WEST COAST
ELECTRIC
FLEETS

The Power of Charging Stations: Smart Systems for the Future

April 19, 2016

Hosted by Fraser Basin Council

Charlotte Argue, Program Manager, Climate Change & Air Quality
cargue@fraserbasin.bc.ca

Today's Speakers

- Jeff Turner, Engineer Electric Vehicles, PowerTech Labs
- Clay Howey, Research Head, Smart Micro-grid Applied Research Team, BC Institute of Technology

WEST COAST ELECTRIC FLEETS

Pacific Coast COLLABORATIVE

Leadership now for a sustainable tomorrow

What is West Coast Electric Fleets?

Pacific Coast Action Plan *on* Climate and Energy

Preamble

The Governments of California, British Columbia, Oregon and Washington,

Pursuant to the *Memorandum to Establish the Pacific Coast Collaborative* of June 2008, as provided for in Article 6;

Affirming our shared vision of Pacific North America as a model of innovation that sustains our communities and creates jobs and new economic opportunities for our combined population of 53 million;

Recognizing that the Pacific Coast is a region bound together by a common geography, shared infrastructure and a regional economy with a combined GDP of US $2.8 trillion, which makes it the world's fifth largest;

existing carbon-pricing programs. Where possible, California, British Columbia, Oregon and Washington will link programs for consistency and predictability and to expand opportunities to grow the region's low-carbon economy.

2) **Harmonize 2050 targets for greenhouse gas reductions and develop mid-term targets needed to support long-term reduction goals.**

Climate scientists have identified the scale of greenhouse gas reductions that must be achieved globally to stabilize the climate. Where they have not already done so, California, British Columbia, Oregon and Washington will establish long-term reduction targets that reflect these scientific findings. To advance long-term reductions, Washington already has in place a mid-term 2035 target. California and Oregon will establish their own mid-term targets.

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Leadership now for a sustainable tomorrow

West Coast Electric Fleets implements the Zero Emission Vehicle (ZEV) commitment in the Pacific Coast Action Plan on Climate and Energy

2) **Take actions to expand the use of zero-emission vehicles, aiming for 10 percent of new vehicle purchases in public and private fleets by 2016.**

The Pacific Coast already has the highest penetration of electric cars in North America. The governments of California, British Columbia, Oregon and Washington will work together towards this ambitious new target by supporting public and private fleet managers to shift their procurement investments to catalyze toward electric car purchases and by continuing to invest in necessary infrastructure to enable low-carbon electric transportation.

30+ Partner Fleets!

Province of BC, *BC*
City of Vancouver, *BC*
District of Saanich, *BC*
BC Hydro, *BC*
City of Surrey, *BC*
Current Taxi, *BC*
Comox Valley Regional District, *BC*
Fraser Valley Regional District, BC
Gea Zone, *BC*
Onsite Equipment, *BC*
WA Dept Commerce
WA Dept Transportation
WA Dept Enterprise Svcs
City of Olympia, *WA*
City of Seattle, *WA*
Puget Sound Clean Air Agency, *WA*
King County, *WA*

State of OR Fleets
City of Portland, *OR*
Lane County, *OR*
City of Ashland, *OR*
Lane Regional Air Protection Agency, *OR*
CMTS LLC, *OR*
State of California Public Fleets, *CA*
City of Santa Ana, *CA*
LADWP, *CA*
City of San Diego, *CA*
City of San Francisco, *CA*
City of Los Angeles, *CA*
Oakland Public Works, *CA*
Pasadena Water and Power, *CA*
City of Sacramento, *CA*
Antelope Valley Trans, *CA*

Become a Fleet Partner

WEST COAST ELECTRIC FLEETS

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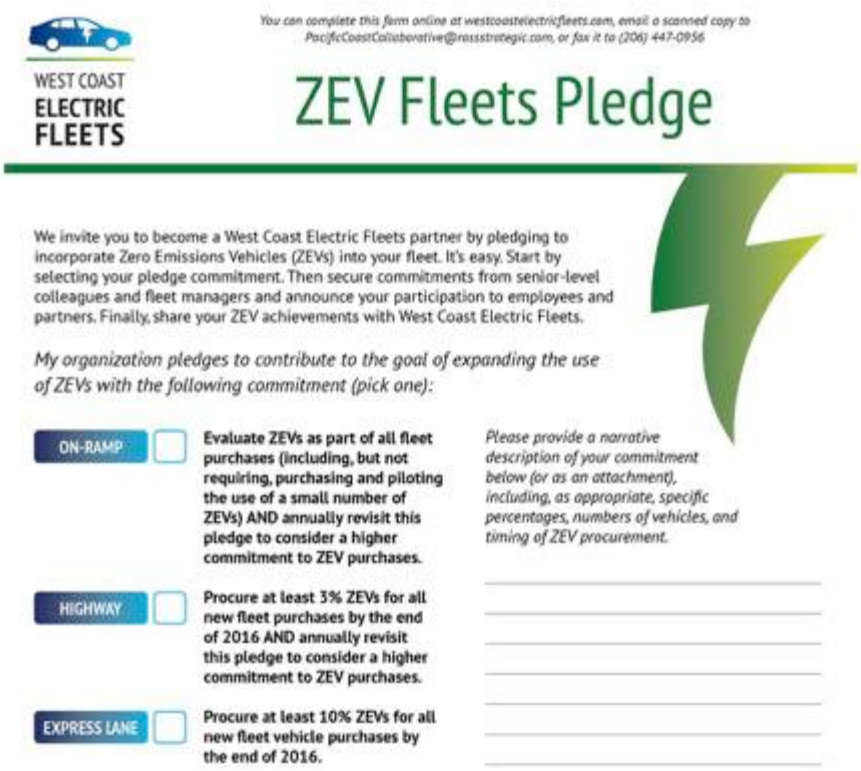
Three-Tiered Commitment

- **On-Ramp:** Commit to **evaluate ZEVs** as part of every fleet purchase and revisit commitment annually
- **Highway:** Commit to procuring at least **3% of ZEVs** for all new fleet purchases by the end of 2016 and revisit the pledge annually
- **Express Lane:** Commit to procuring at least **10% ZEVs** for all new fleet vehicle purchases by the end of 2016



WEST COAST ELECTRIC FLEETS

You can complete this form online at westcoastelectricfleets.com, email a scanned copy to PacificCoastCollaborative@rossstrategic.com, or fax it to (206) 447-0956

ZEV Fleets Pledge

We invite you to become a West Coast Electric Fleets partner by pledging to incorporate Zero Emissions Vehicles (ZEVs) into your fleet. It's easy. Start by selecting your pledge commitment. Then secure commitments from senior-level colleagues and fleet managers and announce your participation to employees and partners. Finally, share your ZEV achievements with West Coast Electric Fleets.

My organization pledges to contribute to the goal of expanding the use of ZEVs with the following commitment (pick one):

ON-RAMP ☐ **Evaluate ZEVs as part of all fleet purchases (including, but not requiring, purchasing and piloting the use of a small number of ZEVs) AND annually revisit this pledge to consider a higher commitment to ZEV purchases.**

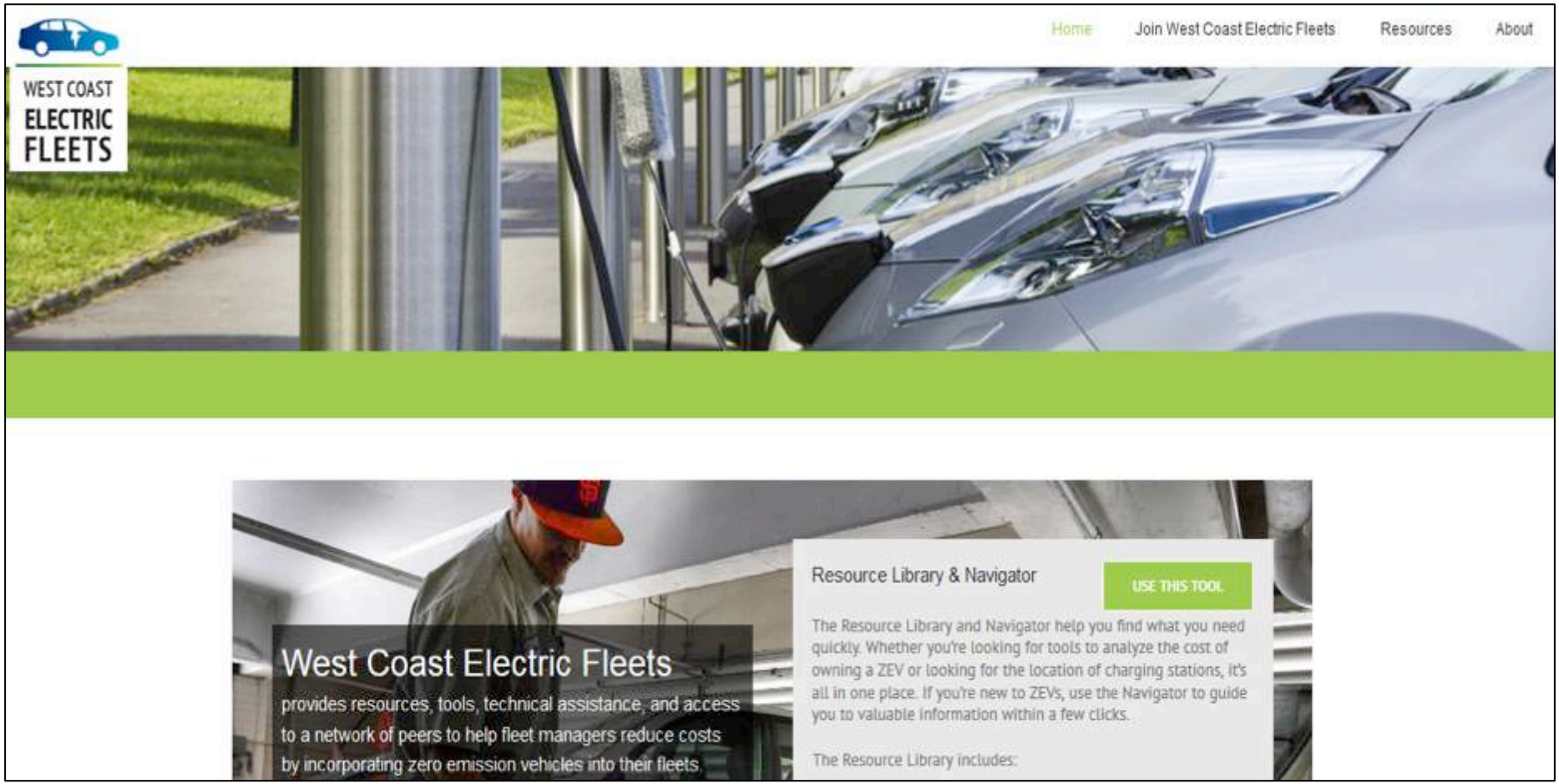
HIGHWAY ☐ **Procure at least 3% ZEVs for all new fleet purchases by the end of 2016 AND annually revisit this pledge to consider a higher commitment to ZEV purchases.**

EXPRESS LANE ☐ **Procure at least 10% ZEVs for all new fleet vehicle purchases by the end of 2016.**

Please provide a narrative description of your commitment below (or as an attachment), including, as appropriate, specific percentages, numbers of vehicles, and timing of ZEV procurement.

The Toolkit

www.Westcoastelectricfleets.com



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West Coast Electric Fleets Partner Fleet Profiles

Antelope Valley Transit A
All-In on Electric Bu

The Antelope Valley Transit Authority re
November 2014. The board that governs the
buses in the fleet will be replaced by 2018 wi
$39 million (USD) coming from Federal and S
some cost, the AVTA will need to identify add
end it is estimated to be 5-10 years before the

The first of the new E-buses under the new ma
service beginning in 2016. With this many
infrastructure for charging requires novel appro
funding, the ATVA will install 85 hard-wire stat
also up to 11 wireless charging stations.
infrastructure in place, bus service should be
to the novel charging approach, the ATVA is al
array to power some of the chargers.

With a steep learning curve, having only recei
buses in 2014, the AVTA is approaching the
hands on deck attitude. Working collaboratively
ATVA is hoping to avoid future issues with
includes the installation of 2 x 1200V lines to
capacity currently offered.

While the AVTA only has 200 employees, the s
them to respond quickly to the mandate.

For more information on AVTA's electric fleet fo
www.avta.com/index.aspx?page=178
Visit us at: www.westcoastelectricfleets.com

City of Vancouver: EV Fleet Ma

In 2009, the City of Vancouver was one of the fi
Mitsubishi i-MiEV as part of their fleet. By 2012, the
in the city's fleet grew from 1 to 17, not including t
and scooters used by staff to get to and from me
currently has 31 EVs in the fleet with plans to have
2020. These EV's are utilized by a variety of depart
Police and Fire departments. The city has partnere
car-share co-op, to further utilize EVs and also to n
of fleet vehicles.

Modo purchased the first EV for their fleet in No
and it was subsequently available to city staff for us
the city has been in a novel partnership with Modo
fleet instead of relying on vehicles restricted to e
access to Modo's 400 cars the city has been able
number of fleet vehicles they have while saving mor

As part of this partnership, the city allows Modo
services to access City-operated charging stations.
the EVs in the city's fleet has helped to redu
emissions by 11% from 2007 levels.

The partnership between the city and Modo has
synergistic relationship, helping the city reduce t
fleet while managing the booking system for 1
including 4 EVs. The additional benefit of cha
available to the public makes this a win for everyone

For more information on Vancouver's electric fleet v
http://vancouver.ca/streets-transportation.aspx
Visit us at: www.westcoastelectricfleets.com

Fraser Valley Regional Dis
Making the Case for EVs

In 2013, the Fraser Valley Regional District planned f
installing a dual-port charging station at their Chilliw
Two years later, they put out a tender for their first
(EV) in their fleet. In order to understand the costs
an EV, the FVRD conducted a business case stud
variety of vehicles including both electric and gas car

In understanding if EVs would meet the demands of
analyzed trip data of their fleet from October 2013
With data showing that 73% of all trips taken were le
the FVRD had a baseline from which to assess the bu

The business case showed that over a 7-year lifespan
the same or less than hybrids and conventional vehic
of EVs was even more pronounced when conside
lifespan because of the drastic savings in fuel an
costs. Even more impressive was that the busines
assume any potential incentives that might reduce
presenting the case that EVs could compete on their

In July 2015 the FVRD took possession of a Nissan L
a Mitsubishi i-MiEV in September. With nearly 5
between the two EVs in the first four months, th
FVRD staff has been a success.

For more information on FVRD's electric fleet contact Rebecca
Abernethy at rabernethy@fvrd.bc.ca
Visit us at: www.westcoastelectricfleets.com

GEAZONE: All Electric Deliv

In 2012, Andrew Mitchell, an eco-preneur st
electric delivery service based in Victoria, B.C
electric tricycle, Andrew quickly grew the bu
what's now 2 E-trikes, 3 Nissan Leafs, and
They have continued to double their growth
first delivery company to sign the West Coast

Since the first delivery in 2012, GeaZone
400,000kg of carbon dioxide from entering
putting over 500,000km on their fleet veh
growth in business has had its drawbacks, s
new electric trucks to add to their fleet
presenting time challenges to a small busines

With little maintenance costs other than ch
tire, GeaZone has been able to be competitiv
services that use gasoline or diesel fuel. W
existing costumers and new ones signing o
expand across Canada and inspire other flee
electric just makes sense. GeaZone sees val
financially, but also because it offers an in
carbon emissions.

For fleet managers looking to make the switc
noted that taking advantage of exist
infrastructure has been key in expanding their

For more information on GeaZone visit: www
Visit us at: www.westcoastelectricfleets.com

City of Surrey:
Leveraging Partners In EV Adoption

The City of Surrey knows EVs are the future of transportation. This commitment was addressed through their 2008 Sustainability Charter and 2010 Corporate Emissions Action Plan. In 2011, Surrey became the first major city in Canada to host a publically accessible EVSE. They also began piloting a Nissan Leaf that same year. It would be a few more years before EVs were added to the fleet.

In making the decision to go electric, the city worked with FleetCarma, a division of CrossChasm Tehnology, to assess whether gasoline vehicles were candidates for switching to electric. With this information in hand, the city decided to remove 12 vehicles in their general fleet and replaced them with 5 Nissan Leafs. This transition was also aided by collaborating with Modo, a local car-share co-op. Utilizing the software and hardware that Modo had developed, the city was able to reduce the operational and logistical complexity with the rollout of their EVs and their ongoing management.

In the initial assessment, EV usage was critical in the return on investment (ROI). It was determined that the EVs would need to be driven 60-80km per day, and this would provide an ROI of 5-6 years. This aspect of the rollout has been a success. The city also surveyed employees who utilized the EVs and were pleased to see that 96% preferred the EVs over gasoline vehicles.

Next steps for the city include replacing more fleet vehicles with EVs, and FleetCarma has already identified 3 additional candidates.

For more information on the City of Surrey's electric fleet contact Burke van Drimmelen: bvandrimmelen@surrey.ca

Visit us at: www.westcoastelectricfleets.com

QUICK FACTS

Current fleet includes
- 5 Nissan Leafs

Daily use per EV
- 60km (37mi)

3 Additional EVs to be purchased in 2016

Annual Statistics per EV
- 14,400km (8,900mi) driven
- 2.76 tonnes GHGs avoided
- 3.12MWh consumed
- $250 in electricity costs

$6,000 SAVED in fuel per year

First major Canadian municipality to offer a public EVSE

Proud partners of West Coast Electric Fleets, an initiative of the Pacific Coast Collaborative.

Plug in BC

Fraser Basin Council

West Coast Electric Fleets Peer Network and Webinar Series

2015 Webinar Themes

- EVs: Barriers and Solutions
- Integrating ZEVs into Fleets
- Complete Fleet Conversions
- ZEV Buses in Transit Fleets

2016 Webinar Themes

- Business Case for Public Fleets
- Charging Infrastructure
- …STAY TUNED!

Featured fleets in past webinars included the City of Seattle; WSDOT; City of Surrey, BC; Foothill Transit; Antelope Valley Transit; California DGS; LADWP; and the Energy Secure Cities Coalition

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Join Us!

Sign the Pledge!

Explore the Toolkit!

www.westcoastelectricfleets.com

Questions?
Contact Charlotte Argue cargue@fraserbasin.bc.ca

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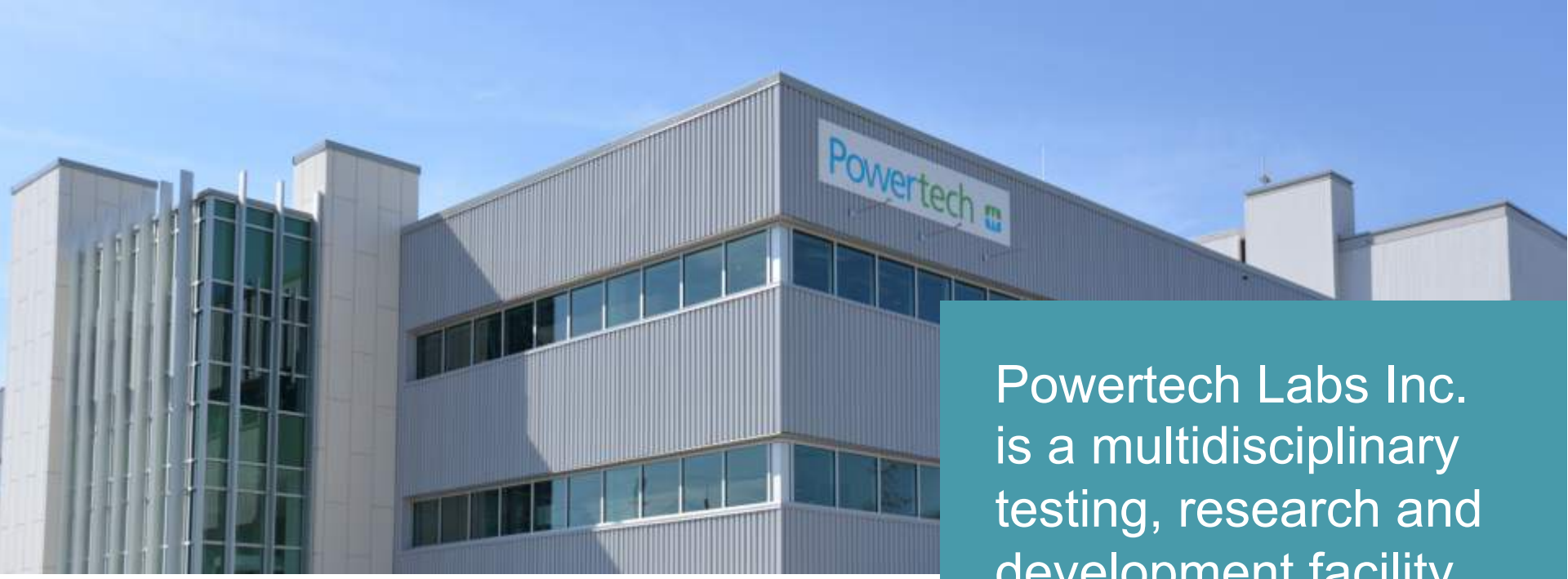
BC EV Smart Infrastructure Project:

Smart Charging Solutions

- Jeff Turner, Electric Vehicles and Energy Systems

- April 2016



Powertech Labs Inc. is a multidisciplinary testing, research and development facility.

We offer a one-stop-shop approach for businesses that require technical engineering expertise, standards and code testing, as well as quality testing and failure analysis services.

Powertech is a subsidiary of BC Hydro. We provide specialized testing and investigation services to support BC Hydro's capital assets: generation, transmission and distribution

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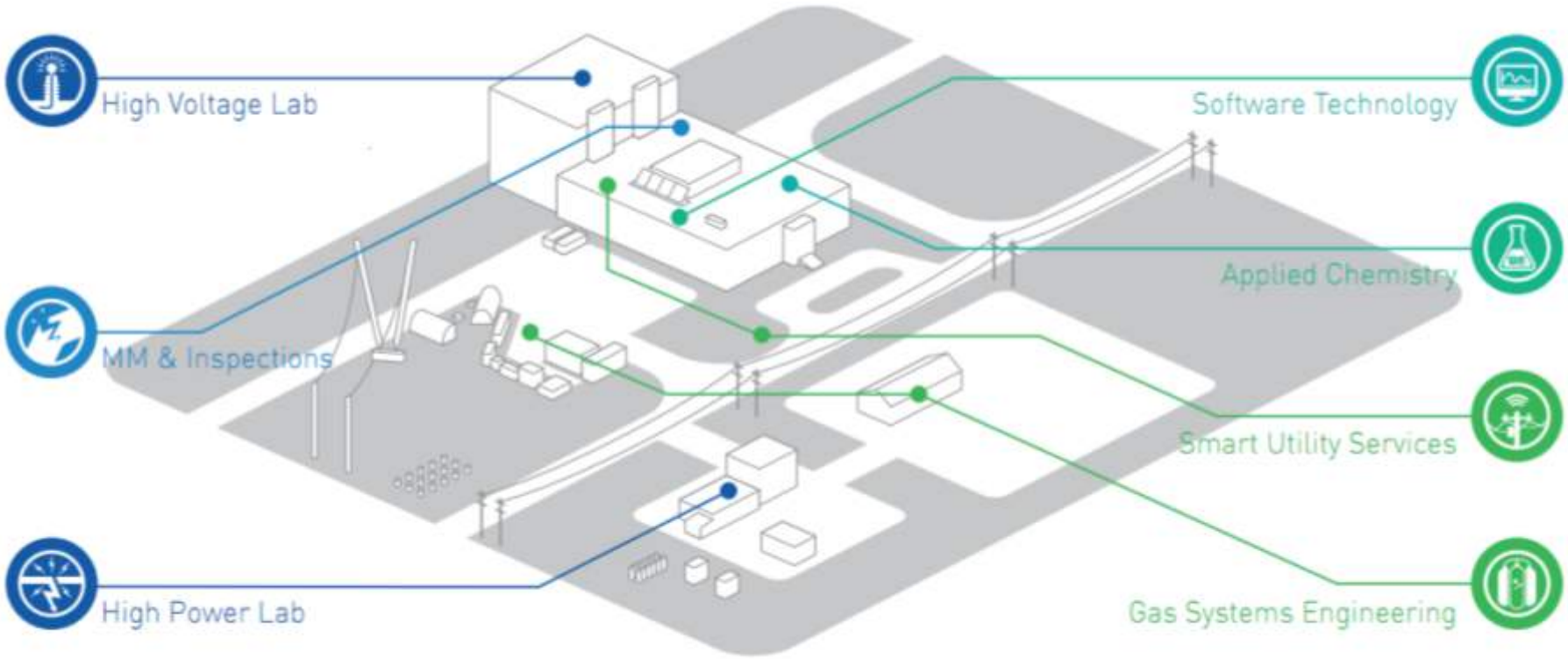
Powertech combines an expert, responsive team of 120 engineers, scientists and technologists & 21 advanced labs



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Smart Utility Technologies

Pole Yard DA/DO Test Facility

WAN technologies

IED and Control System

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Smart Utility Technologies

Critical Infrastructure Comms

Connected Devices

Multi-service Mesh and FAN

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Electric Vehicles and Energy Systems

We support the rapidly expanding EV market by providing engineering and consulting services to both local and global clientele. We are leading experts in all aspects of EV technologies, from infrastructure and smart grid integration, through to fleet deployments and component testing.

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Powertech EV Services

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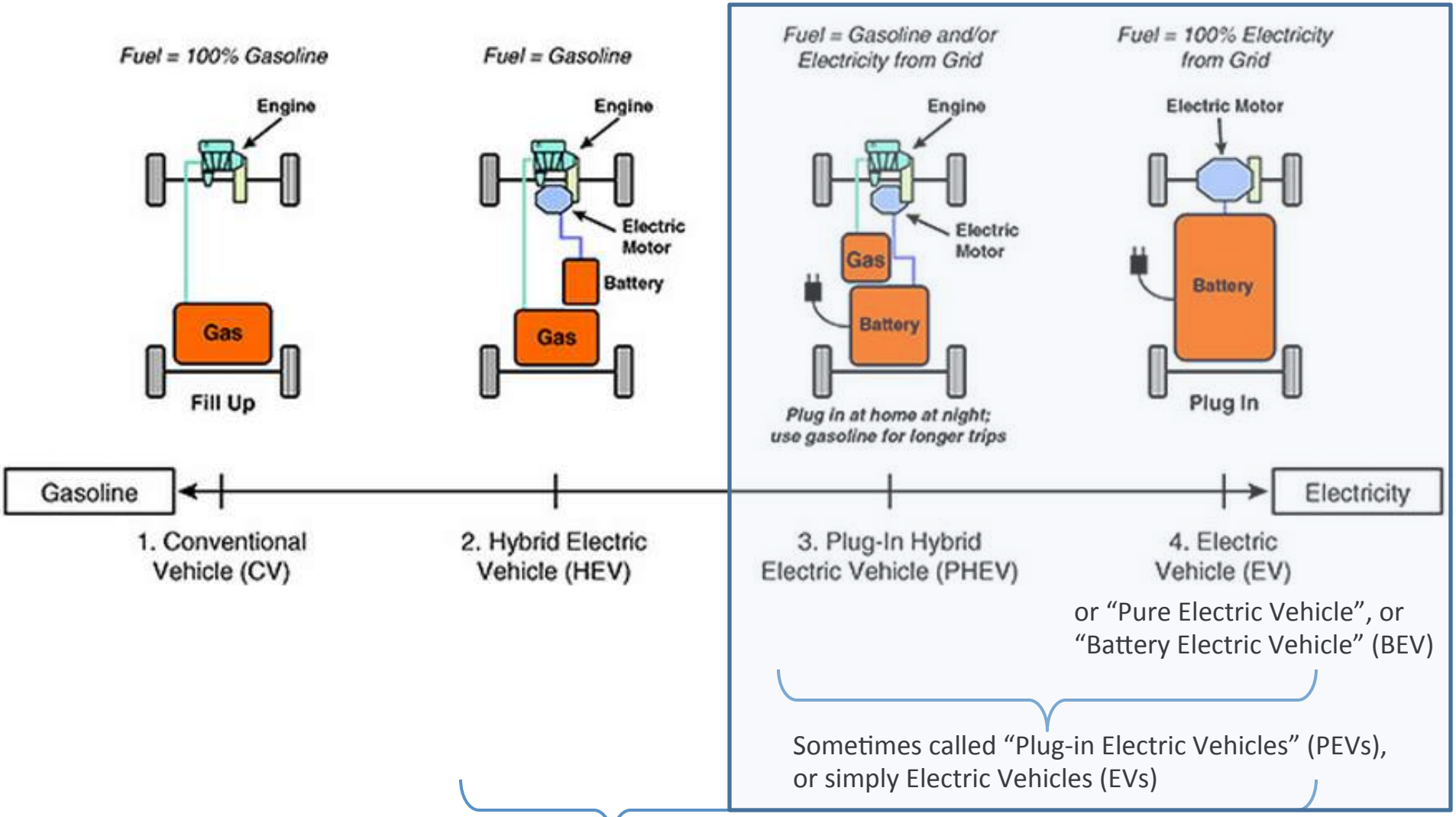
Types of vehicles

Graphic from Electric Power Research Institute: et.epri.com

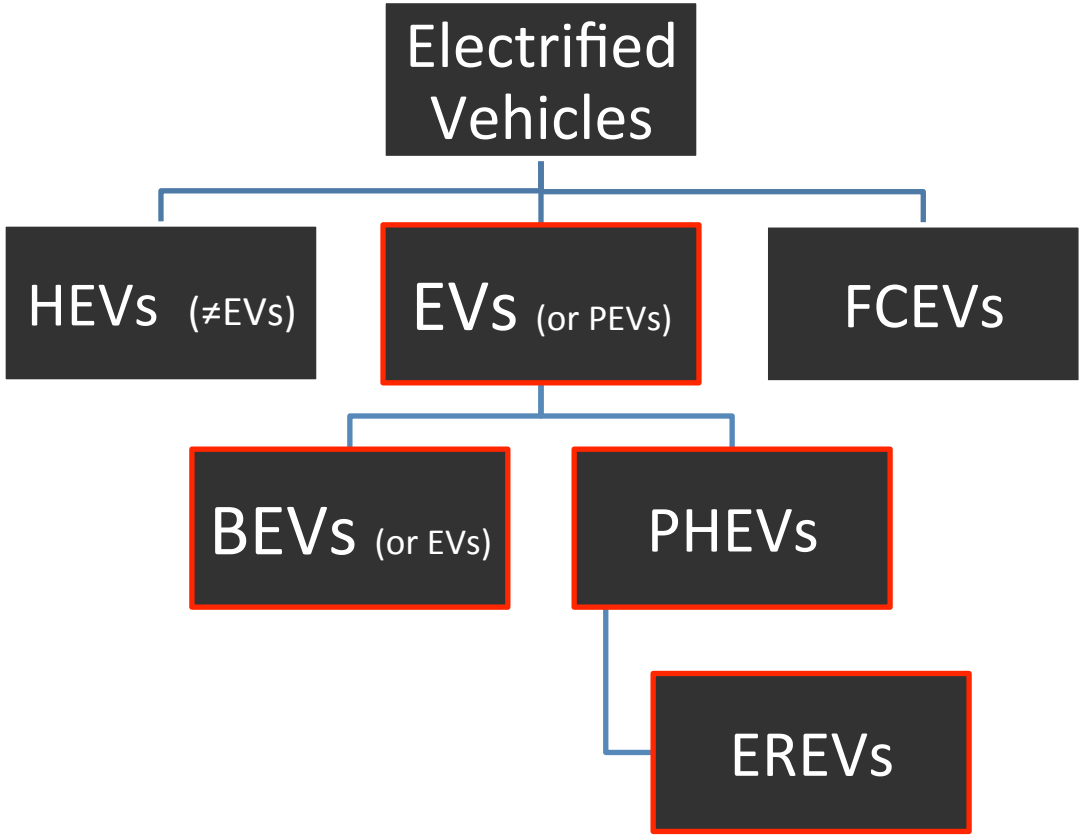


or "Pure Electric Vehicle", or "Battery Electric Vehicle" (BEV)

Sometimes called "Plug-in Electric Vehicles" (PEVs), or simply Electric Vehicles (EVs)

Sometimes called "Electrified Vehicles"

Types of vehicles



Categorization of electrified vehicles; electric vehicles are highlighted in red.

Examples of BEVs

Nissan LEAF - US$29,860
Type: BEV
Battery: 24-30kWh
Electric Range: 117km – 170km
Charging Power: 6.6kW AC, 50kW DC
Charging Time: 4h AC, 30min DC

Tesla Model S – US$ 71,200 – $106,200
Type: BEV
Battery: 70kWh or 90kWh
Electric Range: 335km or 426km
Charging Power: 10kW or 20kW AC, 120kW DC
Charging Time: 4-8h AC, 1-2h DC

Volkswagen e-Golf - US$29,815
Type: BEV
Battery: 24.2kWh
Electric Range: 134km
Charging Power: 7.2kW, 50kW DC
Charging Time: 4h, 30min DC

Examples of PHEVs

Chevrolet Volt - US$33,995
Type: PHEV or "EREV" – "Extended Range" EV
Battery: 17kWh
Electric Range: 80km
Gas mode: 5.5L/100km, 610km total range
Charging Power: 3.6kW
Charging Time: 4h

BMW i3 – US$43,395
Type: BEV, "BEVx" with optional range extender
Battery: 18.8kWh
Electric Range: 130km
Gas mode: 6L/100km, 240km total range
Charging Power: 7.4kW, 50kW DC
Charging Time: 3h, 30min DC

Toyota Prius PHV - $35,700 (updated Prius Prime coming soon…)
Type: PHEV
Battery: 4.4kWh
Electric Range: 18km (blended – burns some gas!)
Gas mode: 4.7L/100km, 870km total range
Charging Power: 3.3kW
Charging Time: 1.5h

Upcoming trend: Affordable 200-mile range EVs

- Chevy Bolt (Pictured, late 2016): 200 miles, $37,500 US
- Tesla Model 3 (late 2017): 200 miles, $35,000 US
- 2nd Gen Nissan Leaf (late 2017): 150-200 miles, no pricing announced

Upcoming trend: Larger plug-in vehicles

Mitsubishi
Outlander PHEV

Tesla Model X
BEV

Mercedes GLE
PHEV

Porsche Cayenne
eHybrid PHEV

Chrysler Pacifica
PHEV

Volvo XC90 T8
PHEV

Commercial EVs

Smith Electric
BEV Truck

Odyne PHEV
Bucket Truck

NOVAbus
BEV Bus

EVI BEV Step Van

Proterra BEV
Bus

Nissan e-NV200
BEV Van

VIA Motors
VTRUX PHEVs

Charging equipment

AC Level 1 (120V):
1-1.9kW
~7.5km/hour
12+ hours

AC Level 2 (240V):
3.3kW to 20kW
15 – 100km/hour
~4-8 hours

DC Fast Charging
25kW to 150kW
125 – 500+ km/hour
~20-45 minutes to 80%

Charging rates depend on the capabilities of both the charging station *and* the EV

BC Electric Vehicle Smart Infrastructure Project

Plug in BC | Fraser Basin Council | Natural Resources Canada / Ressources naturelles Canada | British Columbia | BC Hydro Power smart | Powertech The Power of Trust. The Future of Energy.

At-Home and On-the-Go

970 Level 2 EVSEs

- 240V, 3.3kW – 18kW
- 200 Single Family Dwellings
- 200 Multi Unit Buildings
- 570 Public Spaces

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DC Fast Charge Critical Infrastructure

30 DCFC Stations

- 50kW, 30 min charge
- Pacific Coast Collaborative
- Planning framework
- Business models evaluation

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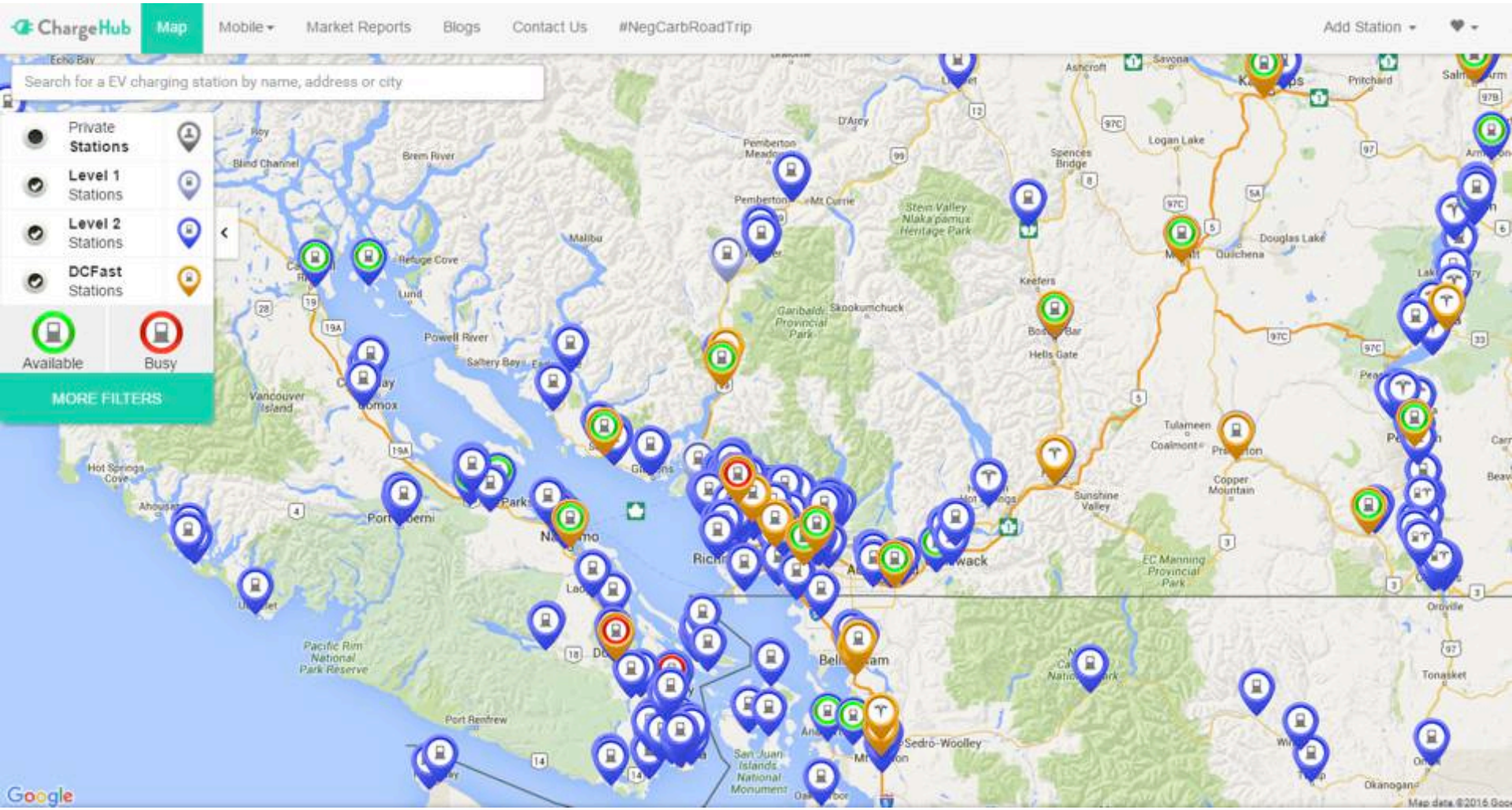
BC Public Charging Stations



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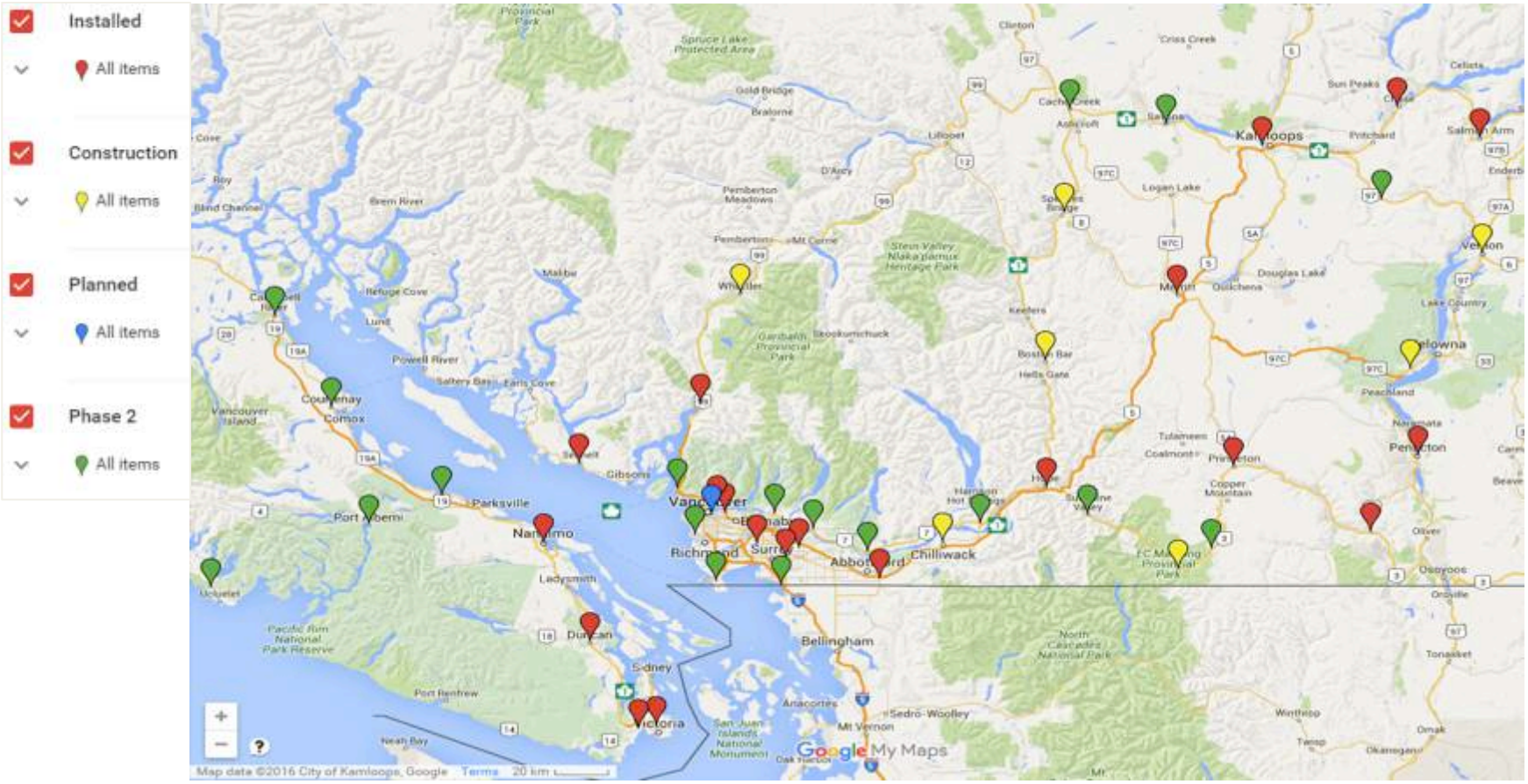
www.chargehub.com

Example DCFC Station
Surrey Museum

Powertech
EV Technology Park

BC DC Fast Charge Stations



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At-Home and On-the-Go

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DC Fast Charge Critical Infrastructure

30 DCFC Stations

- 25-50kW, 30 min charge
- Pacific Coast Collaborative
- Planning framework
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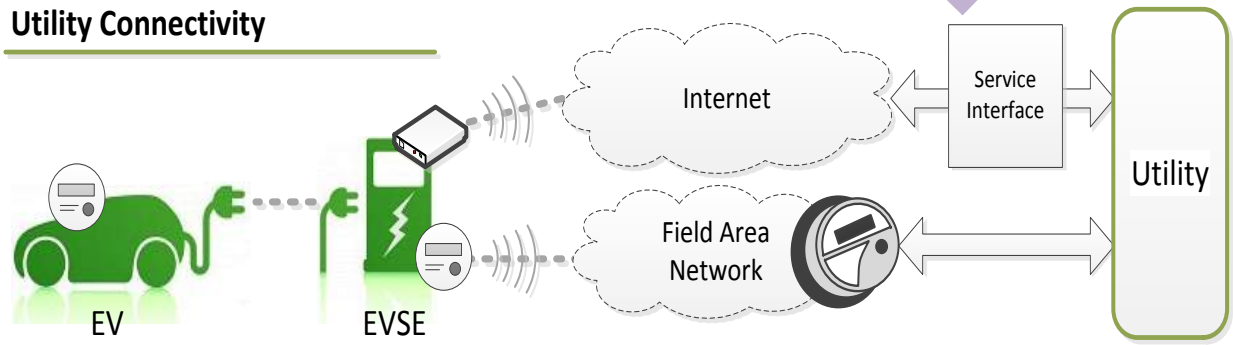
Smart Grid

Initiatives

- evCloud
- Grid-Aware
- Smart-Charging
- Demonstrations
- Utility roadmaps

Utility Connectivity



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evCloud™

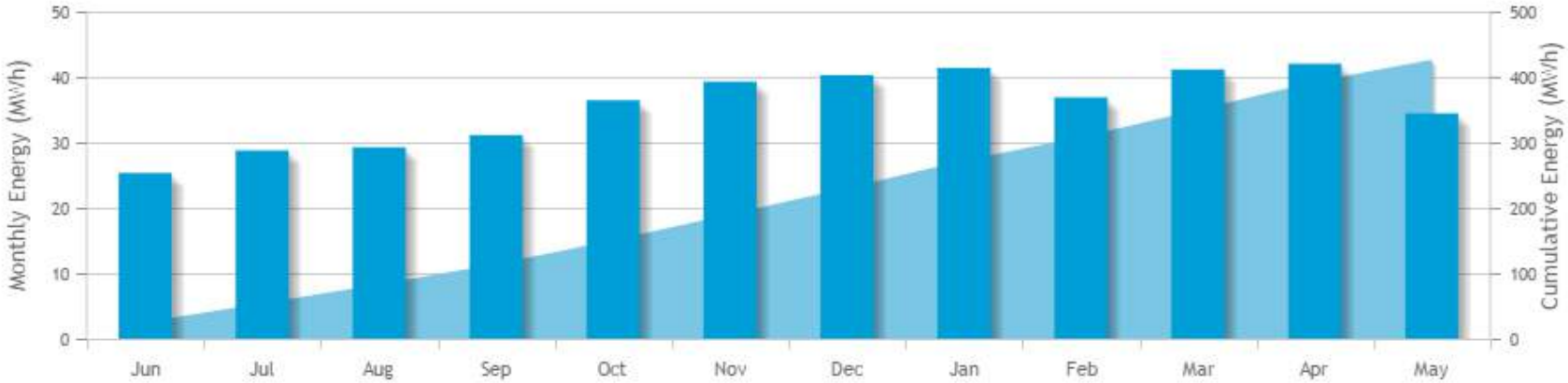
Collecting usage data from BC's growing network of public Electric Vehicle charging stations

Number of Stations: 443 | Number of Charge Events 99,168 | 635,000+ kg CO2 saved | 264,000+ L fuel saved

Home | About | Map

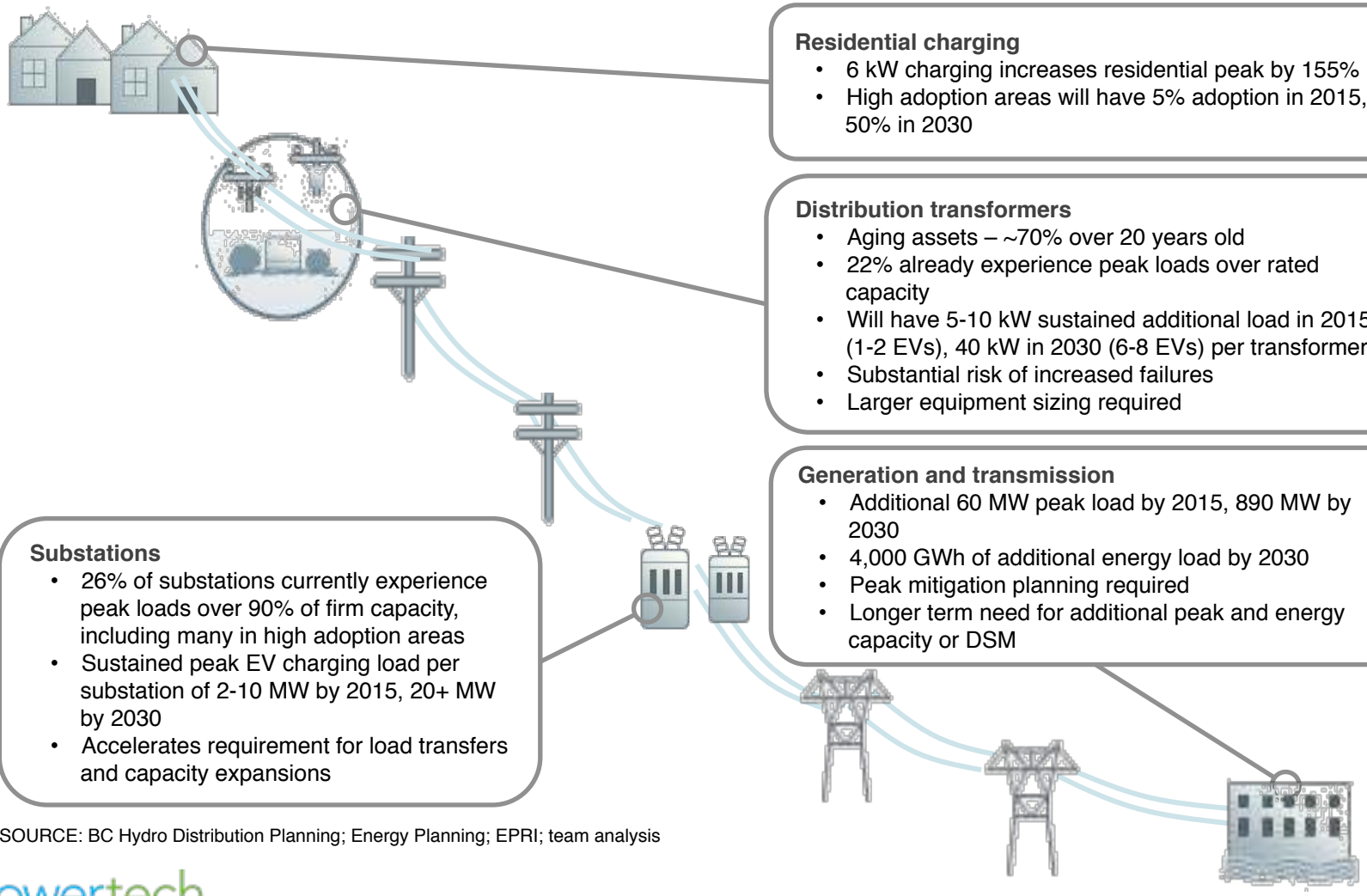
Total Charging Energy Dispensed

YTD: 426245



Stations Being Monitored	Number of Locations	Number of Charge Events	Total Energy Dispensed
443	214	99,168	661,069 kWh

Impacts of EV charging on electrical infrastructure



Residential charging
- 6 kW charging increases residential peak by 155%
- High adoption areas will have 5% adoption in 2015, 50% in 2030

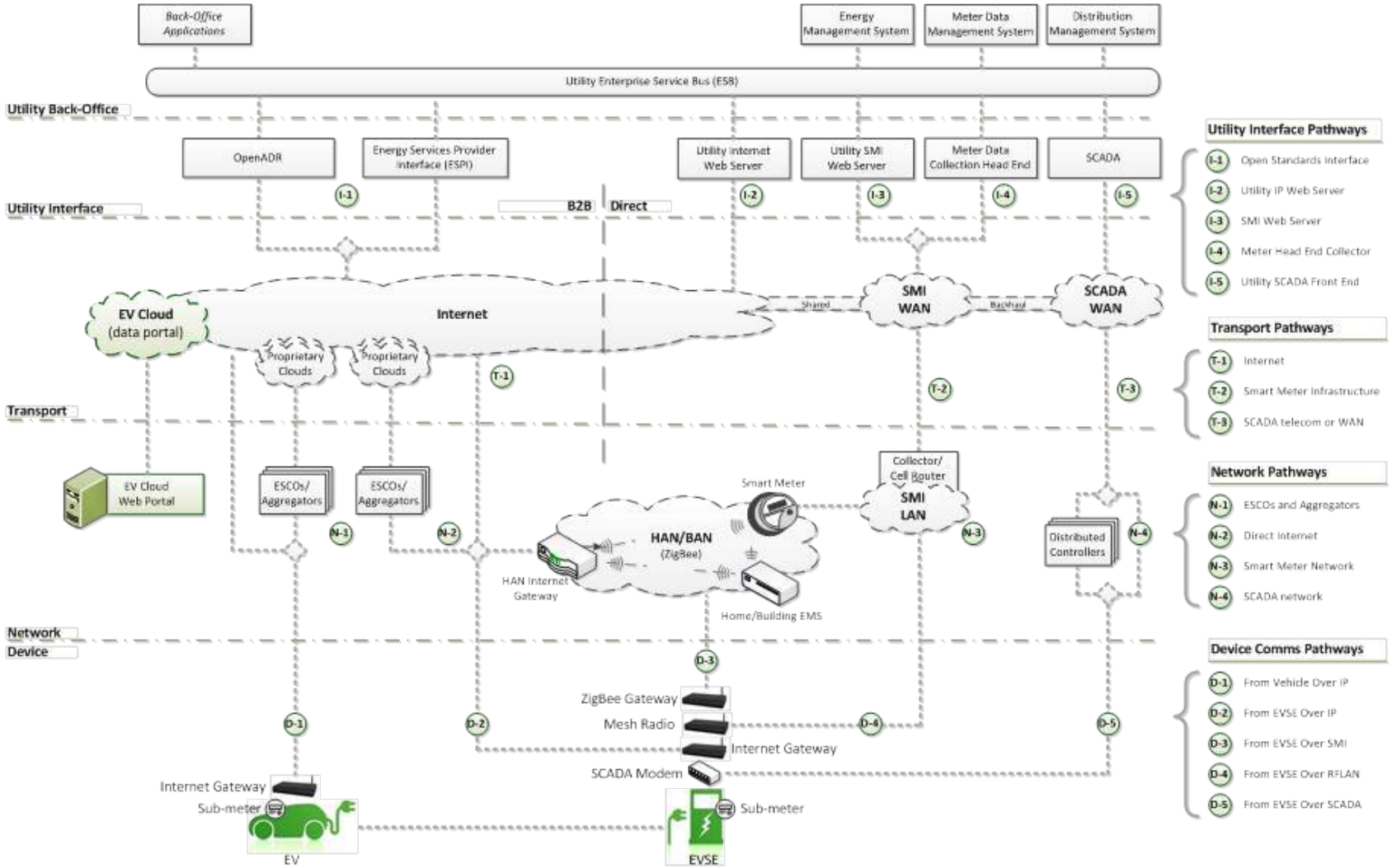
Distribution transformers
- Aging assets – ~70% over 20 years old
- 22% already experience peak loads over rated capacity
- Will have 5-10 kW sustained additional load in 2015 (1-2 EVs), 40 kW in 2030 (6-8 EVs) per transformer
- Substantial risk of increased failures
- Larger equipment sizing required

Generation and transmission
- Additional 60 MW peak load by 2015, 890 MW by 2030
- 4,000 GWh of additional energy load by 2030
- Peak mitigation planning required
- Longer term need for additional peak and energy capacity or DSM

Substations
- 26% of substations currently experience peak loads over 90% of firm capacity, including many in high adoption areas
- Sustained peak EV charging load per substation of 2-10 MW by 2015, 20+ MW by 2030
- Accelerates requirement for load transfers and capacity expansions

SOURCE: BC Hydro Distribution Planning; Energy Planning; EPRI; team analysis

Smart Charging



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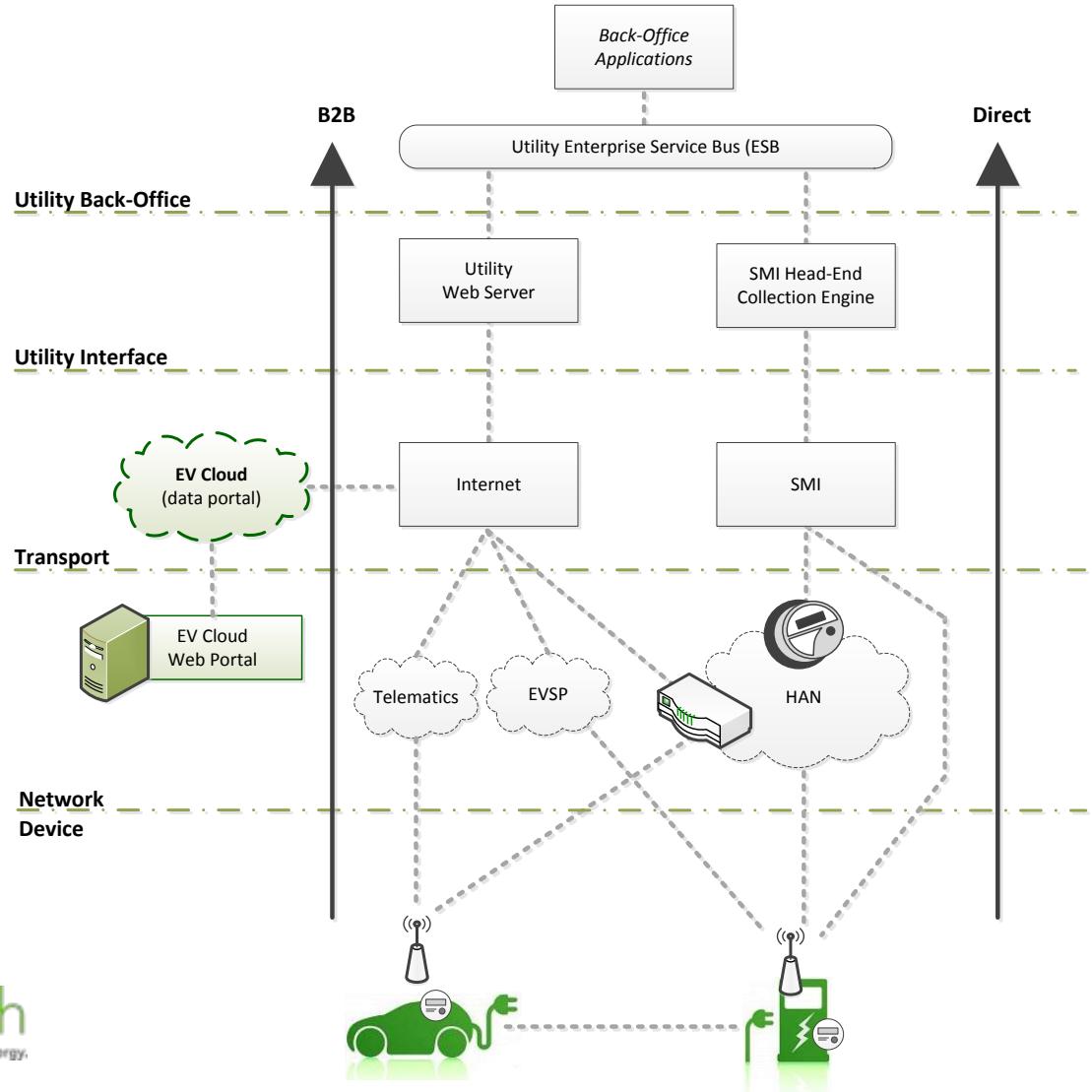
Smart Charging

Multiple Communications Pathways



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Smart Utility Lab
EV Technology Park

The Powertech EV Tech Park provides an environment for testing new EV charging technologies, supporting communications through both internet-based pathways as well as direct pathways through utility-owned Smart Metering Infrastructure

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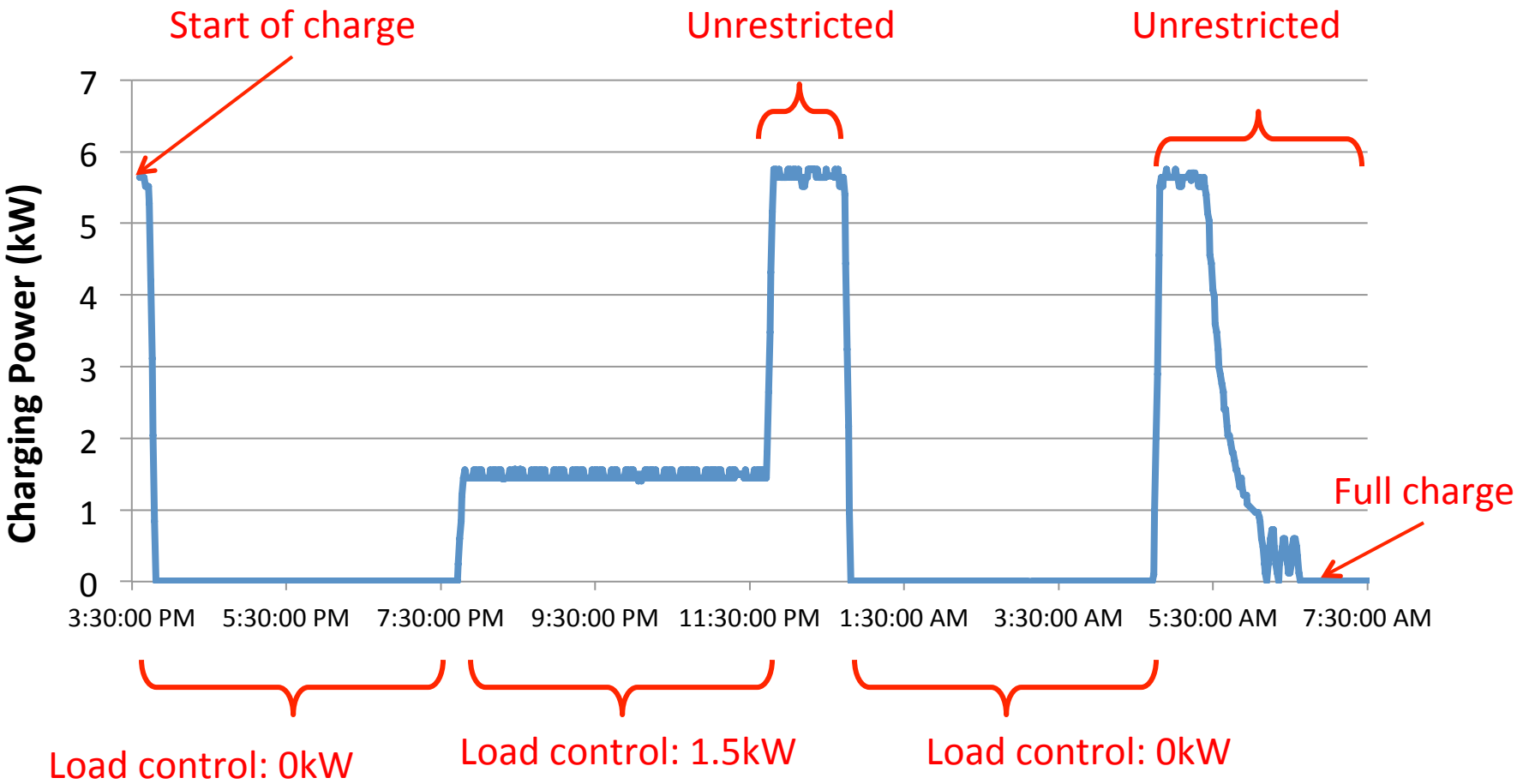
Smart Charging – Minimizing Grid Impacts

Nissan Leaf - Overnight Charge with multiple DLC events



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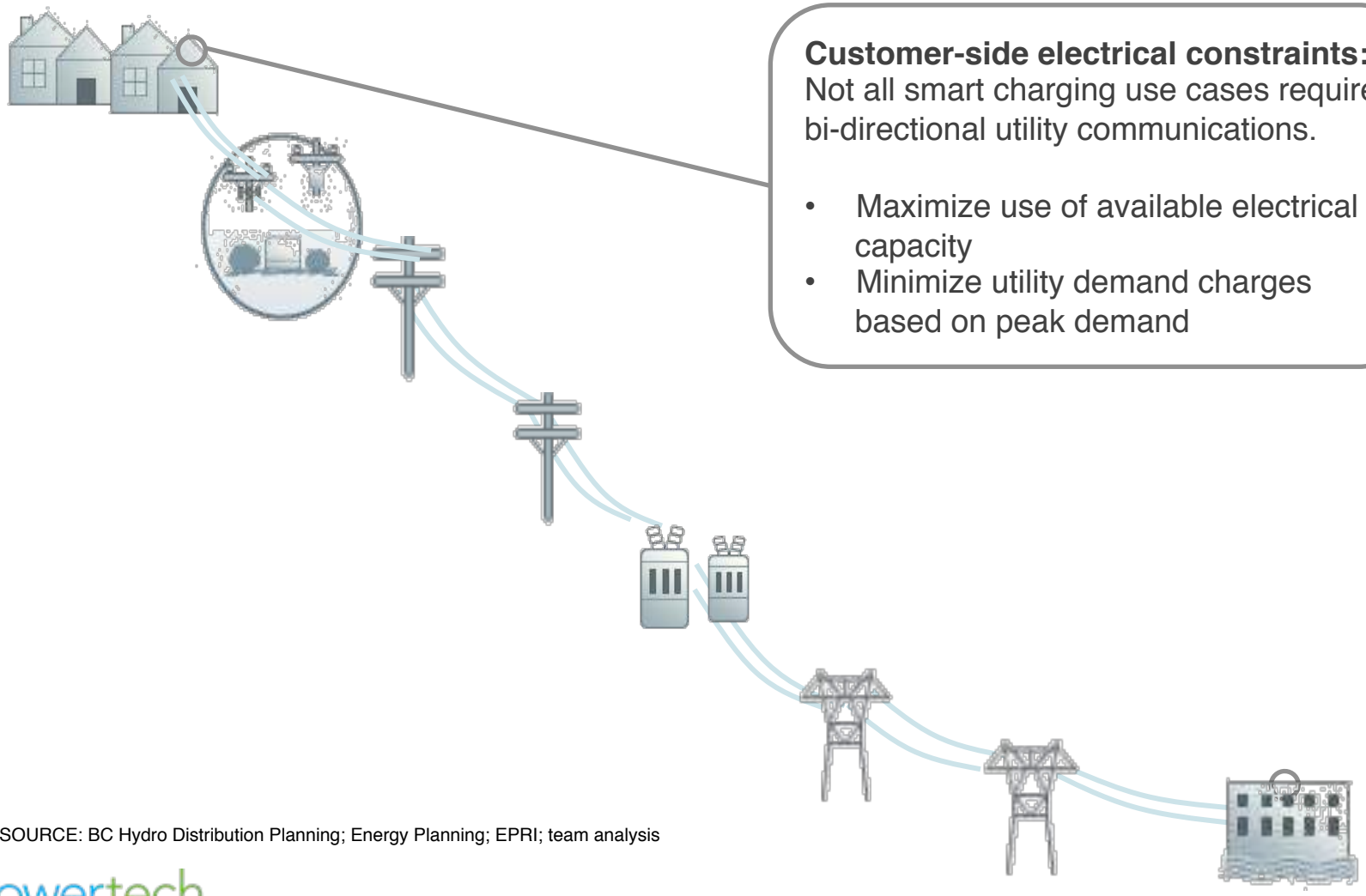
Impacts of EV charging on electrical infrastructure



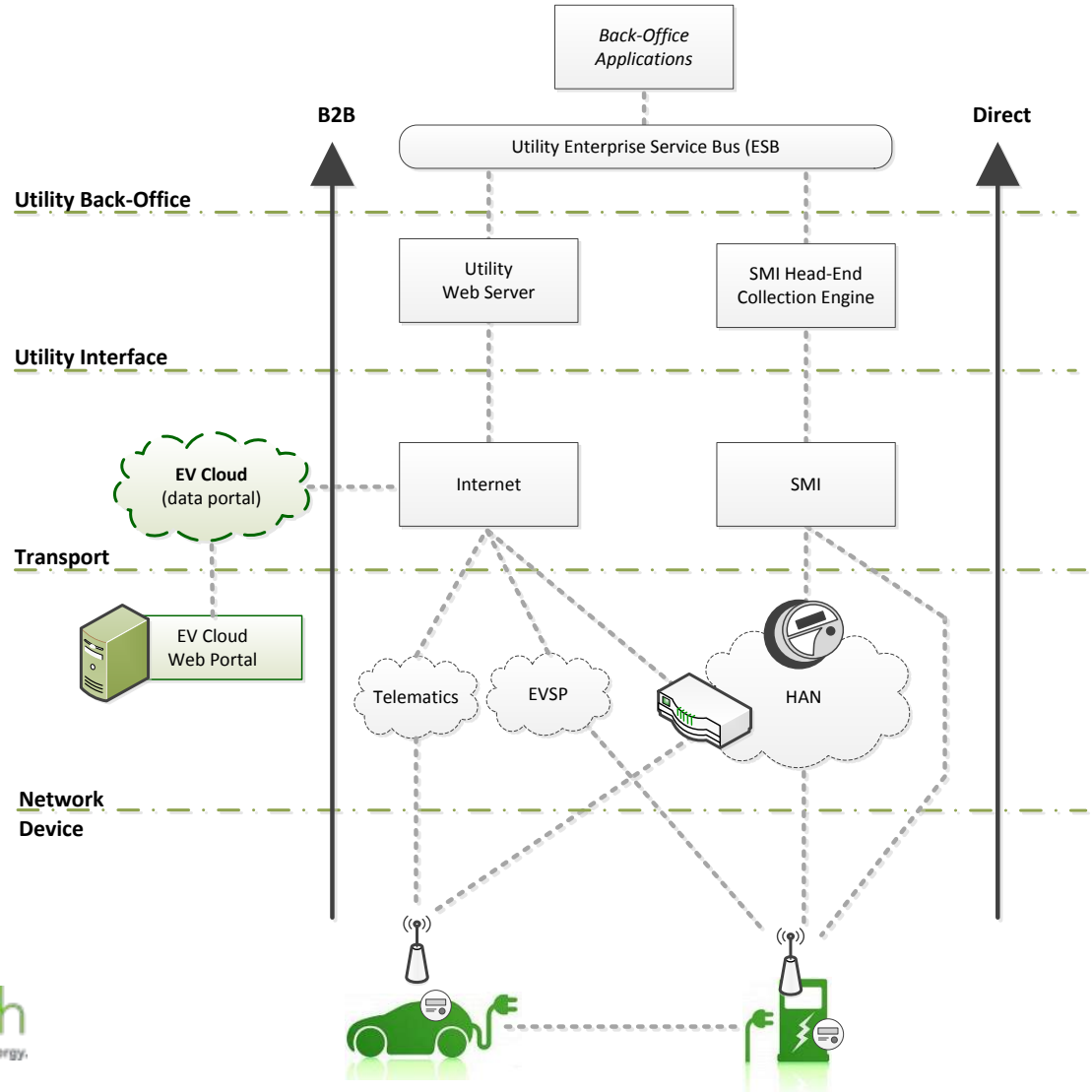
Customer-side electrical constraints:
Not all smart charging use cases require bi-directional utility communications.

- Maximize use of available electrical capacity
- Minimize utility demand charges based on peak demand

SOURCE: BC Hydro Distribution Planning; Energy Planning; EPRI; team analysis

Smart Charging

Multiple Communications Pathways



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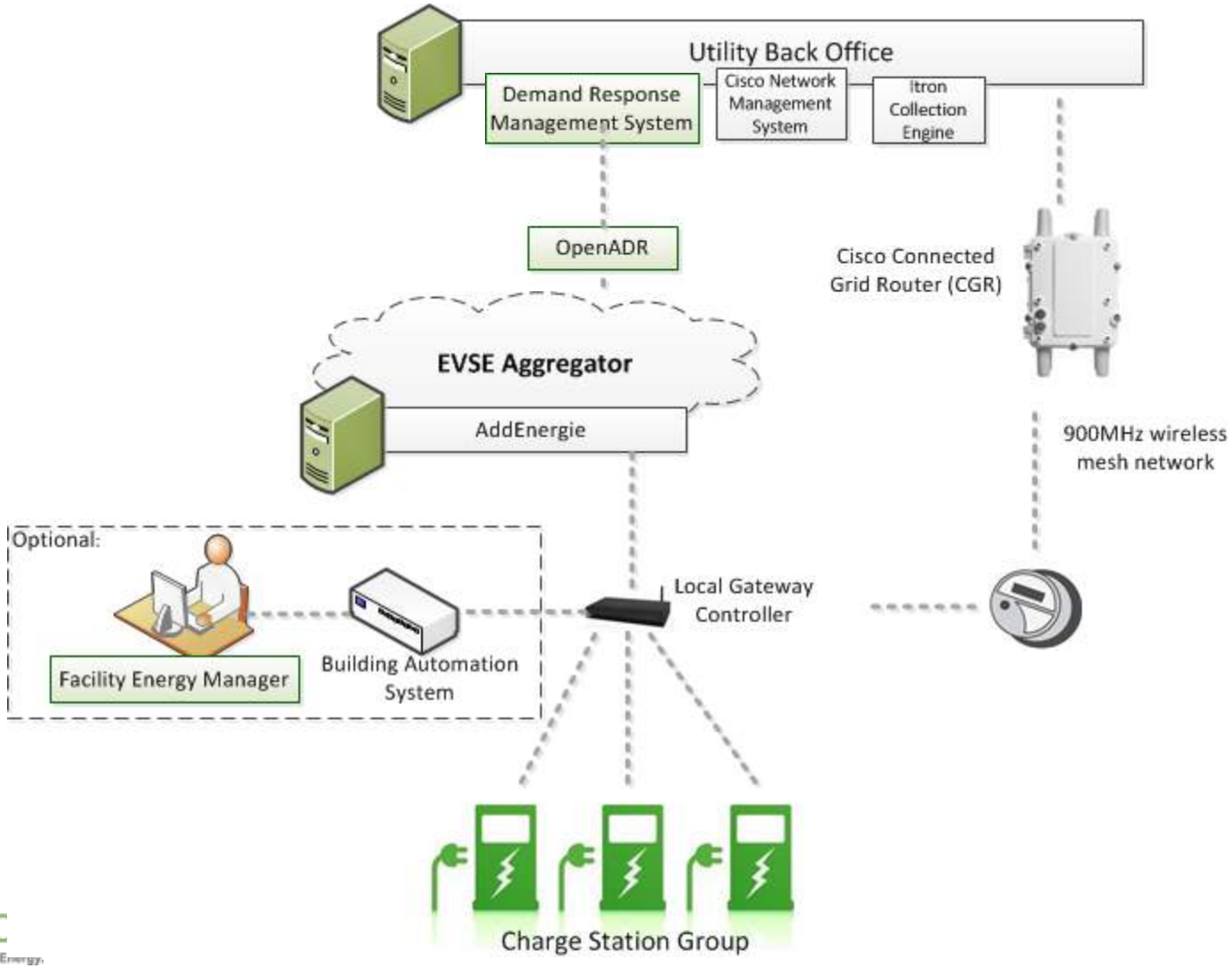
BC EVSI
Smart Grid Initiatives



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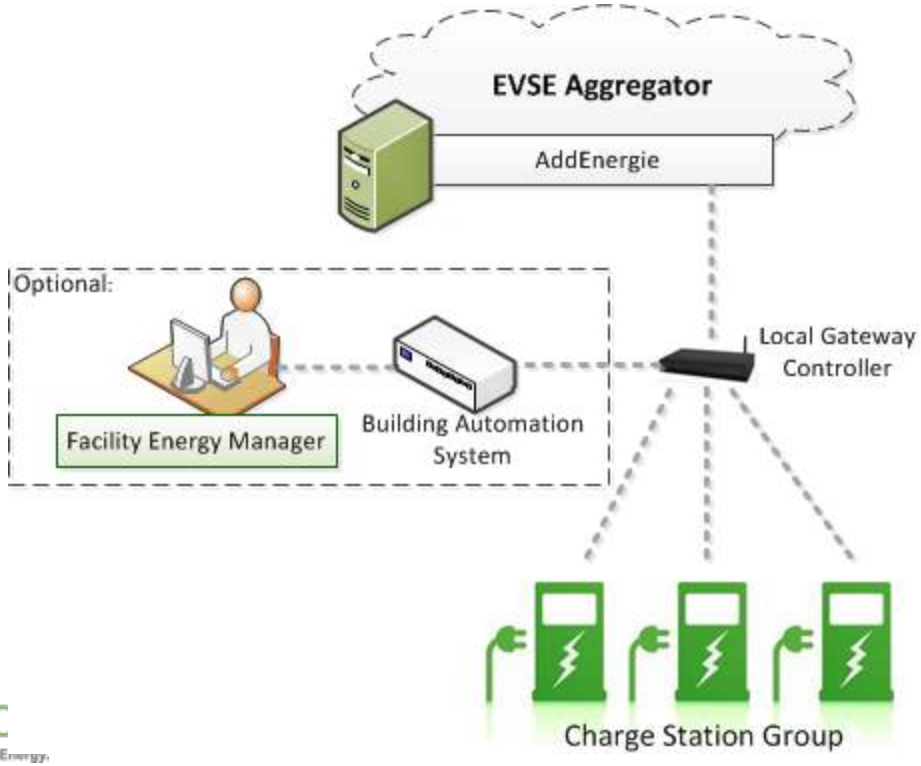

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EVSI Demo Site:
BC Hydro's Edmonds Complex

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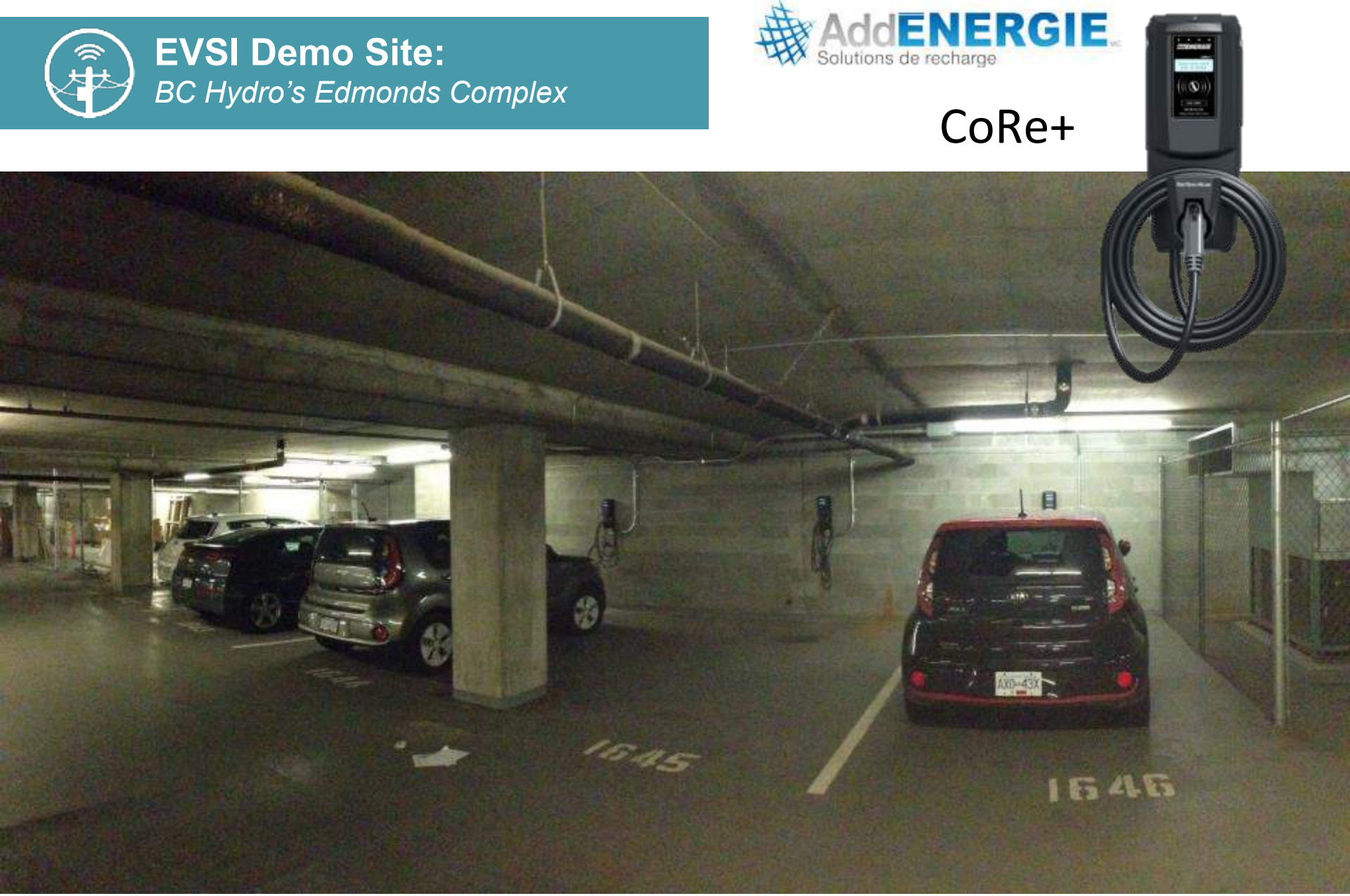
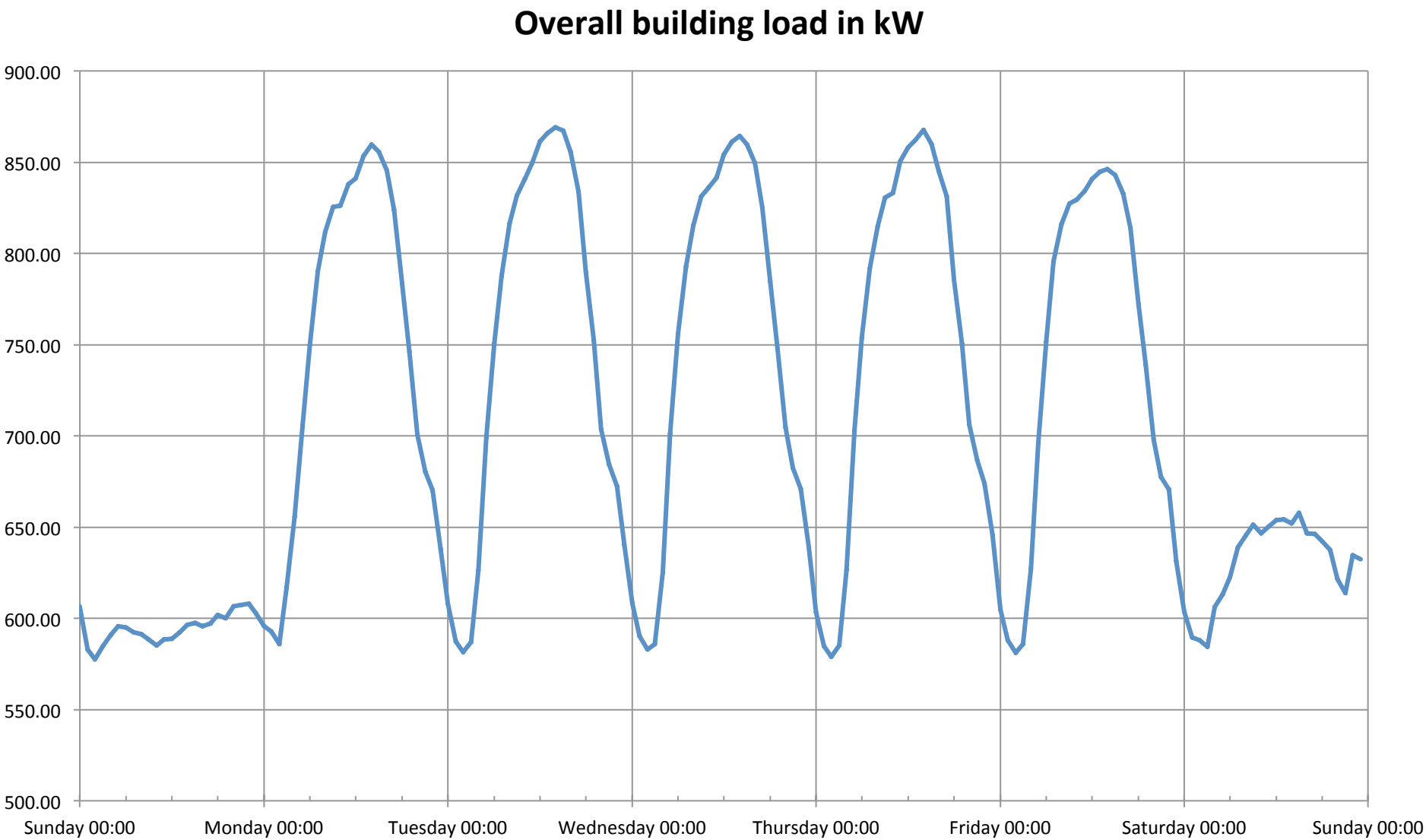
AddENERGIE
Solutions de recharge

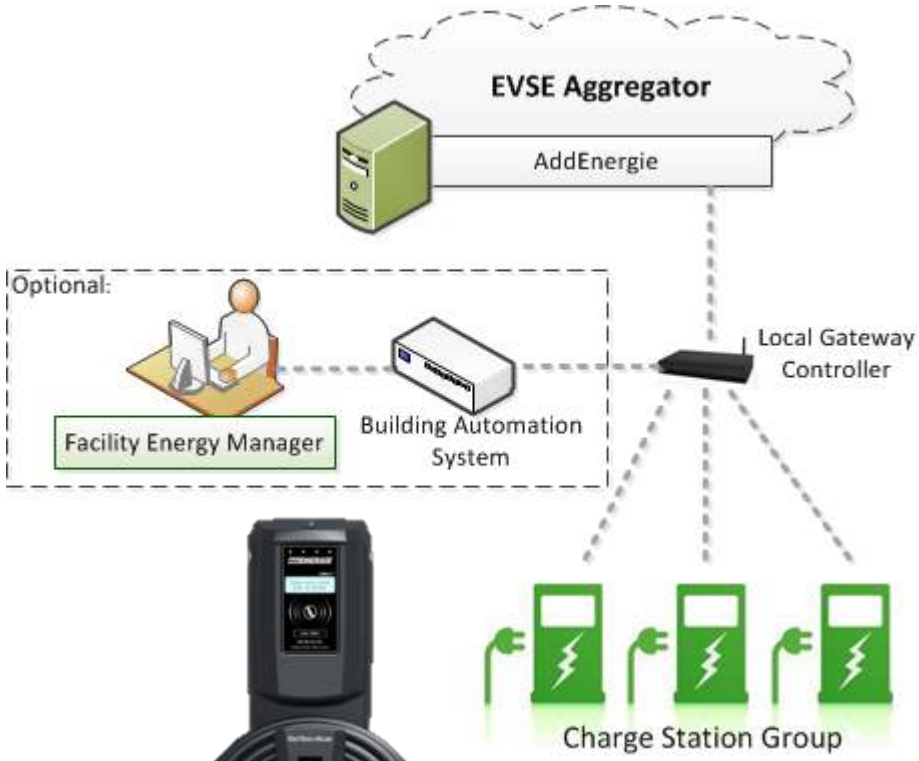
CoRe+



EVSI Demo Site:
BC Hydro's Edmonds Complex



EVSI Demo Site:
BC Hydro's Edmonds Facility



CoRe+

AddENERGIE
Solutions de recharge

Power Sharing

- Shares limited electrical capacity across a greater number of charging stations

Power Limiting

- Limits charging power according to time of day or in real time based on available capacity
- Minimizes demand charges

EVSI Demo Site:
University of British Columbia

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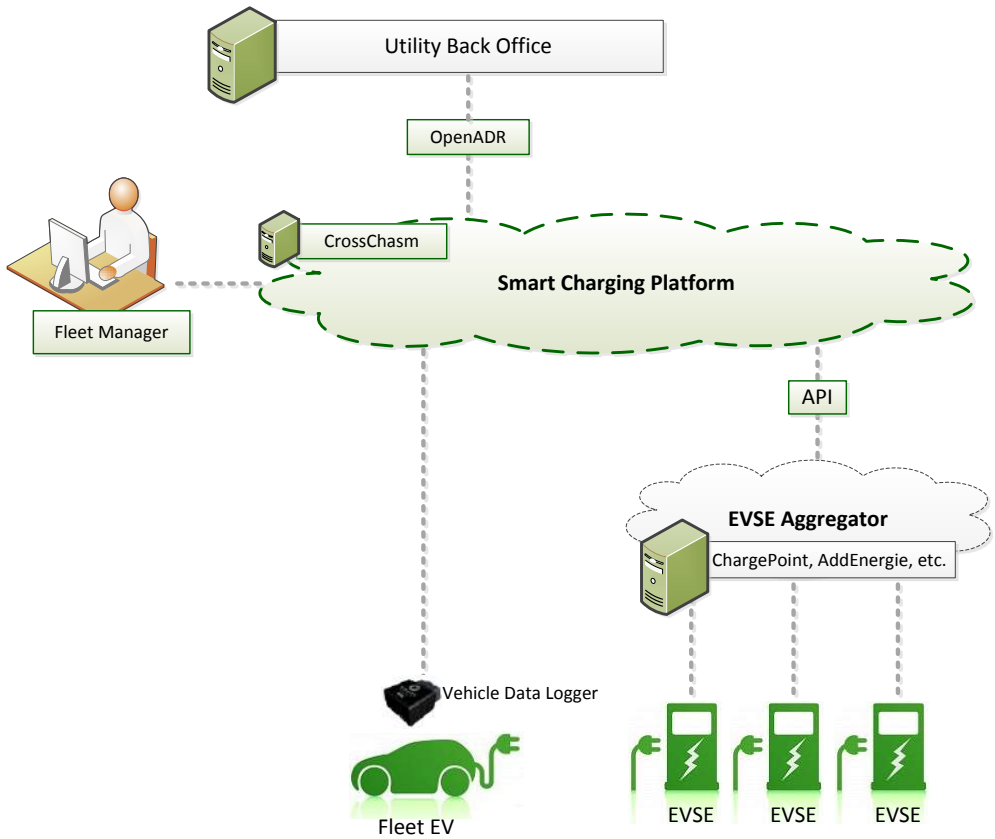
University of British Columbia

fleetcarma™
Energy & Emissions. Made Easy.



FleetCarma Smart Charging Platform

- Incorporates vehicle-side data to optimize smart charging decisions according to vehicle and driver needs
- Compatible with AddEnergie and ChargePoint stations
- OpenADR interface for bi-directional utility communications

Smart Utility Lab
EV Technology Park

The Powertech EV Tech Park provides an environment for testing new EV charging technologies, supporting communications through both internet-based pathways as well as direct pathways through utility-owned Smart Metering Infrastructure

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The Power of Trust. **The Future of Energy.**

Thank You!

Jeff Turner, Electric Vehicles and Energy Systems

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APPLIED RESEARCH

SMART MICROGRID APPLIED RESEARCH TEAM (SMART)

CLAY HOWEY

What we do.

Research and develop solutions to problems in:

- Smart Microgrids
- Critical Infrastructure Security
- Information Technology

How we interact with industry:

- BC Hydro is a strategic partner in our Smart Microgrid research
- OASIS project involves partnerships with Siemens, Panasonic, Schneider Electric, enCompass, PowerTech Labs
- NSMG-Net involves BC Hydro, Hydro One, Hydro Quebec, EION Wireless, Schneider Electric
- Provide a vendor-agnostic test bed for smart grid technologies
- IT firms directly contract R&D services to create solutions that yield competitive advantages
- 10 research staff dedicated full time to R&D projects

How we interact with students:

- Currently have 2 McGill PhD Candidates (Elec Eng), 1 UofA Masters student (Elec Eng)
- In recent past had 1 BCIT B. Eng (Elec Eng), 1 SFU PhD Candidate, 1 UBC PhD & 1 SFU Masters Candidates
- Have had numerous BCIT Diploma, B. Tech, and B. Eng students on variety of projects
- Via our NSERC Smart Microgrid Network (NSMG-Net), we involve students from McGill, U of Toronto, UBC, U of Manitoba, U of Waterloo, U of New Brunswick, U of Alberta, U of Western Ontario

Featured Project - OASIS

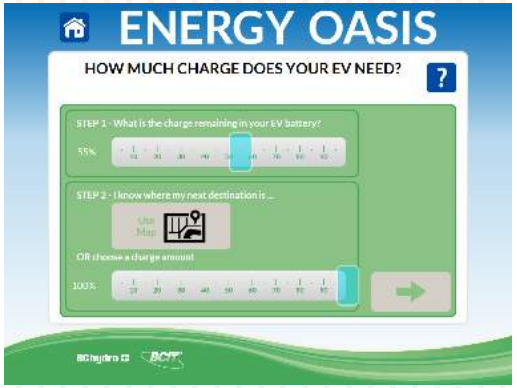
- Project to build a 250 kW solar canopy over a parking lot
- 40’ container houses 500 kWh Li-Ion Battery Energy Storage System (BESS)
- Powers two DC Fast Charge, six Level 2, and two Level 1 Electric Vehicle Charging Stations, LED parking lot lighting

OASIS Project continued…

- System is “islandable”, meaning it can disconnect, and reconnect to the grid
- System can backfeed surplus energy to the grid
- Project demonstrates state of the art solar technology coupled with energy storage, and the direct displacement of CO2 emissions related to transportation

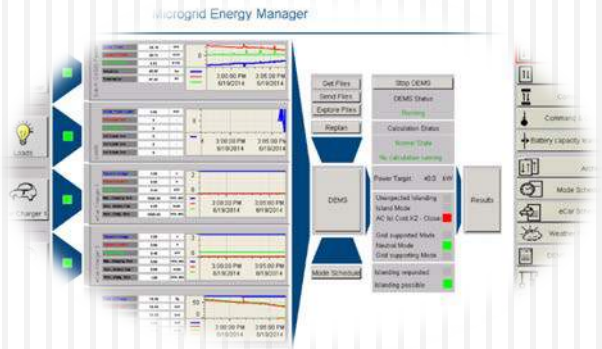
OASIS Project continued…

- EV drivers can make reservations
- System can deliver power based on availability of solar energy, and destination of EV driver
- Advanced generation and load forecasting system from Siemens
- Mitigation of EV charging on grid load



Kiosk

Mobile APP

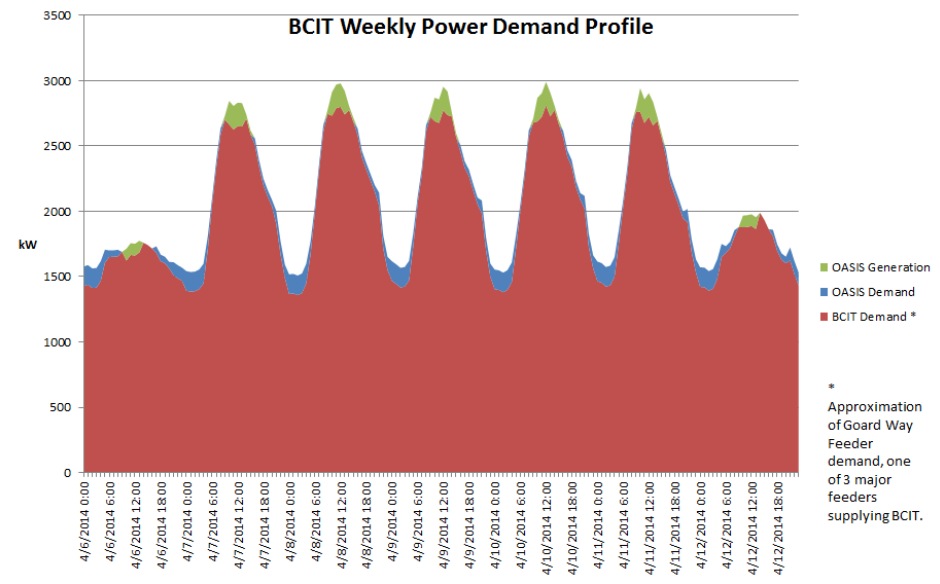


What is the Problem?

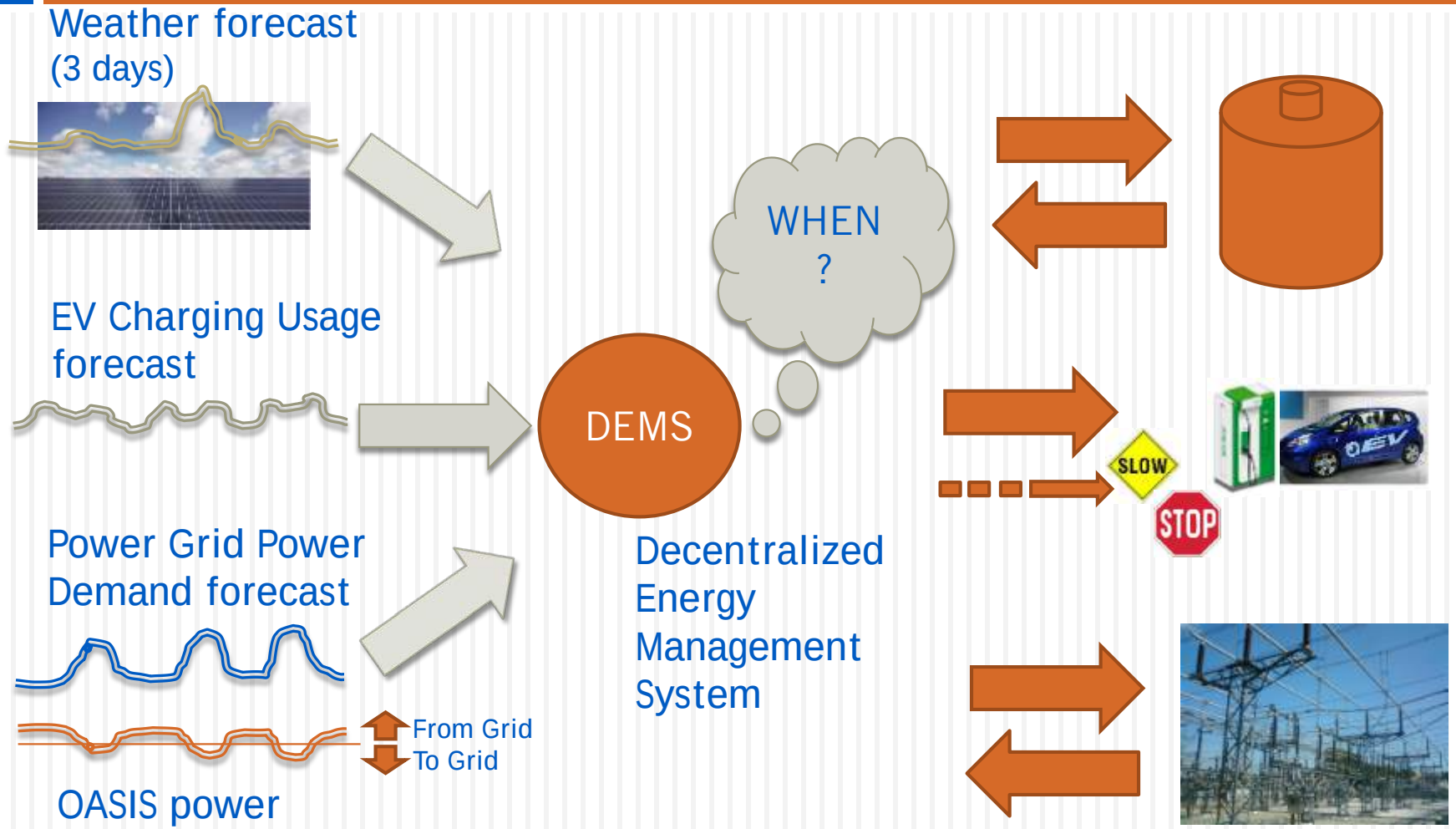
- We have adequate generation and transmission capacity in BC to electrify fleet
- Distribution, however, is another story
- If many EVs plug in simultaneously, distribution transformers and feeders may become overloaded
- “Demand Response” solutions need to be researched, tested and verified

Demand Response

- OASIS can do Demand Response to shave demand peaks, and fill in valleys
- Reduces demand charges, reduces peak load on distribution feeders



OASIS Project: Demand-Response Control, PV, and Energy Storage Mitigate EV Charging

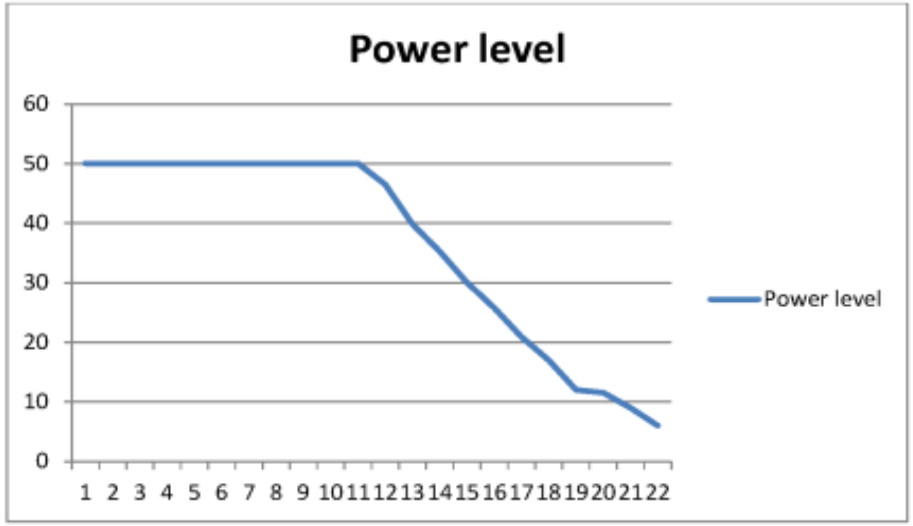


How many cars can OASIS charge in a day from Solar?

- Vancouver averages 3 sun hours per day, which equates to 3hours x 250kW = 750kWh per day (average) over a year.
- Average Nissan LEAF charging session is 10kWh
- Average Session time is 30 minutes
- We could support 75 LEAFs charging every day
- After factoring in house loads that number drops to about 50
- But it would still be hard to get that many cars through the chargers without having big lineups.

OASIS Project continued…

Typical Power Curve (Summer)



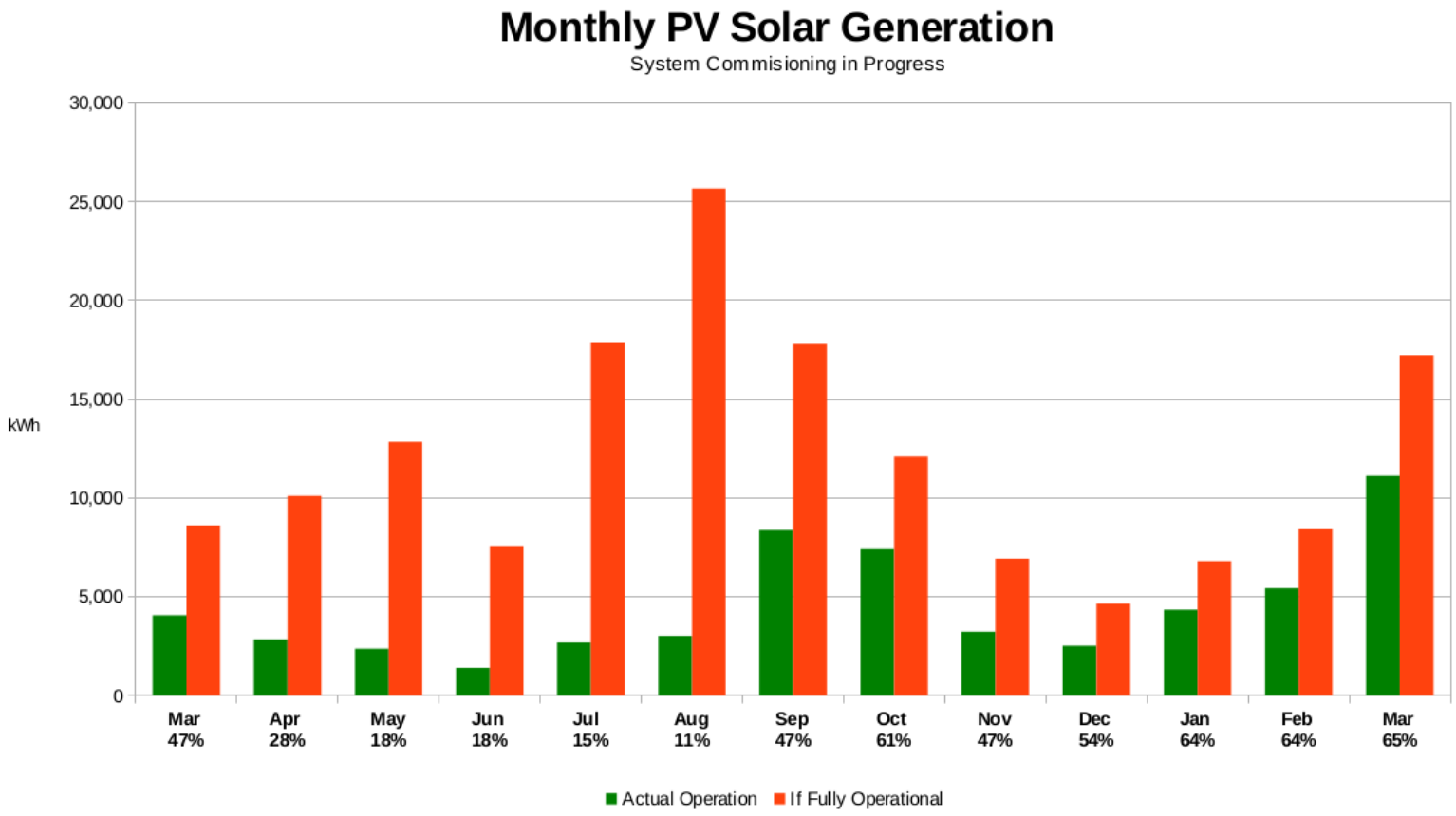
Unforeseen Challenges

- Location Selection
  - lots of campus roof space but little of it able to support load
- Battery Module Layout
  - Re-orientation of modules required

  → Resulted in innovative rack re-design
- PCS and Noise By-law
  - Requires noise abatement enclosure

  → Resulting in solutions with technology transfer potential
- EV Charger Power Loss
  - Power Quality to Fast Charger must be high, UPS required

OASIS Generation Data



Total Measured PV Generation: 58,782.98 kWh
If Fully Operational: 156,647.09 kWh

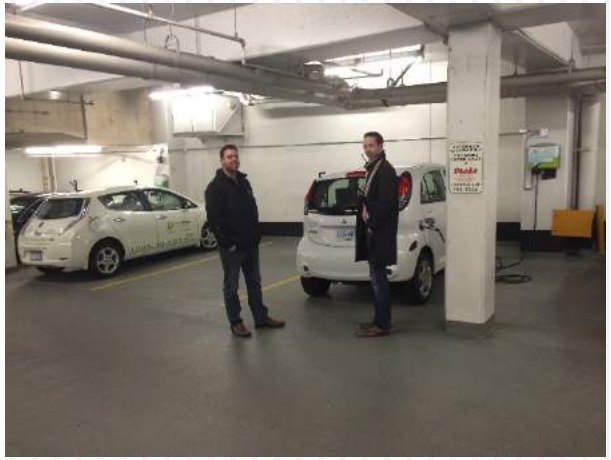
OASIS Project continued…

Major Project Components

- Panasonic – PV modules (solar panels) and four quadrant inverter
- Siemens – Substation Automation gear, Distribution Energy Management System
- Schneider Electric – DC Fast Charge EV Chargers, Smart Meters

Other BCIT EV Chargers

- Downtown campus – two Level 2 chargers
- Centre for Applied Research & Innovation (CARI) – one Level 2 charger
- Gateway Building, main Burnaby campus – two Level 2, four Level 1 chargers
- AFRESH Home, main Burnaby campus – one Level 2, one Level 1 charger



Consumer Behaviour Research

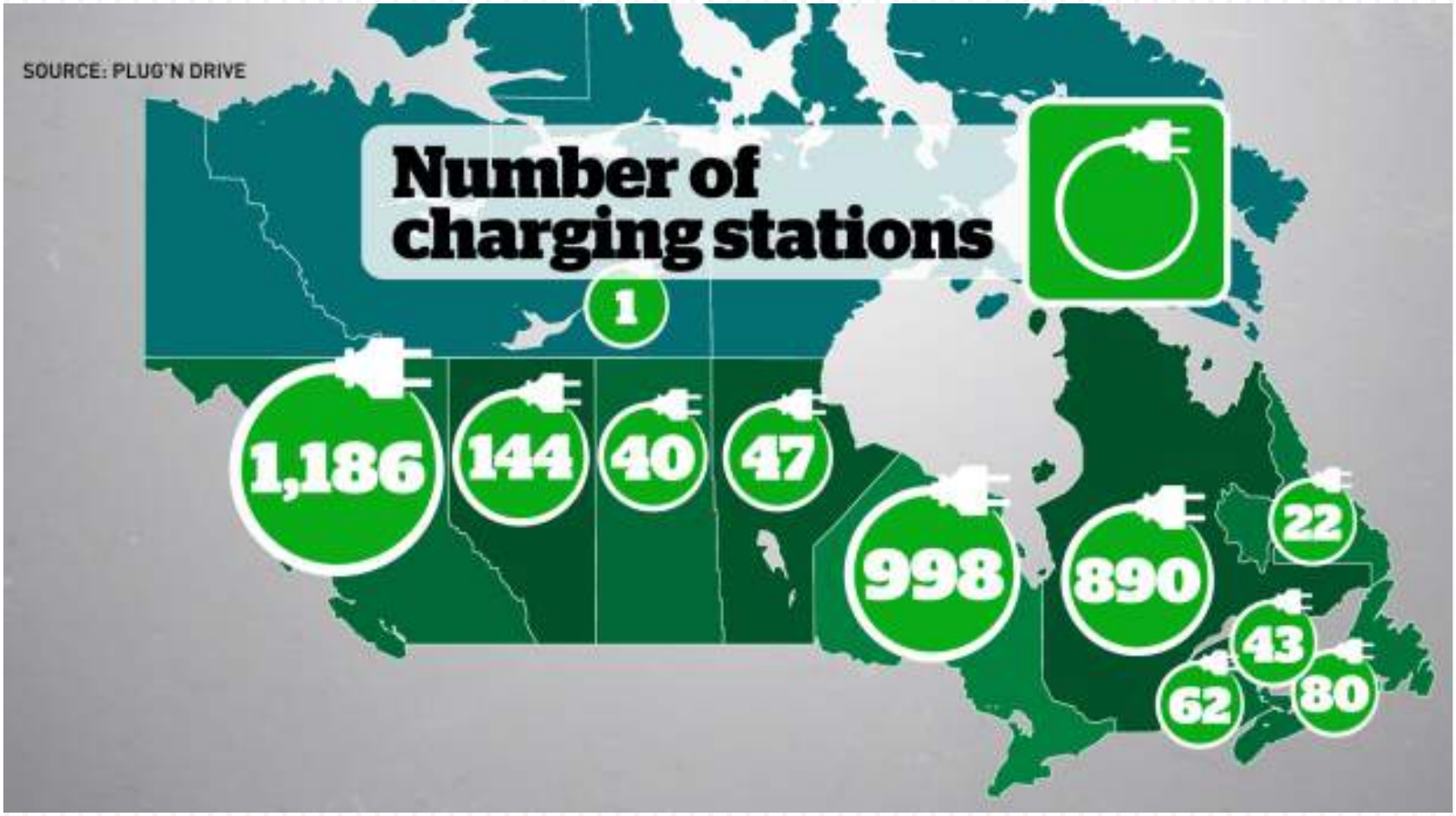
- Research Project with UBC, UVic, and SFU
- Uses the six Level 2 EV chargers at OASIS
- Researching EV driver appetite for aligning charging with availability of renewables
- Level 2 chargers can be “throttled” between 0, 1, and 7 kW.
- EVs will be charged when drivers need them, but time may be delayed to availability of renewables

Future Applied Research Projects

Future Projects

- Improvements to forecasting system
- Pilot project with Powertech Labs on Utility Controlled Charging at BCIT's AFRESH home
- More collaboration with UBC, SFU, UVic on behaviour change research

BC Leading Canada in EV Chargers



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CLAY HOWEY

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