

value

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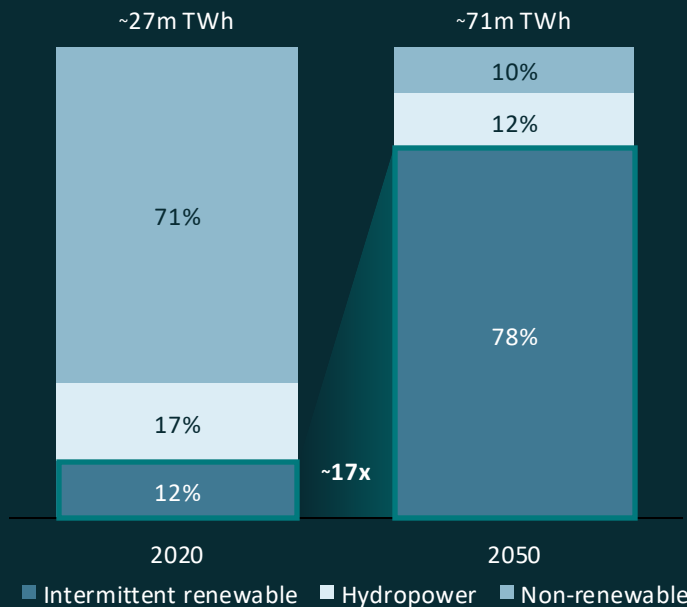
Boosting Profits with Smart Power

Advanced Optimisation and Automation for Multi-Asset Portfolios

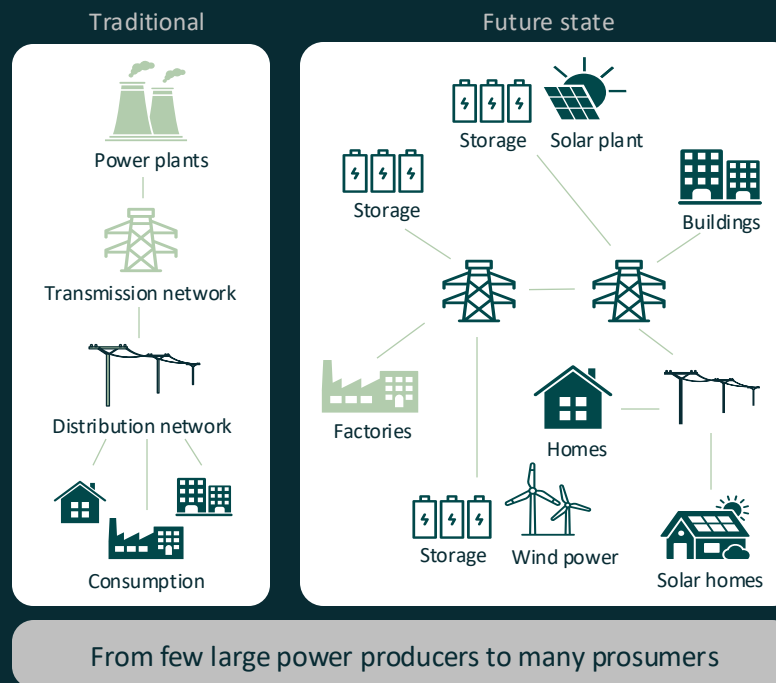
A growing share of intermittent power sources imposes new challenges for power producers and grid operators

A rapid increase in intermittent renewable energy production

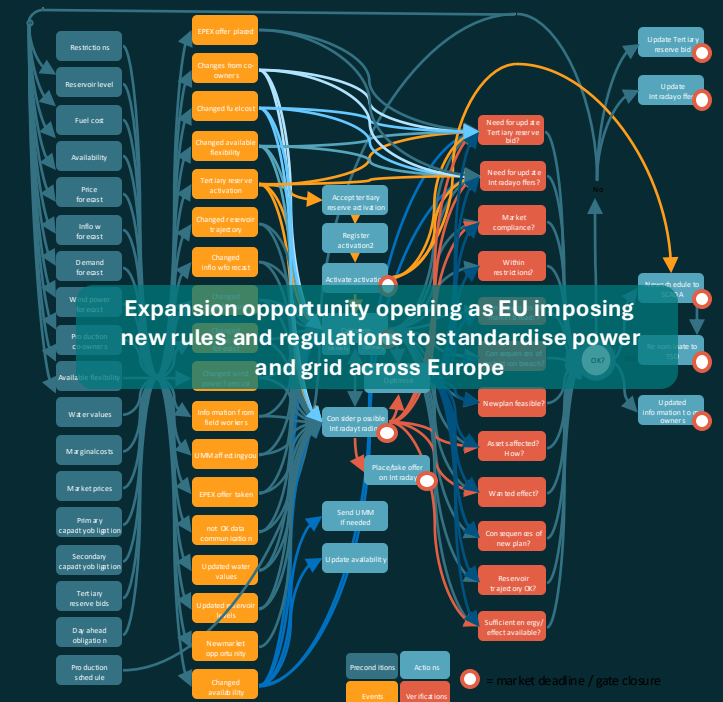
Global electricity generation by source in IEA Net Zero Emission by 2050 scenario



Moving from a centralised to a distributed power system



Optimisation, trading and grid operations is becoming more complex

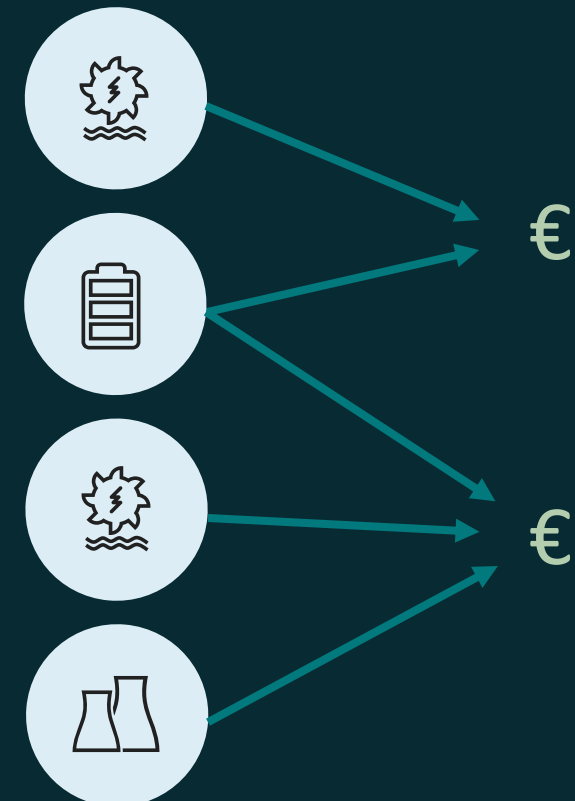
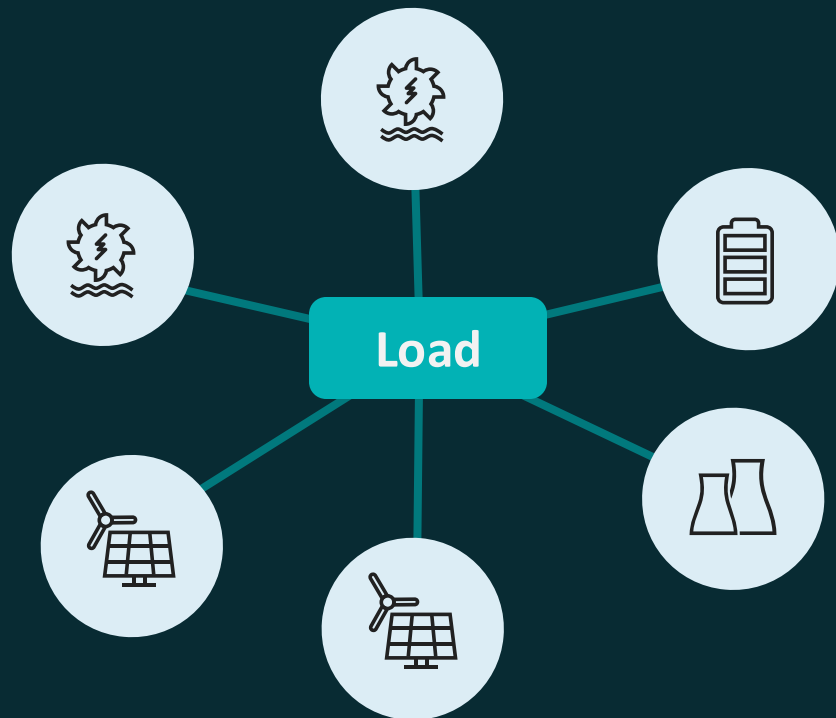


Strong and increasing demand for software and services that can address complex and real-time decisions

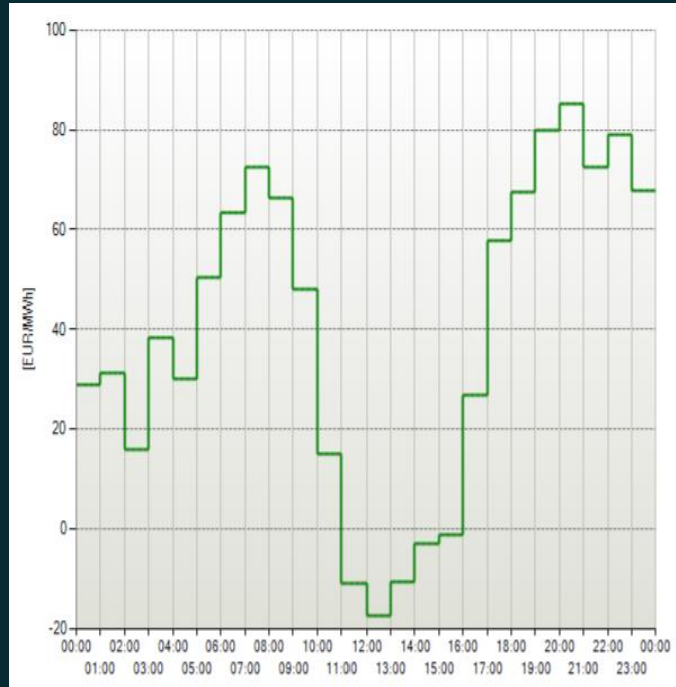
What does this mean for asset optimisation?

From internal optimization to market optimization

- Need to connect to markets in integrated manner
- Need for market analysis to make correct decisions in algorithms
- Willingness to act on markets actively

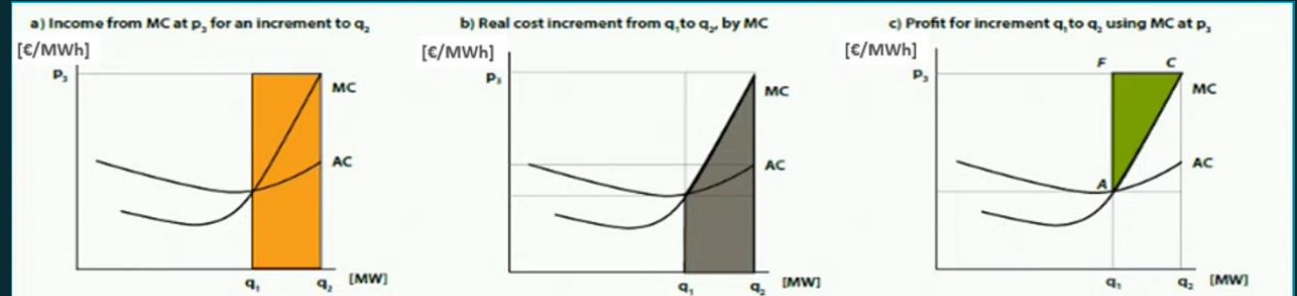


Deterministic scenarios: Opportunity costs calculation

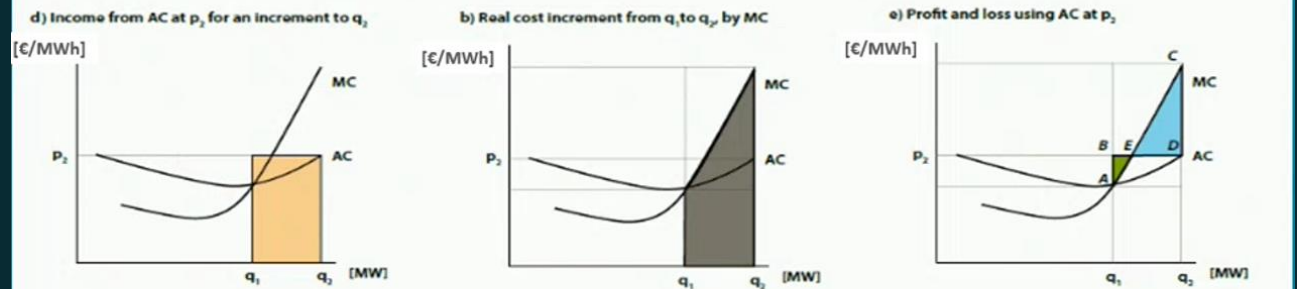


Post processing: Marginal Cost Pricing

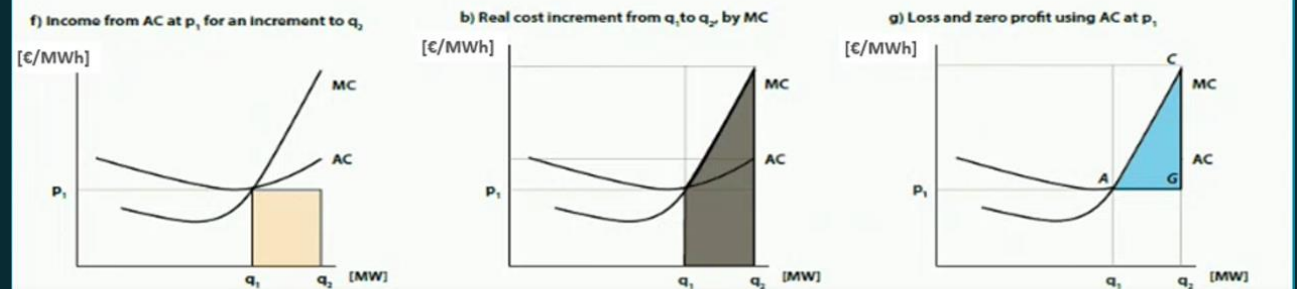
1. Selling power to Marginal Cost



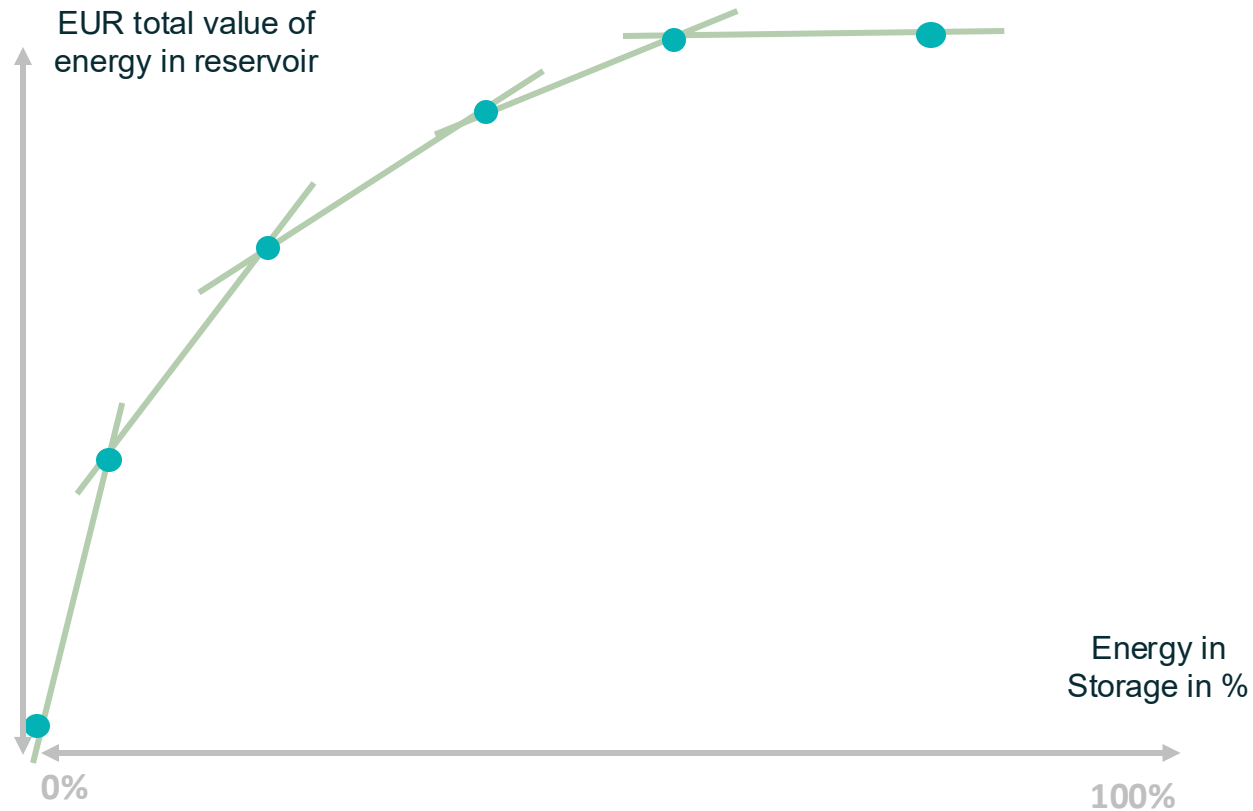
2. Selling power to average cost at maximum production



3. Selling power to average cost at best point



Stochastic: Evaluation of value with uncertainties



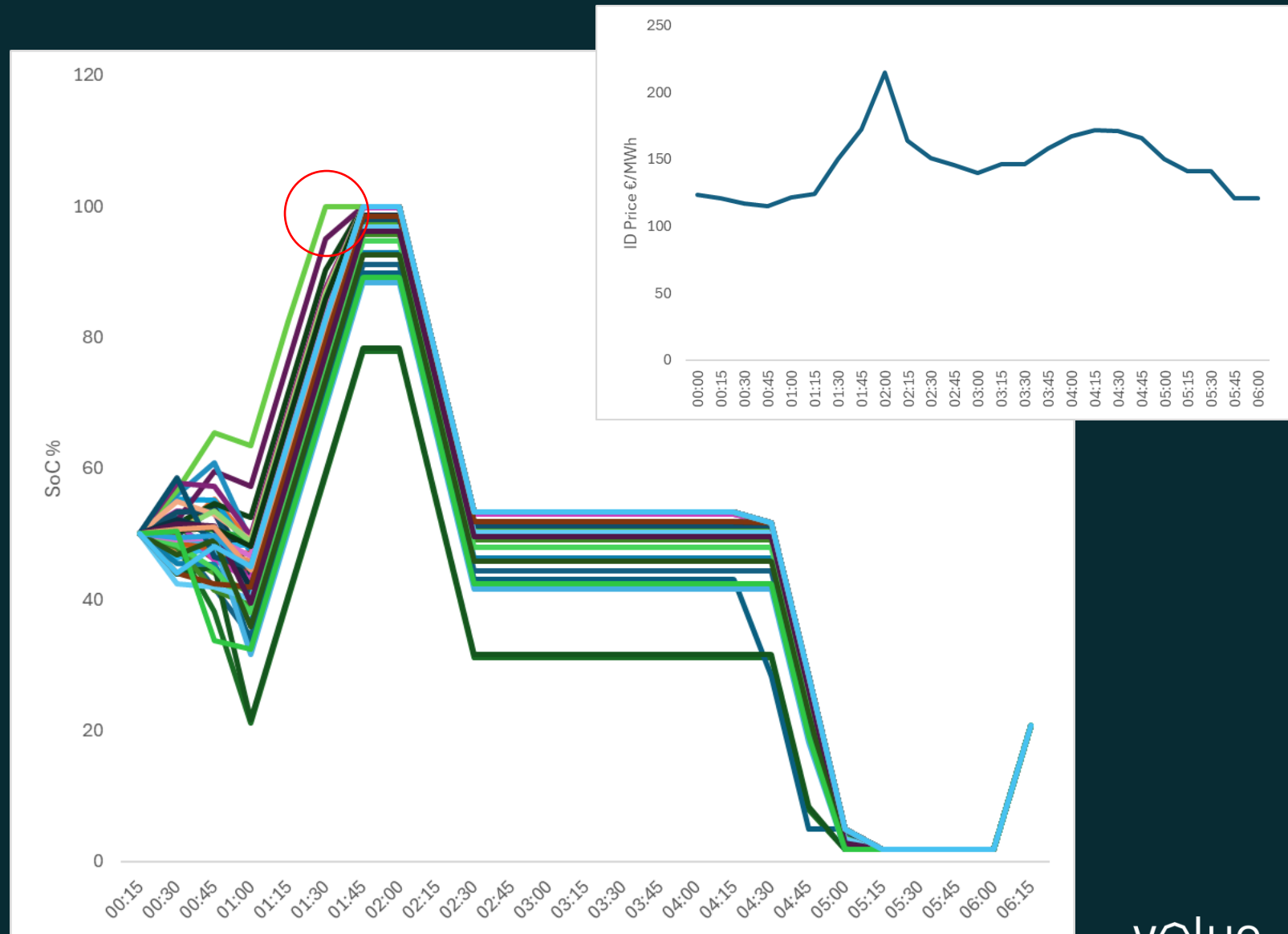
- Energy value is evaluated using scenarios taking in account uncertainties
- Used as starting point for short term optimization
- Risk for running out of energy can be quantified.

Example: Water values for large Hydro reservoirs

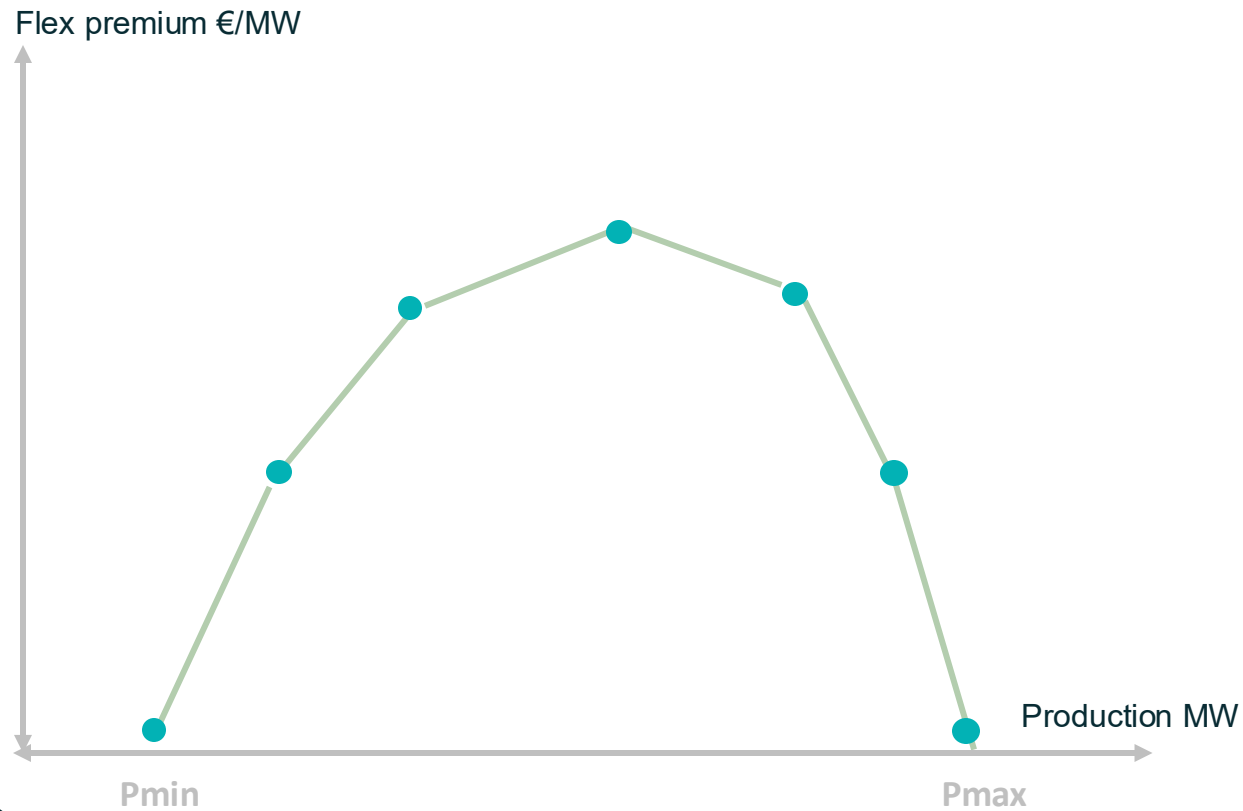
- Stochastic inputs price and inflow
- Usually run for 0.5-3 years ahead
- Updated weekly

Short term stochastic : Energy Activations

As the highest price is at 01:45
model prefers to get as much energy
as possible even over buying for
some scenarios.



Optimising Flexibility Premium



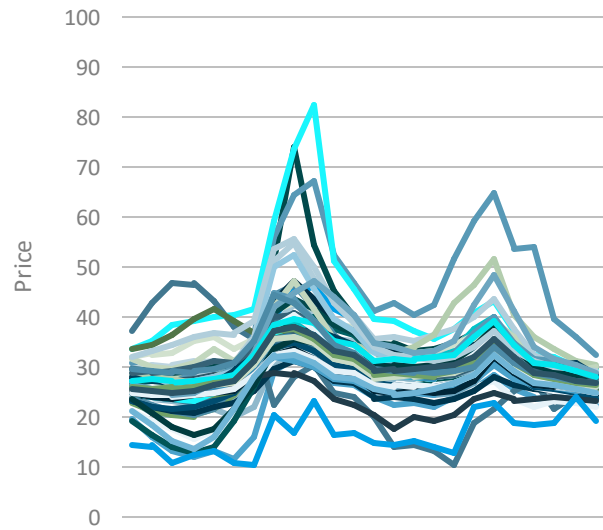
- Asset is awarded a premium for Flexibility
- Operating in the middle is preferred for maximum flexibility
- Activation change for reserves is increased due both directions

Example: Value Flex trading

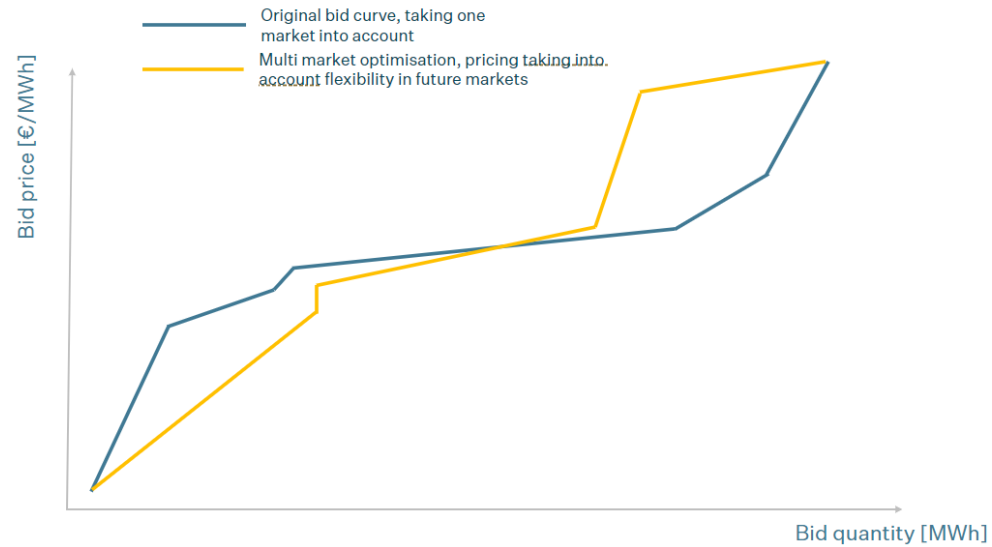
- Algo trader sells flexibility to short term markets
- Expected revenue 3.0–5.0 €/MWh flex

Multi-Market

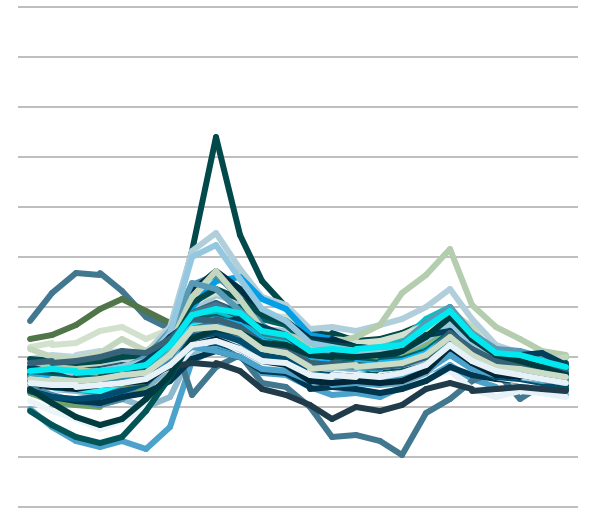
Price scenarios



Multi-Market optimisation



Production plans



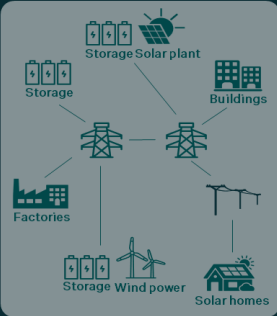
Need of automation



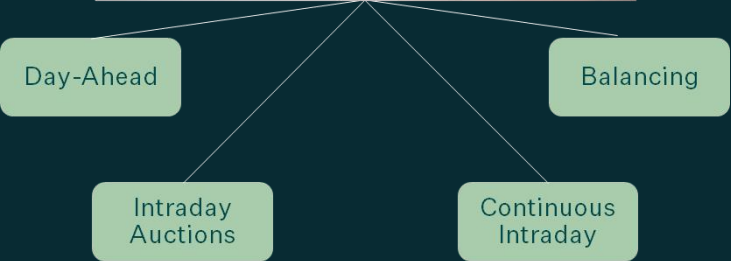
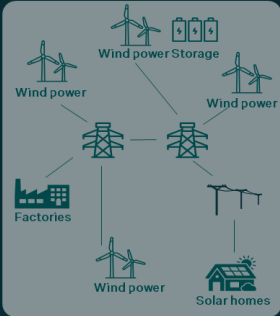
Traditional



Month 1

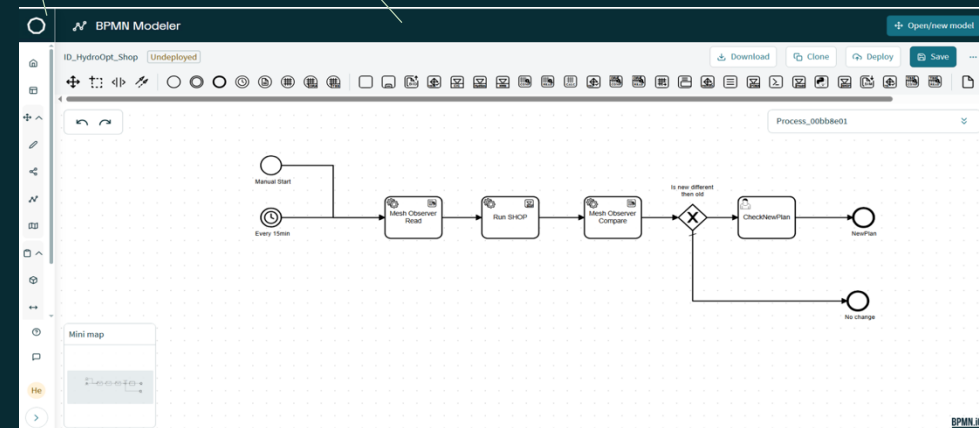
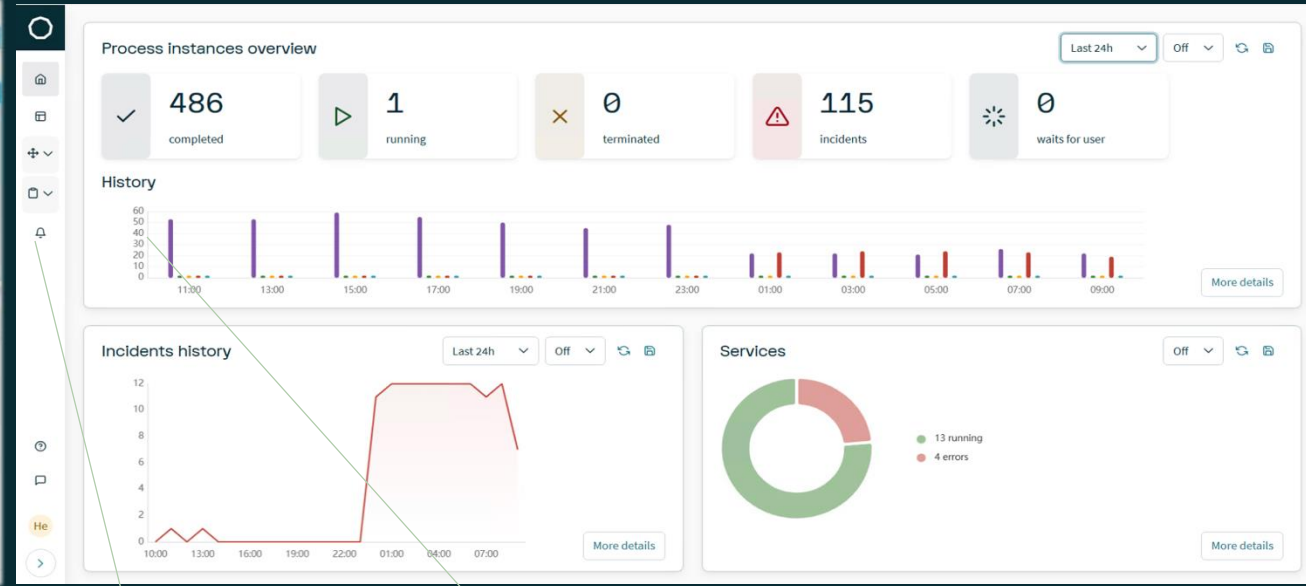
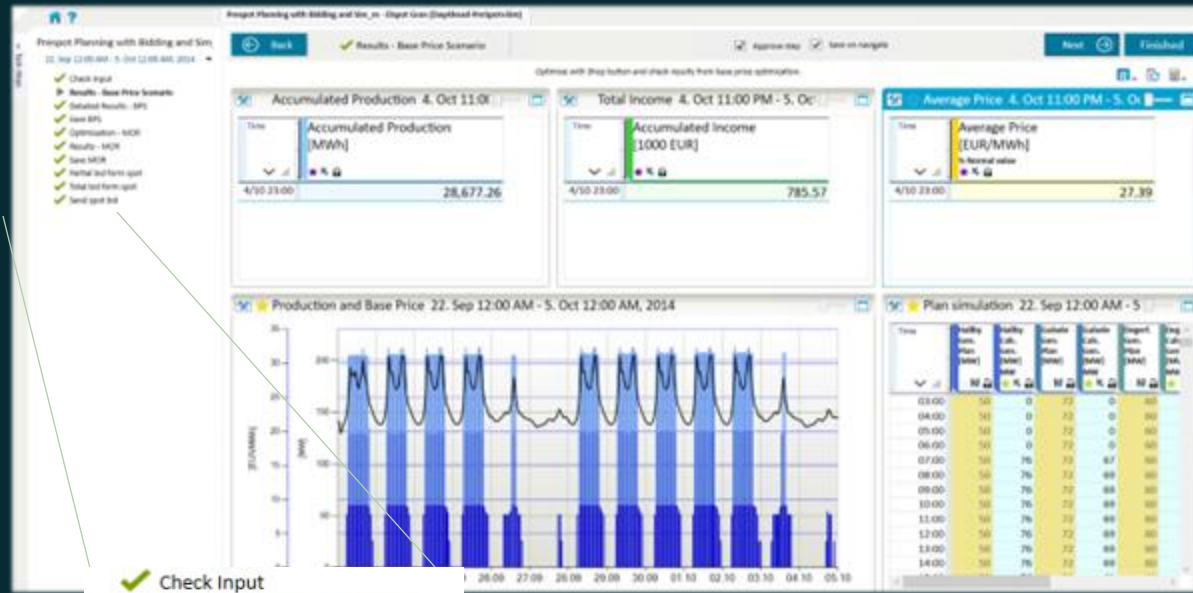


Month 2



Smart Power

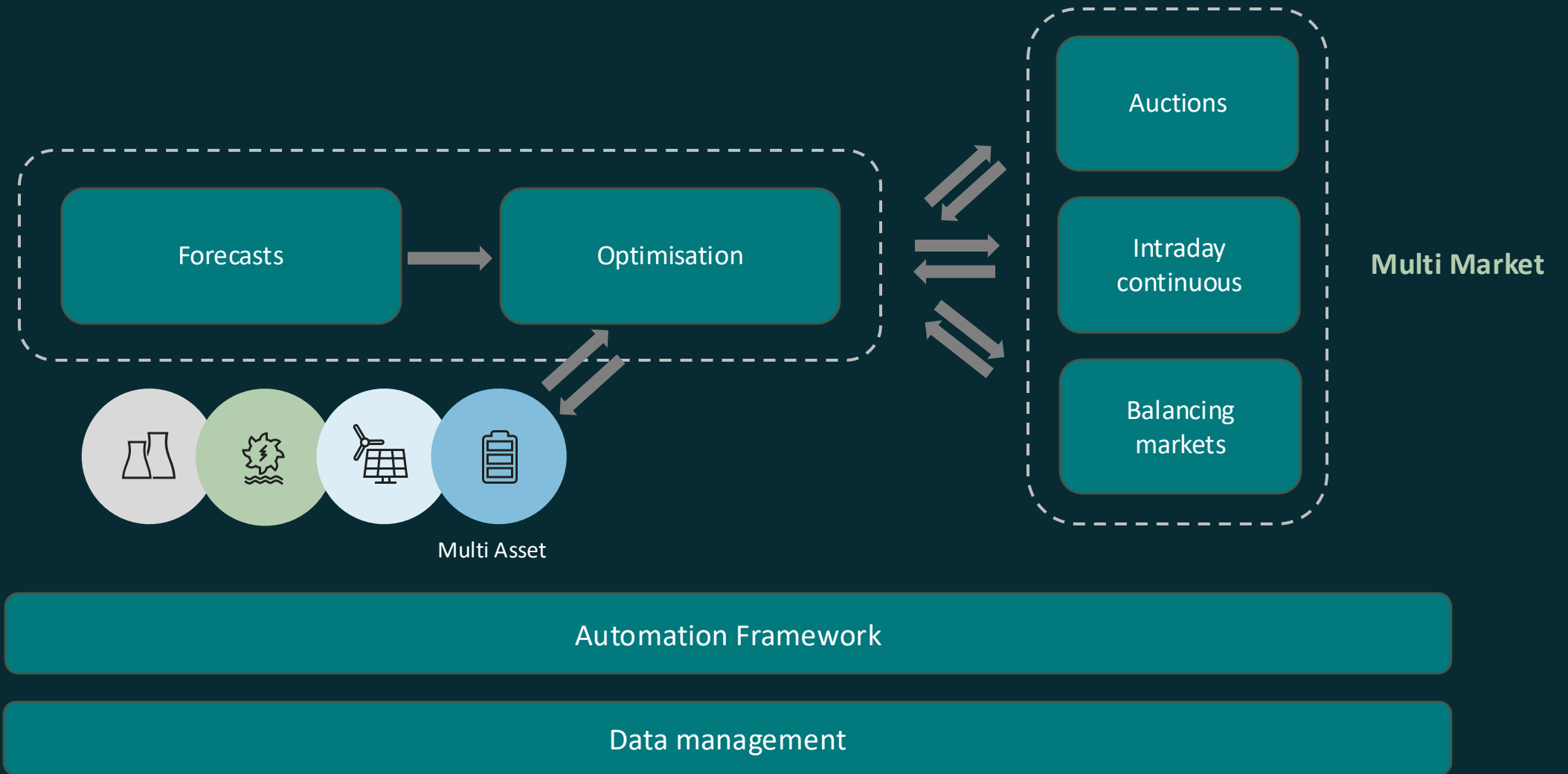
From manually triggered to event triggered automation





Is there a process that cannot be automated at all?

Smart Power



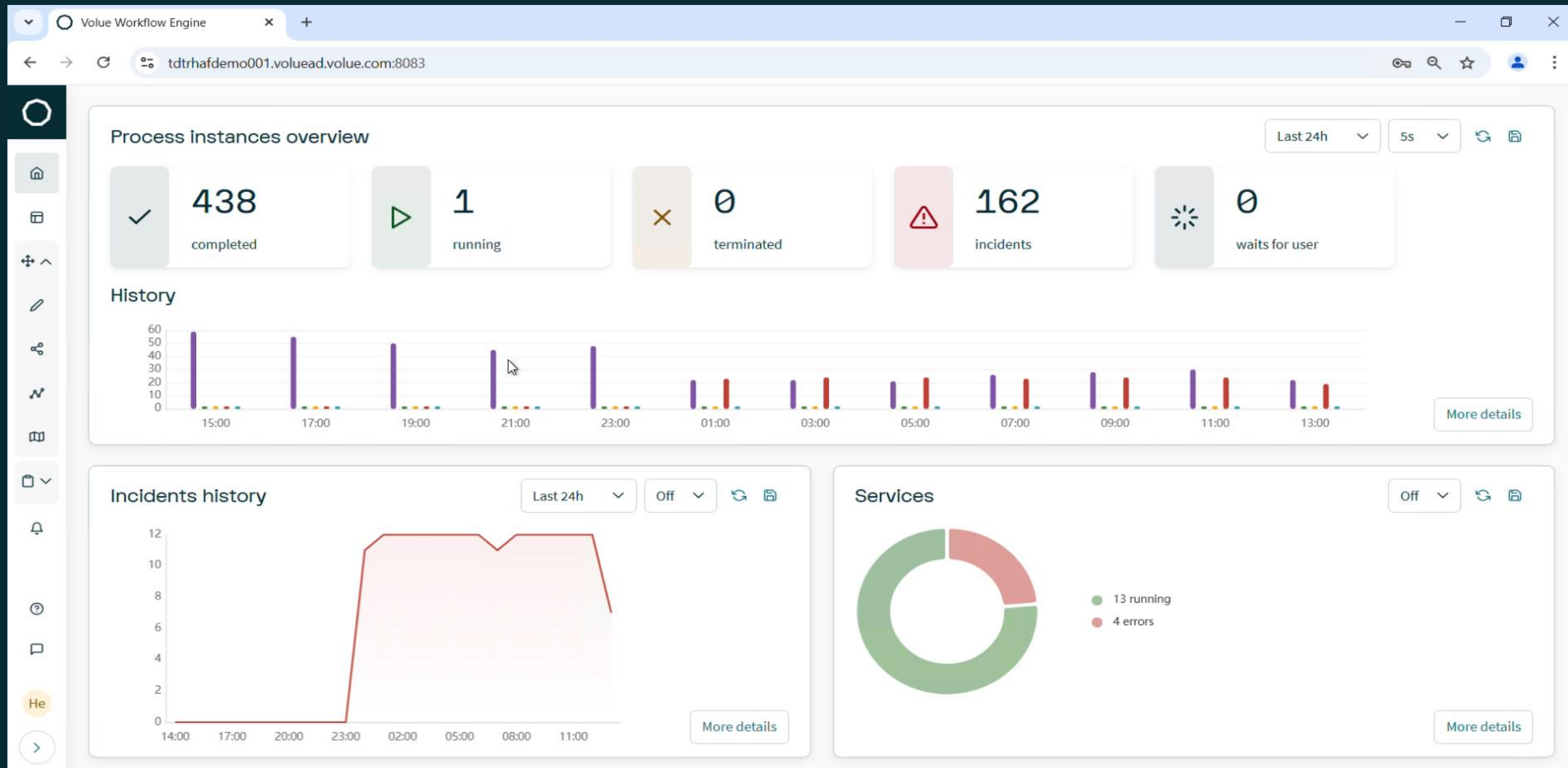
Full control of input

Availability Planner Beate Sæther[illegible]

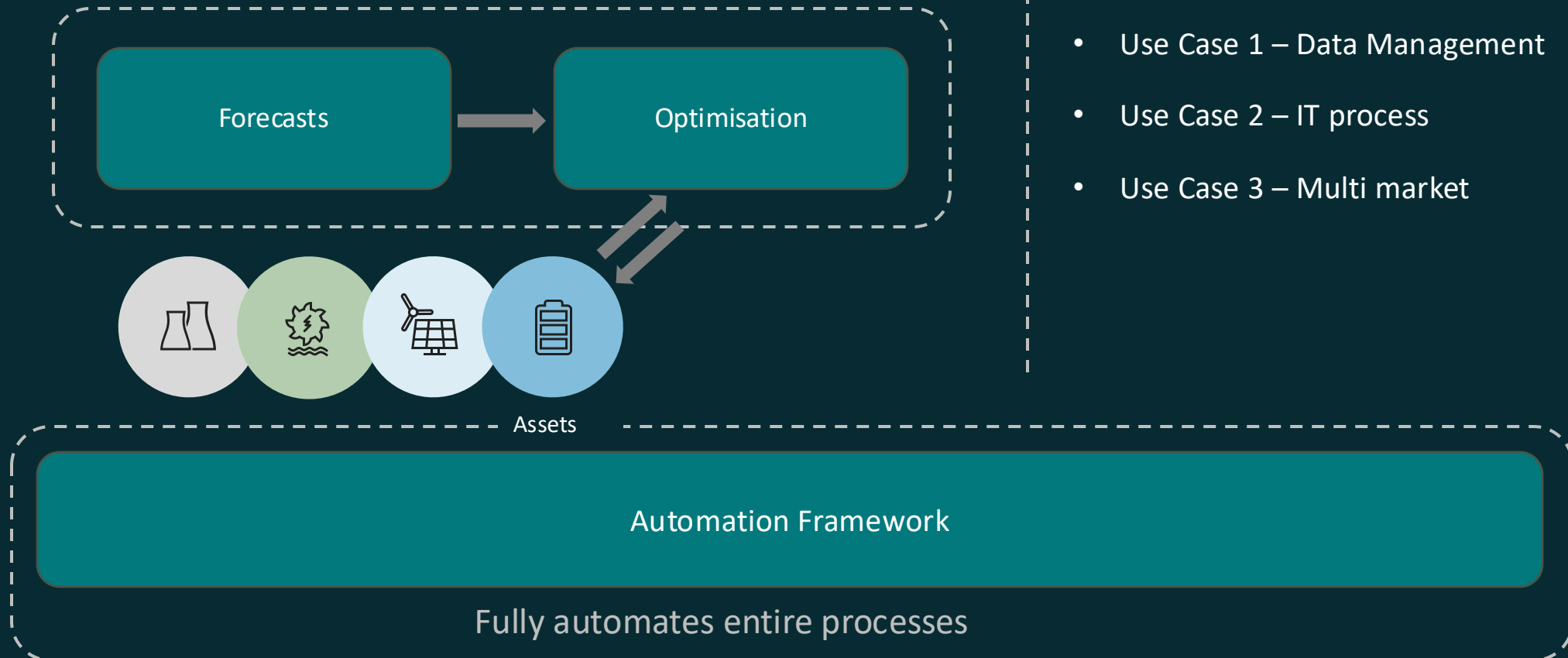
Event based automation

value

Asset onboarding

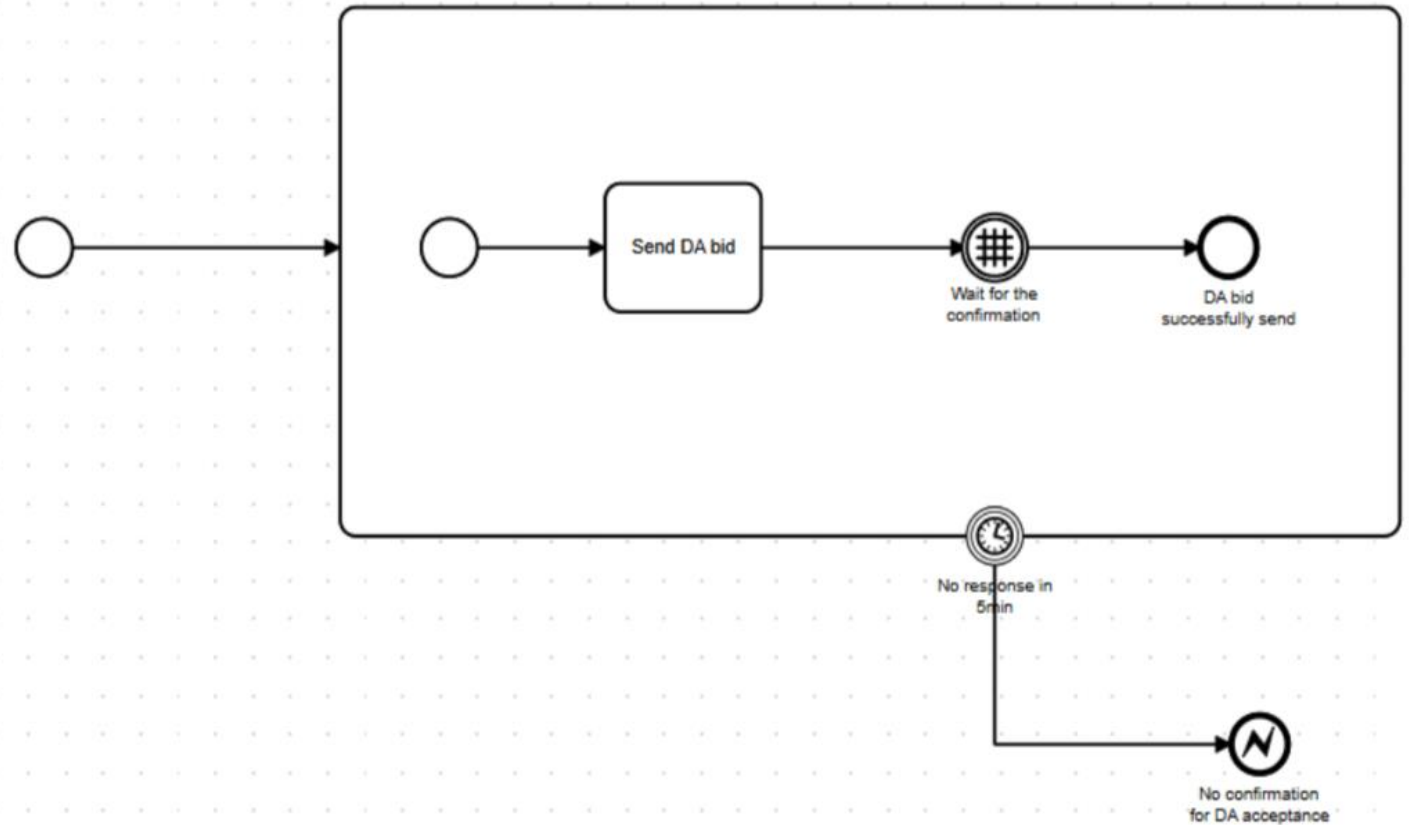


Normally still only partially automated by power producers



Event based automation

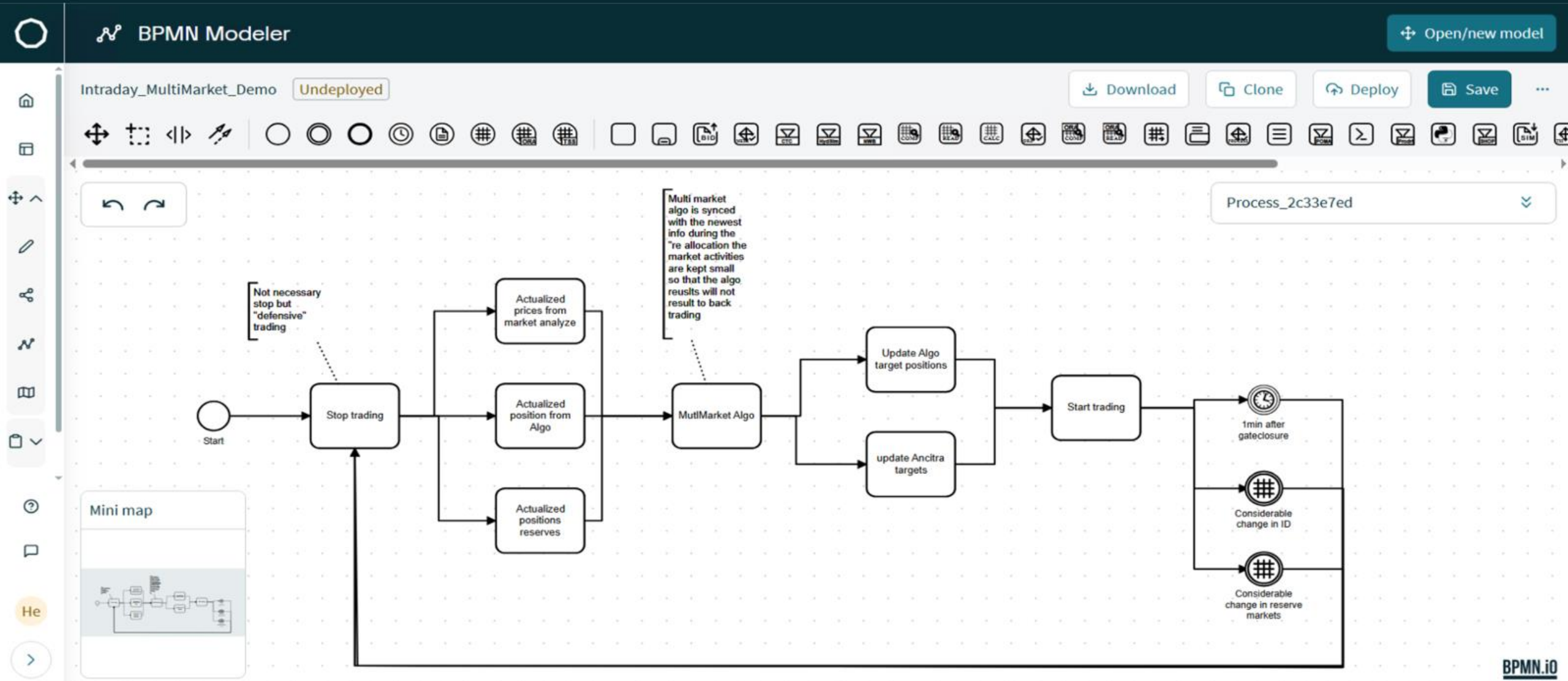
Use case – IT process

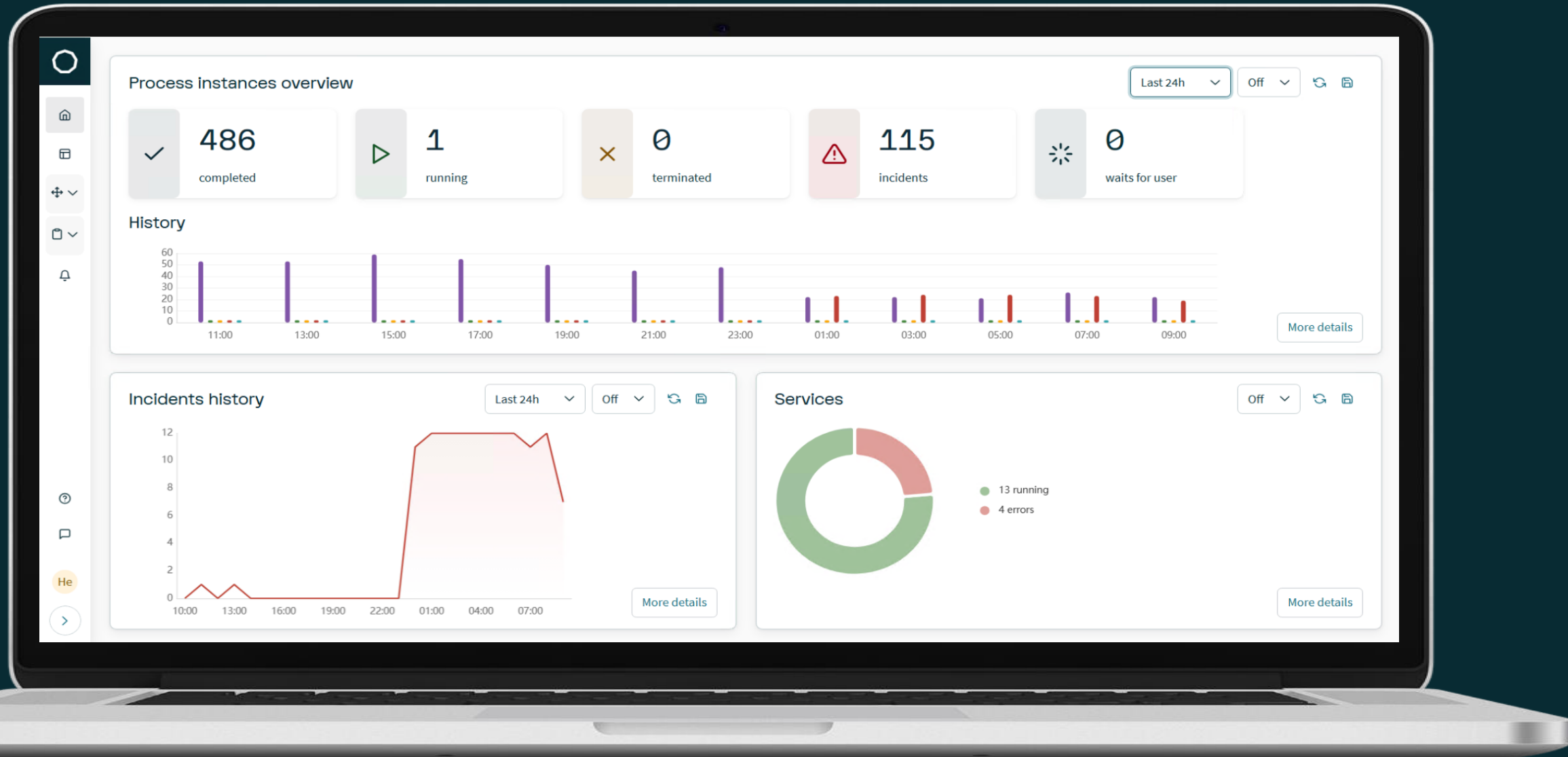


Event based automation

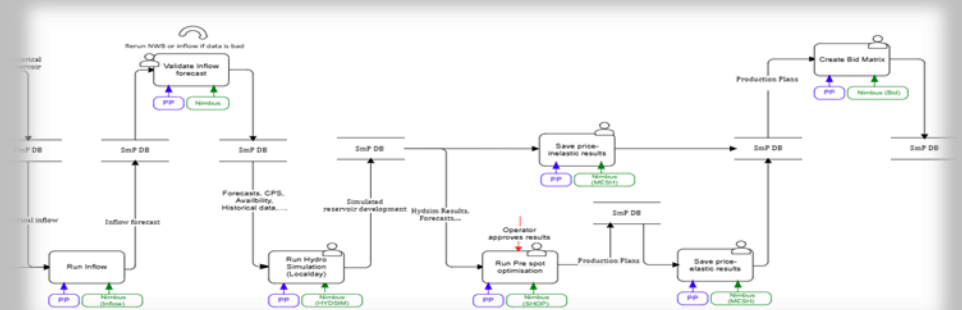
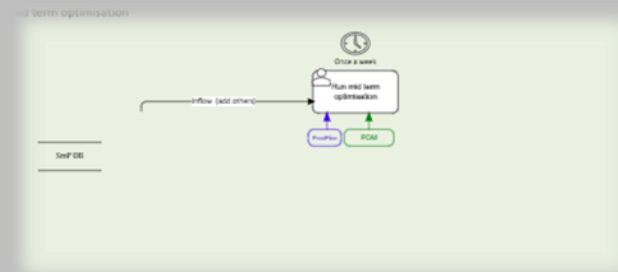
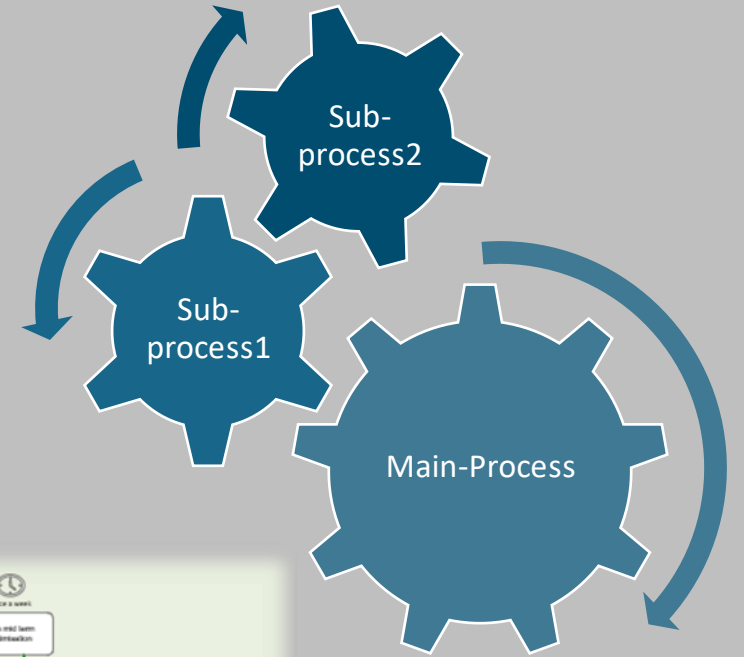
value

Handle multiple markets





Enabling automation with business process modelling



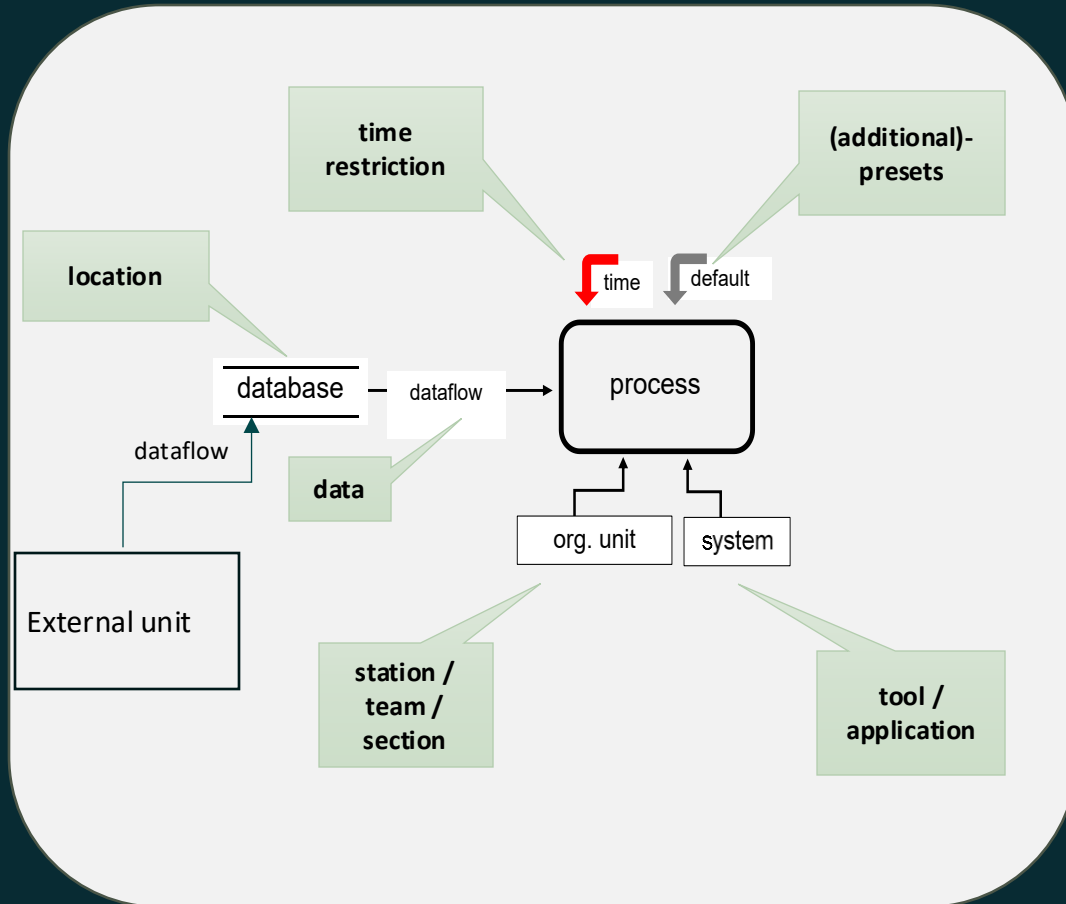
Energy-production & trading planning processes

Examples



Method of business process modelling

Structured analysis and design technique (SADT)



Method

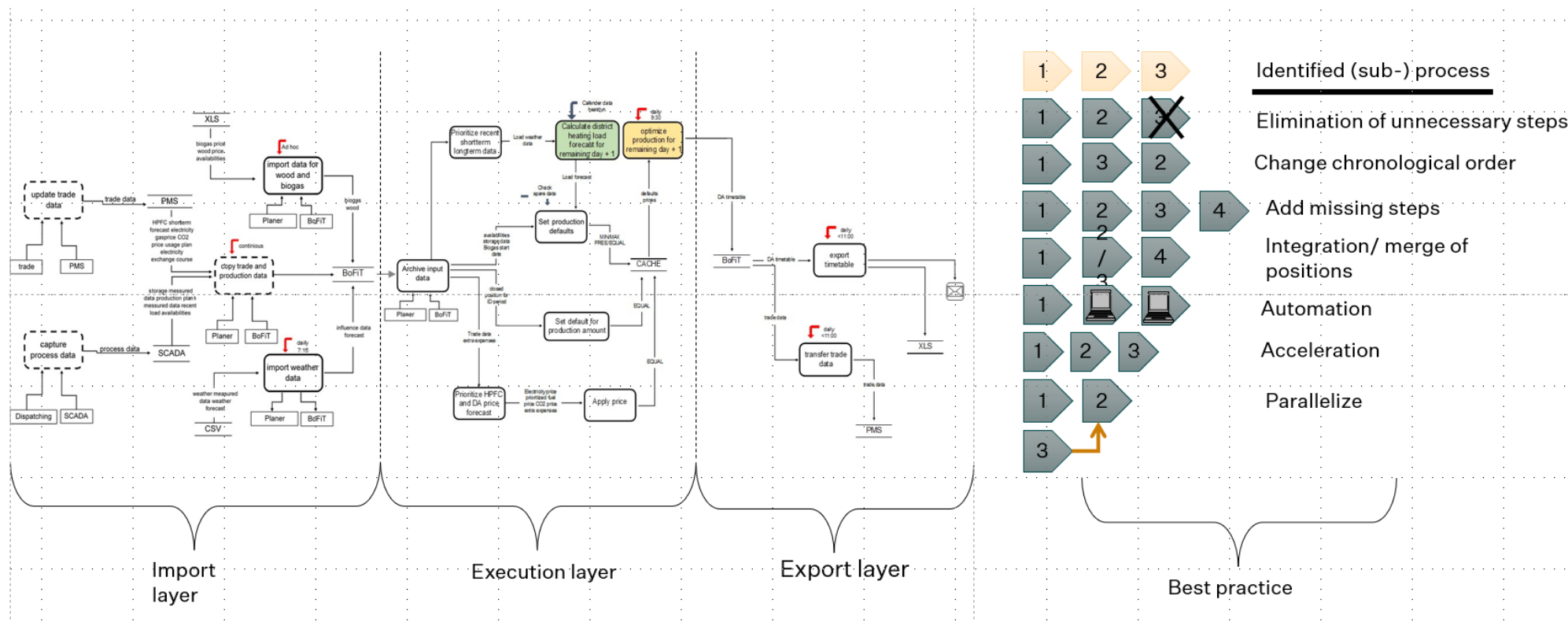
- Shows how the dataflows is organized
- Very simple but effective way to pin down the key facts
- Interview technique
- It merges IT-infrastructure, interfaces, data- and communication flows and modelling in one landscape
- It maps responsible persons/ departments/ owners
- Proven in many implementation- and sales projects

3 Steps:

- Status quo process Modell/ pain point identification
- Process-to-be modelling (target concept; best practice)
- Move from status quo-process to target process (elimination of weaknesses & former design flaws)

Example Day-Ahead planning

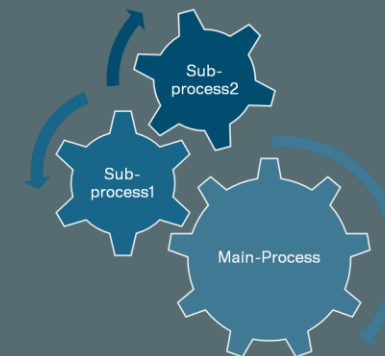
Process organization chart





Value business process modelling

Methods & value added

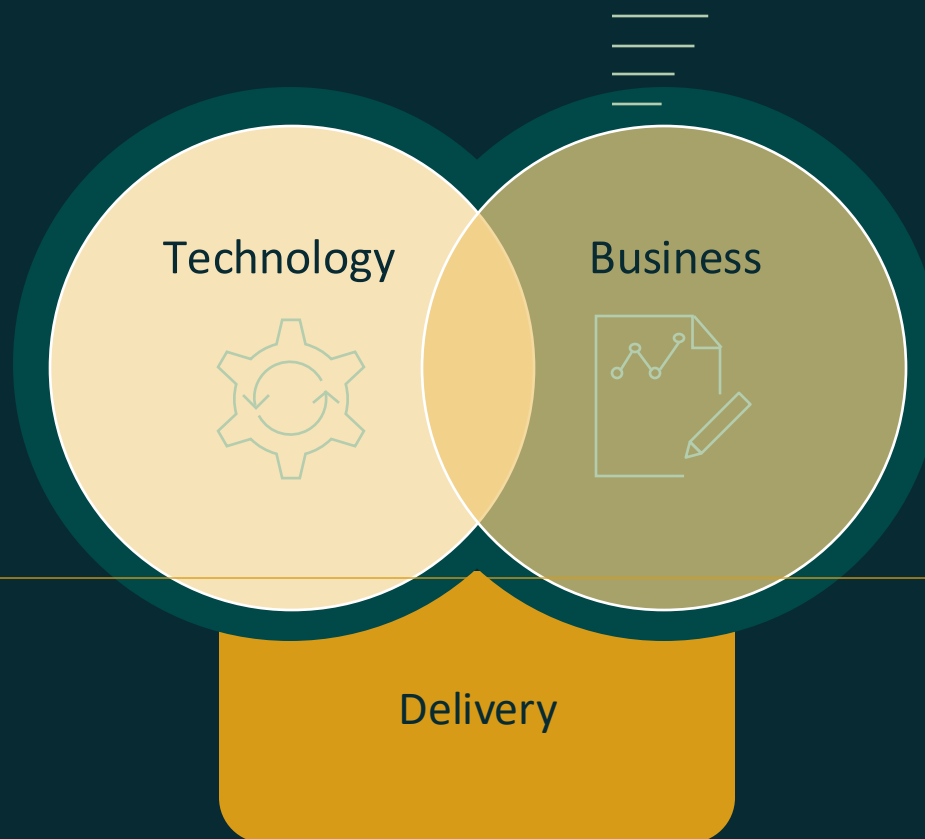


Analysis and diagnosis

- IT Infrastructure
- Interfaces
- Technology Project management
- System integrations
- Innovation and adoption of New Technologies
- Data analysis

Business process and model analysis

- Data-flow analysis
- Process-optimization
- Organizational transparency
- Best-practice transfer/ competence sharing
- Delivery enhancements
- Responsibilities are mapped & clearly defined



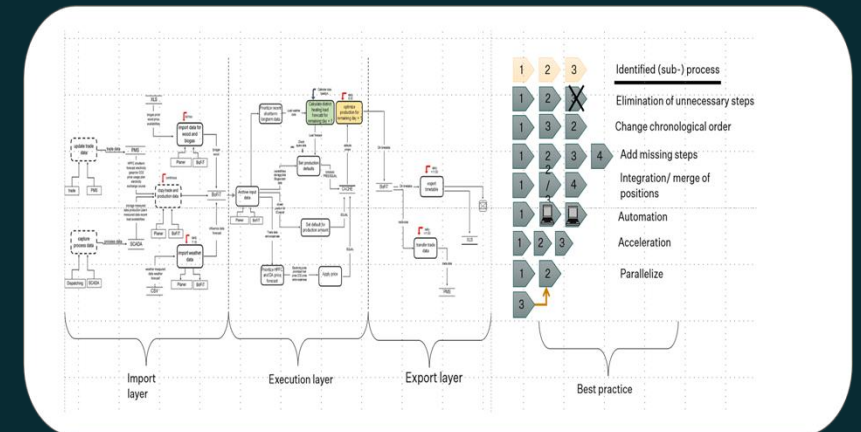
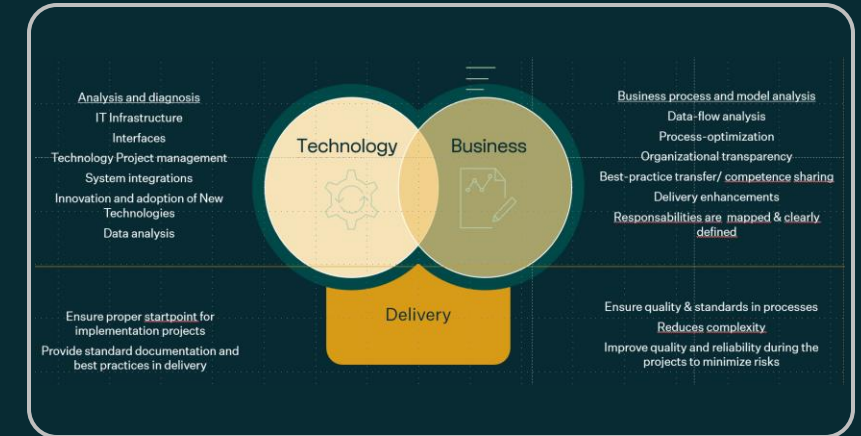
- Generate proper startpoint for implementation projects
- Provide standard documentation and best practices in delivery

- Ensure quality & standards in processes
- Reduces complexity
- Improve quality and reliability during the projects to minimize risks

Value business process modelling



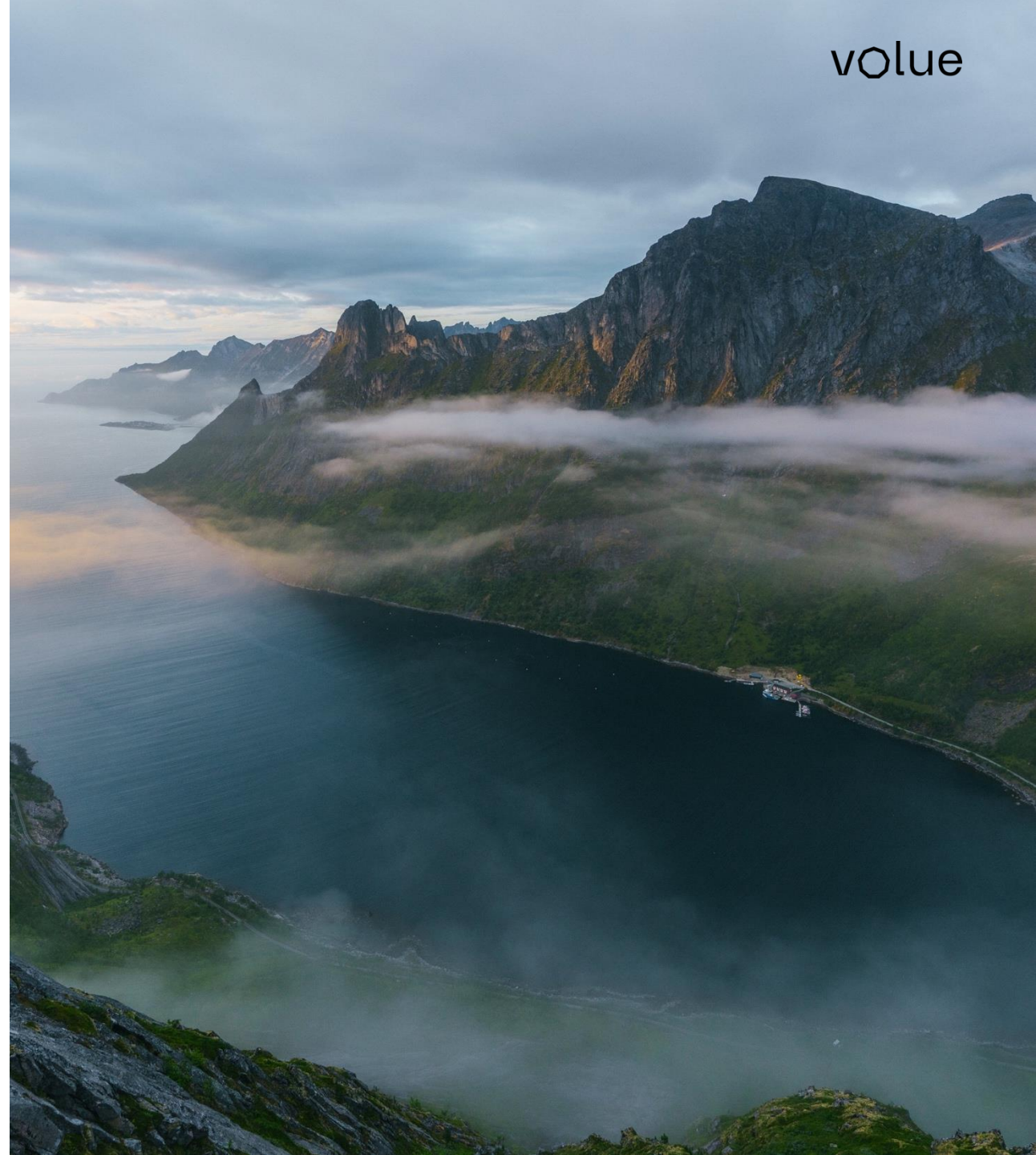
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Conclusions

- Market changes leads to more complex processes
- Going from internal to market to multi market optimisation
- The need for event based automation in real time increases
- Automation of several tools playing together is a key for profitable trading
- Attention dashboard to overview automated processes

value



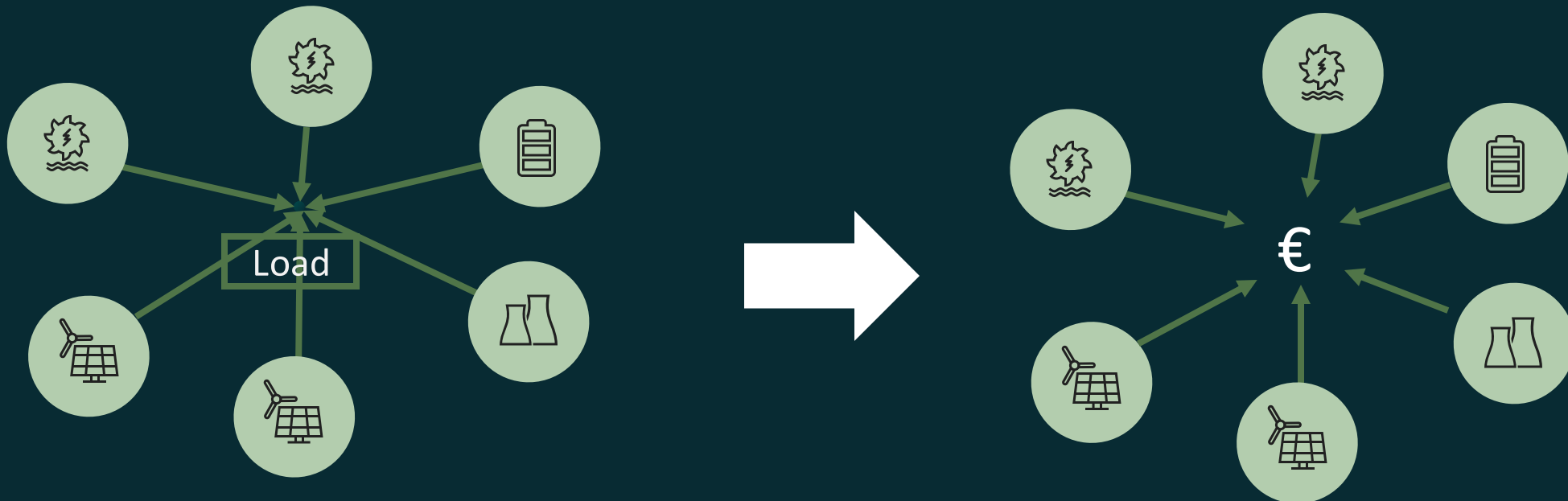
Thank you

Backup

Optimisation of a big number of assets

To optimize problems with big amount of assets (in thousands) in short times for short term planning we "decompose" the problem. Volue uses Lagrangian relaxations for this:

- Lagrangian relaxation applied to energy balance / reserves
- Lagrangian multipliers, "shadow prices" introduced
- Subproblems: optimisation against shadow price
- Price coordination, "master problem", dual optimisation



Event based automation - Use case – power plant optimisation

Volue Workflow Engine

tdtrhafdemo001.voluead.volue.com:8083/#!/dashboard

Operator's Dashboard

Model

Process instances

168 incidents

Search 981 instances

Time range

24.03.2025 - 25.03.2025

Filter by status

Select...

Filter by tags

Select...

Auto Refresh

Off

	Name	Output Parameters	Trigger	End Event	Status	Started At	Tags	
✓	☐ HydroOpt		⌚ (Every 15min)	No change	Completed	25.03.2025 15:45:00	Hydro Intraday Demo	...
✓	☐ ID_Battery_Opt		⌚ (Every 15min)	NewPlan	Completed	25.03.2025 15:45:00	Battery Intraday	...
✓	☐ BatteryPortfolio_Optimize		⌚ (Every 15min)	TraderUpdated	Completed	25.03.2025 15:43:00	Battery Algo	...
✓	☐ HydroOpt		⌚ (Every 15min)	No change	Completed	25.03.2025 15:30:00	Hydro Intraday Demo	...
✓	☐ ID_Battery_Opt		⌚ (Every 15min)	NewPlan	Completed	25.03.2025 15:30:00	Battery Intraday	...
✓	☐ BatteryPortfolio_Optimize		⌚ (Every 15min)	TraderUpdated	Completed	25.03.2025 15:28:00	Battery Algo	...
✓	☐ HydroOpt		⌚ (Every 15min)	No change	Completed	25.03.2025 15:15:00	Hydro Intraday Demo	...
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✓	☐ BatteryPortfolio_Optimize		⌚ (Every 15min)	TraderUpdated	Completed	25.03.2025 15:13:00	Battery Algo	...
✓	☐ HydroOpt		⌚ (Every 15min)	No change	Completed	25.03.2025 15:00:00	Hydro Intraday Demo	...

1

2

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4

5

99

1-10 of 981

Show

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