PV Manufactured in Florida for $1.08 a gallon

James Fenton
“Game Changers”
The New Electric Cars

- 80% of VMT is less than 40 miles per day
- 26% of Florida vehicles are small cars
- 4,000 kWh/yr for 12,000 miles
- If all small cars electric
  - 1.4 billion gallons of gasoline saved per year
  - $2.6 billion net cost savings per year if PV electric
  - 15 TWh (billion kWh) additional energy needs per year (4 MORE LARGE POWER PLANTS)!

Nissan Leaf (all electric)

Chevy Volt (plug-in hybrids)

Total Cost of Electric Car ~ Cost of Gasoline Car at the end of 5 years
Costs of PV modules are dropping below the power law experience curves

Sources: (CdTe) First Solar Earnings Presentation, SEC Filings; (c-Si) Navigant, Bloomberg NEF, NREL internal cost models

April 2012 Spot market price = $0.83
Installed Price of PV

National Weighted Average System Prices, 2010 – Q1 2012
PV Grid Parity?

- FL Residential Electricity Price
- FL Conservative Trendline
- FL 2000 to 2010 Trendline
- Residential PV LCOE
- Residential PV LCOE w/ ITC

GRID PARITY 2013

- 15.6 ¢/kWh
- 13 ¢/kWh
- 8 ¢/kWh

Florida Residential Electricity Price, cents/kWh

Year

Residential Photovoltaic Power is Equivalent to **$1.08 Per Gallon Gasoline**

<table>
<thead>
<tr>
<th></th>
<th>Fuel Efficiency</th>
<th>Fuel Price</th>
<th>Cost per Mile</th>
<th>Cost per 12,000 Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gasoline Car</strong></td>
<td>25 mpg</td>
<td>$3.25 per gal</td>
<td>13¢ per mile</td>
<td>$1,560</td>
</tr>
<tr>
<td><strong>Electric Car</strong></td>
<td>3 miles per kWh</td>
<td>13¢/kWh ($1.08 per gal equiv.)</td>
<td>4.3¢ per mile</td>
<td>$520</td>
</tr>
</tbody>
</table>
Future Price of Gasoline?

- US Retail Gasoline Price
- Average Price
- Trendline

$8.60 per gallon, 2025

$3.25 per gallon
Price of Gasoline?
LIGHT-DUTY VEHICLE FUEL ECONOMY STANDARDS, 1955-2025

- Leaded Regular
- Unleaded Regular
- Trendline
- PASSENGER CARS
- AVERAGE VEHICLE

Gasoline Price, Dollars per Gallon

Year

Model Year Miles per Gallon, MPG

- $3.25
- $8.60
PV $1.08 a gallon today less than a $1 tomorrow

* Costs are relative to cost of $3.25 per gallon gasoline at a vehicle efficiency of 25 mpg
A Florida Fable

“The Foreign Fuel”
Extra Slides
Drive for Free

4:17 minute video
http://vimeo.com/24514610
The Cost of Doing Nothing

(5:53 minutes)  http://vimeo.com/14676549
Building Training

- 38 building science courses offered
- More than 500 course attendees
  - Nearly 100 students received ENERGY STAR 3.0 training
  - 90+ students received weatherization training
  - 21 students received Florida green home certification training
  - Over 70 students received residential EnergyGauge® rater training
U.S. Photovoltaic Manufacturing Consortium (PVMC)

• DOE wanted a similar SEMATECH model for the PV Industry

• Led by SEMATECH in partnership with CNSE (College of Nanoscale Science and Engineering) and UCF (University of Central Florida)

• Overall investment of ~$300M over 5 years from DOE and matching funds
**Initial PVMC cSi Program Areas**

$14.3M of DOE and industry/partner matching funding

**In-line/Off-line Metrology**

- **Primary Goals**
  - Identify critical industry needs in metrology and rank
  - Develop projects to demonstrate new cSi metrology technologies
  - Transition new metrology technologies into pilot and manufacturing lines

**New Feedstock/Wafering Methodologies**

- **Primary Goals**
  - Identify necessary feedstock/wafering targets for $/W
  - Establish cSi feedstock/wafering programs to accelerate transition of new technologies into mainstream manufacturing
  - Provide and foster process, test, and demonstration activities to validate new technologies and identify technical barriers
Which Purchase Is Best for Florida?

Salad Bowl
- Cherry
- 13” Diameter
- Food-Safe
Made in Florida
$10.00

Salad Bowl
- Cherry
- 13” Diameter
- Food-Safe
Made in China
$9.50
Which Purchase Is Best for Florida?

Energy
- FL Jobs
- Independence
- Money Stays in FL
TBD

Made in Florida

Energy
- Gasoline 36B
- Electricity 27B
$57B

Imported
A Central Florida Example

Cost Optimization Analysis for Typical Florida Home

Neutral Cost Line

Net Cost Savings

Annualized Energy + Improvement Costs ($/yr)

Base
HWwrap
Crvl_noVnt
Lgts_75% Fl
Ceil_R30
ach50=7
LowFloSh
Lgts_100% Fl
Duct Qn=0.06
Duct Qn=0.03
SHW_40/80PV
ES_Fridge
Ceil_R38
Crvl_W_R10
SKW-PV
## Residential Electricity is Equivalent to $0.99 Per Gallon Gasoline

<table>
<thead>
<tr>
<th></th>
<th>Fuel Efficiency</th>
<th>Fuel Price</th>
<th>Cost per Mile</th>
<th>Cost per 12,000 Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gasoline Car</strong></td>
<td>25 mpg</td>
<td>$3.25 per gal</td>
<td>13¢ per mile</td>
<td>$1,560</td>
</tr>
<tr>
<td><strong>Electric Car</strong></td>
<td>3 miles per kWh</td>
<td>12 ¢/kWh ($0.99 per gal equiv.)</td>
<td>4¢ per mile</td>
<td>$480 (~$466, Drive for Free)</td>
</tr>
</tbody>
</table>