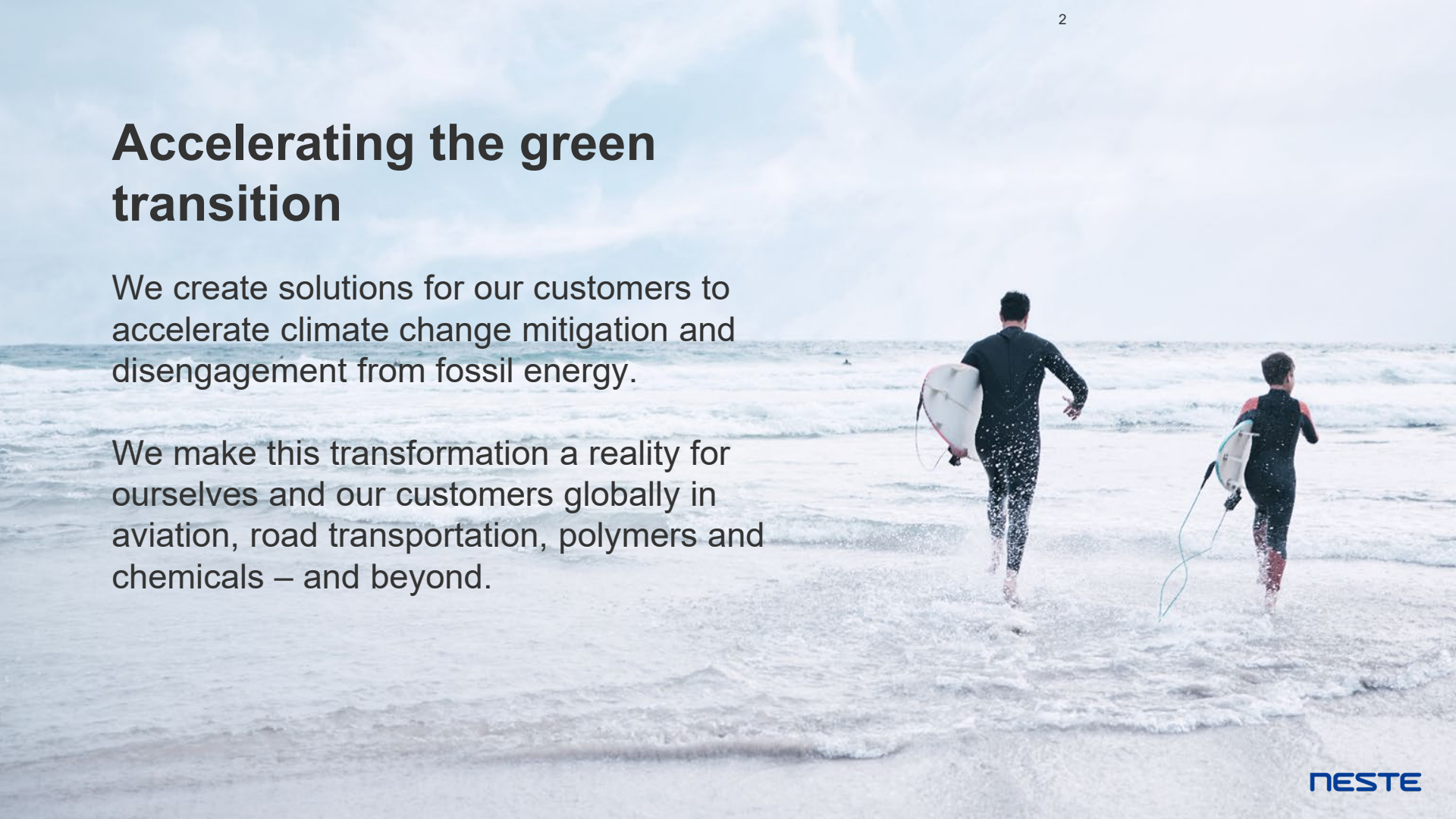
Driving the development of renewable hydrogen

Hydrogen Research Forum Finland
2 October 2024
Heidi Bergman, Head of Investment Concepts, Renewable Hydrogen & PtX iBP

Accelerating the green transition

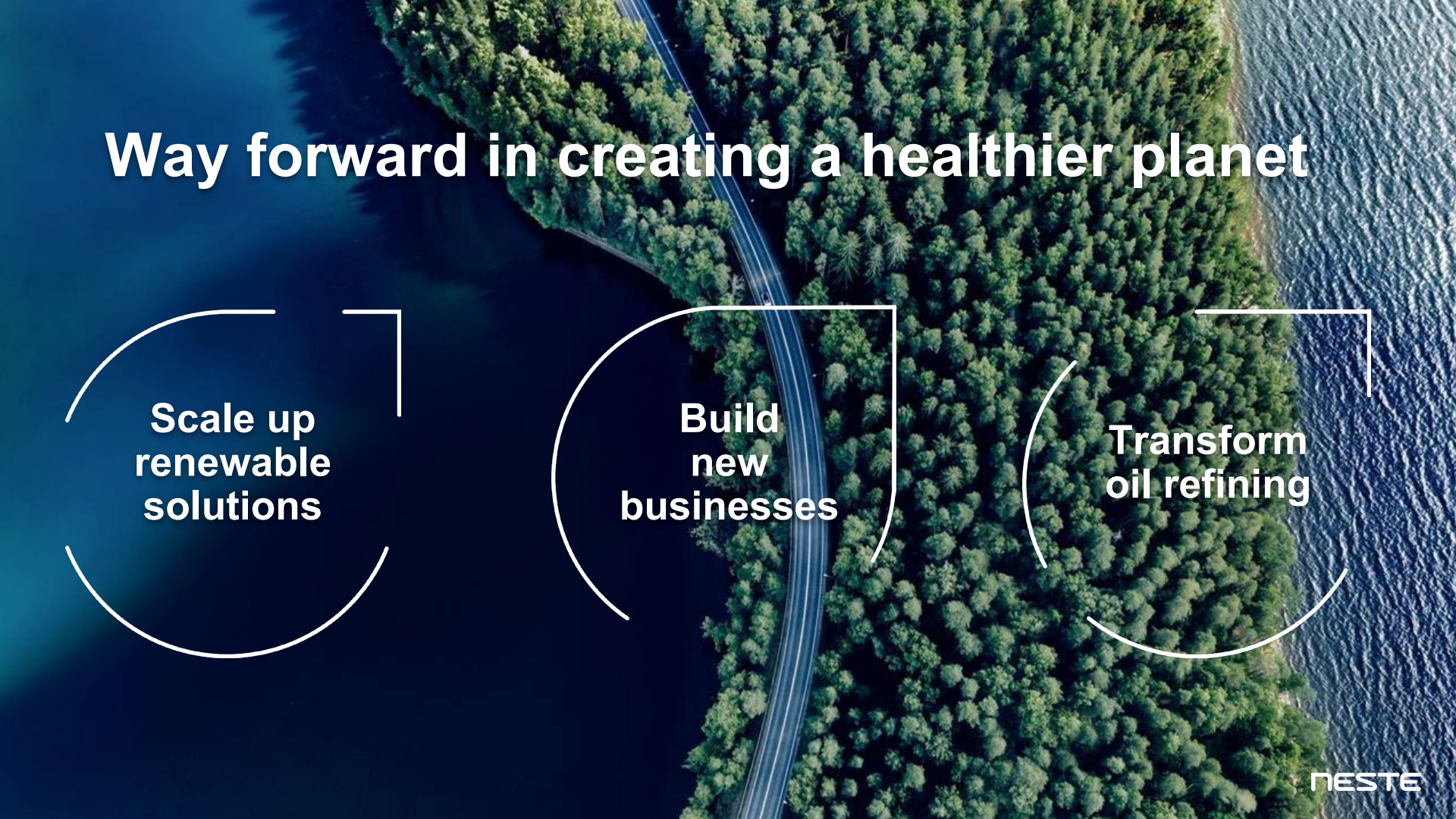
We create solutions for our customers to accelerate climate change mitigation and disengagement from fossil energy.

We make this transformation a reality for ourselves and our customers globally in aviation, road transportation, polymers and chemicals – and beyond.



Creating a healthier planet for our children

Way forward in creating a healthier planet

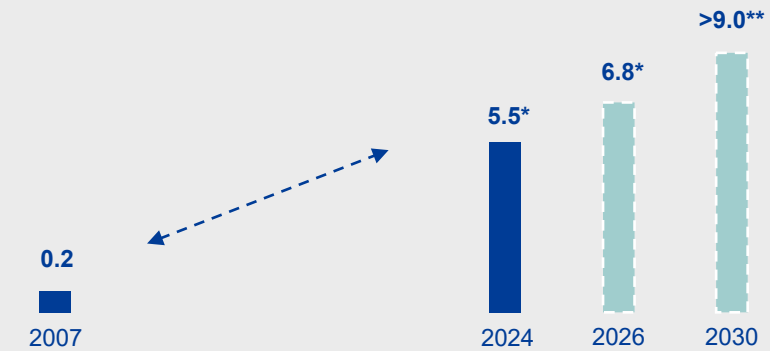


Focused on refining waste and residues into renewable products

Renewables production on three continents

- Rotterdam, the Netherlands
- Singapore
- Porvoo, Finland
- Martinez, California, the U.S. (joint operation)

Renewables production capacity growth, Mt



*) incl. Martinez Renewables **) Aspiration, 2030 numbers including both renewable and circular capacity.

Driving value with a strong raw material portfolio

Grow and strengthen our position in the waste and residues value chain

Strengthening our renewable raw material sourcing globally through **partnerships and acquisitions** and by growing **the global aggregation network**

A growing, scalable portfolio of a wide variety of renewable raw materials, such as

- Animal fat waste
- Used cooking oil
- Vegetable oil processing waste and residues

Expand and diversify our raw material portfolio

Diversifying our portfolio of renewable and recycled raw materials with **novel, sustainable raw materials and technologies** enabling their use.

Scaling up and exploring new raw materials and technologies

- Liquefied waste plastic
- Novel vegetable oils from regenerative agriculture
- Algae
- Lignocellulose
- Renewable hydrogen and Power-to-X

Porvoo crude oil refinery to become a leading renewables and circular solutions hub

Long-term capacity potential of renewable and circular products after the transformation

~3 Mt / year

Total investment

~2.5 billion eur

Carbon-neutral production

by 2035

Targeted completion by the **mid-2030s**

Press release 20.12.2023: Neste's crude oil refinery in Finland to be gradually transformed into a renewables and circular solutions refining hub (link)

Renewable hydrogen and PtX

Renewable electricity + Water → Renewable hydrogen + Carbon-dioxide → E-fuels and materials

& Oxygen and heat O_2

NESTE

Renewable hydrogen is an important development area for Neste

Focus on renewable hydrogen is an essential part of Neste's strategy.

Replaces fossil hydrogen in Neste refinery processes

Contributes to reaching Neste's climate commitments

Contributes to making Porvoo refinery the most sustainable refinery in Europe by 2030

Increases national energy self-sufficiency and supply security

Creates a platform for e-fuel production

120 MW electrolyzer for green hydrogen production at Neste Porvoo refinery

- Neste's objective is to reach Final Investment Decision readiness during 2024
- The aim is to utilize the heat generated in the production process for district heating purposes

Green hydrogen

Production of green hydrogen by electrolysis, execution in phases

First phase, 120 MW, in basic engineering phase (ca. 2t/h of green hydrogen)

Green hydrogen to refining

Utilization of the heat generated in the production

Funding:
- IPCEI grant of 27.7 MEUR to hydrogen projects in Porvoo by Business Finland
- Energy investment aid of 1.96 MEUR for heat recovery from hydrogen production by Ministry of Economic Affairs and Employment in Finland

NESTE

IPCEI funding: European-wide collaboration and investments in the hydrogen value chain

- IPCEI project network (incl. R&D and investments) brings European companies together to create key strategic value chains related to hydrogen within 4 distinct themes
- IPCEI funding supports cooperation throughout Europe with a wide range of topics
- Objective is to increase European growth, employment and competitiveness

IPCEI HYDROGEN

Hydrogen technologies
Hy2Tech
35 companies
41 projects
NESTE

Hydrogen use
Hy2Use
29 companies
35 projects
SOLAR FOODS P2X solutions

Hydrogen infrastructure
Hy2Infra
32 companies
33 projects

Hydrogen mobility
Hy2Move
11 companies
13 projects

IPCEI: Important Project of Common European Interest
Funding to IPCEI projects in Finland is granted by Business Finland

NESTE

Planned hydrogen projects in Finland

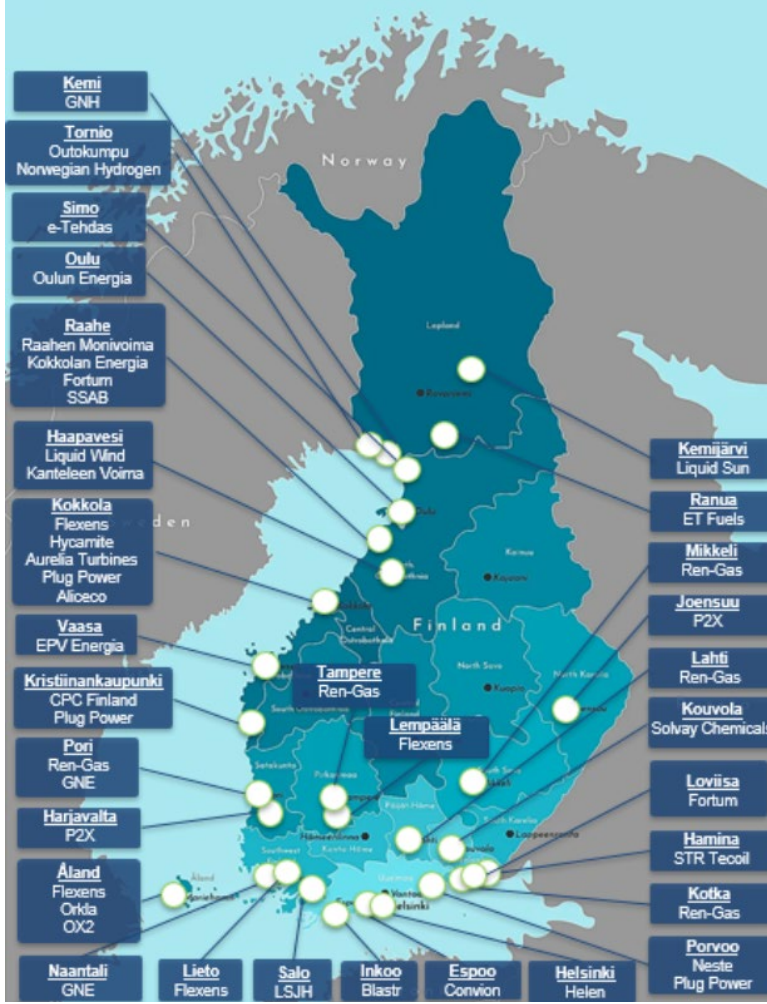
- ~ 40 projects are being planned
  - Annual production capacity of 1 Mtpa of hydrogen
  - Applications focus on e-fuels and industrial use

- Abundant clean resources in Finland
  - Cost competitive electricity supply, with great potential for capacity ramp-up
  - Clean water
  - Biogenic CO2

- Abundant sector coupling opportunities to integrate hydrogen across industries and energy sectors

- Extensive technical expertise - Finland already has wide capabilities to provide hydrogen related technologies and solutions

- https://h2cluster.fi/projects/



Source. Hydrogen Cluster Finland

Demonstrating green hydrogen to refining at Rotterdam refinery

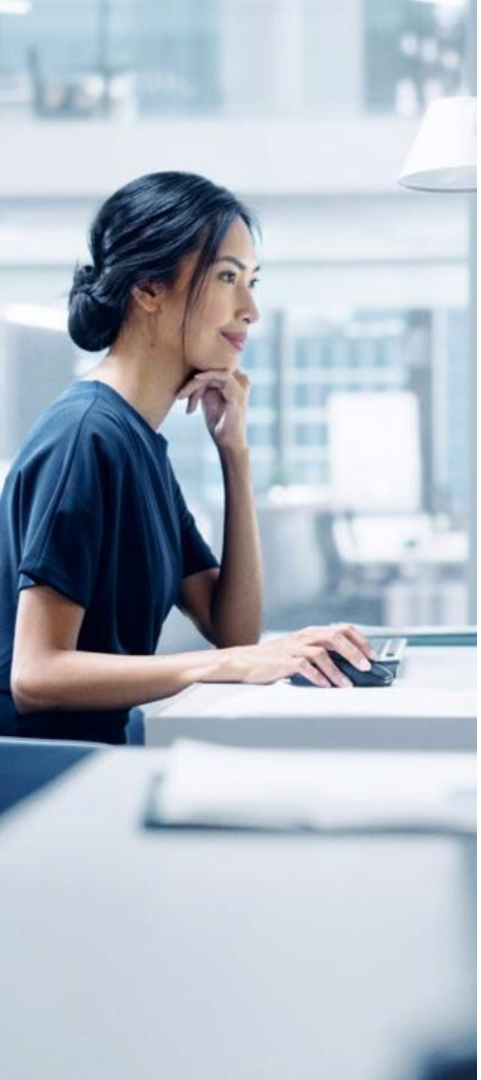
We will demonstrate green hydrogen production at our Rotterdam refinery with CEA, Sunfire, SMS Group and Engie in an EU project MultiPLHY. The project aims at the installation and integration of the world's first multi-MW scale high-temperature electrolyser system into a refinery.

2.6 MW
nominal power input

60 kg/h
green hydrogen

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 875123. The Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research.

NESTE



Leading the way in green transition: Key enablers for renewable hydrogen investments

Renewable electricity ramp-up

Massive investments needed in renewable power production and transmission capacity

Infrastructure build-up

Power transmission and hydrogen storage & distribution infrastructure development

Electrolysis

Increase in electrolyzer manufacturing capacity is currently limited due to lack of orders.

New partnerships

Value chain development and optimisation

Integration between industry and utility sectors

Funding

Financial support to kick start the hydrogen economy

Regulation

Clear, solid, enabling regulation to drive demand and investments


NESTE
Change runs on renewables