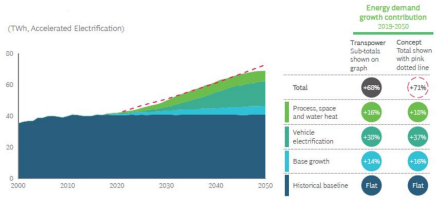
Electrification
Network Challenges & Opportunities

- Management of flexibility resources provides optimal headroom for new loads and intermittent renewable energy generation, allowing consumers the opportunity to play an increasing role in the operation of the electric grid.
- If left uncontrolled the uptake of electrification will require significant electricity network infrastructure investment.



Source: Transpower Whakamana i Te Mauri Hiko (March 2020) - Accelerated Electrification Path; Concept Consulting, BCG analysis

Project Background

- A collaborative partnership between industry (represented by EEA) and EECA.
- **Purpose:** to evaluate the processes that need to be in place to apply the OpenADR 2.0 (2.0a and or 2.0b) communication protocol to achieve active managed charging of electric vehicles (EVs), enabling flexibility services to be utilised in the electricity sector in New Zealand. (Now also including PV/Battery offering from Solar Zero)
- **Project Team:** (Steering committee, Industry design team and Delivery team) - over 40 individuals giving their expertise, insight and time in-kind.

Project Context

- Open communication protocols are internationally acknowledged as a prerequisite to a fully demand flexible electricity system.
- The most successful (and widely adopted) open communication protocols
  are grounded in international standards.
- OpenADR as a 'dispatch' protocol is ideally designed to deliver an exemplar
  of functional demand flexibility in NZ.
- OpenADR is ideally configured to interface with the most common communication protocol used in EV chargers globally - OCPP v1.6 and above.

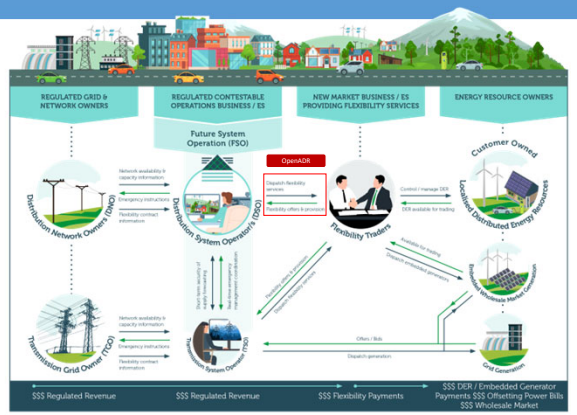
OpenADR

- Mature demand response protocol
- More suited to interfacing EDB's and Flex Suppliers
- Transpower already had an operational head end (VTN)

Project Objectives

1. Determine the use cases for flexibility services to be communicated and create process maps for these.
2. Assess the advantages and limitations of OpenADR within the New Zealand context, including a high-level comparison against other communication protocols.
3. Demonstrate interoperability of communication protocols between EDB's, EV flexibility suppliers and consumers.
4. Assist industry participants in understanding the systems investment involved with utilising flexibility services.

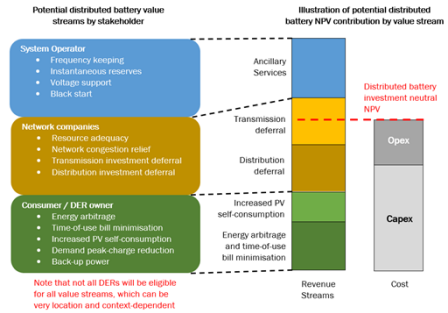
A Market-Led Model



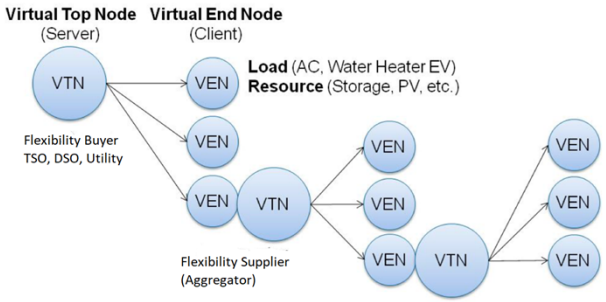
Value Stacking

How do actors' benefit?

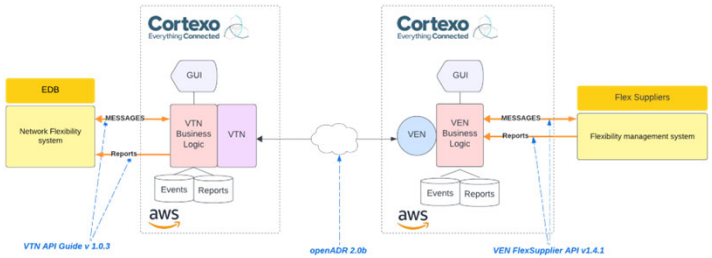
- Consumer participation (choice), ability to invest in DER and realise full value
- Flexibility suppliers will be financially incentivised for participation in Flex events
- Open communication protocols enable an open market, creating competition and driving cost of electricity down for consumer
- Network security, ability to shift demand from peaks
- Demand flexibility will negate and/or defer need for investment in network infrastructure



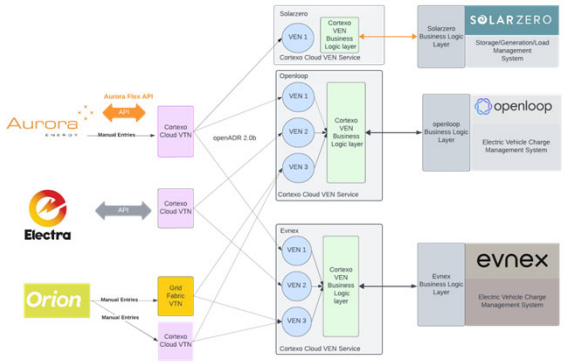
OpenADR Hierarchy



High-level Structure

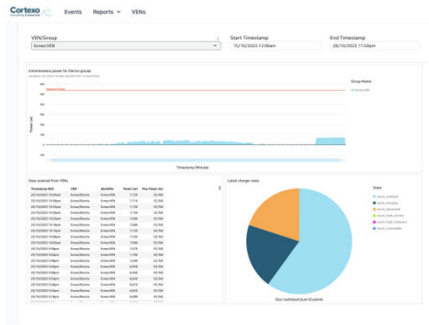


What's in Part B?

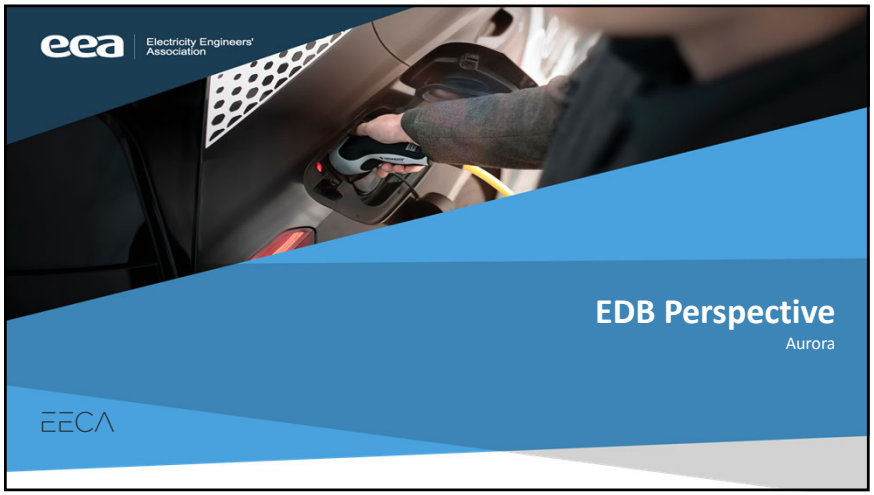


Complex Signals, API & Reporting

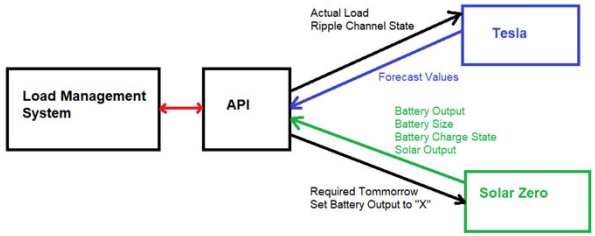
- In Advance
  - Load Dispatch – delta kW
- Immediate (Dynamic)
  - Load Dispatch – delta kW
- Emergency
  - Simple – 3 (!00%)
- PR Bid
  - Load Dispatch – delta kW
  - Electricity Price - $/kWh
- PR Discovery
  - -Load Dispatch – delta kW
  - (optional) Electricity Price - $/kWh
- Dynamic Operating Envelope
  - Max import
  - Min import
  - Max export



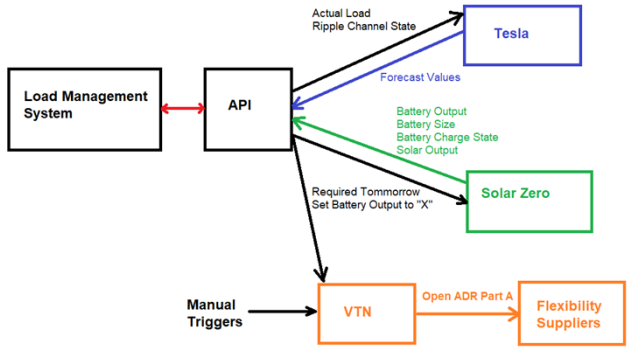
Cortexo Everything Connected



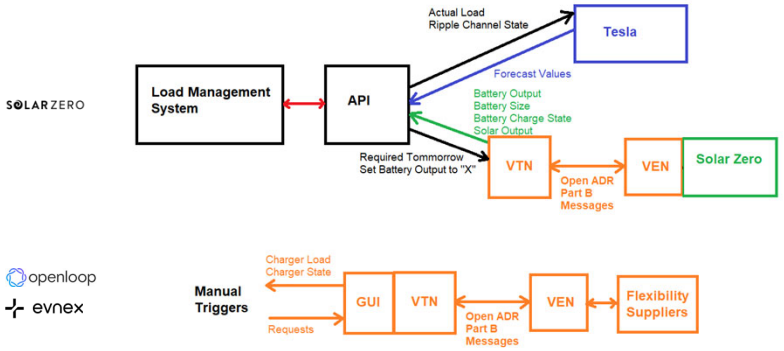
Aurora Load Management



Aurora Part A Trial



Aurora Part B Trial



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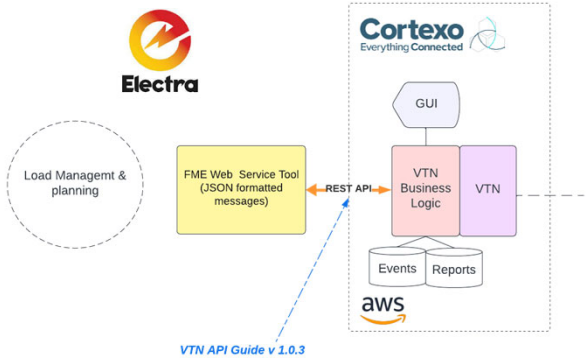
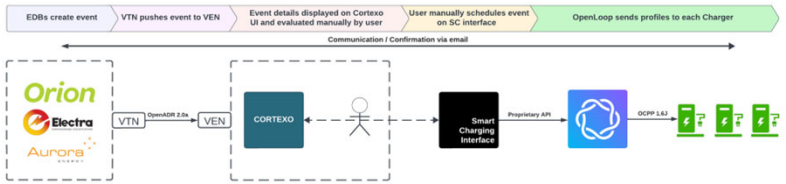
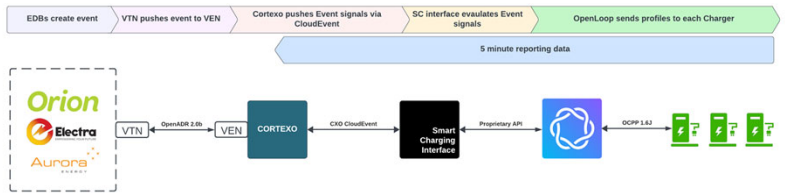
Part B - API approach



OpenLoop: Part A Flow



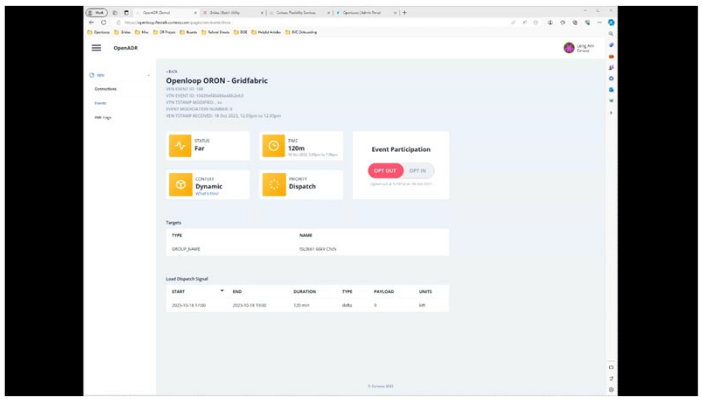
OpenLoop: Updated Part B Flow



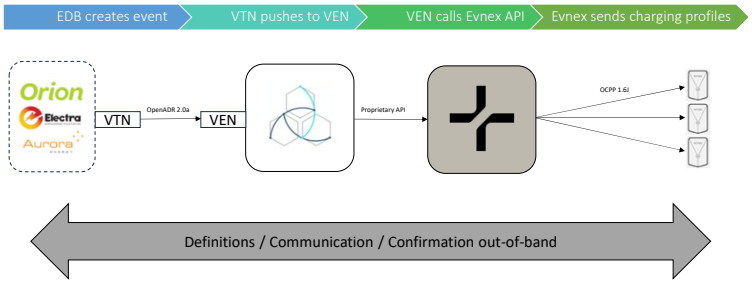
OpenLoop: Logic Applied

- Opt-in / Opt-out evaluation (Part A & Part B)
  - Max 1.5kW per charger
  - Outside of business hours only (5pm – 8am)
- Programme evaluation (Part B)
  - Evaluate Events as soon as they arrive on VEN (including modifications)
  - Dispatch instruction to chargers 2 hours prior to event start time
    - Dynamic & Emergency dispatch instructions**
  - Set elevated peak hour (5pm – 8pm) price for price responsive programmes

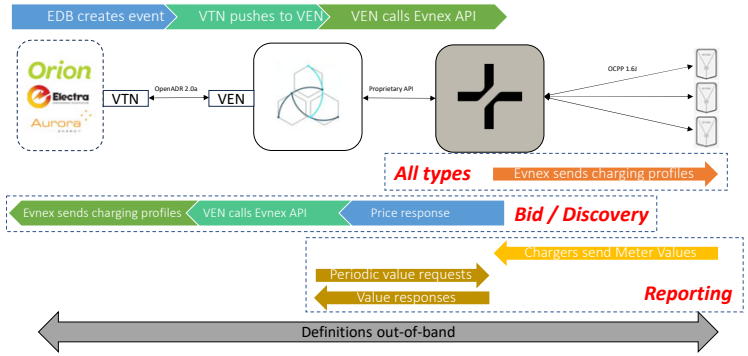
OpenLoop: Demo



Evnex
Part A block diagram



Evnex
Part B block diagram



Evnex
Decision making

- Events during peak price hours only
- Charging profiles get sent immediately
- If cancelled, profile gets deleted and charger falls back to original behaviour
- Pricing is just a fixed number at the moment

NEXT STEPS

Industry Engagement	Establishment Part A	Establishment Part B	Select Delivery Partners	Protocol Implementation	Template Development	Disseminate Learning
April '22 - Engaging with industry and regulators.	**July '22** - Project team & Steering group established - Partner selection criteria developed - Project timeline - Industry survey	**August '22** - Industry committed to project and funding received.	**October '22** - Select and develop agreements with the delivery partners, EDBs and Flexibility Suppliers.	**Part A: April '23** **Part B: Dec '23** - Phase one: To achieve the OpenADR 2.0-part A standard. - Phase two: To achieve the OpenADR 2.0-part B standard. - Industry consultation	**March '24** - Template developed providing the industry with the approach and guidance.	**April '24** - A series of webinars and training opportunities for the industry.
Stage gate 1 and 2	**Stage gate 3 and 4**	**Stage gate 5 and 6**	**Stage gate 7**	**Stage gate 8**	**Stage gate 9**	

We are here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Panel Discussion
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