

NREL - DOE Technology Performance Exchange

2014 Building Technologies Office Peer Review

The screenshot shows the homepage of the Technology Performance Exchange (TPE). At the top left is the TPE logo with the tagline "Confidence through data." and the NREL logo with "NATIONAL RENEWABLE ENERGY LABORATORY" below it. A navigation bar includes links for Home, Technology Categories, Companies, About, Developers, and Log in | Register. The main content area is divided into four steps: 1. REGISTER (for manufacturers, test laboratories, and basic users), 2. SEARCH OR BROWSE TECHNOLOGIES (with a search bar and fan icons), 3. COMPARE DETAILED ENERGY PERFORMANCE DATA (with two fan icons and data lists), and 4. EVALUATE ENERGY AND COST SAVINGS (with a document icon and a person presenting a chart). Below this is a "SEARCH PRODUCTS" bar and a "BROWSE TECHNOLOGY CATEGORIES" section with a grid of technology types like SSL Replacement Lamps, Hot-Water Boilers, DHP: Indoor Units, etc. Two callout boxes on the right provide instructions for "Manufacturers" and "Partners/Developers".

TPE Technology Performance Exchange
Confidence through data.

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Home Technology Categories Companies About Developers Log in | Register

1. REGISTER
Manufacturers and Brand Owners add your products to the site
3rd Party Test Laboratory or Contributing Evaluators add detailed performance data
Basic Users view product data
REGISTER NOW

2. SEARCH OR BROWSE TECHNOLOGIES
Search for cost-effective, energy-efficient technologies

3. COMPARE DETAILED ENERGY PERFORMANCE DATA

4. EVALUATE ENERGY AND COST SAVINGS
Use data in your calculations and energy simulations
Present the results to encourage capital investment in energy saving technologies

SEARCH PRODUCTS

BROWSE TECHNOLOGY CATEGORIES

- SSL Replacement Lamps
- Non-SSL Lamps
- Lamp Ballasts
- Non-SSL Luminaires
- SSL Luminaires
- Hot-Water Boilers
- Steam Boilers
- Compressors
- Rooftop Units
- Gas-Fired Unit Heaters
- Pumps
- DHP: Indoor Units
- DHP: Outdoor Units
- Heat Pump Water Heaters
- Transformers
- Photovoltaic Modules
- Inverters

Manufacturers
Learn how to submit your products to the Technology Performance Exchange.

Partners/Developers
Learn about the Technology Performance Exchange API.

Project Summary

Timeline:

Start date: January 27, 2012

Planned end date: September 30, 2014

Key Milestones

1. Launch TPEX with 15 technology product categories; 9/30/2014
2. Recruit three utilities to commit up to \$100,000 and use TPEX data; 9/30/2014

Budget:

BTO \$ to date: \$614,000

FEMP \$ to date: \$565,000

Other \$ to date: \$323,759

Total future DOE \$: TBD

Target Market/Audience:

Commercial building owners/operators, utilities, technology evaluation staff, manufacturers, energy modelers, researchers

Key Partners:

DOE Federal Energy Management Program
Bonneville Power Administration

Project Goal:

Ensure that necessary energy performance data are easily accessible for a broad array of technologies to reduce investment risk and drive uptake of cost-effective efficiency measures.

Purpose and Objectives

Problem Statement: Perceived fiscal risk associated with the installation of unfamiliar technologies impedes adoption rates for cost-effective, energy-saving products.

PROBLEM: How do building owners/operators, utilities, and technology demonstrators make informed decisions on energy saving technologies?

Building Owners/Operators, Utilities,
and Technology Demonstrators



PROBLEM: How do manufacturers/distributors reach potential customers and provide them with the information they need?



Purpose and Objectives

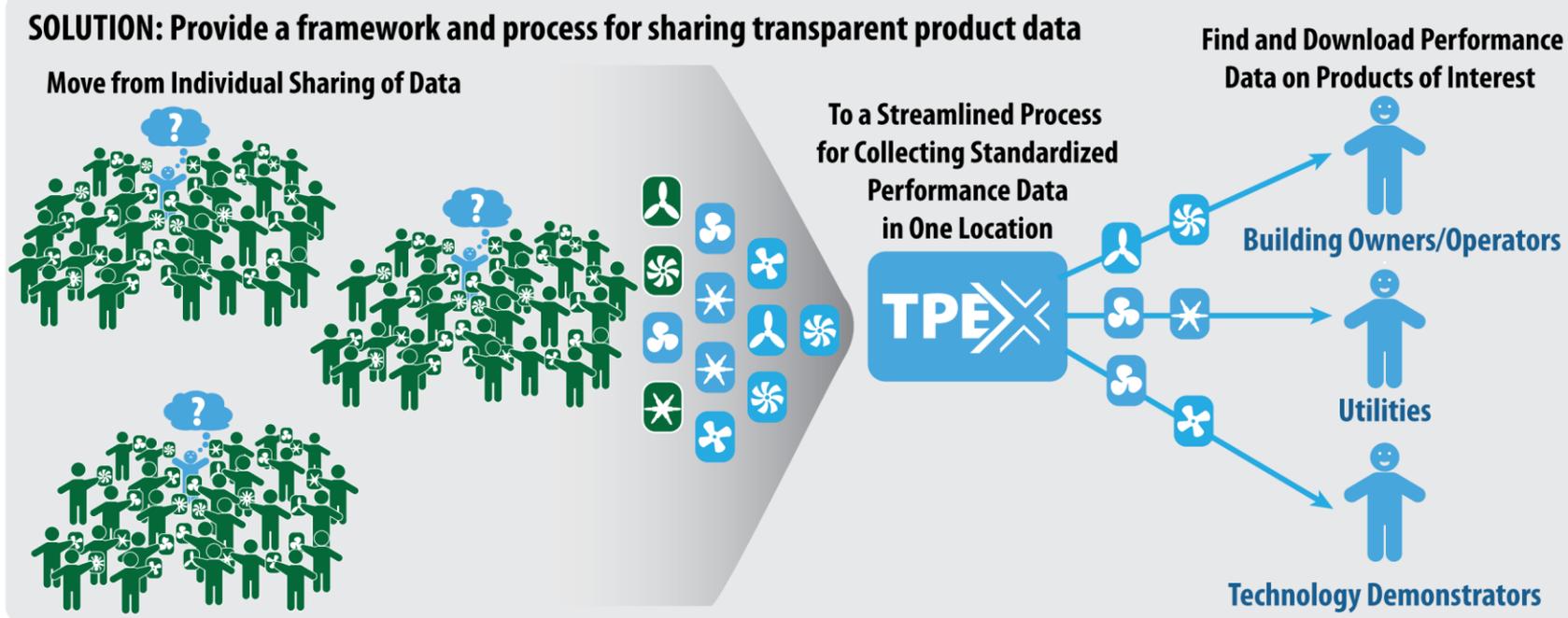
Target Market and Audience: Lower limit – 387 trillion Btu/year¹

Implementers

- Commercial building owners/operators
- Utilities
- Technology evaluation staff
- Manufacturers

Analysts

- Engineers/energy modelers
- Researchers



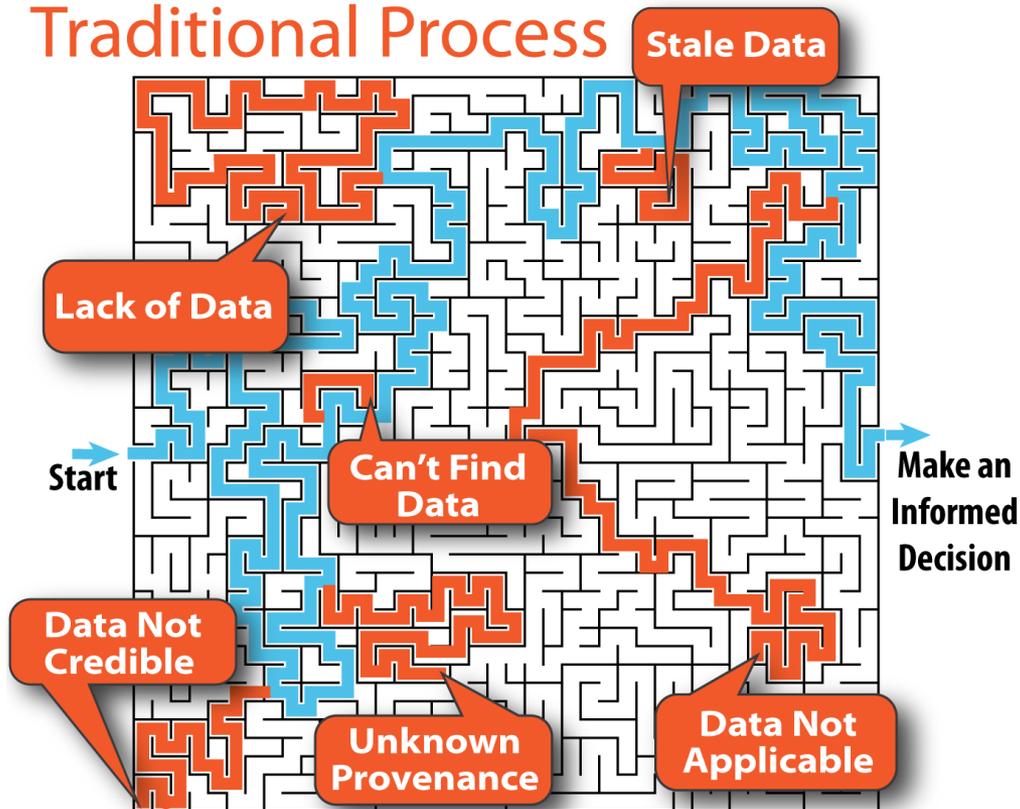
¹ US Energy Information Administration. Electric power sales, revenue, and energy efficiency Form EIA-861 detailed data files. <http://www.eia.gov/electricity/data/eia861/> Last accessed April 2, 2014.

Purpose and Objectives

Impact of Project:

- Ensure that necessary energy performance data are easily accessible for a broad array of technologies to reduce investment risk and drive uptake of cost-effective efficiency measures.
- Success metrics: Number of technology categories, products, and datasets

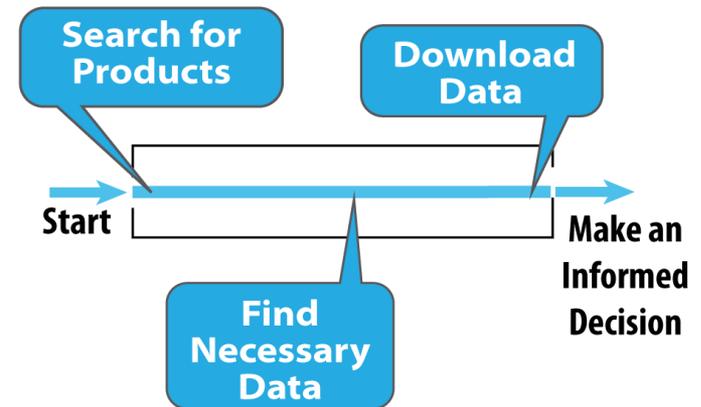
Traditional Process



credit: <http://www.mazegenerator.net/>



Process



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

Approach

Approach:

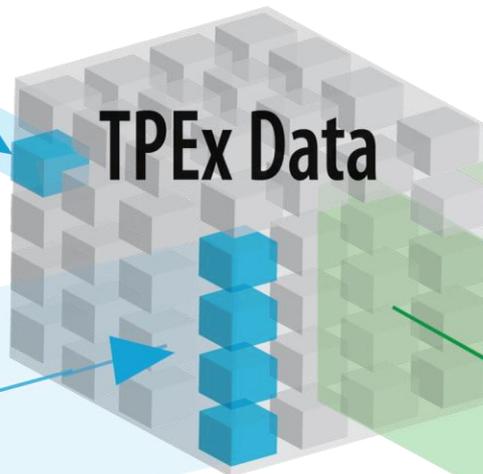
- Define the characteristics necessary to credibly predict performance
 - Bottom-up philosophy
- Create the infrastructure necessary to find, share, and leverage data
 - Restricted workflows
 - Web-based user interface
 - Application programming interface (API)
- Provide data transparency via metadata
 - Organization
 - Derivation method
 - Submission date

Approach

Manual Data Entry



User X Data



Manual Search and Data Download



Returned Data

End User A

Automated Data Upload



User Y Data

Automated Search and Download



Returned Data

End User B



Data Delivered Through UI OF END USER B

Approach

Quality Control: Filter performance data by the type of contributor.

Filter by:

- All
- Contributing Evaluator  46
- 3rd Party Test Lab  20
- Manufacturer  166

cture		0.895		0.65		420		0.321	
		0.895		0.65		420		0.321	
		0.895		0.65		420		0.321	
cture		0.921		0.70		385		0.456	
cturer 3	5819046503	0.921		0.70		321		0.334	

Approach

Quality Control:

Provenance

▼ **Module Efficiency** 
(average of 5 reports)

18.40 %



Source	Posted on	Derivation	Data	
Manufacturer of This Product	1/3/2014	Self-Measured, Laboratory	18.43	
National Renewable Energy Laboratory	3/6/2014	Calculated Using Others' Measured Laboratory Data	18.37	
Federal Energy Management Program	3/12/2014	Calculated Using External Data, Derivation Unknown	18.41	
Testing Laboratory Alpha	3/20/2014	Self-Measured, Laboratory	18.39	
Utility X	3/21/2014	Self-Measured, Field	18.40	

KEY:  CONTRIBUTING EVALUATOR

 3RD PARTY TEST LABORATORY

 MANUFACTURER/ BRAND OWNER

Approach

Example: Solar PV Module Parameters

- Module Efficiency
- Rated Power
- Cell Material/Type
- Length
- Width
- Total Number of Cells
- Number Of Cells In Series
- Solar Cell Area
- Nominal Operating Cell Temperature
- Short Circuit Current Temperature Coefficient
- Open Circuit Voltage Temperature Coefficient
- Maximum Power Temperature Coefficient
- Maximum Power at LTC
- Maximum System Voltage
- Maximum Stress Limit
- Rated Hail Diameter Impact Resistance
- Rated Hail Speed Impact Resistance
- Manufacturer's Warranty Available
- Warranty Time Length
- Pmp Guaranteed By The Warranty
- Electrical Performance Chart

(Subsection)



Power at Maximum Power Point Values (Watts)					
Light Spectrum	Irradiance (W/m ²)	Module Temperature (°C)			
		15	25	50	75
AM 1.5	1,100				
AM 1.5	1,000				
AM 1.5	800				
AM 1.5	600				
AM 1.5	400				
AM 1.5	200				
AM 1.5	100				

Key Issues & Distinctive Characteristics

Key Issues:

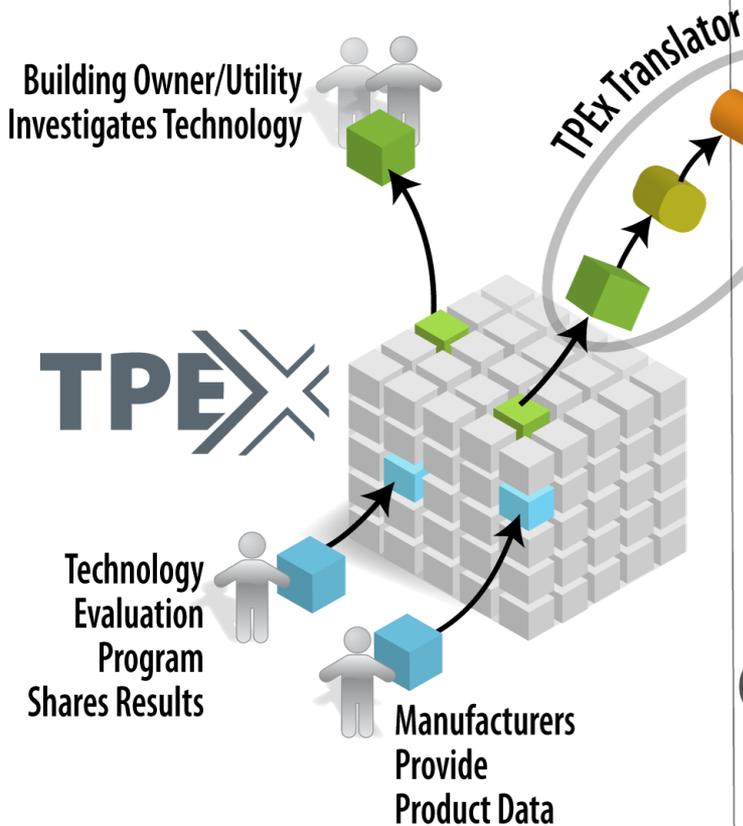
- Market visibility
 - Communications plan
- Growing the dataset
 - DOE RFI
 - Utility engagement efforts

Distinctive Characteristics:

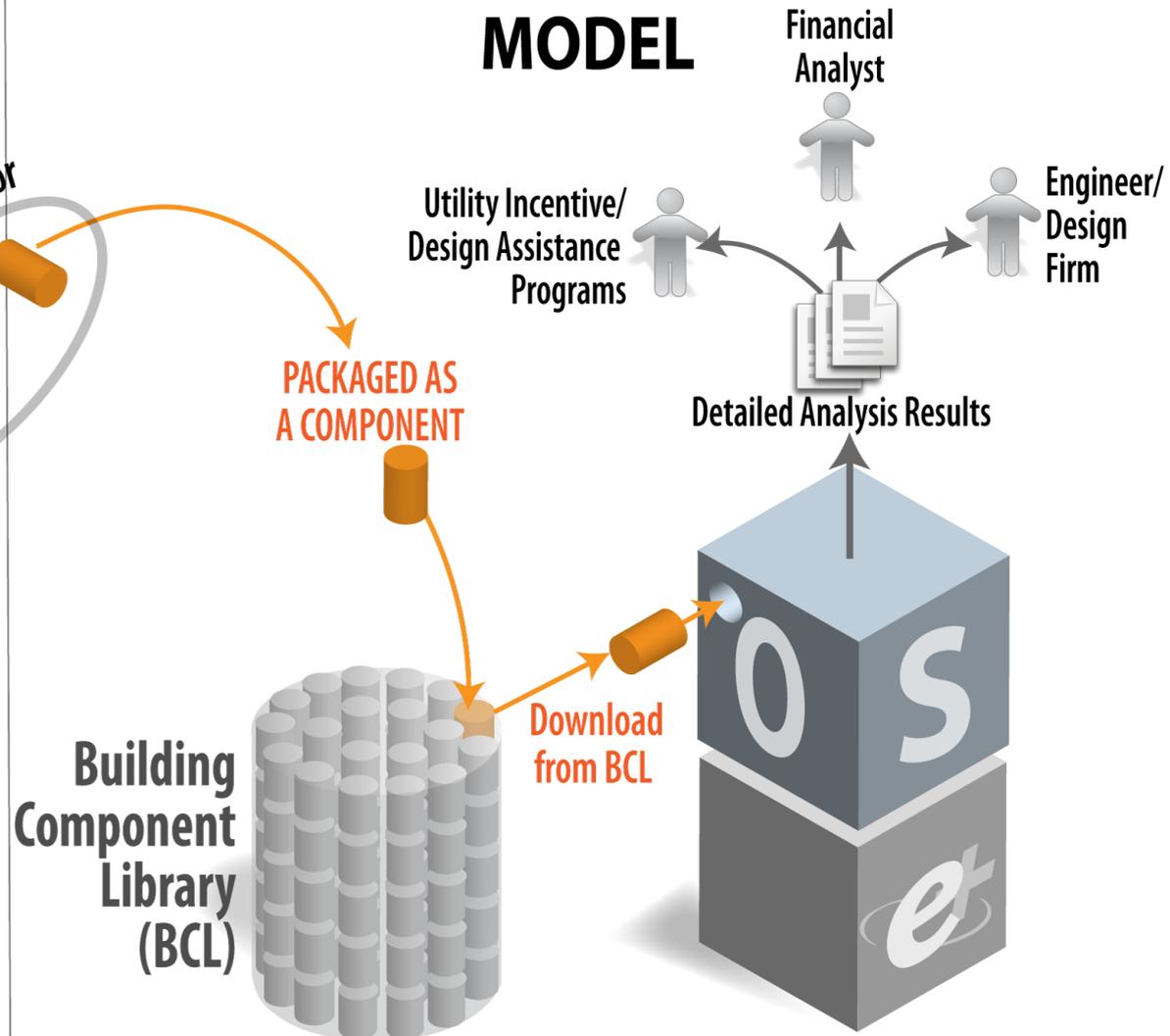
- Necessary parameters identified up-front to ensure relevance
- Data provenance (provider, derivation, date, etc.) is clearly identified
- Products are NEVER rated or ranked; judgment of “goodness” and “trustworthiness” left to the end user
- API allows automated data uploads/downloads
- Integrated with the Building Component Library/OpenStudio ecosystem

Distinctive Characteristics

DATA



MODEL



Progress and Accomplishments

Lessons Learned:

- Diversity of technology evaluation workflows/processes
- Institutional inertia

Accomplishments:

- Site infrastructure is complete
 - Intuitive Web-based user interface
 - Read/write API
- Six technology categories added in FY14
 - Total now stands at 17
- >20,000 product datasets added
- TPEX integrated with the Building Component Library
- TPEX brand being developed
- Market outreach efforts underway

Progress and Accomplishments

Market Impact:

- Coordinate and leverage utility, state, and federal technology evaluation efforts
 - Working with several utilities to integrate the Technology Performance Exchange into their technology evaluation programs
 - DoD engagement
 - Private sector engagement
- Manufacturer outreach to increase number of datasets
 - RFI, news release, workshops, etc.
- Relationship development at key events
 - Better Buildings Summit
 - ACEEE Summer Study on Energy Efficiency in Buildings
 - ASHRAE Annual and Winter Meetings

Project Integration and Collaboration

Project Integration:

- Better Buildings Alliance specifications
- Utility pilot
- Building Energy Data Exchange Specification (BEDES)

Partners, Subcontractors, and Collaborators:

- Federal Energy Management Program
- Bonneville Power Administration

Communications:

- DOE RFI
- NREL press release
- BTO & FEMP email alerts
- BTO & BBA project webpages
- ACEEE Summer Study on Efficiency in Buildings (future: August 2014)
- News articles (Eco Building Pulse, Energy Manager Today, Green Building Advisor)
- SPC 205 Meeting, 2014 ASHRAE Winter Conference

Top Down

BPD, SEED

Confidence Through Data

TPEX, BCL

Bottom Up

Next Steps and Future Plans

Next Steps and Future Plans:

- Outreach and engagement
 - Gather data on thousands of products
 - Stream millions of performance data points via the API
 - Amplify impact of utility incentive programs
 - Stakeholder addition of new technology categories
- Foster 3rd-party application development
 - Increase use of energy data in procurement decisions
- Residential building technologies
- Transition the site to a relevant non-profit

REFERENCE SLIDES

Project Budget

Project Budget:

- FY2012: \$223,000 BTO; \$200,000 FEMP
- FY2013: \$257,000 BTO; \$290,000 FEMP
- FY2014: \$134,000 BTO; \$75,000 FEMP

Variations: No variance

Cost to Date: 34% of DOE funds spent in FY2014

Additional Funding: Bonneville Power Administration

- FY2013: \$222,870
- FY2014: \$100,889

Budget History

FY2012 – FY2013 (past)		FY2014 (current)		FY2015 (planned)	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
970k	223k	209k	101k	TBD	TBD

Project Plan and Schedule

Project Schedule												
Project Start: January 27, 2012	Completed Work											
Projected End: September 30, 2014	Active Task (in progress work)											
	Milestone/Deliverable (Originally Planned)											
	Milestone/Deliverable (Actual)											
	FY2013				FY2014				FY2015			
Task	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)	Q1 (Oct-Dec)	Q2 (Jan-Mar)	Q3 (Apr-Jun)	Q4 (Jul-Sep)
Past Work												
Q1 Milestone: Develop Data Entry Forms	◆											
Q2 Milestone: Release TPEX v1.0		◆										
Q4 Milestone: Bulk Upload Scripts				◆								
Q4 Milestone: Formal API Enhancement				◆								
Q4 Milestone: Site Maintenance and Server Upgrades				◆								
Q4 Milestone: Industry Outreach Activities				◆								
Current/Future Work												
Q1 Milestone: Add 6 New Technology Categories					◆							
Q1 Milestone: Add PV Module and Inverter Datasets					◆							
Q2 Milestone: Progress Report on Utility Collaborative						◆						
Q3 Milestone: Utility Technology Status Report							◆					
Q4 Milestone: Integrate Utility Technologies of Interest								◆				
Q4 Milestone: Recruit 3 Utilities to Support/Use TPEX								◆				
Q4 Milestone: Launch TPEX with 15 Technologies								◆				