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Transforming the Fossil Industry: Neste's Sustainable Refinery

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Neste is the world's leading producer of sustainable aviation fuel (SAF) and renewable diesel and a forerunner in developing renewable and circular feedstock solutions for polymers and chemicals.

Neste key figures in 2023

22,926 MEUR revenue

6,018 employees on average

11.0 Mt CO₂e our customers reduced their GHG emissions enabled by Neste's renewable products

4 refineries (Porvoo, Rotterdam, Singapore, Martinez*)

5.5 Mt renewables production capacity

10 Mt crude oil refining capacity

Our ambition is to transform the Porvoo refinery into a leading renewables and circular solutions hub in the mid 2030s

Challenge

- New sustainability criteria to steer operations in the future
- Transformation requires multiple investment decisions
- Complex existing refinery configuration and supply chain

Solution

- Utilize AVEVA Unified Supply Chain Network tool in strategic decision making

Results

- **Economics evaluated for each investment**
- **Combined impacts and dependencies identified for each investment**
- **Sustainability criteria modelled and acknowledged as part of the decision making**
- **Total investment is approximately 2.5 BEUR**



Converting a crude oil refinery into renewables and circular solutions will be challenging

Challenge

- **Sustainability:** Climate and sustainability regulations bring new types of constraints to refining business. The value from the transformation is highly dependent on the new constraints.
- **Amount of Change:** Transformation requires heavy investments both from resourcing and funding perspective. Traditionally value from investments is reviewed for each case separately. Now we want to always evaluate each investment against the whole transformation program.
- **Complexity:** Porvoo site is complex with Nelson index of 12.1. Complexity gives us favorable yield structure and flexibility in operations. The downside is that impact of changes is hard to evaluate refinery-wide.
- **Management of the change:** Transformation is a massive change to our business. We need to ensure that the change is executable, and the deployment is lead in centralized manner.

How to plan the transformation so that it will be sustainable for Neste?



Defining the Refinery concept of the Future

Objectives for modelling

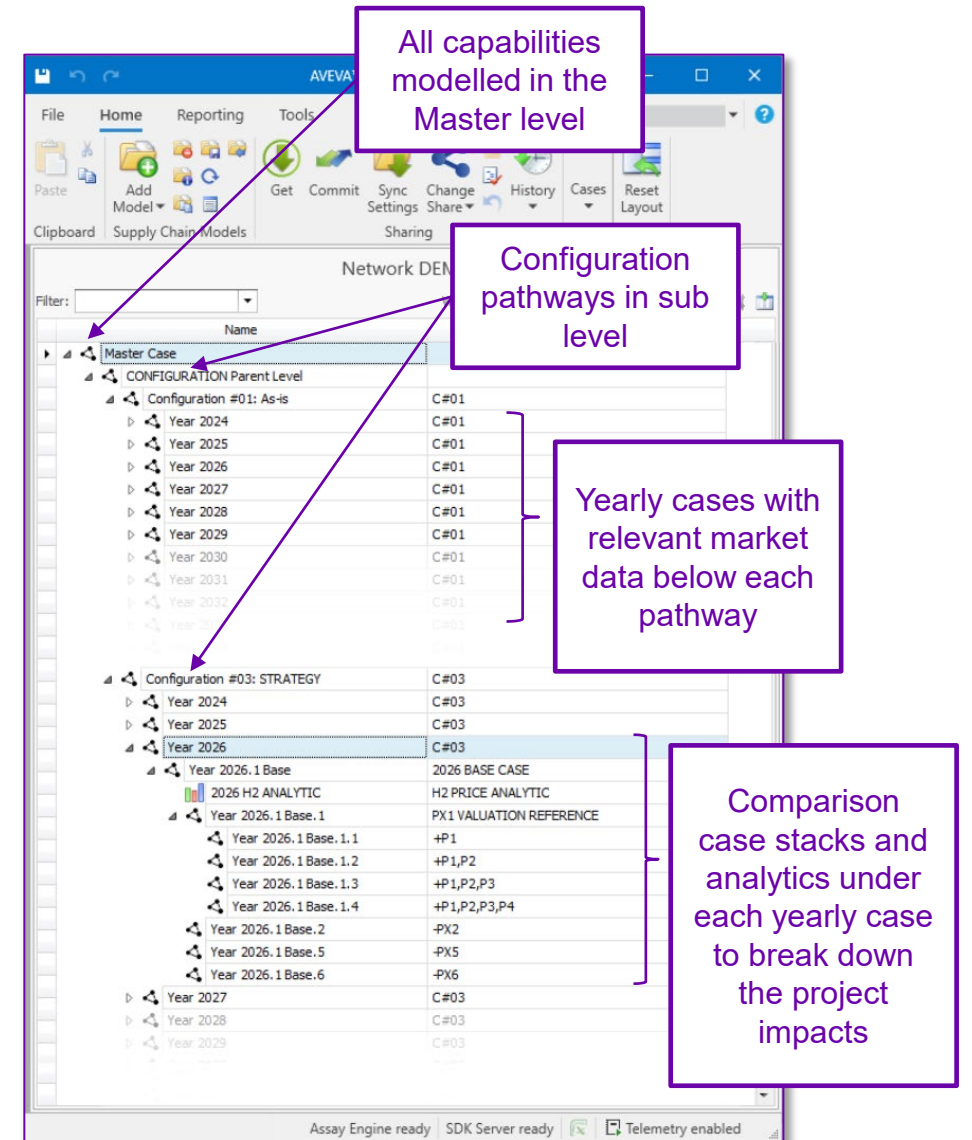
- **Sustainability**
 - Evaluate, trade and constrain CO2 emissions
 - Include regional mandates and regulations
 - Show different market options for products with different origin
- **Amount of Change**
 - New circular and biological feedstocks
 - Retrofitting and revamping existing units
 - Completely new process units and products
 - Continuing and discontinuing current operations
- **Complexity**
 - Integrate changes into existing assets
 - Understand and differentiate the contribution of each individual decision
 - Recognize synergies and combined impacts
 - Consistent data management and unbiased evaluation of projects



Modelling the Refinery concept of the Future

Implementation

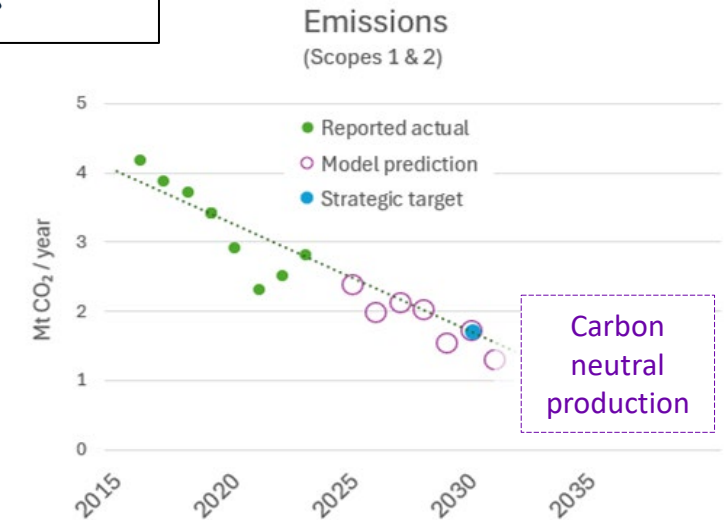
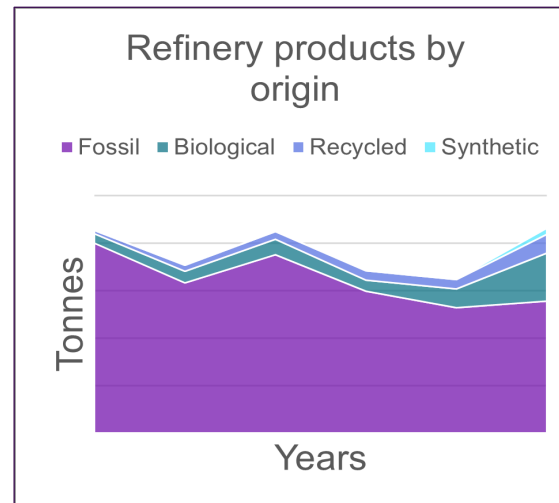
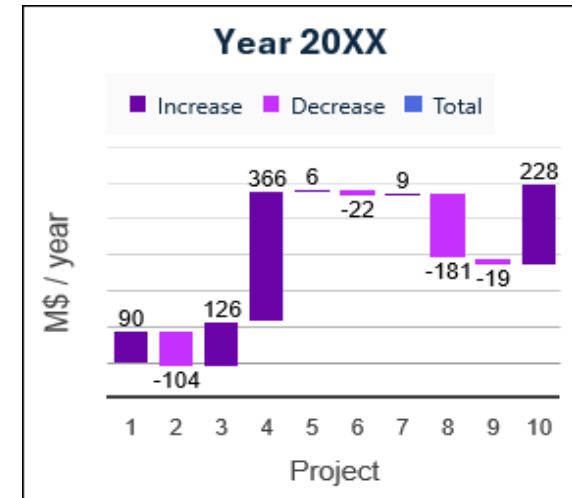
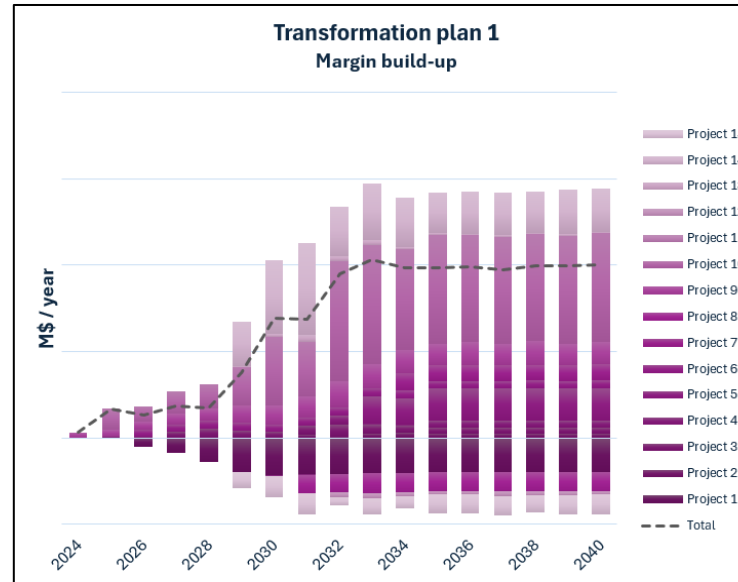
- Utilizing AVEVA Unified Supply Chain Network to model Neste's end-to-end supply chain
 - AVEVA USC Plan model from Porvoo refinery which is also used in S&OP process
 - Possibility to include 10+ years in yearly periods
- New options and capabilities brought in by strategic initiatives were added on top of the existing refinery
 - Parallel pathways for refinery transformation
 - Selected initiatives activated in correct pathways in correct years
- Model details to meet the sustainability targets:
 - Differentiate CO₂ emissions of biological and fossil origin
 - Keep track on sustainability criteria and material distribution from various novel feeds
 - Comply with renewable fuels distribution obligations



Unified way to evaluate decisions with common criteria

Examples of reporting use cases

- **Financial:**
 - Margin contribution of each project and all together
- **Sustainability:**
 - Projection of emissions
 - Development of refinery feedstock and product portfolio categorized in many ways
- **Countless other**
 - Outlooks for hydrogen and fuel gas balance
 - Inbound and outbound volumes for logistics planning
 - Sensitivity against selected market parameters
 - etc.



Successful strategic planning using Unified Supply Chain

Benefits

- Efficiency
 - Common tool with long usage history and easy-to-adopt user interface
 - Common reference data with S&OP model
 - Consistent data management
 - Option to solve cases in calculation hub
- Agility
 - Understanding the combined impacts of overlapping projects
 - Adjusting and readjusting the future configurations is quick
 - Project prioritization is easier
- Sustainability
 - Sustainability criteria embedded in the planning process
 - Optimized business to meet sustainability constraints



We are already on the way but the work will continue for years to come

Conclusion

- Strategic planning process maturity has increased
- We will need to maintain the model from now on
- Re-evaluating the transformation roadmap is essential in the future
- Organization needs to be driving the deployment of the strategy
- Planning is tricky but execution will be challenging

“Having proven optimization model to support in our planning has brought confidence to our decision making.”

Antti Joki, Vice President, Refinery Development & Transformation, Neste



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Questions?

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