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U.S. Department of Energy

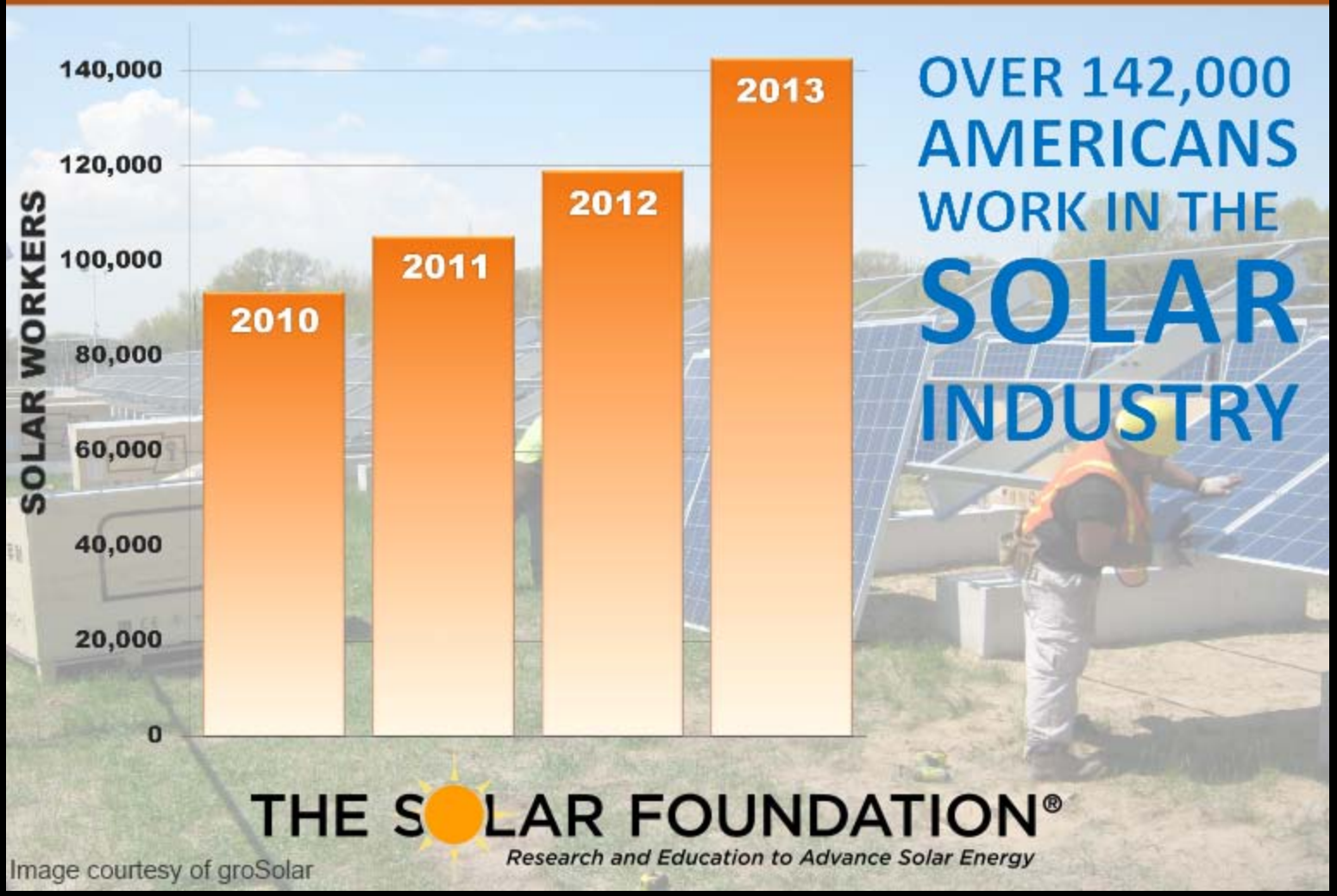


The SunShot Initiative
3/8/14

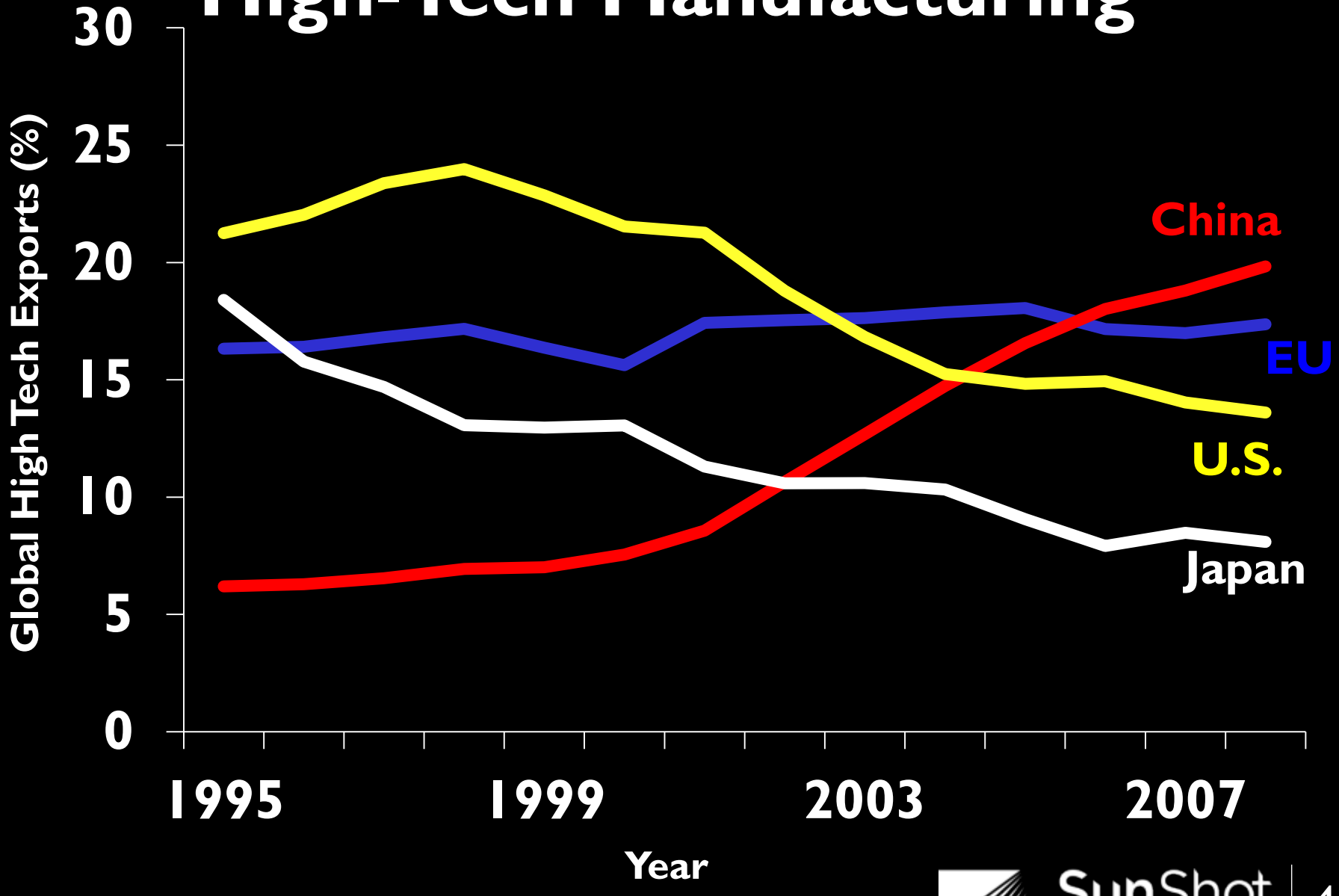
4.7 GW of PV in 2013

10X more installed than in 2009

NATIONAL SOLAR JOBS CENSUS 2013



High-Tech Manufacturing



Source: National Science Foundation, *Science and Engineering Indicators 2010*

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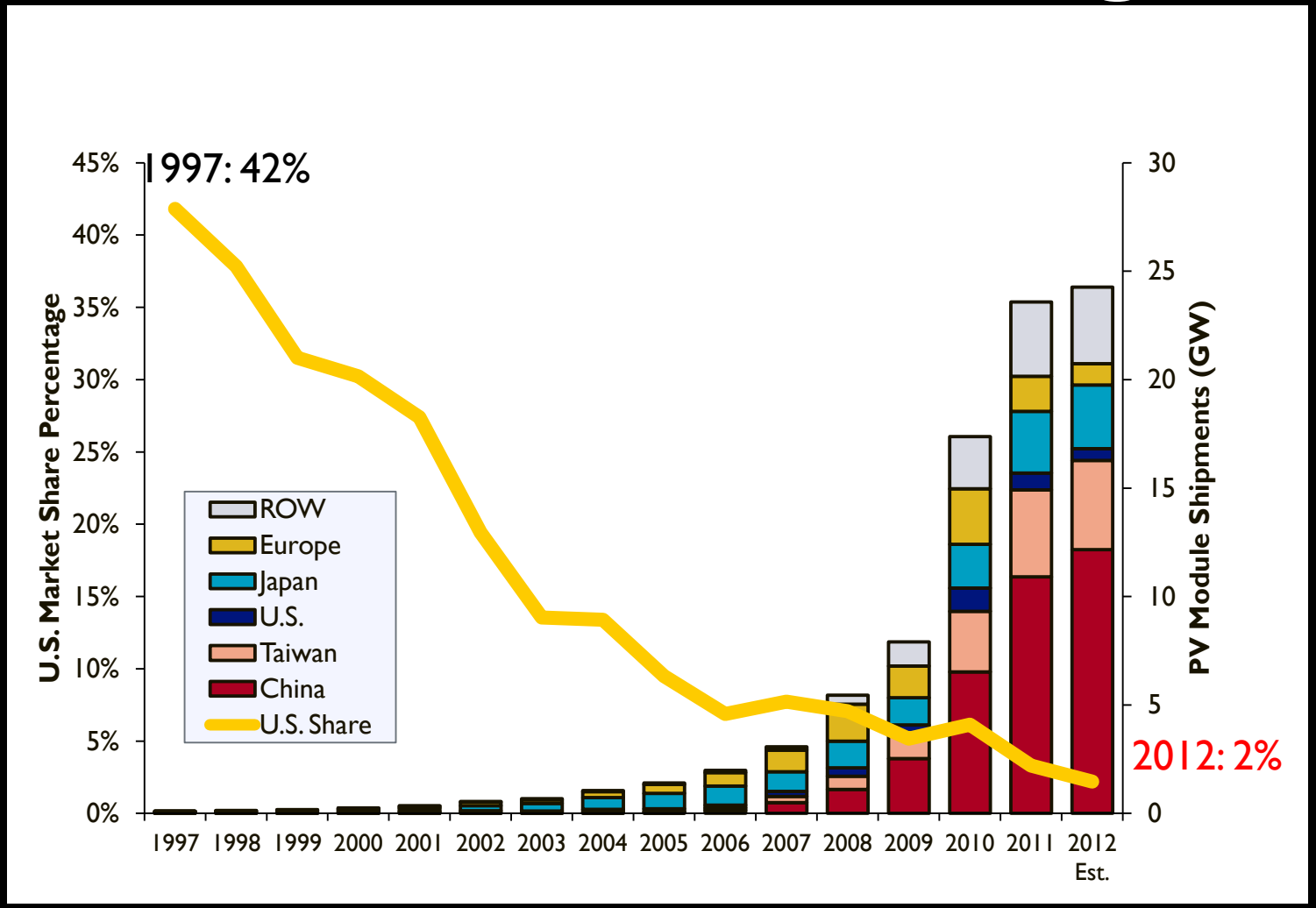
Erosion of Domestic PV cell and Module Manufacturing



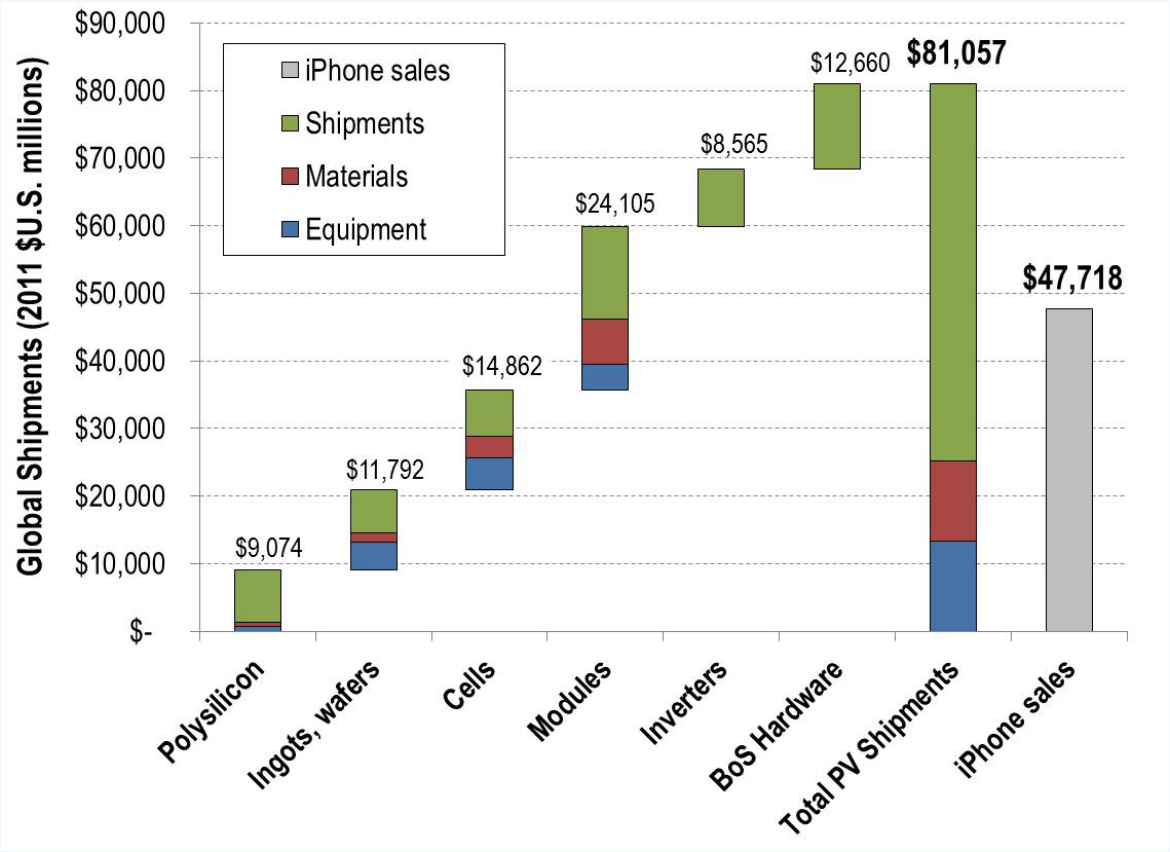
Manufacturing

"Abandoning today's 'commodity' manufacturing can lock you out of tomorrow's emerging industry."

- Andy Grove, co-founder, former CEO, Intel

Global PV Shipments are Significant

In 2011, PV shipments exceeded iPhone sales despite accounting for <1% of global electricity supply.



- Solar investments grew 52% in 2011 ($147 Bn)
  - While manufacturers experienced period of distress
- Demand led by developed economies
  - But, China demand surged in Q4; targets also raised 67%
- Threats to future investments
  - EU sovereign debt crisis
  - EU and U.S. policy

Sources: BNEF Q4 2012 PV Market Outlook, BNEF Q4 2012 Solar Spot Prices, GTM "Wafer-Cell-Module Database" (June 2012), VLSI Research, Photon (Inverter prices), NREL internal cost model (BoS hardware prices), UNEP (global solar investments)

Solar (PV) energy is capital intensive

Investments comprised mostly (63%) of manufactured goods

Manufacturer and direct-supplier revenues approached $100BN in 2011, despite solar PV accounting for <0.5% of world electricity generation

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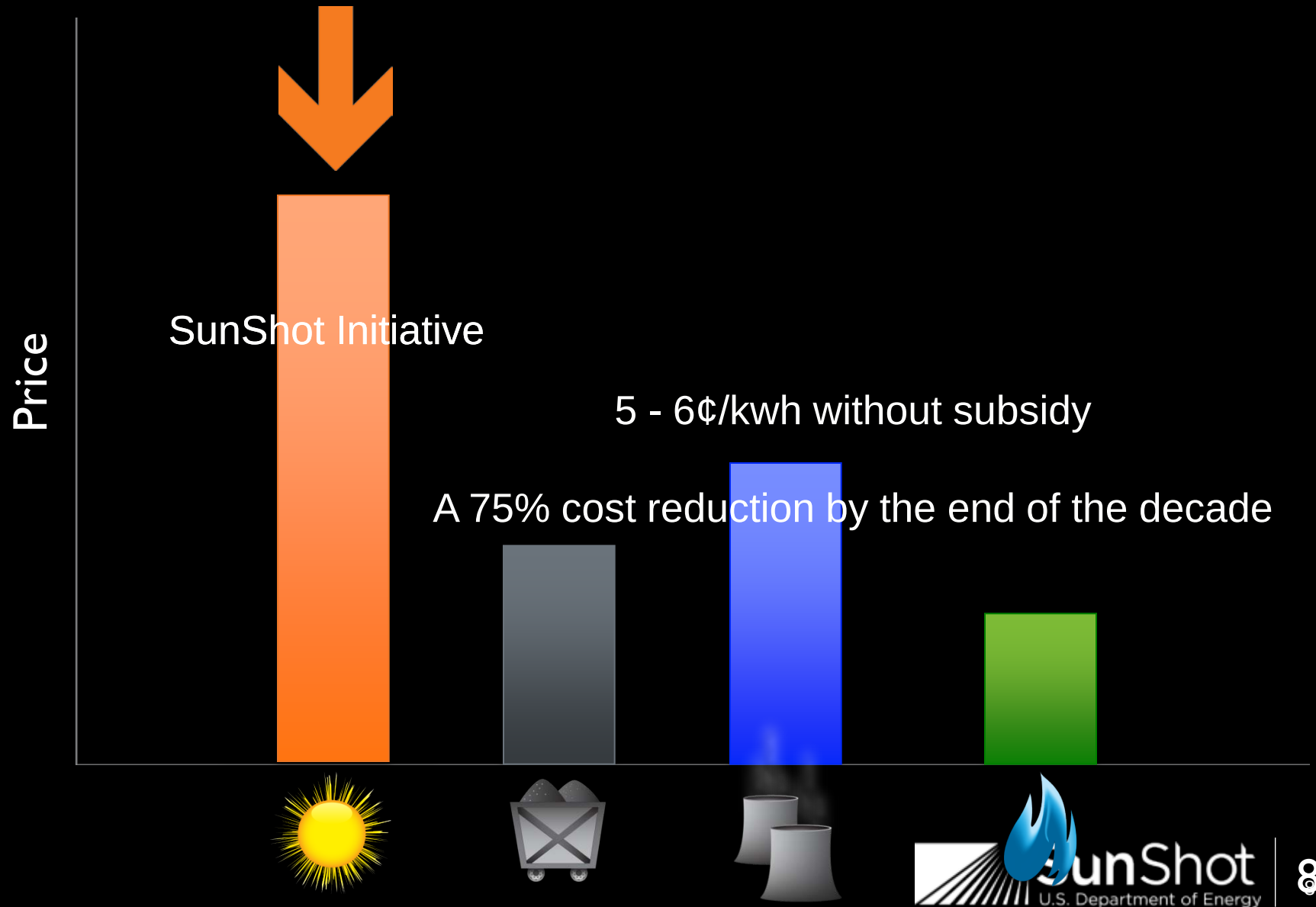
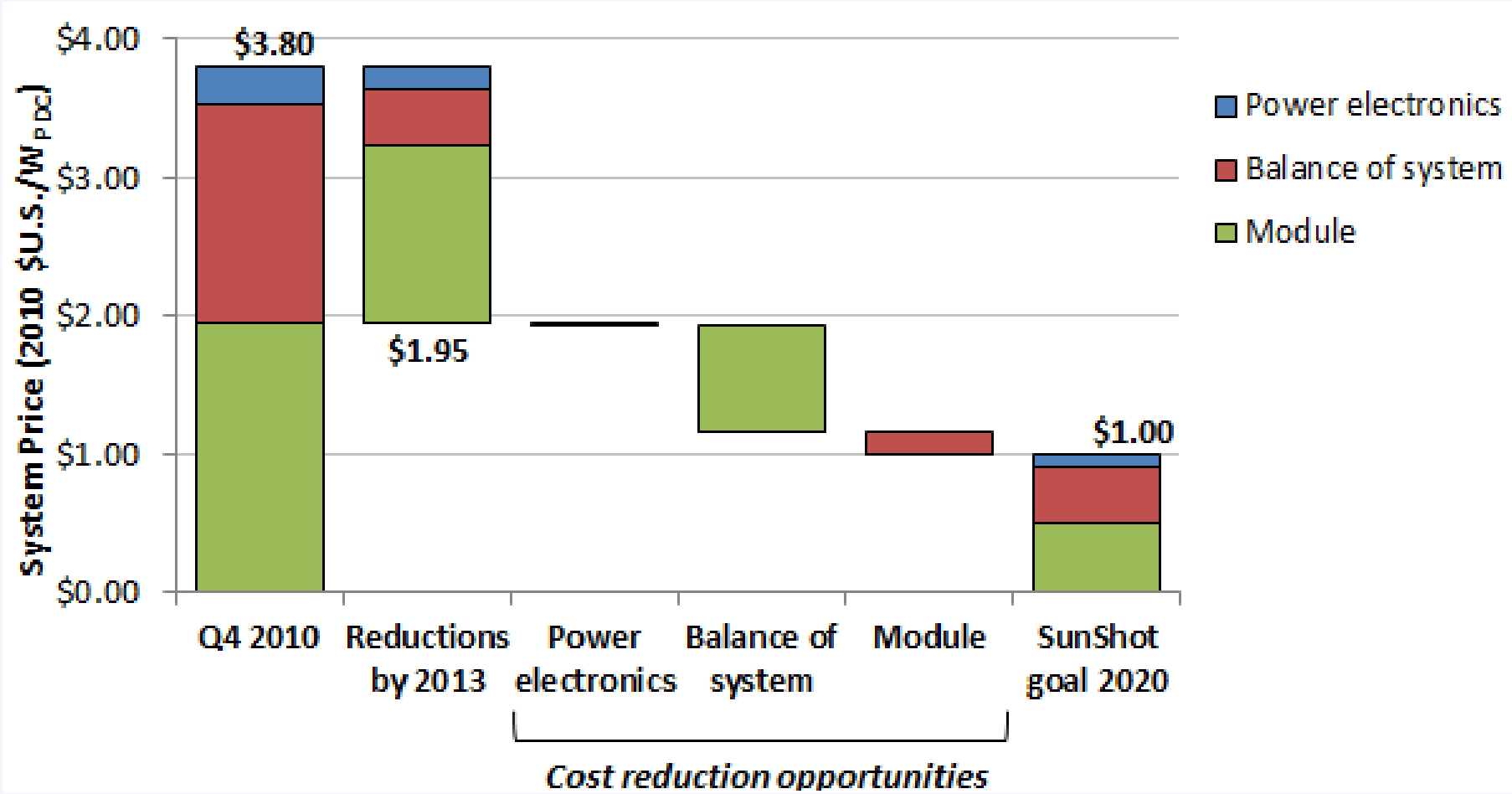
So what is the SunShot Initiative?



SunShot Utility Scale Progress Q42013



Sources: Margolis , R., et al. (2012). "*SunShot Vision Study*." DOE/GO-102012-3037. Golden, CO: National Renewable Energy Laboratory, pp. 265. Accessed 2013: http://www1.eere.energy.gov/solar/pdfs/47927_appendices.pdf; Goodrich, A; James, T; and Woodhouse, M. "*Residential, Commercial, and Utility-Scale Photovoltaic System Prices in the United States: Current Drivers and Cost Reduction Opportunities.*" NREL Technical Report No. TP-6A20-53347, Available Online at: www.nrel.gov/docs/fy12osti/53347.pdf . ; NREL internal (PV system cost) analysis (September 2013).

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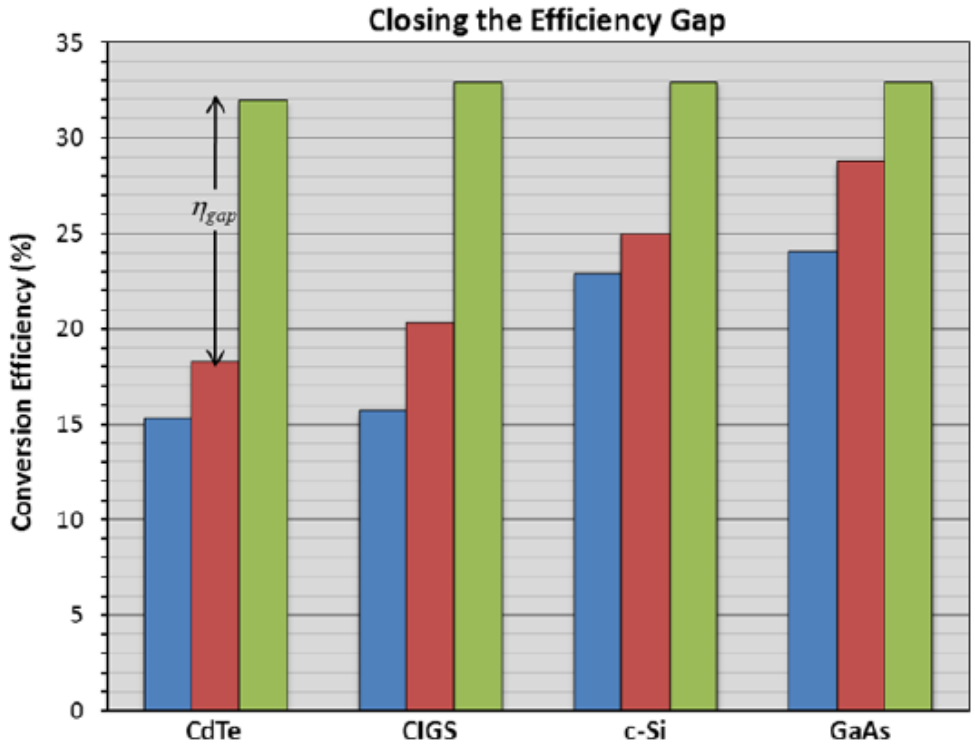
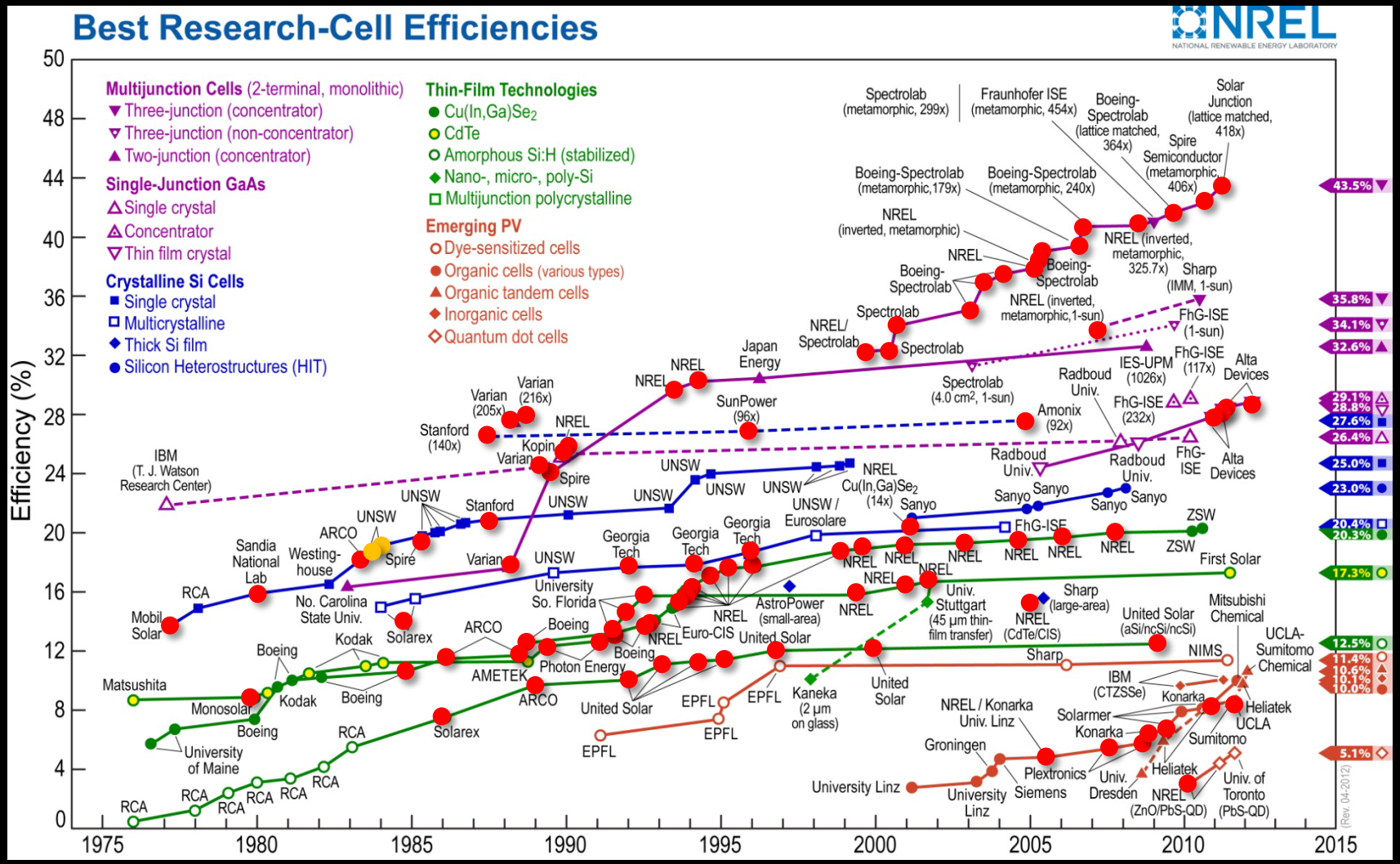
Reaching for Efficiency Limits



	CdTe	CIGS	c-Si	GaAs
Best Module[1]	15.3 ± 0.5	15.7 ± 0.5	22.9 ± 0.6	24.1 ± 1.0
Best Research Cell[2]	18.3 ± 0.5	20.3 ± 0.6	25.0 ± 0.5	28.8 ± 0.9
Schockley-Queisser Limit[3, 4]	32	33	33	33

[1] Green, M. A. *et al.*, "Solar cell efficiency tables (version 41)", *Progress in Photovoltaics: Research and Applications*, 2013, vol. 21, pp. 1-11. [2] Best Research-Cell Efficiencies, Rev 12-2012, National Renewable Energy Laboratory. [3] Green, M. A., "Radiative efficiency of state-of-the-art photovoltaic cells", *Progress in Photovoltaics: Research and Applications*, 2012, vol. 20, pp. 472-476. [4] Shockley, W. and Queisser, H. J., "Detailed Balance Limit of Efficiency of p-n Junction Solar Cells," *Journal of Applied Physics*, 1961, vol. 32, pp. 510-519.

World Record Cell Efficiencies

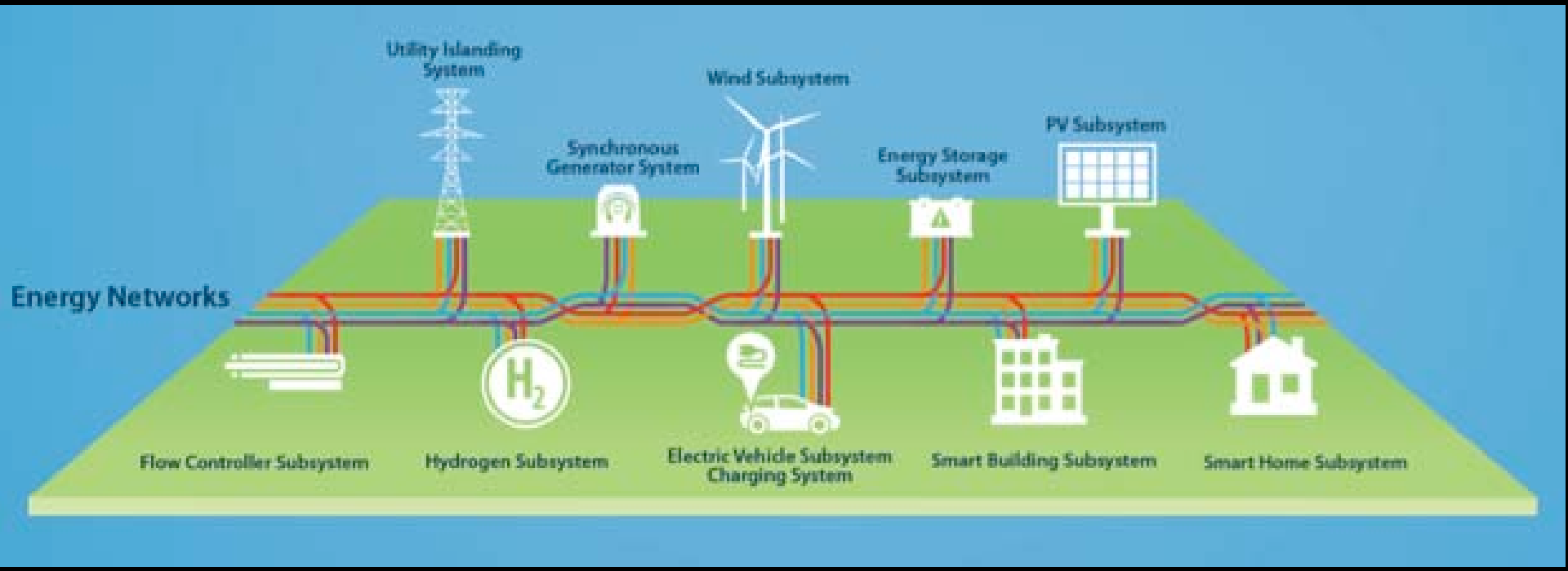


- ~50% of the world record cell efficiencies from 1975-2012 were made by researchers supported by the DOE

RTC Locations

SNL manages NM, NV, FL and VT
NREL manages CO

Energy Systems Integration



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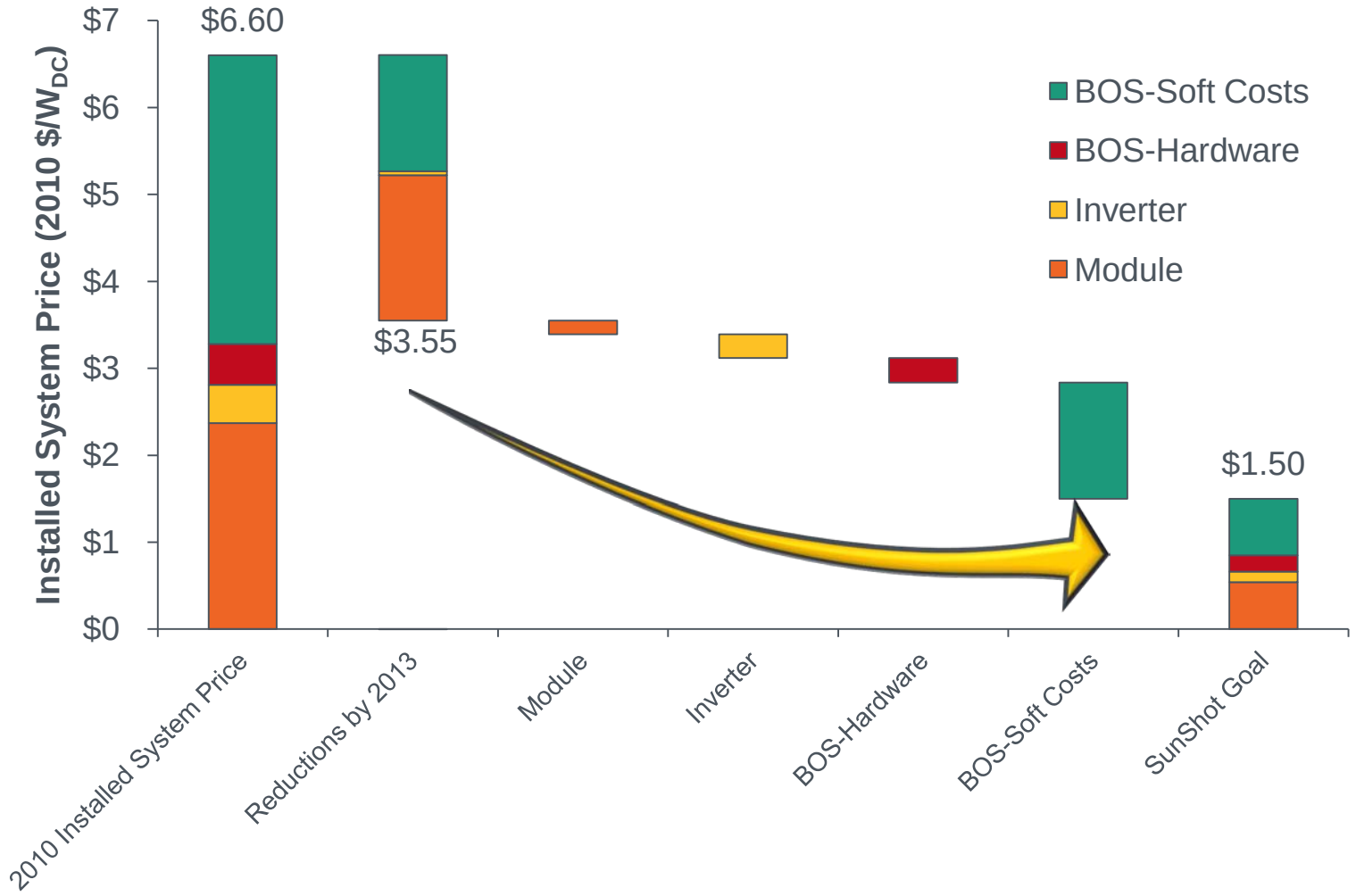
PV System Pathway to SunShot
Residential



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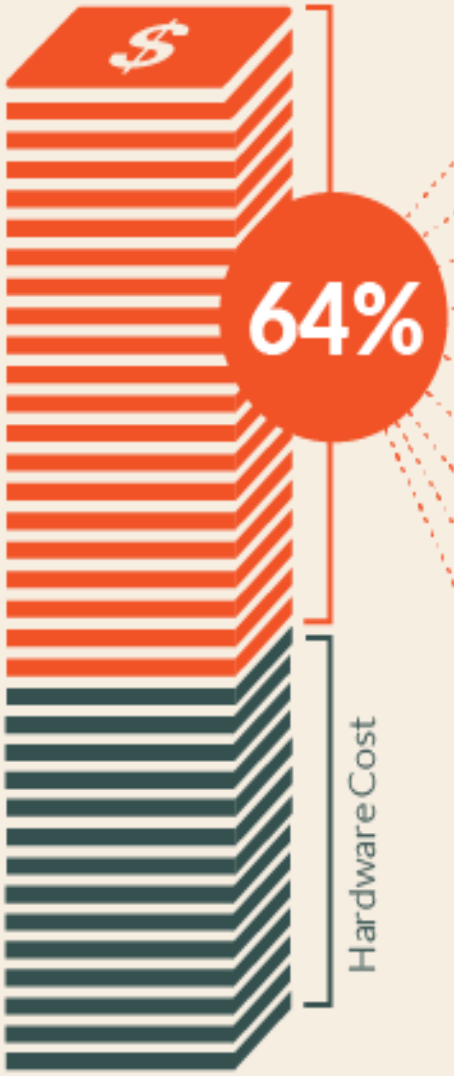
Soft Costs



2%	Permit Fee
2%	Permitting, Installation, Interconnection Labor
5%	Sales Tax
6%	Transaction Costs
9%	Installer/Developer Profit
9%	Indirect Corporate Costs
9%	Customer Acquisition
11%	Installation Labor
12%	Supply Chain Costs

Red tape related to solar installations can drive up costs and limit solar adoption. In the U.S., there are

18,000 JURISDICTIONS,
3,000 UTILITIES,
50 STATES,

with different rules and regulations.

More Paperwork = Higher Cost

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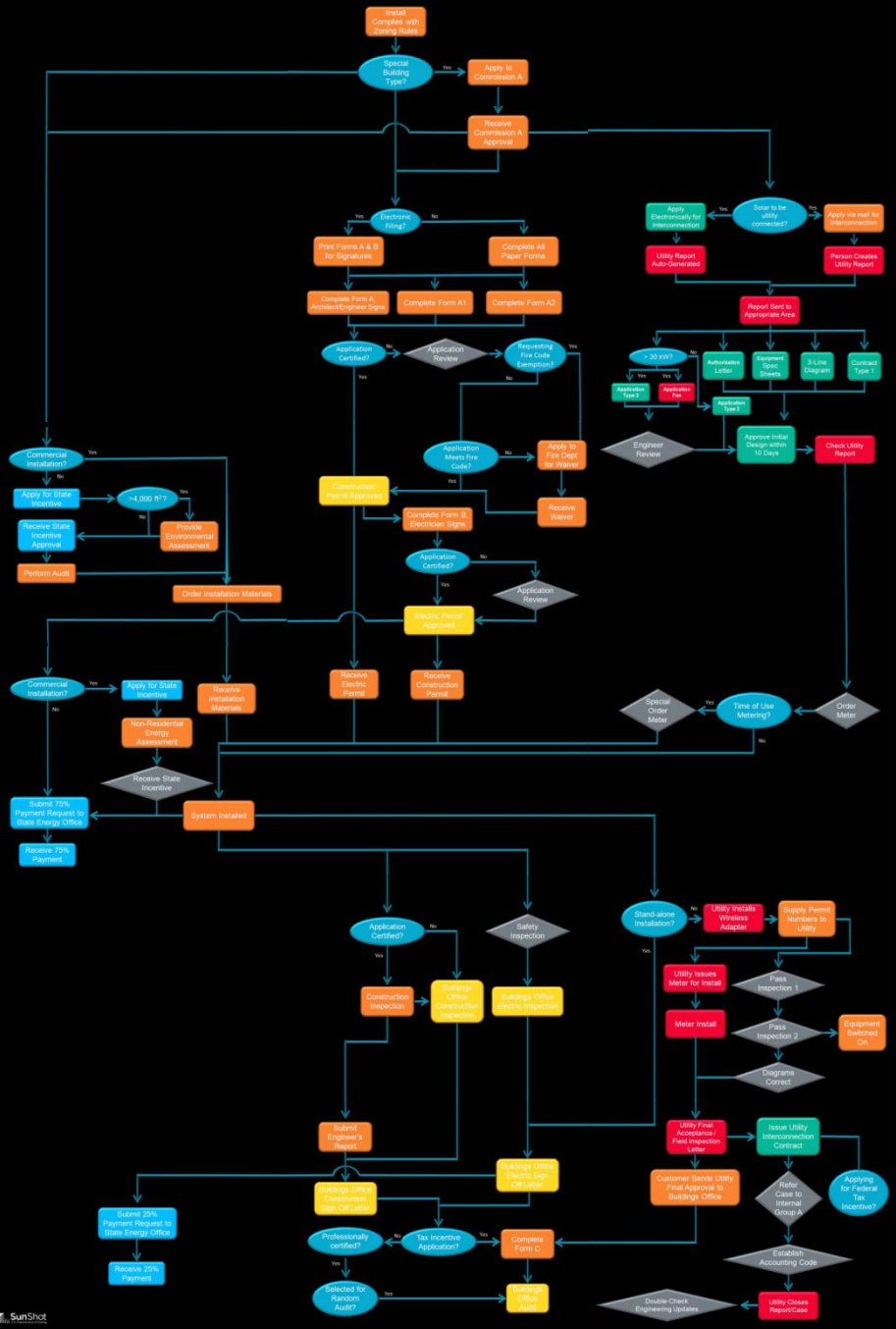

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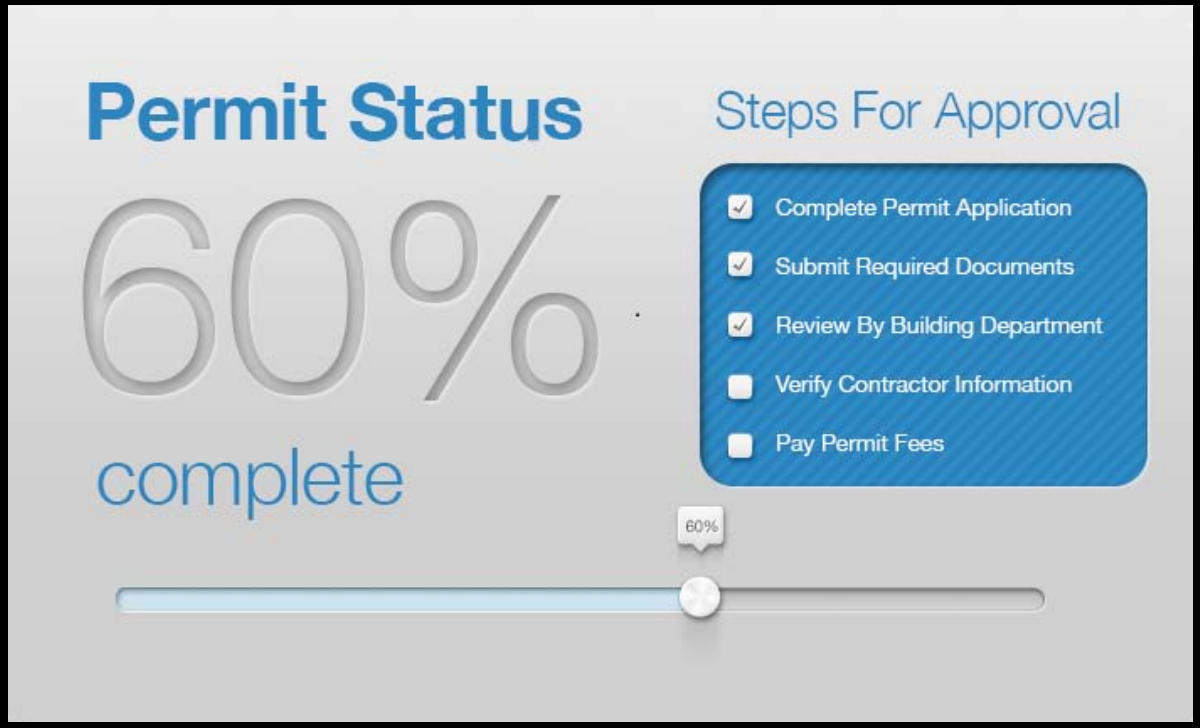
And Permitting is Different Everywhere

Unlike physics, where we can fundamentally figure out the upper limit for the efficiency of solar cells, there is no such limit to bureaucracy

Streamlined Permitting, Inspection

- Web-Based permitting
- Track you permits in real time
- Eliminate trips to permitting office

simply civic

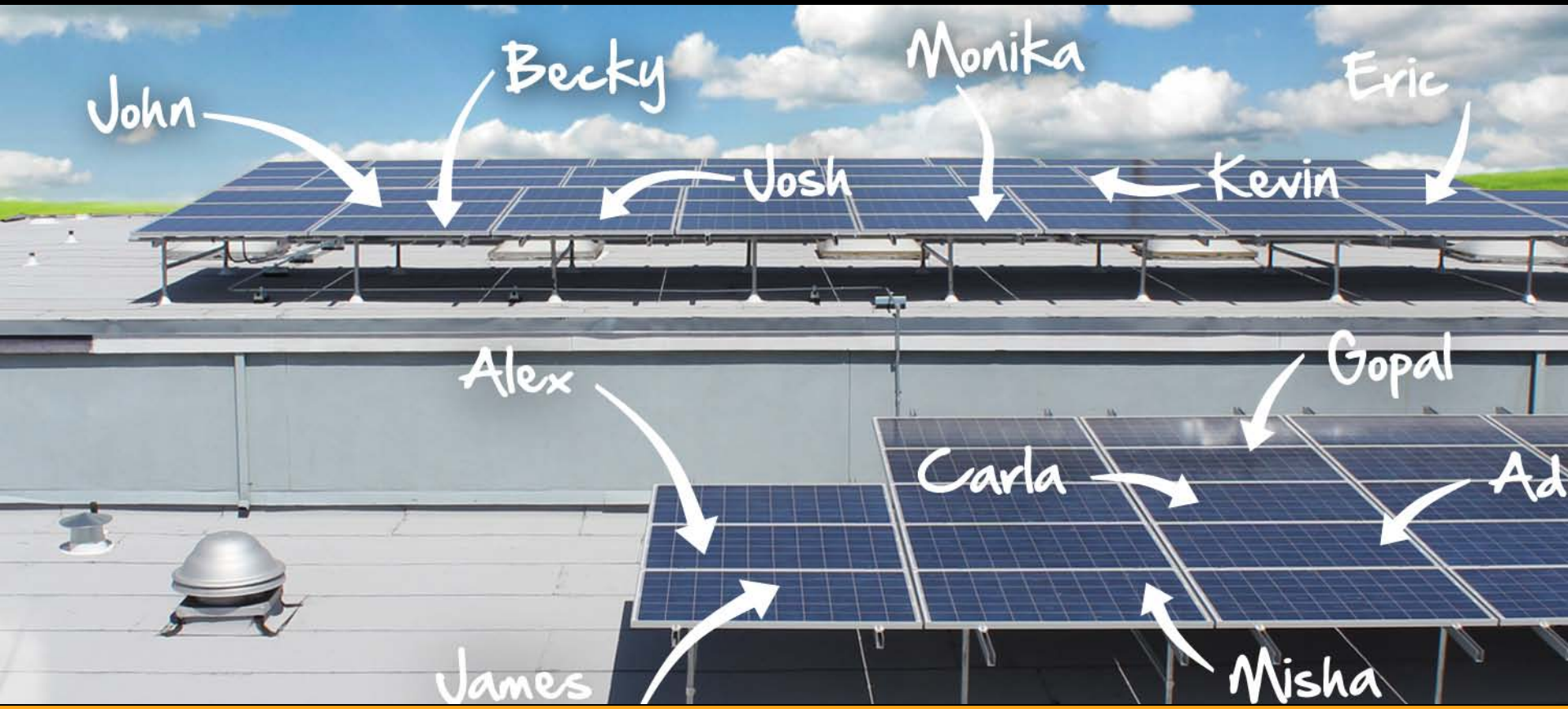


Big Data Lowers Solar Soft Costs

- Sun Number Scores - engaging consumers
- Roof top data processed to qualify buildings
- Lowering the cost of customer acquisition

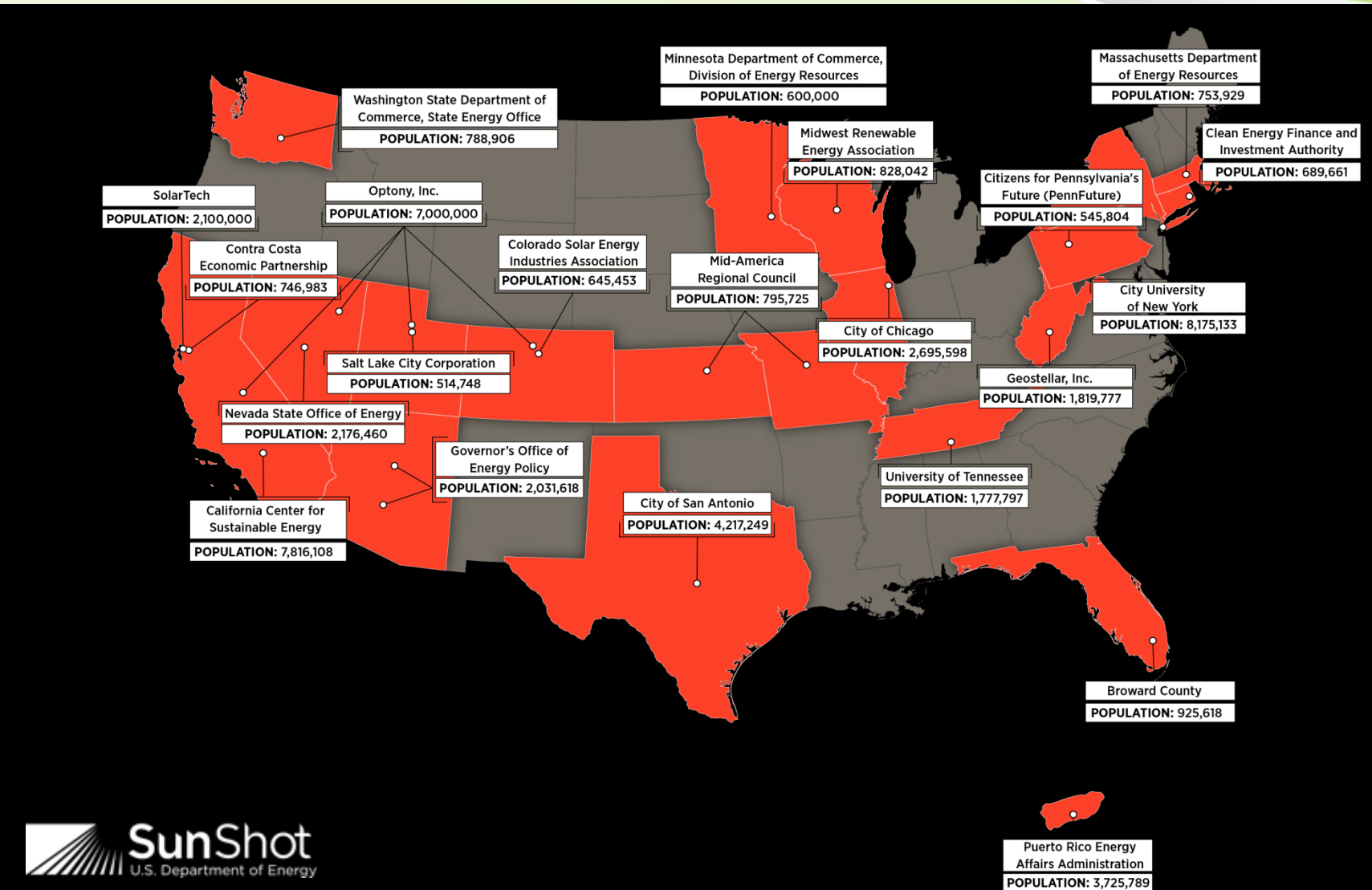
Crowd-Funded Solar

- Non-homeowners can go solar for $25
- Crowdfunding lowers the cost of capital



ROOFTOP SOLAR CHALLENGE

A national effort to make clean solar electricity cost–effective for your community.



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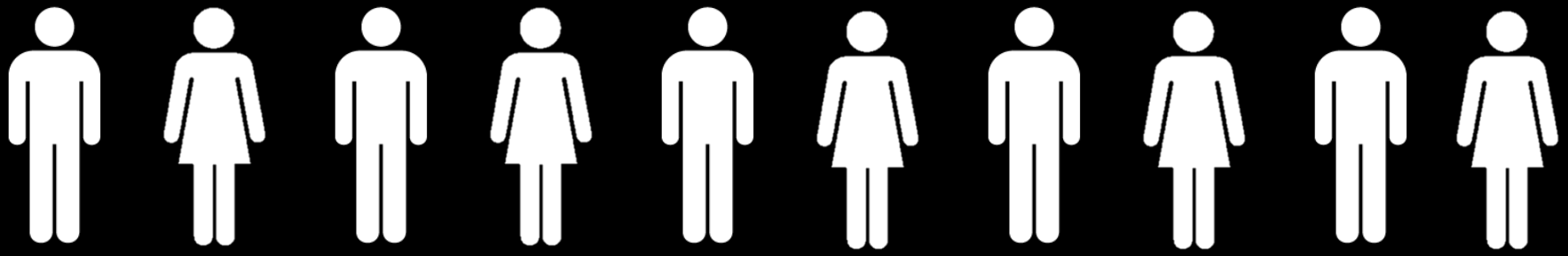
Well, let's say you can shave 10 seconds off of the boot time. Multiply that by five million users and that's 50 million seconds, every single day. Over a year, that's probably dozens of lifetimes. So if you make it boot ten seconds faster, you've saved a dozen lives. That's really worth it, don't you think?

22 Rooftop Solar Challenge Teams
Cut red tape by 1 week
600 MW installed
40,000 installations
40,000 weeks of red tape = 768 Years of red tape
About 10 lives saved



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