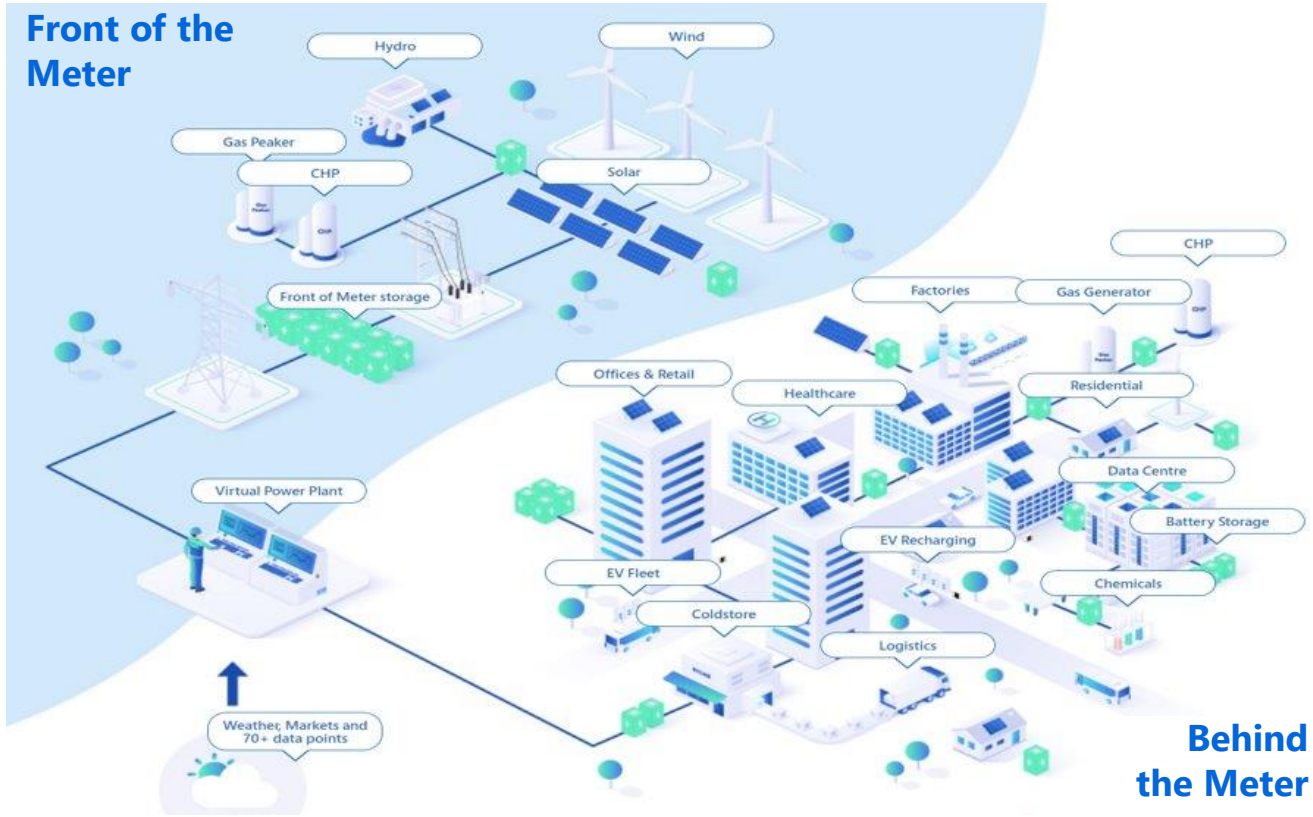
GridBeyond™

# Crisis, contingencies, and climate change

## Global Energy Trends 2024

# About GridBeyond

## We Transform Energy Into Opportunity For The Entire Ecosystem




GridBeyond leverages the power of AI to help organisations capitalize on opportunities resulting from the digital and energy transitions. We empower energy users, generators, fleet operators, and renewable developers to uncover additional **revenue** streams, lower **energy cost**, and drive **sustainability**.

**Partners:**

Founded in **2010**

**Global**

Offices in the US, Canada, Ireland, UK, Australia, Japan

**2.3GW**

Load portfolio

**500+ MW**

Of batteries under contract

**160+**

Employees

**900+**

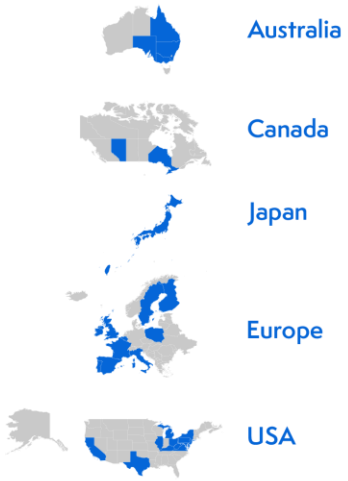
Customers and partners

# About GridBeyond

## We Transform Energy Into Opportunity For The Entire Ecosystem

160+ Team

### Countries where we have expanded



- Australia
- Canada
- Japan
- Europe
- USA

### GridBeyond's timeline

- **2021** — Japanese expansion
- **2019** — Entering the US market
- **2016** — Series A funding rounds completed
- **2014** — EnergyConnect platform launched
- **2011** — Expanded into energy management
- **2020** — 2020 Global Cleantech 100 company
- **2018** — GridBeyond is #1 for FFR services
- **2015** — Several seeds funding rounds completed
- **2012** — Entered UK market
- **2010** — Launched as WireliteSensor

### Services

- Activation
- Artificial Intelligence
- Demand Side
- Robotic Trading
- Installation
- Revenue Generation
- Battery Storage
- Monitoring
- Metering
- Planning

**Partners:**

Founded in **2010**

**Global**

Offices in the US, Canada, Ireland, UK, Australia, Japan

**2.3GW**

Load portfolio

**500+ MW**

Of batteries under contract

**160+**

Employees

**900+**

Customers and partners

# Some of our Success Stories

## Batteries

- ZENOBE ENERGY
- VEOLIA
- ArdaghGroup
- UCB
- EURAC POOLE

## Food / Logistics

- NFT
- brakes
- RICK BESTWICK
- Reed Boardall
- natures way foods
- abp

## Glass / Metals

- B SHAKESPEARE & CO
- BAS CASTINGS
- MAT FOUNDRY GROUP LTD
- TIVAC ALLOYS LIMITED
- SIMEC
- CFBOOTH
- VALE
- outokumpu
- MEW

## Mills

- Muntons Passionate about malt
- Odlums
- TARMAC A CRH COMPANY
- Kilsaran INTERNATIONAL
- IMERYS
- KIERNAN MILLING

## Chemicals /Water/ ♻

- DESCH PLANTPAK
- ATHLONE EXTRUSIONS
- ROYDON RECYCLING UK LTD
- northern ireland water
- Dŵr Cymru Welsh Water
- UISCE EIREANN ÉIRINN WATER

## Commerce

- AVIVA STADIUM
- DUNNES STORES
- TIFCO HOTEL GROUP
- CELTIC MANOR HOTELS, RESORTS, CONFERENCES
- Anglia Co-operative together we make the difference
- WP webprint
- foyleside The Centre of Shopping

## Pulp & Paper

- GLENNON MOTHERS
- MEDITE DEFINING THE STANDARD OF MDF
- Smurfit Kappa
- kronospan
- UPM BIOFORE BEYOND FOSSILS

## Other

- RANDOX
- Fingleton White
- eir let's make possible...

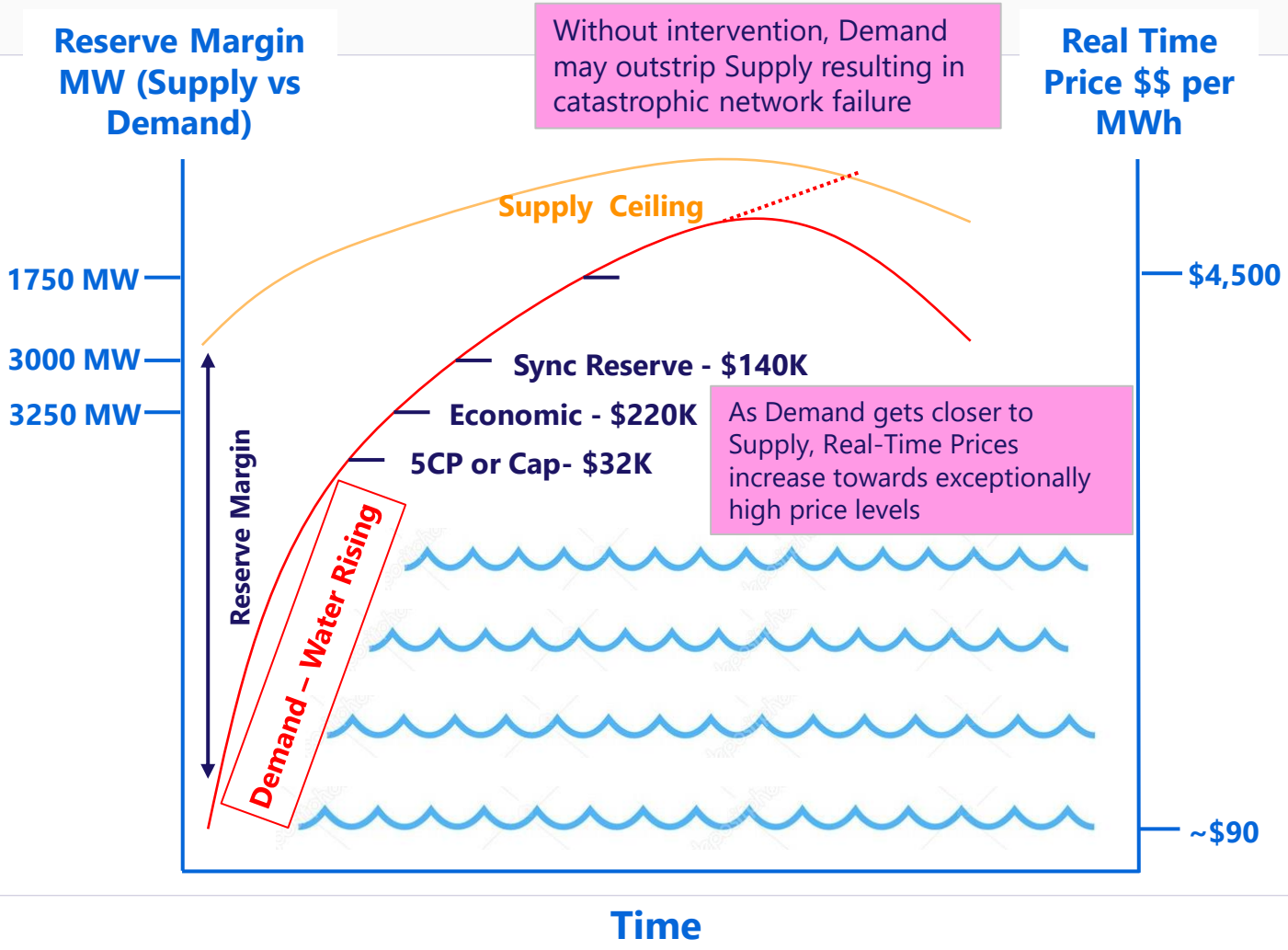
## Key Partnerships

- GENFLEX
- ESB
- electricity northwest
- VEOLIA
- RAINPOWER
- CHIYODA CORPORATION
- EDF ENERGY
- Crown Commercial Service Supplier



GridBeyond™

# ISO Demand Response Services




| Service | Value (per MW per Year) | Dispatches per year |
|---|---|---|
| Responsive Reserve Service FFR **(RRS FFR)** | **$177K** | **1 to 2** |
| Responsive Reserve Service UFR **(RRS UFR)** | **$115K** | **1 to 2** |
| Emergency Response Service **(ERS)** | **$48K** | **1 to 2** |
| Non-Spin Reserve Service **(NSRS)** | **$195K** | **20** |
| 4 Coincidental Peaks **(4CP)** | **$70K** | **20** |

**$90k from ERCOT Programs is equivalent to:**

- $900,000 in annual sales for a business with a 10% Profit Margin
- $1,800,000 in annual sales for a business with a 5% Profit Margin
- $9,000,000 in annual sales for a business with a 1% Profit Margin

# Where is your approach in the energy transition?

| Peak Avoidance & Predictive Analytics | Grid Revenue Services | CHP Forecasting/ Optimization | Day Ahead Energy Trading | Solar & Energy Storage | Renewables and CPPAs | Analytics & Emissions Reporting | Fleet Electrification |
|---|---|---|---|---|---|---|---|
| Optimizing Flexibility | | | | | Path to Net Zero | | |

## Typical challenges

### Reducing Cost

- Have you considered Real Time Peak Avoidance?
- Are you sure you are maximizing the value from your energy flexibility?

### Enhancing Sustainability

- How do achieve near term Science based targets?
- How do I go about setting targets? What incentives are there?

### Enabling Resilience

- Cost of resilience to you?
- How much backup do you need?

### Grid Constraints

- Peak Power Requirements?
- Delays? Charges?

# Aim of today's webinar

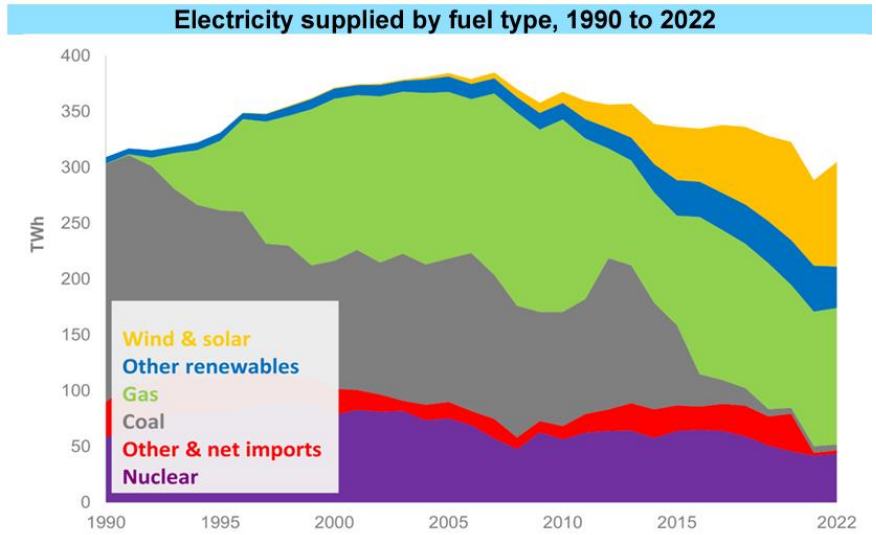
- Climate change and net zero are key policy agenda items
- Severe weather adds to growing concerns on the impacts
- Action from policy-makers is lagging behind
- Businesses have opportunities to make a significant difference
- But how can you **realise these opportunities?**



GridBeyond

# Accelerating renewables growth

- Global renewables capacity additions could reach **550GW in 2024**
- The passage of the Inflation Reduction Act (IRA) is further boosting availability of cost-effective renewable power
- The grid presents some level of obstacle
  - ~1,300GW of new resources are waiting to connect to power grids across the country

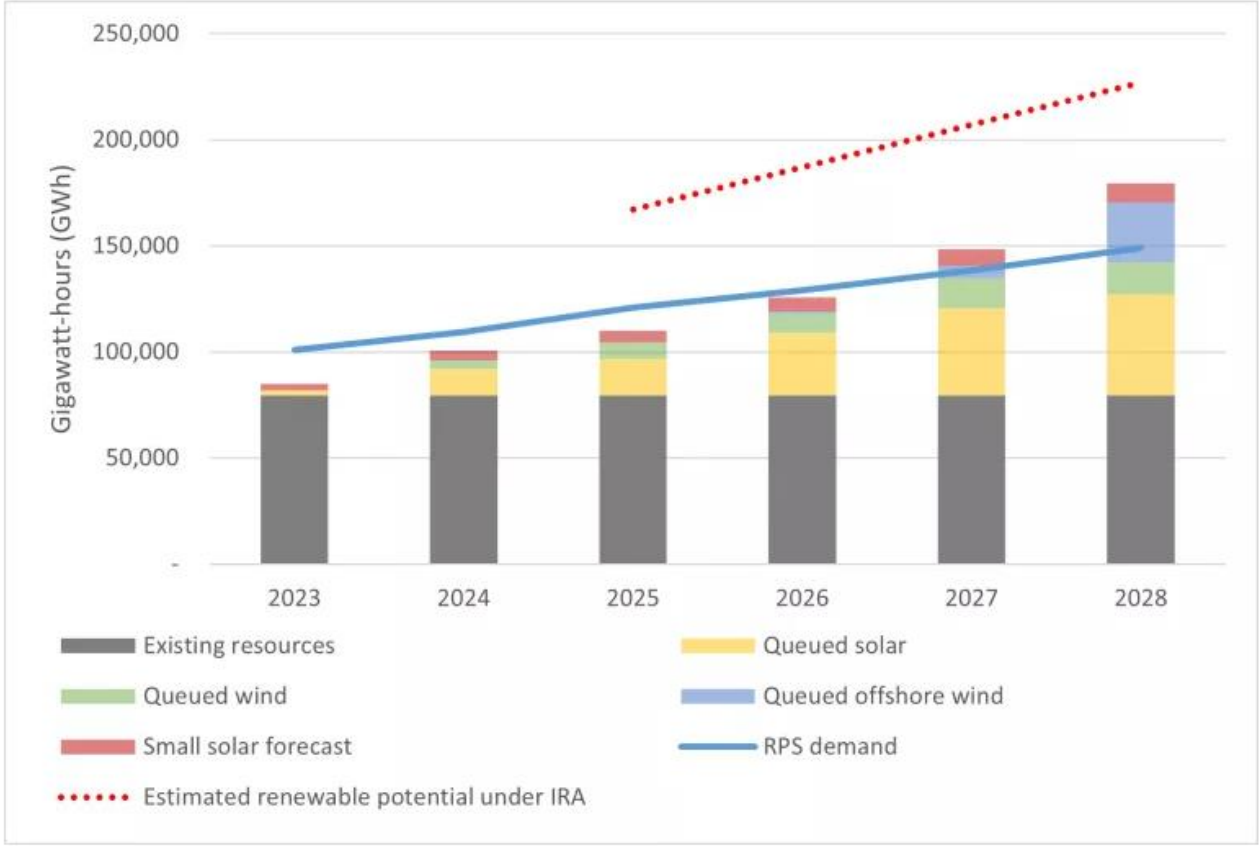





GridBeyond

# Backlogs

- In PJM there was more than 200GW of renewables in the interconnection queue as of September 2022
- Projects in the RTO region face an average delay of nearly four years
- In November 2022, FERC issued an order approving a proposal by PJM to replace its existing first-come, first-served interconnection process with a cluster-based first-ready, first-served approach
- FERC is also considering interconnection reform on a federal level




Projected RPS-eligible renewable resource supply in PJM through 2028

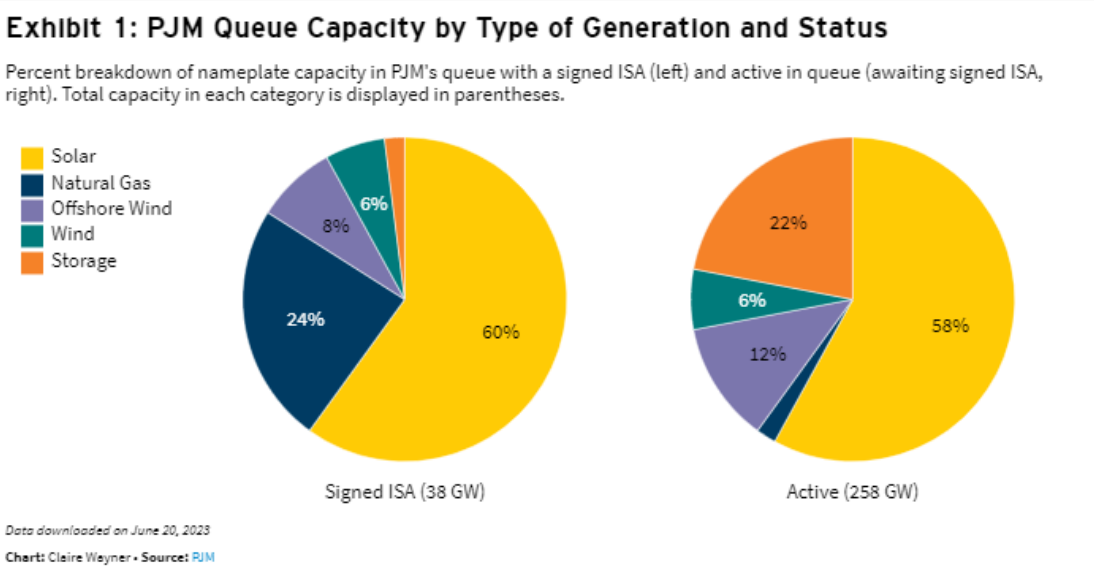
*Source: NRDC*



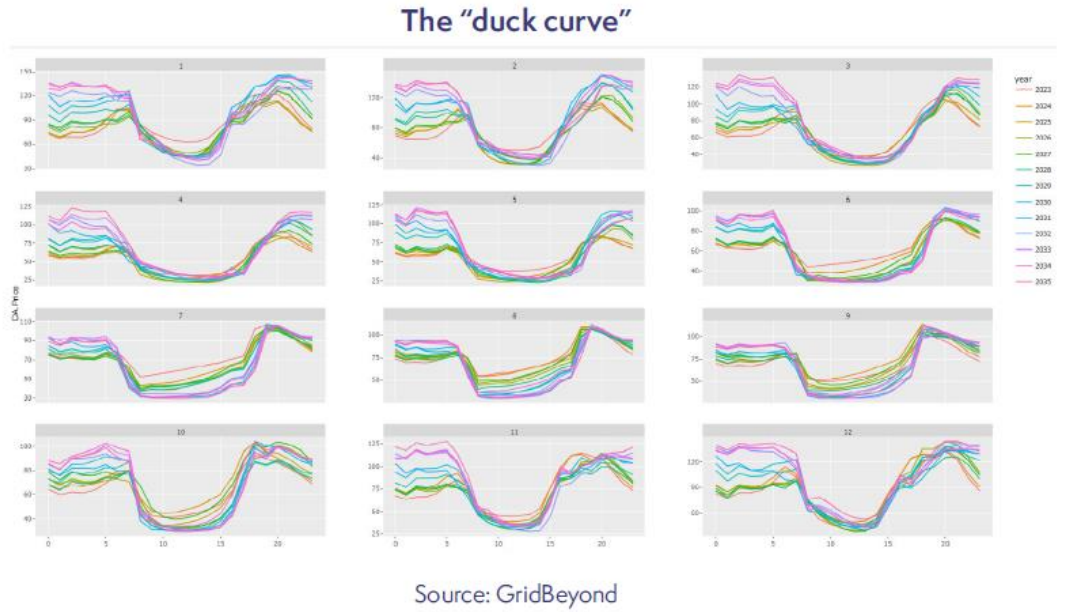
GridBeyond

# Changing grid dynamics

- Hours of excess renewables and nuclear are growing
- The duck curve presents challenges for grid operators:
  - Low (and in some cases negative) midday prices reduce revenues of thermal power plants
  - The extreme swings exert additional wear and tear on conventional peaker plants

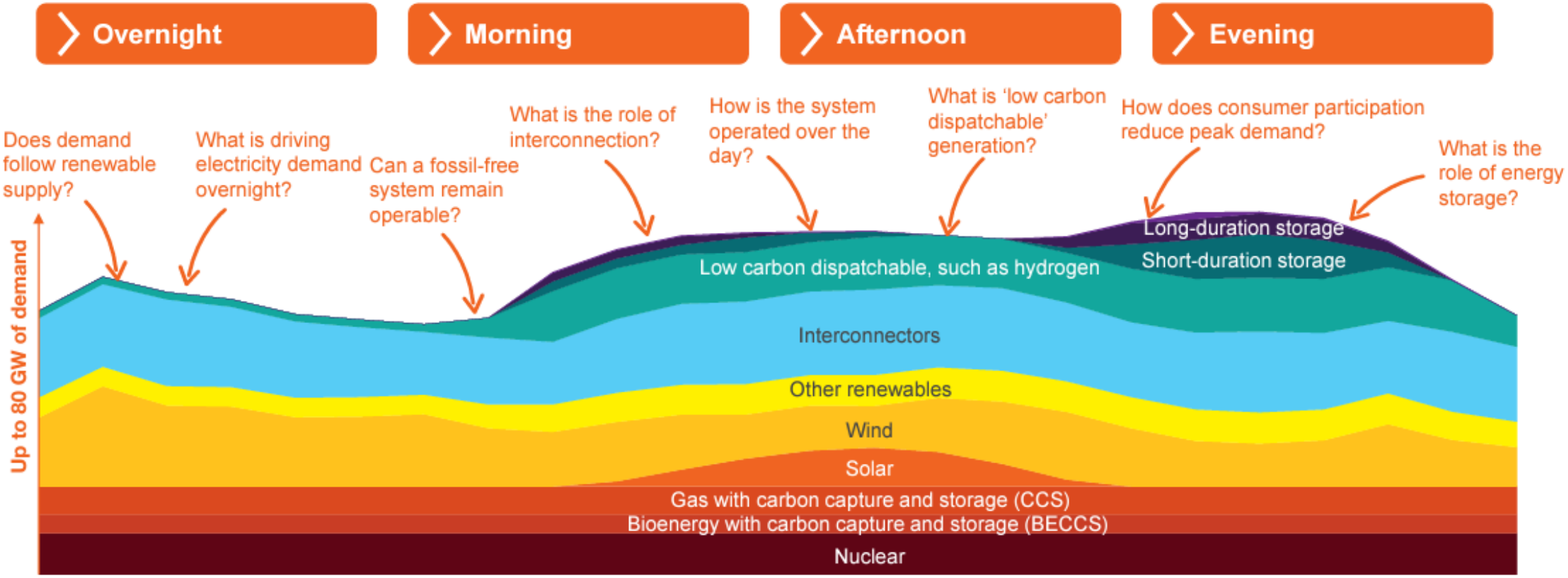



*Source: RMI*




Source: GridBeyond

# Day in the life - 2035




*Source: Regen, National Grid ESO*

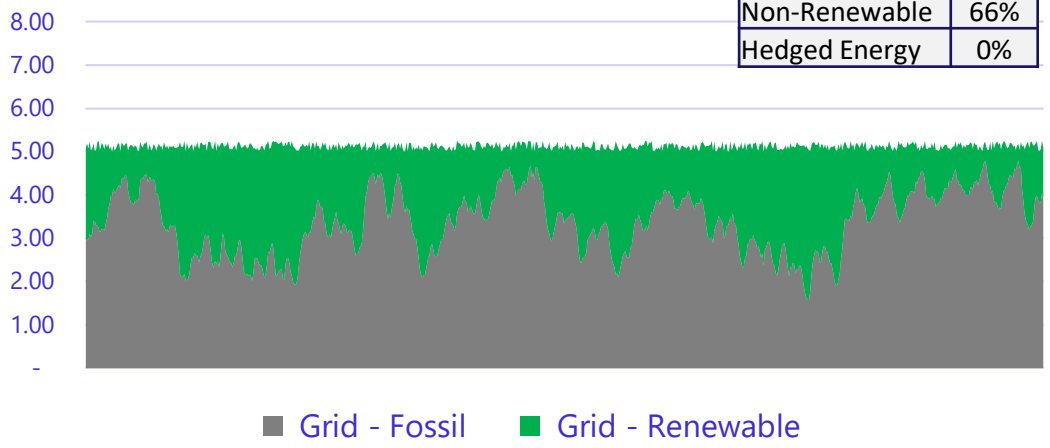


GridBeyond

# Power matching- 1 month example – Progressive Energy Strategy

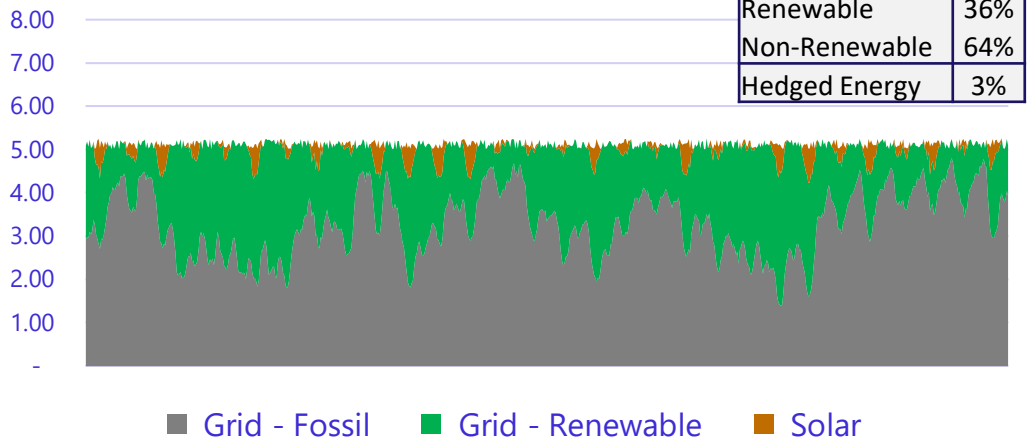
## 1. Grid Energy (April)

| | |
|---|---|
| Renewable | 34% |
| Non-Renewable | 66% |
| Hedged Energy | 0% |



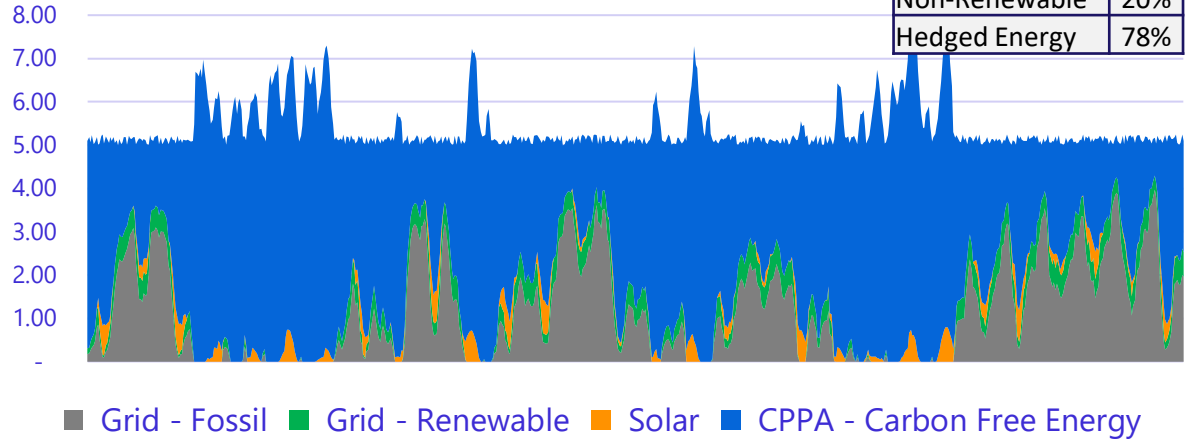

## 2. Grid Energy + Solar (1MW)

| | |
|---|---|
| Renewable | 36% |
| Non-Renewable | 64% |
| Hedged Energy | 3% |



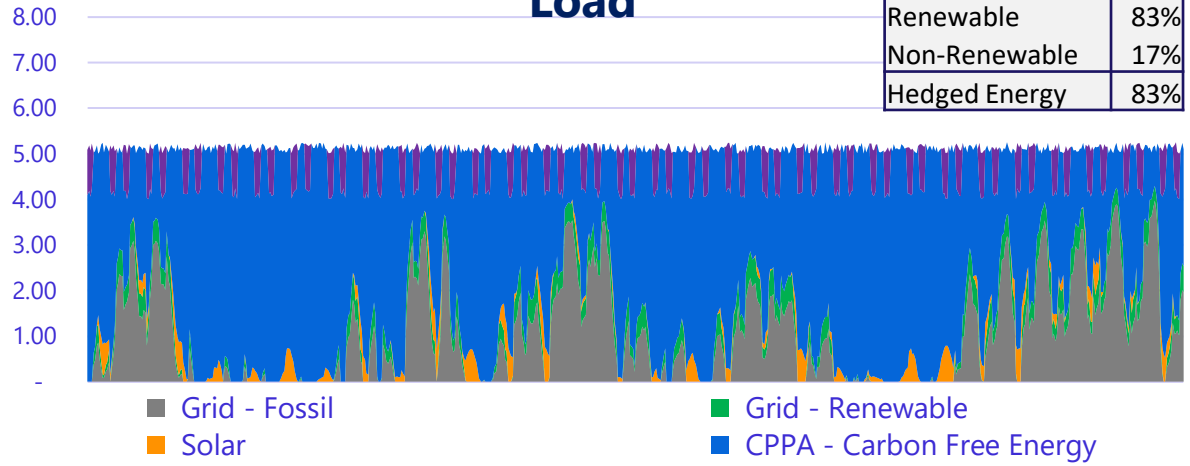

## 3. Grid Energy + Solar + CPPA

| | |
|---|---|
| Renewable | 80% |
| Non-Renewable | 20% |
| Hedged Energy | 78% |



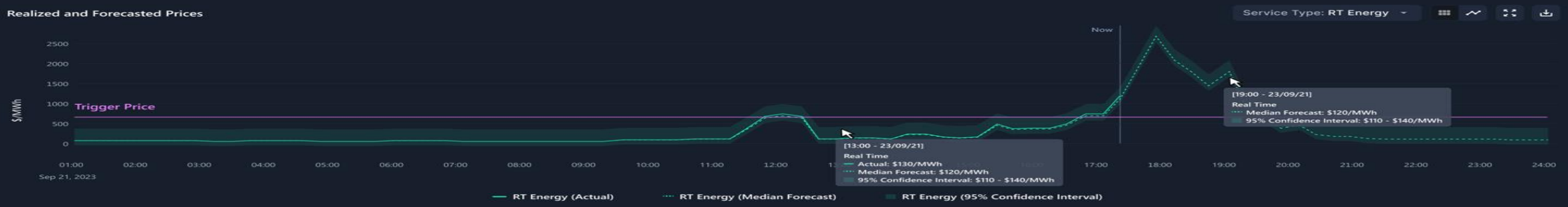

## 4. Grid Energy + Solar + CPPA + Battery + Load

| | |
|---|---|
| Renewable | 83% |
| Non-Renewable | 17% |
| Hedged Energy | 83% |

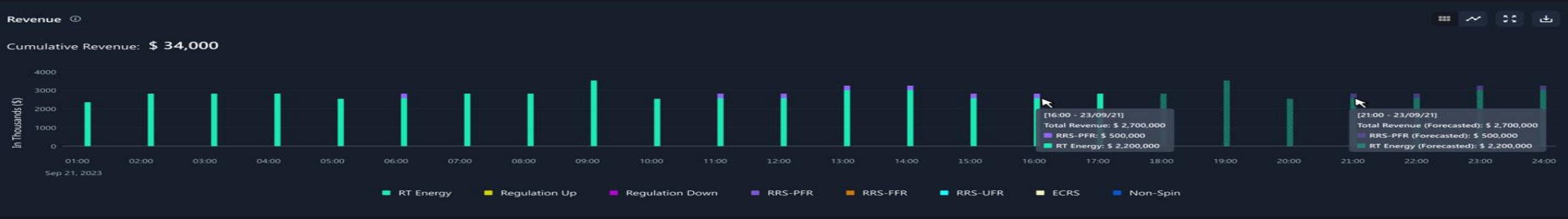


# GridBeyond Optimisation Platform Snapshot 2

## Realized and Forecasted Prices




## Revenue




## Trade Recommendations

# Assess: PJM Site


**Your Site(s) Name:**
**Max Load:** 19.42MW
**Min Load:** 11.56MW
**Average Load**: 14.98MW
**Flexible Load (Phase 1):** 4.00MW of Lighting/HVAC load
**Flexible Load (Phase 2):** Diesel Generator retrofit.MW TBC

**Applicable PJM Programs based on Flexible Assets:**
- Synch Reserve (SR)
- Economic Dispatch (Energy)
- 5CP or Capacity

## Flexible Assets

### Lighting

Response Time: Within 30 minutes

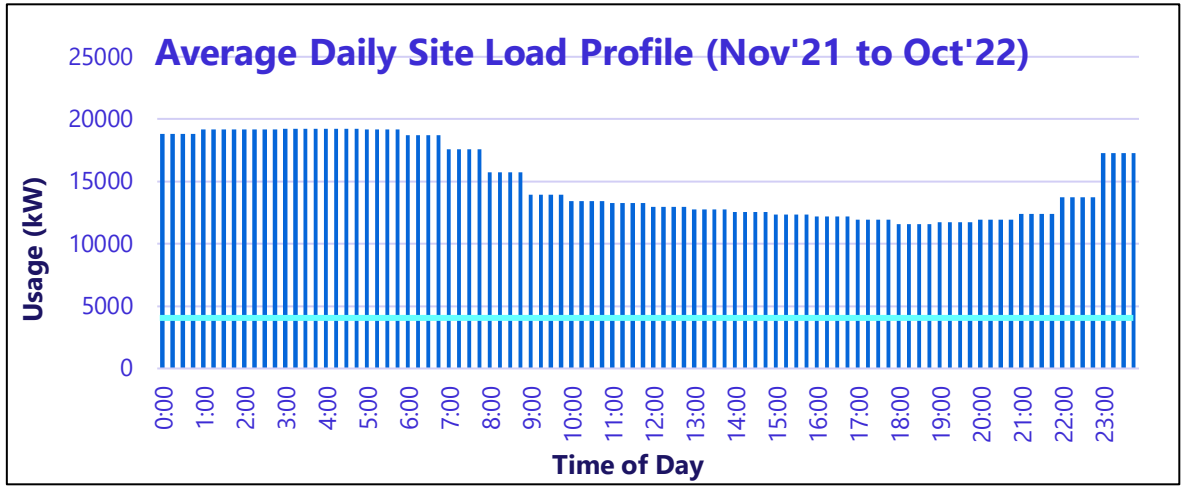
### HVAC/Thermostat

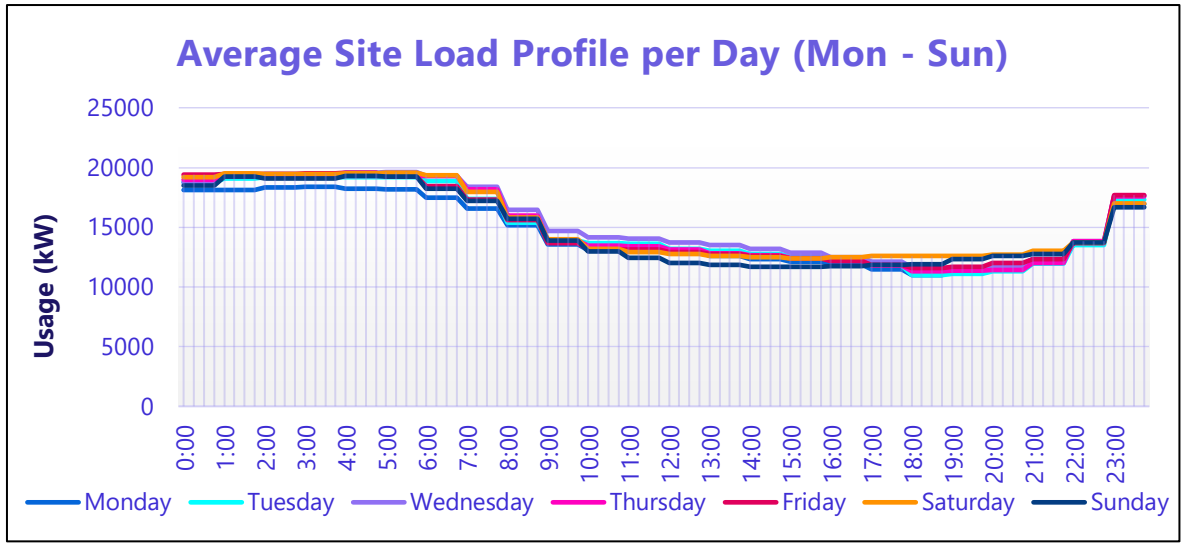
Response Time: Within 30 minutes

### BackUp Generators

Response Time: Within 10 minutes

## Energy Load Profile



# Unlocking additional value by working with GridBeyond

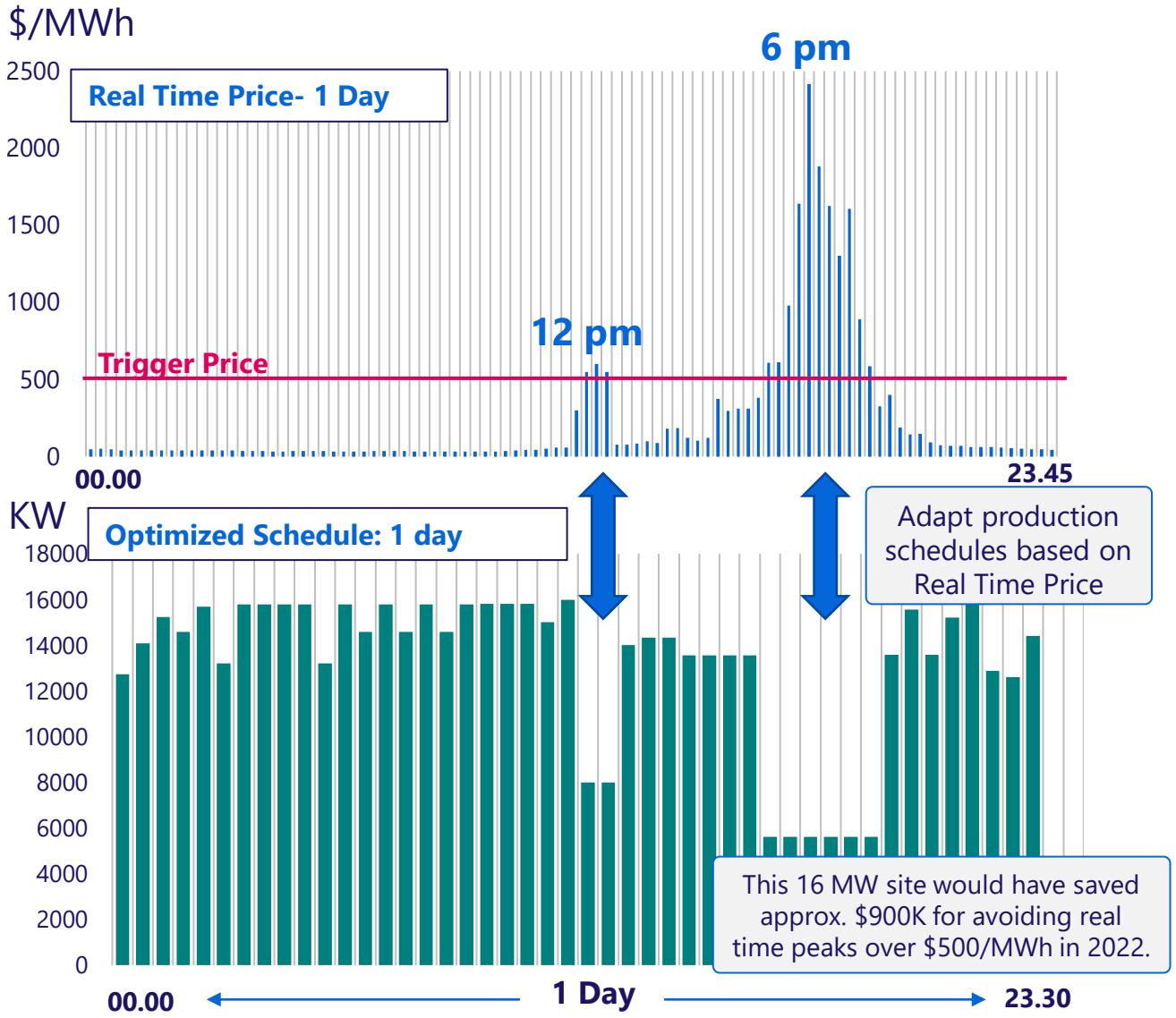
| | PJM |
|---|---|
| **Existing Services** | Com Ed: Voluntary Load Reduction (VLR): **$80K/**year (based on 8MW) |
| **GridBeyond Optimized Service Stack** | **Sync Reserve:** $140K (Revenue)<br>**5CP or Capacity:** $72K (Saving)<br>**Economic Dispatch :** $220K (Revenue)<br>**Total Value/MW:** $432K/year<br>(based on 4MW) |
| **Additional value generated through GridBeyond** | **+$424K/year** |

Please note that the saving from Real Time Energy is based on a strike price of $500/MWh. Please also note that existing services have been assumed based on knowledge of competitor offerings.

- By partnering with GridBeyond, MPEA could generate an additional **$424K/year** through a combination of revenue and savings.
- Our enhanced data science forecasting and automation capabilities allow for optimized stacking of DR with Real Time Cost Avoidance which is the key to unlocking additional value in the markets.

# Optimized Real Time Cost Avoidance

## Load/Price Forecast




## What Could I have saved in 2022?

| Trigger Price | Value | Hours Dispatched |
|---|---|---|
| $100/MWh | **$126K/MW** | 510 Hours Annually (5.8% Annual Impact) |
| $150/MWh | **$113K/MW** | 273 Hours Annually (3.1% Annual Impact) |
| $200/MWh | **$105K/MW** | 200 Hours Annually (2.2% Annual Impact) |
| $500/MWH | **$85K/MW** | 62 Hours Annually (<1% Annual Impact) |

Please note these values are based on ERCOT RT Prices for 2022.

## How does this work with my energy supply contract?

Index

Block & Index

Fixed

**Full Exposure to RT Market:** GridBeyond works directly with the customer to generate energy savings. No REP involvement.

**Part Exposure to RT Market:** GridBeyond works with REP to generate customer savings on indexed MW volume.

**Fixed Price:** In PJM, Economic Dispatch rewards customers with additional revenue even if they are on a fixed contract

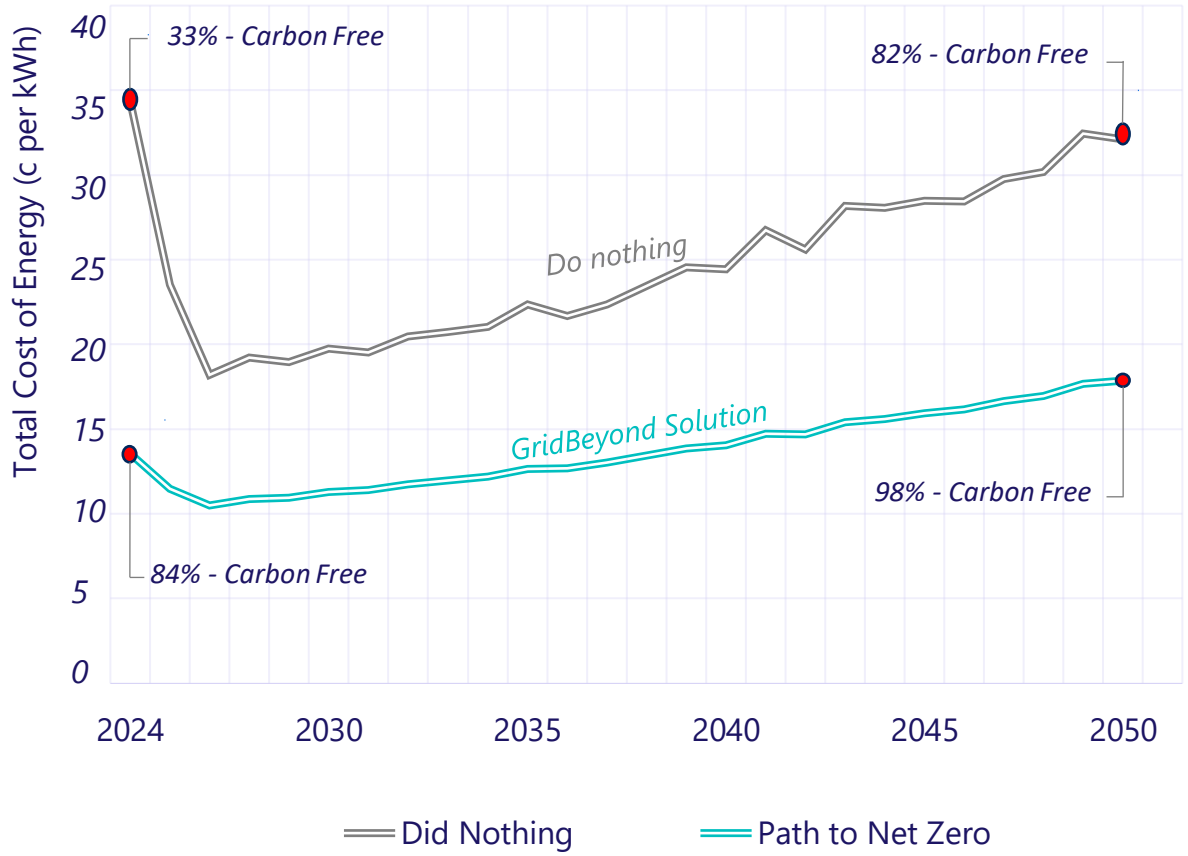
# Example site for 5MW data center - PNZ

## Example Site: 5MW Data centre

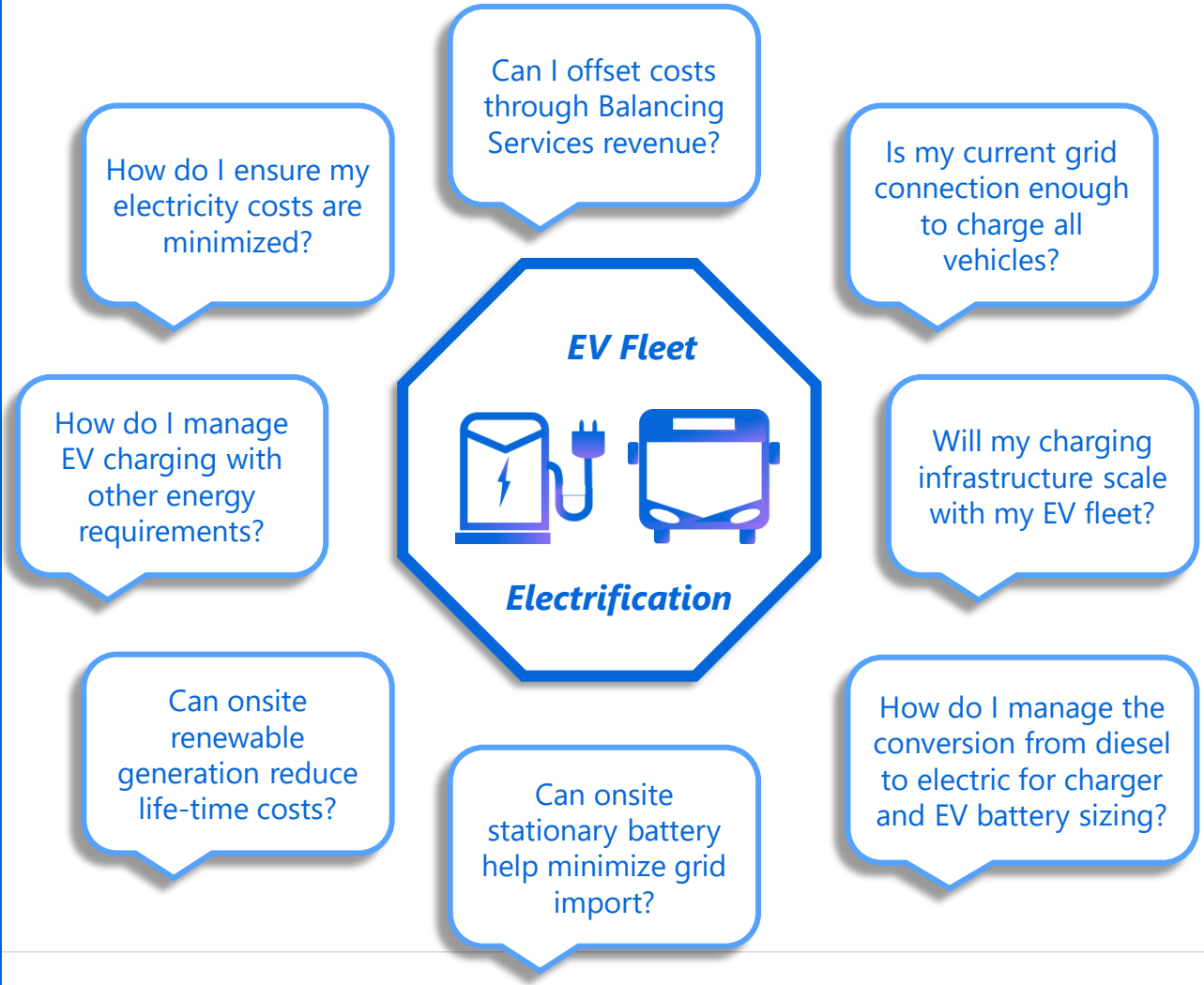
- Introduction of Battery, Solar and CPPA decreases carbon footprint from 66% to 16%.
- Fixed Energy costs increase from 0% to 80%
- Cost of Energy decreases by 40%

| Energy Consumption | Start of Journey (MWh) | Path to Net Zero (MWh) |
|---|---|---|
| Grid - Fossil Fuel | 29,200 | 7,096 |
| Grid - Renewable | 14,600 | 1,918 |
| Solar (On-site) | - | 1,703 |
| CPPA | - | 33,083 |
| Battery | - | Yes |
| **Total Energy** | **43,800** | **43,800** |
| **Carbon Free Energy** | **33%** | **84%** |
| **Fixed Hedged Energy** | **0%** | **83%** |

**Forecast of energy prices**



# EV fleet electrification considerations



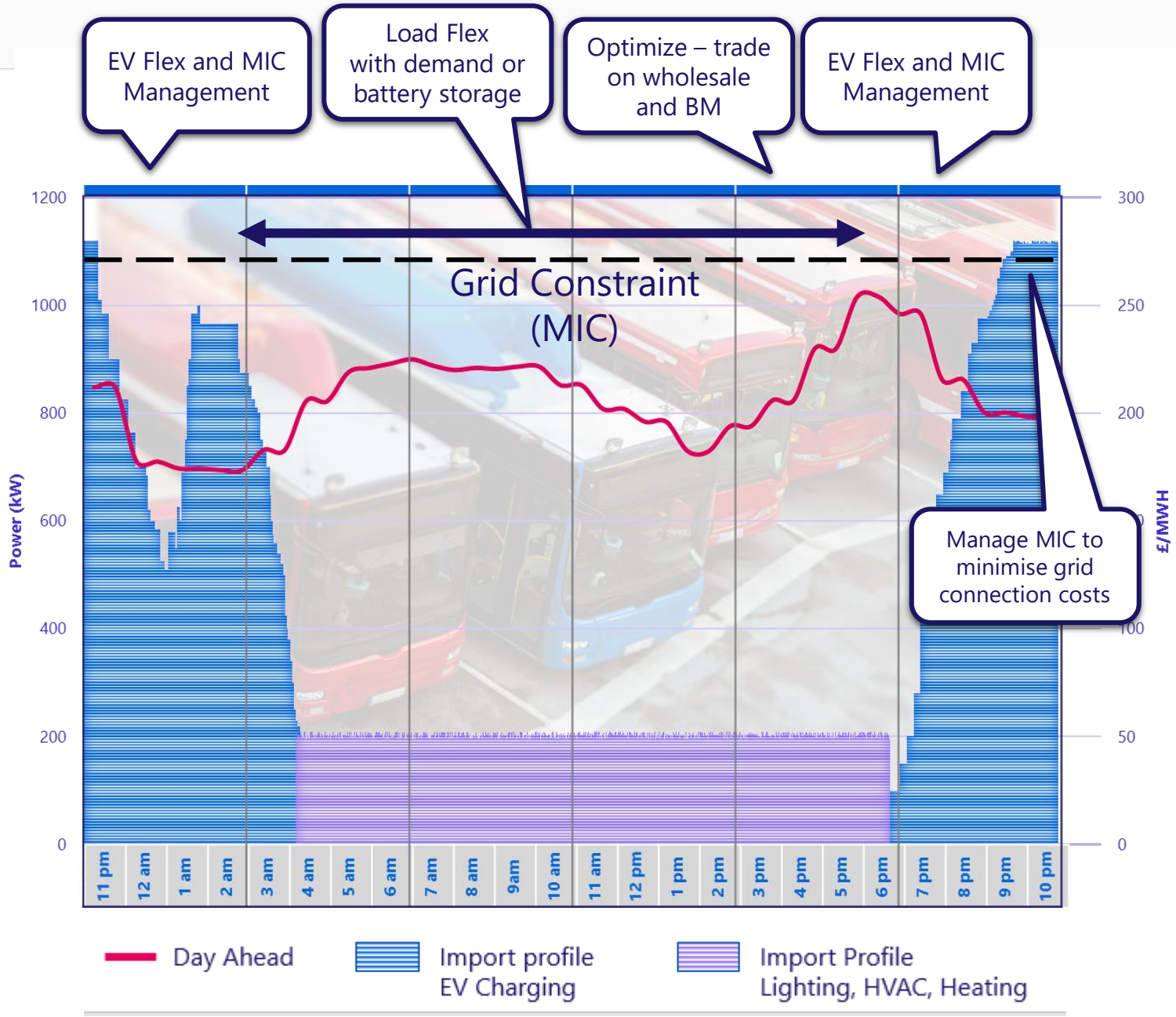

## Challenges with EV Fleet Electrification

- Sizing and planning charging infrastructure
- Sizing/planning onsite renewable generation
- Sizing/planning onsite stationary battery
- Charge management – complex trade-offs
  - Fleet operation schedules vs. optimum charging schedules
  - Grid Constraints
  - Generate revenue/savings from energy flexibility



GridBeyond

# Optimized EV depot power consumption




## EV and Load Flex

- Buses typically connected to chargers from 7pm to 6am.
- EV batteries can deliver Flexibility Services to earn additional revenue.
- **Main priority is to ensure buses are fully charged for morning routes.**
- From 6am to 7pm, load assets such as HVAC, lighting and heating, and stand-alone battery assets can generate revenue in the market.

## Managing Grid Constraints

- A stand-alone battery can **provide additional capacity** to allow for simultaneous charging of **more EVs whilst remaining within the Maximum Import Capacity**.
- Our onsite controls allow us to manage your load, battery and EV assets to protect your site from **exceeding Grid constraints and paying penalties.**

GridBeyond

# ViewPoint energy portal

Real Time Energy and GHG Emissions Dashboard


Realtime quantitative analysis of your site's consumption

Track your DR revenue streams and energy savings in one place

Deep dive into your metered data to trouble-shoot problems

Understand your carbon footprint (tCO2e)

GridBeyond

# Funding your journey

**Demand Response** revenue can fund your whole journey towards 24/7 carbon free energy.
From powerful AI based analytics to turn-key asset implementation, we can help at every step of the way without any upfront Capex.

*We are helping customers across multiple industries to achieve their sustainability goals.*

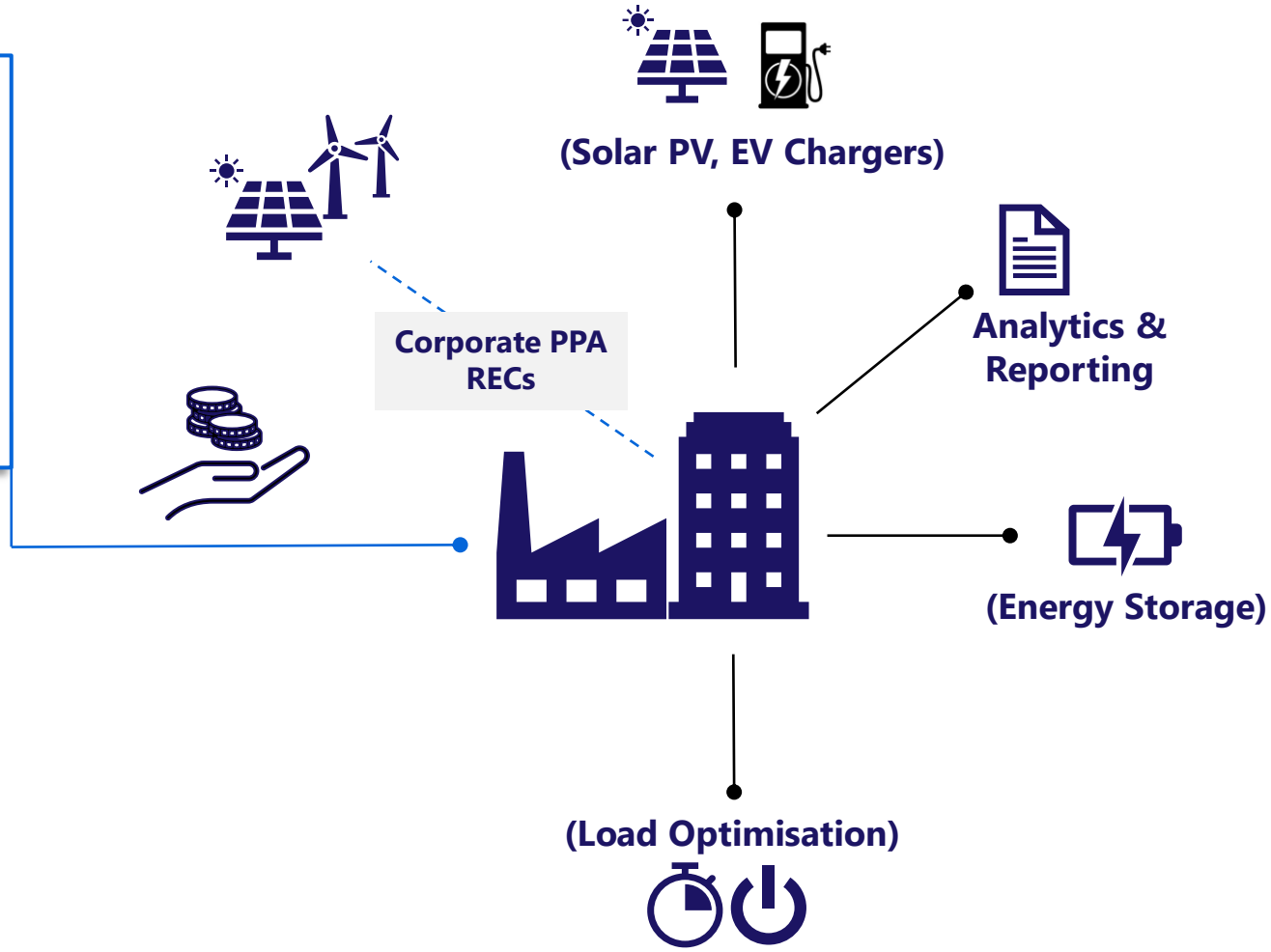
TARMAC A CRH COMPANY

americold

ARYZTA

Deloitte.

the Wonderful company






GridBeyond

# Transform energy into opportunity


**At GridBeyond we bridge the gap between distributed energy resources and energy markets**

**Our technology means every connected asset, whether its utility-scale renewables generation, energy storage or industrial load, can be utilized to help balance the grid**

GridBeyond

# Tools you can use or Tools we use to help you

## DSR

Unlock additional revenue streams with Robotic Trading. Let AI handle the complexities of providing ancillary services, optimising your participation and generating extra income effortlessly.

## Trading as a Service

Asset optimisation solutions to help you earn the most revenue possible from your participation in energy markets. By optimising your assets, you can take advantage of market conditions and increase revenues.

## Forecaster

Harness AI models to forecast price, demand, renewable power generation, and other time series data using Forecaster to ensure that all revenue streams are maximised.

## Peak Management

With AI-driven Peak Management, you can efficiently manage peak demand periods, ensuring minimal expenses and maximising your overall savings.

## Bid Optimizer

AI-powered optimisation and Robotic Trading to drive profitability to new heights by ensuring optimal bids that maximise gross margin or P&L across all forward trading periods.

## SaaS

A suite of software to maximise profitability of your investments in the energy sector - from planning to optimisation, powered by AI.

## Designer

A powerful tool to assist asset and project developers in planning, designing, and analysing prospective revenues from investments in the energy sector.

## CapEx free battery

Asset optimisation solutions to help you earn the most revenue possible from your participation in energy markets. By optimising your assets, you can take advantage of market conditions and increase revenues.

## Baseline

Deliver cost and carbon savings with unparalleled reliability and efficiency, while simultaneously addressing the commercial aspects of your portfolio, as you accelerate the mission to end global dependence on fossil fuels.

| Peak Avoidance & Predictive Analytics | Grid Revenue Services | CHP Forecasting/ Optimization | Day Ahead Energy Trading | Solar & Energy Storage | Renewables and CPPAs | Analytics & Emissions Reporting | Fleet Electrification |
|---|---|---|---|---|---|---|---|
| Optimizing Flexibility | | | | | Path to Net Zero | | |

# Thank you

Any questions?

For more information, contact academy@gridbeyond.com

**Want to be the first to know when new academy resources become available?**
Subscribe to academy updates at
**gridbeyond.com/academy-subscribe**

# Biographical Information

**Joseph C. Hayden, V.P. of Revenue**
**GridBeyond**
**2101 CityWest Blvd. Ste. 100, Houston, TX 77042**
**972-822-9341**
**joe.hayden@gridbeyond.com**

Joe Hayden is the VP of Revenue for North America for Dublin-based GridBeyond. He has lead businesses supporting the electric utility sector for over 20 years and in demand response over the last 5 years during what he terms the 4th major electricity grid transformation.

GB is the world's leading technology platform for helping companies manage distributed and flexible energy resources. The transition to a Net Zero economy is driving significant change in the energy sector and GB helps navigate the opportunities resulting from this transformation. From the rise of renewables generation to the ever-increasing need for grid balancing services that go well beyond traditional Demand Response. The result is a significant requirement for scalable and real-time solutions to manage the carbon friendly, energy system of tomorrow through an automated AI controls-based grid services solution.

Joe will attempt to explain where we are in the transformation of the grid's generation makeup, how carbon reductions have made significant strides balancing against reliability and resiliency challenges never seen before, and certain to increase in severity and frequency over time.

Joe has served in leadership positions with Motorala, GE, Ercisson while focused on the first high-tech industry, electricity generation, transmission, and distribution. He resides as a native Texan and is a graduate of Texas Tech University.