Better Buildings®
U.S. DEPARTMENT OF ENERGY

Leveraging the Technology Performance Exchange (TPEx) for Large Portfolios

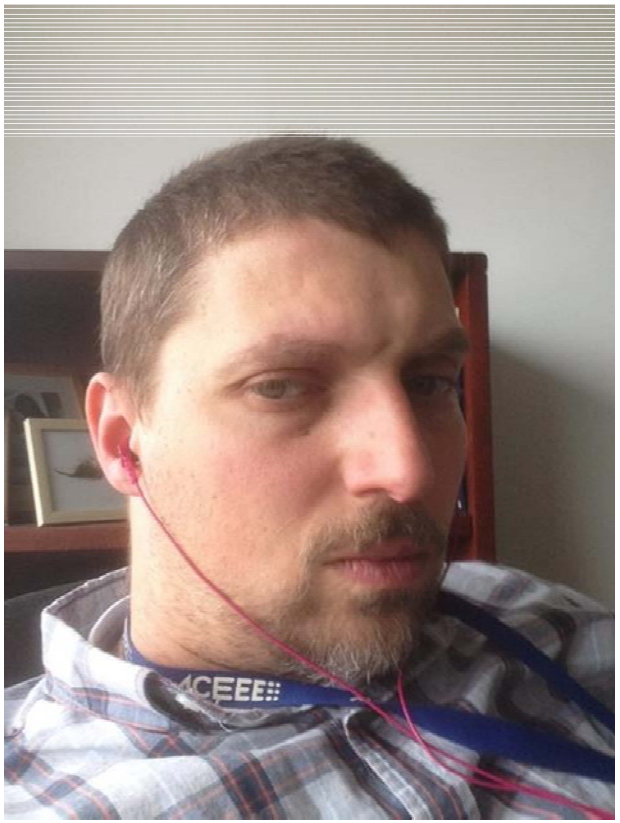
October 3rd, 2016

U.S. DEPARTMENT OF ENERGY

TPEx Team

Danny Studer

NREL principal investigator



Amir Roth

BTO technology manager

Who is on the Call?

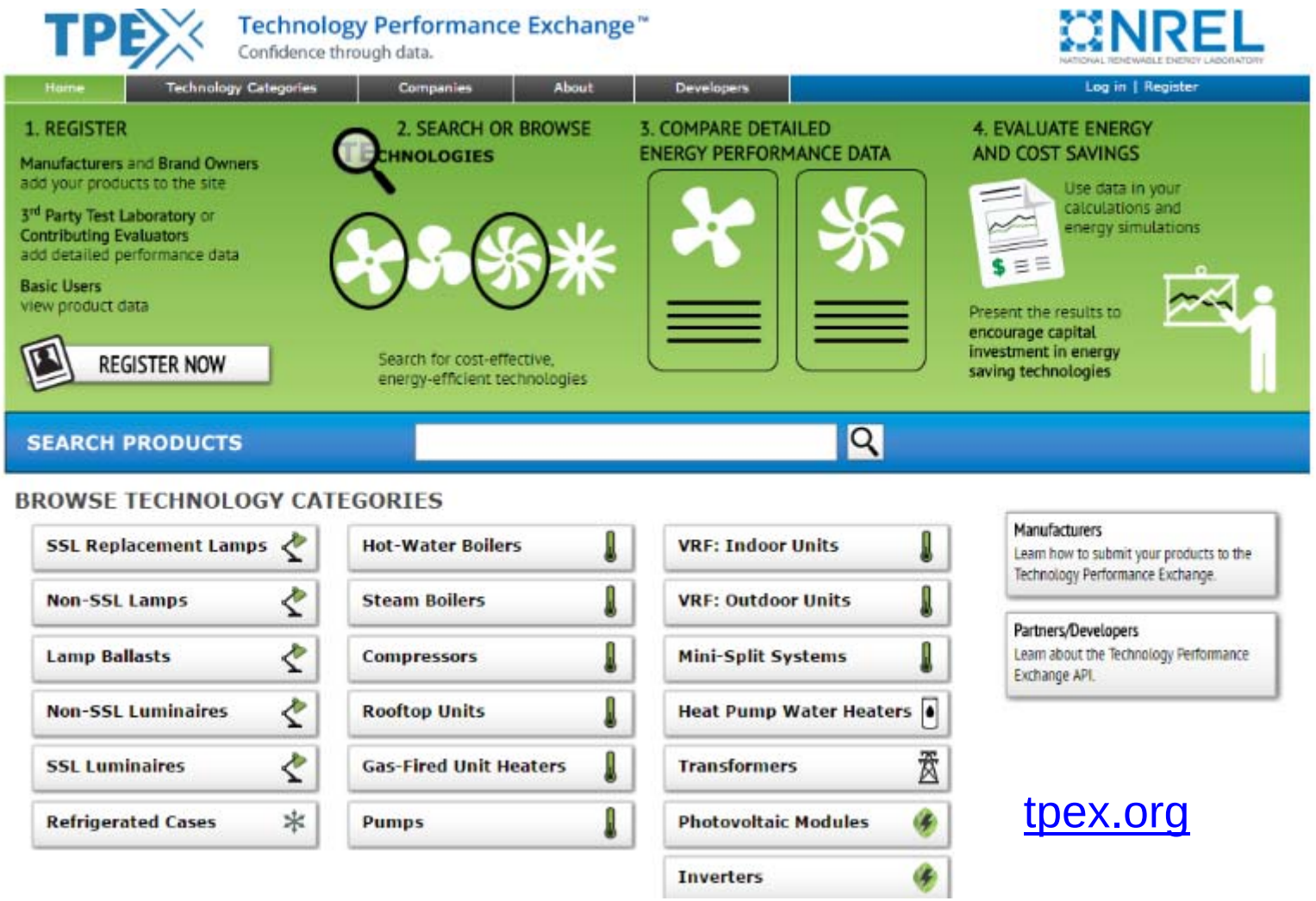
Please introduce yourself:

- 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.org

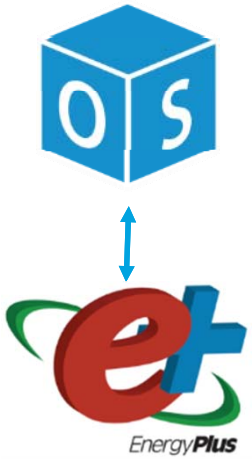
How does TPEx fit into the larger picture?

- 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

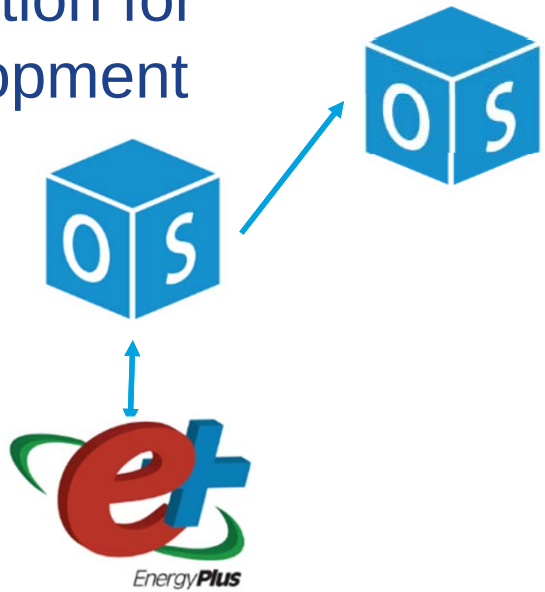
The larger picture

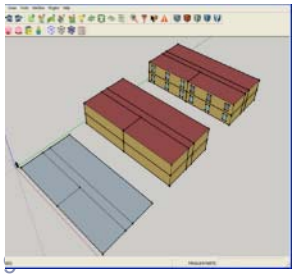


- OpenStudio software development kit (SDK) for BEM
  - BEM's Linux or Android — dramatically reduces app development effort
  - openstudio.net

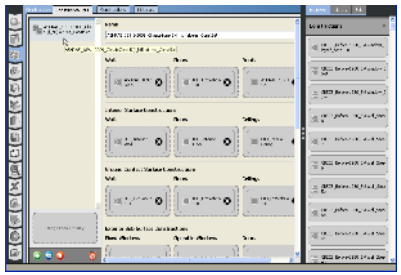
The larger picture

- OpenStudio application for single-model development

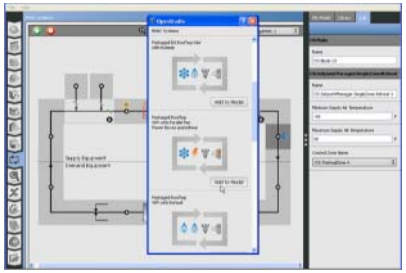




Envelope



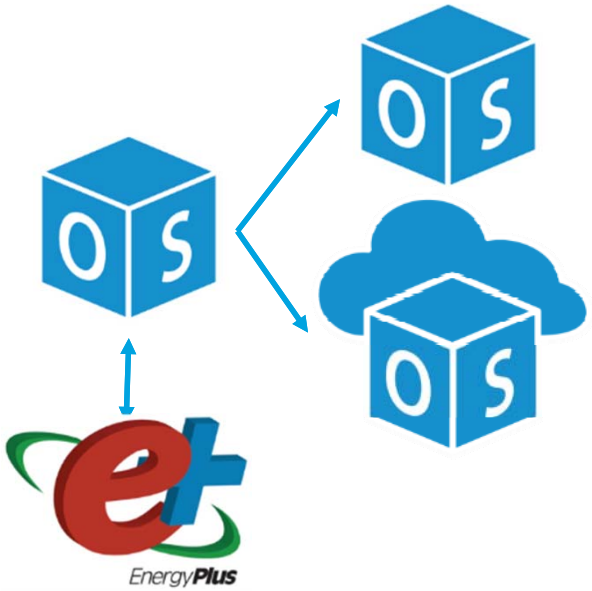
Constructions, loads schedules, etc.



HVAC templates or custom systems

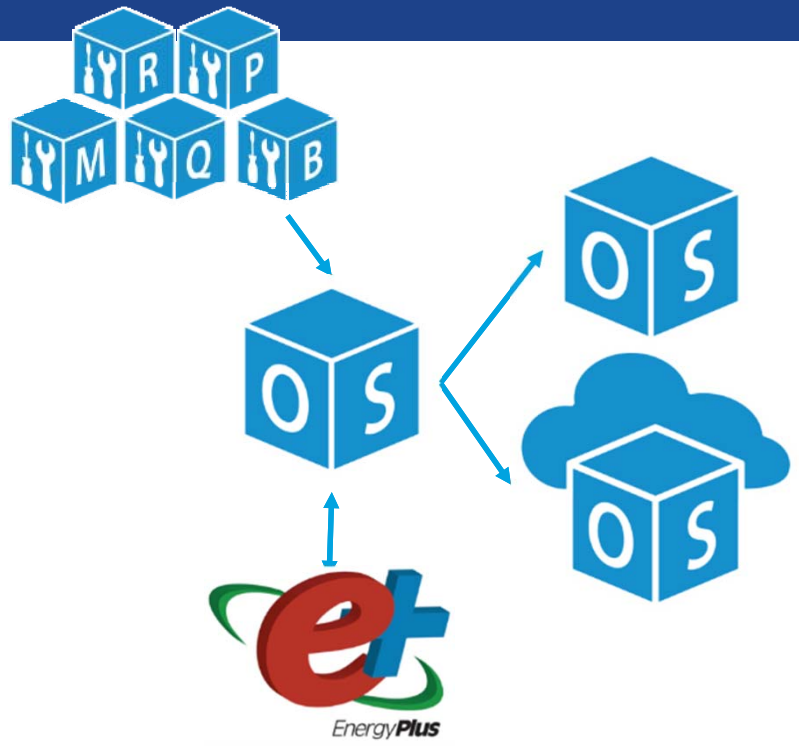
Run, report, QAQC, parametric analysis

The larger picture



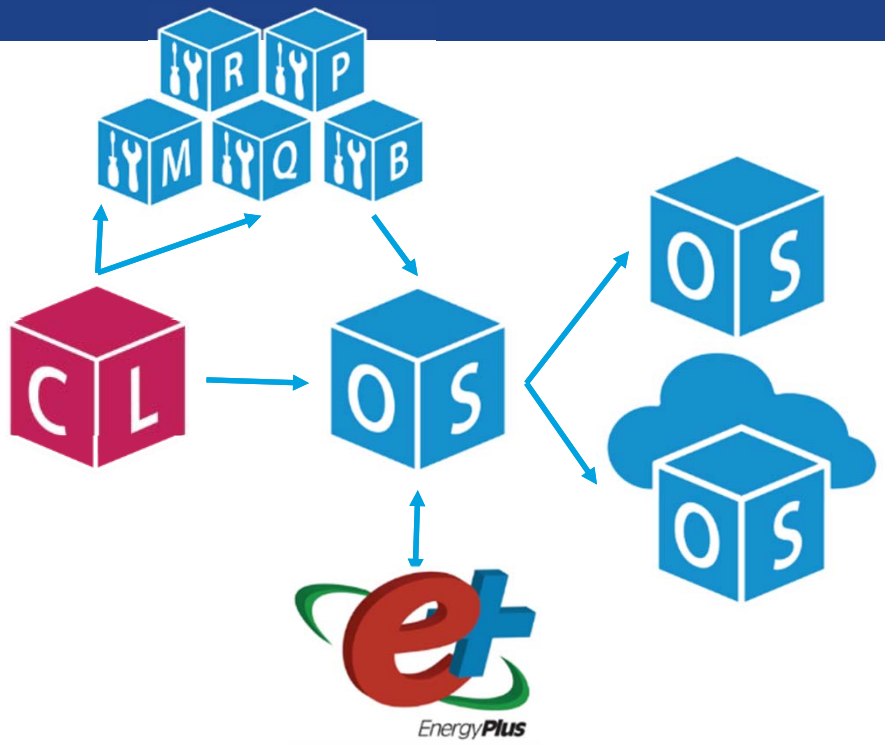
- OpenStudio server for large-scale analysis
  - Sensitivity/uncertainty analysis, design optimization, calibration, etc.
  - Image works on multiple clouds — Amazon, Google, Rackspace, etc.

The larger picture



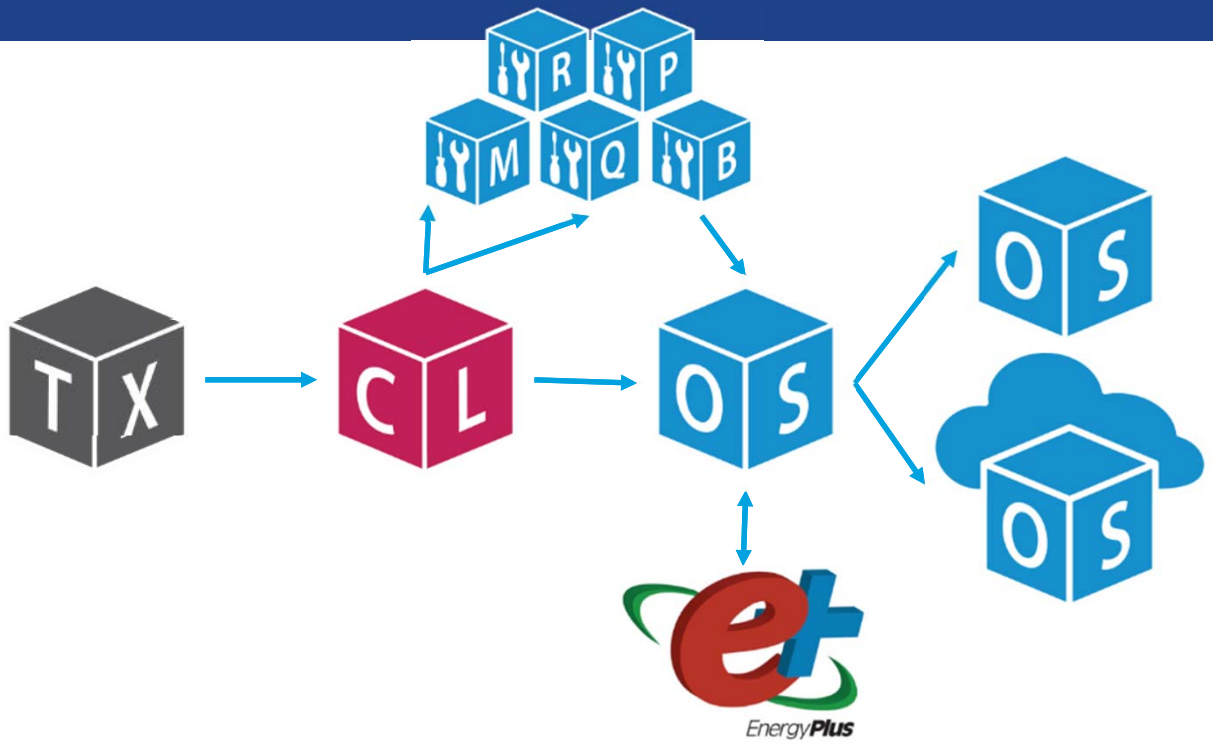
- OpenStudio Measures for workflow automation
  - Ruby scripts that use OpenStudio API – analogous to Excel VB macros
  - Model Measures for automating ECMs
  - Measures are for anything – Reporting, QA, auto-baselining, workflow, etc.
  - Great way of codifying & sharing knowledge

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

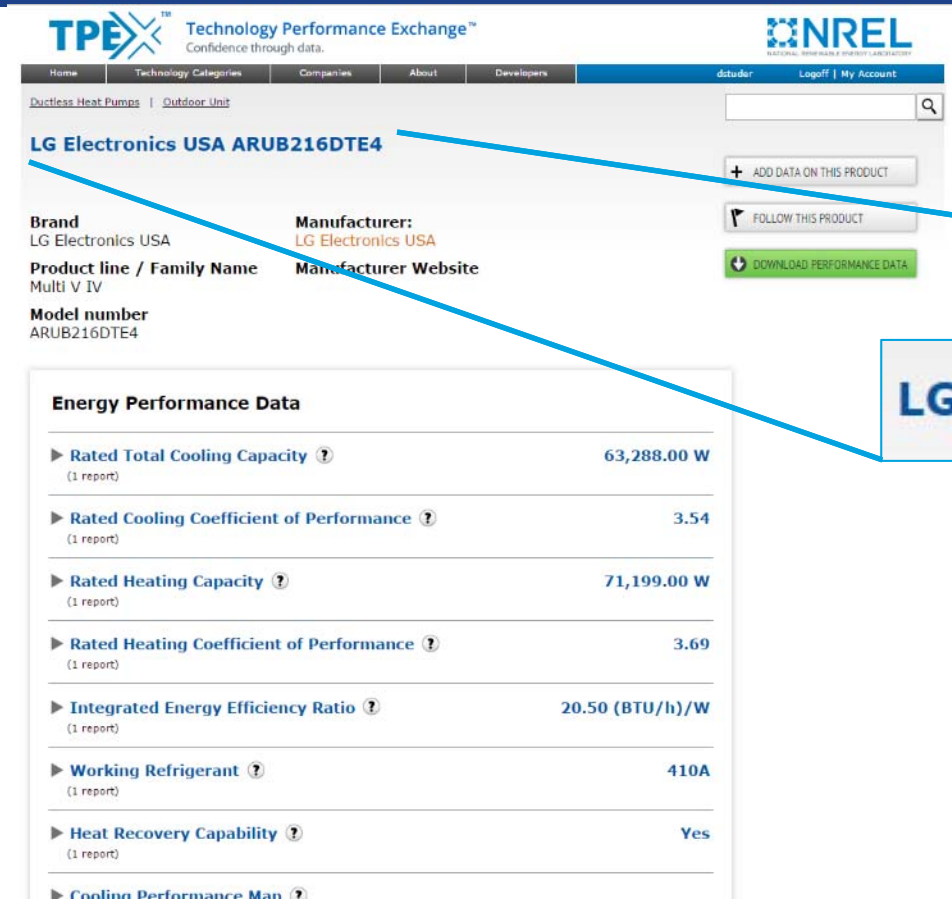
Peer Discussion

- 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

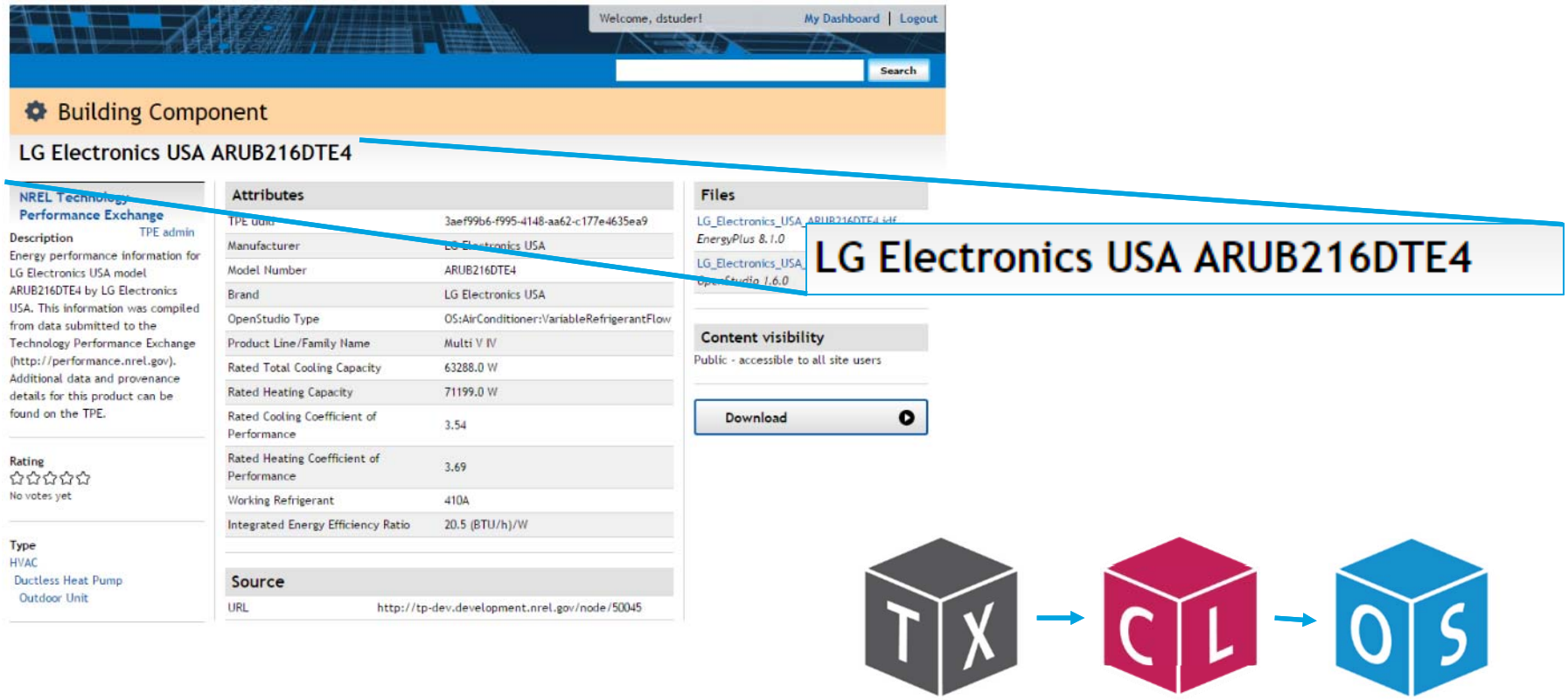
UC 1: Incorporate Into Prototype Designs



LG Electronics USA ARUB216DTE4

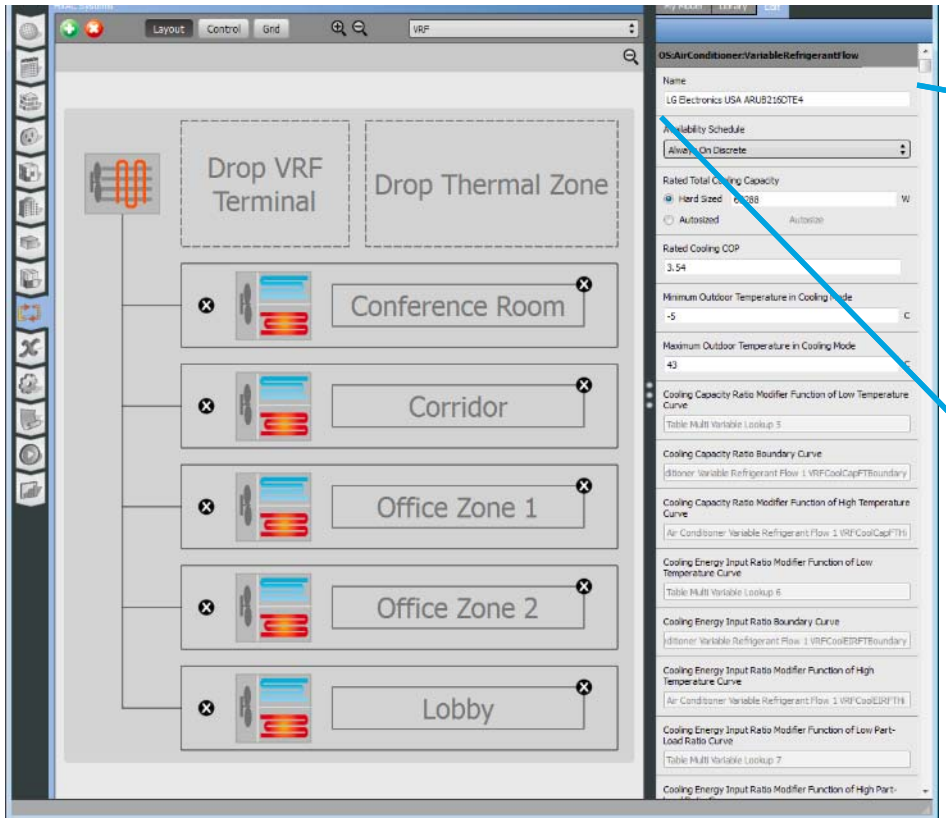
- Step 1: Enter component in TPEx
  - Hopefully, it's already in there!

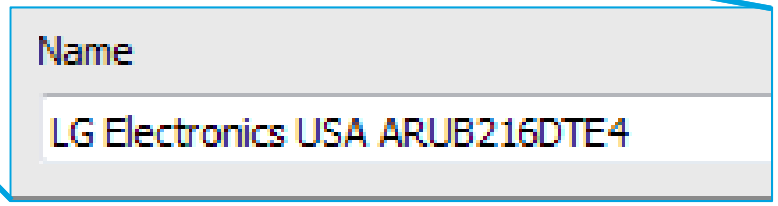
UC 1: Incorporate Into Prototype Designs



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

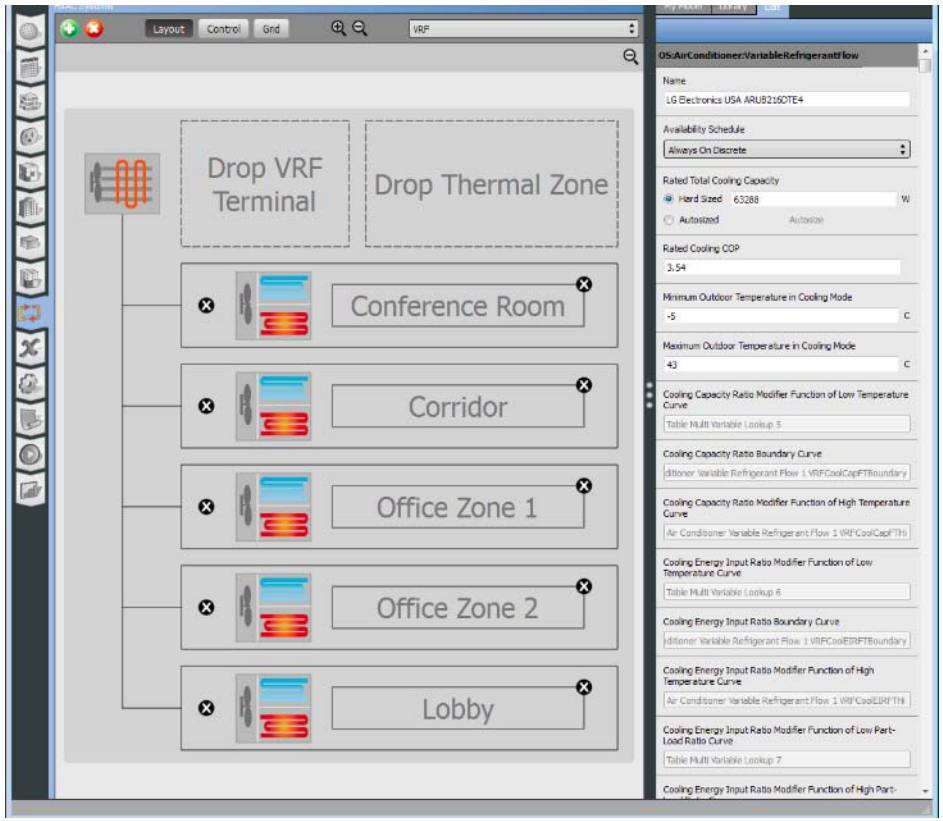
UC 1: Incorporate Into Prototype Designs

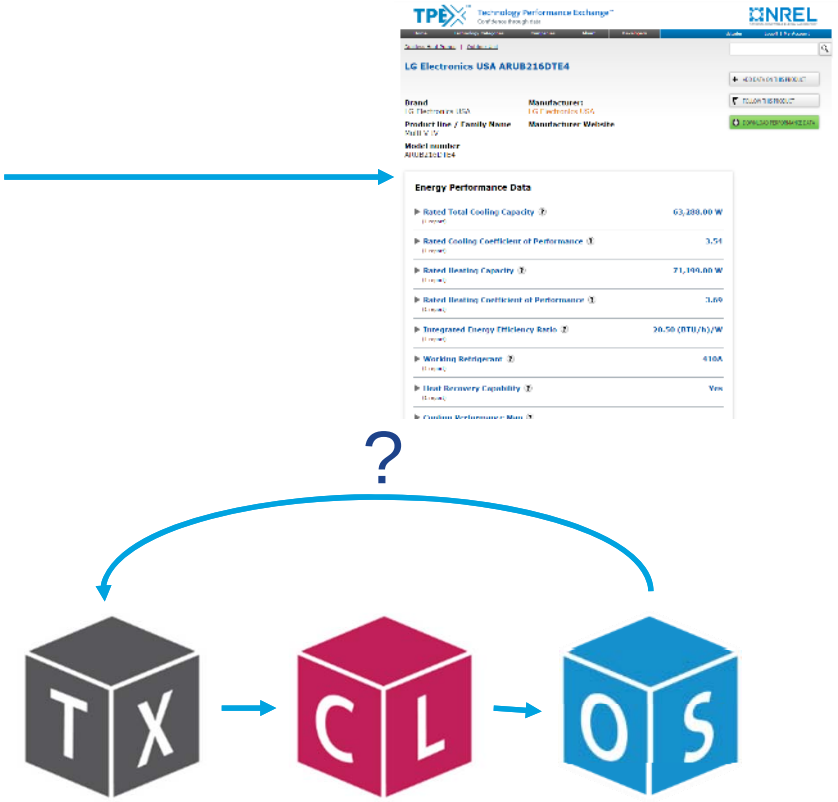




- Step 3: Import into project library
  - Drag and drop into model

UC 1: Incorporate Into Prototype Designs



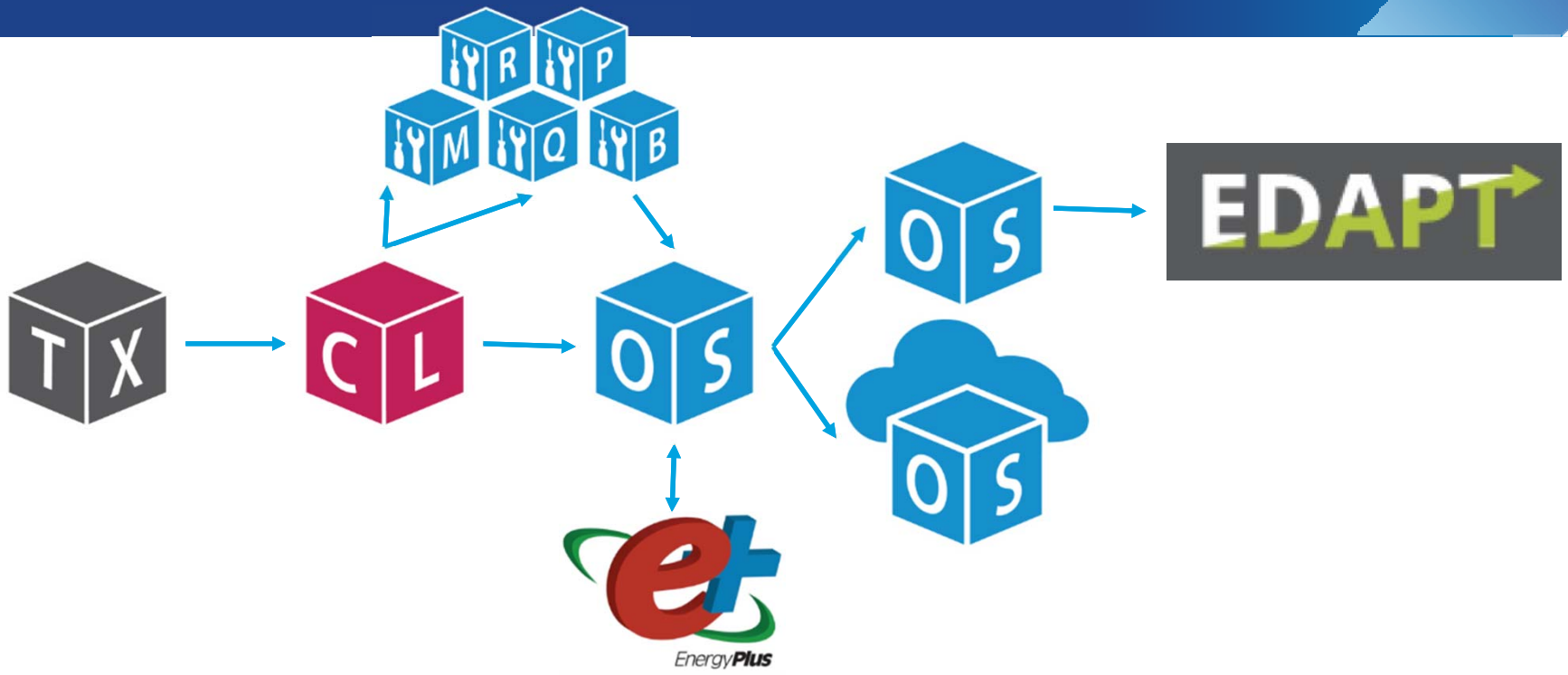


- Coming later this year: TPEx lookup from models
  - Find real equipment that meets performance specifications

Peer Discussion

- Is this use case beneficial to you?

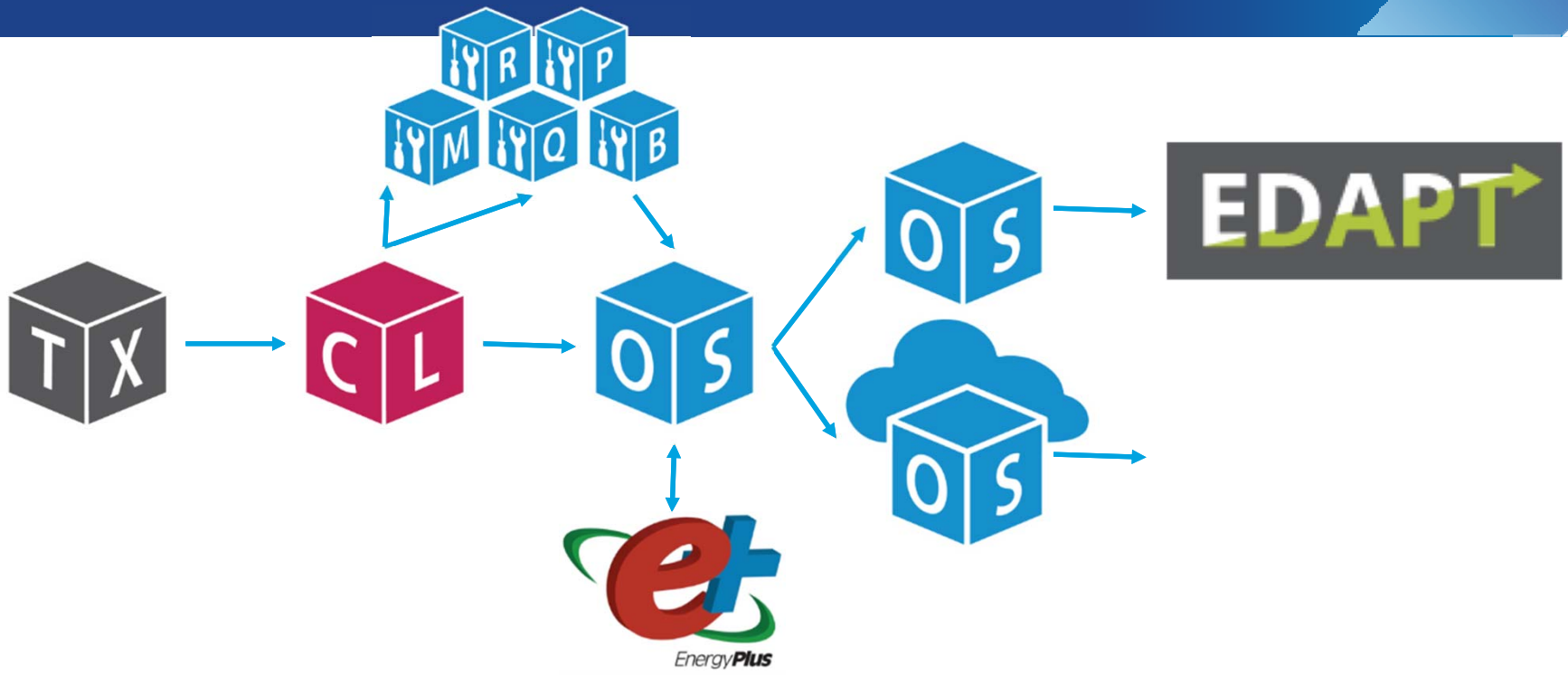
UC 2: Ex Ante Utility Incentives



- 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](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