



Cerulogy

# Aviation biofuels in Spain

Dr Chris Malins and Dr Cato Sandford

# SAF

- ▶ Low carbon intensity “sustainable aviation fuels” (SAF) have been identified as a central plank of efforts to reduce the climate impact of aviation
- ▶ SAF is produced from renewable resources:
  - ▶ HEFA fuels (hydroprocessed esters and fatty acids) from vegetable oils and animal fats such as palm oil and used cooking oil
  - ▶ Cellulosic jet fuel produced from grassy and woody material such as agricultural and forestry residues
  - ▶ Electrojet fuel synthesised from electrolytic hydrogen produced with renewable electricity
- ▶ HEFA pathways require less advanced technology and are currently cheaper, but the availability of vegetable oils is limited compared to global aviation fuel demand



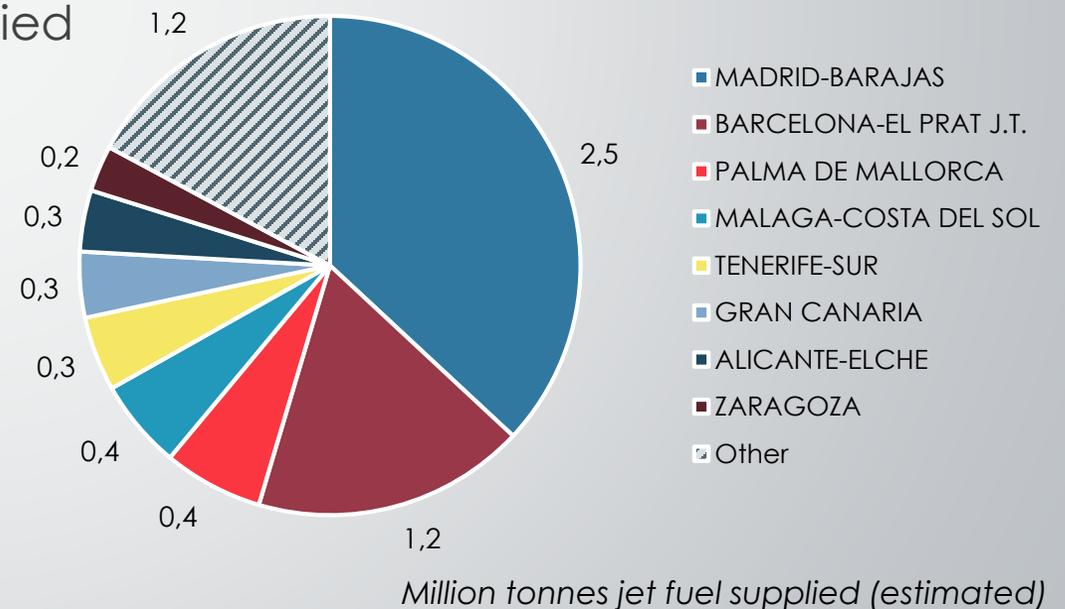
# Policy drivers

- ▶ International
  - ▶ The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) run by ICAO gives credit for SAF use
  - ▶ The value of this credit is low compared to the cost of SAF production
- ▶ European Union
  - ▶ A new 'ReFuelEU' SAF mandate has been proposed in the Fit for 55 package to take SAF use to 5% by 2030 and above 60% by 2050
  - ▶ SAF can also be supported under the existing Renewable Energy Directive
- ▶ National policy in Spain
  - ▶ Spain has previously expressed the intention to introduce a SAF mandate with targets similar to those in ReFuelEU



# Market context

- Before COVID, Spain consumed about seven million tonnes of jet fuel per year, associated with 22 million tonnes of combustion CO<sub>2</sub> emissions
- More than half of Spanish jet fuel is supplied at two airports (Madrid and Barcelona)
- In the past SAF has been supplied at these airports plus Zaragoza and Seville
- The airport operator Aena has committed to delivering zero net CO<sub>2</sub> emissions by 2040
- Iberia is working with Repsol to increase SAF use

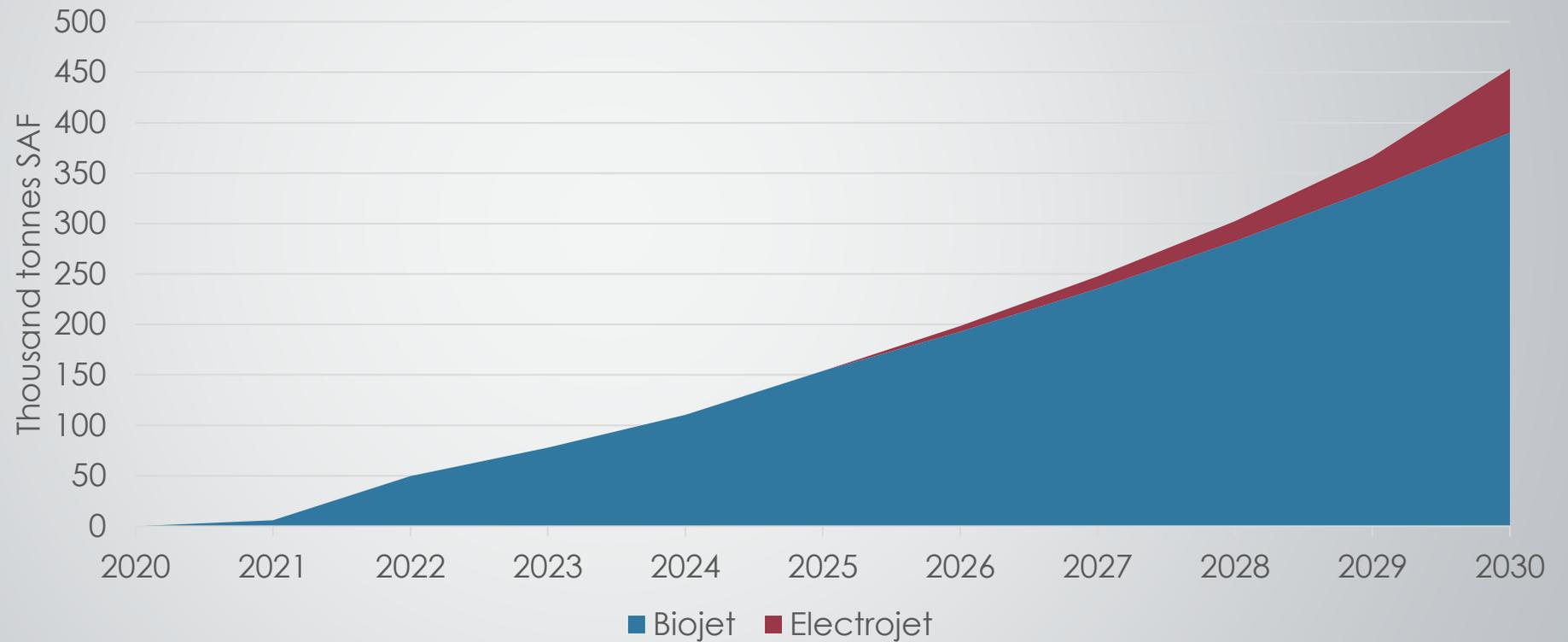


# Biofuel production in Spain

- ▶ Spain is a leader in Europe in co-processing vegetable oil with fossil diesel at oil refineries to produce renewable diesel
  - ▶ In 2020, 740 thousand tonnes of capacity and 430 thousand tonnes of production
  - ▶ Repsol produces most of this renewable diesel
- ▶ This co-processing technology can also be used to produce SAF
  - ▶ Repsol has produced three batches of SAF since 2020, a total of about 550 tonnes
  - ▶ There are practical barriers to scaling up SAF production through co-processing
- ▶ Repsol has announced a dedicated 250 thousand tonne biofuel hydrotreating facility to open in 2023
  - ▶ According to the technology provider this could output 80% SAF



# SAF deployment required to meet ReFuelEU targets for Spain

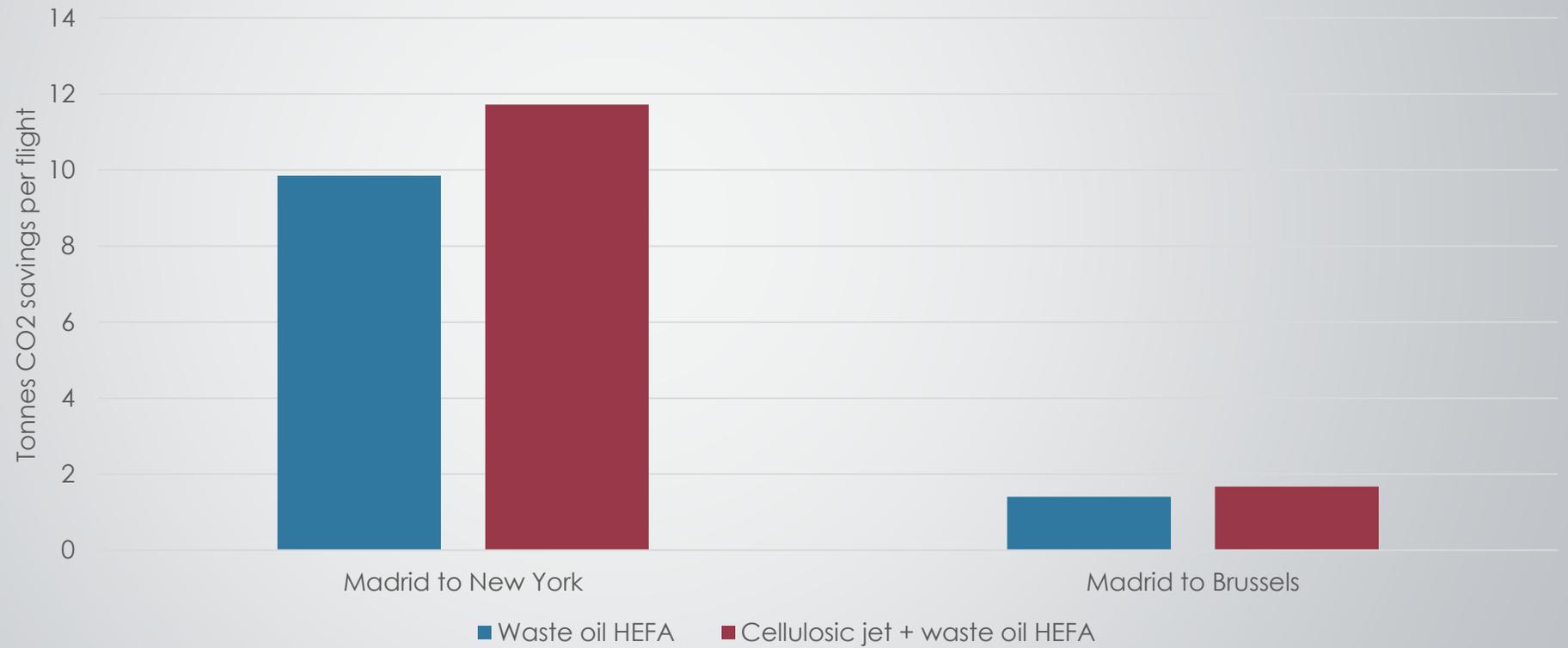


# SAF and sustainability

- ▶ Spain's renewable diesel industry has historically been dependent on palm oil for feedstock
  - ▶ Palm oil is associated with deforestation, and is set to be excluded from subsidy in the EU by 2030
- ▶ Waste and residual oils for HEFA would be more sustainable, but these resources are in high demand for other biofuel applications in the EU and U.S.
- ▶ Cellulosic biofuel pathways can be both sustainable and scalable, but are not being pursued in Spain at commercial scale
- ▶ Electrojet from renewable electricity can be both sustainable and scalable; Repsol is developing a demonstration scale project



# Flight CO<sub>2</sub> savings



# Conclusions

- ▶ SAF use in Spain is expected to increase rapidly, driven primarily by the ReFuelEU initiative
- ▶ Spain has a large existing renewable diesel industry which could be (partly) reoriented to jet fuel production, but:
  - ▶ It is currently dependent on palm oil which is a sustainability problem
  - ▶ There are technical barriers to redeploying co-processing capacity to produce SAF
- ▶ Spain will need dedicated SAF capacity to achieve targets
  - ▶ An opportunity to refocus on cellulosic SAF and electrojet





# Thanks!

[chris@cerulogy.com](mailto:chris@cerulogy.com)