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Neste: Integrated AVEVA-Powered S&OP Optimization at Neste Renewables

AVEVA WORLD 2022

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AVEVA



Neste in a nutshell

On a journey to a carbon neutral world

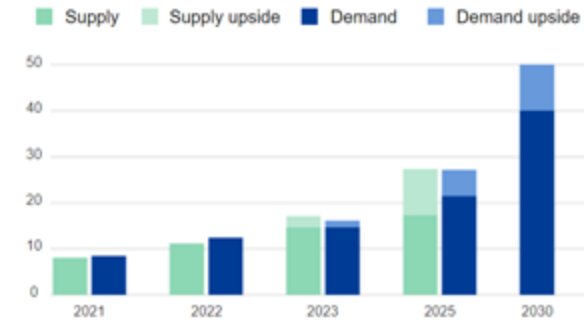
- We create solutions for combating climate change and accelerating a shift to a circular economy.
- We refine waste, residues and innovative raw materials into renewable fuels and sustainable feedstock for polymers and chemicals.
- We are the world's leading producer of sustainable aviation fuel and renewable diesel, and renewable feedstock solutions for various polymers and chemicals industry uses. We are also developing chemical recycling to combat the plastic waste challenge.
- Our ambition is to make the Porvoo refinery in Finland the most sustainable refinery in Europe by 2030. We are introducing renewable and recycled raw materials such as liquefied waste plastic as refinery raw materials. We have committed to reaching carbon-neutral production by 2035.

The Challenge

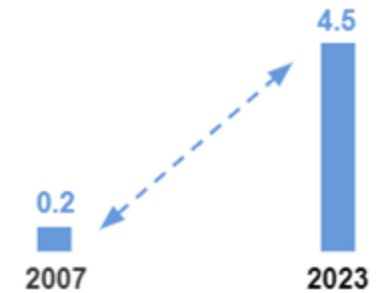
The Challenge

Growing demand is driving the Neste ambition

- Demand for renewable fuels and products is drastically increasing due to tightening regulations and need to reduce the carbon footprint of road- and aviation fuels and polymers and chemical products
- Neste's global production capacity is increasing, and will increase even more in the future to respond to the market needs
- Type of supply has also evolved from simple vegetable oils mainly to more sustainable waste-based feedstocks -> acquisitions of waste oil collector companies -> more complex upstream supply chains
- Diversification of product portfolio for renewable aviation and renewable polymers and chemicals -> more complex end part of the supply chain, more diverse products and customer base
- Growing competition in the renewable fuels area -> even greater need to maximize the margin



Global renewable supply and demand forecast



Neste near-term production capacity growth



Neste Global production and terminal locations

The Solution

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AVEVA Unified Supply Chain at Neste Renewables

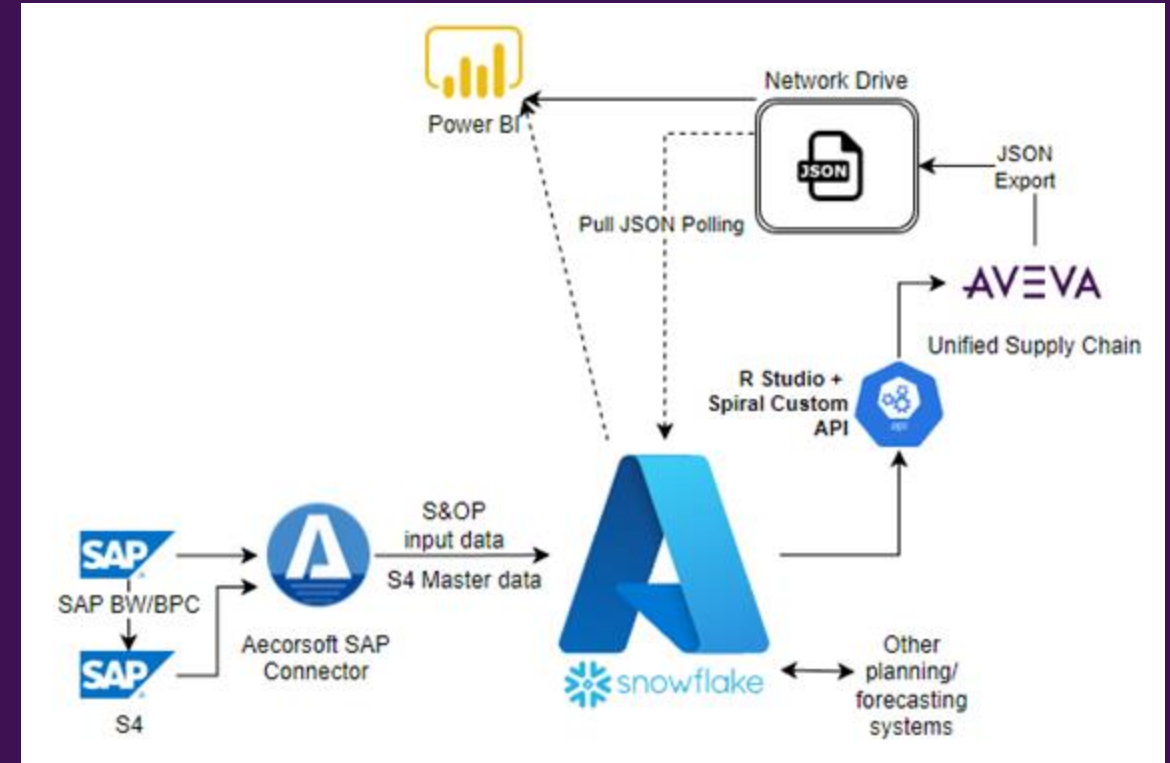
Optimizing the Neste global end-to-end supply chain

- At Neste the AVEVA Unified Supply Chain is used at:
 - Neste Oil products for refinery scheduling (schedule) and for refinery optimization (Assay, plan, calculation hub), Plan component also utilised for strategic studies
 - Neste Renewable products for SAP-integrated logistics and production scheduling (Schedule) and for S&OP optimization (Network) with SDK-based integrations and JSON-based reporting of the results
- RP S&OP model 3-step history:
 - Original implementation in **2016**: relatively simple model with no actual plants (just supplies and demands), no integrations, manual copy-paste of input data from excel, Tableau-based reporting using watch set exports
 - Major model and integration upgrade in **2020**: addition of production plants, harmonisation of the naming with SAP, SDK-based custom application for importing input data using csv-files, separate conversion tool to combine SAP-based data for Spiral format, export of results using excel add-in and PowerBI
 - Further enhanced model in **2022**: addition of new Neste plants and aviation production capabilities, utilisation of sales groups, merge of conversion tool and custom app with direct integration to modern Azure database, reporting of results using JSON and PowerBI

The Solution 1/3

Integration changes

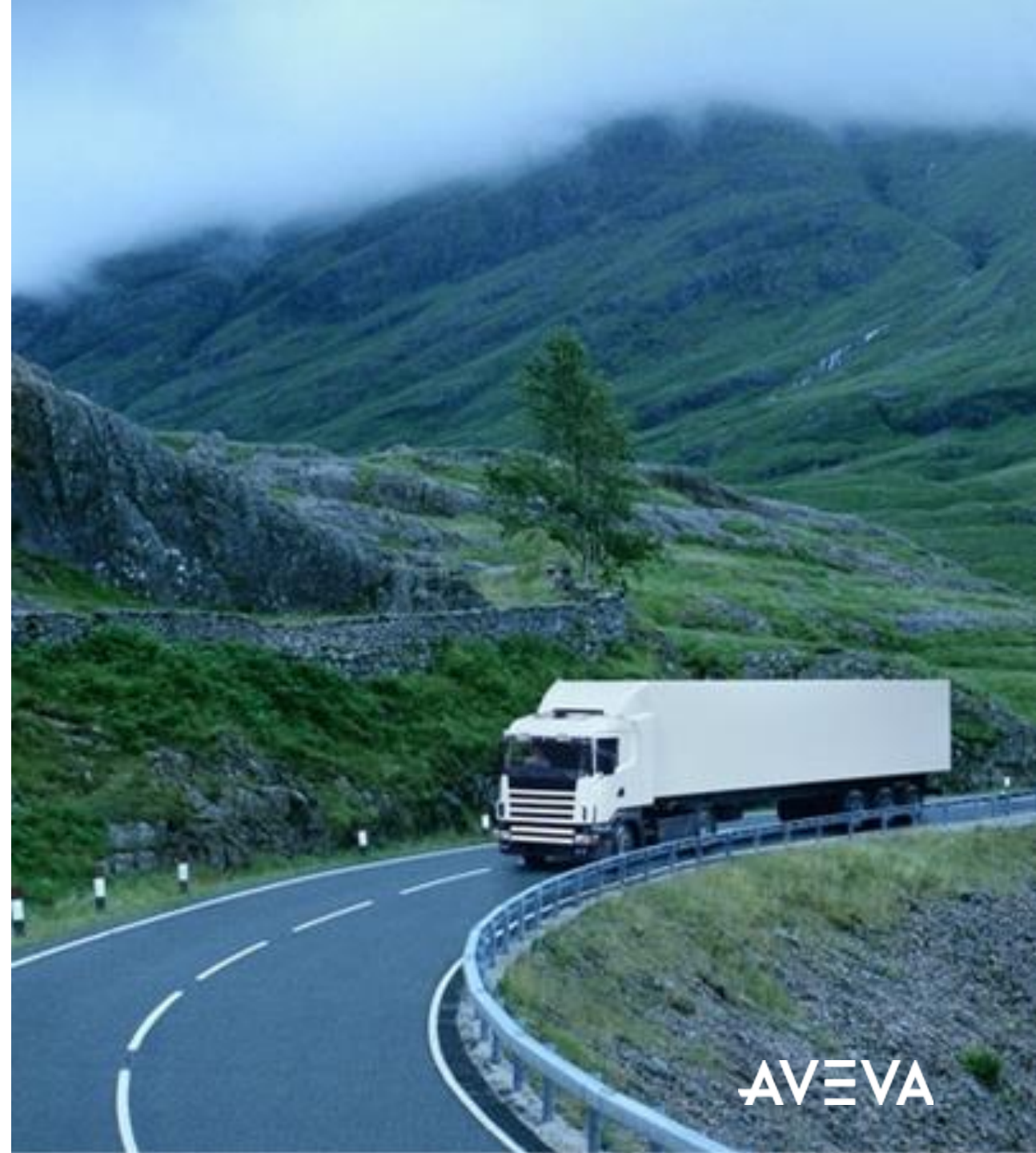
- Input data for 2016 model was imported manually via watch sets (copy-paste)
- Input data for 2020 model: data first converted using a conversion tool that combines SAP input data (CSVs) and data from other planning tools to Spiral table format file (CSV), data imported using custom application using Spiral SDK, work done by **SI**
- Input data for 2022 model will be stored in Azure database, from where it will be loaded and converted using the local application and pushed to Spiral using SDK-based application, planning results will be pushed back to Azure. Work done by **SI**



The Solution 2/3

Network model evolution

- 2016 model contained demand and supply markets with production costs and transport costs represented in transport lanes, moved yielded products around, no terminals, work done by **Neste** team
- 2020 model added production plants in the model with production costs per feedstock at the plants, yields and side products represented at plants, naming conventions aligned with SAP, sales and supply markets revisited, different production modes added, terminals added, work done by **Neste** and **AVEVA** teams
- 2022 model added more production plants and versatility in the products (namely Jet production capabilities), more aligned model structure with other planning layers in terms of transport links, nodes and production parameters, work done by **Neste** and **AVEVA** teams



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The Solution 3/3

Reporting changes

- **2016** model results were taken to Tableau from exported excel file (from watch set) and the result of the optimization was manually taken to other planning tools
- **2020** model results were extracted using excel addin and using PowerBI to read and report the results, the result of the optimization was taken manually to other planning tools
- **2022** model results were exported using templated JSON file export and reported in PowerBI. The data from JSON file will also be stored to Azure, from where it can be utilised by other planning tools directly (integration to be finalised) or reported to PowerBI

Current Neste RP S&OP model

Complex but fast

- 15-period model with rolling monthly periods, runtime roughly 5 minutes per single scenario
- ~120 Supplies, ~120 demands, 5 refinery nodes with Spiral plan submodels, ~20 terminal nodes, impurity and capacity constraints defined for each plant and period
- Transport links between nodes specified for the each period
- Monthly data imported using custom SDK-based app -> model (supplies, demands, transport links) is automatically rebuilt programmatically during every upload
- Reporting and scenario comparison capabilities built in PowerBI



The Benefits and Summary

Benefits

- RP S&OP Network model benefits

1) Data integration benefits

- Less manual inputs or copy-paste issues
- Programmatic way to enter and import data
- Possibility to do data validation prior importing

2) Modeling/optimization benefits

- Model is representing more accurately the actual network -> results are more applicable to operative plans
- Easier to expand the model with new markets, feedstocks and products
- Modeling changes can be done same time with other planning systems
- It is easy to quickly generate scenarios

3) Reporting benefits

- Easy to share results to stakeholders
- Easy to compare single and multiple scenarios in PowerBI

Change runs on renewables



Challenge

Neste has gone through a major transformation from regional oil refining company to becoming a global leader in renewable and circular solutions. Rapid expansion of production capability in three different continents and sales of renewable and circular products has necessitated the need to improve the global optimization from supply of raw materials to delivery of end products for our customers.

Solution

As part of Neste ERP implementation project in 2020, process, data structure and integration pipeline was implemented to gather the input data for the monthly S&OP from sales and supply teams and to transfer the input data to the AVEVA Unified Supply Chain planning system. To better support the increased complexity while maintaining optimization speed, the optimization model was also revamped. This development has been further continued in 2022, where direct system-to-system integrations have been put in place and model and reporting further enhanced.

Benefits

Reduced S&OP cycle time, more accurate and scalable long-term optimization model, systematic process for gathering the data. Structured way to report the results to key stakeholders. Easy visualisations for planners to compare the results and see the emerging trends in the optimization.

“The new AVEVA Unified Supply chain S&OP model has made it easier not only to maximize the gross margin across Neste RP global supply chain, but also to quickly run and compare large number of scenarios.”

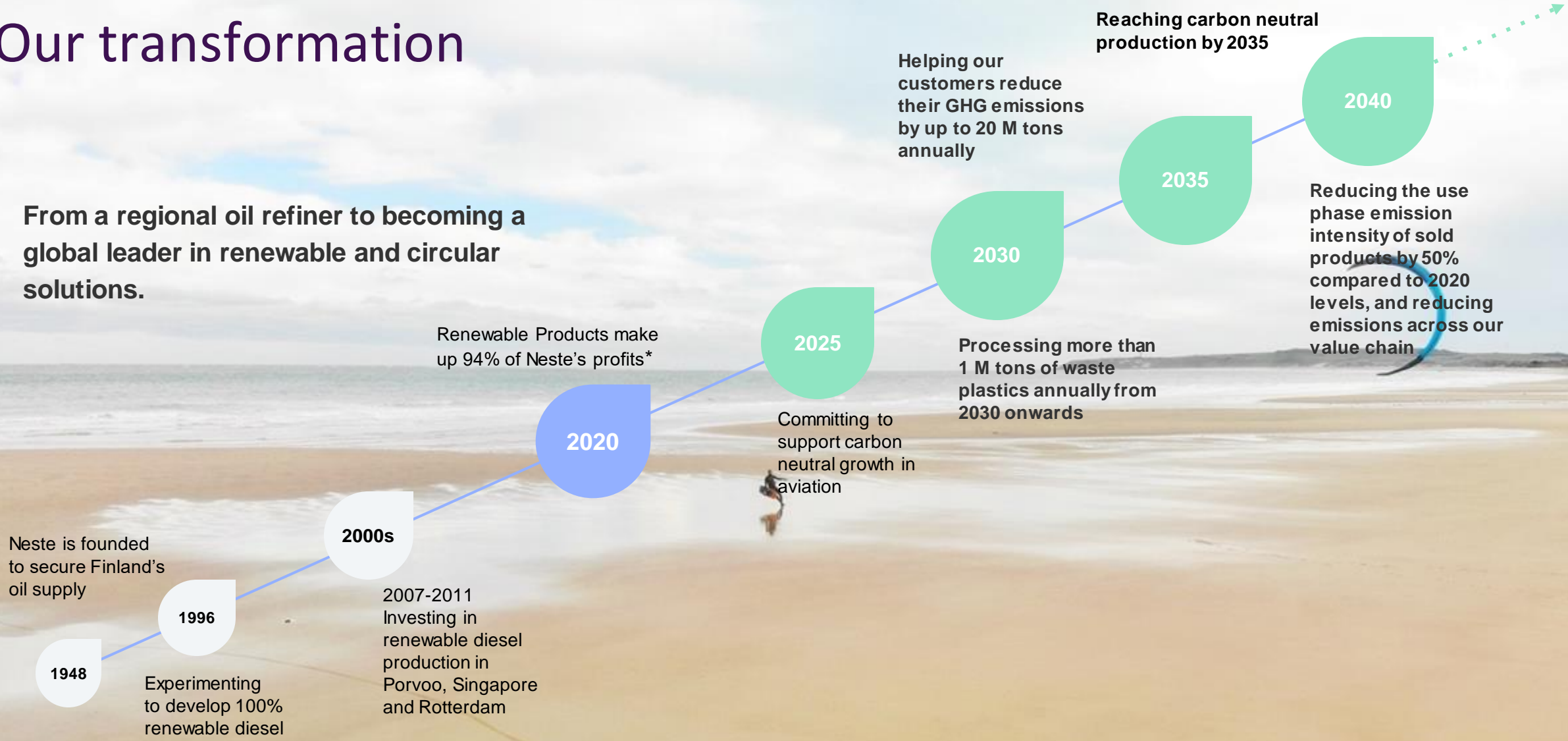
Sanna and Pirjo, Neste RP S&OP planners

The Future

AVEVA

Our transformation

From a regional oil refiner to becoming a global leader in renewable and circular solutions.



* Comparable operating profit



..But the work is not finished

Future model enhancements

- Enabling lead times, opening inventories and in-transit inventories
- Enabling better handling of shutdown periods at production plants
- Reworking the overall model logic to better align with other tools
- Standardize plant models (same standard model for all sites, different parameters)
- Further enhancing the network based on the new business models and production capabilities
- Enhance connectivity between systems with automated programmatic interfaces



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Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

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