



Small Scale PV for Large Scale Market Penetration

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There needs to be a message!

A simple goal for solar power generation

maybe . . . **20% by 2040 or 2050?**

- How do we get there?
- How do we build a political base?

➔ Increase capacity by expanding small-scale, user-owned, distributive PV systems!



What is small scale?

System sizes are increasing . . . across all sectors:

Sector	2010 installations	2010 percentage	2011 projection
Residential	264 MW	30%	19 %
Non residential	372 MW	42%	27%
Utility	242 MW	28%	54%
Total	878 MW	100%	100%

Source: SEIA/GTM; Solarbuzz

Small scale is distributive generation equal to . . .
15% to 20% of owner's electricity consumption.



What about the residential sector?

... why are these systems so large ?

U.S. 2010 residential installations:

- Installed capacity: 264 MW; 46,000 installations
- Average size: 5.7 kW (i.e., twenty-five 230Wp panels!)

What's up . . . what are the drivers:

- Demographics of early adopters
- Bias of residential installers & lease aggregators
- Federal and local incentives
- Low market frequency

Source: IREC, 2011



Residential . . . the perfect PV market

To grow the PV market . . . we need to embrace the primary attributes of grid-tied ***residential PV***:

- It's distributive
- It's scalable
- It's maintenance free
- It's offsets the highest electricity rates
- It's user-owned . . . democratization, choice



Why small-scale residential PV?

- More affordable
- It takes less space on the roof
- It's easy and less expensive to install
- More efficient
- Economic investment
- More aesthetic
- Perfect hedge



Sample residential electricity usage

	Monthly usage	1.38 kW system	1.84 kW system
U.S.	908 kWh	Percentage of electricity usage	
Forth Worth	1,140 kWh	14%	18%
Phoenix	1,076 kWh	17%	23%
Richmond	1,170 kWh	12%	17%
Tampa	1,133 kWh	14%	18%
Boulder	687 kWh	17%	33%
Harrisburg	842 kWh	16%	22%

In most U.S. markets, 6 to 8 panels would equal 15% to 20% of household electricity usage.

Source EIA (2009 data) & PV Watts



Reduce size to increase PV capacity

- There are > 75M owner occupied homes in America + 15M second homes!
- Many are not suitable for PV systems, BUT
 - There are many more homes that have room for 6 to 8 panels instead of 25 panels,
 - There are many more owners that can afford 6 to 8 panels instead of 25 panels,
 - Small-scale is aesthetic, efficient, affordable, easy to install, and easy to own.

U.S. Census Bureau 2010



20MW or 2kW: a case for DRG

	Utility scale	Home rooftop
Land use		✓
Installation cost (Wp)	✓	
Maintenance		✓
Security		✓
Time to market		✓
Decentralization		✓
Distributive		✓
T&D upgrade		✓
T&D loss		✓
Efficiency		✓
Environment		✓
Political base		✓



Market drivers for large scale PV?

It's big business . . . it's large cap . . . it's big players

- Rapid RPS compliance
- Contractor expertise (EPC)
- Legal expertise; tax driven equity
- Finance platform availability (PPA's)
- Turf preservation . . . utility side of meter
- Government / trade association support



Project Amp . . . a case in point

A big win for the big players . . . **DOE** provides \$1.4B in loan guarantees for 733MW on 750 warehouses

- Participants: NRG, Prologis, & Bank of America
- Incentives: Federal loan guarantee, Section 1603 cash grant, 100% bonus depreciation
- Political base: big business . . . but little popular support!
- Section 1705: 12 projects = \$12.4B = 422 FT jobs



Building a political base for PV

In announcing Project Amp, . . . DOE Secretary Chu states:

*This unprecedented solar project . . . will help us meet the **SunShot** goal of competitive [utility scale] solar power with other forms of energy by the end of the decade.*

To address PV's potential in America, there must be a political base of supporters . . .

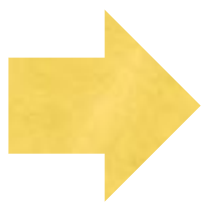
**➔ homeowners and business owners
. . . not Bank of America.**



What if . . . *Bring it home America!*

A federal loan guarantee program for small scale home solar systems: 50% installed costs

- $733\text{MW} / 1.84\text{kW} = 400,000$ homes
- $\$1.4\text{B} / 400,000 = \$3,500 / \text{home}$
- $\$3,500 \approx 50\%$ after PTC costs at $\$5.00/\text{Wp}$



Benefits: homeowners create political base; jobs for local contractors; jobs for local suppliers, loans for local banks; clean air for local communities!



Small scale PV . . . let's do the math

Assume

- 1.84kW Fort Worth (eight 230's)
- PV Watts derate factor
- 11.51¢ kWh (BFIT)
- 30% PTC, NO REBATES
- Installed cost \$5.00 W
- \$6,480 APTC . . . Just do it!

Electricity escalation	25 yr. IRR
None	4.26%
3%	7.71%
30 year Treasury	2.80%



What about the electric utilities?

- It's time to get onboard with residential distributive generation.
- It's highly efficient and grid-friendly.
- There are numerous revenue opportunities.
- Grid-tied PV works because it's grid-tied. T&D providers should be compensated too.
- If you look to PUC's for protection from the future, it may be protection you don't want!



In Summary . . . small scale PV

- Good for homeowners
- Good for local contractors
- Good for the PV industry
- Good for political base

