Transactive Energy and Future Markets
Opportunities for OpenADR

H. Walter Johnson
Technical Executive

OpenADR Alliance Member Meeting
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Today's Panelists and Topics

- Walt Johnson (EPRI) – Three active TE and price communication projects

- Mark Martinez (SCE) – A California IOU perspective on TE and price response

- Michel Kohanim (Universal Devices) – Example of a demand-side TE project

- Rolf Bienert (OpenADR Alliance) – Options and prospects for supporting TE with OpenADR

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Three Early Stage TE and Price Communication Projects

- CEC "Transactive Load Management Signal and Systems" Projects
  - Coordinated awards to 9 different teams
  - 8 projects responding to uniform price signals from a single source
  - Uses OpenADR 2.0b

- SMUD Price Communication Application
  - Distribute forward and realtime prices to 9 DER pilot projects
  - Planning to use OpenADR 2.0b

- "The Grid Edge Active Transactional Demand Response" ("The GREAT-DR") at Hydro Ottawa
  - Decentralizing and largely automating DR and TE right through to the grid edge
  - Using IEEE 2030.5

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Purpose and Structure of CEC GFO 15-311

Demonstration of Transactive Load Management Signals and Systems for California's Integrated Transmission and Distribution Grid – "…to fund applied research and development projects that test and assess how groups or aggregations of distributed resources respond to current, planned and potential price signals."

Three groups included in the GFO:

1. Load Management Systems that Facilitate Participation as Supply-side Resources
2. Load Management Systems that Facilitate Participation as Demand-side Resources
3. Development of One or More Transactive Signals to Facilitate Demand Response

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CEC's Goals for the Transactive Signal

- To be used by utility customers (and the recipients under this solicitation) as a basis for automating their load management strategies

- To test customer response to a dynamic price or informational signal that reflects and anticipates system conditions

- Could be based on CAISO market prices or utility tariffs as well as including information on other indicators of system conditions

- To enable comparison of system performance under this signal with existing programs

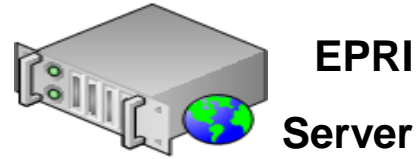EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Awardees

- Group 1 – Supply-Side Resources
  - BMW of North America
  - Center for Sustainable Energy (CSE)
  - OhmConnect
- Group 2 – Demand-Side Resources
  - Alternative Energy Systems Consulting (AESC)
  - California Institute for Energy and Environment (CIEE), University of California
  - Electric Power Research Institute (EPRI)
  - Luskin Center for Innovation (UCLA)
  - Universal Devices/TeMIX
- Group 3 – Transactive Signal Design and Delivery
  - EPRI

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EPRI's Group 3 Project: Signal Design Framework

TLM Price Analytics at a Point*

FIELD DEPLOYMENTS: Outside Group 3 Project Scope
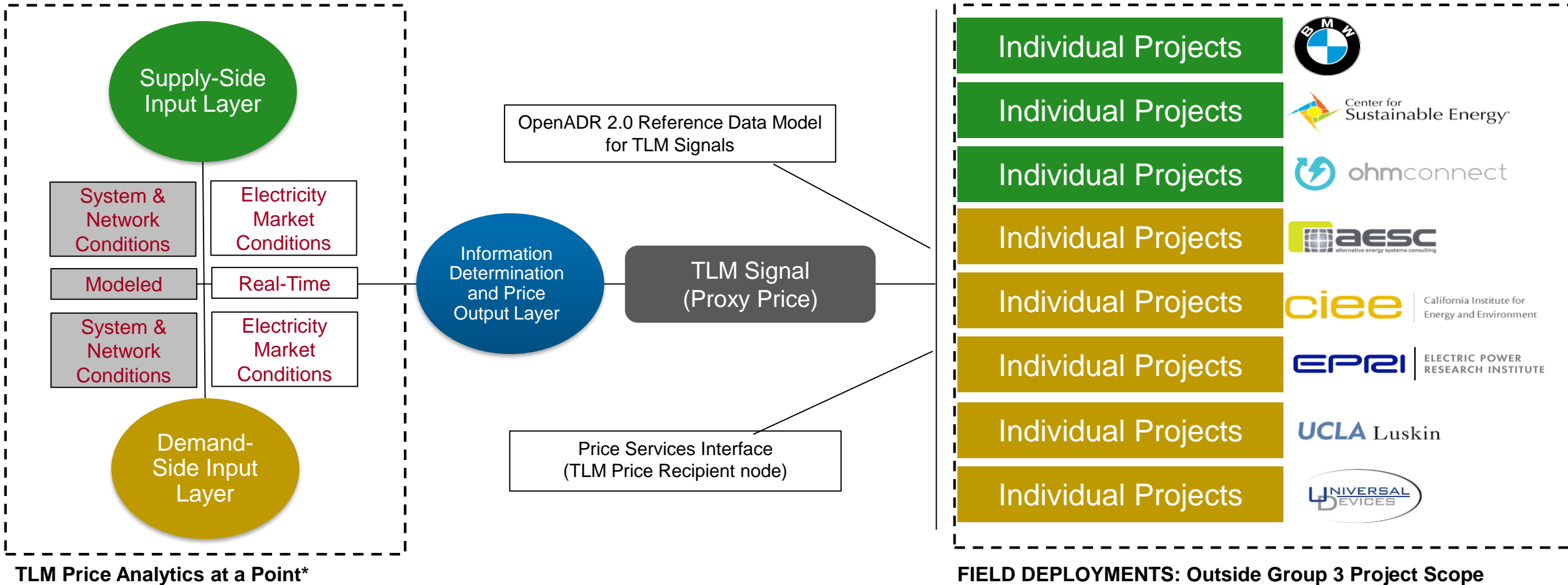
* This point can be a generic construct within the grid based on future advanced TLM designs that may account for spatial granularity.

Signal Distribution Using OpenADR 2.0

	EPRI Server
Role	Virtual Top Node
Designed Use	DRMS
License	BSD 3-Clause
Profiles	2.0a and 2.0b
Data Models	Push/Pull (Poll)
Transports	HTTP, XMPP
Programming Language	JRuby, Java
Tested Operating Systems	Linux, Mac OS
Available on GitHub.com	Yes

- Complete OpenADR 2.0b-compliant server
- Available as open source since February 2014; updated most recently in January 2017
- Received Alliance certification in October 2014
- Profile 2.0b
  - EiEvent (full)
    - ELECTRICITY_PRICE
    - marketContext
- Modified to pull LMPs and LAP price data from CAISO OASIS
- Performs some adjustment and scaling of the prices

TLM signals are intended to be communications standards-agnostic.

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SMUD Price Communication Application

- Price distribution for SMUD DER pilots
- Recipient projects have10 to 8000 clients
- Schedules include
  - Wholesale prices
  - TOU/TOD
    - 2 to 5 periods/day
    - Posted in advance
    - Weekday and weekends/holidays
    - CPP/VPP
  - Dynamic dispatch
- OpenADR will provide one communication mechanism
- Also asking for a "simpler" alternative
  - Might be able use new IEC 62325 pricing extensions

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"The Grid Edge Active Transactional Demand Response"

- The GREAT-DR is "a platform solution that enables a customer's electricity demand and generation to seamlessly interact in real-time with the electrical grid."
- Participants:
  - Project Leader: Hydro Ottawa
  - Funders: Ontario Ministry of Energy's Smart Grid Fund and the LDC Tomorrow Fund
  - Collaborators: Carleton University, CIMA Canada Inc., Energate (Tantalus) Inc., Panasonic Eco Solutions Canada (with Tabuchi Americas), Quadra Power Inc., Thorium Technologies Inc., the University of Ottawa
  - Supporter: IEEE Standards Association

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GREAT-DR Project Overview
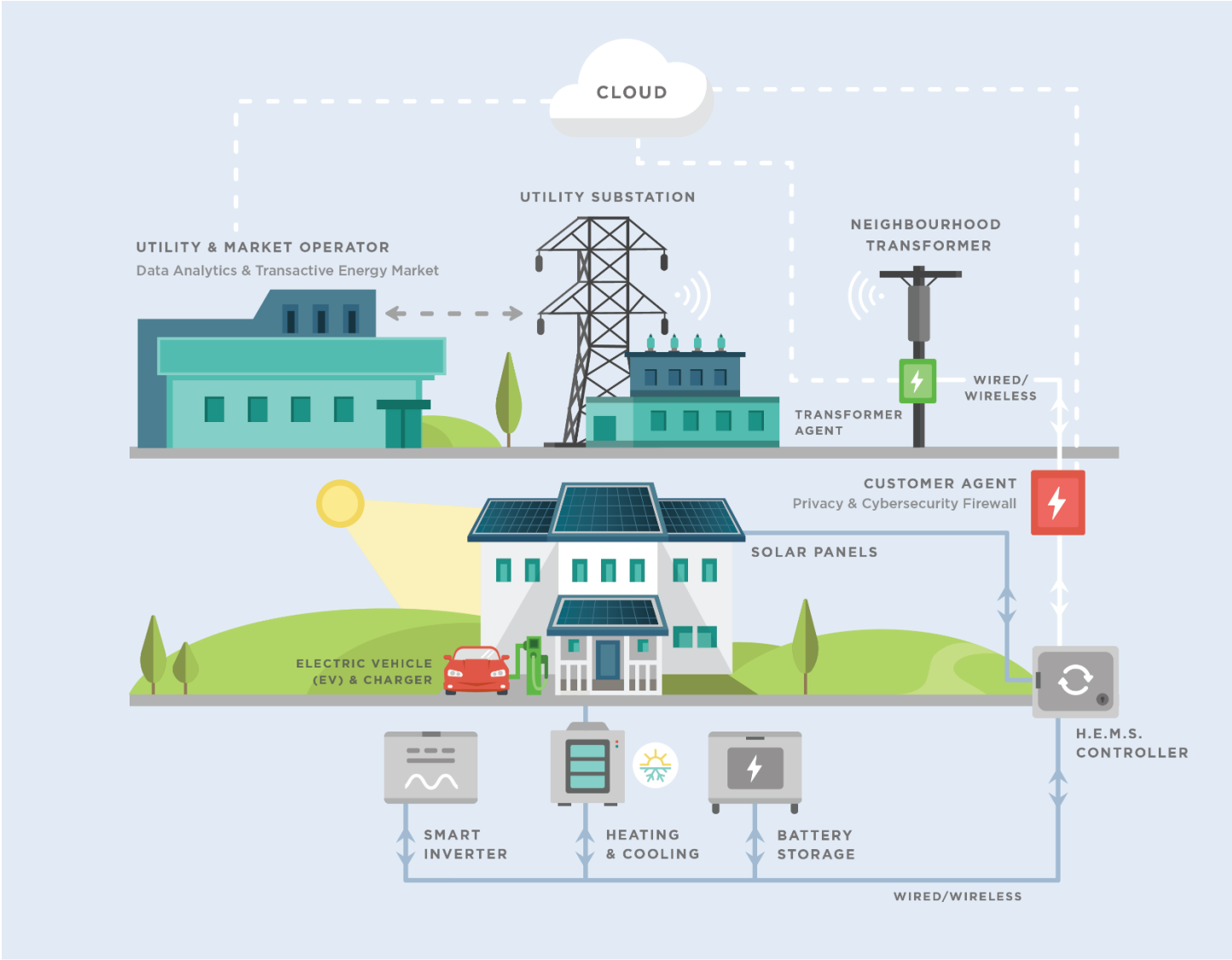
GREAT-DR Project Summary

- Will include 30 customers in Ottawa
  - Clustered around the same transformers
  - For an initial investment of $27,000 or less, participants will receive an integrated state-of-the-art solar generation system and control devices worth approximately $40,000, including roof-top solar panels, HEMS, smart inverter, battery storage, bi-directional meter, and a "critical load panel" for emergency power
- Will use IEEE 2030.5 for TE transactions
  - Described as "the elegantly efficient decentralized, virtually seamless Transactive demand response (TDR) solution"
  - The project will "simulate the future marketplace for energy"

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GREAT-DR Project Status

- Targeting 30 customers
  - Clustered around the same transformers
  - 10 have qualified so far
- Two-year trial
  - Customer qualification occurring now
  - Expect to by underway by the end of 2018

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Now on with the Show!

Michel

Mark

Rolf

Open Discussion

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Together…Shaping the Future of Electricity

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