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Transition to green power challenges & required capabilities

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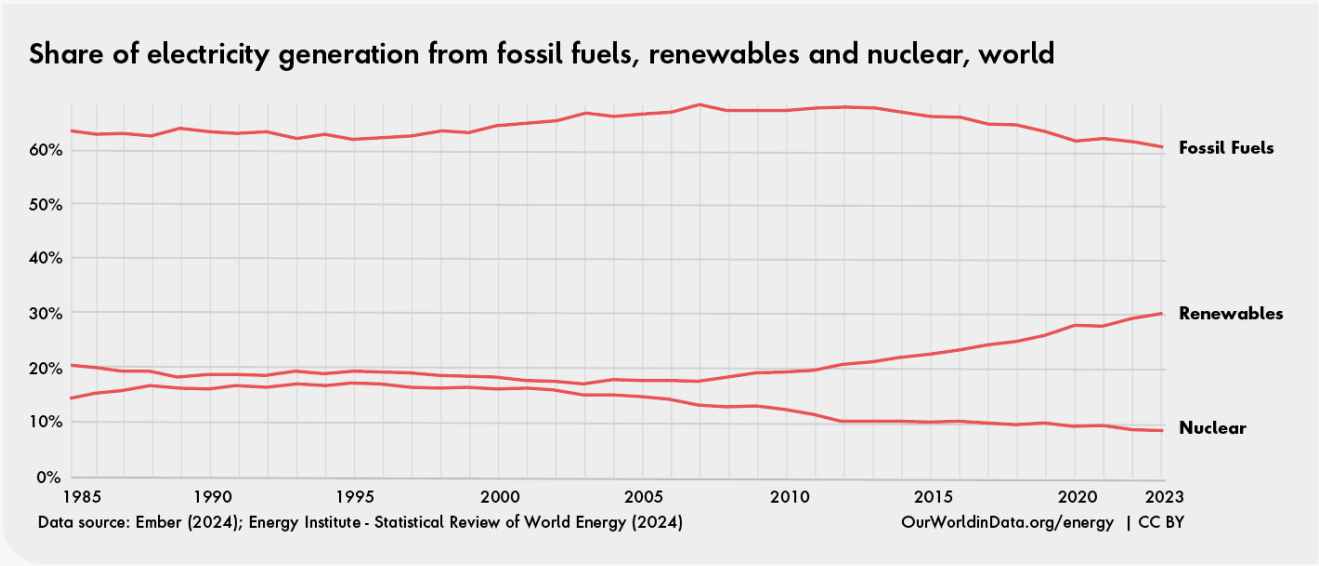
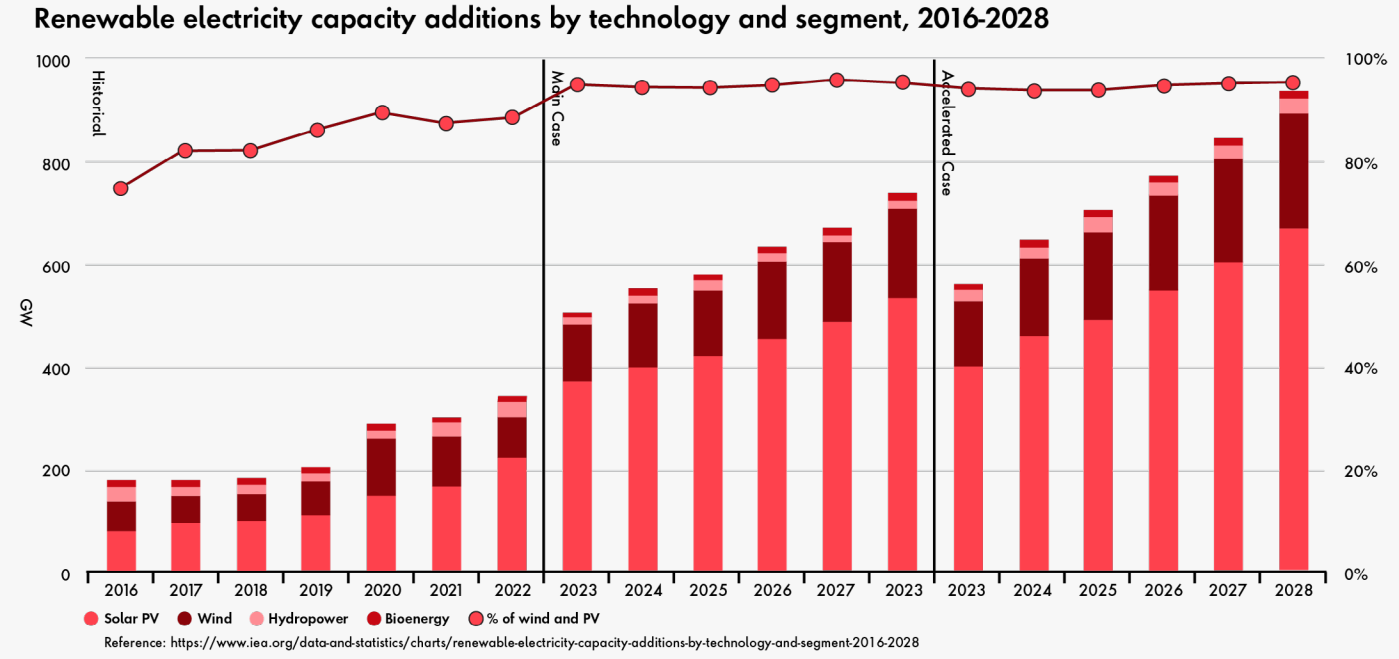
Introduction

Green Power is leading the energy transition

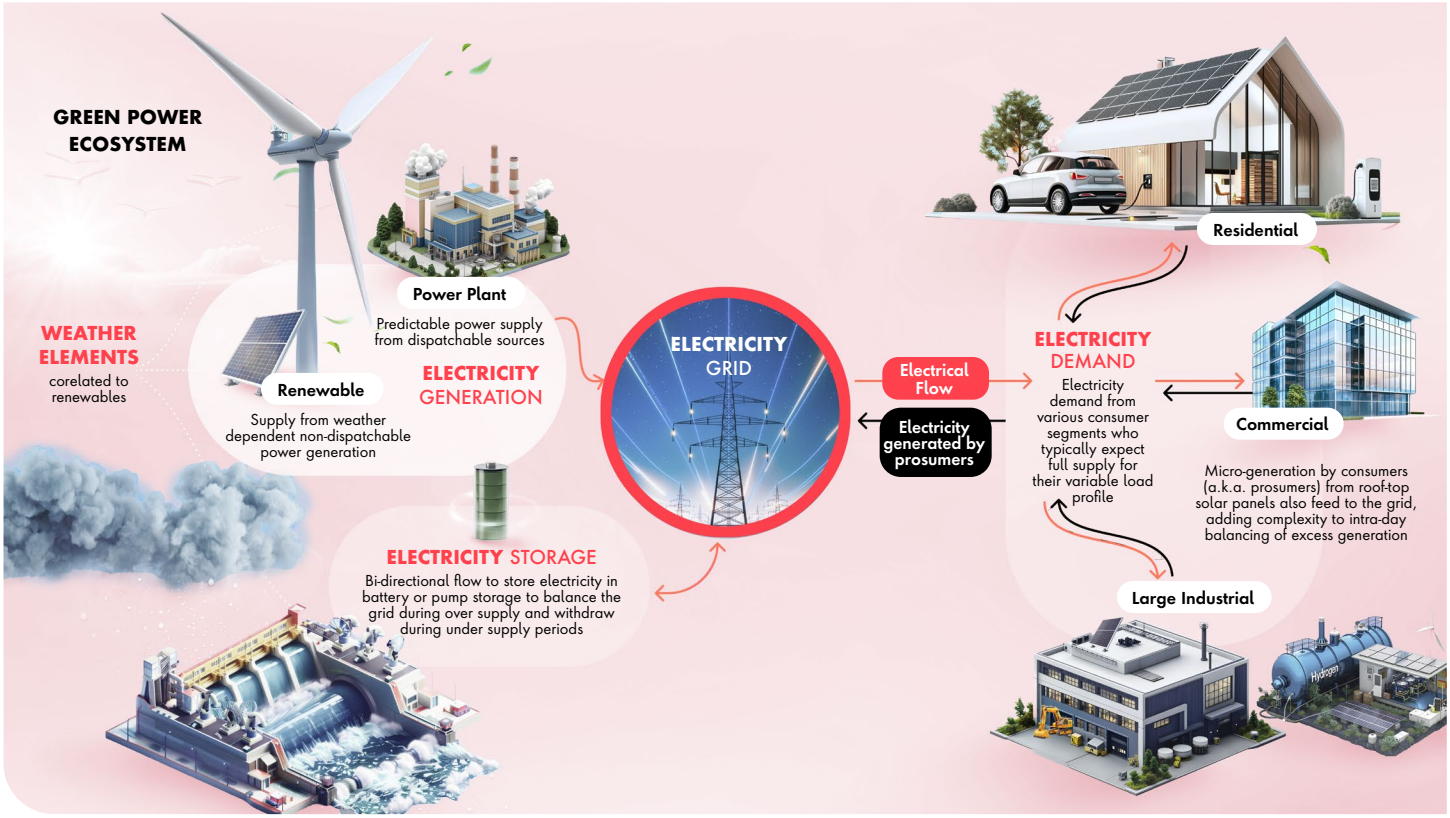
The focus on energy security has helped in accelerating the transition to renewable energy. A survey from IEA show that solar and wind are the primary contributor to green electricity production and is expected to grow even further in coming years. This also reflects in the evolution of green power ecosystem.





Green Power ecosystem

The transition to renewable energy sources is leading to changes in consumer demand, which is in turn driving a shift in the generation mix.



Shift in generation mix

Currently, the power sector is undergoing a significant transformation towards a diverse mix of dispatchable (from traditional) and non-dispatchable (from renewable) energy sources. This evolution is reinforced by the growing use of emission reduction certificates, verifying the integration of green energy into the grid. Advanced renewable energy storage solutions like Battery Energy Storage Systems (BESS) are progressing to offer enhanced flexibility in rapidly managing supply and demand fluctuations, even at short notice. Furthermore, there is an increasing trend towards utilizing weather derivatives to minimize financial risks stemming from adverse weather conditions.

Overall, the industry is witnessing a shift towards a more varied and sustainable energy landscape, driven by technological advancements, regulatory changes, and the growing emphasis on environmental considerations in power generation and distribution.

Shift in consumer behaviour

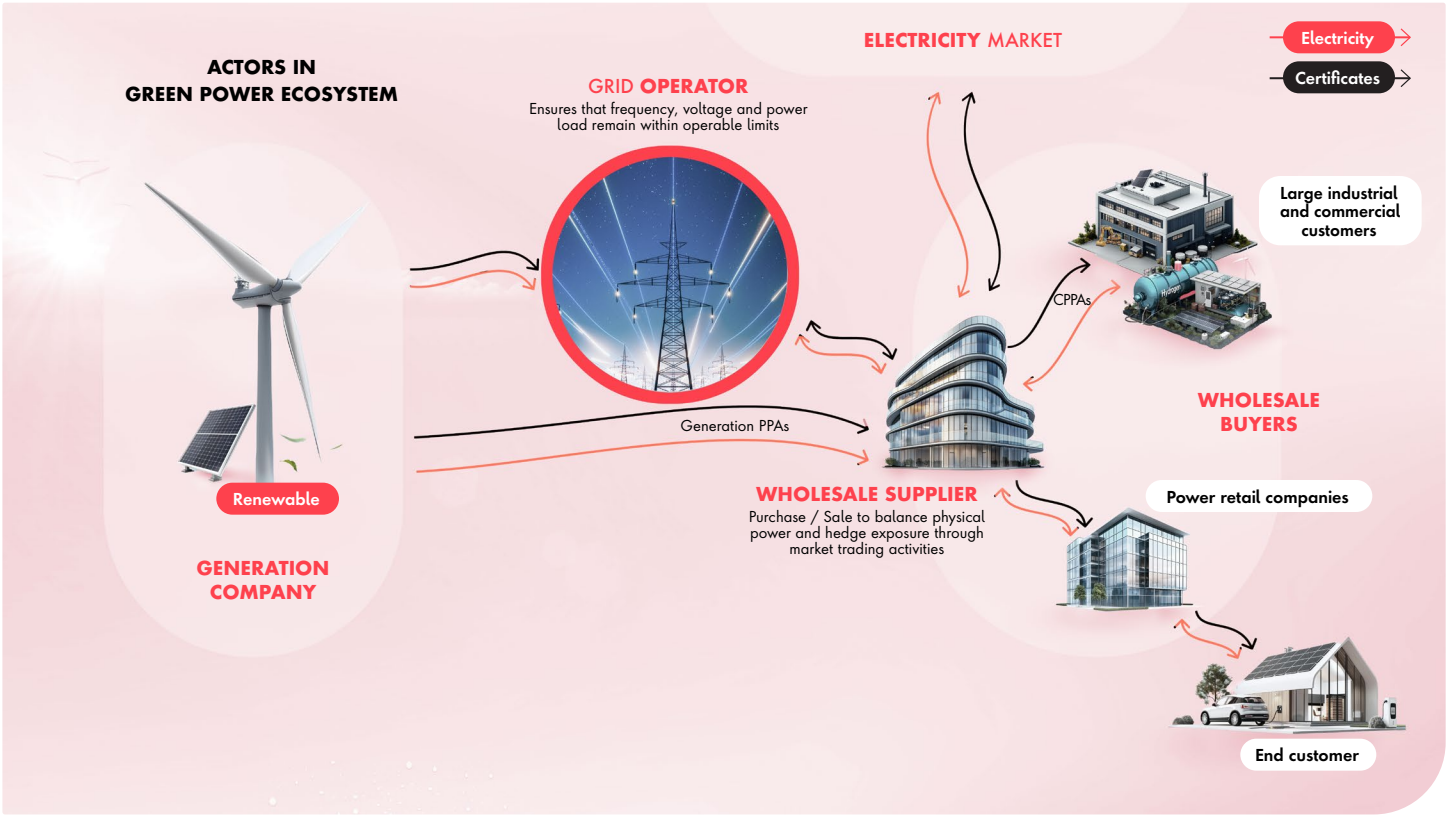
There is a clear shift in consumer behaviour towards being prosumers who contribute surplus power to the grid during peak generation hours, rather than just consuming electricity. This change, driven by an abundance of renewable energy on warm days, leads to lower intra-day electricity prices, departing from traditional peak priceband.

Growing consumer awareness is fuelling a demand for green energy from electricity suppliers, especially among corporate consumers. This trend is evident in the rising adoption of Corporate Power Purchase Agreements (CPPAs) for procuring green energy. CPPAs are increasingly favoured by organizations of all sizes as a strategic approach to meeting their decarbonization goals. The evolving consumer landscape and preference for green energy sources signify a significant transformation in energy market dynamics, underscoring the importance of sustainability and environmental stewardship in power consumption practices.

Shift due to energy transition has affected how power producers, grid operators, wholesalers and retailers operate, as there are more actors and influencers in the ecosystem.

Actors in Green Power ecosystem

Back-to-back contracts between generation and consumer PPAs may involve a basic "sleeving fee" for wholesale power suppliers. Often the generation capacity comprises multiple generators pooled together to meet the electricity demand from various consumers. This process involves balancing physical power flow by offsetting open short/long positions through market transactions or with storage units like Pumped Storage or Battery Energy Storage Systems (BESS).



Role of Wholesale Supplier

A wholesale power company (supply & trading) sits at the junction of generator, grid operator, market and consumers to:

- Supply the generated power to consumers.
- Trade in the market to balance the difference between supply and demand.
- Hedge the volume and price risk in the market (due to inherent uncertainty in the renewable power production and price volatility).

Green power is not produced as baseload, the production profile for green power has lot of fluctuations due to seasonality, time of day, etc, and power companies are exposed to volume and price risk associated with green power and GoOs. The rapid increase in the share of renewable power in the portfolio, is posing several challenges in the management of green power portfolio.

The above functions also take care of managing Guarantees of Origin (GoOs) certificates in the green power portfolio. Wholesale power companies typically have long term power purchase agreements (PPAs) to provide the route-to-market (RTM) for power produced from renewable power assets.

Objectives & challenges for wholesale suppliers

Managing green power portfolio has typically three key **objectives**:

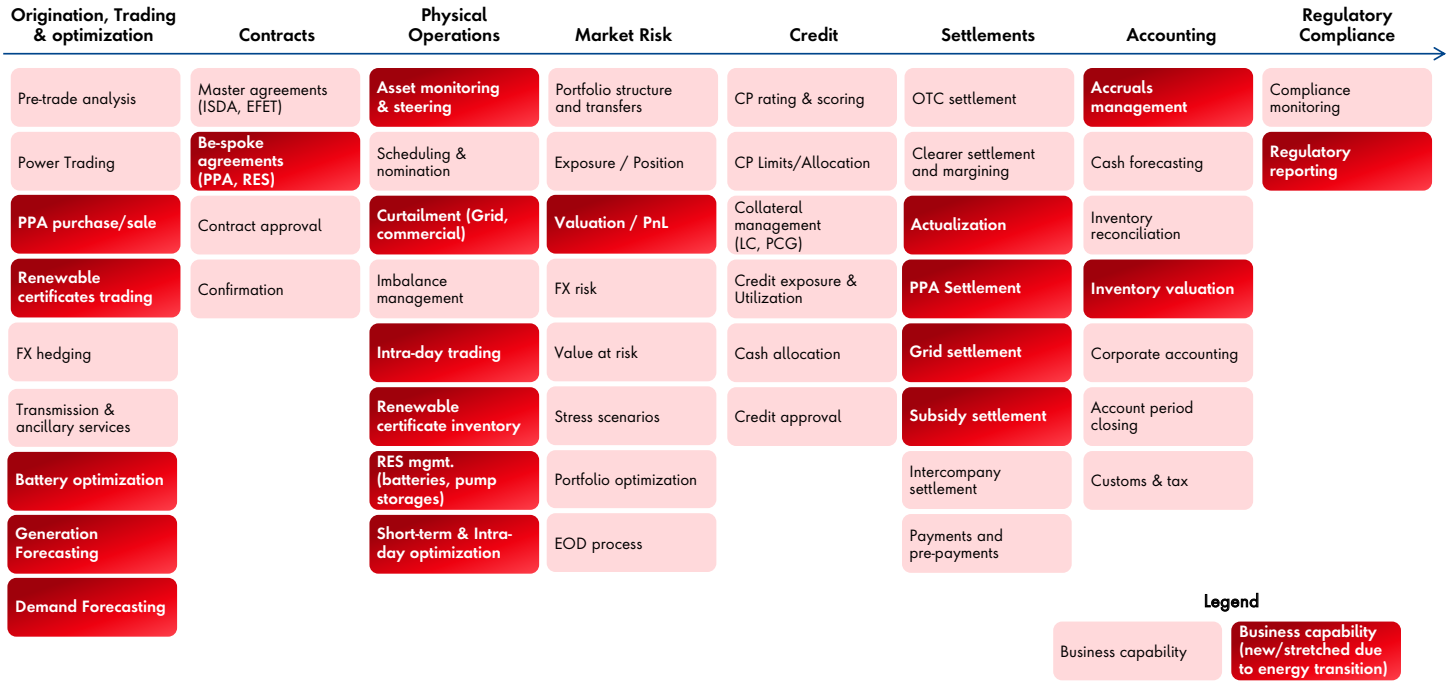
- **Optimization** of volume of physical power flow to balance supply and demand
- **Monetization** of the overall portfolio, to ensure the commercial viability of green power assets
- **Compliance** with regulatory obligations related to green power supply and trading

The rise in distributed generation and rapid growth of new green assets will significantly impact green-growth ambitions of power wholesale suppliers, necessitating the development of enhanced or new capabilities to address these challenges.

Focus has to be on solving some key problems in order to achieve these **objectives**:

- **Balancing supply and demand** by more accurate forecasting of customer demand and renewable generation
- Ability to better **forecast renewable generation** by combining asset information, asset performance and weather
- Ability to **predict curtailments** and calculate loss of production based on metered data, intraday signals and constraints in grid capacity
- **Short-term/Intra-day position view** combining data from various assets/PPAs, grid signals, metered data, auction allocation, sales commitment and hedge positions
- **Secure digitalization of IT & OT** to support real time steering and data acquisition from distributed (often remote) sites
- Capturing **subsidy clauses** and factoring it into optimization for commercial decision making
- Modelling **certificates (incl. inventories) and their transfers** between generation, trading and sales
- **Modelling of complex contractual clauses** to allow for higher degree of automation in lifecycle management of assets and contracts

Capabilities to support growth in green power for wholesale suppliers



How can we partner with you in your energy transition?

At Publicis Sapient, we have decades of experience of working with our clients and partners to identify and unlock the capabilities and deliver value to the business.

We leverage our unique combination of **SPEED capabilities** in achieving this goal. To support our clients with green growth agenda, we propose a four-step approach to identify and address problems.

How can we partner with you in your energy transition?

BUSINESS STRATEGY AND MODEL

- Which market areas and instruments are steps in the right direction?
- How to setup renewable assets and associated contracts?
- Which processes need to be adjusted/defined to speed up onboarding of new contracts?

ASSESS & BUILD CAPABILITY

- What are the pain points in current risk & valuation methods?
- What are the gaps in functionality hindering intra-day trading and optimization?
- How can you get better forecasts for generation and consumer demand profiles?

BUILD DATA AND TECH FOUNDATION

- How can we better integrate near-real time data feeds from various sources?
- What integration technology stack can solve current problems and scale to future data load?
- What additional systems / tools are required to support decision makers?

COMBINE CX WITH AI CAPABILITY

- How can we simplify the complexity in multiple data series & signals for human users?
- How can we get users to focus on decision making and automate the resulting actions?
- How can we reduce time-to-market for new enhancements, products, solutions?

CASE STUDY | Global Renewables Developer

Integration of renewable sales and trading function

THE IMPERATIVE FOR CHANGE

Our client had acquired a significant wind and solar power generation portfolio as the result of an asset swap with another global energy company. The commercial asset optimization activities of the acquired assets were managed by three separate regional groups, despite the client's legacy global sales & trading capability.

he client hired Publicis Sapient to integrate the Commercial Optimization activities into the global Supply & trading business. Building a scalable business platform with systems and processes capable of supporting a doubling of the portfolio this decade, a 70% increase over previous growth plans.

THE TRANSFORMATIVE SOLUTION

Publicis Sapient develop a Target Operating Model (TOM) for the integrated entity. Specifics of the renewable business were accommodated; however, standardization of systems and process across the business was a priority to accelerate the implementation. A target architecture, aligned with the BOM and leveraging existing architecture, was also designed.

Publicis Sapient also developed a data migration strategy to support the move across new systems and support more efficient business processes.

We also developed a detailed roadmap prioritizing the regions and business functions and incorporating constraints dictated by other corporate initiatives

BUSINESS IMPACT

Developed the target operating model for an integrated global sales & trading organization

SCALABLE

The operating model and architecture solution will support the doubling of the portfolio, incorporating new products and markets

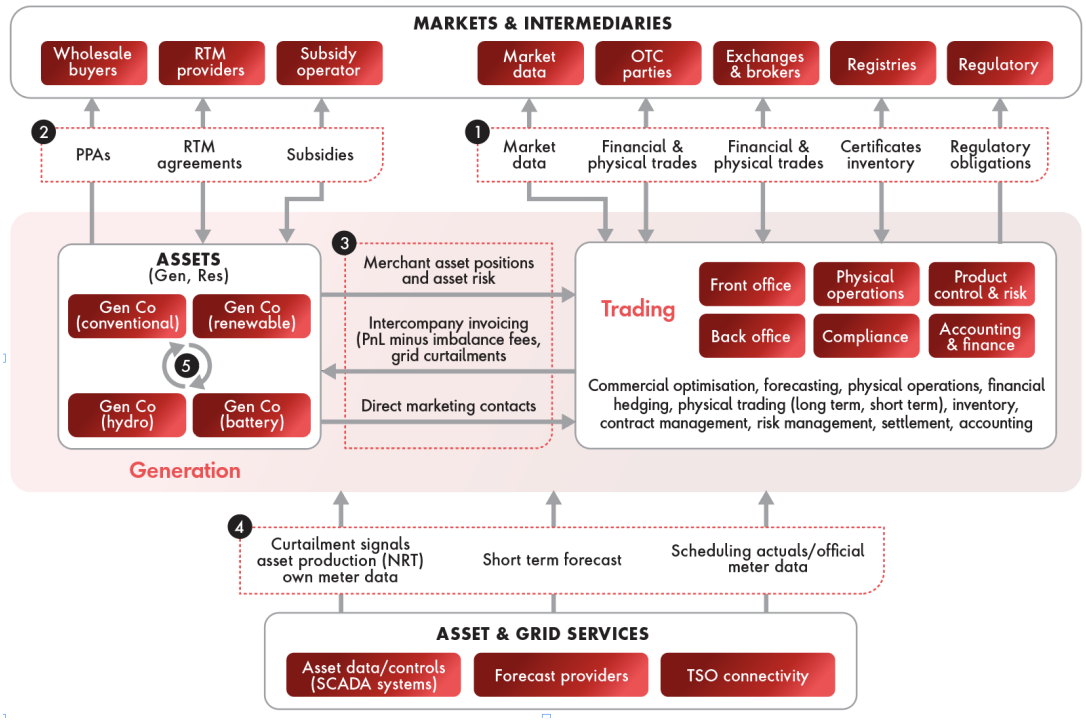
FIT FOR PURPOSE

Our solution incorporated the needs of the business, prioritizing a high-growth potential region and designing it as a standalone unit enabled by the existing trading systems and processes

Reference Business Model

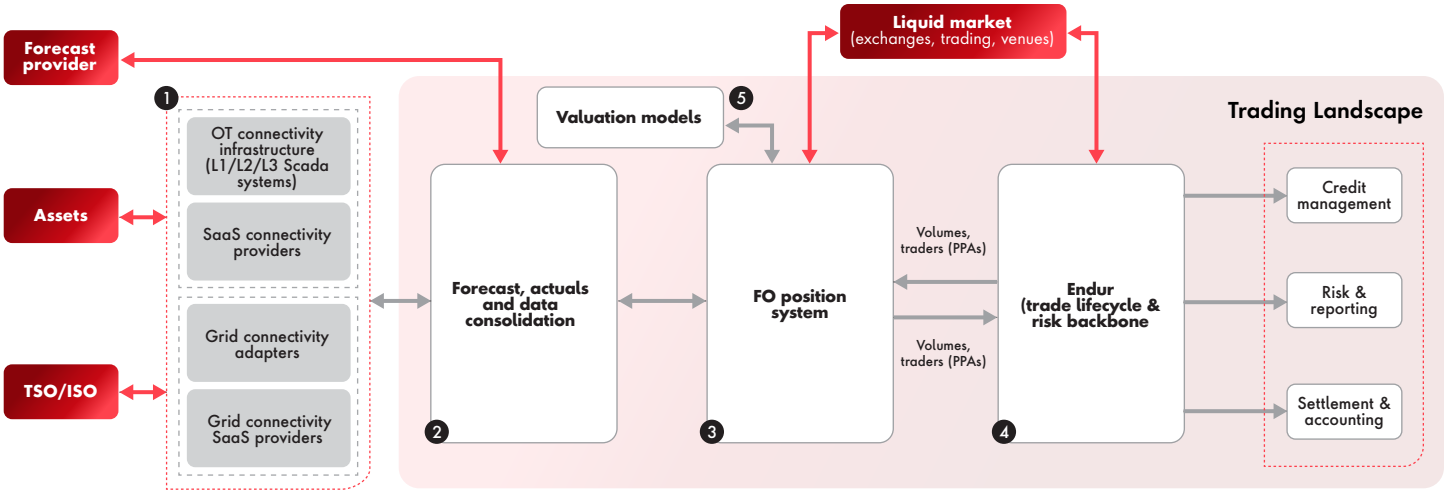
The business model for the physical power generation, supply and trading entities show the commercial relationship between them and also highlight that the inter-company agreements are equally complex and critical for overall business context.

1. Commercial/trading interactions with the market
2. Operational and commercial agreements & interactions for physicals. Service agreements for RTM
3. Intercompany agreements between Generation and the Sales/Trading for sales of power or hedging (multiple models – transfer price, profit sharing)
4. Relationship and data flow from external service providers
5. Inter-company interaction between generation companies



Reference Architecture

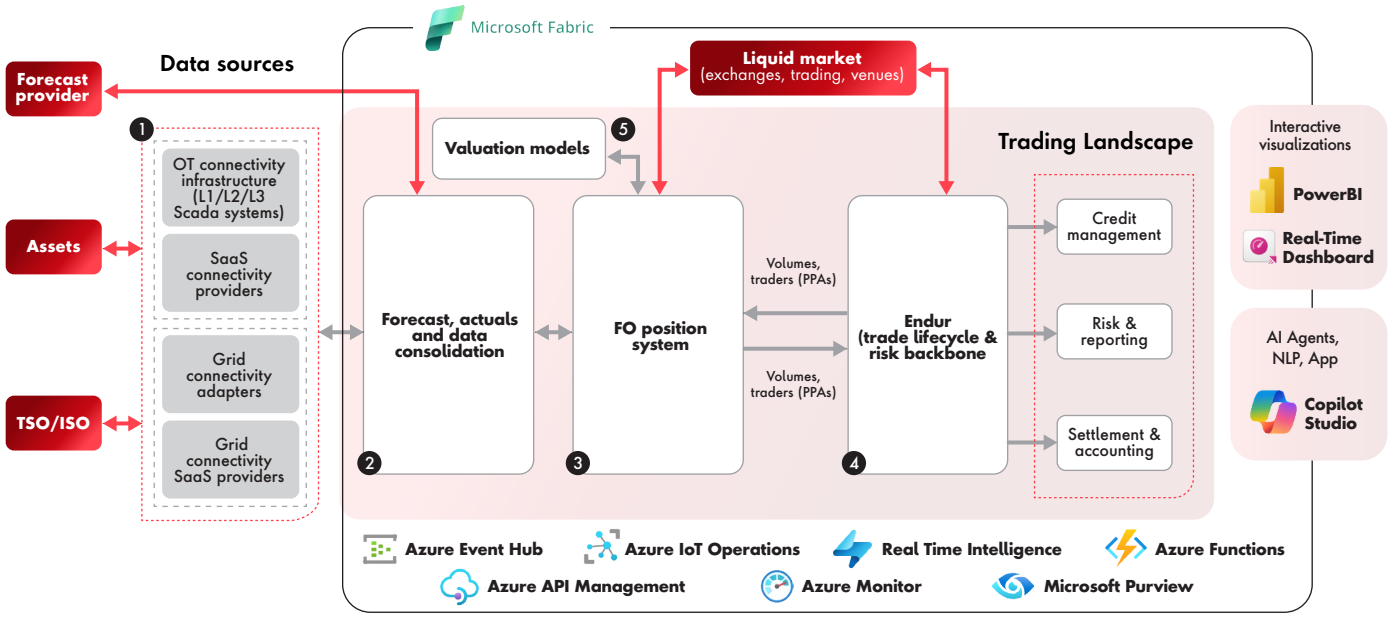
The combined capabilities across OT and IT areas enable the business to manage assets and take data driven decisions on hedging.



1. OT infrastructure for operational data incoming from assets and grid operators on NRT production, metering data. Also, outgoing curtailment instructions and nominations. Some markets have custom build connectors, others have standard SaaS solutions.
2. Consolidation of operational data incoming from assets and grid operators. Aggregate positions, blending of forecasts, business rules and also data curation for outgoing communication for nomination and curtailments.
3. FO position monitoring and trading / hedging decisions considering market value factors, ST forecast and asset availability.
4. Use of data series to model complexity of multiple timeseries associated with asset and PPA contracts.
5. Market value factors and delta (Subsidy) feeding into hedging decisions.

Technical Approach

Leveraging Microsoft Fabric, Azure services and Microsoft Copilot Studio to achieve the expected outcomes and provide a transformative solution.



Let's get started!

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