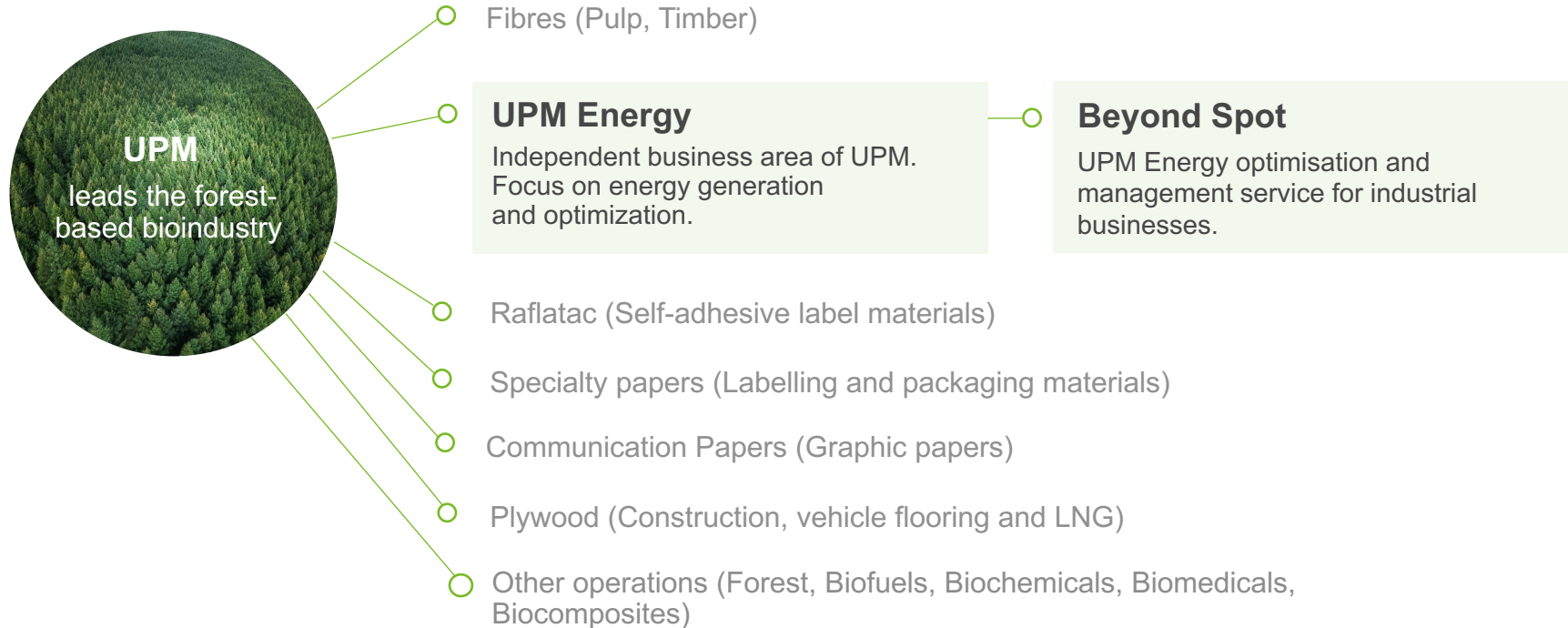


Beyond Spot[®]

An Innovative Energy Management Service For Industrial Businesses

Jukka-Pekka Häkli, UPM Energy
29th November 2022

Our industrial DNA

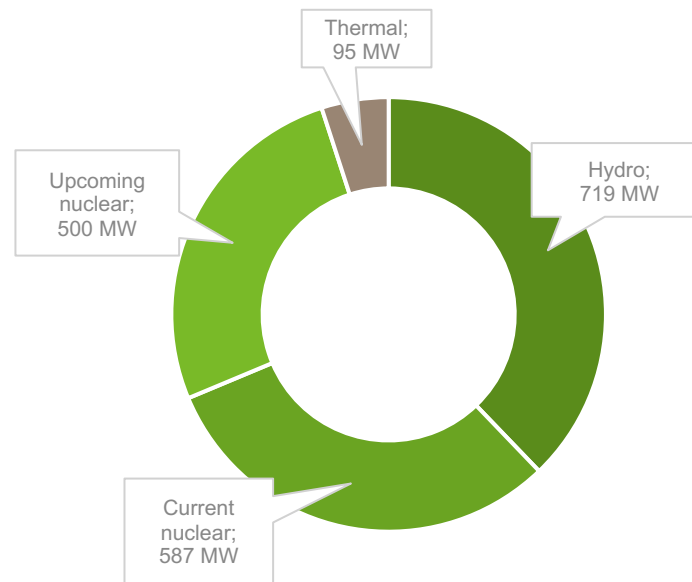


UPM Energy is significant producer of low emission energy, with its competitive electricity generation asset portfolio



- Second largest electricity producer in Finland
- Current generation capacity 1,400 MWe
- Share of upcoming OL3 capacity 500 Mwe
- UPM Energy is growing on CO₂ free electricity generation - 98% of production CO₂ free (2020) and increasing

In addition to UPM Energy's assets, UPM Group has generation assets worth 1,400 MWe at its mill sites



Annual production around ~9 TWh, of which clear majority is nuclear and hydro

More uncertain and complex energy markets require new thinking and actions



Uncertainty and complexity are increasing

Political dimension is a growing factor in energy markets.

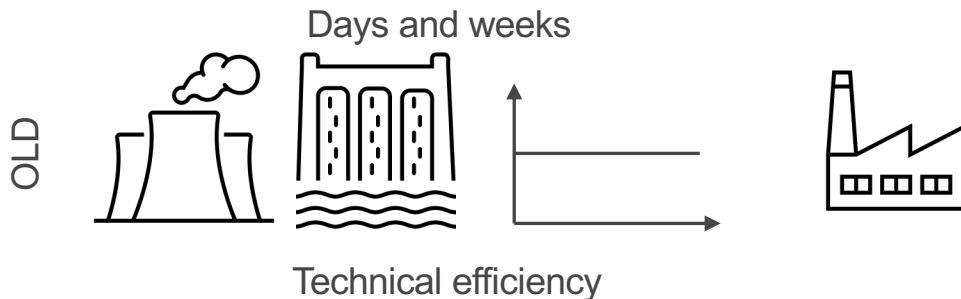
Renewables and hydrogen economy are game changers

Market design and roles are changing. From traditional producer-consumer roles to multidimensional market actors.

New operational environment requires new thinking

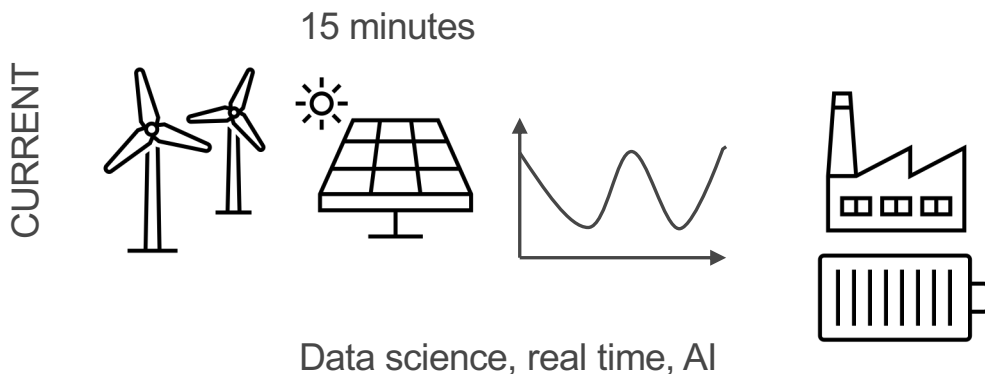
Growing need to operate outside the traditional box and think about energy in larger scope than just in megawatts

Energy transition means that consumer needs to engage more in maintaining energy balance



New world order needs new skills and capabilities

More IT and data than technical – energy is numbers and real time data transfer



Less forecasting and more adaption – probabilities more relevant than bad forecasts

Need for speed – accelerating technological development and requirement for quick response times

Energy market transformation is already here and it is accelerating - Luckily the needed tools already exist!



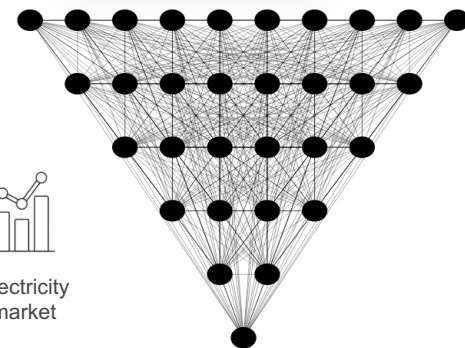
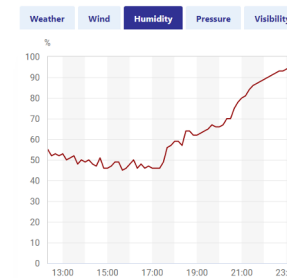
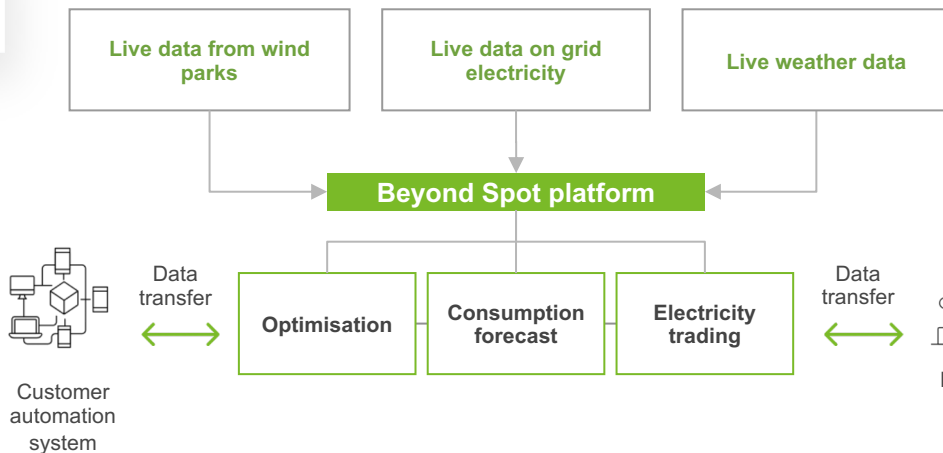
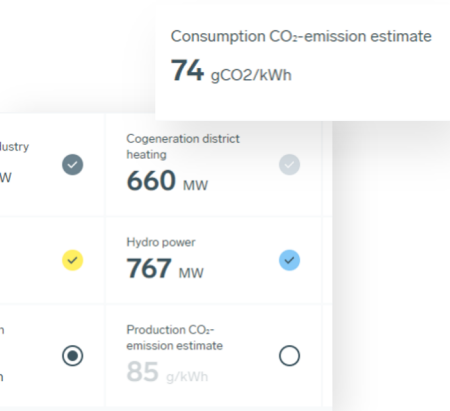
- The more there is renewable power production capacity, the higher the power price volatility. Wind power capacity will increase 1700 MW this year. Balancing highly volatile power production needs fast response from other power producers and consumers
- The roles in the power market will turn around: The consumer will become the active one and the producer the passive one -> consumption flexibility becomes critical and pays off like never before
- There are already solutions and services to do consumption flexibility. The idea is to analyse how much could a power consumer adjust with the consumption and when, plus what is its monetary value
- To be noted: **flexibility** (use the same energy, BUT at a different moment of time than usually – can be implemented immediately, with same equipment) and **energy efficiency** (using less energy than before by investing in another equipment) are two different things!

Beyond Spot® - customer data enhanced with co-data from external sources



Via our approach, the data of **how and where electricity is consumed is visible**.

Combined with 3rd party data we can also visualize information which enables managing environmental component of the energy consumption at hourly level.



UPM Schongau



UPM Schongau is located in the German town of Schongau, some 100 kilometers from Munich.



Founded in 1887



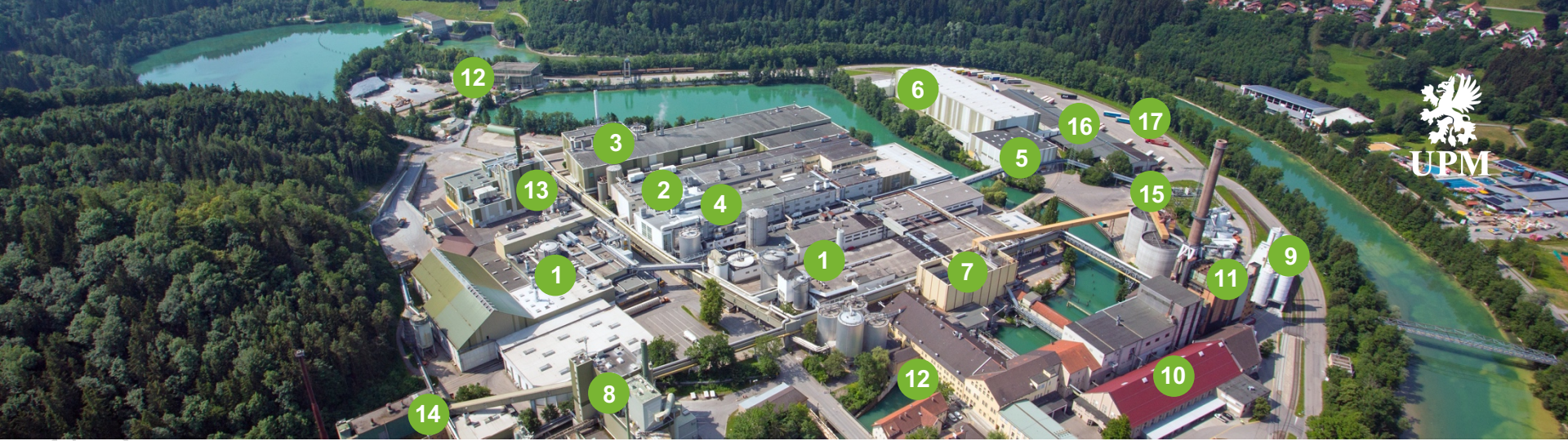
540 employees



Newsprint and Improved Newsprint (MFS)
Uncoated mechanical papers (SC)
Machine finished speciality

Uncoated mechanical
papers (SC)

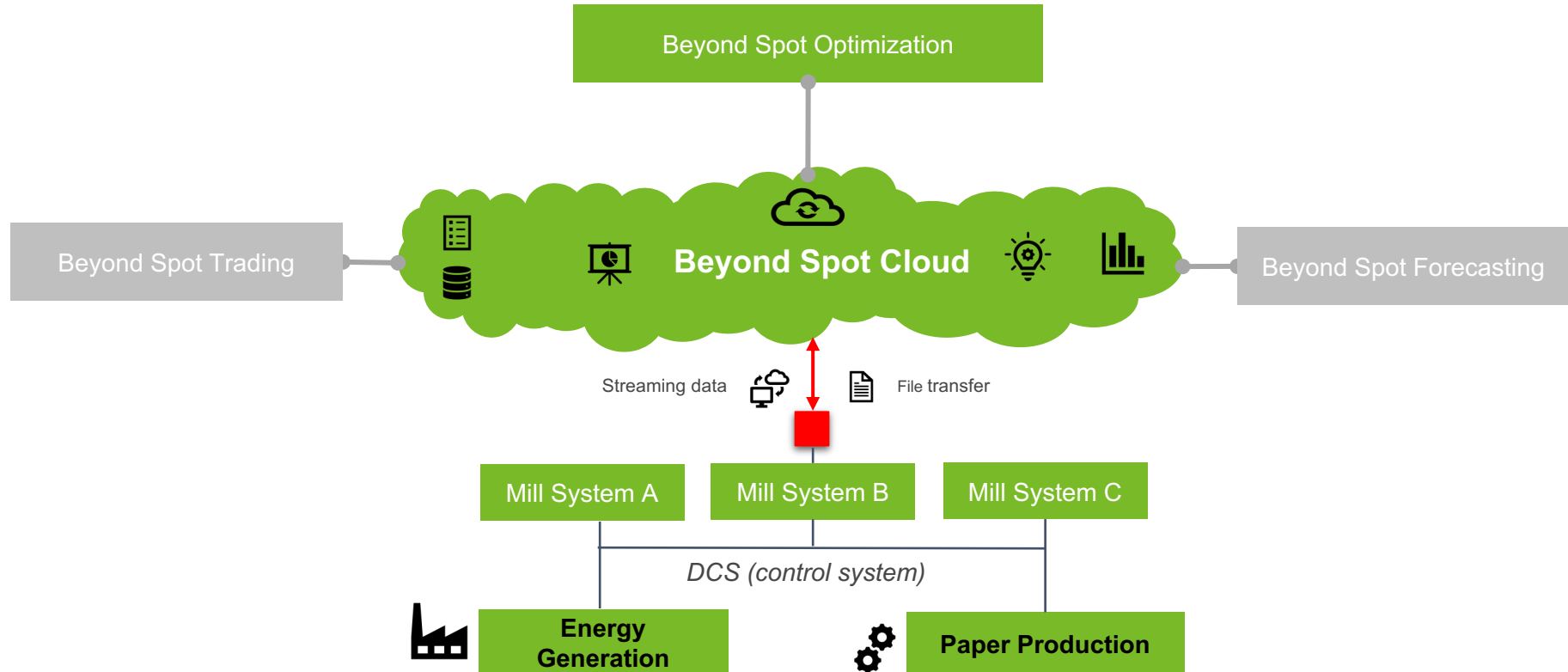
UPM **BIOFORE** - BEYOND FOSSILS



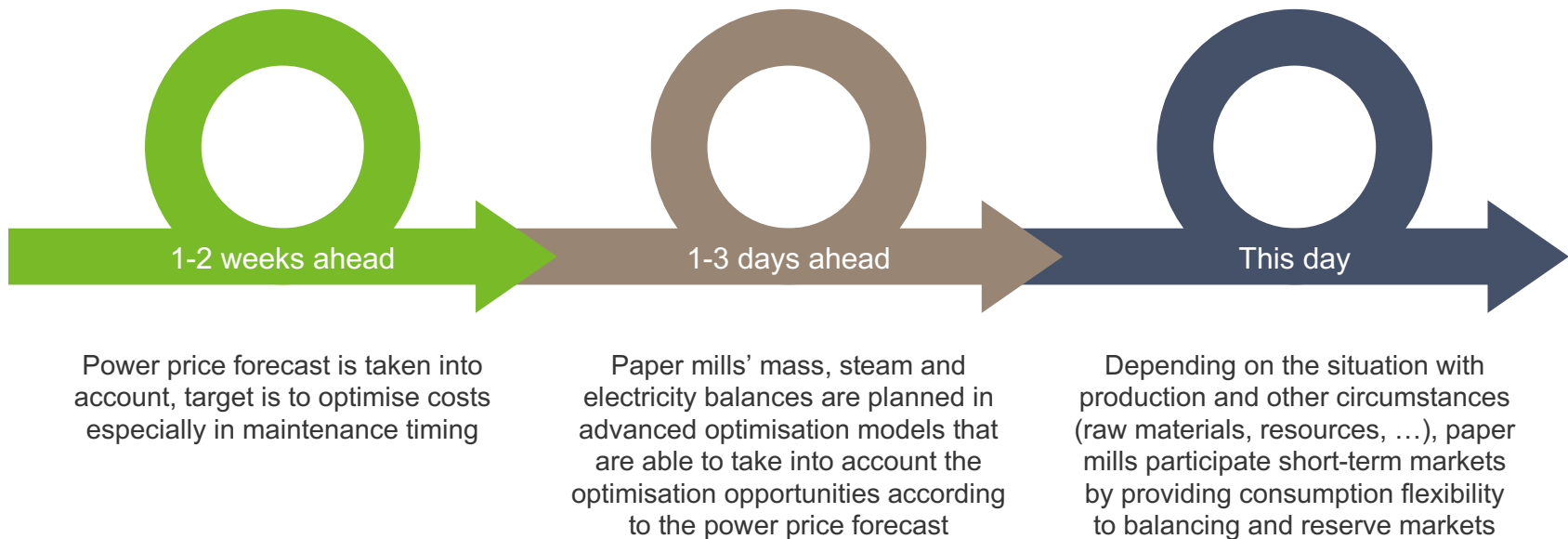
Paper mill

- | | | |
|--------------------------|---|---|
| 1 Deinking plant | 7 TMP plant / heat recovery | 13 Gas fired CHP plant (HKW 3) |
| 2 Paper machine 6 (PM 6) | 8 CHP plant (HKW 2) | 14 Effluent treatment plant / biogas extraction |
| 3 Paper machine 7 (PM 7) | 9 Specialty Minerals Inc. PCC production | 15 Wood chips storage |
| 4 Paper machine 9 (PM 9) | 10 Workshops | 16 Old paper warehouse |
| 5 Packaging | 11 Steam power plant / district heat system | 17 Loading bridge area |
| 6 Paper loading | 12 Hydropower plant | |

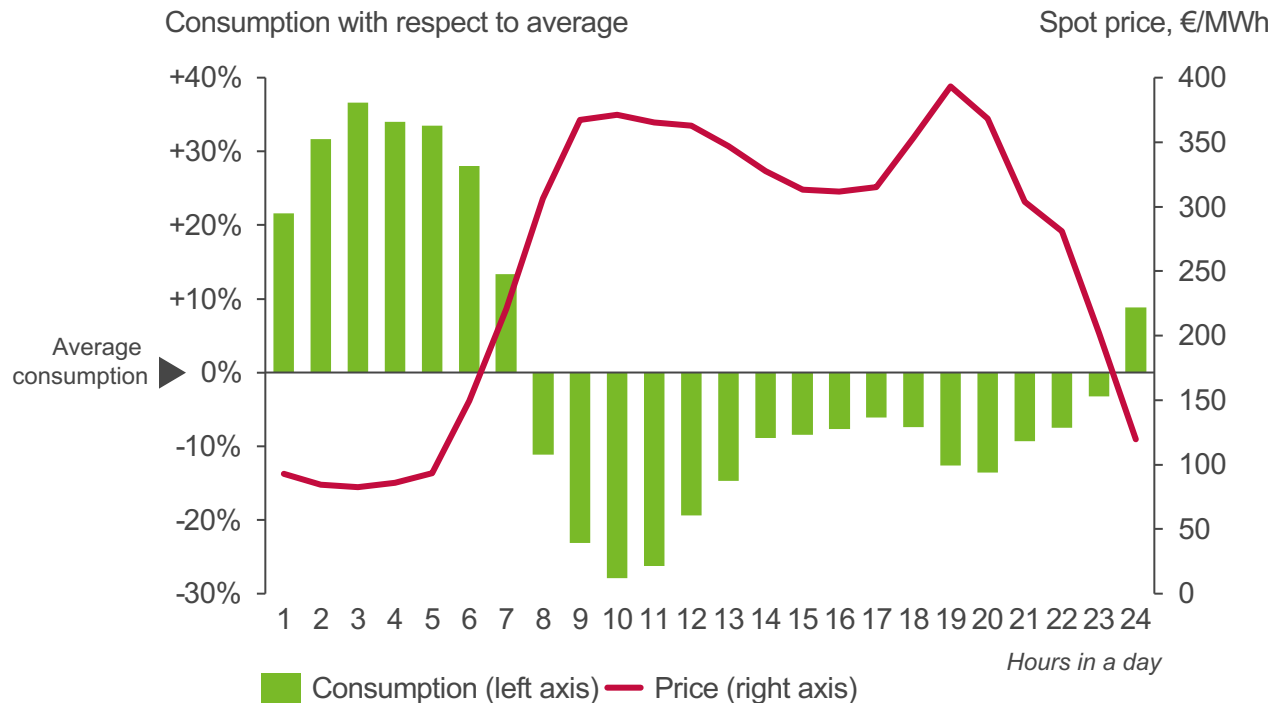
Beyond Spot® scope of Schongau project



Power price is taken into account in paper production planning in several different phases, evening out the consumption peaks



Example: Next day power consumption, on average in August 2022 on single paper machine line, incl. mass production



UPM **BIOFORE**
BEYOND FOSSILS



Wapice, the digitalization company from Finland



- › Transforming **Industrial Companies** through digitalization since 1999
- › **Private ownership**
- › Continuous **organic** and **profitable** growth
- › Employing **>350 IIoT** and **AI** experts
- › 10 office locations in Finland
- › ISO 9001, ISO 14001 and ISO 27001 certified



National
Entrepreneur
Award 2016



Microsoft Partner
GOLD Application Development

ENABLER OF
EnergyWeek
2018



Microsoft
Partner

2019 Partner of the Year Winner
Application Innovation Award



Technology & Digitalization Services

What we do @Wapice



**Analytics, AI
and Big Data**



Cloud Services



Consulting



Cyber Security



DevOps



**Electronics Design and
Embedded Systems**



**Internet of Things
Services**



Design Services



**Technology and
Digitalization Solutions**



**Web and Mobile
Solutions**



**OPC and OPC UA
Solutions**



Microsoft Azure connected factory pipeline

✓ Challenges

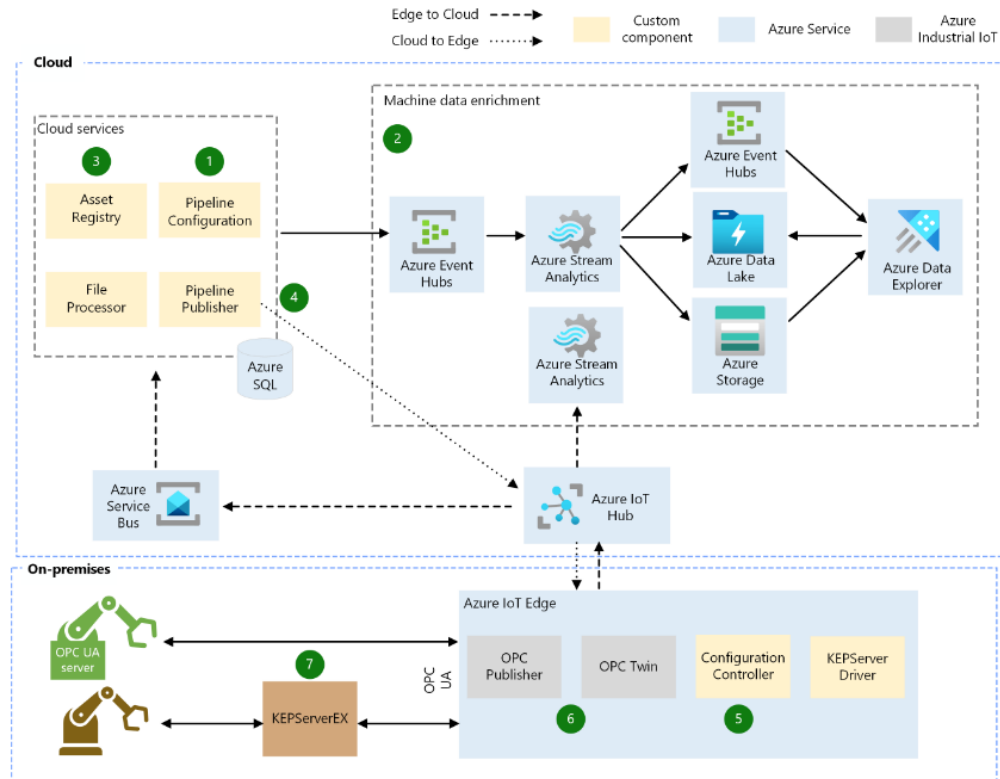
✓ On-premises access

- ✓ Azure IoT Edge located in On-premises
- ✓ Access to production needed for R&D team

✓ Application development using

only Azure services

- ✓ Development time & costs can be high without plug and play application modules

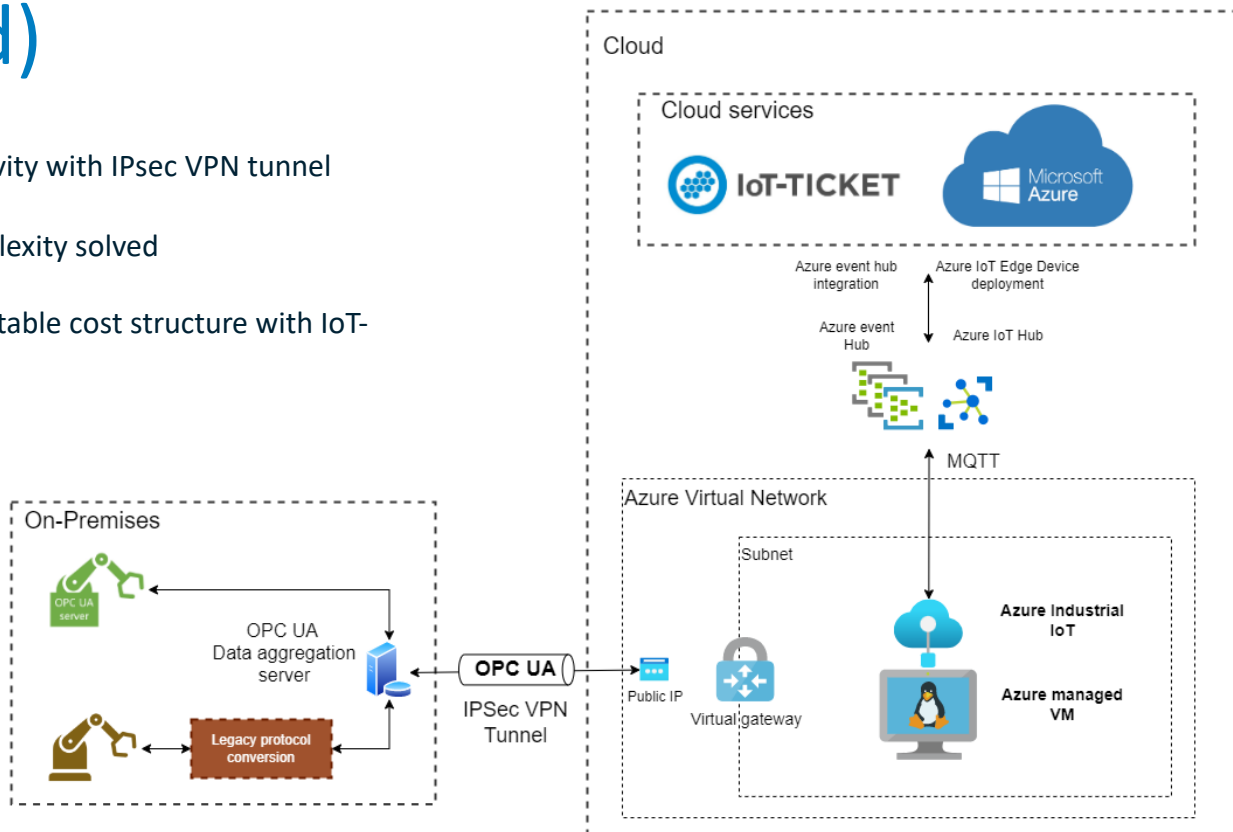


<https://learn.microsoft.com/en-us/azure/architecture/example-scenario/iot/connected-factory-signal-pipeline>



Microsoft Azure connected factory pipeline (re-designed)

- ✓ Secure OPC UA cloud connectivity with IPsec VPN tunnel
- ✓ Access and maintenance complexity solved
- ✓ Fast time to market and predictable cost structure with IoT-TICKET® cloud tools



OPC UA addresses challenges



Industry 4.0 solution

Vendor independent

Scalable

Inbuilt Security

Standardized long-term roadmap



Simple architecture

Clear responsibilities between different operators, systems and interfaces

Easier to integrate and aggregate industrial systems

Easier to maintain and solve problems



Straightforward interoperability and cloud connectivity with standard tools



IoT-TICKET®



CREATE APPS, FAST

Arrive at solutions

– start now, deliver tomorrow

We provide free multi-platform apps and APIs to provide you the means to start acquiring data and start creating functional applications right now.



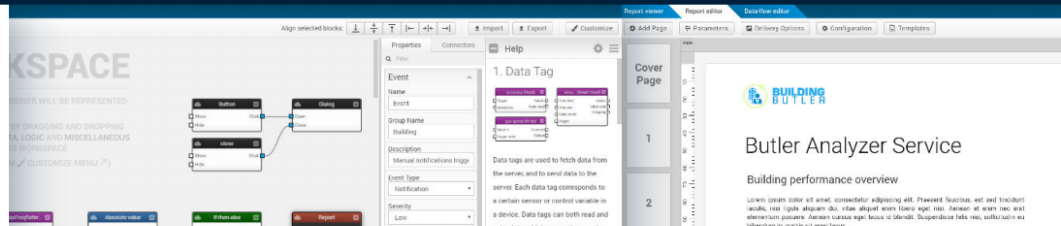
THE IoT PRODUCTIVITY STUDIO

Cut down the costly software development

– empower anyone to build apps

IoT-TICKET® includes web-based drag & drop tools for application building: create Dashboards with over 30 customizable widgets and add the logic **visually** by connecting data blocks.

CLOUD ENABLED MESH NETWORKS

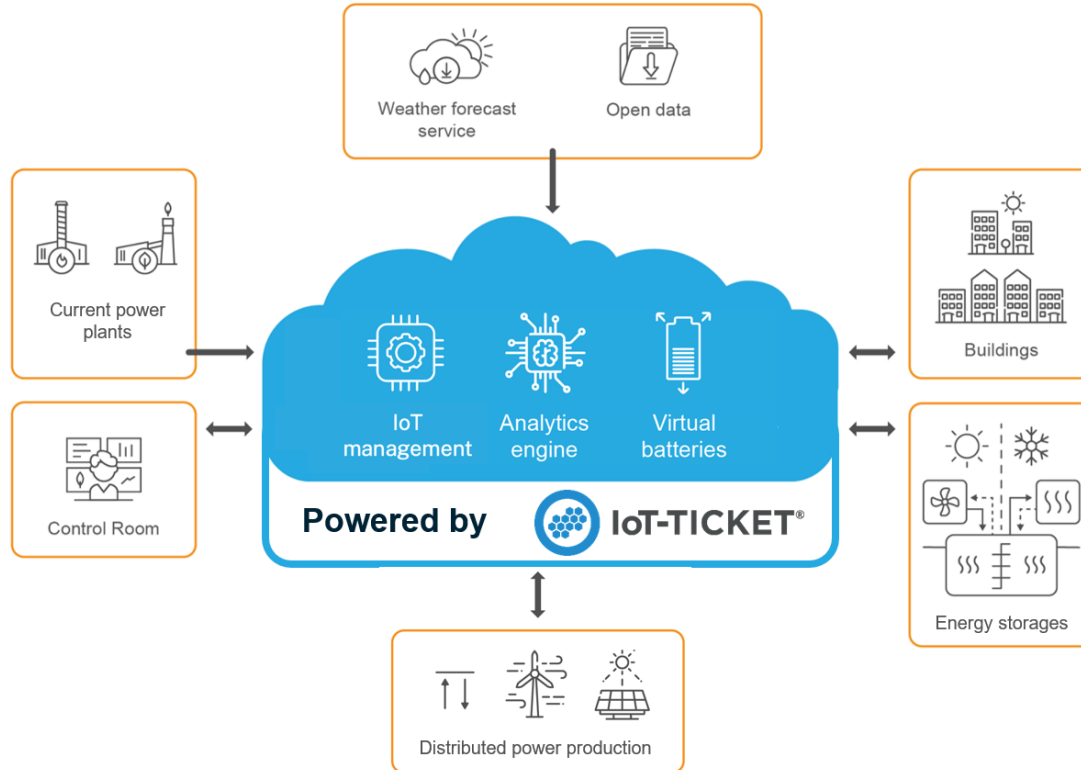


IoT-TICKET[®] addresses challenges

Current challenges adapting IoT more in the industry based on IoT Signals Ed. 2



The platform of energy services





CREATING A SMARTER
FUTURE **TODAY**

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