

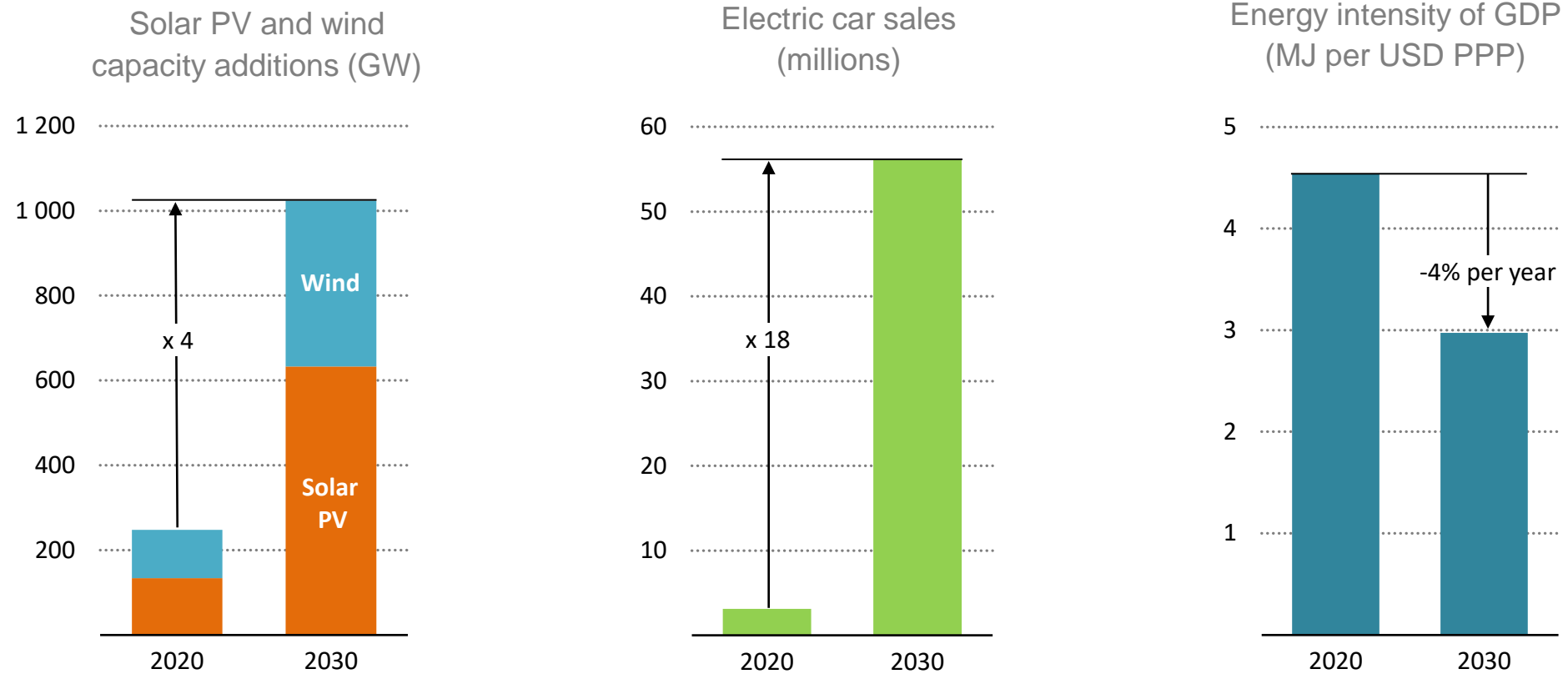


Net Zero by 2050: a Roadmap for the Global Energy Sector

IEA Vernetzungstreffen – Forschung für die Energiewende, 29. September 2021

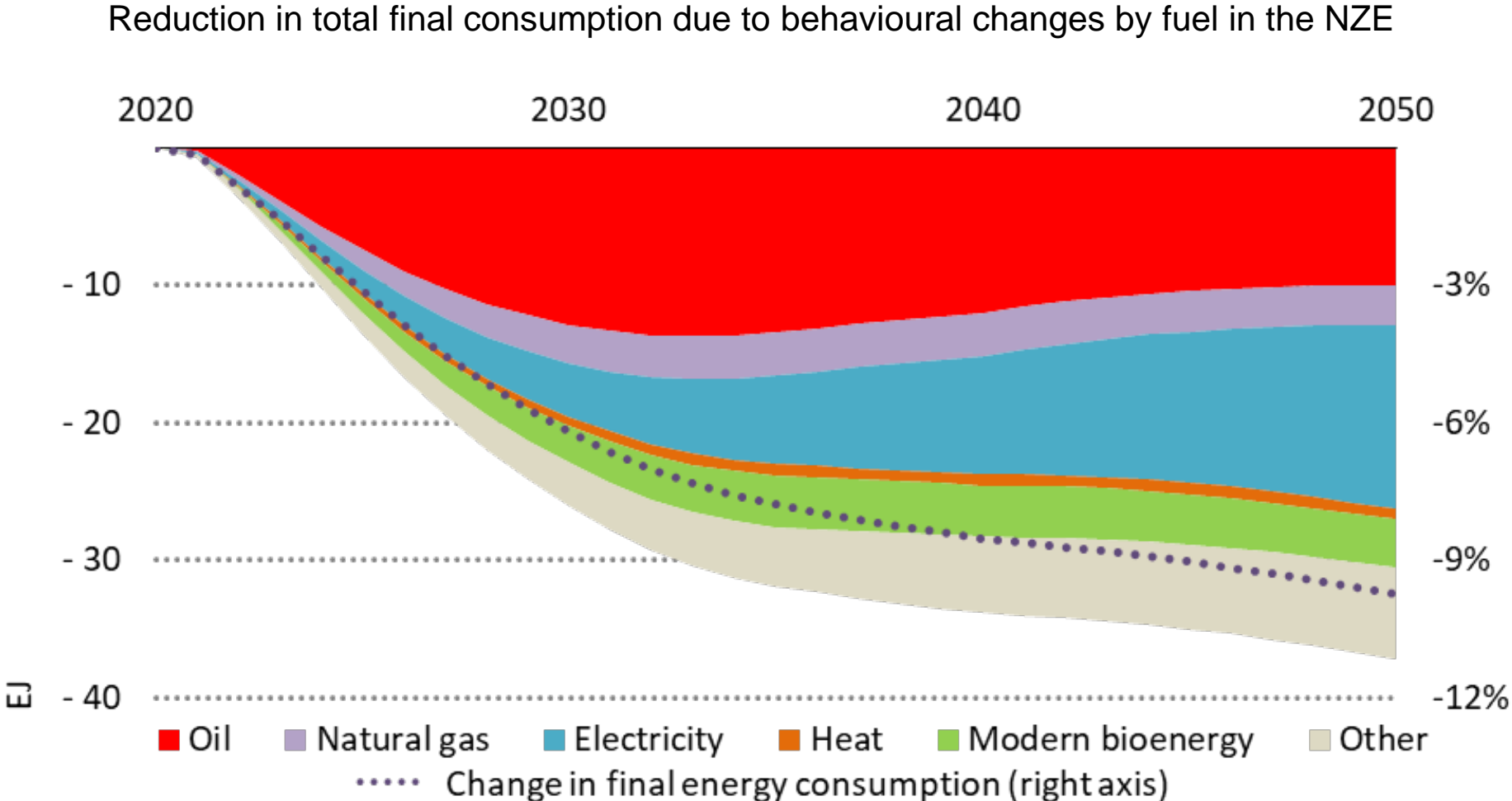
Uwe Remme, Hydrogen and Alternative Fuels Unit Head

Make the 2020s the decade of massive clean energy expansion



Technologies for achieving the necessary deep cuts in global emissions by 2030 exist, but staying on the narrow path to net-zero requires their immediate and massive deployment.

Behavioural changes help to save energy in the NZE



The impact of behaviour changes and materials efficiency on final energy consumption increases over time.

Key behavioural changes in the NZE

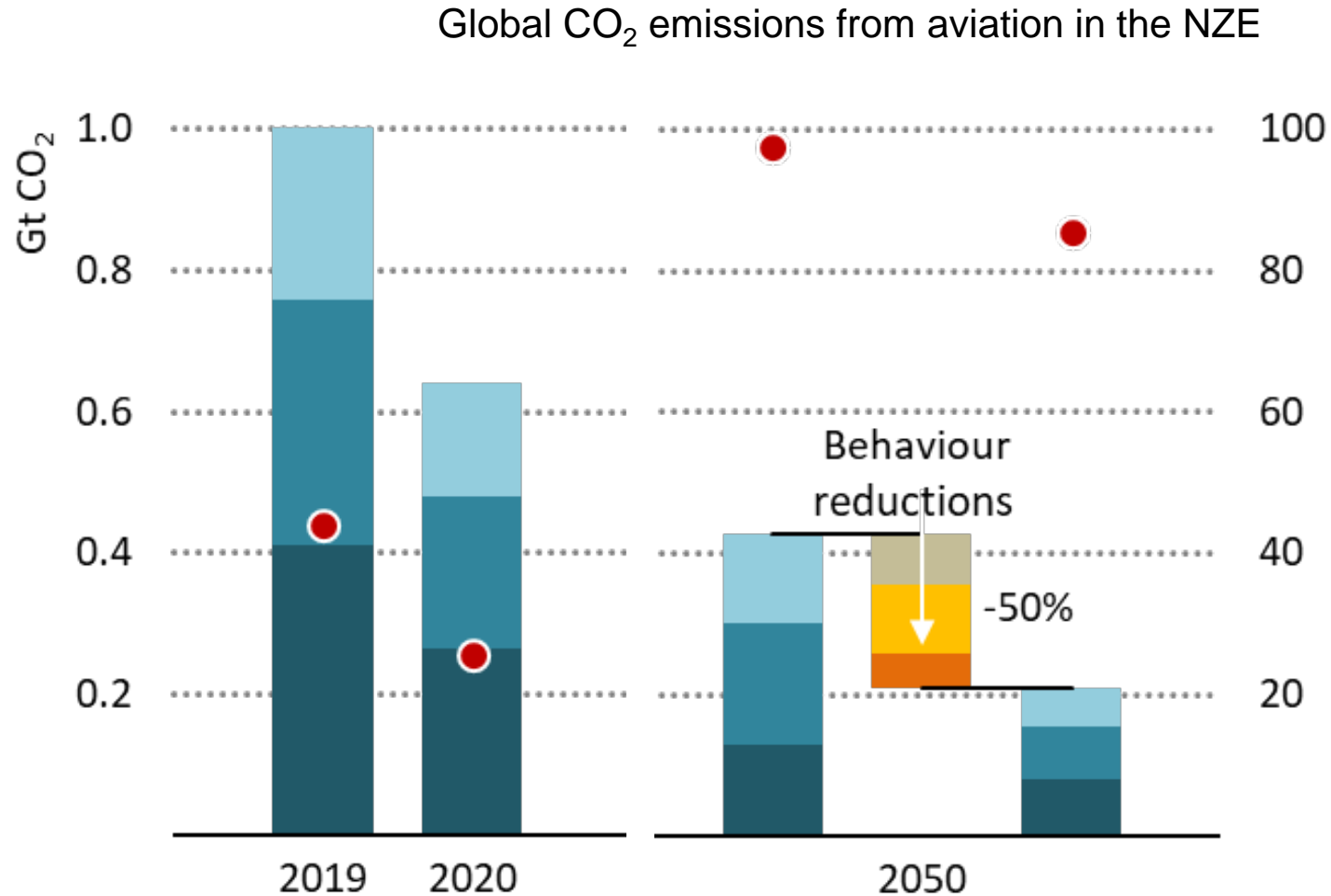
Policy options		Related policy goals	Cost effectiveness	Timelines	Social acceptability	CO ₂ emissions impact
Low-car cities <ul style="list-style-type: none"> Phase out ICE cars from large cities. Rideshare all urban car trips. 	<ul style="list-style-type: none"> Low-emissions zones. Access restrictions. Parking restrictions. Registration caps. Parking pricing. Congestion charges. Investment in cycling lanes and public transportation. 	<ul style="list-style-type: none"> Air pollution mitigation. Public health. Reduced congestion. Urban space. Beautification and liveability. 	●	●	●	●
Fuel-efficient driving <ul style="list-style-type: none"> Reduce motorway speeds to less than 100 km/h. Eco-driving. Raise air conditioning temperature in cars by 3 °C. 	<ul style="list-style-type: none"> Speed limits. Real-time fuel efficiency displays. Awareness campaigns. 	<ul style="list-style-type: none"> Road safety. Reduced noise pollution. 	●	●	●	●
Reduce regional flights <ul style="list-style-type: none"> Replace all flights <1h where high-speed rail is a feasible alternative. 	<ul style="list-style-type: none"> High-speed rail investment. Subsidies for high-speed rail travel. Price premiums. 	<ul style="list-style-type: none"> Lower air pollution. Lower noise pollution. 	●	●	●	●
Reduce international flights <ul style="list-style-type: none"> Keep air travel for business purposes at 2019 levels. Keep long-haul flights for leisure at 2019 levels. 	<ul style="list-style-type: none"> Awareness campaigns. Price premiums. Corporate targets. Frequent-flyer levies. 	<ul style="list-style-type: none"> Lower air pollution. Lower noise pollution. 	●	●	●	●
Space heating <ul style="list-style-type: none"> Target average set-point temperatures of 19-20 °C. 	<ul style="list-style-type: none"> Awareness campaigns. Consumption feedback. Corporate targets. 	<ul style="list-style-type: none"> Public health. Energy affordability. 	●	●	●	●
Space cooling <ul style="list-style-type: none"> Target average set-point temperatures of 24-25 °C. 	<ul style="list-style-type: none"> Awareness campaigns. Consumption feedback. Corporate targets. 	<ul style="list-style-type: none"> Public health. Energy affordability. 	●	●	●	●

● = poor match

● = neutral match

● = good match

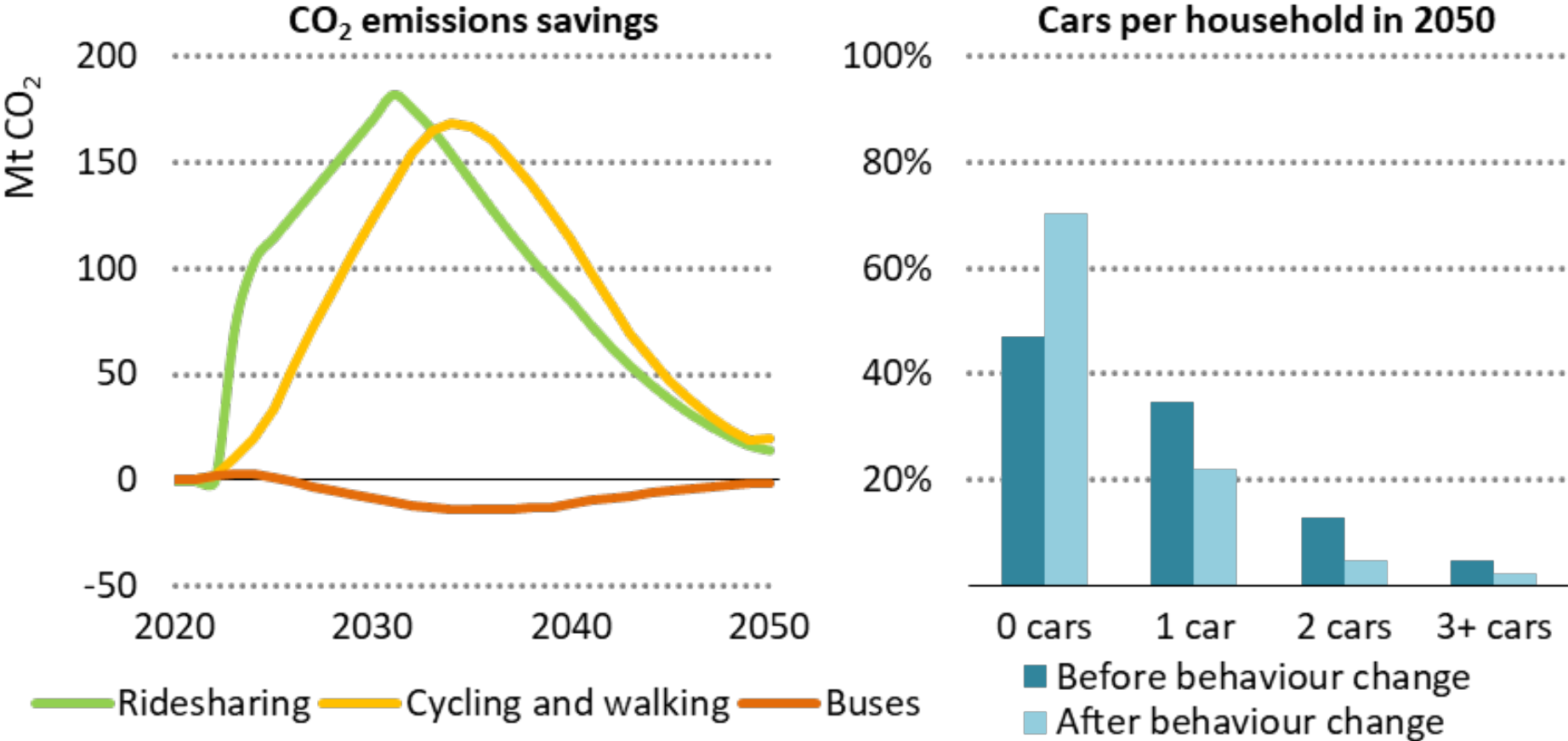
CO₂ reductions from behavioural changes in aviation



Demand for passenger aviation is set to grow significantly by 2050, but behavioural changes reduce emissions by 50% in 2050 despite reducing flights by only 12%.

Using cars less reduces emissions over the next decade

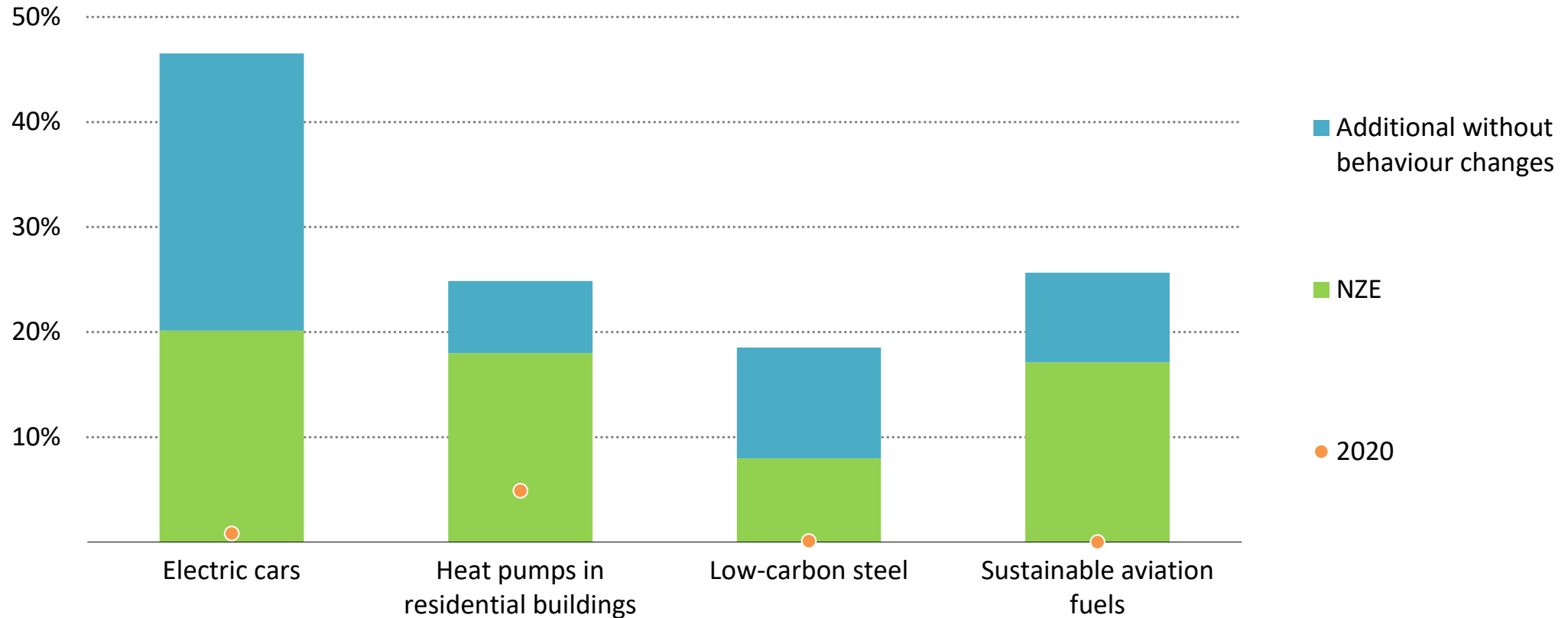
Global CO₂ emissions savings and car ownership per household due to behavioural change in the NZE



Policies discouraging car use in cities lead to rapid reductions in CO₂ emissions and lower car ownership levels, though the impact diminishes over time as cars are electrified.

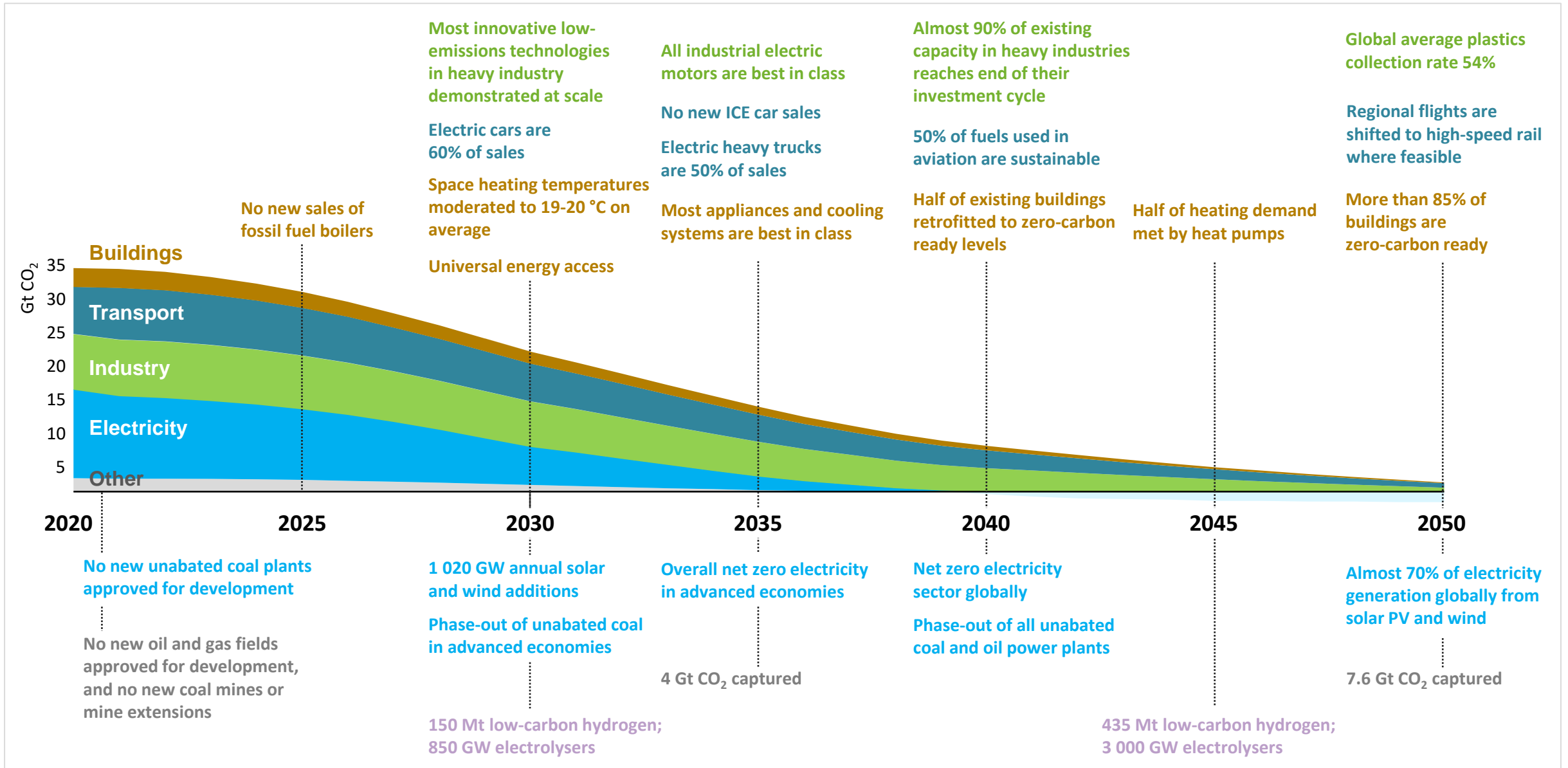
Is net-zero by 2050 still possible without behavioural change?

Share of low-carbon technologies and fuels with and without behavioural change in 2030 in the NZE



In the absence of behavioural changes, the share of low-emissions technologies in end-uses in 2030 would need to be much larger to achieve the same emissions as in the NZE

Set near-term milestones to get on track for long-term targets



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