance
4. Home does not have a conducive location for solar
5. Initial investment is too costly

Community Solar

COMPARISON OF MODELS

Administered by	Utility	Special Purpose Entity	Non-profit
Owned by	Utility or 3rd party	SPE members	Non-profit
Financed by	Utility, grants, ratepayer subscriptions	Member investments, grants, incentives	Donor contributions, grants
Hosted by	Utility or 3rd party	3rd party	Non-profit
Subscriber Profile	Electric rate payers of the utility	Community investors	Donors
Subscriber Motive	Offset personal electricity use	Return on investment; Offset personal electricity use	Philanthropy
Long-term Strategy of Sponsor	Offer solar options Add solar generation (possibly for Renewable Portfolio Standard)	Sell system to host Retain for electricity production for life of system	Retain for electricity production for life of system
Examples	Sacramento Municipal Utility District – Solar-Shares Program United Power Sol Partners	University Park Community Solar, LLC Clean Energy Collective, LLC	Solar for Sakai

Source: http://www.nrel.gov/docs/fy11osti/49930.pdf Published November 2010

Community Solar

	Utility	Special Purpose Entity	Non-profit
Electricity from Solar System	• Participant receives an estimated or actual kWh credit for their portion of project (virtual net metering) • Participant receives a monetary credit for the value of production for their portion of the project	• SPE sells the electricity to the utility (PPA) • SPE sells the electricity to the system host (SSA) • SPE assigns kWh to utility accounts per agreement with utility (virtual net metering) • Electricity from the system is netted against SPE members' group bill	• Non-profit owner uses on-site and net-meters • Non-profit owner assigns to utility accounts per agreement with utility (virtual net metering) • Electricity from the system is netted against a group bill
Renewable Energy Credits	• Assigned to participants • Retired on participants' behalf • Retained by the utility	• Rights to RECs sold up-front • RECs sold on an on-going basis • Retained for participants	• Rights to RECs sold up-front • RECs sold on an on-going basis • Retained for non-profit
Federal Tax Credits and Deductions	• Neither the commercial ITC nor the residential renewable energy tax credit is available to participants • If the utility has a tax appetite, it may use the commercial ITC • Normaliz ation accounting rules will impact the value of the ITC for regulated utilities	• SPE can pass benefits of Commercial ITC through to participants • Only of use if participants have a tax appetite for passive income offsets	• Project donors can deduct the donation on their taxes • Non-profits are not eligible for federal tax credits
Accelerated Depreciation (MACRS)	• Not available to participants • An investor-owned utility may be able to use MACRS, provided they own the system • To qualify for MACRS, regulated utilities must use normalization accounting	• SPE passes depreciation benefits through to the participants, subject to passive activity rules	• Not useful to non-profits
State and Utility Rebates and Incentives	• Utility may qualify and use rebates/incentives to buy down the project costs;, benefits are indirectly passed on to participants	• SPE may qualify and use rebates/incentives to buy down the project costs or pass through to partici-pants	• Nonprofit may qualify and use rebates/incentives to buy down the project costs

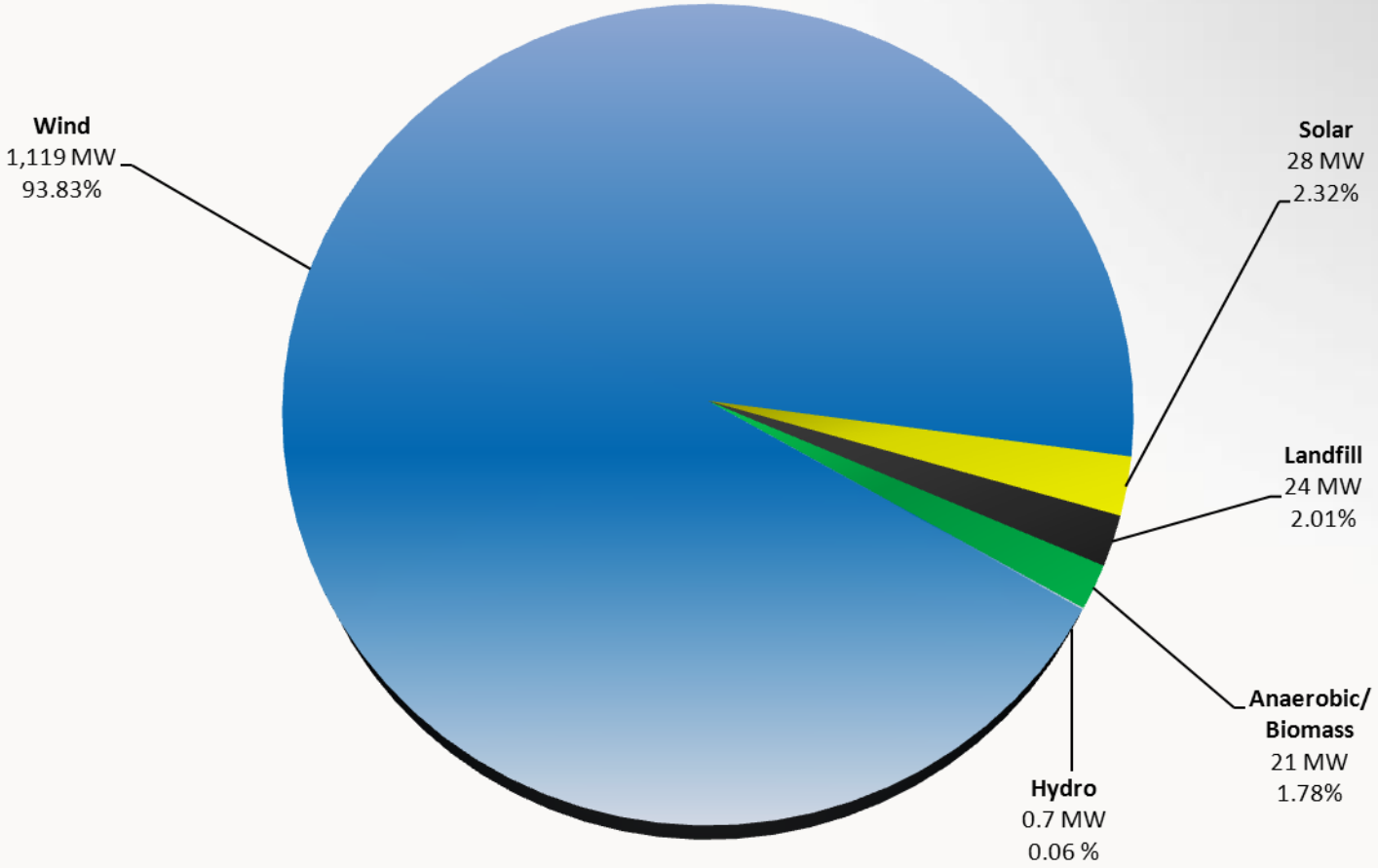
Source: http://www.nrel.gov/docs/fy11osti/49930.pdf Published November 2010

Federal Tax Credit

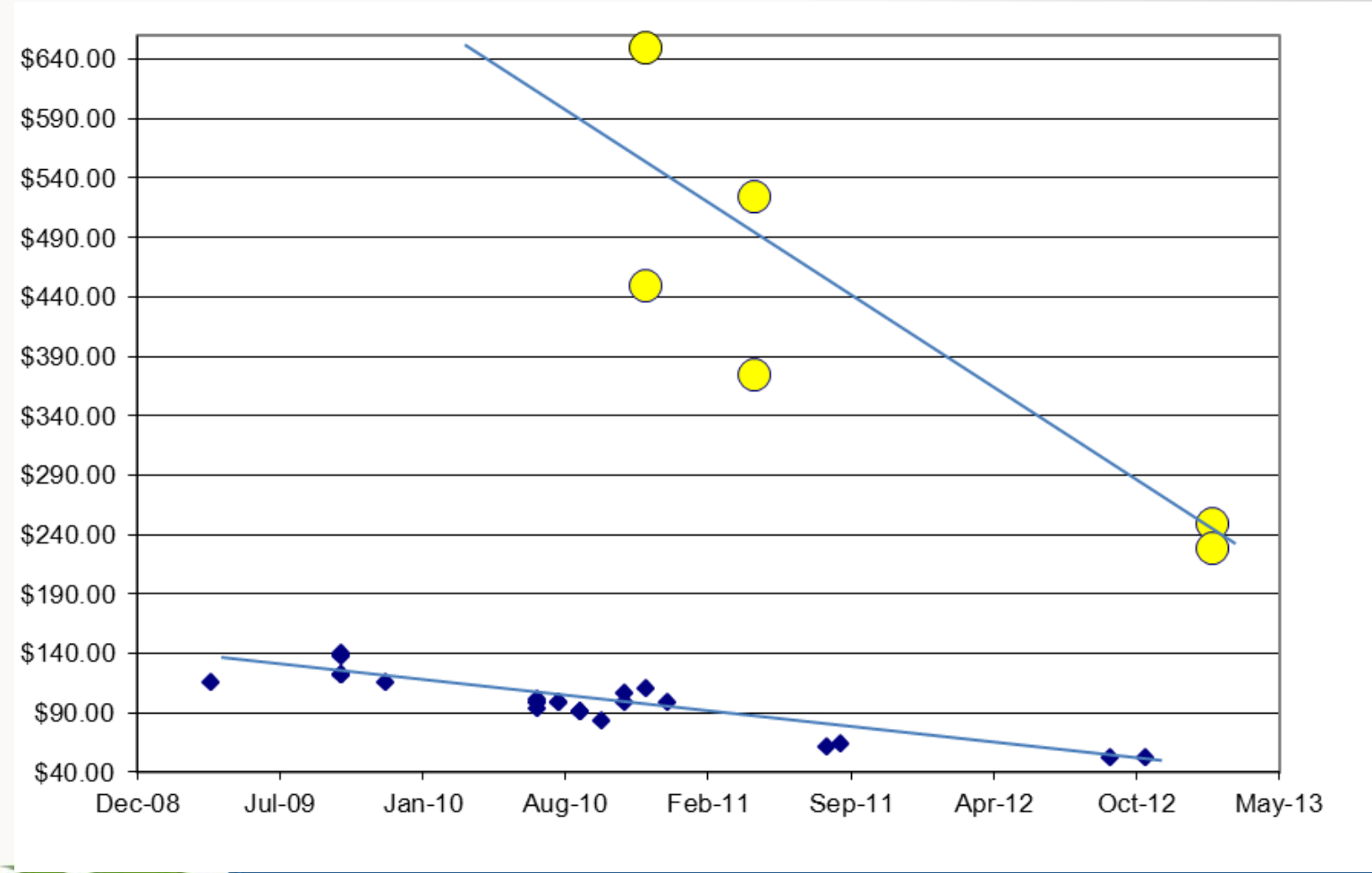
- 30% Personal Tax Credit for solar photovoltaic systems placed in service after 2008
  - For residential systems
  - Expires 12/31/2016
- 30% Investment Tax Credit for solar photovoltaic and solar thermal systems
  - For non-residential
  - Expires 12/31/2016

http://www.dsireusa.org/incentives/index.cfm?state=us

Solar in Michigan



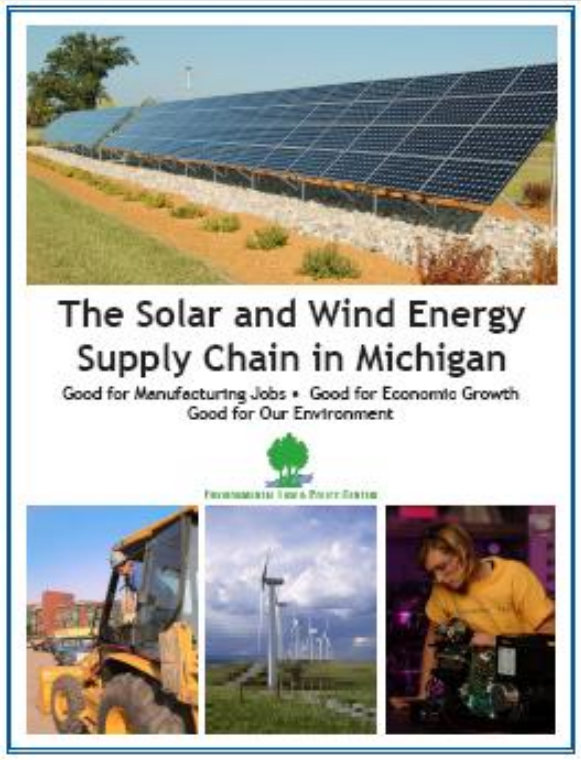
Small-Scale Solar Prices vs. Utility Scale Renewable Prices



Environmental Law & Policy Center

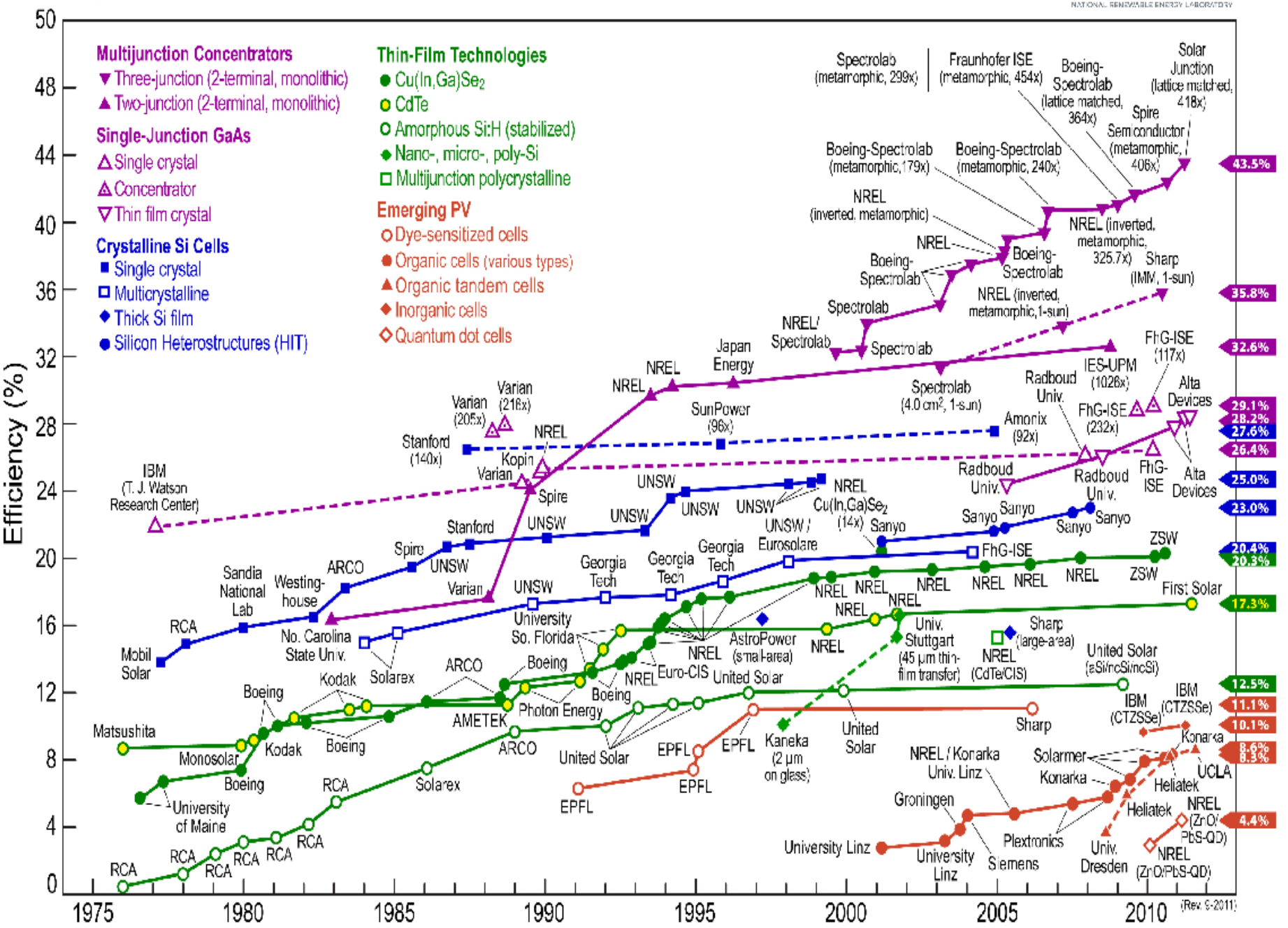
2011 Solar/Wind Supply Chain Report

- **121 solar power supply chain businesses**
- **120 wind power supply chain businesses**
- **Old line manufacturing companies are re-tooling to make renewable energy equipment for growing markets**

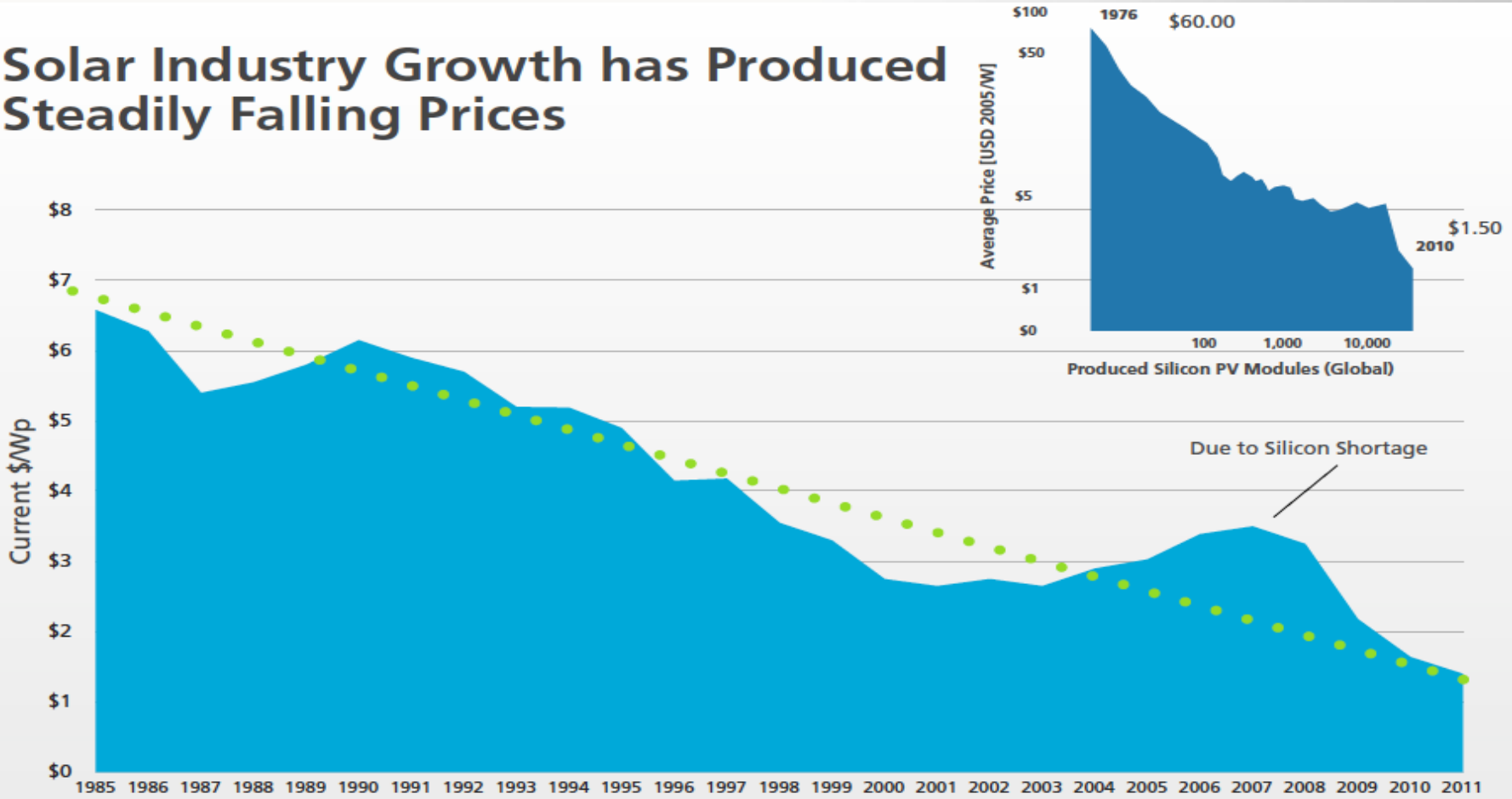


MICHIGAN PUBLIC SERVICE COMMISSION

Best Research-Cell Efficiencies



Solar Industry Growth has Produced Steadily Falling Prices



Module Pricing Trends 1985-2011

Sources: 1976 -1985 data from IPCC, Final Plenary, Special Report Renewable Energy Sources (SRREN), May 2011; 1985-2010 data from Paula Mints, Principal Analyst, Solar Services Program, Navigant; 2011 numbers based on current market data

Retrieved on 02/13/2013 from: http://thinkprogress.org/climate/2011/11/07/362705/krugman-solar-power/?mobile=nc

Learning Curve Cost Reductions

- *The DOE SunShot Initiative is a collaborative national initiative to make solar energy technologies cost-competitive with other forms of energy by reducing the cost of solar energy systems by about 75% before 2020.*

http://www1.eere.energy.gov/solar/sunshot/

Dow Powerhouse Solar Shingles

United Solar Ovanics Bankruptcy

"Auburn Hills, Mich.-based Energy Conversion Devices (ECD), a provider of flexible solar laminates and systems for the building-integrated and commercial rooftop market, has filed for Chapter 11 bankruptcy protection in a Michigan court."

Solar Industry; February 14, 2012; http://www.solarindustrymag.com/e107_plugins/content/content.php?content.9703

Hemlock Semiconductor Corporation

"Hemlock Semiconductor Group said on Monday it will lay off about 400 workers in Tennessee and Michigan due to a global glut of polysilicon and the threat of tariffs on its products sold in China."

Ruters; January 14, 2013; http://www.reuters.com/article/2013/01/14/us-hemlock-jobs-idUSBRE90D10A20130114

Solyndra Bankruptcy

"Solyndra LLC, which makes specialized cylindrical solar systems for commercial rooftops Wednesday announced in a statement that it was suspending operations because of unfavorable global economic and solar industry market conditions."

CBS SF; August 31, 2011;
http://sanfrancisco.cbslocal.com/2011/08/31/fremont-based-solyndra-shuts-down-operations-1100-laid-off/

Ford Best Buy Program

Focus Electric Charging Station Sales

- Ford is working with Best Buy to offer Ford Focus electric charging station sales, installation and technical support.
- Best Buy intends to sell the charging station, and offer complete consultation and installation services through its Geek Squad tech support services unit
- Ford's on-board 6.6-kilowatt charger allows for full charge at home with the 240-volt outlet in three to four hours
- http://www.media.fordvehicles.com/article_display.cfm?article_id=33772