



U.S. DEPARTMENT OF ENERGY
SOLAR DECATHLON

2011

Renewable Energy & Smart Grid

Workforce Opportunities & Issues in
the Electric Utility Industry

presented by Tyler White

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PHI

SMART Grid

Solar

Closure





PHI Smart Grid - in a Picture



PHI's Employee Workforce

- 4,600+ employees
- Over 50% employees represented by IBEW
 - 4 Union Locals
- All four generations represented





Blueprint for the Future

Commitment to our Customers

- **Overview.** Consists of advanced technologies/an “intelligent” grid and energy efficiency programs that are designed to improve service to our customers and empower them to manage their energy use and costs.
- It includes Smart Meters, Smart Thermostats, Energy Efficiency incentives, environmental programs, and strategies in reducing our carbon footprint.
- The estimated cost is approximately \$650 million over approx. 5 years
- PHI’s Blueprint for the Future has received national (Washington Post, ABC World News Tonight) and even a bit of international news coverage (BBC); specifically, the smart meters associated with the program.
- **Benefits.** Help customers manage their energy use and cost
- Enhance reliability and customer service
- Provide the location of outages without customers having to call in



PHI's Smart Grid in Words

Our definition aligns with the DOE and EISA 2007 vision of Smart Grid

- Modernizes the grid while utilizing existing wires, transformers, and substations
- Enables deployment of renewable / green energy alternatives
- Brings new advanced meters, sensors, communications equipment, automation and computers to the existing grid
- Collects and transmits data to computers wirelessly
- Provides appropriate energy cost and usage information to customers and system performance to operators
- Promises significant advances in customer service, outage detection, service restoration, providing customer usage information, and reducing the number of estimated bills

Investing in the Smart Grid- US Utilities focus

Smart Grid benefits to the customer...

- Puts decision making in the hands of customers
 - Improved information, programs and pricing options will allow customers to make informed energy choices
 - Gives customers better information about their service and use
- Automatically accommodates changing conditions
 - Fault isolation, quick automatic restoration, advanced grid sensors
 - Reroute power flows, change load patterns, improve voltage profiles
 - Automatic notification for corrective actions and maintenance activities, which minimizes workforce intervention
- Enables us to operate the system with greater efficiency
 - Better asset management by optimizing grid design and investments
 - Optimized grid operations, reduce losses
 - Greater reliability and security
- Promotes green energy initiatives and enables participation of distributed, renewable energy resources and plug-in electric vehicles

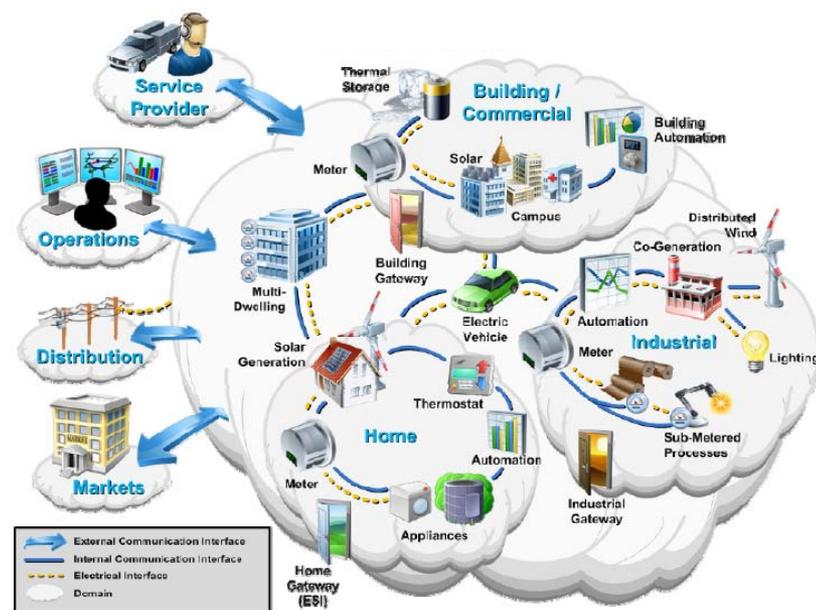
The Complexities of a Smart Grid Implementation

US Utilities Focus

This is the most significant technology transformation since the grid was first created.

A Smart Grid implementation involves:

- Multi-layered investments by the government, utilities and end-users
- Complex integration of a number of new technologies
- A rollout that takes several years (evolutionary)
- Necessary adoption of evolving technical standards for smart grid interoperability and cyber security
- Education and training of workforce
- Effective education and engagement of customers

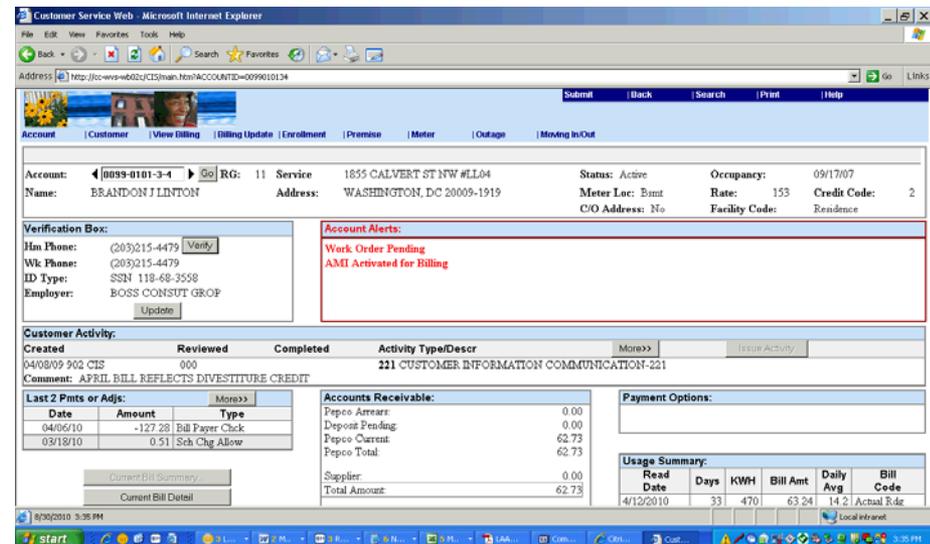


Significant Work is underway in US Utilities Consortiums such as EPRI, NIST, EEI to advance Smart Grid

New Smart Grid Jobs

The company will create new smart grid jobs & opportunities during the project life-cycle (2010 - 2013) to include:

- Energy Advisors working throughout our PHI Call Centers
- Energy Engineers
- AMI Operations Analysts
- Training Specialists
- NOC Staff members

Customer Service Web - Microsoft Internet Explorer

Address: http://ec-www-hb02u/cis/main.htm?ACCOUNTID=0099010134

Submit | Back | Search | Print | Help

Account | Customer | View Billing | Billing Update | Enrollment | Premise | Meter | Outage | Moving In/Out

Account: 0099-0101-3-4 RG: 11 Service: 1855 CALVERT ST NW #LL04 Status: Active Occupancy: 09/17/07
 Name: BRANDON J LINTON Address: WASHINGTON, DC 20009-1919 Meter Loc: Bmt Rate: 153 Credit Code: 2
 C/O Address: No Faraby Code: Residence

Verification Box:
 Hm Phone: (203)215-4479 | Verify
 Wk Phone: (203)215-4479
 ID Type: SSN 118-68-3598
 Employer: BOSS CONSUT GR0P
 Update

Account Alerts:
 Work Order Pending
 AMI Activated for Billing

Customer Activity:

Created	Reviewed	Completed	Activity Type/Descr
04/08/09	902	CIS	221 CUSTOMER INFORMATION COMMUNICATION-221

Comment: APRIL BILL REFLECTS DIVESTITURE CREDIT

Last 2 Pmts or Adjs:

Date	Amount	Type
04/06/10	-127.28	Bill Payer Chck
03/18/10	0.51	Sch Chg Allow

Accounts Receivable:

Pepco Arrearf	0.00
Deposit Pending	0.00
Pepco Current	62.73
Pepco Total	62.73
Supplier	0.00
Total Amount	62.73

Payment Options:

Usage Summary:

Read Date	Days	KWH	Bill Amt	Daily Avg	Bill Code
4/12/2010	53	470	63.24	14.2	Actual R.dz

8/30/2010 3:35 PM

What are the Challenges

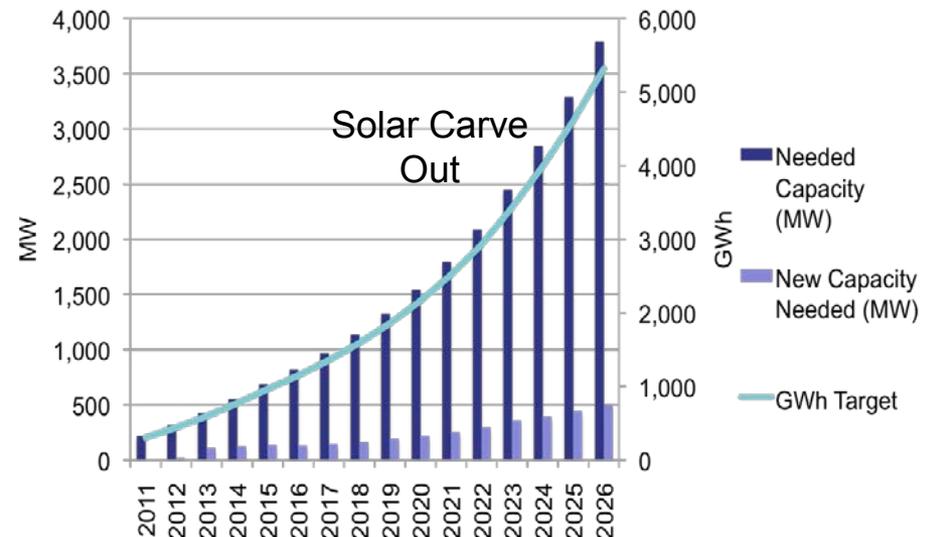
- The ACE territory is being subjected to tremendous external pressure, from BPU to Developer, to integrate large amounts of distributed energy into the electric grid ... Solar
- The state of New Jersey has declared as part of the New Jersey Energy Master Plan that they are extremely supportive of distributed energy as a means of driving economic development in the state
- Current distribution system is designed and sized for one way power flow... now, large amounts of generation must move in multiple directions, many times backwards
- Quantity and scale of projects locating in South Jersey – with majority in rural areas. Several feeders have reached maximum capability and cannot accommodate additional solar – we could eventually see similar issues in DPL and Pepco
- Developers are getting frustrated with the required processes at both PJM and ACE with regard to the level of study needed and the time to complete
- Intermittency of Solar PV generation threatens integrity and reliability of system
 - Mitigating resulting power quality problems experienced by end-use utility customers (\$\$)
 - Additional wear and tear on utility equipment (\$\$)

The volume of this work in New Jersey is beginning to overtake our internal resources ...

New Jersey State Renewable Plan

NJ's existing Energy Master Plan Goals by 2020:

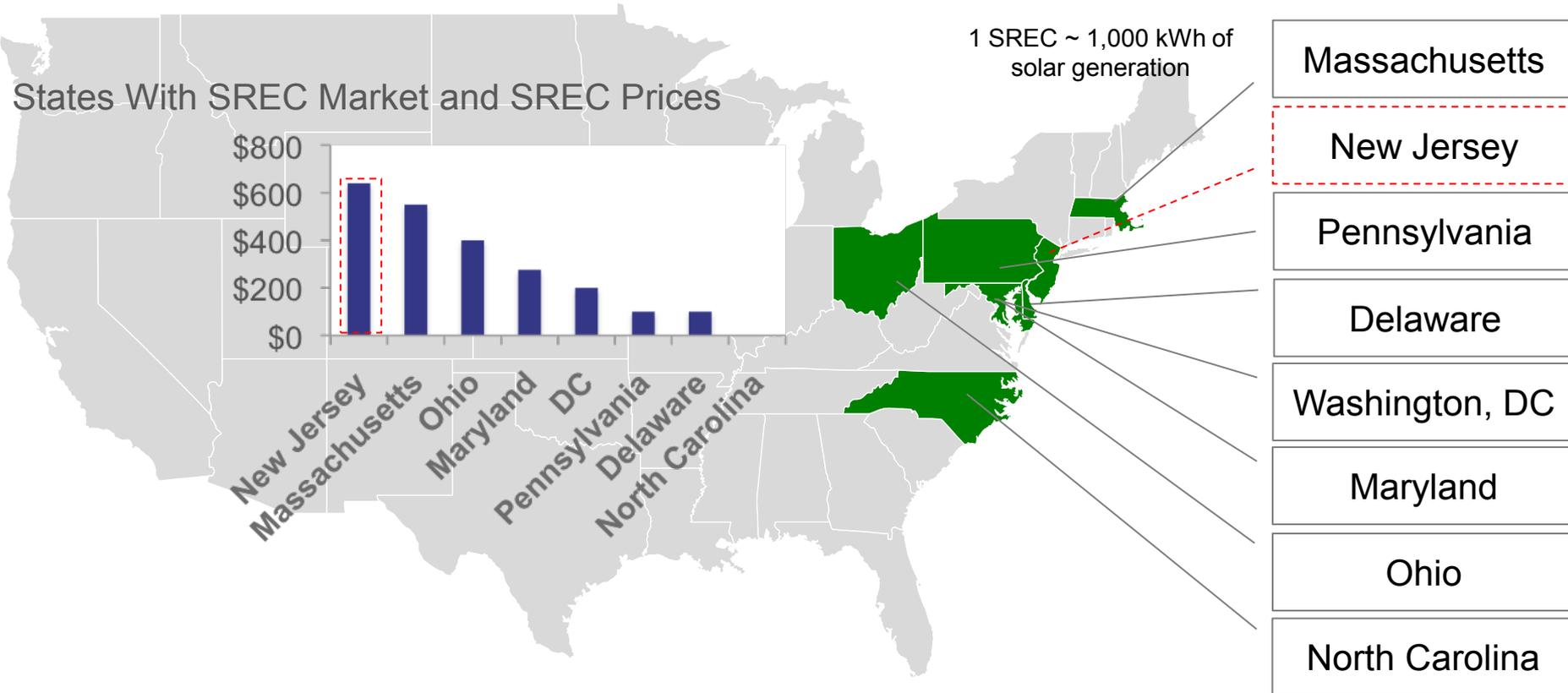
- 20% reduction in energy consumption;
- 5,700 MW reduction in peak energy demand;
- 30% of NJ's energy needs met through renewables.



- By 2026, NJ expects to have 150,000 solar installations for over 5GWh of generation, producing 80,000 jobs
- The New Jersey solar market is growing at an exponential rate, driven by generous incentives and ambitious renewable portfolio standard (RPS) targets

There are 345 licensed solar installers in NJ, 275 have been in the business less than 2 years

Solar Renewable Energy Certificates



The current value of the SRECs in NJ has made it an extremely profitable enterprise for customers and developers ... There's gold in those rays of sun!!!

Solar Expansion ... A National to ACE Perspective

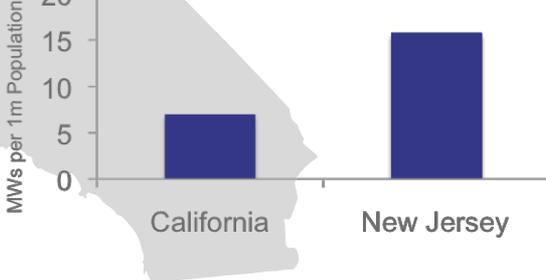
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More Solar PV Capacity Per Capita Than California

Total Solar Capacity Per Capita
(MW per 1m Population, end-2010)

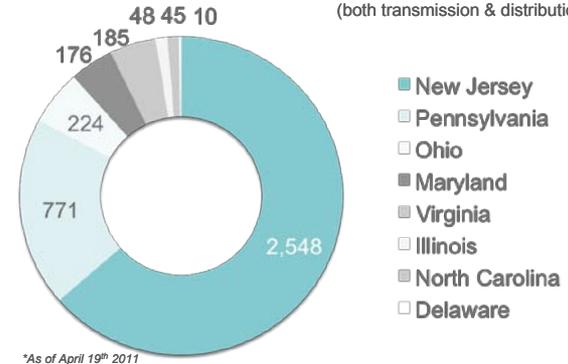


2010 Solar Capacity Additions Per Capita
(MW per 1m Population)



2 New Jersey Leads Other PJM States

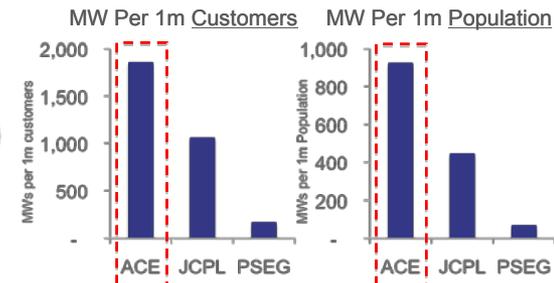
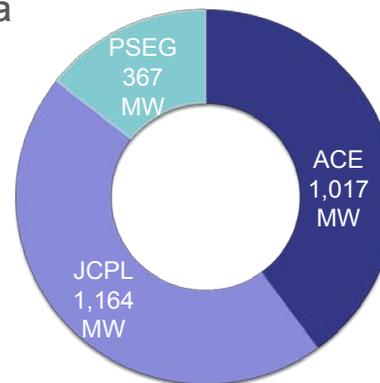
Solar Projects In PJM Queue: State-By-State (MW)
(both transmission & distribution)



New Jersey accounts for nearly 2/3 of the PJM solar project queue

3 ACE Leads the other New Jersey Utilities

New Jersey Utilities: Solar Projects In PJM Queue



Source: customer and population figures for each utility's service territory taken from annual reports

*As of April 19th 2011

Atlantic City Electric Statistics

As of 5/18/2011:

• Net Energy Metering (NEM)



• Active – 2,025 Customers (45.6 MW); 22.5kW avg

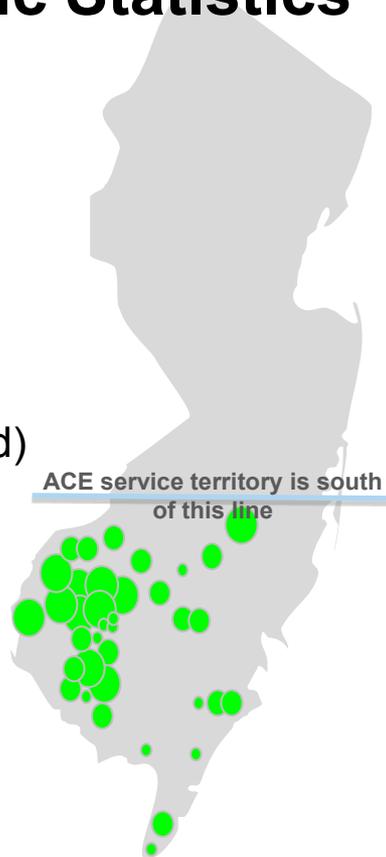


• Pending – 945 Customers (49.3 MW); 52.2kW avg

• PJM Queue (Grid Connected)

• Pending – 69 (1,017 MW)

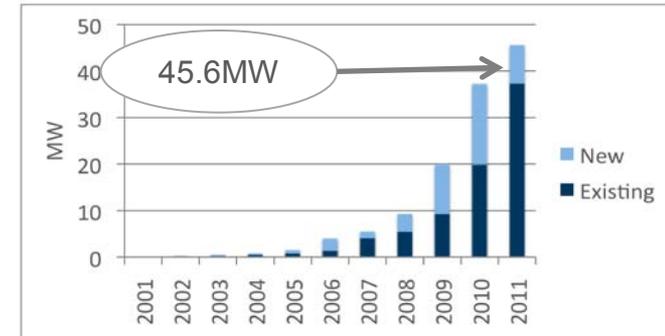
ACE service territory is south of this line



Merchant Generation Projects

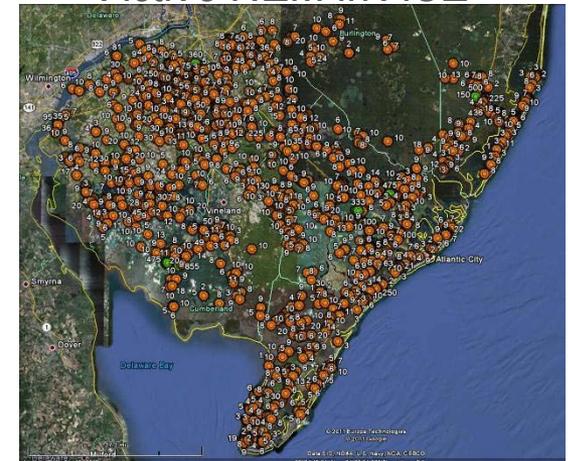
-  Greater than 10MW
-  5MW to 10MW
-  Less than 5MW

Installed Solar NEM PV Capacity*



*As of May 18th 2011

Active NEM in ACE



The distribution infrastructure in NJ is rapidly transitioning from supplying load in one direction (generator to customer) to a multidirectional super highway ... creating enormous complexity!

Types of Interconnection Requests



Net Energy Metering (NEM) projects – Residential / Commercial

- NEM projects are pursued when the interest is “netting” or “zeroing out” the on-site energy use of an end-use customer over the course of a year;
- NEM interconnection applications are managed by the local utility;
- The majority of NEM installations are “distribution sized” in the range of 5 to 25 KW with some as large as 2 - 4 MW.



Merchant generation projects – PJM Queue Projects

- PJM projects are pursued when the interest is generating and selling energy into the regional energy market, typically with little to no on-site energy use;
- Managed by the regional transmission organization (PJM in the case of ACE);
- Merchant generation installations are “transmission-sized” and range from a few MW up to 20 to 30MW or more.

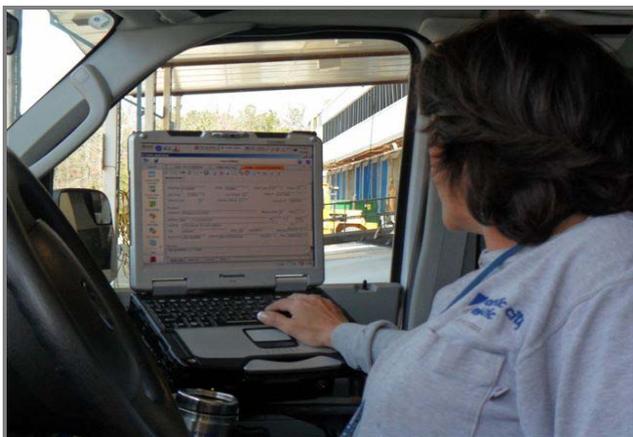
What We're Doing

- ACE sponsored a New Jersey Solar Forum held in the summer 2010, went a long way towards explaining the processes and the natural limitations of large amounts of solar on the grid;
- Working with Legislative leaders to move a bill that would allow large solar connections to Transmission grid (69kv and below) and receive SREC's.
- Developed a plan to build out the distribution network to accommodate more solar subject to BPU support / approval;
- Developing distribution system interconnection guidelines and criteria; education, research, standards development, participation in PJM stakeholder groups, working with local and other utilities, both inside and outside of the US;
- Establishing a Distributed Energy Resources group within Asset Strategy & Planning to be the single point of focus;
- Contracting for additional resources from external engineering consulting services to help with the backlog;
- Continuous improvements to NEM application approval process;
- Process work, led by Rob Stewart, being performed to reduce time to approve request and improve coordination;
- The GPC (Green Power Connection) Team is working feverishly to keep-up with requests.

Distributed resources are proliferating at a rapid rate and we have to manage the infrastructure, regulatory and political issues ... This is our core business

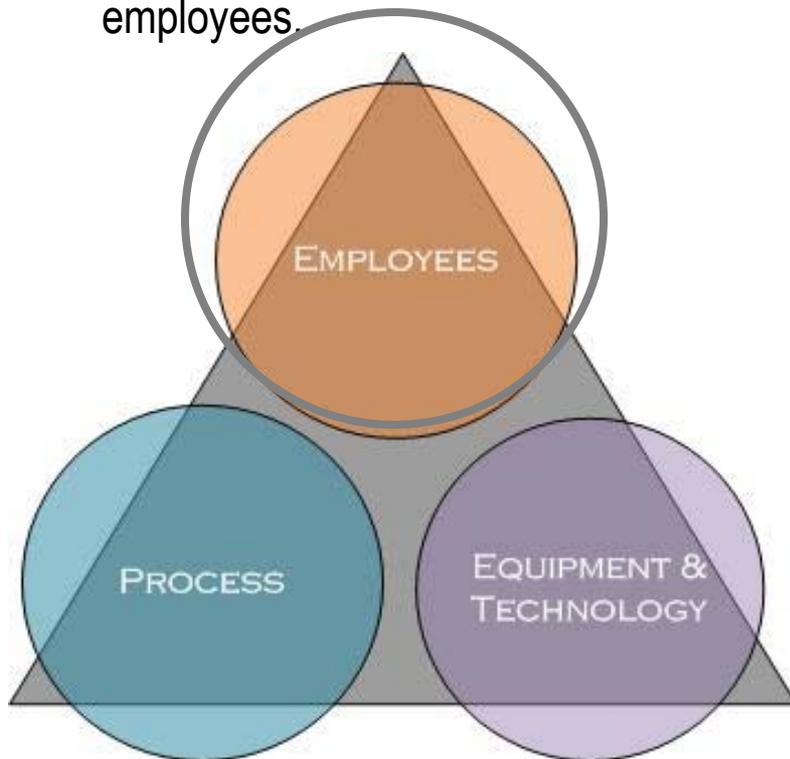
Technology: Training Technology Tools

- PHI also utilizes technology in the field. A mobile data terminal (MDT) offers just-in-time training solutions & job aids while serving employees access to work orders, communicate work status, etc.



Project Description

- Timely and comprehensive training and workforce development are necessary to fully realize the benefits of the Smart Grid investments
- Over 500 unique employees have been trained to date an estimated audience of over 700 employees.



PROCESS: Training Certifications and Associations

- PHI conducts approved training programs recognized by the government and state agencies.
- PHI is actively involved with a number of professional, educational and trade associations in order to network and gain knowledge in best-in-class behaviors and actions with the goal of providing customer satisfaction.



TECHNOLOGY: Training Technology Tools

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Questions?

