AUC
Alberta Utilities Commission

TVR & Other DSM Enablement

Innovation Forum

Table of Contents

- Introductions
- Purpose of today & Context
- Jurisdictions & Case Studies
- Open Discussion
- Close-out

Purpose of today

While the focus of the engagement is to develop a recommendation for MDM structure in Alberta, today we want to take a **step back** and look at the broader picture so that we can understand why this is an important step, and learn from others who have gone through this journey

Why is this important now?

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Demand continues to increase…

Digitalization Surge:

Rapid growth in data centers, AI, and cloud computing, is expected to consume 14% of Canada's power.

Increased Electrification:

The global shift to electric vehicles, heating, cooling, and industry has started to impact Canada's electricity sector.

Climate and Weather Impacts:

More extreme weather drives higher cooling needs, resilience investments, and causes volatile demand patterns.

Population Growth and Urbanization:

Alberta's population is planned to grow by 2M residents by 2051

… which can lead to significant impacts

Increased Electricity Demand and Generation Needs:

Electricity demand in Canada is expected to double or triple by 2050, from 600 TWh to approximately 1300 TWh, driving significant generation build-out requirements.

Grid Infrastructure Challenges:

Grid challenges (including transmission bottlenecks, extreme weather, asset end of life, renewable integration and weak east-west interconnection) threaten reliability.

Rising Electricity Costs Due to Investment Needs:

Meeting soaring demand and addressing infrastructure deficits will require major new investments, translating into higher electricity prices.

Environmental and Policy Imperatives:

Increased pressure to move towards net-zero will demand fast scaling of clean energy, mitigating emissions growth.

Ultimately, this likely means **Canada will need to support double its electricity supply in 25 years**, while decarbonizing and modernizing the grid. This is both a risk (reliability, affordability) and an opportunity (clean tech growth, jobs, innovation).

Across the globe electricity sector participants are involved in many initiatives to stay ahead of demand

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Participants	Regulators	Generators	Transmission Facility Operators (TFO)	Distribution Facility Owners (DFO)	Retailers / Aggregators	Residential Consumers	Advocacy Groups / Research / Innovators / Other
Innovation Areas	• Market Structures • Settlement Changes • **Time-Varying Rates** • Market Reform • Demand Response enablement • DSM enablement • Retail Competition • Interoperability Standards	• Generation Planning • Diversification and Flexibility • Onsite generation for loads (ex: data centres) • Long-duration storage and flexibility • **Grid Support**	• Grid Operations and Planning • Interconnections with other jurisdictions • Grid enhancing technologies (GETs) • Wide monitoring and control • TFO-DFO coordination platforms • **Grid Support**	• Grid Operations and Planning • **EV managed charging** and V2G • AMI data access • DER Orchestration • **Demand Response** • Smart Grid • Microgrids • DER interconnection • **Behind-the-meter solutions**	• Competitive Rate Offerings • Customer Incentives • Customer Education • **Behavioral DR** and **gamification** • Peer-to-Peer & community energy • **VPP (Virtual Power Plants)** • Carbon-aware and green tariffs • Energy-as-a-service	• Adoption of renewables & DER • Advanced reporting • **Smart Home devices and software** • **VPP (Virtual Power Plants)** • Community energy and microgrids • Energy efficiency and electrification	• Customer Education • Regulatory sandboxes and **pilots** • **Open data and transparency** (green button) • Policy / Consumer Advocacy • **Research** • Standards development • Innovation accelerators • Equity initiatives
Why	Ensure reliability and affordability, protect customers, and enable secure, equitable innovation at scale	Maximizes revenues and delivers additional generation flexibility.	Unlock capacity and stability without large new builds	Deferring costly infrastructure upgrades and increasing operational flexibility	Differentiates offerings, lowers churn, and monetizes customer flexibility	Cuts bills, boosts resilience, reduces negative impacts, and supports control and privacy	Safeguards equity, security, standards, and validates what works

Let’s visit a few jurisdictions across the globe and learn how they are innovating in the electricity sector

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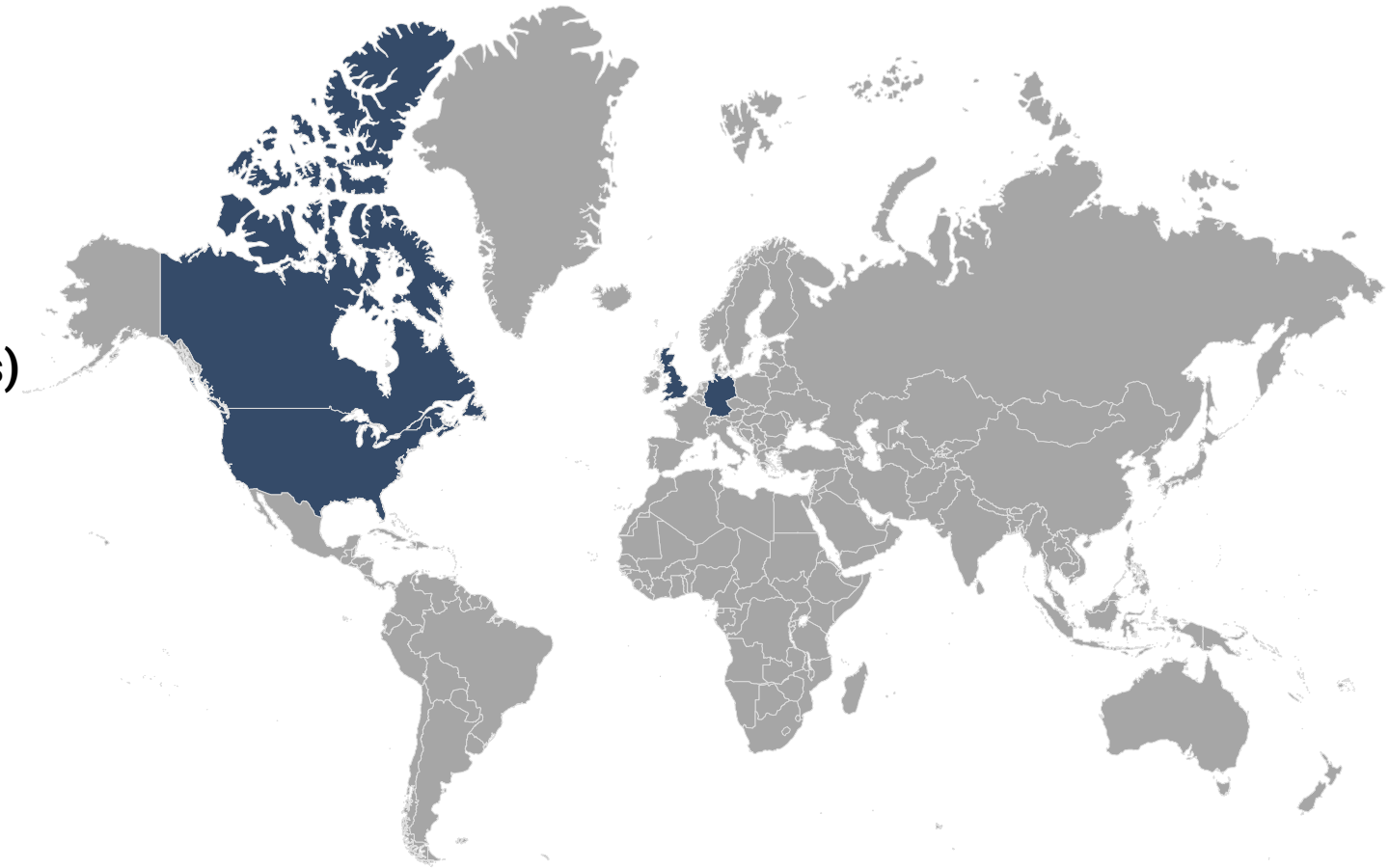
1. **USA – California**
2. **Canada – Ontario**
3. **Canada – Québec**
4. **Germany**
5. **United Kingdom – England**
6. **Canada – Alberta (with guest speakers)**



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United States - California

	Summary
Market Structure	Partially deregulated; competitive wholesale (CAISO); Retail choice or CCA (Community Choice Aggregation) available
Market Size Estimates	• ~13 Million • ~Peak 48 GW (2024)
Market Operators	CAISO; Vertically integrated IOUs and municipally owned utilities
AMI	• ~100% • Hourly or 15-minute
MDMS	Decentralized. Each IOU (and CCA) stores and manages its customers interval data in its own MDMS. Green button data access is standardized and available through APIs at IOUs.
Retail Rate Structure	• **Tiered Flat** – Legacy; higher price for higher usage. • **Default TOU** – Now standard; expensive 4–9pm, cheaper other times. • **EV TOU** – Super-off-peak overnight rates. **CPP / SmartRate** – Optional; surcharge on critical peak days.

United States – California - Sacramento Default TOU and managed EV charging

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In an evening-ramp constrained system, SMUD defaulted residential TOU (5–8 pm) with first-year bill protection and opt-out, then layered telematics-based managed EV charging.

Profile

Name: Sacramento Municipal Utility District (SMUD)
Customers: 500k
Topic: Default residential TOU and managed EV charging

Perspective

Default TOU with opt-out and first-year bill protection, paired with automated EV scheduling, delivers scalable peak shaving without harming customer trust.

Challenge

- Duck curve: midday solar surplus; steep 5–9 pm ramp
- Avoid peaker runs on hot days; meet carbon goals
- Rapid EV adoption risking evening and feeder peaks

Approach

- Default TOU: summer on-peak 5–8 pm $0.28/kWh; off-peak $0.09; winter lower with small mid-peak
- First-year bill protection; opt-out allowed; targeted education and online tools
- Managed EV charging (2022): ~1200 EVs piloted; telematics via OEMs; automated off-peak scheduling; simple incentives

Outcome

- Annual peak load reduced by 4-8%
- >90% stayed on default TOU
- EV: ~$60/EV-year avoided grid costs; SMUD's program won a 2025 PLMA Award for innovation, set to expand to 30,000 EVs
- ~12,000 tons of avoided GHG emissions and ~$11-16 million in commodity cost savings.

75 - 130 MW
peak load reduction

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Canada - Ontario

	Summary
Market Structure	Hybrid; competitive + contracted wholesale (IESO) + retail rates mostly regulated unless customer switches to a retailer
Market Size Estimates	• ~5 Million • Peak ~27 GW (2025)
Market Operators	IESO; ~60 LDCs
AMI	• ~100% • Hourly intervals
MDMS	Centralized: VEE and bill framing centralized; Green Button mandated province-wide.
Retail Rate Structure	• **Flat Tiered** – Two price levels based on monthly usage • **Time-of-Use (TOU)** – Default; 3 periods (on/mid/off-peak). • **Ultra-Low Overnight (ULO)** – Optional; super cheap 11pm–7am, higher peak.

Canada - Ontario
Ultra-Low Overnight pricing to shift EV/flexible loads

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Ontario introduced an optional Ultra-Low Overnight plan from 3.9¢/kWh to 39.1¢/kWh. Aimed at EVs and flexible loads, ULO is offered province-wide alongside TOU and Tiered, with OEB-set prices and monitoring to maintain revenue neutrality.

Profile

Name: Ontario Energy Board
Customers: ~5M
Topic: Optional Ultra-Low Overnight 4-period TOU (2023 rollout)

Perspective

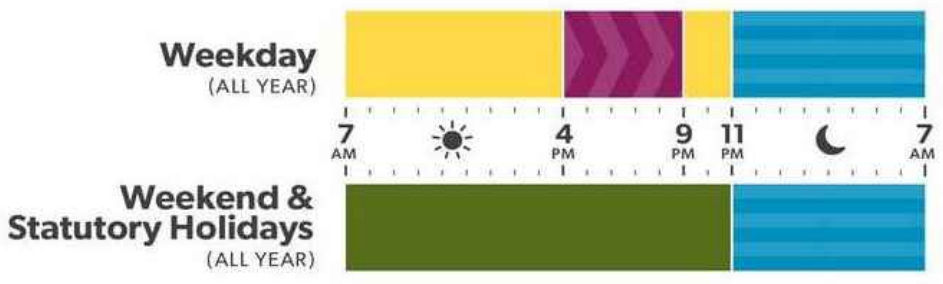
A clear, predictable overnight discount accelerates EV charging and appliance shifting, improving affordability and evening peak management.

Challenge

- Residual evening/winter peaks under standard TOU
- Rapid EV adoption needs stronger overnight incentives
- Maintain customer choice and revenue neutrality across plans

Approach

- ULO design:
  - 3.9¢/kWh (11 pm–7 am);
  - weekend off-peak 9.8¢ (7 am–11 pm);
  - mid-peak 10.2¢ (7 am–4 pm, 9–11 pm);
  - On-peak 39.1¢ (4 pm – 9 pm)
- Rollout: available May–Nov 2023 across all utilities; optional enrollment via simple switching; OEB sets prices semi-annually and tracks load profiles
- Choice architecture: ULO offered alongside existing TOU and Tiered; online calculators and comparison charts



Outcome

- Uptake: Tens of thousands enrolled (and growing), mainly EV owners.
- Behavior: EV and flexible loads shift to 11 pm–7 am; 4–9 pm use down.
- Impact: $90/year typical EV savings; projected $5.7M/year system benefits.

~5.7M
per year in potential capacity cost savings

Canada - Ontario "Green Button" Implementation

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Ontario mandated Green Button Download My Data and Connect My Data across all utilities, opening hourly/15-minute usage data and secure third-party sharing to ~5 million metered accounts. This enables app-driven insights, better rate selection, and automation to support EVs and flexible loads.

Profile

Name: Ontario Energy Board
Customers: ~5M
Topic: Green Button data access (Download My Data, Connect My Data)

Perspective

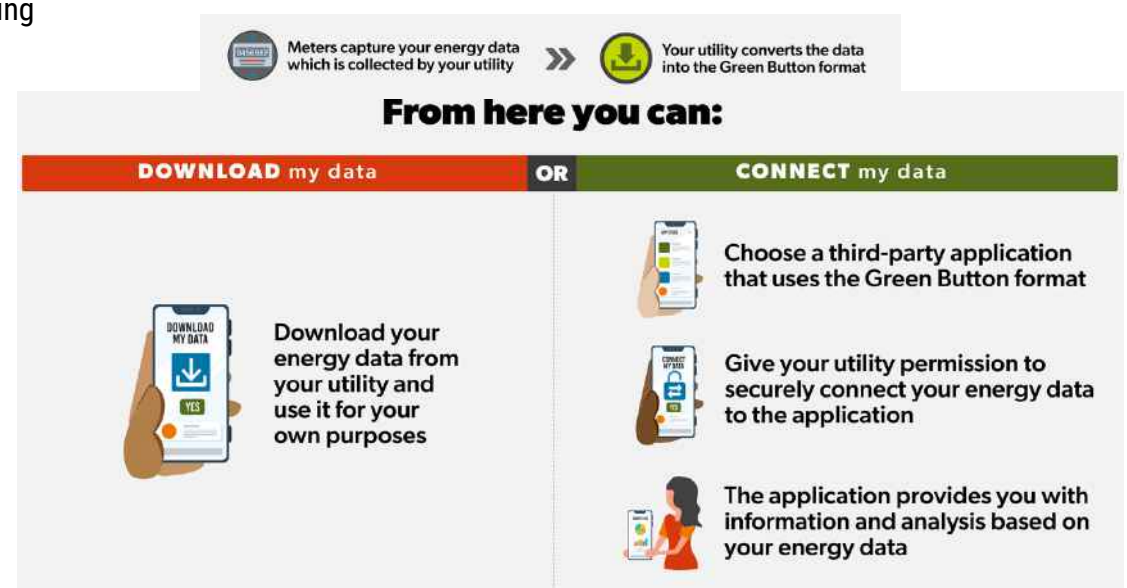
Data rights plus standard APIs unlock customer understanding, third-party innovation, and practical demand flexibility at scale.

Challenge

- Limited visibility into hourly usage for many customers
- Confusion choosing between TOU vs Tiered vs new ULO options
- Need secure, privacy-controlled sharing with apps

Approach

- Regulation O. Reg. 633/21: electricity and gas utilities implement DMD/CMD by Nov 1, 2023
- Portals provide hourly/15-min interval downloads (standardized XML) and consent-based API sharing
- Customer controls: authorize/revoke third-party access; cybersecurity/privacy guidelines; OEB oversight and working group



Outcome

- Compliance: Most utilities live by Nov 2023; small extensions only.
- Adoption: Thousands of app connections; growing use for plan optimization.
- Data quality: Early gaps improving via OEB working group; no major privacy issues.

~5M
metered accounts with green button access

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Canada - Québec

	Summary
Market Structure	Vertically integrated monopoly
Market Size Estimates	• ~4.5 Million • Peak ~40 GW
Market Operators	Hydro-Québec (TSO, DSO, retailer)
AMI	• ~100% • 15-minute intervals
MDMS	Hydro-Québec manages all meter data; customer portal access;
Retail Rate Structure	**Flat Rate** – Default; Tiered flat rate **Winter credit Option –** Flat rate with credit for kWh reduction at peak **Flex D - Hilo VPP**– Optional; VPP and load control systems. Lower annual flat fee – high peak costs. Rebates associated with Hilo challenges in peak reduction.

Canada - Québec
Dynamic winter peak pricing and smart home DR

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Optional critical-peak pricing plus automated smart-home control delivers large, reliable winter peak reductions at lower cost than new capacity.

Profile

Name: Hydro-Québec
Customers:~340k+
Topic: Dynamic winter peak pricing (Flex D, Winter Credit) and Hilo smart-home demand response

Perspective

Combining optional price signals with automation turns widespread electric heating into dependable, low-cost peak capacity, avoiding new plants and supporting exports.

Challenge

- Extreme cold drives short, intense winter peaks; costly to serve with new capacity
- Historically flat, low rates reduce engagement; past voluntary DR had limited impact
- Need to manage electrified heating and EV load while preserving affordability

Approach

- Dynamic pricing offers (Dec–Mar; max 30 events, 2–4 hours):
  - Flex D: lower annual price (4.4¢/kWh) outside events; high event price (45¢/kWh); customers notified day-ahead; post-season "shadow bill" and easy switching.
  - Winter Credit Option: bill credits Credit for every kWh curtailed (minimum of 2 kWh per event) 56.786 ¢/kWh
- Hilo smart-home service (launched 2020):
  - Thermostats, smart plugs, hub, app; low-cost bundles with performance-based rewards
  - Subsidized home automation equipment
  - Automated "challenges" align with HQ peak events; opt-out per event allowed
  - Integration: Hilo + Flex D maximizes savings; also available with standard Rate D
  - Scale: ~19.5k users (2022–23) to ~60k (2024–25); average rewards ~$100–$150/winter

Outcome

- Currently about 60,000 customers signed up for such programs;
- 620 MW of objective by 2029

~330 MW
curtailed per event

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Germany

	Summary
Market Structure	Deregulated; Competitive generation, retail open since ~1998
Market Size Estimates	• ~50 Million • Peak ~77GW (2022)
Market Operators	4 TSOs (50Hertz, Amprion, TenneT, TransnetBW); ~900 DSOs
AMI	• ~5%; accelerating with legislation • Daily intervals; 15-minute for AMI meters
MDMS	Hybrid; Secure Smart Meter Gateway architecture instead of central MDMS; DSOs and third parties manage data; privacy by design
Retail Rate Structure	• **Flat Rate** – Most common. • **Night Tariff (HT/NT)** – For electric heating; cheaper nights. • **Dynamic Tariffs** – Hourly pricing for smart meter users

Next Kraftwerke - Virtual Power Plant (VPP)

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By bundling biogas, CHP, solar PV, batteries and flexible industrial loads, NK turns decentralized assets into reliable, dispatchable capacity that trades day-ahead/intraday energy and stabilizes peaks at scale.

Profile

Name: Next Kraftwerke
Customers: 12,000 participating DERs
Topic: Aggregation of DERs for balancing and energy markets

Perspective

Aggregation + clear market access turned fragmented DERs into dependable, low-cost flexibility without ratepayer subsidies.

Challenge

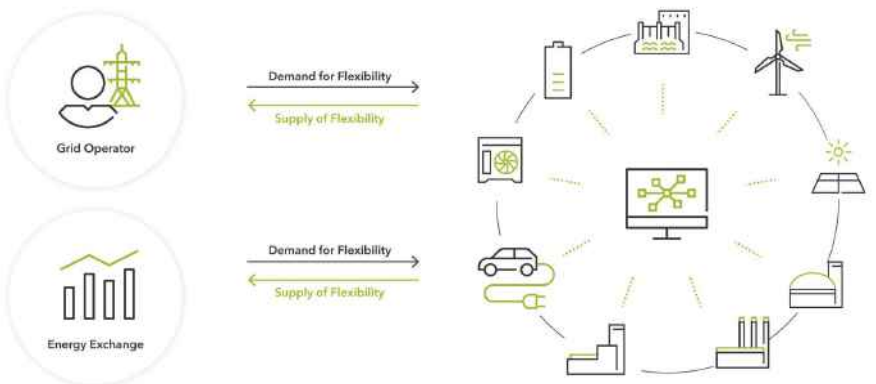
- Rapid renewables growth drove volatility and peak-balancing needs
- Small DERs below 1–5 MW reserve-market bid thresholds
- Must prove reliable, auditable performance across thousands of assets

Approach

- Built VPP platform: telemetry, forecasting, remote dispatch; 15-min scheduling. Aggregation of DER and Load control to reach minimas
- Traded energy; supplied primary/secondary/tertiary reserves; emergency gensets early
- Scaled to VPP-as-a-Service (NEMOCS – Software offering) and expanded cross-border

Outcome

- Scale: >10 GW aggregated; ~12k units; 8 countries (2022)
- Reliability: qualified for FCR/aFRR/mFRR; second-to-minute response



>10 GW
aggregated capacity gained

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United Kingdom - England

	Summary
Market Structure	Deregulated; Competitive generation & retail since ~1990s
Market Size Estimates	• ~30 Million • Peak ~62 GW (2007) now ~45 GW (2024) due to efficiency
Market Operators	National Grid ESO; 14 Regulated DSOs
AMI	• ~60% • 30-minute intervals
MDMS	Decentralized; Data Communications Company (DCC) manages all smart meter data; supports 30-minute settlement and third-party access
Retail Rate Structure	• **Flat Standard Variable Tariff (SVT)** – Default; all day rate • **Economy 7** – Legacy; 7 cheaper night hours, higher day rate • **Agile Octopus** – Dynamic; half-hourly prices change daily • **Octopus Go** – EV-focused; 4-hour cheap overnight window

United Kingdom - England
Dynamic retail tariff enabling demand response

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Combining smart meters, open APIs and gamified engagement, Agile shows opt-in dynamic pricing can deliver measurable demand response, high satisfaction (~89%) and self-selected participation without cross-subsidies.

Jurisdiction Profile

Name: Octopus Energy
Customers: 2% of OE customer base
Topic: Half-hourly, day-ahead indexed retail pricing

Perspective

Dynamic pricing plus simple automation drives measurable peak shifting and savings; best as opt-in for smart-metered, flexible customers.

Challenge

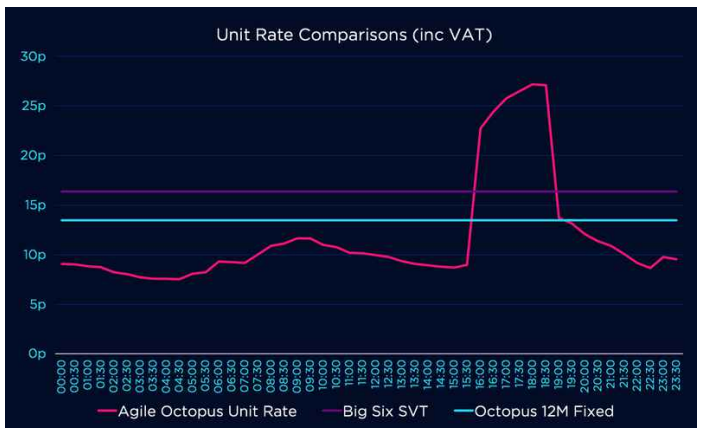
- Evening peak (4–7 pm) and flat tariffs strained capacity
- Belief that "consumers won't shift for small savings"
- Needed engaging, transparent product with volatility safeguards

Approach

- Launched Feb 2018: half-hourly prices published daily ~4 pm; indexed to day-ahead wholesale
- Volatility guardrails: price cap **(initially 35 p/kWh**) to limit spikes
- **Negative prices passed through;** customers paid to consume during surplus wind
- Open API/IFTTT; **integrations** for EV chargers, heat pumps, batteries; app prompts and gamified engagement
- Governance: Ofgem (regulator) innovation support; smart meters and supplier profiling; smooth switching for consumer protection

Outcome

- Behavior: EV charging shifted off 4–7 pm; ~3% usage reduction
- Savings: £188/yr (2020) to **£440/yr (2024 vs standard)** with larger benefits for flexible/EV households
- Experience: 89% satisfaction; ~90% retention in early pilots



~£440
Average savings per year

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Canada - Alberta

	Summary
Market Structure	Deregulated wholesale market; retail-choice; competitive generation and retail
Market Size Estimates	• ~1.6 Million • Peak ~12 GW (2024)
Market Operators	AUC, AESO, MSA; 4 large DFOS + Muni + REAs
AMI	• Currently being deployed in many service areas • 15 minute intervals; monthly settlement
MDMS	Decentralized; Each DSO/retailer manages meter data for its customers
Retail Rate Structure	• **Rate of Last Resort (RoLR)** – Default; regulated 2-year fixed rate. **Competitive Retail Plans** – Fixed or variable rates; no mandated TOU. • **Optional TOU Pilots** – Some utilities offer TOU or EV charging rates.

Canada - Alberta
TOU vs managed EV charging

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Simple TOU creates high local coincidence and overload risk; managed charging keeps neighborhood loads under limits, achieves 97% DR compliance, and preserves driver convenience

Profile

Name: Uni. of Calgary
Customers: ~200 EV customers for Fortis
Topic: TOU vs managed charging; customer acceptance and DR performance

Perspective

What helps bulk power may harm local networks: TOU reduces system peaks but can synchronize EV charging. Managed charging is a necessary complement to protect distribution assets.

Challenge

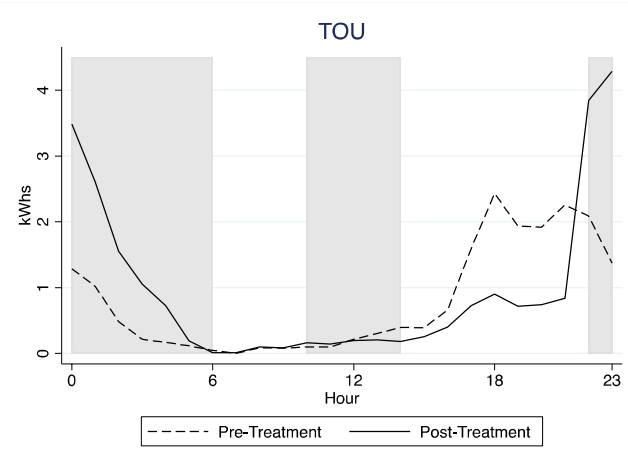
- Do common EV TOU designs increase local peak coincidence and transformer overloads?
- Can centralized, telematics-based managed charging solve coordination reliably and acceptably for customers?

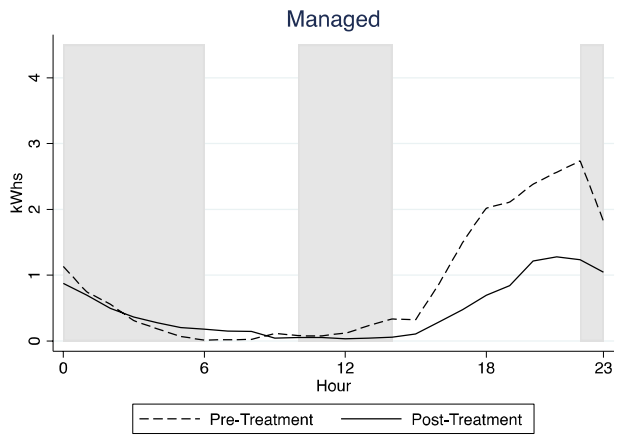
Approach

- RCT: Control (flat), TOU credit ($0.035/kWh off-peak 10 pm–6 am, 10 am–2 pm), Managed charging (same credit + telematics automation)
- “Virtual transformer” clusters: 10 EVs with 12–24 kW caps; measure capacity violations and peak magnitudes
- Outcomes measured: hourly profiles, constraint exceedances, DR participation, overrides, satisfaction; willingness-to-enroll test

Outcome

- Baseline: ~75% home charging; start 6–9 pm; heavy late-night.
- TOU: +54% off-peak; 10 pm surge; overloads; only 5–8% evening drop.
- Managed/DR: Stayed under 12–24 kW caps; no 10 pm spike; ~50% lower 5–9 pm EV load; 97% event compliance; <1% overrides.





Direct Energy

TVR Innovations

October 2025

AGENDA

Who We Are

Customer Pain Points

Benefits to the Customer

Innovation in Other Markets

Customer Experience with TVR

Summary and Questions

Direct Energy / NRG - Experience in Alberta and Beyond

FAMILY OF BRANDS

nrg · reliant. an NRG company · vivint · direct energy · Green Mountain Energy · Stream · XOOM energy · cirro ENERGY · DISCOUNT POWER · AWHR

PRODUCTS

- Electricity
- Natural Gas
- Renewables
- Backup Power

SERVICES

- Home Security
- Energy Solutions
- Smart Home Technology
- Energy Management
- HVAC Services
- Protection Plans
- Portable Power
- EV Energy Plans

NRG Energy, **Direct Energy's parent company**, is a leading energy and home services company powered by people and out passion for a smarter, cleaner, and more connected future. A **Fortune 500** company operating in **Canada and the United States**, NRG delivers innovative solutions that help people, organizations, and businesses achieve their goals while also advocating for competitive energy markets and customer choice.

ALBERTA BRANDS

nrg · direct energy · XOOM energy

- **50%** carbon emissions by 2025[2]
- **net-zero** carbon emissions by 2050
- **100%** electric by 2030 for light-duty vehicle fleet

NRG RETAIL & INDUSTRIAL FOOTPRINT[3]

KEY POLICY INTERESTS

- Access to data from AMI meters
- Electricity market restructure
- Canada and USA cross-border relations
- Carbon market strategy

2 office locations
CALGARY, NRG Corporate
EDMONTON, NRG Home

190+ employees

COMMUNITY IMPACT[4]

Key Community Partners

- Alberta Children's Hospital Foundation
- Big Brothers Big Sisters of Red Deer and District
- Breast Cancer Canada
- Emergency Assistance Foundation Canada
- Rocky Mountain Business Seminar
- The Stollery Children's Hospital Foundation
- Variety - the Children's Charity of Alberta

1K+ hrs contributed by NRG volunteers

32 supported charities

$201K+ donated to charities

direct energy · nrg

TVR Implementation Solves Customer Pain Points

Estimated Readings Are Frustrating

Many customers still receive bills based on estimates - not actual usage. When real readings finally occur, customers face **catch-up bills that can be confusing,** impacting trust.

Lack of Transparency & Real-Time Data

Customers have **minimal visibility into energy consumption**, reducing the ability to make **informed decisions** about when & how they use electricity. Retailers also don't have visibility to provide them with tools to help inform their usage.

Outdated Infrastructure Create Accountability Gaps

Readings are **delayed or missed**. The current system **requires a lot of effort** from retailers and customers to work together to verify charges or understand billing discrepancies.

The Smart Solution: Time-of-Use Pricing & Smart Meters

The path forward is clear. Smart metering technology (real-time) combined with time-of-use (TOU) pricing will help customers who want transparency, understanding and control over their energy costs.

Real-Time Usage, No Surprises

Smart meters provide accurate, real-time data on energy consumption. **No more estimated bills. No more sticker shock.**

Rates Drive Informed Decisions

Time-of-use pricing shows customers when electricity costs more and when it costs less. They can **shift usage to off-peak hours** and save money.

Understanding Builds Confidence

Seeing **benefits from load shifting** and **TOU plans designed for their lifestyle**, gives customers a **sense of confidence** when managing energy costs

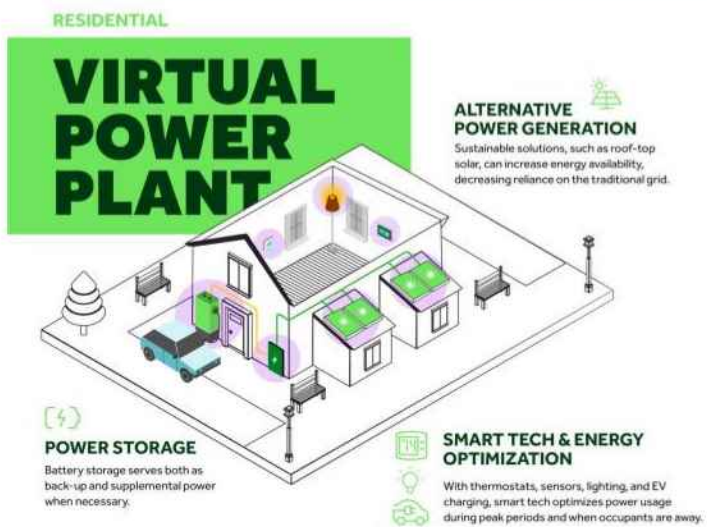
Products Offered in Other Markets Highlight TVR Benefits, Increasing Flexibility with Continued Fixed Price Protection

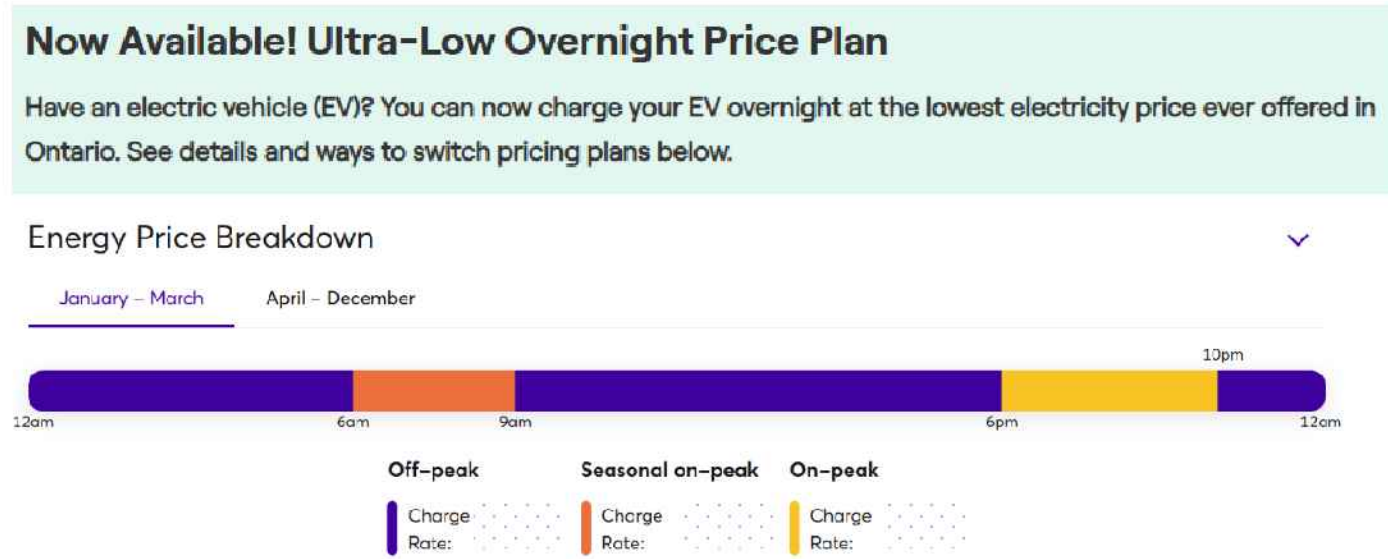
Free Nights

"Enjoy the savings that comes with free nights between 9 p.m. and 9 a.m."

Free Weekends

"Get free electricity from 6:00 p.m. Friday – 11:50 p.m. Sunday – that's over 100 days of free power!"





direct energy nrg

What Our Texas Customers Say About TVR

"We work during the day and are home in the evenings and weekends, so this plan **helps us maximize savings** during those times."

"I liked the idea of doing chores like laundry and **running the dishwasher after 8 PM on weekdays** to cut costs."

"I like sleeping with the AC at 68–67°F. **Free nights help me save** on electricity that would otherwise cost more since I'm away most of the day."

"We use a lot of electricity on weekends, so we **concentrate all laundry on those free days**."

"I **save at night** and on weekends, **avoiding a huge summer bill**."

"I can do laundry, **charging my EV**, or anything that uses a lot of electricity on weekends."

"It works because I can lower the AC temp when convenient. Free electricity starts at 9 PM and ends at 6 AM, so **I plan chores during that time**."

TVR Innovation Enables Customers and Retailers Do More

Helping Customers Take Control

Greatly increases **access to information & data** (including app functionality)

Facilitates greater **knowledge and real time customer control**

Provides a means for customer to **directly impact their bills** (including elements of T&D), by scheduling activities in periods when prices are advantageous

Customers **can be rewarded** for peak demand reduction

Retail Improvements

Retailers can further **reduce customer price exposure**, still protecting them from wholesale price volatility

Expands **products options**, including free periods, usage shifting (time of day, day of week) to **meet individual customer needs**

Efficiencies from **remote connections reduce operational costs** and credit & collection frictions

Expanded rates **increase customer choice**

Key Takeaways

If implemented correctly, Direct Energy believes that smart meter infrastructure combined with **TVR can deliver substantial benefits to customers** and the electricity industry

- Smart meters and the associated data can help **reduce customer frustrations and create transparency** into energy consumption
- TVR can provide customers the opportunity to **take control of their energy costs** by choosing **products that best fit their lifestyles** and being rewarded for shifting usage to lower demand periods
- The technology has **proven benefits and driven innovation** in other regions, giving Alberta an opportunity to take advantage what works in other markets
- Direct Energy & NRG are keen to work with industry participants to share knowledge from other markets
    - Nicole Black, Director, Regulatory Affairs, nicole.black@nrg.com
    - Kevin Thompson, Manager, Regulatory Affairs, kevin.thompson@nrg.com
    - Lori Armstrong, Senior Commercial Director, lori.Armstrong@nrg.com
    - Trevor Martin, Senior Manager, Operations, trevor.martin@nrg.com

EPCOR

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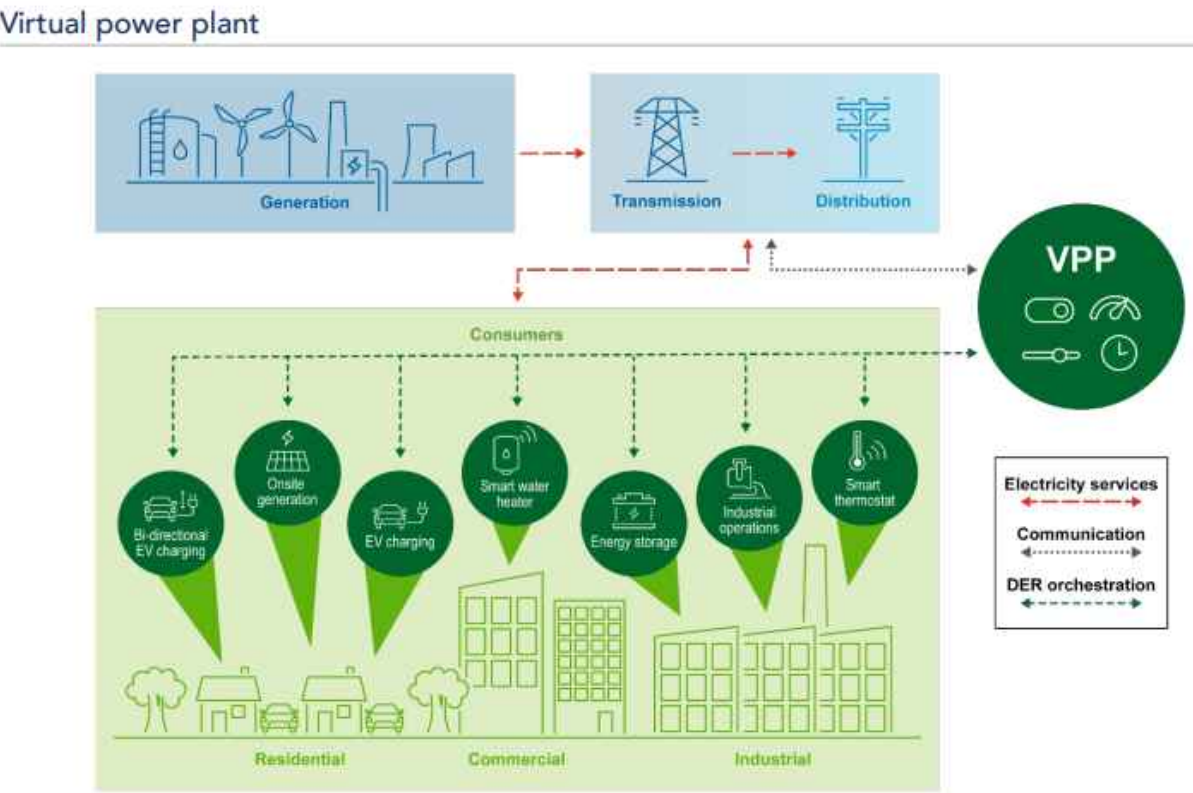
Virtual Power Plant with Utility Control



- DER – Distributed Energy Resources
- DERMS – Distributed Energy Resource Management System
- VPP – Virtual Power Plant

What is a Virtual Power Plant?

VPPs are networks of small energy-producing or storage devices, like solar panels and batteries, that are pooled together to serve the electricity grid. With their participants' approval, their energy can be tapped by utilities during times of high demand, or can be reserved for later use.

The Opportunity:

VPPs use software to aggregate and control the DERs, creating a flexible and reliable supply of electricity that can respond to demand and market signals. VPPs can benefit consumers, grid operators, and the environment by reducing peak load, providing ancillary services, and increasing the use of renewable energy sources.

Blatchford Virtual Power Plant (Edmonton, AB)

Blatchford

SOLARTILITY

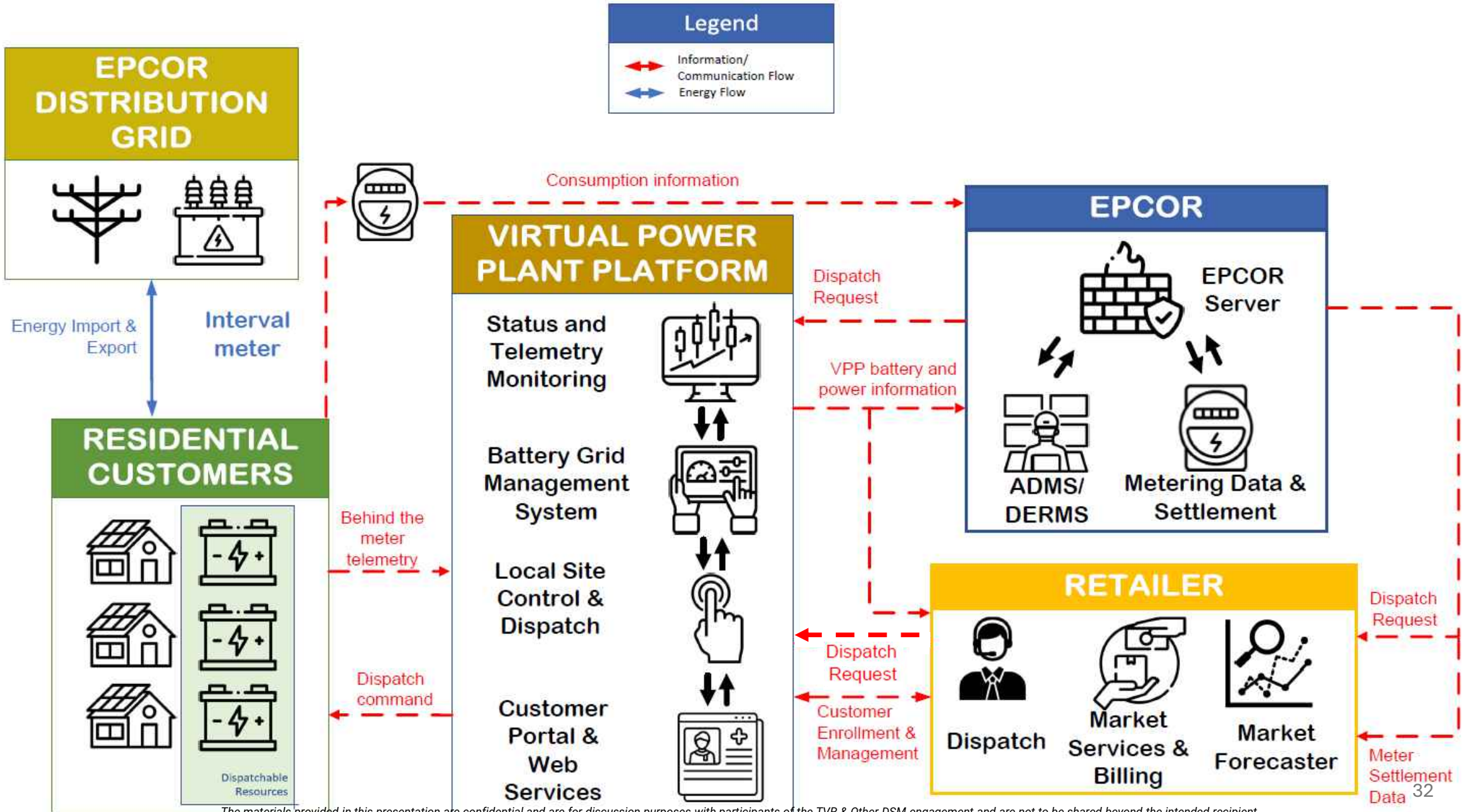
EPCOR

EMISSIONS REDUCTION ALBERTA

Shell

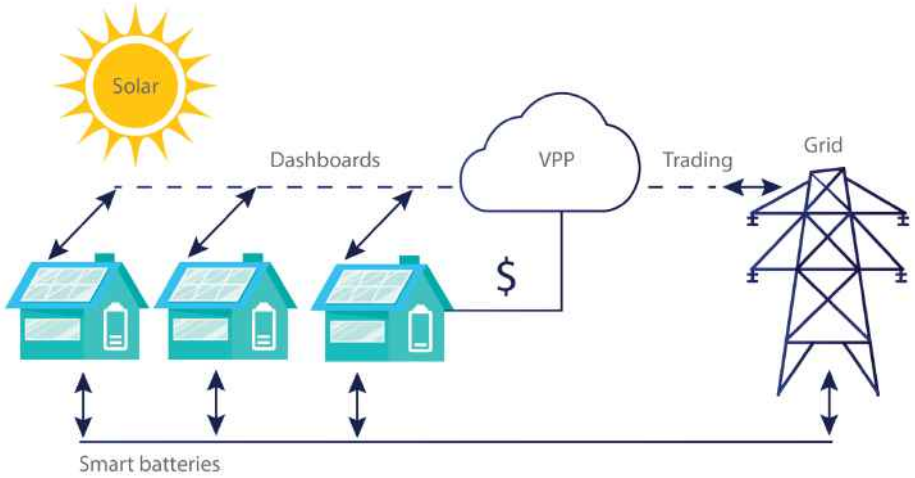
sonnen

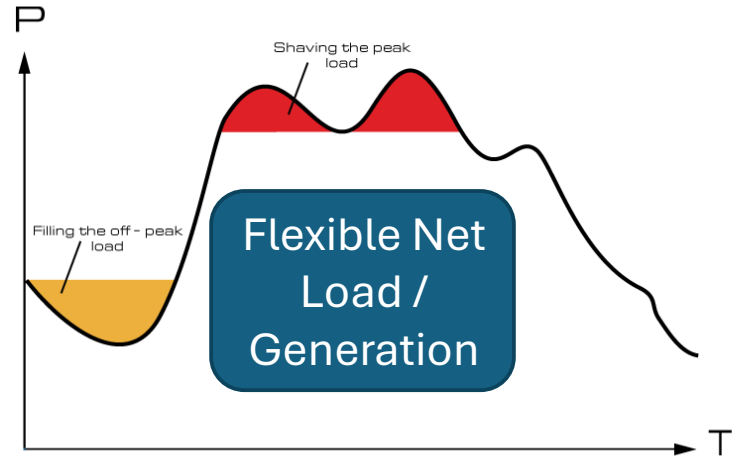
How it works



Why It Works

Aligning Motivations and Benefits for All





Benefits

<u>Solartility (VPP Retailer)</u>

- ✓ Alberta market(s) entry
- ✓ Sell services to DFO/TFO/ISO
- ✓ Energy arbitrage

<u>DFOs:</u>

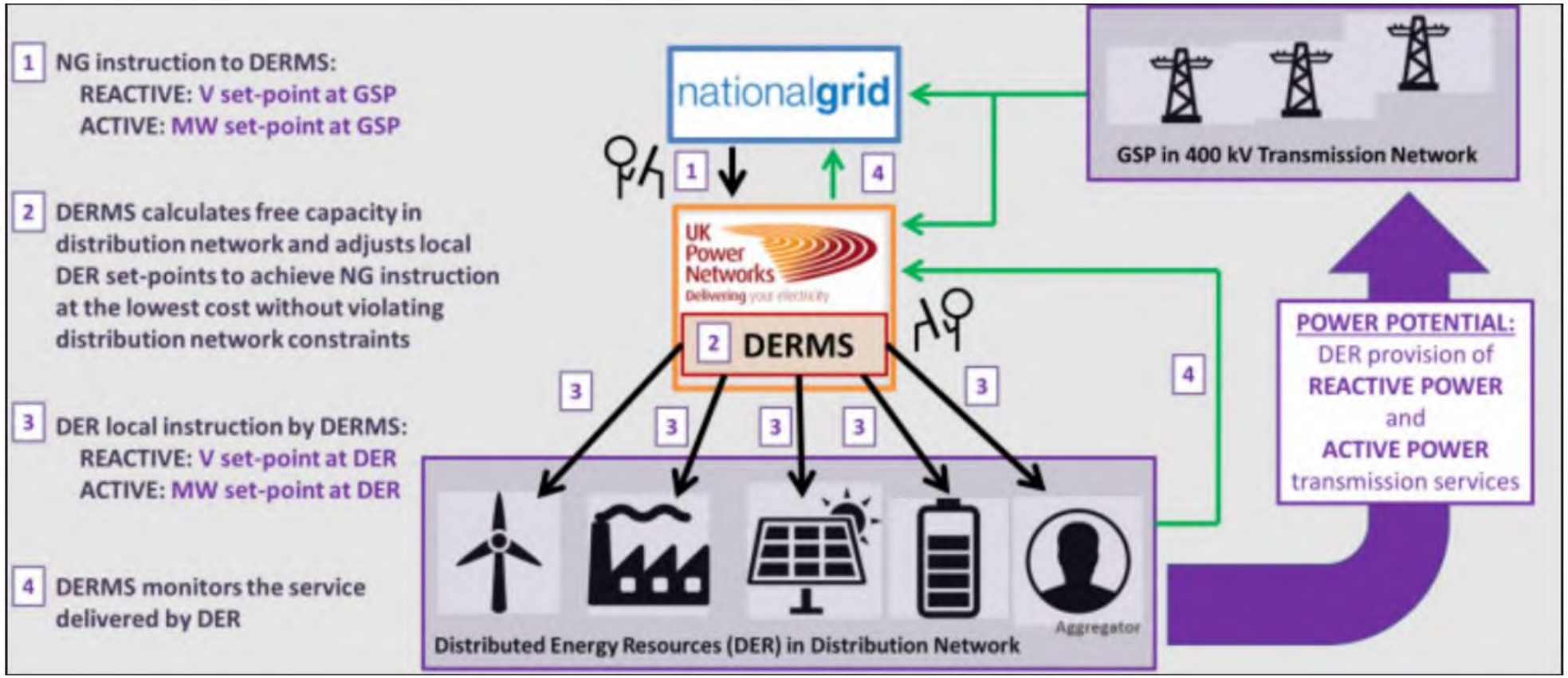
- ✓ Peak load reduction on infrastructure
- ✓ Cultivate private investment into Distribution Flexibility

<u>Homeowner:</u>

- ✓ Subsidized PV and ES equipment
- ✓ Payments for grid services

Thinking Long: Evolving the DFO Model…?

U.K. NESO Concept – DSOs require a minimum operational capability (ex: DERMS)



Future Innovation in Alberta

AUC
Alberta Utilities Commission

Let's discuss the future of Alberta. Not every innovation is suitable for Alberta's unique situation; we welcome your input on which innovations should be implemented here and what steps are necessary to achieve these objectives.

Global Electricity Sector Innovations

Policy & Market Design

- Market Structures
- Settlement Changes
- **Time-Varying Rates**
- Market Reform
- Demand Response enablement
- DSM enablement
- Retail Competition

Grid Operations & Planning

- Enhanced Demand Forecasting
- **Demand Response**
- Smart Grids and Automation (ADMS and DER orchestration)
- Microgrids
- DER Interconnection
- **Behind-the-meter solutions**
- **Grid Support**

DER & Flexibility Ecosystem

- Diversification and Flexibility
- DER adoption and integration
- **VPP (Virtual Power Plants)**
- **EVs and Managed Charging**
- Onsite generation for data centers
- **Smart Home Devices**

Customer Programs & Data Access

- Competitive Rate Offerings
- **Pilots**
- **Behavioral DR** and **Gamification**
- Customer Incentives
- Customer Education
- **Green Button / Data Access**

Enablers for Innovation

Market Design & Pricing	Governance & Regulatory	Pilot Programs	Grid Modernization	Retail & Customer Programs
Data / Digital /Analytics	Interoperability & Standards	Cybersecurity / Privacy / Protections	Workforce	Financing / Investment

Let's ask ourselves:

- Which future innovations could be feasible for Alberta, supporting grid operations and reducing the impact of demand growth?
- Which operational model (centralized vs decentralized data) support best Alberta's near- and long-term outcomes?
- What enablers would be needed to make those innovations feasible?
- What outcomes should Alberta prioritize over the next 5 years to manage demand growth and reduce customer costs?
- What could be done with existing assets?

Next Steps

To ensure success your participation is critical

Primary Workshops	Utilities Specialists Workshop	Technical Planning Workshop	Outcomes & Learnings	Regulatory Forum
Date	**Tuesday, November 4, 2025** 8:30-4:30PM In-person Attendance Only – Calgary, AB	**Tuesday, November 5, 2025** 8:30-4:30PM In-person Attendance Only – Calgary, AB	**Thursday, November 27, 2025** 1:00 - 3:30PM Virtual Attendance	**To be determined** 1:00-3:00PM Virtual Attendance
Overview	Establish the operational, regulatory, and commercial considerations affecting MDM design alternatives and TVR roll-out	Define technical requirements and architectures for each option, identify gaps and outline roadmap	Share preliminary findings and engagement outcomes	Explore and discuss potential regulatory changes and impacts that should be considered
Attendees	**Requested Participants:** DFOs, Retailers, Market Bodies, Transmission and IPP respondents are requested to actively participate in the Utilities Specialist Workshop. Additionally, we request **manager/director roles** in the following areas: • MDMS/AMI • Settlement & Retail Operations • DFO/Retailer Representatives • Commercial Strategy/Regulatory • Financial Planning • Data Governance /IT Managers • PM/Implementation Lead **Optional Participants:** Other respondents are invited to join and listen to the topics as well as participate in the open discussion at the end	**Requested Participants:** DFOs, Retailers, Market Bodies, Transmission and IPP respondents are requested to actively participate in the Technical Planning Workshop. Additionally, we request **technical lead roles** in the following areas: • MDM/AMI Architecture • Settlement Systems • IT/Data Architecture • DER/Net Metering • Data Governance/Quality • DFO/Retailer Representatives • Trans./Independent Power Providers • Cybersecurity/Information Security • Implementation / Systems Integ. **Optional Participants:** Other respondents are invited to join and listen to the topics as well as participate in the open discussion at the end	**Requested Participants:** All respondents are requested to join and participate in the Outcomes & Learnings **Optional Participants:** N/A	**Requested Participants:** Regulatory roles within DFOs, Retailers, Market Bodies, Transmission and IPP respondents are requested to actively participate in the Regulatory Forum **Optional Participants:** N/A

- If you have any questions regarding this engagement, please visit:
  - https://engage.auc.ab.ca/consultations/engagement-on-enabling-time-varying-rates-for-residential-and-other-electricity-customers-in-alberta/
- or send us an email at:
  - Chris Robertshaw
  - chris.robertshaw@auc.ab.ca
  - Kristjana Kellgren kristjana.kellgren@auc.ab.ca

Thank you

- www.auc.ab.ca

Appendix

Please note: Workshop Plan is tentative and subject to change.
Topics and additional details will be shared with the invitation request.

Workshop Overview

AUC
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Pre-Workshop Questionnaire

01
Introduction & Overview
10/20/25 – 1:00-2:30PM
Review work-to-date, introduce scope and level-set expectations, expected outcomes, Q&A

02
Customer/Advocacy Groups Forum
10/23/25 - 1:00-3:00PM
Collect customer input to shape requirements and considerations in relation to TVR enablement

03
Innovation Forum
10/30/25 – 1:00-3:00PM
Explore and discuss feasible, future-ready TVR enabled capabilities

04
Utilities Specialist Workshop
11/4/25 - 8:30-4:30PM
Establish the operational, regulatory, and commercial realities affecting MDM choices and TVR roll-out considerations

05
Technical Planning Workshop
11/5/25 - 8:30-4:30PM
Define technical requirements and architectures for each option, identify gaps and outline roadmap

Post-Workshop Questionnaire

06
Outcomes & Learnings
11/27/25 – 1:00-2:30PM
Share preliminary findings and engagement outcomes

07
Data Validation (if required)
TBD
As-needed discussions to validate additional considerations and questionnaire responses

Please note: Workshop Plan is tentative and subject to change.
Topics and additional details will be shared with the invitation request.

Workshop Information

AUC
Alberta Utilities Commission

Primary Workshops	Introduction & Overview	Customer/Advocacy Groups Forum	Innovation Forum	Utilities Specialists Workshop	Technical Planning Workshop	Outcomes & Learnings
Overview & Agenda	Review work-to-date, introduce scope and level-set expectations, expected outcomes, Q&A	Collect customer input to shape requirements and considerations in relation to TVR enablement	Explore and discuss feasible, future-proof capabilities	Establish the operational, regulatory, and commercial considerations affecting MDM design alternatives and TVR roll-out	Define technical requirements and architectures for each option, identify gaps and outline roadmap	Share preliminary findings and engagement outcomes
	• Introductions • Engagement Approach • TVR Enablement • Market TVR Enablement Structures • Questionnaire Results • Q&A and Next Steps	• Customer Context • Market TVR Enablement Structures • Focused topics - TBD (customer protections, billing considerations, data access, etc.) • Open Discussion • Recap & Next Steps	• Introductions & Objectives • Innovation Presentation • Focused Topics - TBD • Open Discussion • Polling & Close-out	• Jurisdictional view • Alberta sector capabilities • AMI roll-out impact • TVR and DSM operations • Operational changes needed • Future scenarios refinement	• Jurisdictional view • Alberta sector capabilities • TVR and DSM operations • Technical changes needed • Future scenarios validation	• Engagement Outcomes • High-Level Learnings • Parking Lot Items • Close-out & Next Steps • Closing Q&A
Attendees	**Requested Participants:** All respondents are requested to join and participate in the Introduction & Overview Session **Optional Participants:** N/A	**Requested Participants:** Customer/Advocacy Groups are requested to join and actively participate in the Customer/Advocacy Groups Forum **Optional Participants:** Other respondents are invited to join and listen to the topics as well as participate in the open discussion at the end	**Requested Participants:** All respondents are requested to join and participate in the Innovation Forum **Optional Participants:** N/A	**Requested Participants:** DFOs, Retailers, Market Bodies, Transmission and IPP respondents are requested to actively participate in the Utilities Specialist Workshop. Additionally, we request **manager/director roles** in the following areas: • MDMS/AMI • Settlement & Retail Operations • DFO/Retailer Representatives • Commercial Strategy/Regulatory • Financial Planning • Data Governance /IT Managers • PM/Implementation Lead **Optional Participants:** Other respondents are invited to join and listen to the topics as well as participate in the open discussion at the end	**Requested Participants:** DFOs, Retailers, Market Bodies, Transmission and IPP respondents are requested to actively participate in the Technical Planning Workshop. Additionally, we request **technical lead roles** in the following areas: • MDM/AMI Architecture • Settlement Systems • IT/Data Architecture • DER/Net Metering • Data Governance/Quality • DFO/Retailer Representatives • Trans./Independent Power Providers • Cybersecurity/Information Security • Implementation / Systems Integ. **Optional Participants:** Other respondents are invited to join and listen to the topics as well as participate in the open discussion at the end	**Requested Participants:** All respondents are requested to join and participate in the Outcomes & Learnings **Optional Participants:** N/A

Key Terminology (1/2)

Term	Definition
Access to Information Act (ATIA)	Access to Information Act for public bodies (replaced FOIP)
ADMS (Advanced Distribution management system)	System which allows the command and control of advanced functionalities on the distribution grid.
AESO (Alberta Electric System Operator)	Operates grid and wholesale market; manages settlement rules
AMI (Advanced Metering Infrastructure)	Smart meters plus communications and head-end systems capturing interval usage
API (Application Programming Interface)	Standardized interface for systems to exchange data
AUC (Alberta Utilities Commission)	Provincial regulator of utilities and retail electricity
Bill protection	Temporary cap/credit to limit adverse bill outcomes
Billing determinant	Quantity used to calculate a bill (kWh by interval, demand)
Centralized MDMS	Central data repository which performs VEE, storage, and access
Certification (interfaces)	Formal recognition of passing conformance tests
CIS (Customer Information System)	Utility billing and customer account system
Conformance testing	Testing against a standard/spec before onboarding
Consent broker	Central service that records customer authorizations and issues access tokens
CPP (Critical Peak Pricing)	High price during rare system peaks with advance notice
Cybersecurity (NIST CSF)	Framework for managing cyber risk (Identify, Protect, Detect, Respond, Recover)
Data governance	Policies/roles for data quality, access, and lifecycle
Data latency	Time from meter read to data availability for use
Data minimization	Collect and retain only what's necessary for a defined purpose
Data portability	Customer ability to transfer their data to another party
Data retention	How long data is kept and how it's disposed of
Data Sharing Agreement (DSA)	Contract governing how data is shared and protected
Data steward	Role accountable for specific data domains
Decentralized MDMS	Data repository owned by each DFO which performs VEE, Storage and access
De-identification / Pseudonymization	Removing or masking identifiers to lower privacy risk
Demand Charges	Prices based on highest usage demand within a billing period
Demand response (DR)	Customer load adjustments triggered by signals or prices
Demand-Side Management	Strategies used by utilities to influence customer energy use over the long term
DER (Distributed Energy Resources)	Behind-the-meter/local generation, storage, load control
DERMS (Distributed Energy Resources Management System)	System allowing for DER to be centrally controlled, aggregated and managed
Developer ecosystem	Third-party innovators using standard APIs
DFO (Distribution Facility Owner)	Wires company responsible for distribution network and metering
Edge cache	Short-term storage close to users to reduce latency
Event bus / Pub-Sub	Messaging pattern for real-time data distribution
EVSE	Electric vehicle charging equipment (Electric vehicle supply equipment)

Key Terminology (2/2)

Term	Definition
FOIP (Alberta) [no longer in use]	Freedom of Information and Protection of Privacy Act for public bodies
Go/No-Go gate	Decision checkpoint with defined criteria
Green Button Connect (NAESB REQ.21)	North American standard for customer energy data access and sharing
High availability (HA)	System design to minimize downtime
Hybrid consent model	Central broker for consent + decentralized data storage
Hybrid/Federated MDMS	Utilities keep data; a shared hub provides consent, APIs, routing
IEC CIM (61968/61970)	International data models for utility enterprise data modeling
Inclining Block Rates	Rates that increase as total consumption crosses certain thresholds
Interval data	Usage measured at fixed intervals (e.g., 15-min, hourly)
Jurisdictional scan	Review of other regions' approaches and outcomes
KPI (Key Performance Indicator)	Metric to track performance (e.g., load shift, latency)
Load profiling	Estimating interval usage for customers without interval meters
M&V (Measurement & Verification)	Method to quantify pilot impacts
MDMS (Meter Data Management System)	Utility system that ingests AMI reads, applies VEE, stores interval data, and shares it with authorized parties
MSA (Market Surveillance Administrator)	Monitors Alberta electricity market compliance and conduct
MultiSpeak	Lightweight integration standard widely used in North America
NERC CIP (relevance)	Reliability standards for bulk power cyber systems
NIST 800-53	Catalog of security and privacy controls
OAuth 2.0 / OIDC	Standards for delegated authorization and identity federation
OMS (Outage Management System)	System which Tracks outages and restoration
PIPA (Alberta)	Personal Information Protection Act for private-sector entities
Privacy Impact Assessment (PIA)	Assessment of privacy risks and mitigations for a system/process
PTR (Peak Time Rebate)	Credits for reducing usage during peak events relative to baseline
RBAC / ABAC	Role-/Attribute-Based Access Control models
Retailer (competitive)	Licensed entity that sells electricity to customers
Retailer parity	Equal, nondiscriminatory access and performance for all retailers
RRO (Regulated Rate Option)	Default electricity supply rate for eligible customers
RTO / RPO	Recovery Time/Point Objectives after an incident
RTP (Real-Time Pricing)	Prices vary hourly or sub-hourly, day-ahead or real-time
Settlement (retail)	Allocation of energy to retailers and reconciliation of charges
Shadow billing	Parallel "what-if" bill under new rate
Single Point of Failure (SPOF)	Component whose failure stops the whole service
TOU (Time of Use)	Fixed prices by time blocks (e.g., peak/off-peak)
TVR (Time-Varying Rates)	Rates that change by time to reflect system conditions