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Connecticut Energy, Environment and Economic Development Conference

Powering New England in the New Environment

Connecticut Power and Energy Society

Bryan Garcia
President
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Yankee Ingenuity

History of Clean Energy Innovation



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Daniel Halladay: Wind Turbine

Owned the Halladay Windmill Company in Coventry, CT

Built and manufactured the first commercially successful self governing new windmill in the U.S. in 1854

Relocated to Batavia, Illinois because of delays in production and shipping as a result of the Civil War.



Albert Pope: Electric Vehicle

Owned the Pope Manufacturing Co. in Hartford, CT

Built electric vehicles under the Columbia Automobile Co. in 1897

Was bought out by the Electric Vehicle Co. and went under in 1899



Bernard Baker: Fuel Cell

Founder, president and CEO of ERC in Danbury, CT

Builds molten carbonate fuel cells for low emission, baseload, distributed generation applications

Receives a two-year 70 MW order from POSCO Power, a South Korean independent power producer in 2011

Governor's Goals

Financing the Clean Energy Goals of the State



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Deliver Connecticut ratepayers **cleaner**,
cheaper and **more reliable** sources of
energy...and **create jobs** while we are
doing that!

What is the role...not of technology
innovation, but financial innovation?

Entrepreneurship and Innovation

Today's Henry Ford



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PayPalTM

SPACEX
Space Exploration Technologies

TESLA

 **SolarCity**[®]

...across the Country in 2008

Financial Innovation in Clean Energy



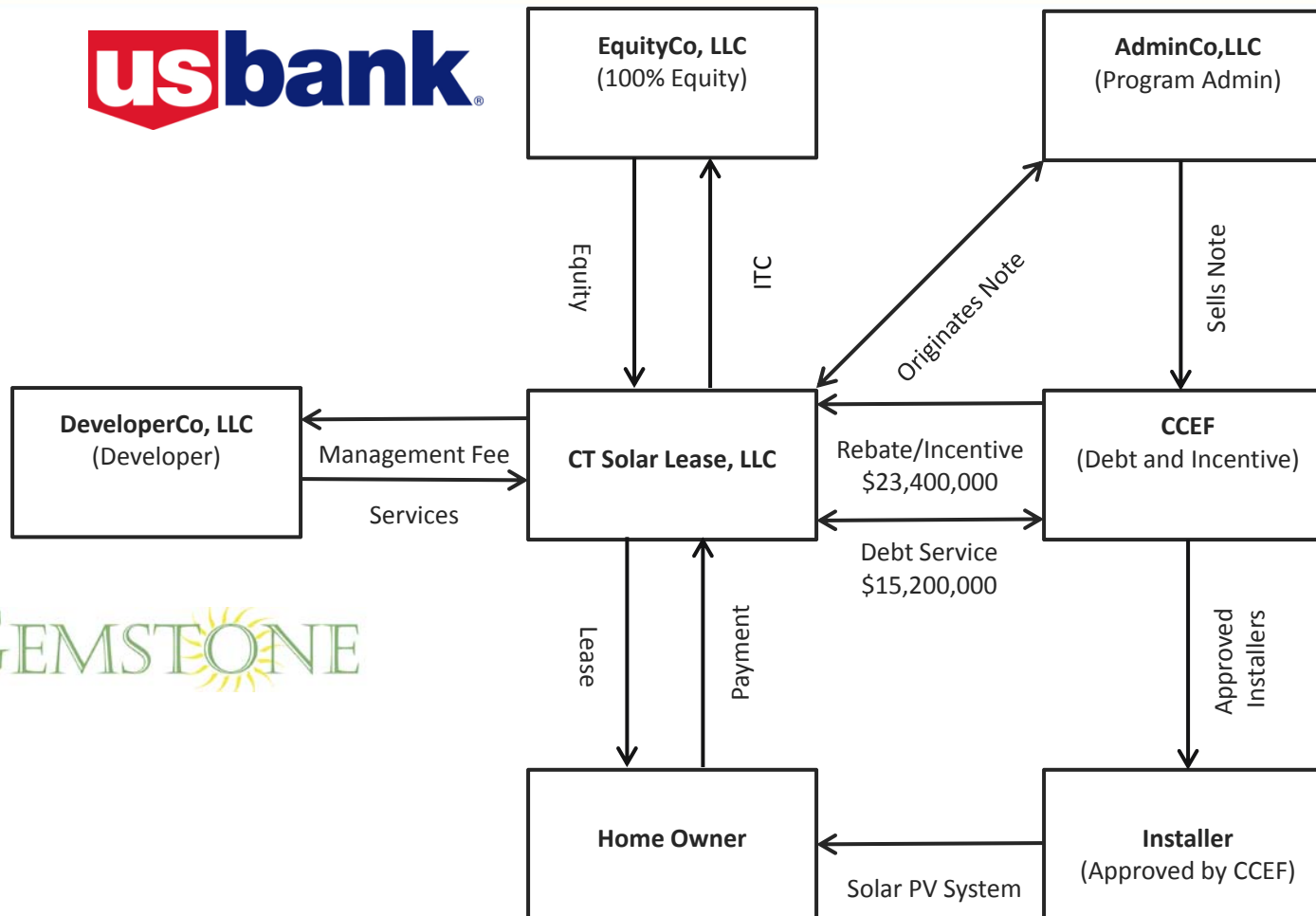
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Connecticut Solar Lease Structure Financial Innovation (Version 1.0)



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REFERENCES

Design – 5.5% interest rate (4% to AFC First Financial for sourcing and servicing, 0.5% CT Solar Lease, and 1.0% to CCEF), secured, 200% of median income

Consumer Credit Guidelines – 640 if salaried, 680 if self-employed for at least 2 years, 720 if self-employed less than 2 years, no bankruptcy in last 7 years, debt to income or monthly obligations to monthly income 50% for all credit scores

Performance – 850 loans, 6.0 kW AC average system size, from \$5,320/kW rebate in 2009 to \$2,731/kW rebate in 2012, and 2 defaults.



Residential Solar PV Economics



Controllable Payback Drivers	Economic Variables	No Subsidy State (without ITC)	No Subsidy State (with ITC)	Current State (Step 1)
☒☒☒	Installed Cost (\$/kW _{STC})	(\$5,000)	(\$5,000)	(\$5,000)
	System Size (kW _{STC})	5.0	5.0	5.0
	System Cost	(\$25,000)	(\$25,000)	(\$25,000)
☒☒	Ratepayer Subsidies	<u>\$0</u>	<u>\$0</u>	<u>\$10,903</u>
	Cost post Ratepayer Subsidies	(\$25,000)	(\$25,000)	(\$14,098)
	Federal ITC	<u>\$0</u>	<u>\$7,500</u>	<u>\$4,229</u>
	Cost post EPBB and ITC	(\$25,000)	(\$17,500)	(\$9,868)
☒	Debt Interest	(\$8,728)	(\$6,110)	(\$3,445)
	Avoided Annual Costs	\$1,244	\$1,244	\$1,244
	Payback Period	>15 years	>15 years	10.7 years
	Internal Rate of Return	<0	<0	5.3%

REFERENCES

\$2,450/kW_{PTC} incentive from CEFA in start state and \$2,100/kW_{PTC} incentive in future state, 14% capacity factor, 0.5% degradation rate on solar PV panels, 2% inflation rate on electricity price, \$0.1826/kWh, 4% interest rate

Drivers of Customer Value

Sensitivity Analysis for Payback and IRR



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	Base Case	Installed Cost Decrease of 10%	Subsidy Increase of 10%	Electricity Price Increase of 10%	Energy Efficiency
Payback	10.7 years	8.7 years	9.9 years	9.7 years	7.7 years
IRR	5.3%	8.8%	6.7%	7.0%	10.8%

Payback %		19%	7%	9%	28%
IRR %		66%	26%	32%	103%



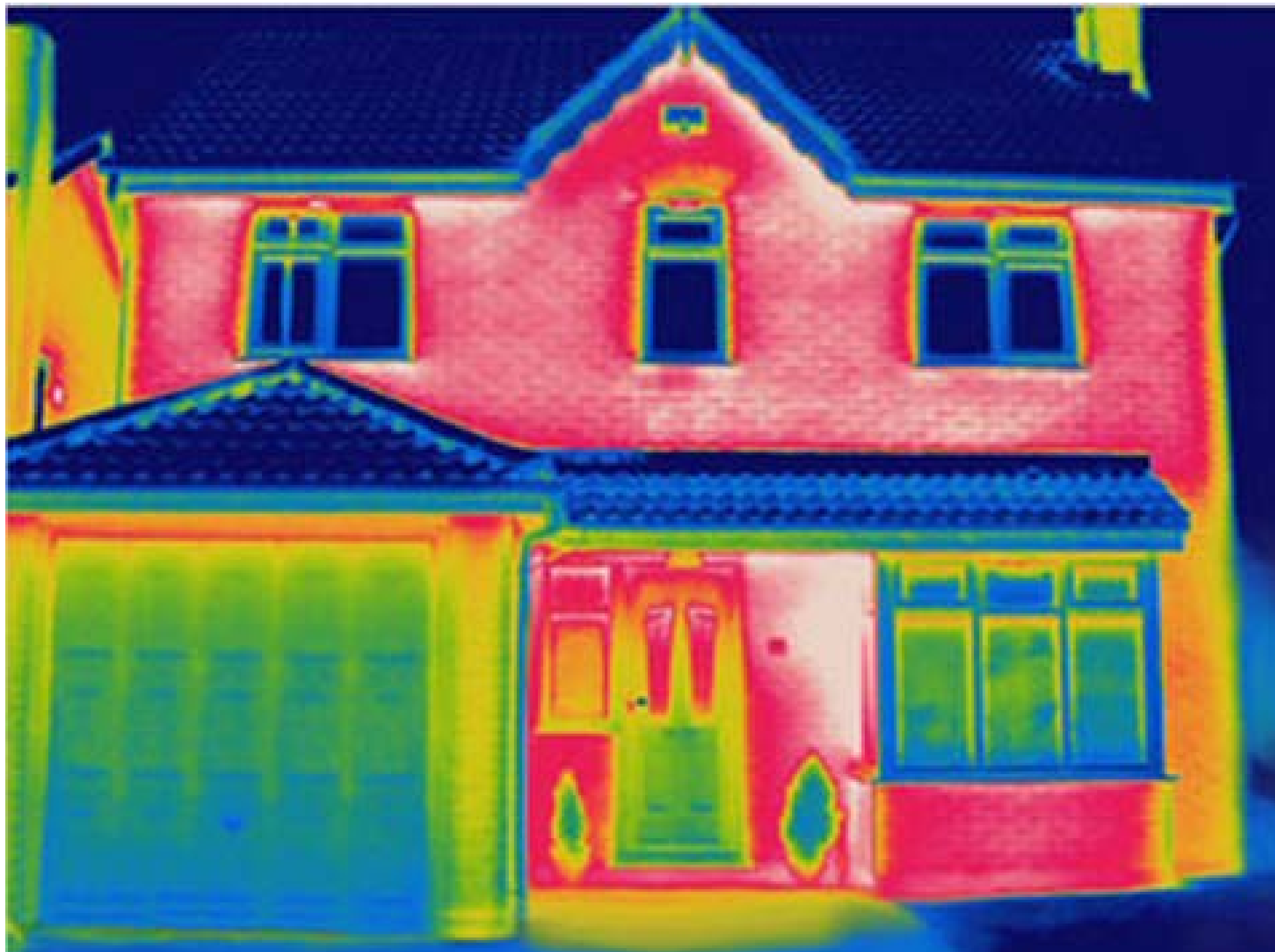
Secret to success is that...

Arnold discovers insulation



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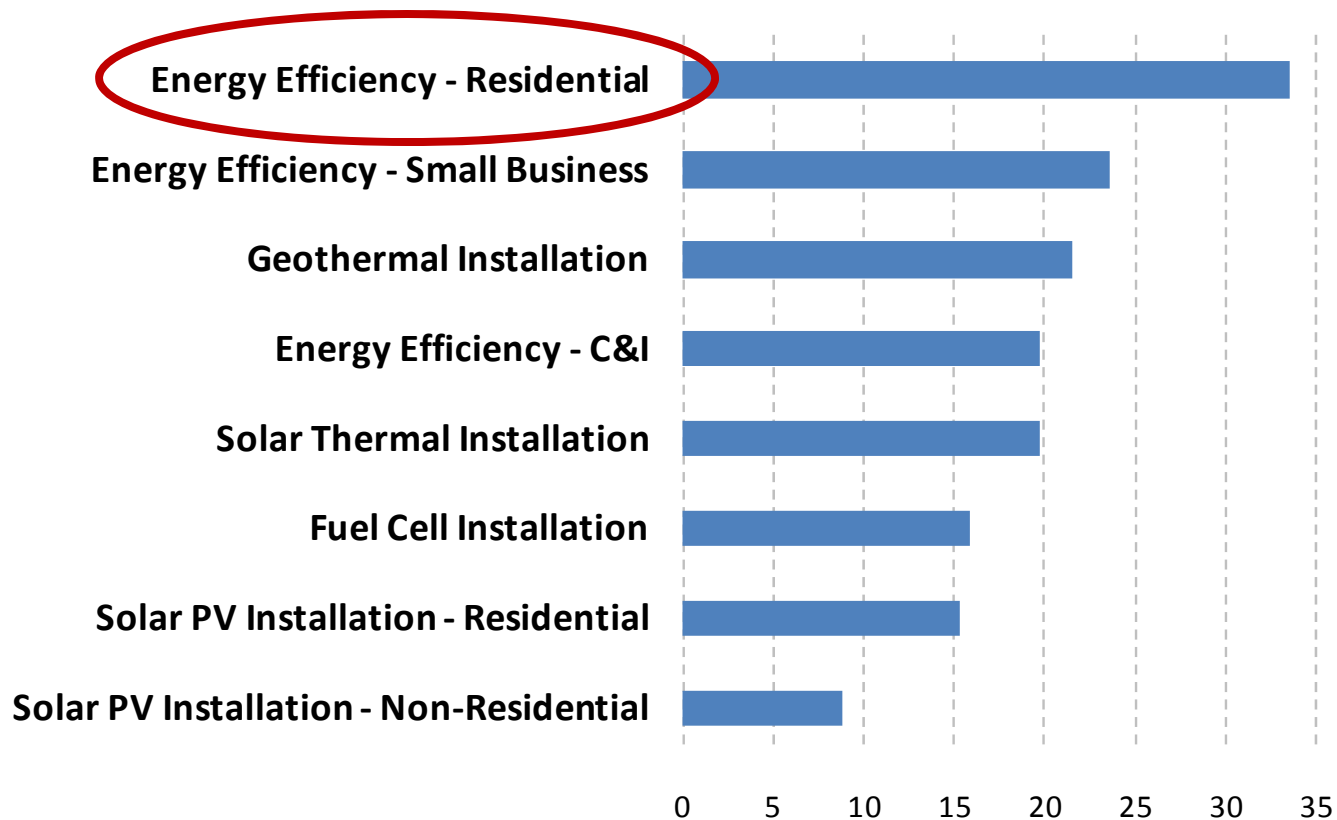


Job Creation in the Residential Sector

Combination of Energy Efficiency and Renewable Energy



Direct and Indirect Job Years Created per Million \$ Invested



Source: Navigant Consulting 2009 CT Renewable Energy/Energy Efficiency Economy Baseline Study.

Financial Innovation for Solar PV

Is there an Opportunity Again?



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	Then in 2008 with CT Solar Lease	Today in 2012 if No Subsidy
Installed Cost (\$/W)	(\$9.00)	(\$5.00)
Ratepayer Subsidy (\$/W)	<u>\$4.00</u>	<u>\$0.00</u>
Cost to Household	(\$5.00)	(\$5.00)



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