

Solar Makes Sense **For Illinois**

Mike Hornitschek Director, Strategic Development StraightUp Solar







Solar Makes "Cent\$" **For Illinois**

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Mike Hornitschek

- Hometown: Hartford, WI
- Immigrant Farm Kid
- Air Force
 - Aero Engineer
 - Pilot
 - Warfighter
 - Leader
 - Strategic Perspective
- Professor
- "Solar Immigrant"





Meaning of Energy

What does energy really mean to me?
 Energy = Work
 Work = Goods & Svcs
 Goods & Svcs = Quality of Life
 Quality of Life = Happiness

- OR -

Energy = Mobility

Mobility = Freedom

Freedom = Pursuit of Happiness

Energy = Pursuit of Happiness!

Energy = Quality of Life = Freedom = Pursuit of Happiness

Meaning of Energy

If Energy = Pursuit of Happiness, then: Jeopardizing Energy = Jeopardizing Pursuit of Happiness So what jeopardizes my pursuit of happiness?

When asked shortly after WWII:

"Prof Einstein, what do you see as the greatest threat to mankind?"



His prompt reply:

"Exponential growth."

Exponential Growth Jeopardizes Energy & Pursuit of Happiness

Population / Energy Correlation

World Population (in billions)



Elements of a Modern Society



Modern Society = * Resources + ** Imagination + *** Energy

- Mother Nature gives us all our resources for free think about it...
 - Wood, minerals, water, farmland.....we simply need to collect them up
- We attach value to these resources when we combine our imaginations and energy to fashion them into the things we need and want...
 - Food, homes, offices, automobiles, hospitals, militaries, cell phones, vacations...
- But there may limits to those things which form the world we hold dear...

* Resources – Finite (maybe)

** Imagination – Infinite (maybe)

*** Energy – Finite or Infinite?

Avoiding "Collapse"



Conclusion:

Society's success depends on how you manage your resources



Understanding Energy: "Engineered Abstraction"

 By design, citizens of modern societies have become disconnected from the physical aspects of energy & fuel



We don't think that making our toast in the morning requires burning a pound of coal 200 miles away

We no longer see fuel drain from the gas pump bulb into our automobile tanks; nor in the age of credit cards and electronic bank payments do we turn over precious cash to pay for our mobility and freedom

Nothing "Disappears" As A Result of Our Consumption

Our Future Energy Must Be...

• Following wood, coal, and oil, the 4th energy must be*:

- Non-depletable to prevent resource conflicts
- Environmentally clean to permit a sustainable future
- [Continuously] Available to provide base-load security for everyone
- In a usable form to permit efficient consumption & minimal infrastructure
- Low cost to permit constructive opportunity for all populations
- A <u>portfolio</u> of substantial investments are needed, but <u>options</u> in the next 20-30 years are limited...

Source	Clean	Safe	Reliable	Base-load	
Fossil Fuel	No	Yes	Decades remaining	Yes	
Nuclear	No	Yes	Fuel Limited	Yes	
Wind Power	Yes	Yes	Intermittent	Soon	
Ground Solar	Yes	Yes	Intermittent	Soon	
Hydro	Yes	Yes	Drought; Complex Scheduling		
Bio-fuels	Yes	Yes	Limited Qty – Competes w/Food		
Space Solar Yes		Yes	Yes	Yes	

* Adapted from Dr. Ralph Nansen's book, "Sun Power"

With Enough Energy...

Self-Actualisation Morality, Creativity, Spontaneity, Acceptance. Experience purpose, meaning and inner potential Self-Esteem Needs Confidence, achievements, respect of others, connections, need for individuality

Love and Belongingness Needs Friendship, family, intimacy, connections Safety and Security Needs Health, employment, property, family, stability Physiological Needs Air, food, water, shelter, clothing, sleep

Maslow's Hierarchy of Needs

Maslow's Hierarchy of Needs

• We can fulfill <u>all</u> of our needs!



With Enough Energy...

BASIC

HUMAN

NEEDS

Self-actualization

Creativity, Problem Solving, Authenticity, Spontaneity Esteem Self-Esteem, Confidence, Achievement Social needs Friendship, Family

Safety and Security

Physiological needs (survival) Air, Shelter, Water, Food, Sleep, Sex

• We can fulfill <u>all</u> of our needs!

"We have no shortage of energy...we just have a relative shortage of solar modules!" - mjh

"Start With Why"



Uniting a common passion to advance a solar Illinois beyond its current energy and economic paradigm, IGEN, ISEA, and MREA dedicate themselves to sharing resources, expertise, and enthusiasm to inspirationally and collaboratively lead the citizens of Illinois to cooperatively create a local and sustainable energy future aimed at rebuilding their communities' economies, enhancing environmental resiliency, and restoring the Land of Lincoln as a beacon of America's innovation and vibrancy.

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2013 US Solar Data*

- If 2013 was about raising the issue of the future of electricity and utilities, 2014 will be about defining solutions.
- Key Figures
 - 4,751 MW of solar PV installed in 2013, up 41% over 2012
 - 13 GW in place today (12.1 GW PV & 918 MW CSP)
 - 140,000 individual solar installations in 2013 = 1:1 solar jobs
 - More solar in the last 18 months than in the 30 years prior
 - Market value of all 2013 PV installations = \$13.7 billion
 - Solar = 29% of all new generation capacity in 2013, 2nd only to natural gas & 100% of new capacity in 7 states including IL & MO!
 - PV system prices fell 15% in 2013
 - 26% PV growth forecast for 2014, most rapidly in residential

*www.seia.org



2013 IL Solar Data*

- There are currently more than **186 solar companies** at work throughout the value chain in Illinois, employing **2,100**.
- In 2013, Illinois installed 2 MW of solar electric capacity, ranking it 31st nationally (4,751 MW in US [41% more than 2012] – Only 0.04% for IL!).
- The 48 MW of solar energy currently installed in Illinois ranks the state 22nd in the country in installed solar capacity. There is enough solar energy installed in the state to power 6,300 homes.
- In 2013, \$6 million was invested in Illinois to install solar on homes and businesses.
- Average installed residential and commercial photovoltaic system prices in Illinois have fallen by 10% in the last year. National prices have also dropped steadily— by 12% from last year and 31% from 2010

2013 MO Solar Data*

- There are currently more than **71 solar companies** at work throughout the value chain in Missouri, **employing 2,800**.
- In 2013, Missouri **installed 28** MW of solar electric capacity, ranking it 17th nationally.
- The **39** MW of solar energy currently installed in Missouri ranks the state 23rd in the country in installed solar capacity. There is enough solar energy installed in the state to power 3,800 homes.
- In 2013, \$115 million was invested in Missouri to install solar on homes and businesses. This represents a 257% increase over the previous year, and is expected to grow again this year.
- Average installed residential and commercial photovoltaic system prices in Missouri have fallen by 18% in the last year. National prices have also dropped steadily— by 12% from last year and 31% from 2010.



<u>Missouri</u> 2,800

28 MW

+257%

\$115M

39 MW

18%

Missouri

vs Illinois

- Solar Jobs -- 2013 MW -

- % Growth -
- 2013 \$\$\$ -
- Total MW -
- 2013 Price Drop -

Illinois 2,100 **2 MW** -93% \$6M

48 MW*

10%

* May Need ~ 1 MW/day install through 31 Dec 2016 to meet 0.6% solar mandate

Solar Client 2014 **Today's solar client is:** 1) The Environmentalist 2) The Fiscal Conservative 3) The Independence-Minded 4) The Working Man & Woman

Mostly, he or she is simply "SMART"!

The "Convergence"



Storage

"Electric" Fuels

Note: Can substitute other renewable electricity here

Gasoline

Fuel

CO₂ Input

2CO₂

200

Jet/Diesel

Fuel

20₂



"Age of Renewables Has Begun...Solar & Wind Are Competing With Fossil Fuel in the U.S..." – RenewEconomy



"Tipping Point Nears for Abandoning the Utility and Going Off-Grid Due to Falling Solar & Battery Storage Costs....240 GW of Addressable Solar in 5 Years" – RenewEconomy



"There is no Apple, Google, Facebook or Amazon of energy today....our kids will hold us accountable" – David Crane

Solar Client 2020+

On-Grid

- Delivery of two types of off-site renewable energy:
 - Wholesale utility generated
 - Community/shared solar

Baseload

 Renewable "blend" or utilityscale storage

Energy Security

- Point-of-use storage
- On-site natural gas cogeneration
- Solar Mobility

Off-Grid

- Entirely off the grid
- Baseload
 - Point-of-use storage

Energy Security

- Inherent
- On-site "synthetic fuel" cogeneration
- Physically grid-tied but only for emergency use at very premium prices
- Solar Mobility

Investment Return (IL)

Out-Of-Pocket Cost											
Install Cost (\$/watt)		System Size (kWDC)		Pre-Incentive Cost (\$)		Local Rebate (%)		Fed Tax Credit (%)		Out of Pocket Cost (\$)	
\$3.25] x	5.00	=	\$16,250	- [25%	-	30%	=	<mark>\$8,531</mark>	
Calculating Lifetime Electric Production											
System Size (kWDC)		Annual kwh/kwDC		Total kWh Year 1		Module Warranty (Years)		Average 25-year Degrade Correction (%)		Predicted 25-year Electric Production (kwh)	
5.00] x	1,270	=	6,350	x [25	x	90%	=	142,875	
\$0.100	You	r 2014 Utility R	ate	(\$/kwh)	BE	NEFITS		Lb CO2 Save	ed:	264,319	
Out of Pocket Cost (\$)		Predicted 25-yr Electric Production (kwh)		Equivalent Solar Utility Rate (\$/kwh)		IRR (%)		ROI (Yrs)		25-Year Net Savings (\$)	
\$8,531] ÷	142,875	=	\$0.060		<mark>8.9</mark> %		10.4		\$17,171	

Solar & Mortgages

Did you know that at today's install costs and mortgage rates you can <u>save \$20,000</u> over 30 years with solar vs paying your normal utility bill?



Solar EV Guilt-Free Driving



- "Pre-pay" your fuel once for 25 years
- <u>Zero</u> CO₂ emissions you drive carbon-free!
- Save \$1,200-\$2,000
 gas/year 4-6 year
 payback

per mile

So What Can We Do?

- Don't Do Nothing!
- Use Our Diversity!



Incentives are Imminent!

Matt The Installer

- Seize the "later adopter" & deregulation opportunity
- Innovate policies & business models
- Set the example by working together

Imagine the Possibilities!

- Micro-invested school community solar
- Unlimited public solar production rules
- Affiliated orgs aggregating demand & their own production with virtual net metering
- Profitable early legacy power plant shutdowns
- Streamlined solar benefaction
- Aggregation towns picking solar as cheapest option
- Independent Illinois farm towns
- Empty brownfields no more
- 10,000's of Illinois jobs
- Illinois a net solar energy exporter

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Why Are We Here? Lead Collaborate Advocate Create Change **Great Historic Energy Transition** Sustainable Future

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Thank You!

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