

An abstract graphic consisting of a network of interconnected nodes and lines, resembling a molecular structure or a complex web, set against a dark blue background. The nodes are represented by small circles, and the lines are thin, light blue or grey. The network is spread across the entire slide, with some denser clusters and some more sparse areas.

# ELECTRON

## **SVCE Local Market Design**

Project Summary and Recommendations

28 September 2021

# Presentation Contents

	Approach
	Market Design Introduction
	Market Value
	Market Structure
	ElectronConnect: Creating and Operating a Market

# Part 1: Approach

# Electron and SVCE completed a study to assess value of local markets to enabling flexibility

## Previous SVCE analysis:

- SVCE VPP Options Analysis (Summer 2019) - GridWorks
- VPP valuation assessment (Winter 2019) – Ascend Analytics
- DER Electrification Adoption Potential Study – Energy+Environmental Economics (E3)

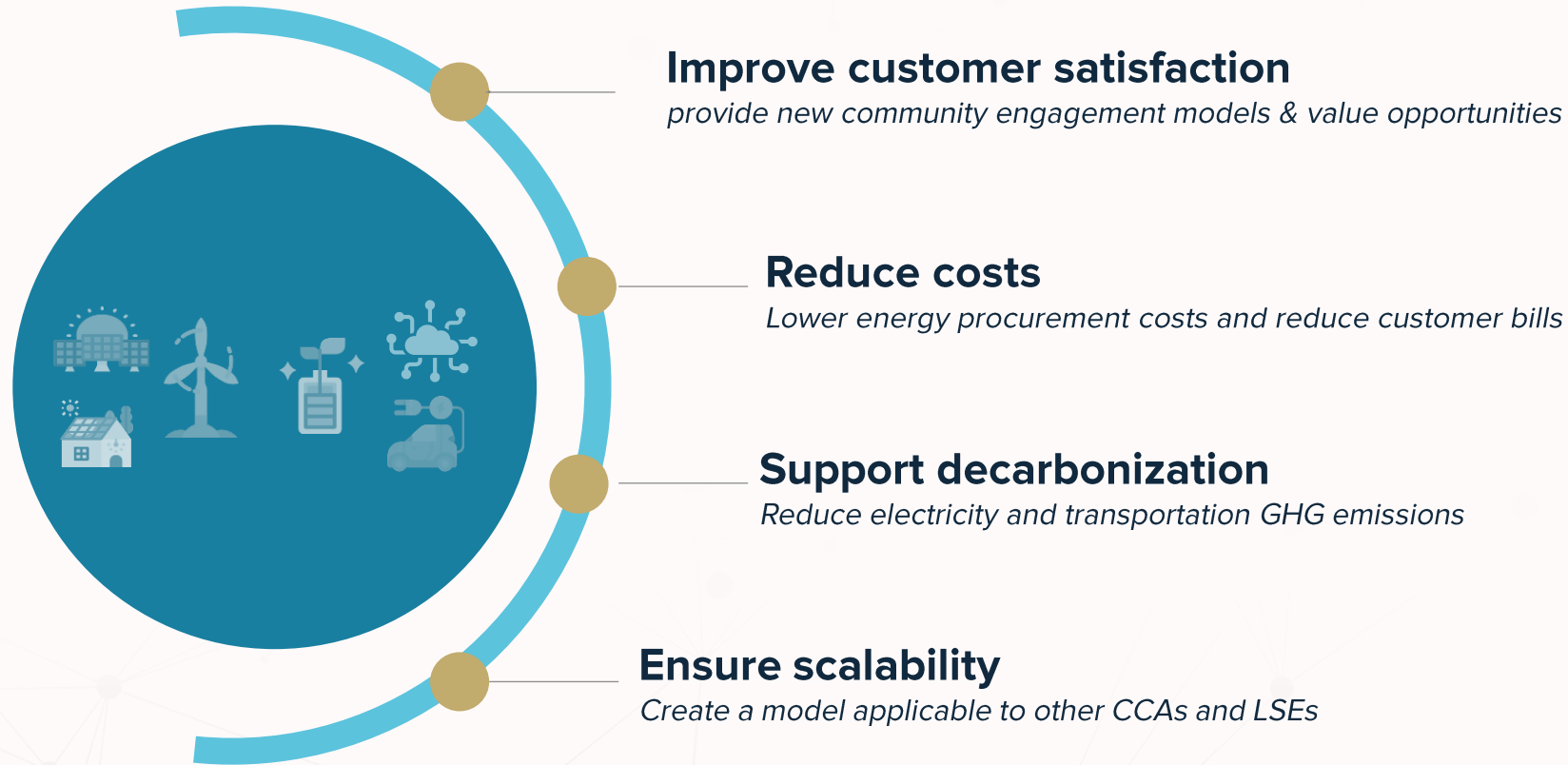
## Scope of Electron assessment:

- Access and expand SVCE value streams
- Define market mechanism to maximise value
- Identify opportunities to stack value

## **Part 2: Market Design Introduction**

## BACKGROUND

# A new market opportunity can generate SVCE, Customer, and Societal value



## BACKGROUND

# Liquidity will be driven through a project increase in DERs



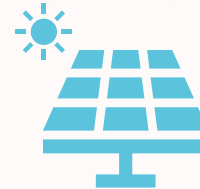
**135 MW**

135 MW



**6.7 MW**

3 MW (<1%) + 3.7 MW



**121 MW**

96 MW + 25 MW

**Current**

**Low\***

**600 MW**

600 MW (16%)

**43 MW**

13 MW (1%) + 20 MW (3.3%)

**312 MW**

242 MW (27%) + 70 MW (5%)

**High\*\***

**700 MW**

700 MW (37%)

**121 MW**

72 MW (5%) + 49 MW (8%)

**641 MW**

420 MW (44%) + 221 MW (16%)

**SVCE prior analysis finds high market value from leveraging devices' ability to load shape**

- EV load dominates value stack
- Smart thermostats and BTM storage offer comparable value opportunities
- Value is stackable between RA, DA, and RT value streams

**E3 estimations of 2030 targets**

\* Low estimations are based on bass diffusion adoption curves

\*\* high estimations assume incentive designed for 3-yr payback period

## VALUE IDENTIFICATION

# Three value streams which may generate appropriate surplus

### Mitigation of Wholesale Exposure

\$17M

10-yr NPV for Load Shaping  
from RT market

### Reduction of Resource Adequacy Costs

\$20M

10-yr NPV for Load  
Shaping from RA

### Reduction of Hourly Emissions

250k

mTons CO2/yr  
emissions\*

Previous analysis by Ascend Analytics to assess VPP valuation and IRP portfolio optimisation

\* Values based on *hourly* accounting, not annual accounting; ACC sets cap & trade to \$22.45/tonne nominal, and \$103.82/tonne w/ GHG Adder for 2021; \$30k/yr



# Part 3: Market Value

## SUMMARY

# DER flexibility can enable multiple streams of value

1

**WHOLESALE EXPOSURE  
MITIGATION  
with load shedding  
(energy)**

*Incentivize load shedding  
during periods of wholesale  
exposure, reducing required  
wholesale procurement*

2

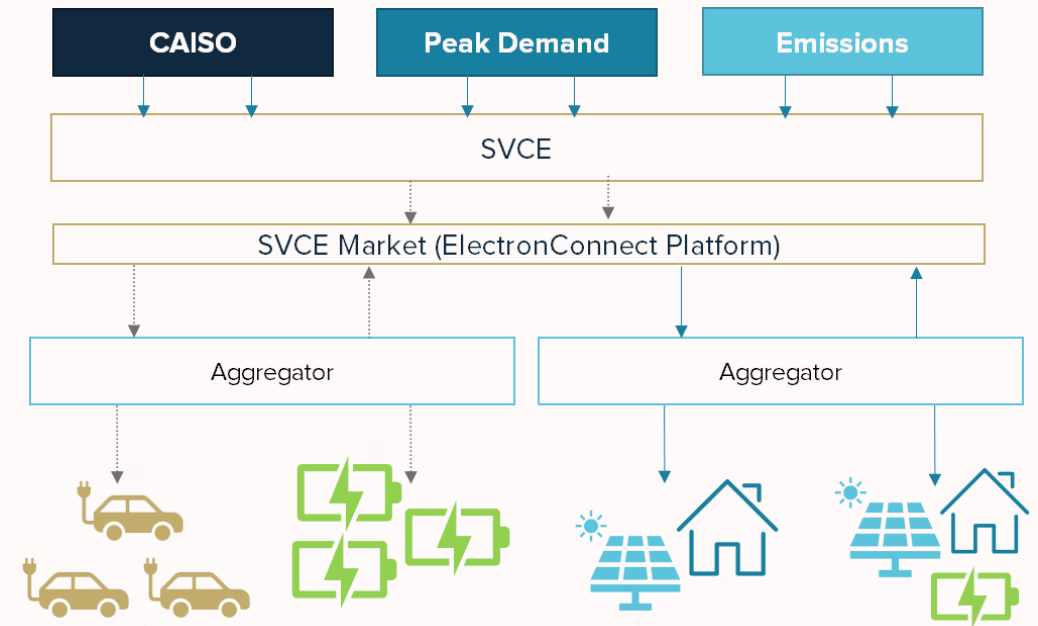
**RESOURCE ADEQUACY  
COST REDUCTION  
with load shedding  
(capacity)**

*Incentivize load shedding  
during critical summer peak  
hours, impacting SVCE's  
longer term RA requirements*

3

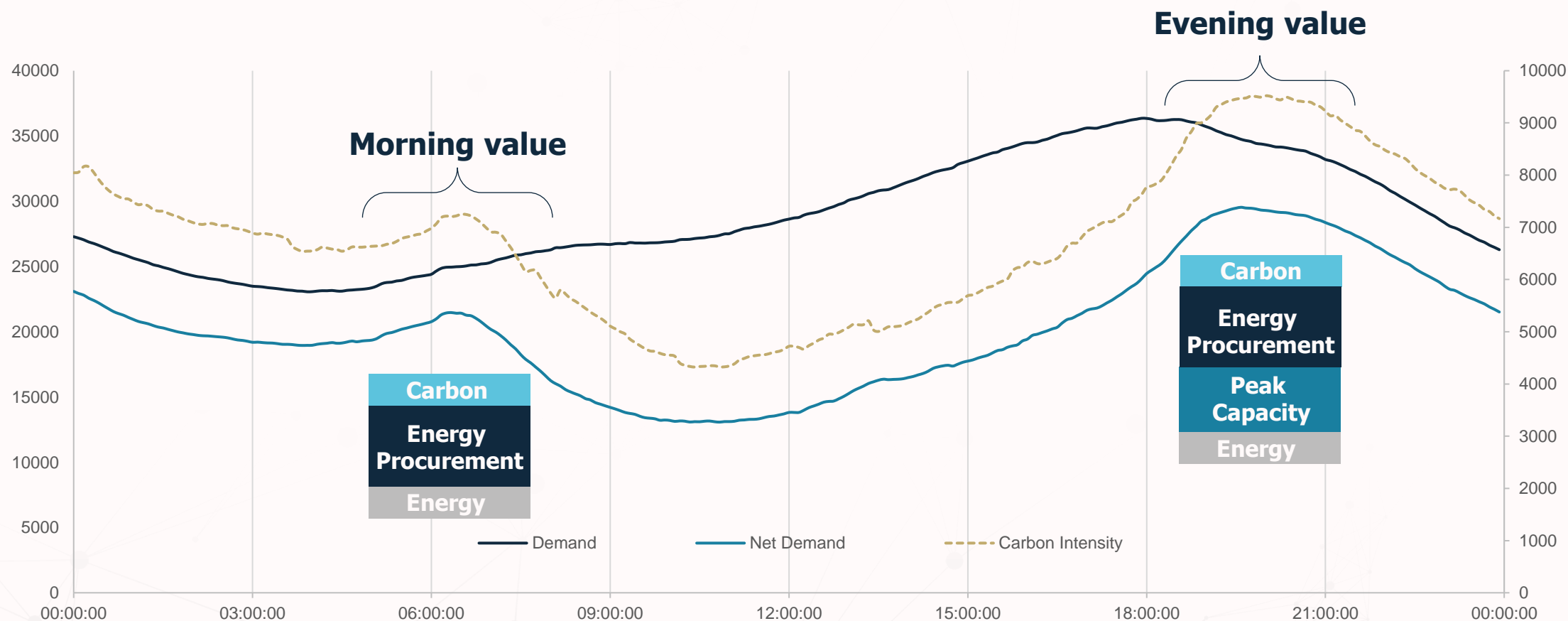
**HOURLY EMISSIONS  
REDUCTION  
with load shifting  
(energy)**

*Incentivize shifting of demand  
from high carbon to low carbon  
periods, reducing hourly  
marginal emissions*



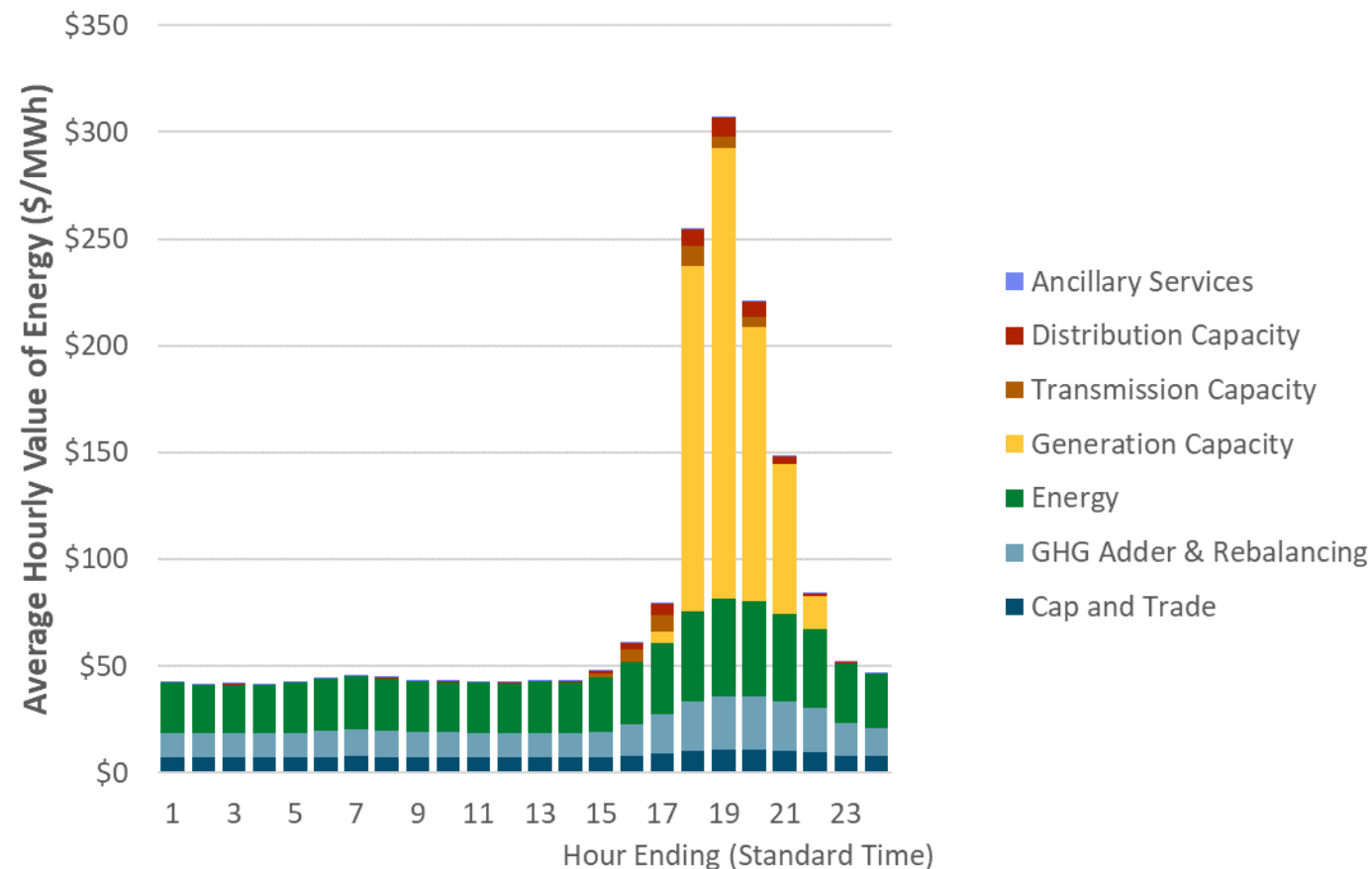
## MARKET INTERACTIONS

# The SVCE market will combine the three value streams in a single price signal



## MARKET VALUE

# Price and value can change over the course of a day



*Illustrative values are shown from the CPUC Avoided Cost Calculator*

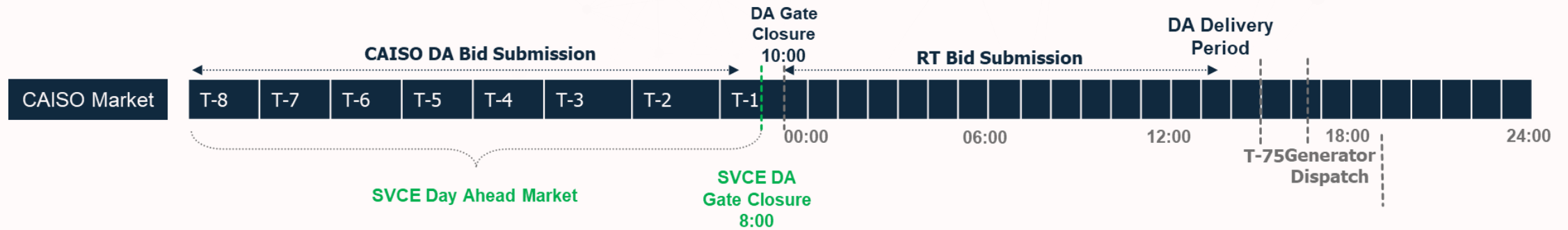
An SVCE market would forecast and define its own price levels based on its appetite to procure from the wholesale market, the value it places on carbon reduction, and peak reduction.

\*SVCE has not provided information on what percentage of its energy purchases are executed through the wholesale market

An abstract graphic consisting of a network of interconnected nodes and lines, rendered in a light gray color against a dark blue background. The nodes are represented by small circles of varying sizes, and the lines are thin, creating a complex web-like structure that spans the entire page.

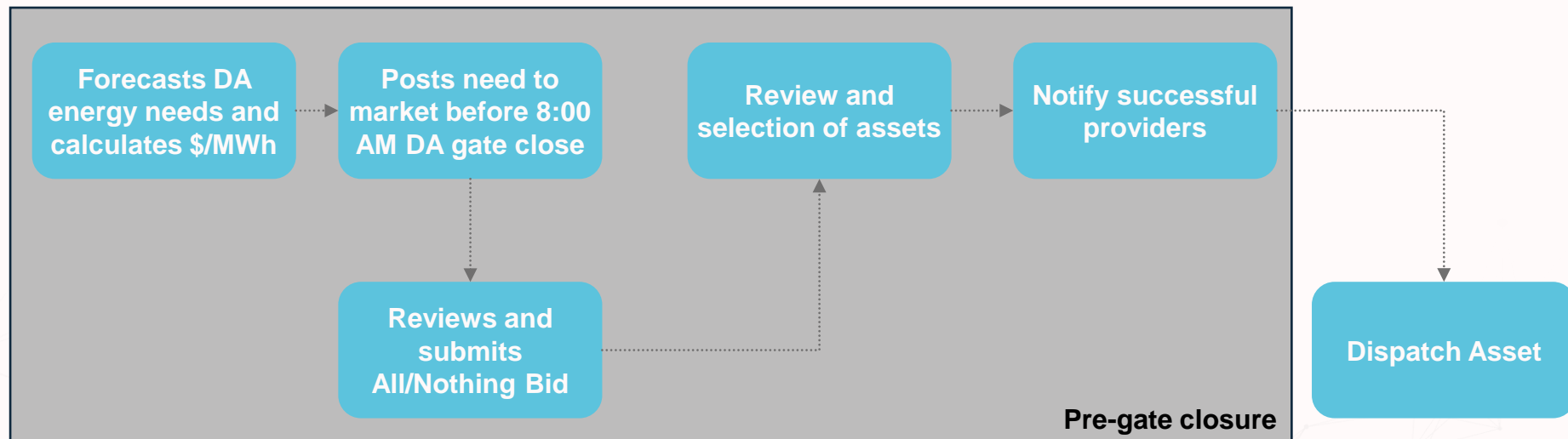
## Part 4: Market Structure

# SVCE Day Ahead Market



SVCE

PROVIDER



## MARKET DETAILS

# Day Ahead Market

## Participation Parameters

- **Optional Service** – Assets can be called to provide volume for Day Ahead Dispatch
- **Delivery** – Assets must be able to sustain up to 4-hr delivery, but 1 – 2 hour delivery is expected\*
- **Dispatch** – Service is an ‘All or Nothing’ Service whereby 100% of the volume will be accepted or rejected
- **Settlement** – Variable \$/MWh. Paid using Pay-as-Bid mechanism with price defined by SVCE
  - Asset settlement will preliminarily be calculated using the 10-in-10 methodology

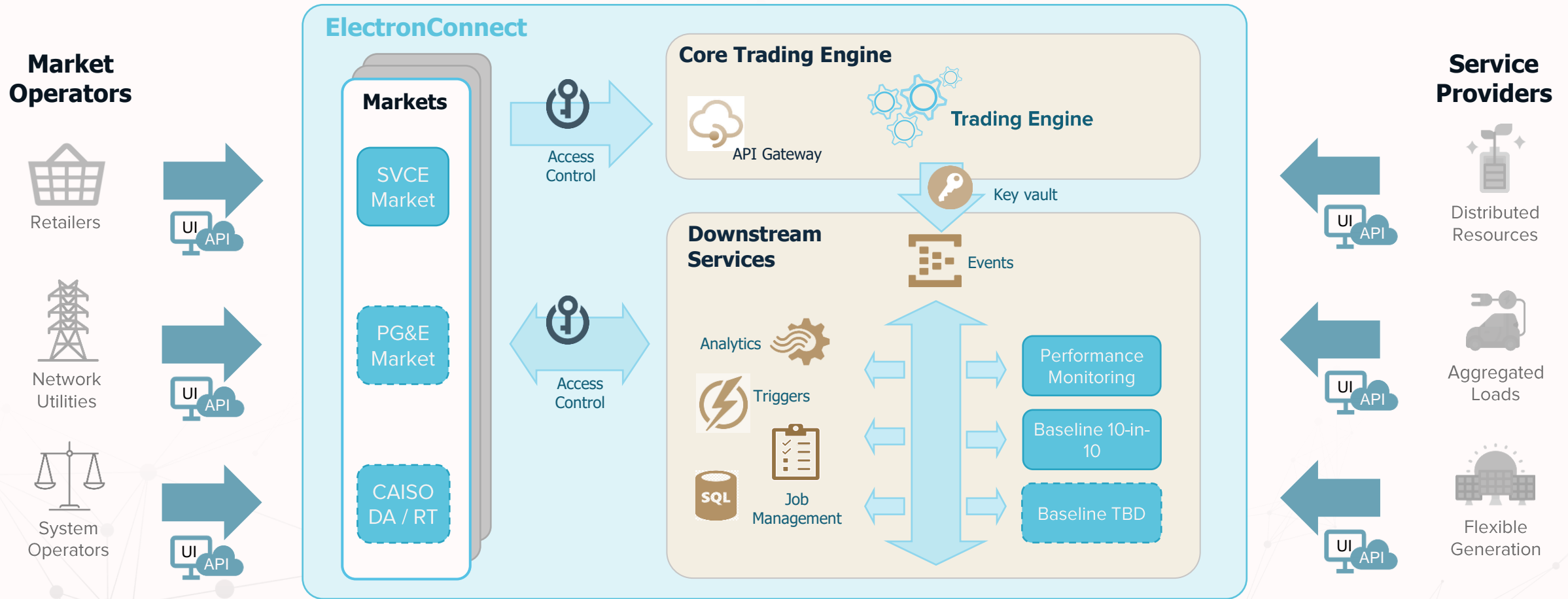
The background of the slide features a dark blue color with a subtle, abstract network pattern. This pattern consists of numerous small, light-colored dots (nodes) connected by thin, light-colored lines, creating a complex web-like structure that spans the entire page.

# **Part 5: ElectronConnect: Creating and Operating a Market**



# ElectronConnect Architecture

Allows for configuration and evolution of components



## **Part 6: ElectronConnect Demo**

# ElectronConnect makes it easy to create, operate, and visualise market outcomes

## Create market

Create market

Market ID \*

Market Name

Epoch Duration (sec) \*

Minimum contract duration \*

Market Start \*

Market license \*

Market category

Market commodity

Create Market

## Request flexibility service

Operations Transactions

Trade Status for service 900

0 Volume Pending 0 Assets Pending 0 Volume Contracted 0 Assets Contracted

Cancel all trades

Service Request for service 900

Volume Requested  Price

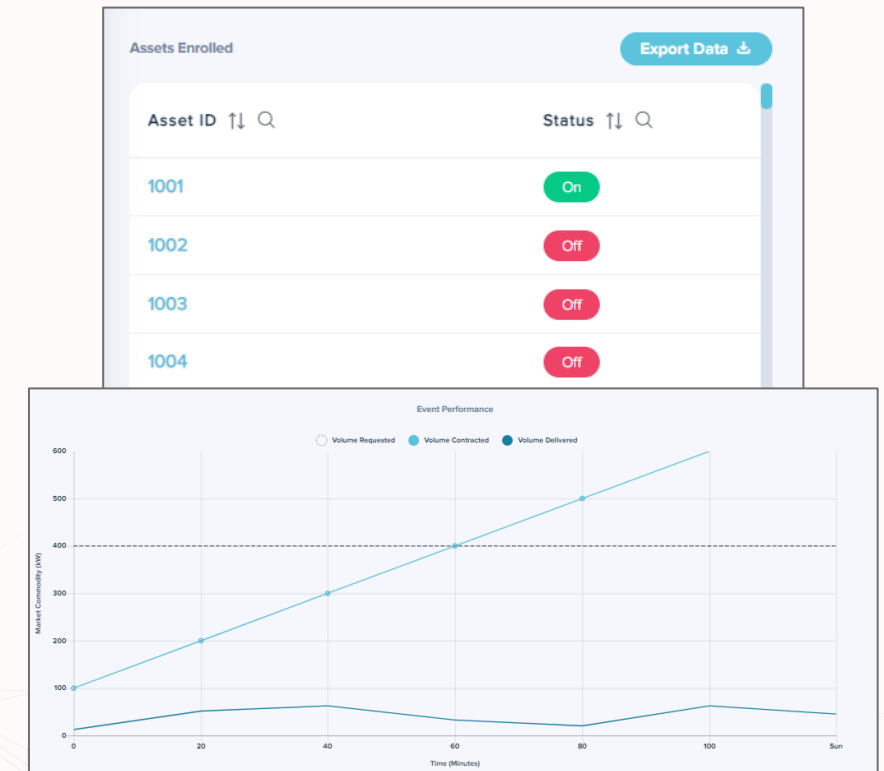
Delivery Start  Min Contract Delivery

Delivery starts in the next epoch

End Request


43 30035


## View market progress





## ElectronConnect Market Platform


**ElectronConnect** is a web app which allows to manage multiple markets from one place



  
Markets


  
Services


  
Assets


  
Settlement

### Market Dashboard

Create Market +

 **79**  
Number of Markets

 **4**  
Live requests


 **9**  
Ongoing Trades


Markets for mkt-owner

Administration Operations


		Current Status			Registration		Market Information	
Name ↑↓ 🔍	Market ID ↑↓ 🔍	Status ↑↓ 🔍	Price ↑↓ 🔍	Volume ↑↓ 🔍	Assets ↑↓ 🔍	Services ↑↓ 🔍	Type ↑↓ 🔍	Commodity ↑↓ 🔍
mkt-owner_1	1	Open			151	9		
111	111	Live	0	55	0	2	Demand Response	Energy
118f04a9-9f01-4b31-ba6a-6eb785d0982a	118f04a9-9f01-4b31-ba6a-6eb785d0982a	Suspended			0	1		
1409Market	1409Market	Suspended			0	1		
201	201	Suspended			0	1		

# It takes seconds to create a new customisable market on ElectronConnect







Markets




Services



Assets





Settlement

Select owner: mkt-owner 



Logout


Create market

 Market ID \*


 Epoch Duration (sec) \*


60


 Market Start \*


09/20/2021 12:54




 Market category



Select market category




 Market Name


 Minimum contract duration \*


1


 Market license \*

Select license type



 Market commodity

Select market commodity



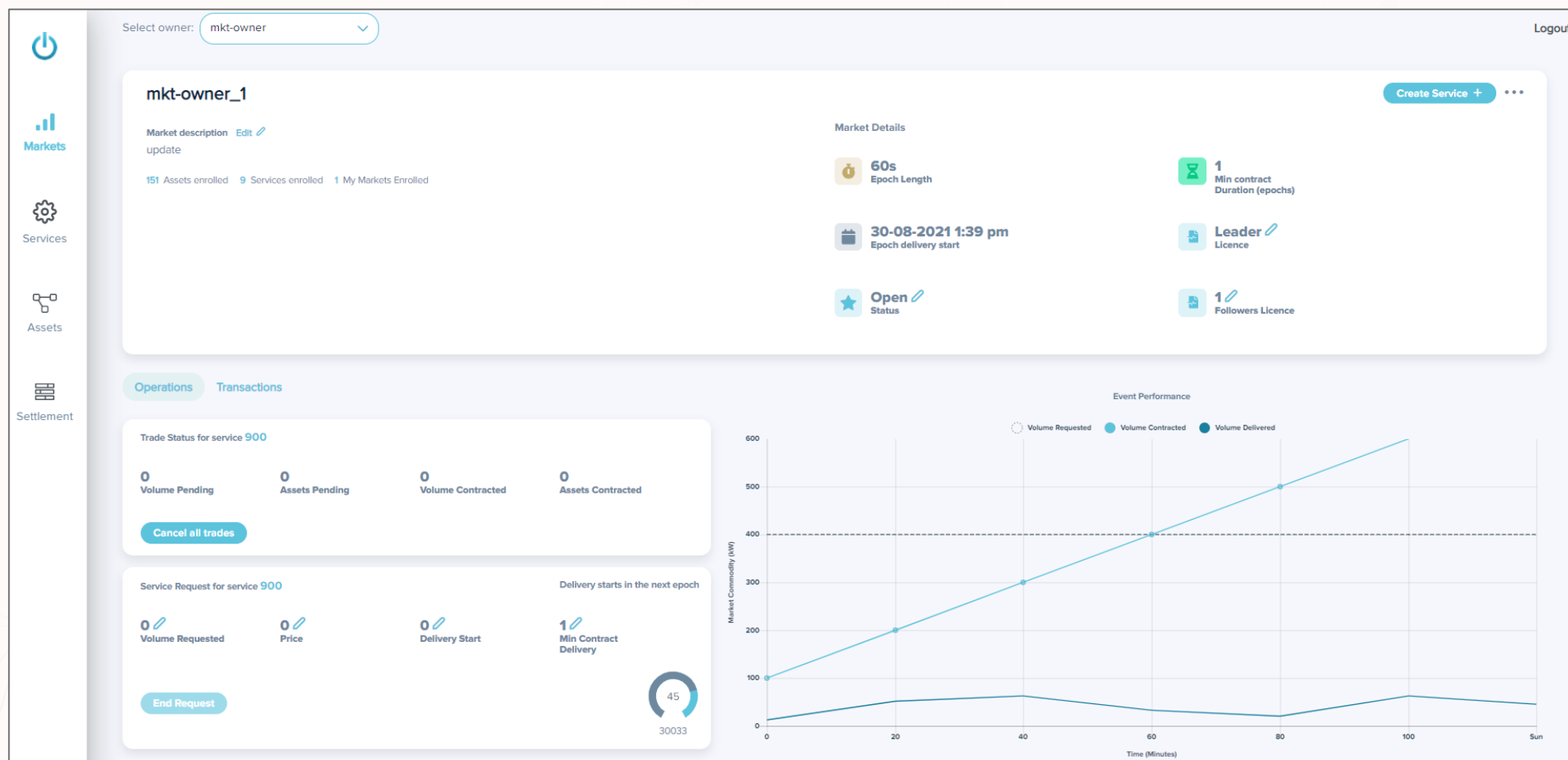
Create Market

ELECTRON

21

## ElectronConnect Market Platform

# A single market dashboard provides an easy way to view and manage your market



# Creating a new market event is quick and simple

Operations

Transactions

Trade Status for service 900

0

Volume Pending

0

Assets Pending

0

Volume Contracted

0

Assets Contracted

Cancel all trades

Service Request for service 900

Delivery starts in the next epoch

0

Volume Requested

0

Price

0

Delivery Start

1

Min Contract Delivery

End Request

43

30035

# Transparent insight into all market participants. Data can be exported for further analysis

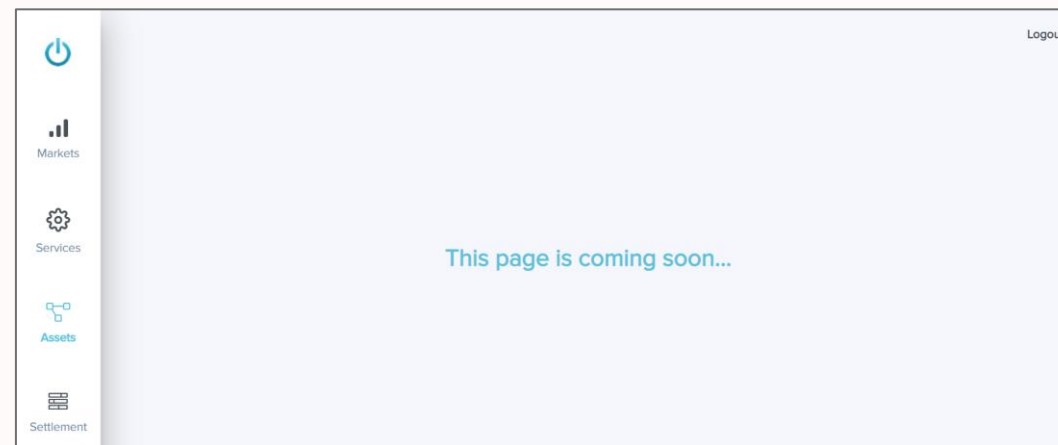
Assets Enrolled		Export Data	Services Enrolled					Export Data
Asset ID	Status		Service ID	Min Contract Duration	Volume Requested	Price Requested	Volume Contracted	
1001	On		44444	1	0	0	0	
1002	Off		21	1	0	0	0	
1003	Off		210	1	0	0	0	
1004	Off		2137	1	0	0	119.8487774095725	
1005	Off		266	1	0	0	0	
1006	Off		301	1	0	0	175.9902514405503	
1007	Off		324	1	0	0	0	



# But what about asset participation?

Asset operators can participate in market events through an easy-to-use API and directly through the ElectronConnect web app (this functionality is coming soon).

Asset			▼
POST	/api/v1/asset/create	Create a new asset	🔒
GET	/api/v1/asset/status	Check asset status	🔒
PUT	/api/v1/asset/attach	Attach asset to market	🔒
PUT	/api/v1/asset/detach	Detach asset from market	🔒
PUT	/api/v1/asset/action	Respond to market event	🔒
PUT	/api/v1/asset/cancel	Cancel asset contracts	🔒
GET	/api/v1/asset/registered	Check market registration status	🔒
GET	/api/v1/asset/licences	Check asset licence	🔒

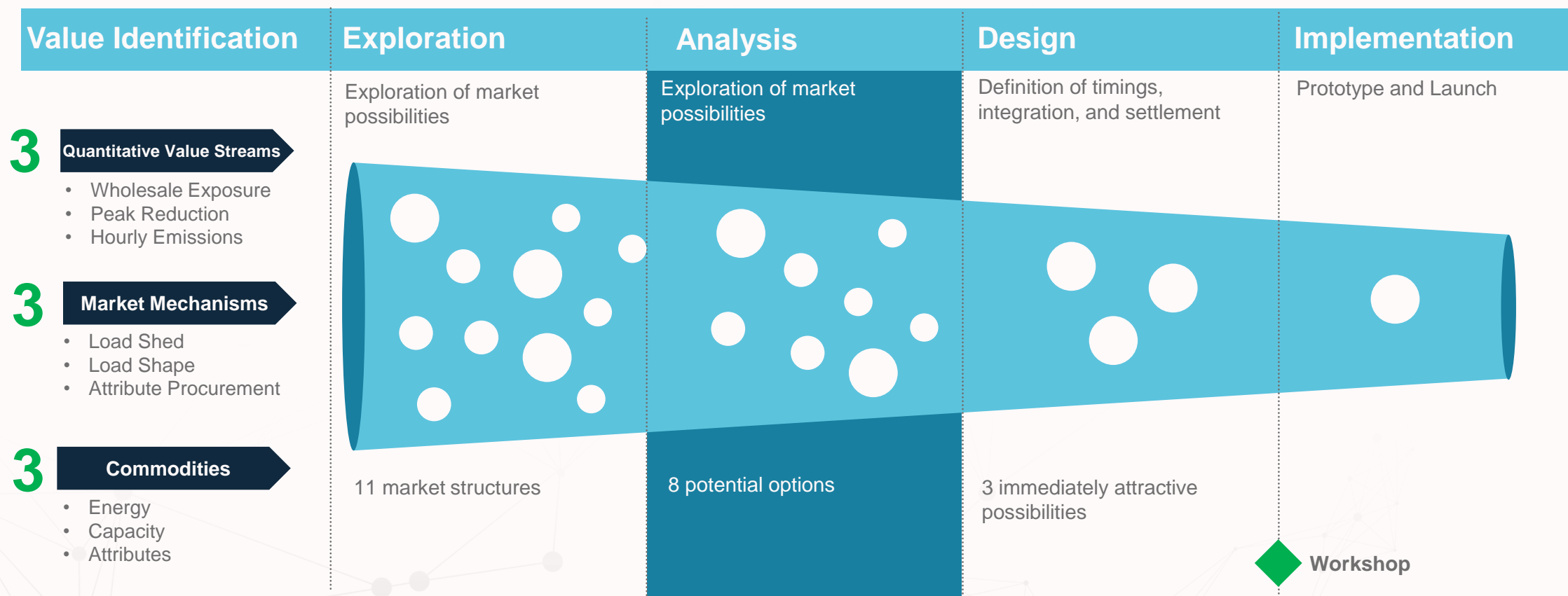


The background of the slide features a dark blue color with a subtle, abstract network graphic. This graphic consists of numerous small, light-colored dots (nodes) connected by thin, light-colored lines, creating a complex web-like pattern that spans the entire page.

# Appendix A

## Market Approach

# Value analysis resulted in single market concept to prototype



The background of the slide features a dark blue color with a subtle, abstract network pattern. This pattern consists of numerous small, light-colored dots (nodes) connected by thin, light-colored lines, creating a web-like structure that spans the entire page. The density of the nodes and lines is higher in the upper half and fades slightly towards the bottom.

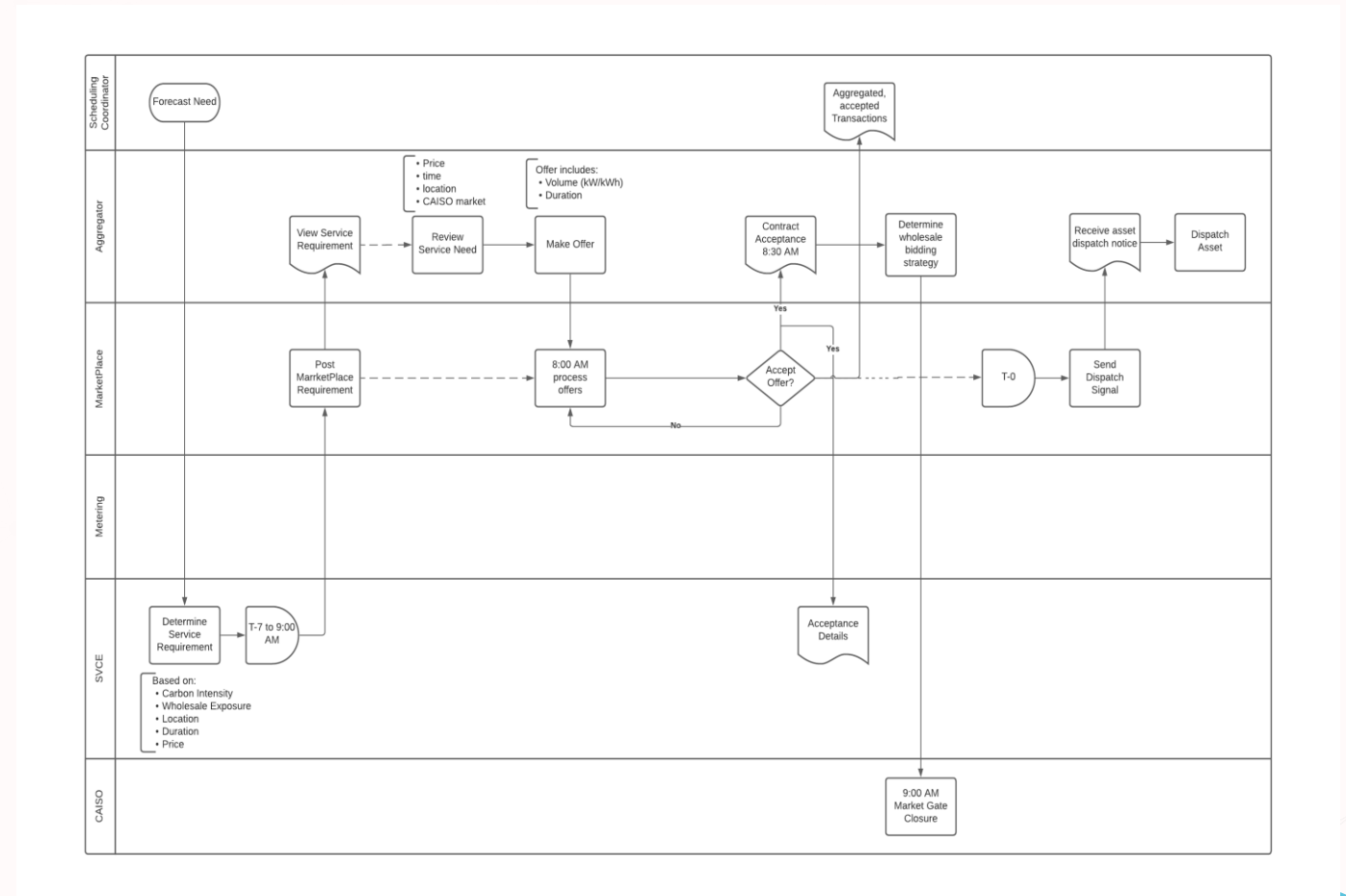
# **Appendix B**

## Market Specifications

# Day Ahead Market

## Detailed Overview

- SVCE receives forecasted DA Market prices and determines if SVCE market is economic
- The SVCE market will provide information to aggregators from T-7 to T-1 8 AM, based on its expected forecasted needs
- After the SVCE Market Gate Closure (8:00 AM), SVCE will select the assets for participation and inform market participants.
- SVCE will inform its Scheduling Coordinator (SC) of the flexibility volume secured in the market, so that the SC can adjust SVCE's imbalance position on the CAISO markets.
- Aggregators can readjust CAISO bids if necessary based on residual quantity not reserved by SVCE
- Aggregator will integrate both CAISO and SVCE dispatch schedules into asset management system



## MARKET DETAILS

# Eligibility

## Who can participate?

### Eligible Assets

- Deliver service minimum 1 hr
- Operate service via API notification from SVCE
- Delivery by demand reduction
- Comply with other service requirements and obligations set out in supporting documentation

### Non-Eligible Assets

- Not be participating in any other balancing or capacity service when the SVCE service is offered
- Not be registered in an existing Proxy Demand Response unit
- Not be participating in PG&E demand response or capacity bidding program

# Assessment & Dispatch

Assets are assessed in accordance with the following

- Assets are price-takers, with value being set by SVCE in variable increments (structure TBD)
- Assets will be accepted in 'first-come, first-serve' order
- Assets will be accepted as 'all-or-nothing', with partial acceptance prohibited
- Assets will receive confirmation of acceptance via API and an optional dispatch signal via API

## MARKET DETAILS

# Settlement

- Assets will be paid \$/MWh value specified by SVCE
- Asset settlement will be calculated using the 10-in-10 methodology\*

\* Stakeholder feedback indicated that 'Day Matching' methodologies are limited in capturing asset behavior; this methodology will be reviewed for later deployments



# Baseline discussion

## Pilot will use standard Day Matching (10-in-10) baseline approach

### Methodology:

- Select the most recent 10 weekdays prior to the event day, where these excluded weekends, holidays, and any other previous event days.
- Calculate the baseline load for each hour of the DR event period (curtailment period) as the average for that hour over the 10 days.
- Adjust the 10-in-10 baseline by applying a scalar adjustment to the unadjusted baseline, where the adjustment takes the form of the ratio of the average hourly usage during specified pre-event (i.e., morning) hours on the event day to the usage in the same period for the unadjusted baseline load.

### Why 10-in-10?

- 10-in-10 *adjusted* baseline studies suggest highest accuracy and lowest bias of the 'day – matching' baselines
- Stakeholder interviews prefer over other standard methods

The background of the slide features a dark blue color with a subtle, abstract network graphic. This graphic consists of numerous small, light-colored dots (nodes) connected by thin, light-colored lines, creating a complex web-like pattern that spans the entire page.

# Appendix B

## ElectronConnect Licensing Description

KEY PLATFORM FUNCTION

# Licenses

3 different types of licenses define market relationships

DEFINITION	COLLABORATIVE	EXCLUSIVE	Not Required
	Assets can participate in multiple markets, as long as they follow the market hierarchy.	Assets are forbidden from participating in other markets when responding to a trade in an Exclusive Market	Market doesn't care if other markets are happening simultaneously (e.g. data markets)

