



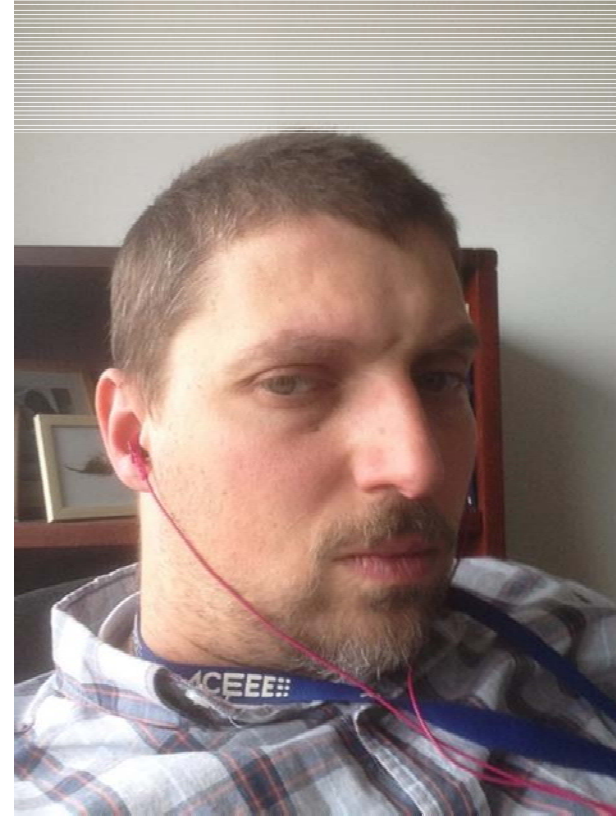
Leveraging the Technology Performance Exchange (TPEX) for Large Portfolios

October 3rd, 2016

TPEX Team



Danny Studer
NREL principal investigator



Amir Roth
BTO technology manager

Who is on the Call?

Please introduce yourself:

- Name and Organization
- Answer one or more of the following questions:
 1. Have you heard anything about TPEX, if so what interest or excites you about it?
 2. Do you negotiate custom utility incentives for EE projects?
 3. What factors do you consider when selecting new equipment?

What is TPEX?

- Public database of equipment performance data from:
 - Manufacturers
 - Utilities
 - Third party equipment testers
 - M&V'ed field demonstrations and pilots
- Plugs into DOE's energy modeling ecosystem
- Facilitates equipment related decision-making for multiple stakeholders
 - Energy managers
 - Designers
 - Utilities

A tour of TPEX

TPEX 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 [Search Bar]

BROWSE TECHNOLOGY CATEGORIES

SSL Replacement Lamps	Hot-Water Boilers	VRF: Indoor Units
Non-SSL Lamps	Steam Boilers	VRF: 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.

tpex.org

How does TPEX fit into the larger picture?

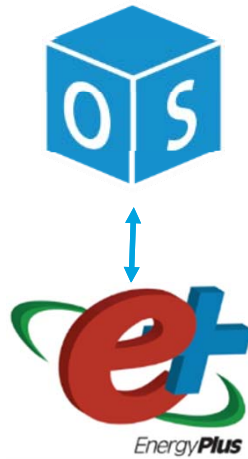
- What IS the larger picture?
- Building Energy Modeling (BEM)
 - Physics-based calculation of building energy use
 - Basis for code development & compliance (e.g., ASHRAE 90.1) ...
 - Green certificates (e.g., LEED)
 - Asset ratings (e.g., Asset Score)
 - Design tools (e.g., Sefaira)
 - Utility incentive programs (e.g., Savings By Design)
- DOE's BEM Ecosystem

The larger picture



- EnergyPlus BEM engine
 - State-of-the-art building physics for low-energy design & operation
 - energyplus.net

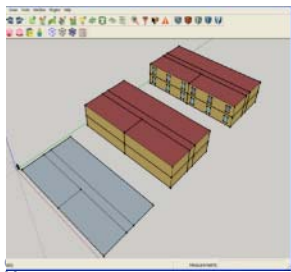
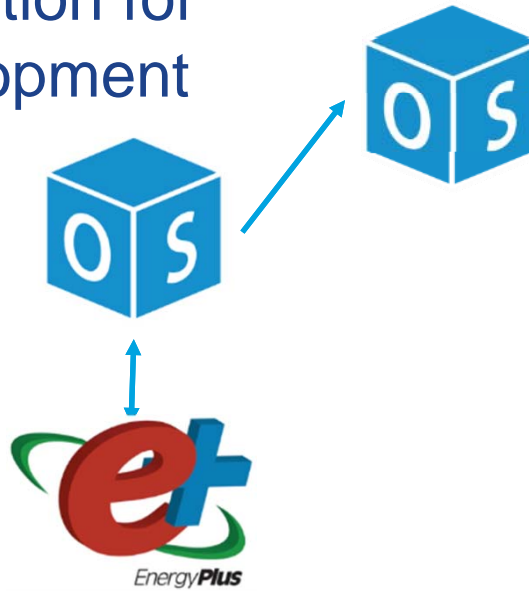
The larger picture



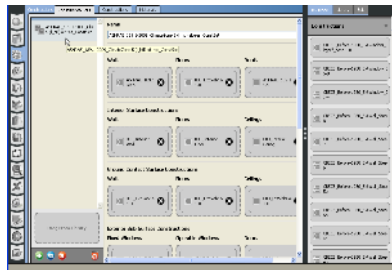
- OpenStudio software development kit (SDK) for BEM
 - BEM's Linux or Android — dramatically reduces app development effort
 - openstudio.net

The larger picture

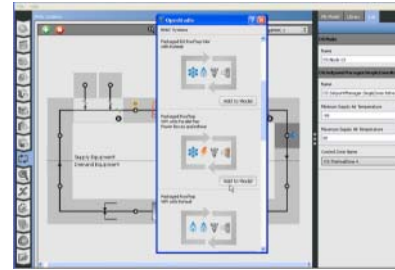
- OpenStudio application for single-model development



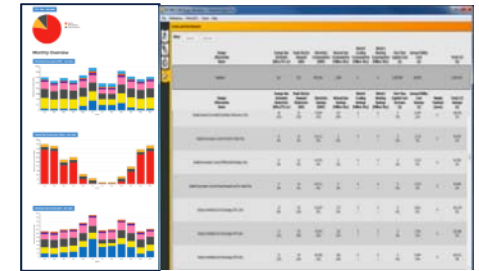
Envelope



Constructions, loads
schedules, etc.

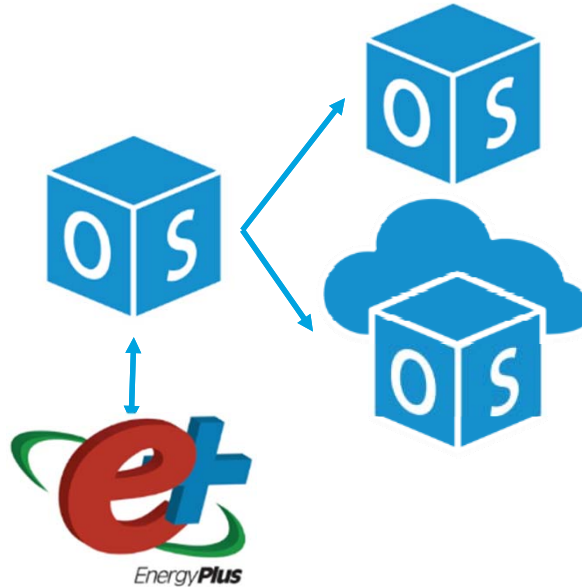


HVAC templates
or custom systems



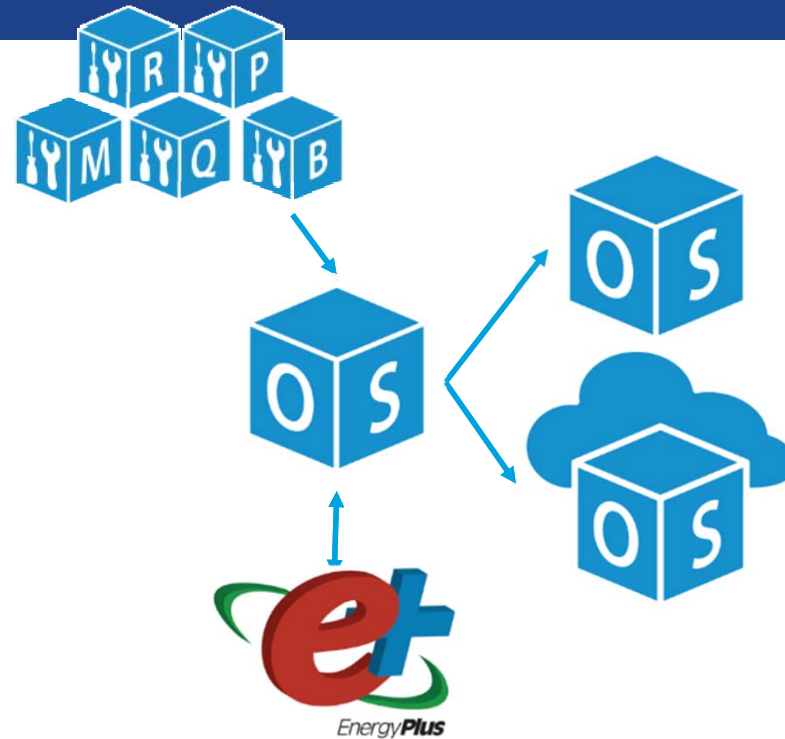
Run, report, QA/QC,
parametric analysis

The larger picture



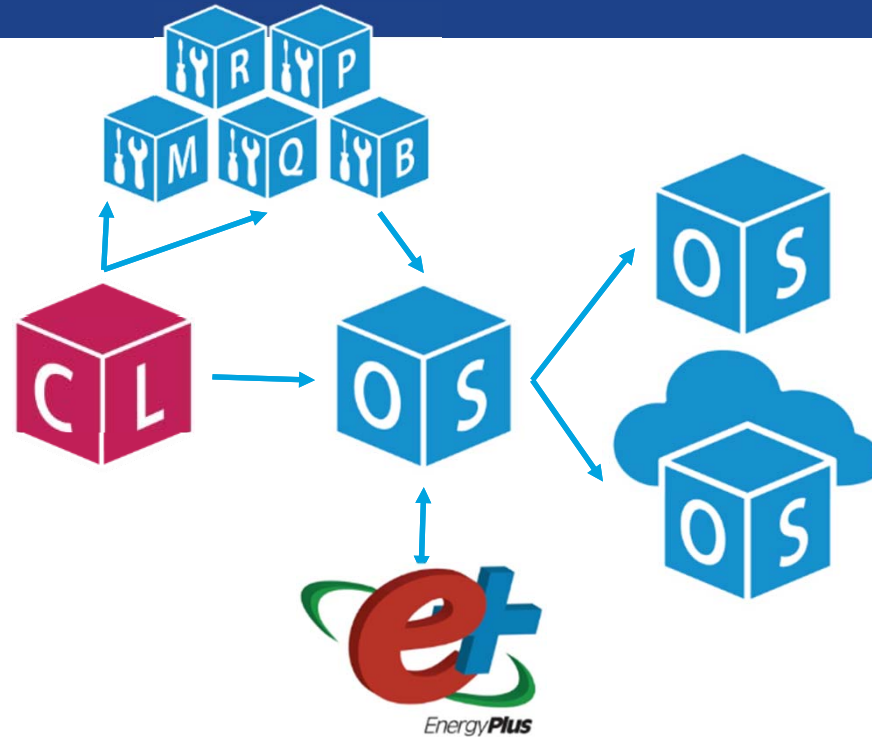
- OpenStudio server for large-scale analysis
 - Sensitivity/uncertainty analysis, design optimization, calibration, etc.
 - Image works on multiple clouds — Amazon, Google, Rackspace, etc.

The larger picture



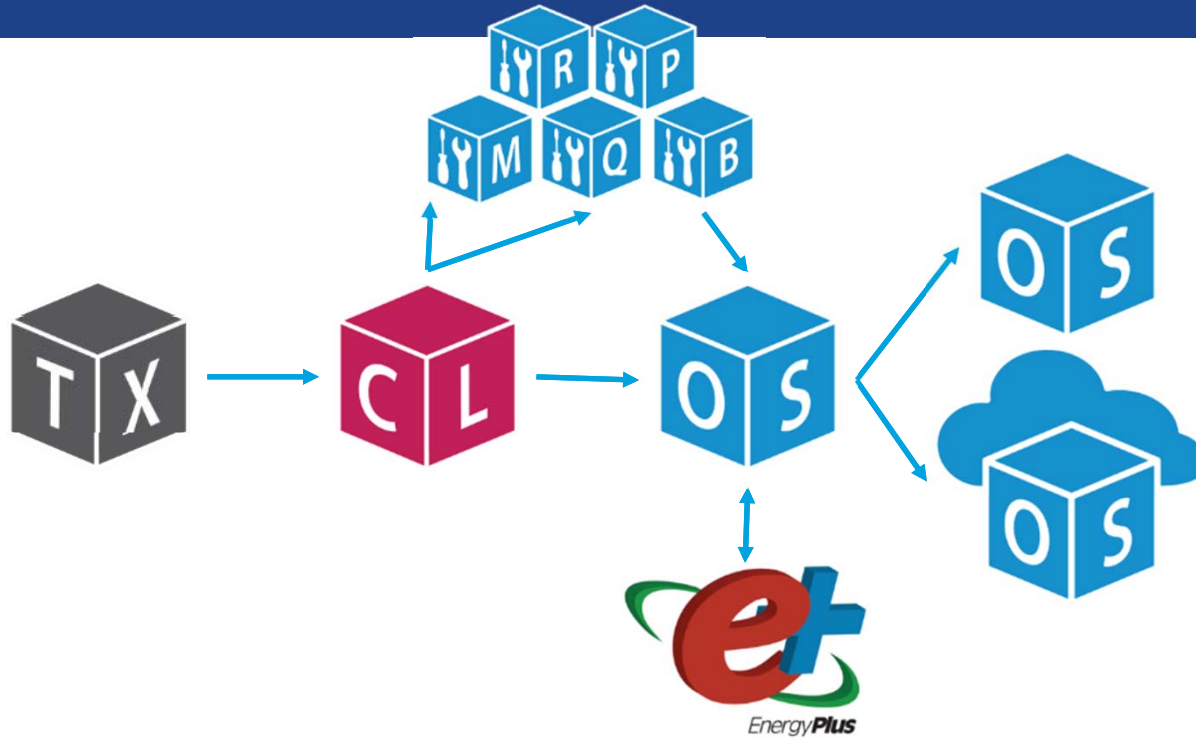
- OpenStudio Measures for workflow automation
 - Ruby scripts that use OpenStudio API – analogous to Excel VB macros
 - Model Measures for automating ECMs
 - Measures are for anything – Reporting, QA, auto-baselining, workflow, etc.
 - Great way of codifying & sharing knowledge

The larger picture



- Building Component Library (BCL)
 - Online repository for Measures
 - And simulation components – weather files, constructions, equipment, etc.
 - Version tracking, provenance tracking, sharing, API
 - bcl.nrel.gov

TPEX in the larger picture



- TPEX
 - Pathway for real equipment performance data into ecosystem

Peer Discussion

- Do you work directly with your store designers?
- Do you assist designers with equipment selections?
- What modeling tools are your designers using?
- Would you like to connect your designers with more information on EnergyPlus?

How can YOU use TPEX?

- Use Case 1: Evaluate real products in retrofit store/ prototype designs
- Use Case 2: Streamline incentive process across multiple utilities

UC 1: Incorporate Into Prototype Designs

TPEX™ Technology Performance Exchange™
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Ductless Heat Pumps | Outdoor Unit

LG Electronics USA ARUB216DTE4

+ ADD DATA ON THIS PRODUCT
FOLLOW THIS PRODUCT
DOWNLOAD PERFORMANCE DATA

Brand
LG Electronics USA

Manufacturer:
LG Electronics USA

Product line / Family Name
Multi V IV

Manufacturer Website

Model number
ARUB216DTE4

Energy Performance Data	
▶ Rated Total Cooling Capacity ? (1 report)	63,288.00 W
▶ Rated Cooling Coefficient of Performance ? (1 report)	3.54
▶ Rated Heating Capacity ? (1 report)	71,199.00 W
▶ Rated Heating Coefficient of Performance ? (1 report)	3.69
▶ Integrated Energy Efficiency Ratio ? (1 report)	20.50 (BTU/h)/W
▶ Working Refrigerant ? (1 report)	410A
▶ Heat Recovery Capability ? (1 report)	Yes
▶ Cooling Performance Man ?	

LG Electronics USA ARUB216DTE4



- Step 1: Enter component in TPEX
 - Hopefully, it's already in there!

UC 1: Incorporate Into Prototype Designs

Welcome, dstuder! My Dashboard | Logout

Search

Building Component

LG Electronics USA ARUB216DTE4

NREL Technology Performance Exchange

TPE admin

Description
Energy performance information for LG Electronics USA model ARUB216DTE4 by LG Electronics USA. This information was compiled from data submitted to the Technology Performance Exchange (<http://performance.nrel.gov>). Additional data and provenance details for this product can be found on the TPE.

Rating
☆☆☆☆☆
No votes yet

Type
HVAC
Ductless Heat Pump
Outdoor Unit

Attributes	
TPE UUID	3ae99b6-f995-4148-aa62-c177e4635ea9
Manufacturer	LG Electronics USA
Model Number	ARUB216DTE4
Brand	LG Electronics USA
OpenStudio Type	OS:AirConditioner:VariableRefrigerantFlow
Product Line/Family Name	Multi V IV
Rated Total Cooling Capacity	63288.0 W
Rated Heating Capacity	71199.0 W
Rated Cooling Coefficient of Performance	3.54
Rated Heating Coefficient of Performance	3.69
Working Refrigerant	410A
Integrated Energy Efficiency Ratio	20.5 (BTU/h)/W

Files

- LG_Electronics_USA_ARUB216DTE4_HF_EnergyPlus_8.1.0
- LG_Electronics_USA_OpenStudio_1.6.0

Content visibility
Public - accessible to all site users

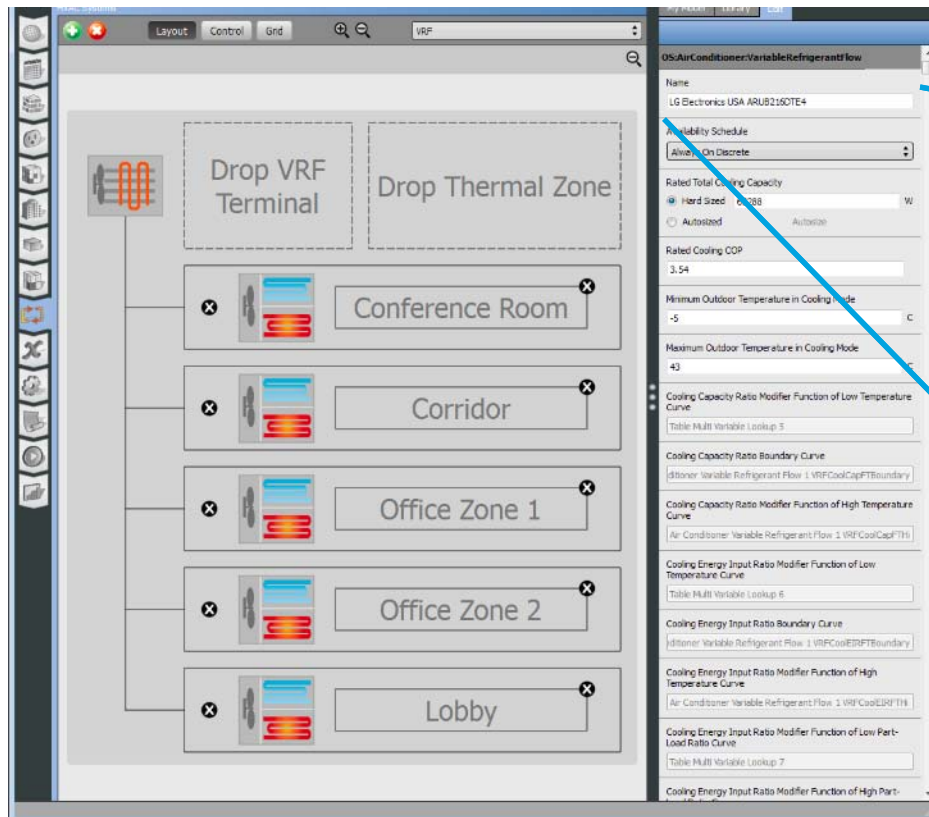
Download

Source
URL <http://tp-dev.development.nrel.gov/node/50045>



- “Step” 2: Translate performance data to simulation format
 - This happens automatically; simulation component created in BCL

UC 1: Incorporate Into Prototype Designs

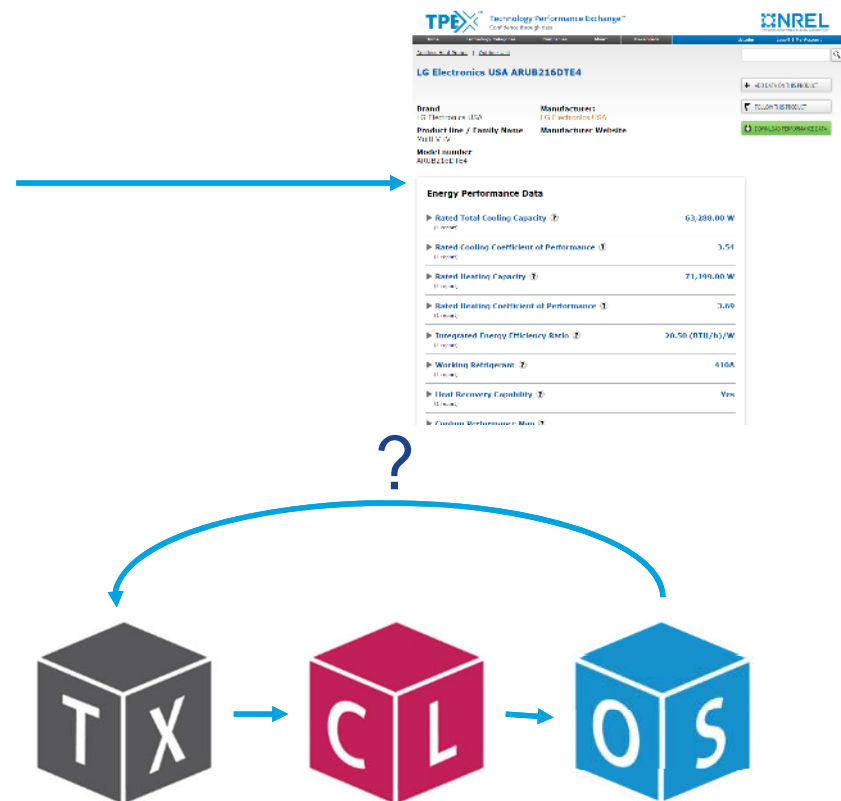
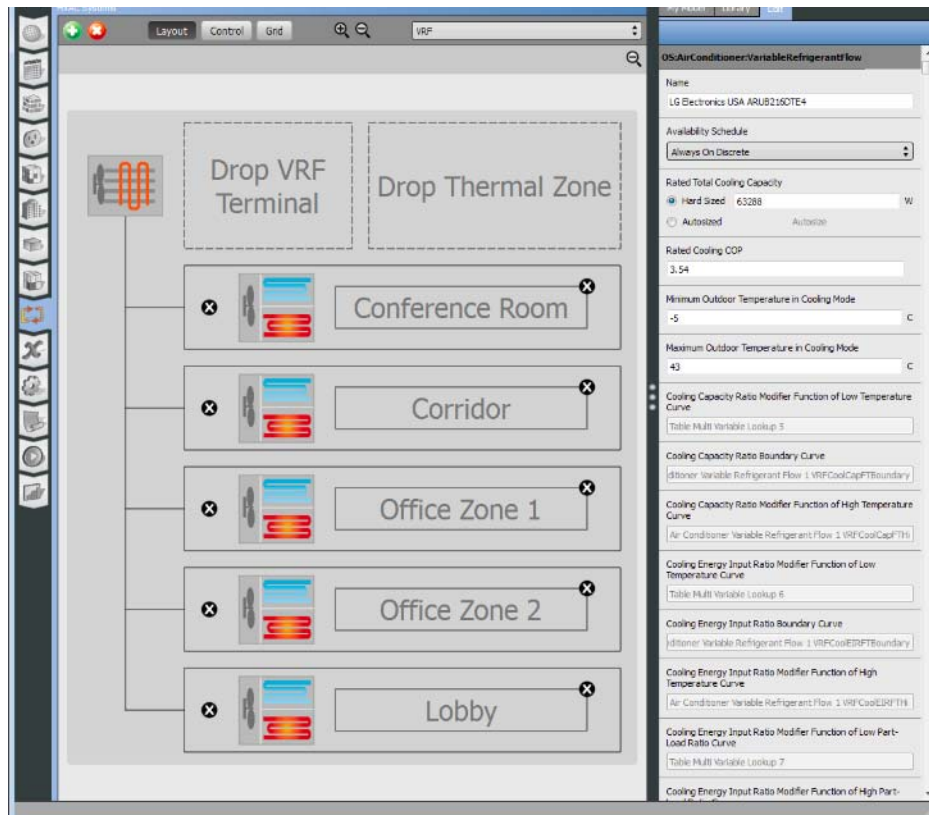


Name
LG Electronics USA ARUB216DTE4



- Step 3: Import into project library
 - Drag and drop into model

UC 1: Incorporate Into Prototype Designs

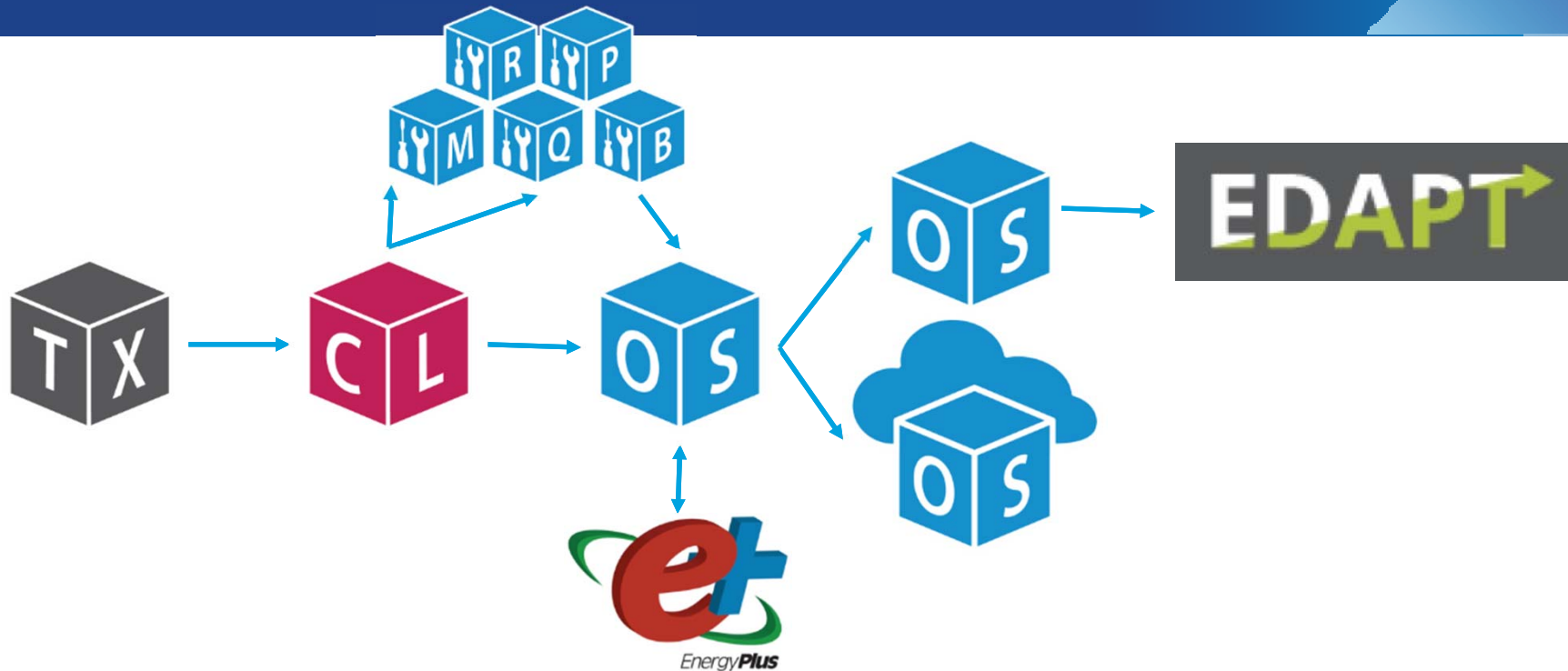


- Coming later this year: TPEX lookup from models
 - Find real equipment that meets performance specifications

Peer Discussion

- Is this use case beneficial to you?

UC 2: Ex Ante Utility Incentives

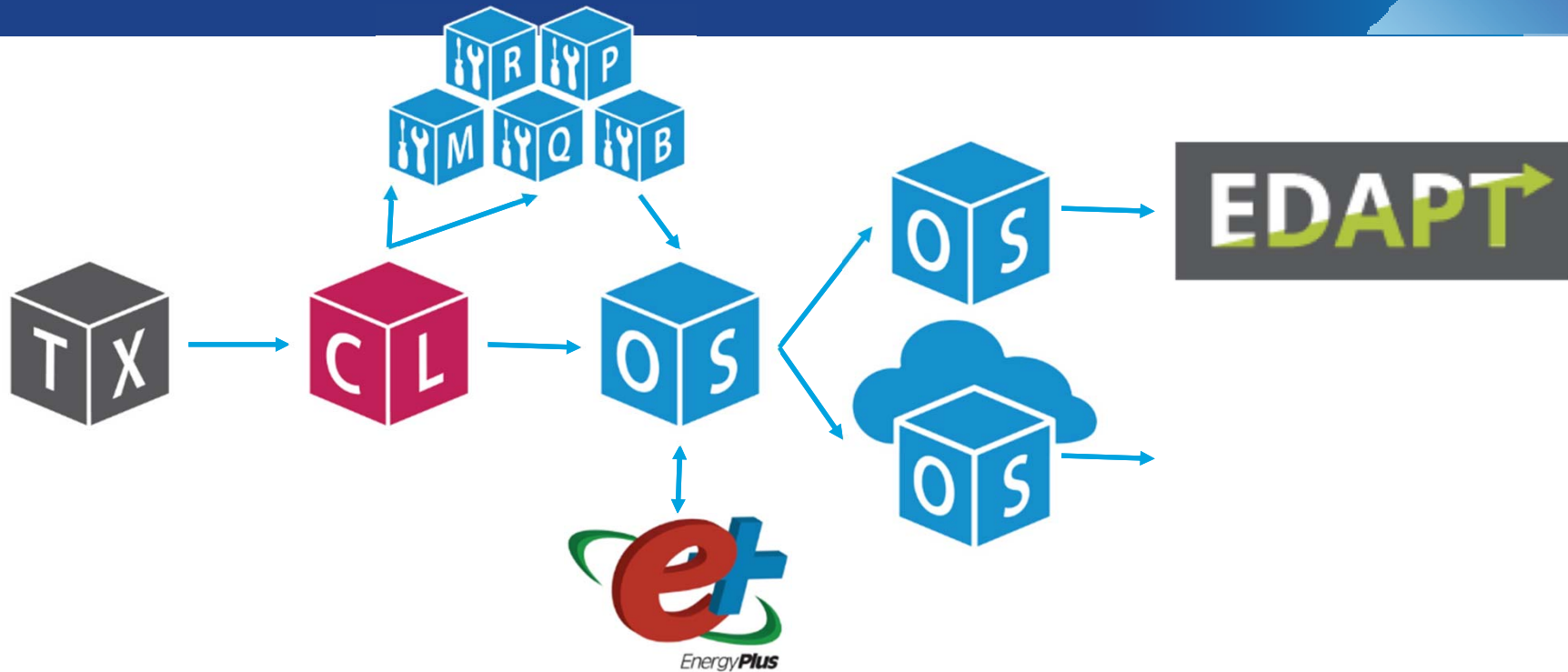


- Custom projects – whole-building performance
 - Savings over code (new construction) or existing conditions (retrofit)
 - Tag “approved” / “preferred” / “certified” products in TPEX
- Energy Design Assistance Program Tracker – eda-pt.org

UC 2: Utilities using EDAPT



UC 2: Ex Ante Utility Incentives



- Deemed savings – one ECM at a time
 - Prototypical analysis to generate typical savings values
 - Tag “approved” / “preferred” / “certified” products in TPEX

UC 2: Utilities using OpenStudio

- Working on it!

Peer Discussion

- Is this use case beneficial to you?
- If so, there are two things needed:
 - Utilities using the system
 - Which utilities do you wish were on this list?
 - What do you need to support your key utilities to use TPEX?
 - Request letter? Utility training?
 - Equipment data
 - Request testing data for your equipment is added to TPEX so accessible to participating utilities
 - Request letter? Training?

Coming soon...

- Resources to support uptake by utilities and manufacturers
- Other ideas?

Contact the TPEX team

- Amir Roth (BTO) – amir.roth@ee.doe.gov
- Danny Studer (NREL) – daniel.studer@nrel.gov