



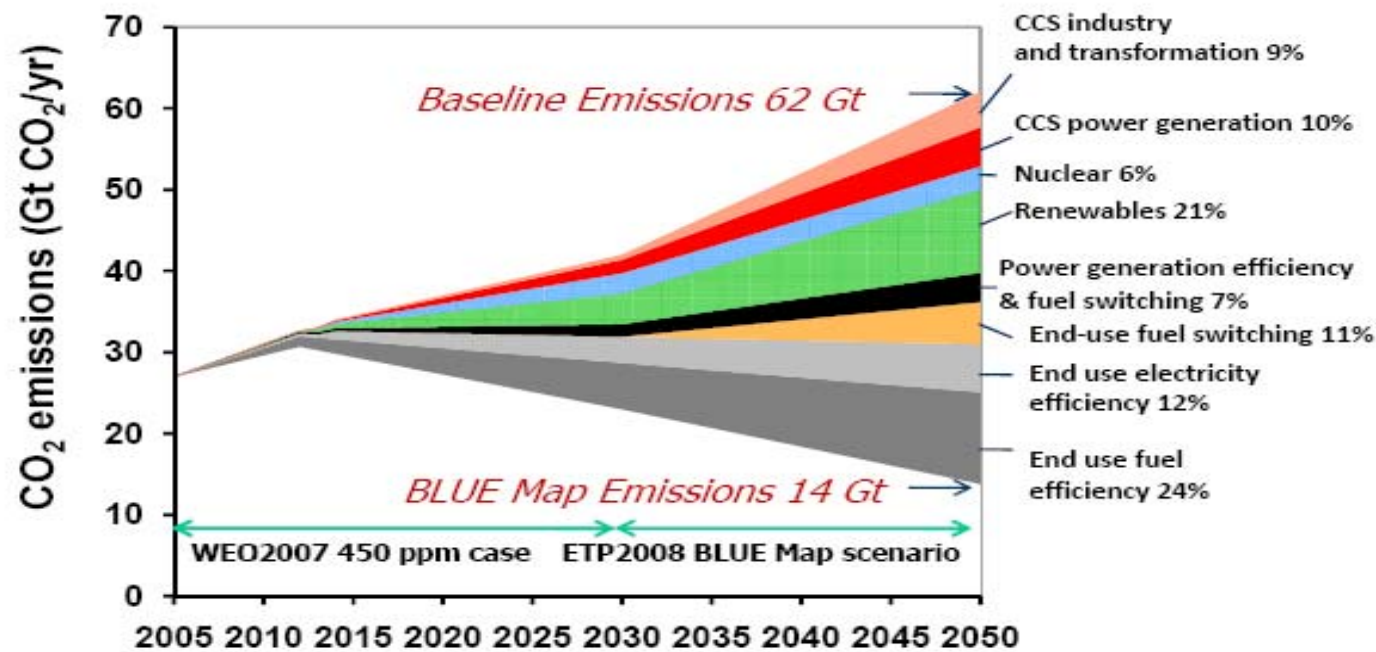
International Symposium on Future Challenges of Transport and Environment - Fuels and Climate Protection

Berlin, 25 June 2008
Dr. Ruprecht Brandis

IEA: Energy Technology Perspectives 1



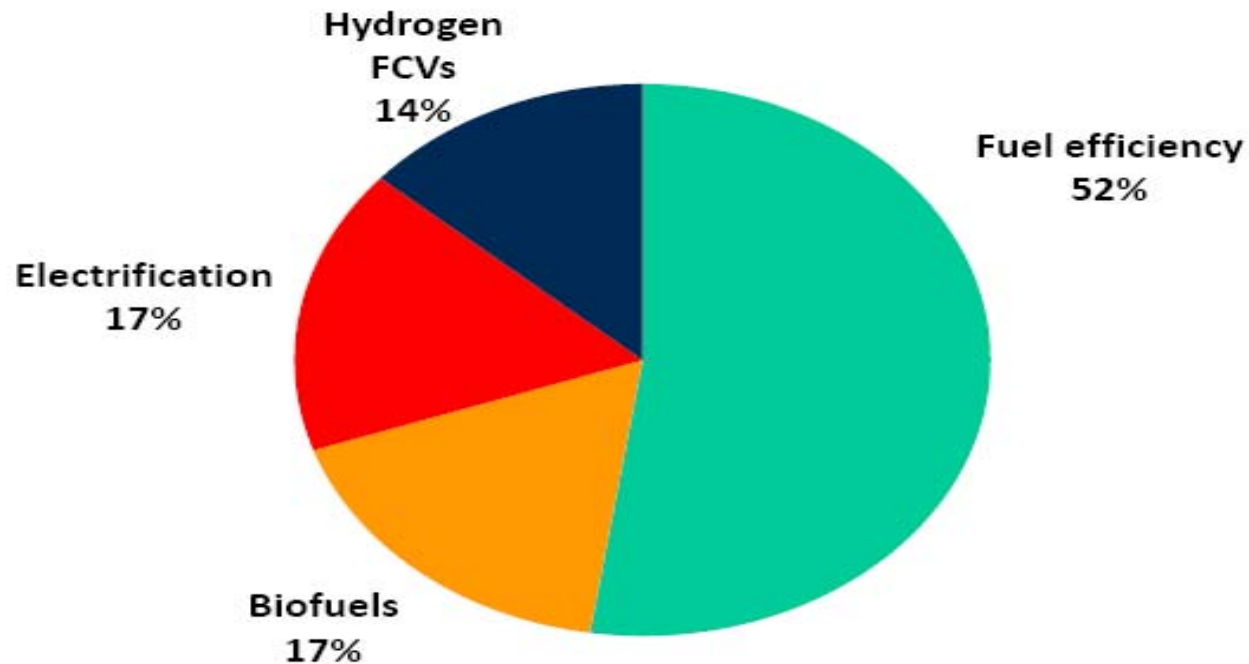
A New Energy Revolution: Cutting Energy Related CO₂ Emissions



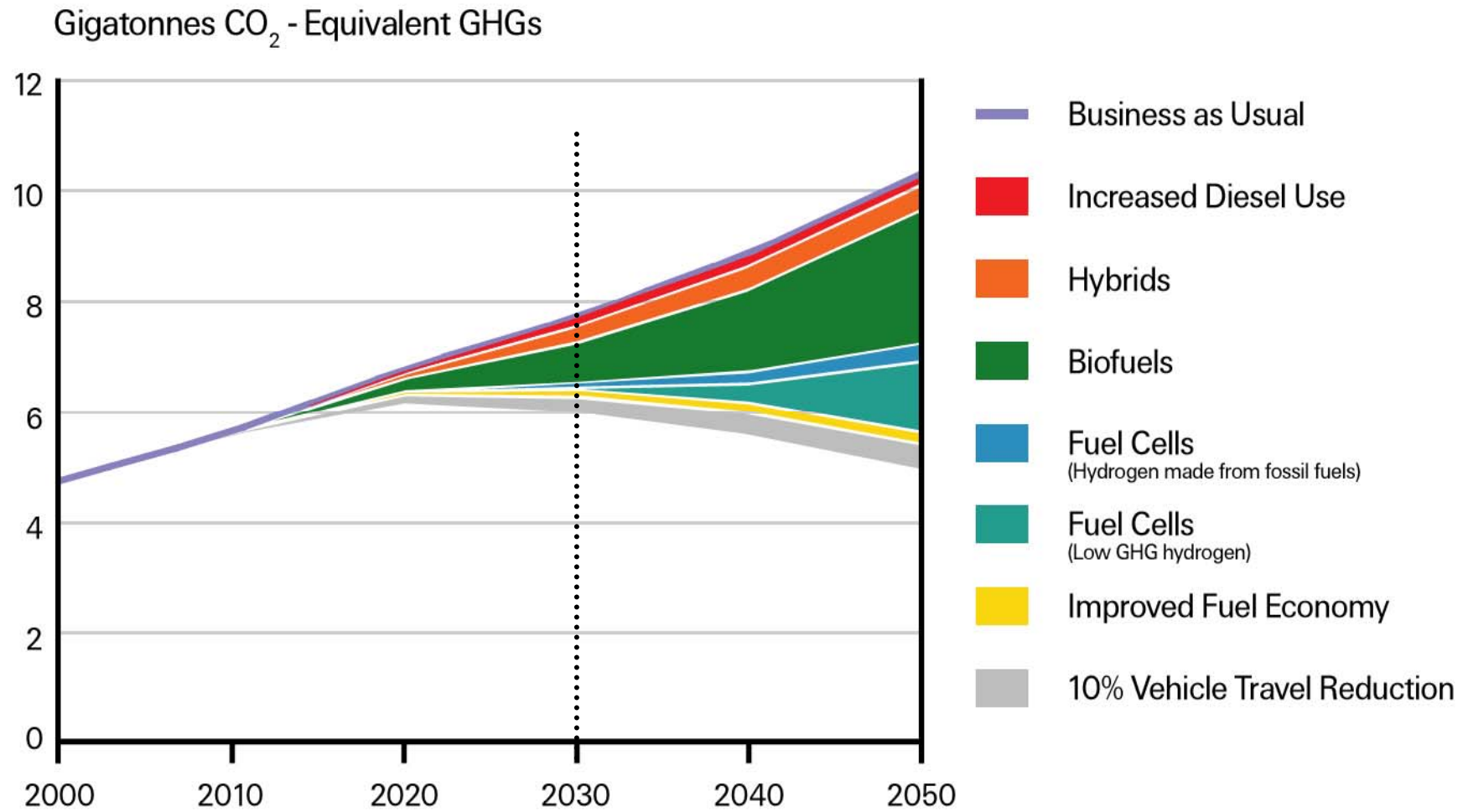


Transport Sector Emissions Reductions

BLUE Map 12.5 GtCO₂ reduction



Biofuels – great potential and currently only option to reduce CO₂ in fuels sector



Source: World Business Council for Sustainable Development. *Mobility 2030* report.



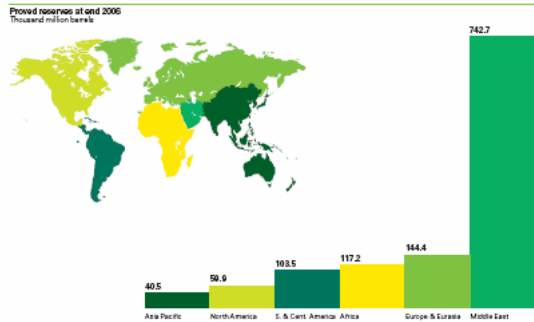
Strategic importance to BP



- Bio-fuels can have a positive impact;
 - Climate Change
 - Energy Security and diversification
 - Rural Development
- For developing countries biofuels provide an opportunity for economic growth involving the large rural, but poor, agricultural community
- For sustainable development it is critical to pursue non-food feedstock ensuring minimal competition of resources with agricultural food crops. This is critical for countries like China & India

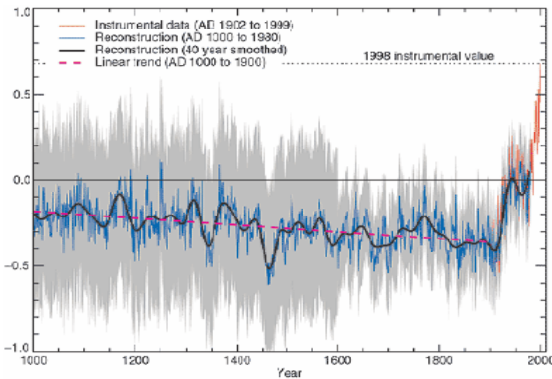
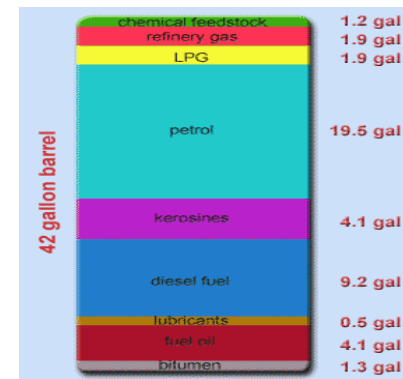


Why Biofuels?



75% of proven oil reserves are in volatile parts of the world

70% of oil consumption is used for mobility

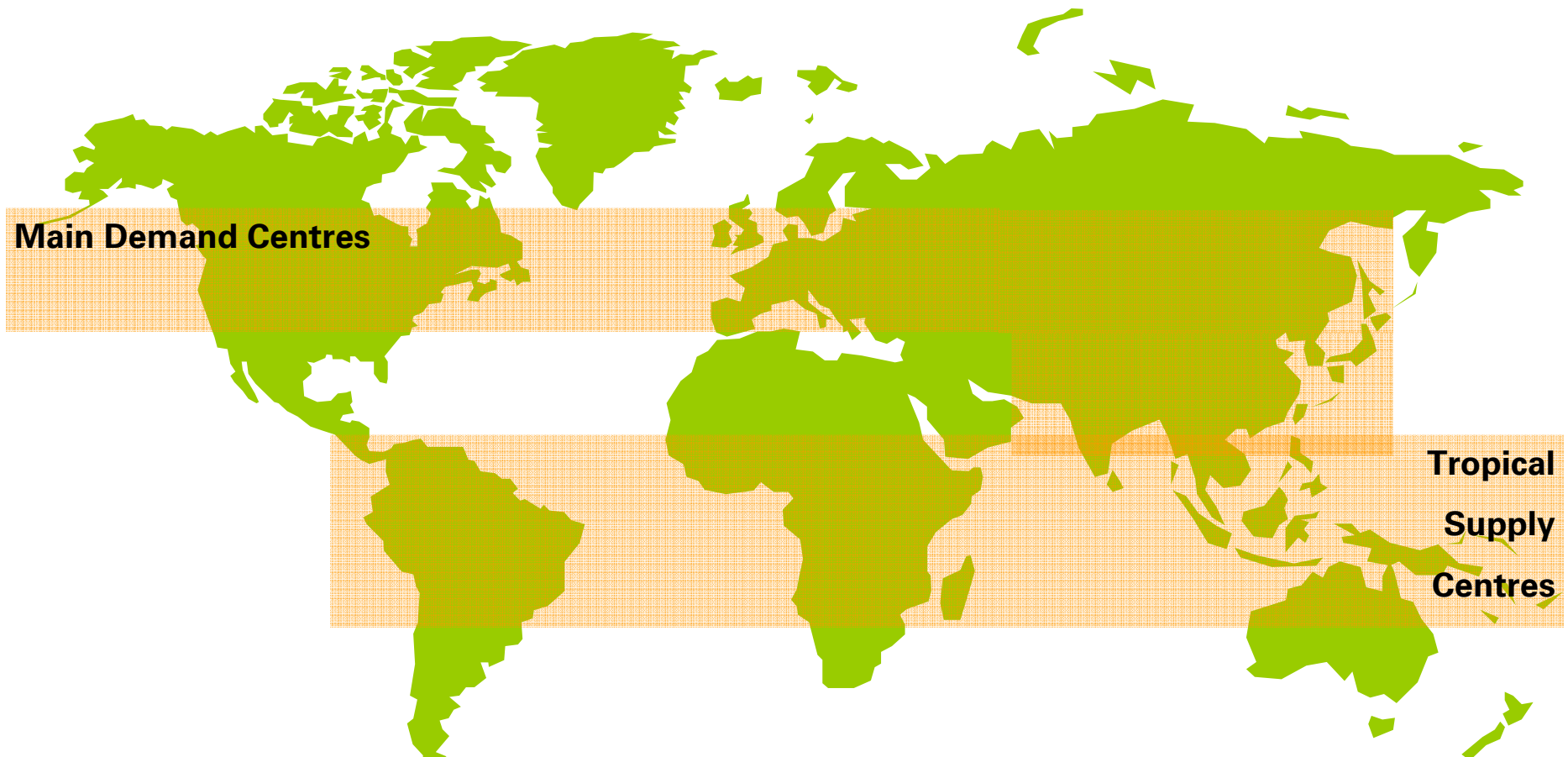


Transportation accounts for almost 20% of daily carbon emissions

Fuel consumption for transportation will grow 55% by 2030



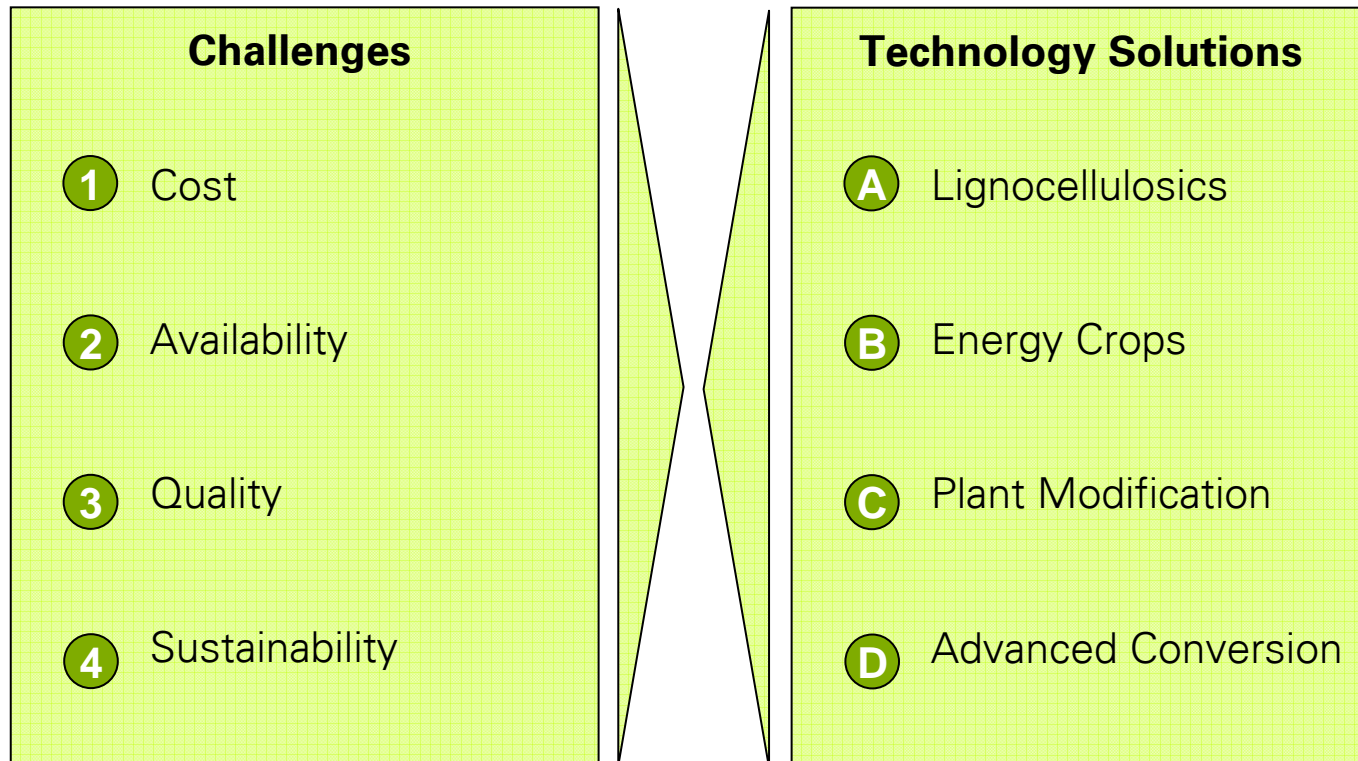
Building a sustainable biofuels business - Sustainability is key to what is possible



Tropical supply centres have advantages in CO₂ efficiency and costs, but raise questions on sustainability. Main demand centres have well accepted sustainability standards, but disadvantages in CO₂ efficiency and costs.



How technology has a major role to play



BP Biofuels Technology Activities



	Gasoline	Diesel
Unconventional Feedstocks	<ul style="list-style-type: none"> Sugar grasses and cane evaluations (Sweet Sorghum etc.) Sugar Cane Bagasse to LC conversion Energy Grasses experiments in collaboration with Mendel Biotech and EBI projects 	<ul style="list-style-type: none"> Jatropha Plantation in collaboration within the BP/D1 JV & with TERI (The Energy Research Institute, India) Cyanobacteria / Algae program in collaboration with Arizona State University
Bioscience	<ul style="list-style-type: none"> Starch / Sugar based feedstocks to Butanol in collaboration with DuPont Energy Bioscience Institute (\$500m / 10 year collaboration investment with UCLA, Berkeley – Lawrence Berkeley National Laboratory – University of Illinois 	
Advanced Processes	<ul style="list-style-type: none"> Lignocellulose to Ethanol Creation of a Bioscience lab to scale up EBI and 3rd party conversion technology Design and construction of butanol pilot plant Commercialisation of new butanol plants and plant retrofits together with DuPont 	<ul style="list-style-type: none"> Process Development on bioreactors to manufacture bio oils from Algae, and diesel fuel from algae oils, in collaboration with Arizona State University Investigation of Sugar to Diesel routes
Advantaged Molecules	<ul style="list-style-type: none"> Butanol product development and fuel commercialisation Investigation of Ethanol from Lignocellulosic processes 	<ul style="list-style-type: none"> Hydrogenated oils as diesel component Advanced Diesel from sugar programs

Summary and Conclusion



- First generation bio-fuels
 - are frontrunners and are available,
 - have in case of Ethanol from Europe and Biodiesel only modest GHG emissions reduction potential
 - are non-ideal fuel molecules that have vehicle/engine compatibility issues.
 - Yield / overall availability is constrained and use food crops as feedstock.
- Advanced bio-fuels
 - are still not available on a large industry-scale basis,
 - have a high GHG emissions reduction potential
 - high quality fuel molecules, avoiding vehicle/engine compatibility issues
 - High yields that can support material penetrations into transport fuels (20-30%), and do not directly compete with food crops.
- Hydrogenated vegetable oils (HVO)
 - are feasible and of high quality,
 - in terms of climate protection are have a performance in between first generation and advanced bio-fuels
 - depending on the kind of oil have to compete with food crops.





Thank you.

