

Sustainable Solar Education Project Webinar

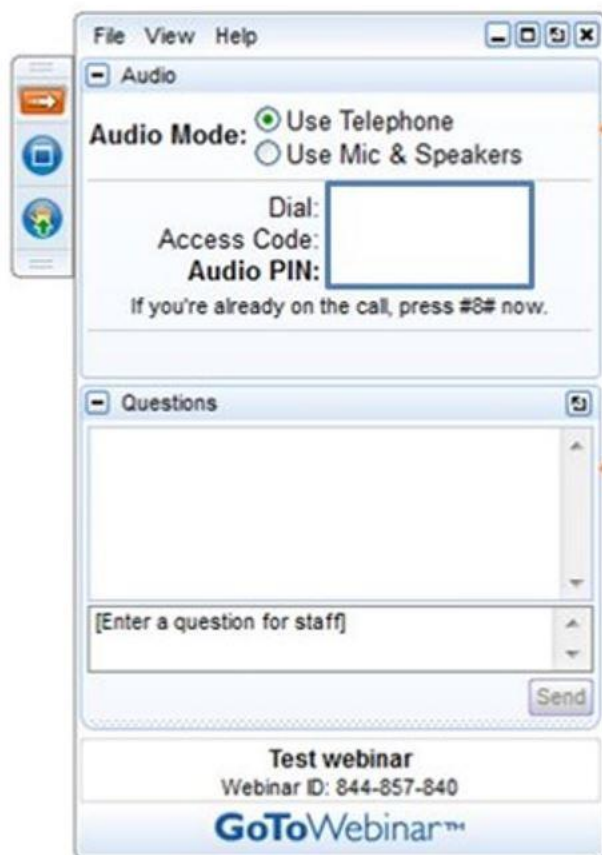
Residential Solar Financing 101

Hosted by
Nate Hausman, Project Manager, CESA

June 22, 2016



Housekeeping



The screenshot shows the GoToWebinar interface. The top section is titled 'Audio' and contains the following options: 'Audio Mode:' with two radio buttons, 'Use Telephone' (selected) and 'Use Mic & Speakers'. Below this are fields for 'Dial:', 'Access Code:', and 'Audio PIN:'. A note at the bottom of the Audio section says 'If you're already on the call, press #8# now.' The bottom section is titled 'Questions' and contains a large text area for entering questions, a smaller text area with the placeholder '[Enter a question for staff]', and a 'Send' button. At the very bottom, it says 'Test webinar' and 'Webinar ID: 844-857-840'.

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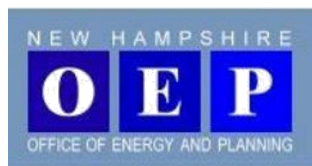
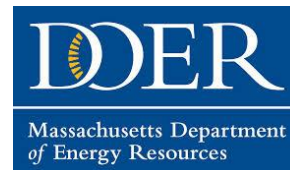
← Submit your questions at any time by typing in the Question Box and hitting Send.

This webinar is being recorded.

You will find a recording of this webinar, as well as all previous CESA webcasts, archived on the CESA website at

www.cesa.org/webinars

CESA Members



Sustainable Solar Education Project

- Provides information and educational resources to state and municipal officials on strategies to ensure distributed solar electricity remains consumer friendly and benefits low- and moderate-income households.
- The project is managed by the Clean Energy States Alliance (CESA) and is funded through the U.S. Department of Energy SunShot Initiative's Solar Training and Education for Professionals program.
- Sign up for the Sustainable Solar mailing list to receive our free monthly newsletter and announcements of upcoming events:

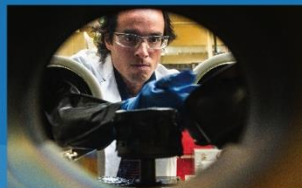
www.cesa.org/projects/sustainable-solar/newsletter/



Today's Guest Speaker

- **Travis Lowder**, Energy Analyst, National Renewable Energy Laboratory (NREL)





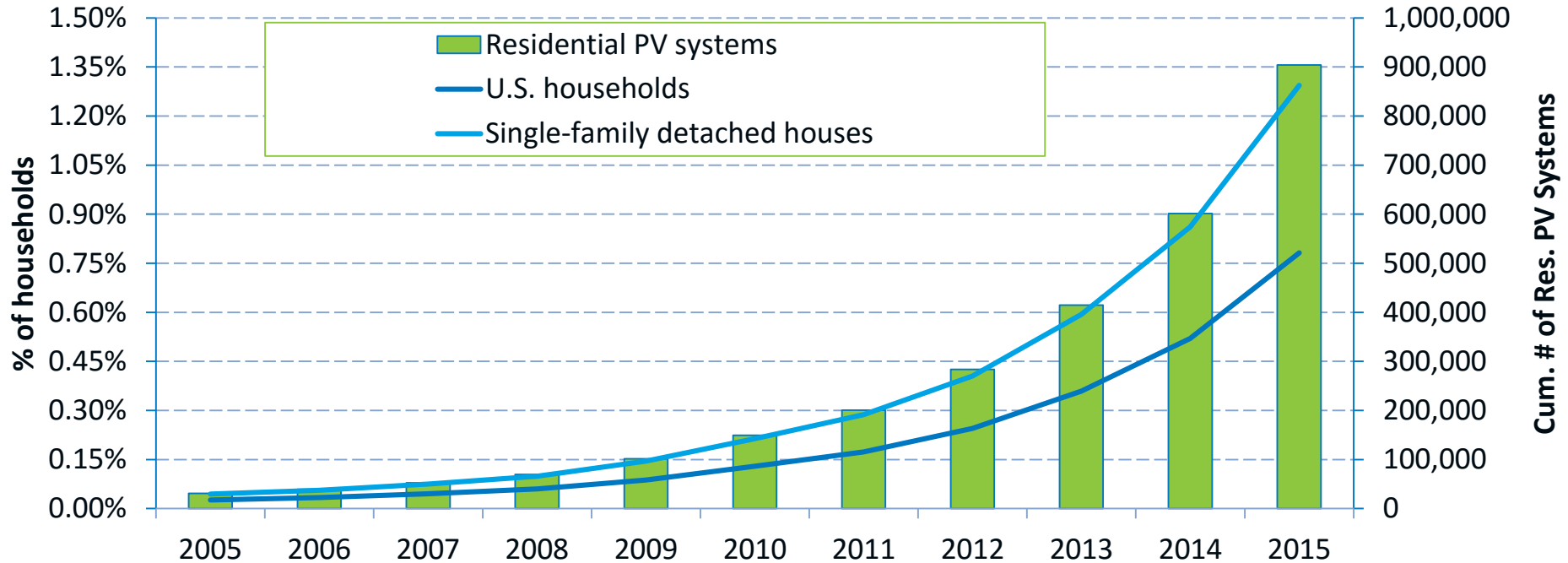
Residential Solar Financing 101

Travis Lowder

National Renewable Energy Laboratory

Wednesday, June 22nd 2016

Demand and Growth



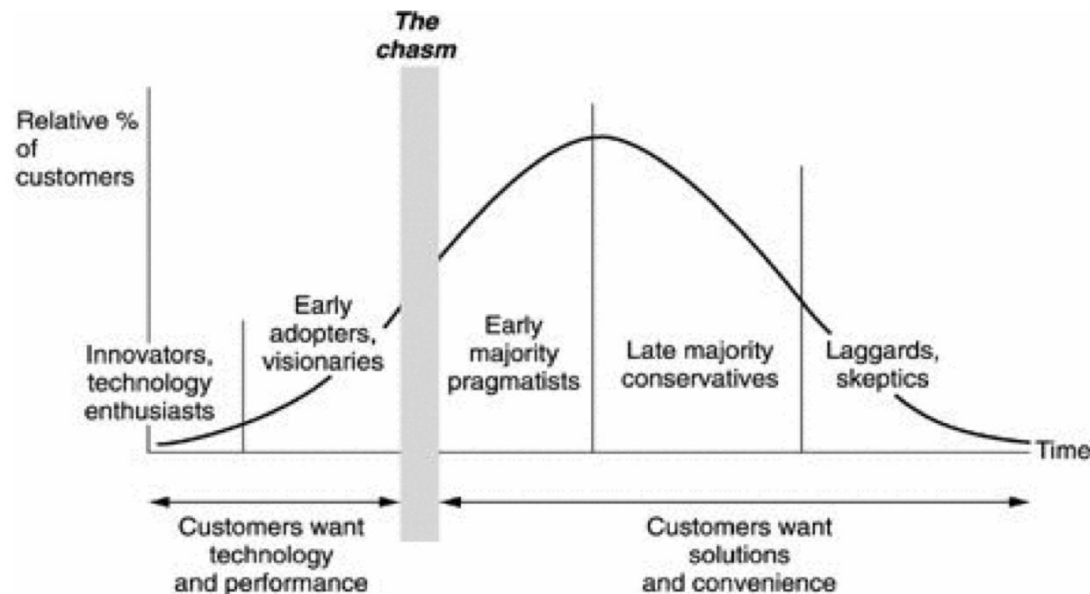
Since 2005, the residential PV market has grown by approximately 55% per year (or about 77x)

Currently a “lumpy” market. Most installations in CA, AZ, HI, MA, NY, NJ, CO and a handful of other states

Sources. Res. PV Installations: 2000-2009, IREC 2010 Solar Market Trends Report; 2010-2015, SEIA/GTM Solar Market Insight 2010-15 Year-in-Review. U.S. Households (<http://quickfacts.census.gov/qfd/states/00000.html>); Single –family houses (<https://www.census.gov/hhes/www/housing/census/historic/units.html>).

What is Driving Residential Solar Adoption?

- Environmental motivations
- Energy self-determination
- Increase home value
- Economics
 - Electricity bill reduction
 - Hedge against utility rate increases



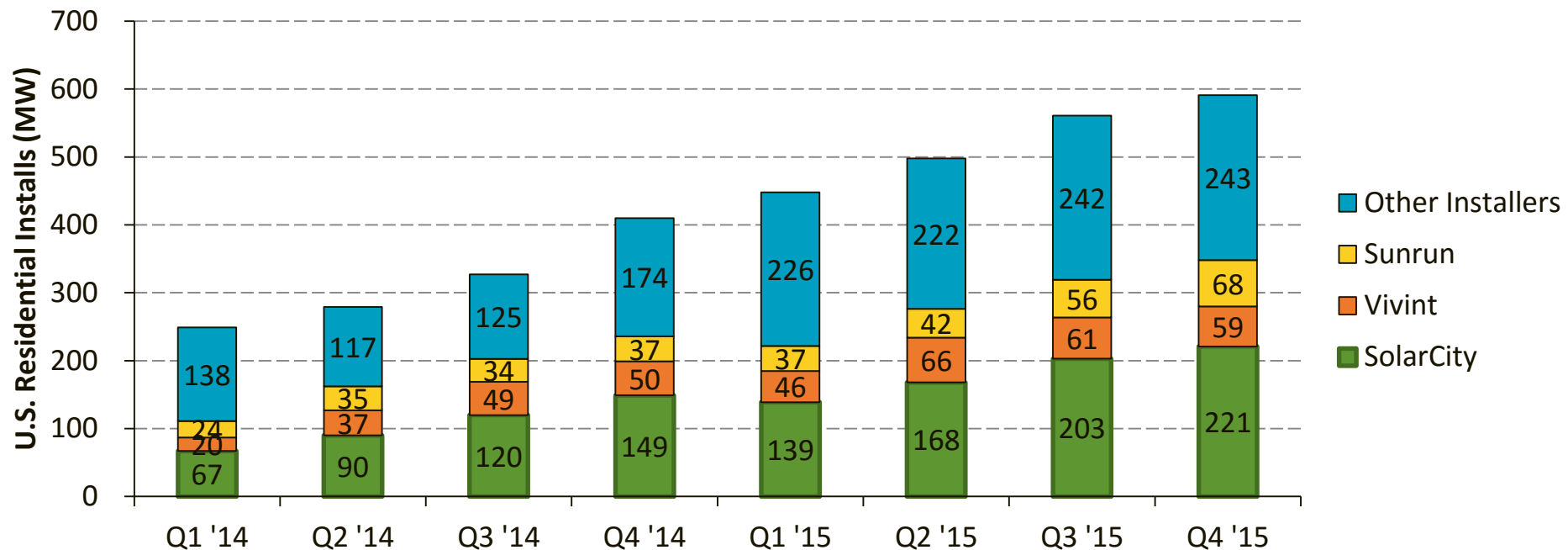
Source: Geoffrey Moore, Crossing the Chasm

Consumer Financing “Menu”

- Cash purchase
- Third-party ownership (TPO)
 - Lease
 - Power purchase agreement (PPA)
 - Pre-paid options
- Loans
 - Solar-secured
 - Secured by the real property
 - Unsecured
 - Secured by tax assessment (PACE)



Residential Market Share



Residential Solar installations are dominated by a few installers, compromising approximately 56% of the market since 2014

All major TPO providers offer loan financing, but lease and PPA still the primary products

TPO Overview

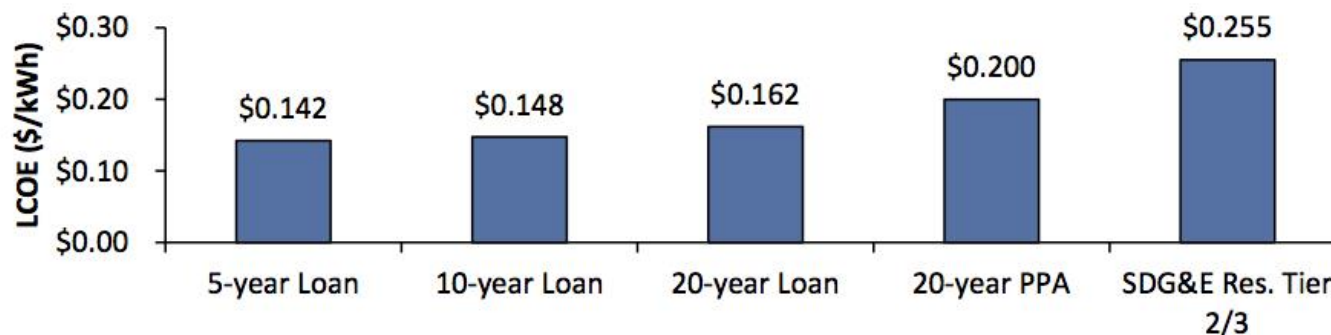
- TPO provider owns system
- Typically 20-year contracts with annual escalator (e.g. 2.9%)
- Lease
 - Host pays flat monthly rate for use of solar system
- PPA
 - Host is charged per kWh of electricity generated by the system
- Production guarantee
- O&M covered by system owner
- Can offer option to purchase (in specified years)
- TPO provider retains right to “reasonable access” of the system

Solar-Secured Loan

- Host owns the system
- Loan amount typically covers system and installation costs (can also include O&M costs)
- Loan terms can range from 10-20 years (with some product terms on either side of that)
- Interest rates from 2.99% to 8% +
- May include interest rate buy-downs from contractor
- Host claims ITC, owns RECs
- Special financing for anticipated ITC amount (e.g. 0% interest, 12-18 month loan with a balloon payment)

TPO vs. Loans

Assumption	Residential	Commercial
Installed Price	\$3.74 per watt	\$2.39 per watt
Location	San Diego, CA	San Diego, CA
Size	5 kW	500 kW
Project Lifetime (PPA length)	20 years	20 years
Incentives	30% Federal Tax Credit	30% Federal Tax Credit, 5-year MACRS depreciation schedule
Loan Interest Rates	5 year: 6.00% 10 year: 7.00% 20 Year: 8.00%	5 year: 3.75% 10 year: 5.20%
3rd-Party Capital Cost (after-tax)	9.2% return (9.0% tax-equity; 10.5% sponsor equity)	9.2% return (9.0% tax-equity; 10.5% sponsor equity)
Host Business or Individual's Capital Cost	6.2% after-tax return (8.7% pre-tax)	10.0% pre-tax return (6.0% after-tax)



Source: *Banking on Solar: An Analysis of Banking Opportunities in the U.S. Distributed Photovoltaic Market*

Property Assessed Clean Energy (PACE)

- Special tax assessment on property in the amount of loan principal and interest
- Funds disbursed to either contractor or property owner for purposes of energy upgrades and retrofits (loan cannot exceed useful life of upgrades)
- Loan is repaid via property tax bill
- Assessment stays with the property—if property is sold, payments resume with new owner
- Security interest in tax assessment is perceived low-risk—allows for subprime FICO underwriting, credit enhancement on securitization, etc.
- FHFA position unclear; residential PACE only available in California and a couple other markets

Other Types of Financing

- Home equity loan or line of credit (HELOC)
- FHA-Insured Financing
 - 203(k)
 - PowerSaver (Title I)
- Unsecured Loan
 - Typically one-off, specially underwritten transactions—e.g. “relationship banking”
- On-Bill Recovery/On-Bill Financing

Solar Economics Evolving in Real Time

- Rate structures
 - Transition away from volumetric charges to time-of-use (TOU)
 - Demand charges
 - Fixed charges
- NEM
 - Reduced compensation
 - Compensation based on TOU
 - Value of solar

Understanding Solar Asset's Disposition to Home

- Personal property, fixture, or real property?
- Do solar finance providers place a lien on the home?
 - Usually not—most security interests tied to the system
- What happens in a home sale, a refinancing, or a foreclosure?
 - Transfer, pay down, UCC re-filing fee



Consumer Protection in Residential Solar

- Due diligence required in going solar—similar to other financial contracts (e.g. car loan)
 - Federal and state regulations exist for several types of financial contracts
 - TILA, RESPA, UDAPs, Regulation M, Regulation Z, etc.
- “Estimated savings” against utility rate hinges on assumptions, projections, etc.
- Know your contractor!
- Understanding liens, disposition of the solar assets, value to home, etc.

Resources

- SAPC standard PPA and lease:
https://financere.nrel.gov/finance/content/solar-securitization-and-solar-access-public-capital-sapc-working-group#standard_contracts
- CESA Homeowner's Guide to Solar Financing:
<http://www.cesa.org/assets/2015-Files/Homeowners-Guide-to-Solar-Financing.pdf>
- SEIA Residential Consumer Guide to Solar Power:
<http://www.seia.org/research-resources/residential-consumer-guide-solar-power>

Thank you!

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



Thank you for attending our webinar

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