



Technology Performance Exchange™
Confidence through data.

The Technology Performance Exchange: An Overview and Update

Daniel Studer, NREL
Eliza Hotchkiss, NREL

January 15, 2015



U.S. DEPARTMENT OF
ENERGY

The Technology Performance Exchange was developed by the National Renewable Energy Laboratory with support from the U.S. Department of Energy's Building Technologies Office and Federal Energy Management Program, and the Bonneville Power Administration.

What's in it for me?

Facility Managers/Engineers/Modelers:

- Increase availability of needed data
- Improve workflow efficiencies and accuracy

Utilities:

- Aggregate industry data
- Reduce the evaluation time/cost barrier

Manufacturers:

- Assuage customers' doubts (i.e., get more effective technologies into the market)



Technology Performance Exchange™
Confidence through data.

What is TPEX?



Technology Performance Exchange™
Confidence through data.

The Technology Performance Exchange



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

Manufacturers

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

Partners/Developers

Learn about the Technology Performance Exchange API.

The Technology Performance Exchange

Data Entry Forms

- Minimum parameters required for a robust analysis
- Identified through engineering analysis

The screenshot shows a data entry form with the following sections:

- Fan Power Input (W) ?**: A text input field and a dropdown menu with the option "- None -".
- Cooling Performance Map Download ?**: A button labeled "Download Template".
- Cooling Performance Map Upload ?**: A "Choose File" button (No file chosen) and an "Upload Excel Spreadsheet" button. A dropdown menu is open, showing the following options:
 - Self-Measured, Field
 - None -
 - Non-Measurable Physical Property/Design Criteria
 - Self-Measured, Field
 - Self-Measured, Laboratory
 - Measured By Others, Field
 - Measured By Others, Laboratory
 - Calculated Using Self-Measured Field Data
 - Calculated Using Self-Measured Laboratory Data
 - Calculated Using Others' Measured Field Data
 - Calculated Using Others' Measured Laboratory Data
 - Reported by External Source, Derivation Unknown
 - Calculated Using External Data, Derivation Unknown
- Heating Performance Map Download ?**: A button labeled "Download Template".
- Heating Performance Map Upload ?**: A "Choose File" button (No file chosen) and an "Upload Excel Spreadsheet" button. A dropdown menu is open, showing the option "- None -".

At the bottom of the form, there are two buttons: "SAVE AND COMPLETE LATER" and "SUBMIT".

Credit: Daniel Studer, NREL

Performance Map Example

Basic Information	
Brand Owner	
Brand	
Product Line/Family Name	
Model Number	

Legend	
	Fill this information in first
	Provide DHP indoor unit cooling performance information in these cells for the conditions specified


Performance Map																						
Outdoor Air Dry-Bulb Temperature	Indoor Air Wet-Bulb Temperature																					
	13.9°C			16.1°C			17.8°C			19.4°C			21.1°C			22.8°C			24.4°C			
	CC	SC	EI	CC	SC	EI	CC	SC	EI	CC	SC	EI	CC	SC	EI	CC	SC	EI	CC	SC	EI	
-5.0°C																						
-3.9°C																						
-1.1°C																						
1.7°C																						
4.4°C																						
7.2°C																						
10.0°C																						
12.8°C																						
15.6°C																						
18.3°C																						
21.1°C																						
23.9°C																						
26.7°C																						
29.4°C																						
32.2°C																						
35.0°C																						
37.8°C																						
40.6°C																						
43.3°C																						

CC: Cooling Capacity (kW)
 SC: Sensible Capacity (kW)
 EI: Energy Input (kW)

Credit: Daniel Studer, NREL

Data Provenance

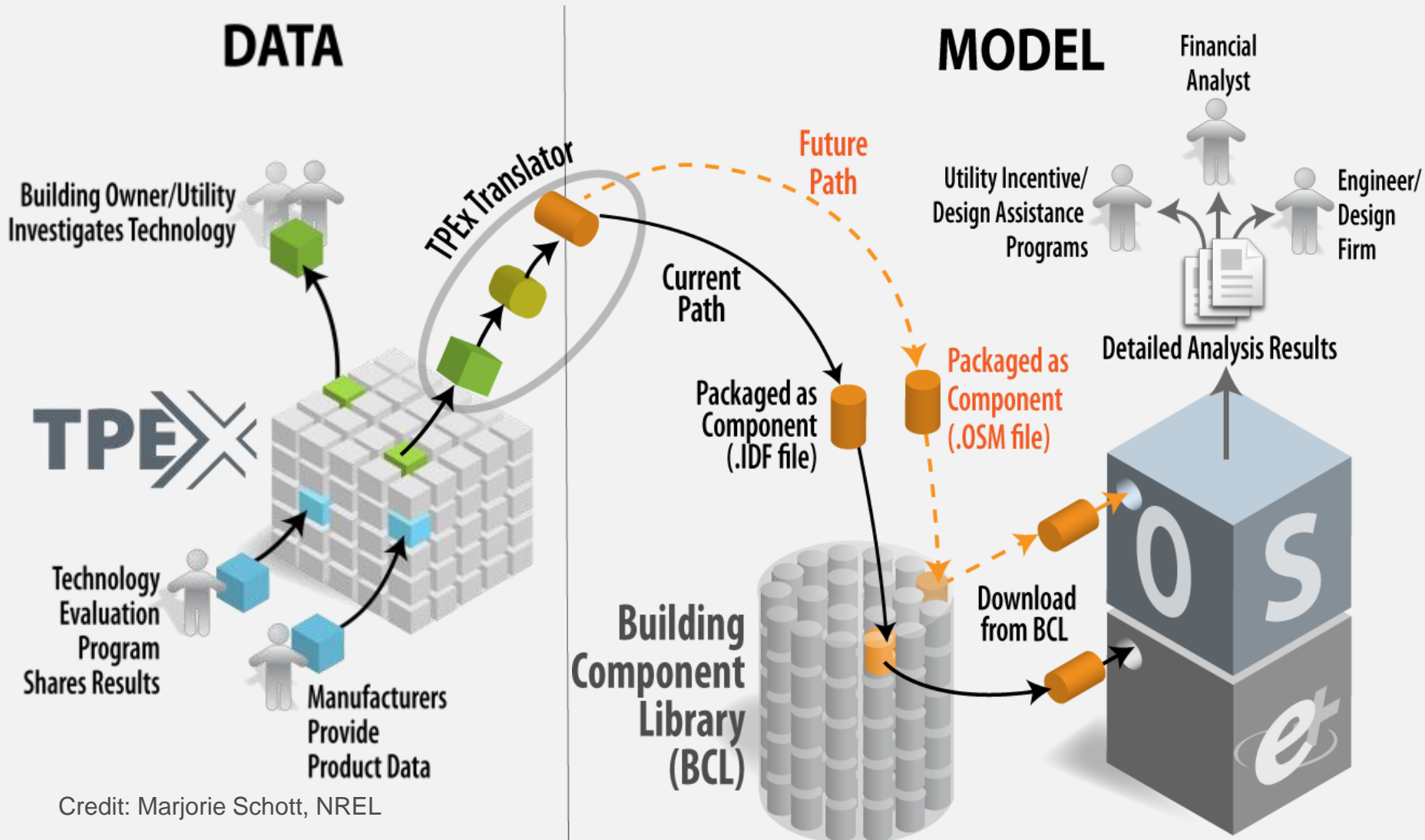
How can we ensure data credibility?

▶ Weighted Efficiency at 240 Volts ?		96.41 %	
(1 report)			
▼ Nominal Input Voltage ?		389.51 Vdc	
(1 report)			
Source	Posted on	Derivation	Data
National Renewable Energy Laboratory	12/20/2013	Calculated Using External Data, Derivation Unknown	389.51 

Credit: Daniel Studer, NREL

- Organization Type
- Organization Name
- Posting Date
- Derivation Method

The Data Ecosystem



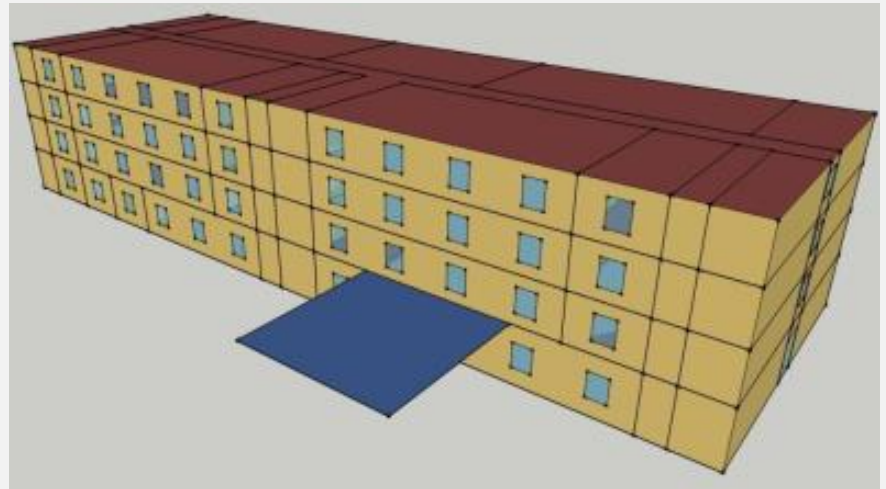
Credit: Marjorie Schott, NREL



Technology Performance Exchange™
Confidence through data.

Proof-of-Concept

- Validated end-to-end TPEX workflow:
 - Data → TPEX → EnergyPlus Model → Predicted Performance
- Two different datasets for the same system
 - Manufacturer performance data
 - Independent lab-test data



Credit: Daniel Studer, NREL

Proof-of-Concept: Results

- Good agreement on performance in heating mode
- No consensus on cooling performance
- Workflow implementation was straightforward and rapid

Project Status

- TPEX is live at www.TPEX.org
- 19 technology categories implemented
- DOE [RFI](#) requesting manufacturer performance data
- 20,000+ product datasets
- Public commitments from Target, Walmart, the Bonneville Power Administration, and LG Electronics
- Ongoing interactions with additional manufacturers and utilities



Technology Performance ExchangeTM
Confidence through data.

Questions?