



# How to decarbonise aviation

## SAF - a solution for today and tomorrow?

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The journey continues..

# Neste in a nutshell

Founded in  
**1948**  
to secure oil supply  
for the state of  
Finland

World's  
**#1**  
producer of Renewable  
Diesel & Jet Fuel from  
waste and residue

One of the world's  
most sustainable  
companies by the  
Corporate Knights  
Global 100 Index

We are  
**4,872**  
dedicated  
professionals  
committed to our  
purpose

In 2021,  
our renewable products  
helped our customers  
reduce GHG emissions by

**10,9 Mt**

**70%**  
of R&D budget  
invested in  
researching and  
testing future raw  
materials

Renewable  
products production  
capacity  
**3.2 →**  
**4.5 Mt/a**  
in 2023

# Solutions to three main markets

## Renewable Road Transportation

Over the life-cycle, Neste MY Renewable Diesel reduces greenhouse gas (GHG) emissions by up to 90% compared to fossil diesel.

## Renewable Aviation

Over the life-cycle, Neste MY Sustainable Aviation Fuel has up to 80% smaller carbon footprint compared to fossil jet fuel.

## Renewable Polymers and Chemicals

Neste RE Renewable and Recycled™ is Neste's solution for the plastics and chemicals sectors to help them reduce crude oil dependency while also tackling climate change and plastic waste challenge.

**NESTE**

An aerial photograph of a white commercial airplane on a runway. The plane is positioned in the lower-left quadrant of the frame, facing towards the upper-left. The runway is a dark grey asphalt with yellow and white markings. The surrounding area is a mix of green grass and brown earth.

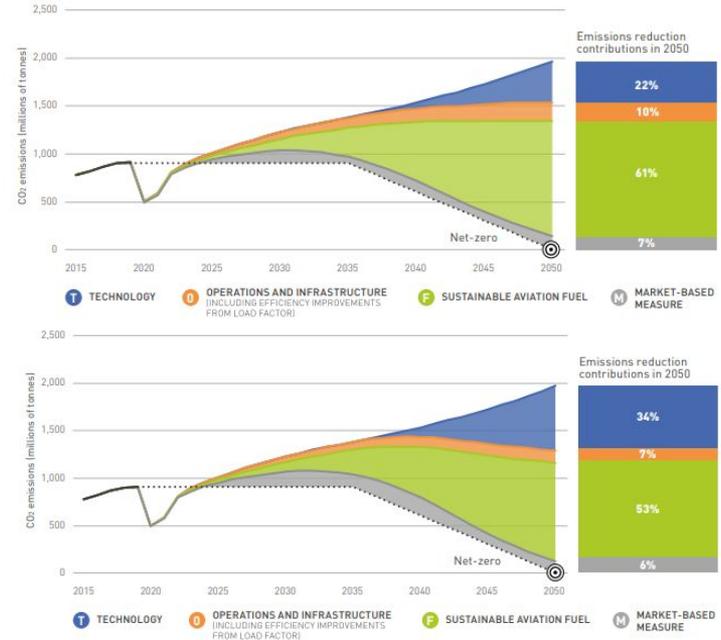
## Aviation has committed to achieving net-zero emissions by 2050

- Aviation accounts for 2-3 % of global carbon emissions - growing to >20% by 2050 if action not taken
- In addition, non-CO2 effects, like contrails, have 2x higher climate impact
- Sustainable Aviation Fuel (SAF) has been identified as one of the key elements in helping achieve these goals
- Despite pandemic challenges, the outlook for SAF is increasingly clear

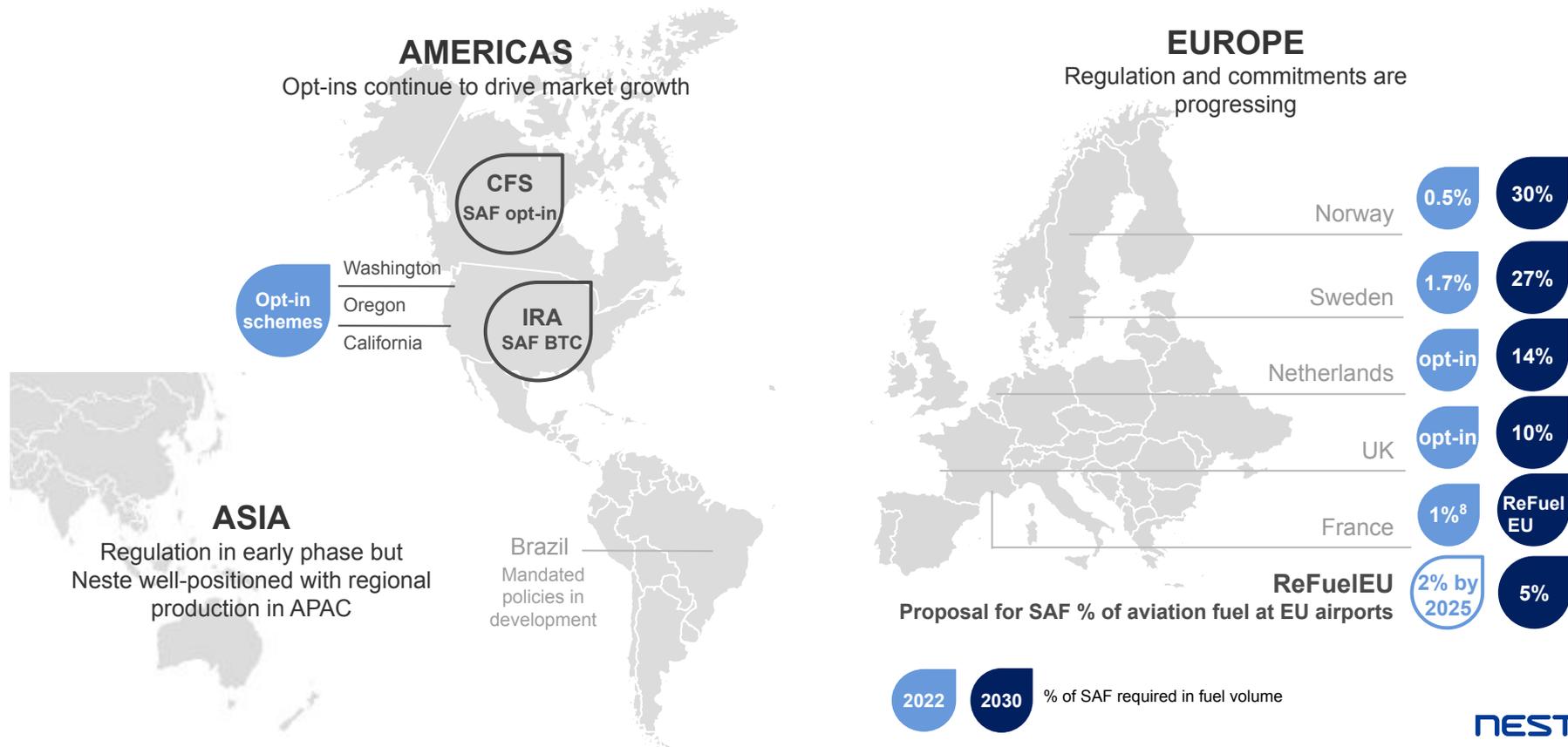
# Would SAF play a role in future?

## All solutions will be needed for reaching net-zero emission by 2050

	2020	2025	2030	2035	2040	2045	2050
<b>Commuter</b> » 9-19 seats » < 60 minute flights » <1% of industry CO <sub>2</sub>	SAF	Electric or Hydrogen fuel cell and/or SAF	Electric or Hydrogen fuel cell and/or SAF	Electric or Hydrogen fuel cell and/or SAF	Electric or Hydrogen fuel cell and/or SAF	Electric or Hydrogen fuel cell and/or SAF	Electric or Hydrogen fuel cell and/or SAF
<b>Regional</b> » 50-100 seats » 30-90 minute flights » ~3% of industry CO <sub>2</sub>	SAF	SAF	Electric or Hydrogen fuel cell and/or SAF	Electric or Hydrogen fuel cell and/or SAF	Electric or Hydrogen fuel cell and/or SAF	Electric or Hydrogen fuel cell and/or SAF	Electric or Hydrogen fuel cell and/or SAF
<b>Short haul</b> » 100-150 seats » 45-120 minute flights » ~24% of industry CO <sub>2</sub>	SAF	SAF	SAF	SAF potentially some Hydrogen	Hydrogen and/or SAF	Hydrogen and/or SAF	Hydrogen and/or SAF
<b>Medium haul</b> » 100-250 seats » 60-150 minute flights » ~43% of industry CO <sub>2</sub>	SAF	SAF	SAF	SAF	SAF potentially some Hydrogen	SAF potentially some Hydrogen	SAF potentially some Hydrogen
<b>Long haul</b> » 250+ seats » 150 minute + flights » ~30% of industry CO <sub>2</sub>	SAF	SAF	SAF	SAF	SAF	SAF	SAF



# Strong growth in sustainable aviation fuel market with opt-in schemes, incentives and SAF mandates



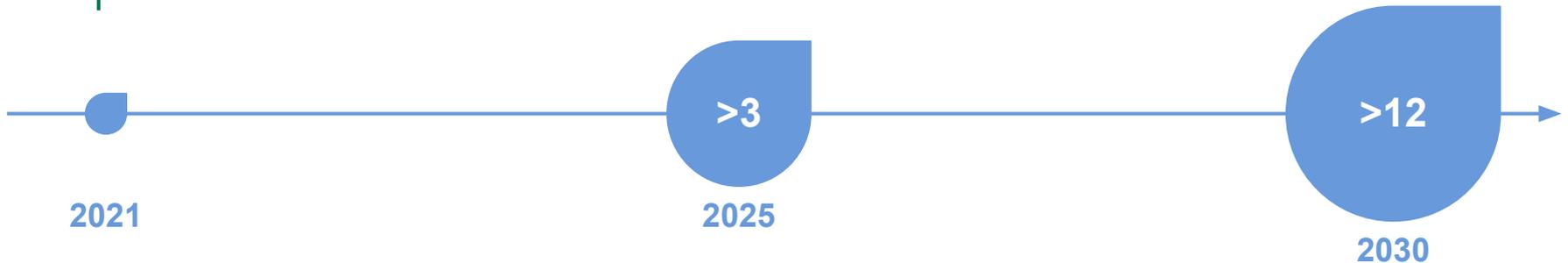
# Global SAF demand to exceed 12 Mton/a by 2030

**Incentive schemes and first-mover countries with mandates emerging**

Neste driving market growth with 1.5 Mton/a capacity in 2023

**Mandates accelerate SAF market growth**

Neste's continuing market leadership in global SAF capacity



SAF  
market

Estimated potential, Mton/a

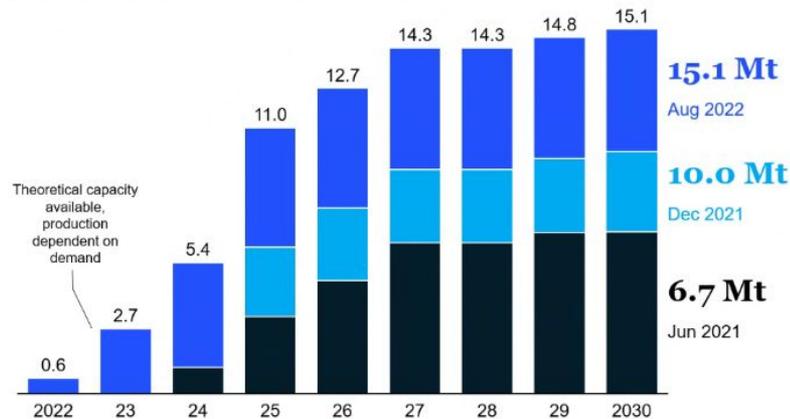
# Potential global SAF production capacity by 2030

## Transition of fossil refineries towards production of biofuels

### The scale-up of SAF production capacity is accelerating rapidly – 15Mt announced by 2030

Commitments for 2030 grew x2.5 in just 14 months

Announced global SAF production capacity, Mt



Source: McKinsey Sustainable fuel supply database based on IRENA, Press releases, 2020 WEF Clean Skies for Tomorrow 2020, Web search

Sustainable Fuels

Increasing number of players start to dedicated sustainable fuels production capacity to aviation fuels

The momentum is there – in just 14 months the committed capacity grew x2.5 from 6.7Mt announced by June 2021 to over 15Mt committed Aug 2022

Short-term production scale-up will largely depend on demand – as regulated demand is expected to mostly pick-up post-2025, voluntary volumes from airlines and companies with strong decarbonization agenda could drive the uptake in the next 2-3 years

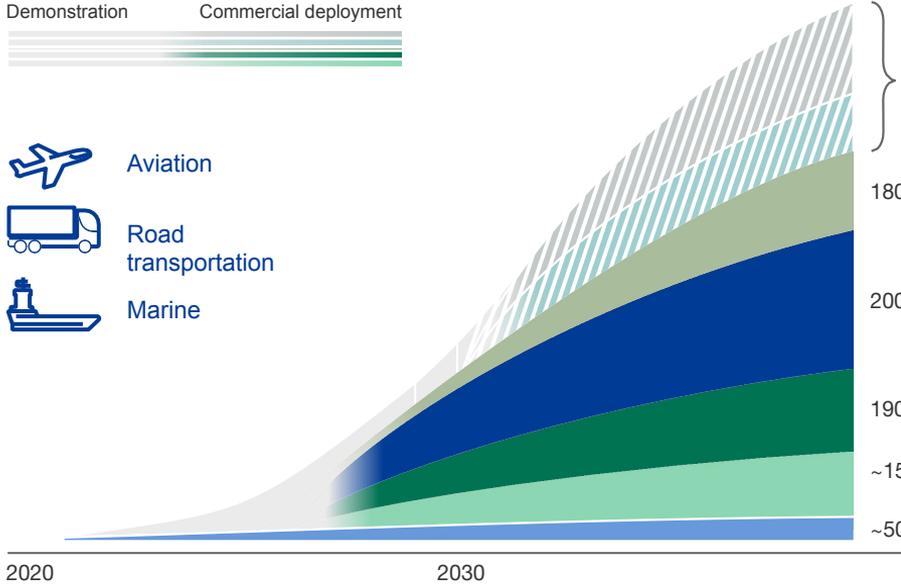
McKinsey & Company

# Unlocking new raw material pools with innovation to accelerate emission reductions in transportation

Global raw material potential for renewable fuels (Mtoe)



-  Aviation
-  Road transportation
-  Marine



Long-term fuel potential (Mtoe)

-  Power-to-liquids
-  Algae
-  Cellulosic energy crops
-  Lignocellulosic residues (agriculture; forestry)
-  Municipal solid waste\*
-  Novel vegetable oils (cover crops; degraded land)
-  Waste and residue fats and oils

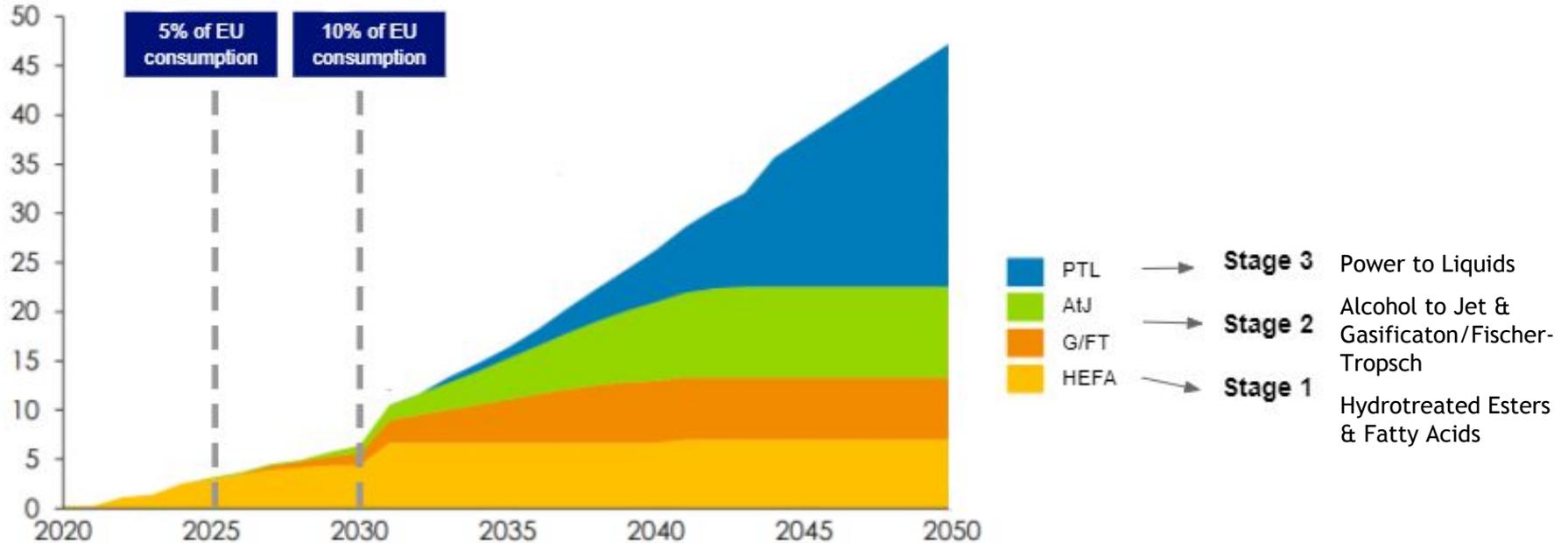
Renewable raw materials hold significant potential to accelerate the reduction of CO<sub>2</sub> emissions, in particular in the transportation sector.

Regulators hold the key to enable a broad renewable raw material pool to unlock the full emission reduction potential in transport and beyond.

Source: Neste analysis based on WEF Clean Skies for Tomorrow and other sources. Biomass potential converted to fuel potential, using around 85% conversion efficiency (weight-based) for fats and oils and novel vegetable oils; around 25% efficiency for lignocellulosic biomass and municipal solid waste.  
 \*80% organic waste, with 20% non-reusable, non-separable plastic waste

# SAF production outlook can deliver meet 5% of all aviation fuel demand in Europe in 2025, and more than 10% in 2030

Development of European SAF capacity in Mt



# Realization of full potential requires scale up of new technologies (“3-stage-rocket” roadmap)



Source: Neste estimates

<sup>1</sup> HEFA = Hydroprocessed Esters and Fatty Acids

# Growth beyond waste oil and fats

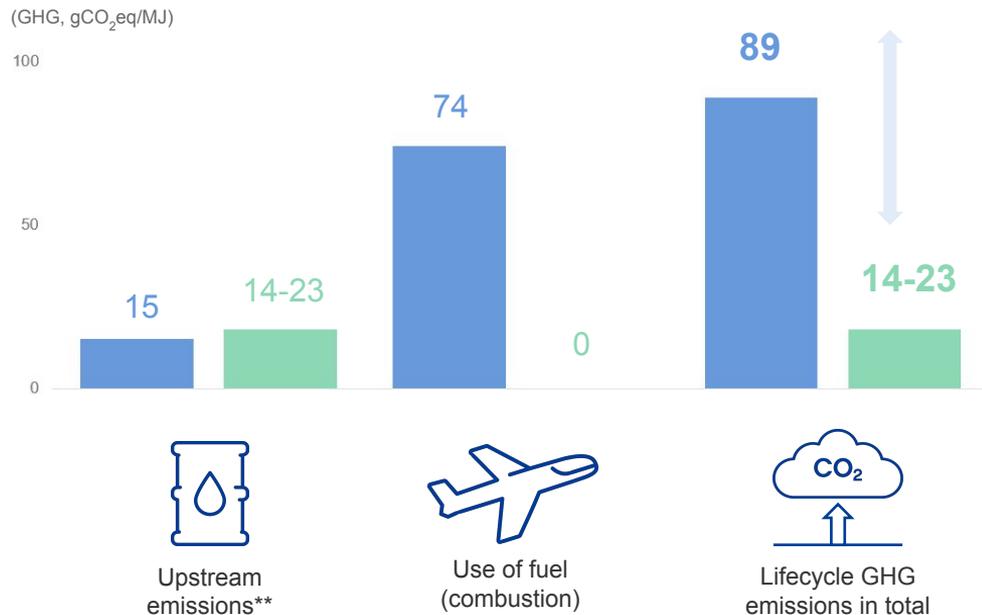
We are set to become a global leader in renewable and circular solutions with a strong focus on innovation





**It is a joint mission!  
But are we doing  
enough?**

# SAF can reduce the GHG emissions up to 80%\* over the lifecycle compared to fossil jet fuel



**NESTE MY**

Sustainable Aviation Fuel

Made from

**100%**

waste and residues,  
such as used cooking oil

Drop-in solution  
requiring

**zero**

additional investment  
in infrastructure

The fuel lifecycle extends from raw material extraction to the consumption of the fuel.

\*According to CORSIA LCA methodology

\*\*Production of feedstock, transports, refining

● Fossil jet fuel

● Neste MY SAF from waste and residues

**NESTE**

# Neste's Sustainable Aviation Fuel capacity will reach 1.5 Mt by end of 2023, and 2.2 Mt by 2026

**2019**

**100 kton SAF**

total global  
production  
capacity

**2023**

**1.5 Mton SAF**

total global capacity  
through investments in  
Rotterdam and  
Singapore

**2026**

**2.2 Mton SAF**

total global capacity  
through further  
investments in  
Rotterdam

**Beyond**

Continuing  
growth with current  
and new  
technologies

# Neste's innovation platforms aim at commercial operations by 2030

## Raw materials and technologies



### Renewable hydrogen

Pilot project ongoing at Neste's Rotterdam refinery with partners. Green H<sub>2</sub> and CCS project at Neste's Porvoo refinery in feasibility phase, selected for EU Innovation Fund grant.



### Power-to-X

Technology end-to-end mapping ongoing.



### Algae

Technology platform build-up ongoing.



### Lignocellulose

Conversion technology alternatives evaluated. Project development ongoing.



### Municipal solid waste

Initial assessment of scalable technologies ongoing.

## End-use segments



Renewable  
aviation

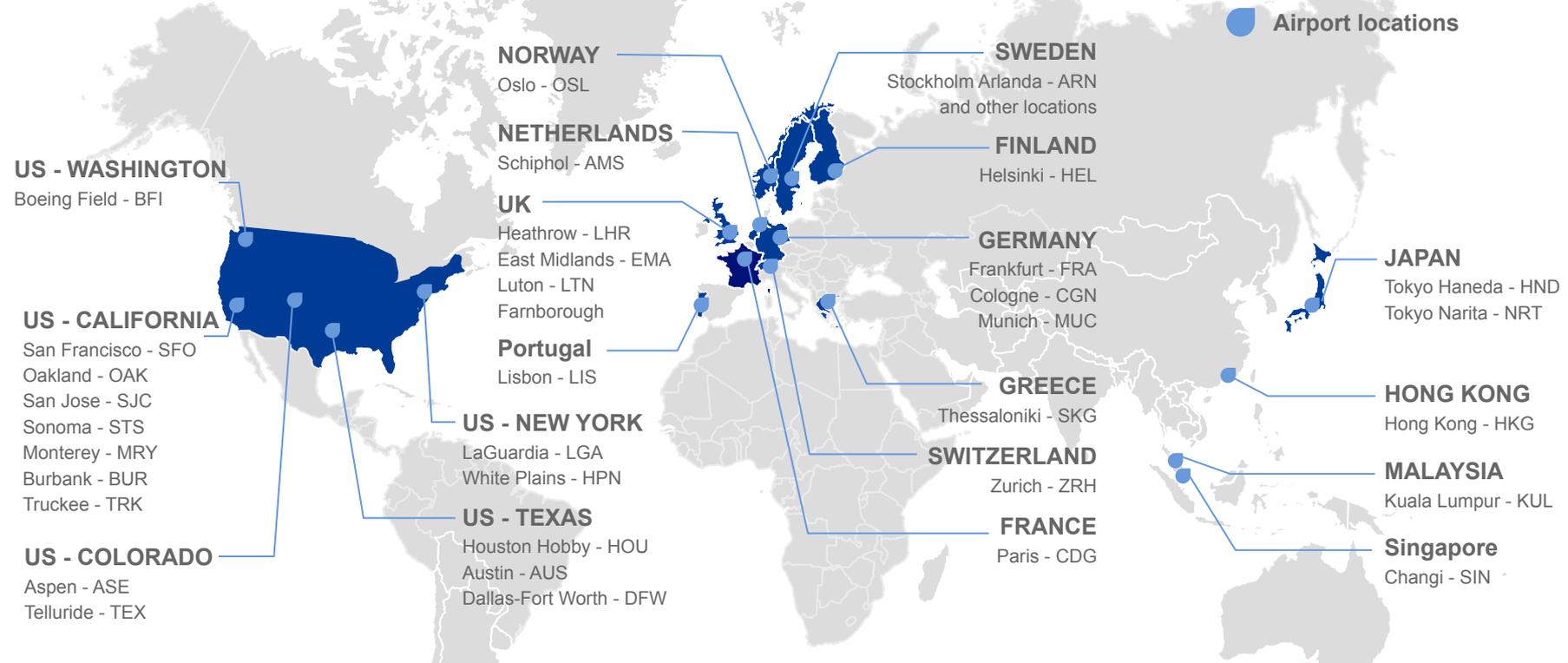


Renewable  
polymers and  
chemicals



Renewable  
road  
transportation

# Neste's SAF is available globally, both through Neste's own network of airports and through distributors



# Voluntary SAF leads to real climate benefits by growing the global demand for renewable fuels



Ambitious and credible climate action accelerates Net Zero by 2050 transition and global GHG emission reductions

SAF from mandates, opt-in or regulatory schemes does not increase the renewable fuels demand globally



Voluntary SAF reduces the demand for fossil fuels



# Higher SAF targets would have an impact on ticket prices

<b>SAF blend:</b>	<b>5%</b>	<b>14%</b>	<b>30%</b>
Helsinki - Singapore	+ €12	+ €33	+ €71
Helsinki - Munich	+ €3	+ €9	+ €20
Helsinki - Stockholm	+ €1	+ €4	+ €8

# NESTE × COLDPLAY

Moving towards sustainable touring with renewable fuels



NESTE

# Conclusions

Climate ambitions in the EU and globally require substantial reduction in transport CO<sub>2</sub> emissions

A broad range of renewable fuels and other low-emission technologies and feedstocks will be needed

SAF will play key role in decarbonizing aviation

A person wearing a black and white plaid shirt and blue jeans is standing in a field of tall green grass. They are reaching up with their right hand towards a green toy airplane that is suspended in the air. The background shows a clear blue sky and a line of trees in the distance.

**Neste is taking  
charge of change**

**Lets act together now!!**