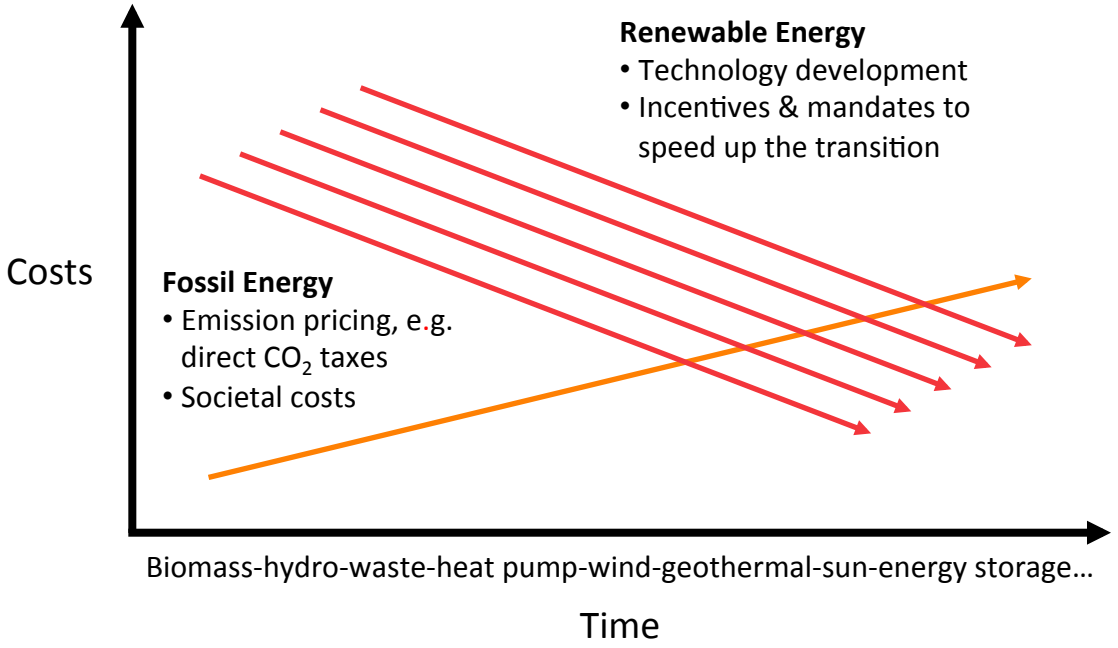
Tampereen Oopperajuhlat – Maamme Energia

Energia liikenteessä

http://www.st1.eu/st1-nordic-energy-outlook

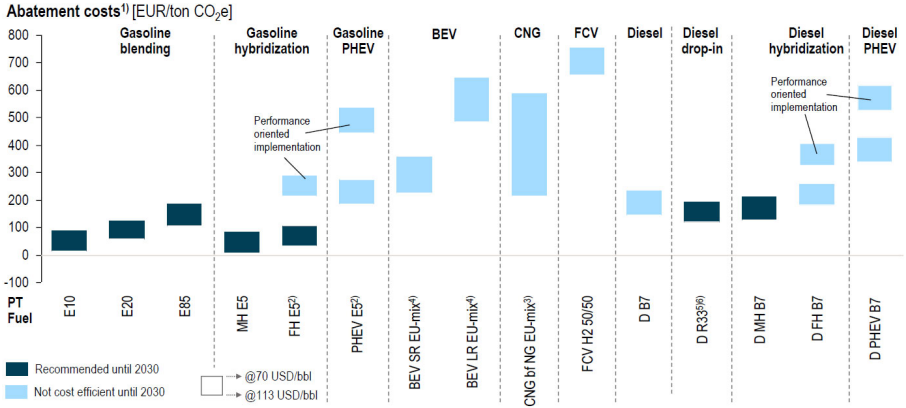
Centralized production is the strength of fossil energy, decentralized production is the strength of renewable energy



THE INEVITABLE DECREASE IN RENEWABLE ENERGY COSTS IS THE KEY TO ITS LONG-TERM SUCCESS

Advanced biofuels decarbonise cost effectively

WTW GHG abatement costs for society, new C-segment PC 2030 [EUR/ton CO_2e]



1) Compared to optimized Gasoline powertrain 2030 using E5, all technologies with 250,000 km lifetime mileage 2) 30% e-driving, higher e-driving share reduces abatement costs
3) Large range between scenarios driven by decoupling effect of natural gas price 4) Risk of higher abatement costs due to need of second battery over lifetime,
SR – short range with 35 kWh battery capacity, LR – long range with 65 kWh battery capacity, both using 2030 EU mix electricity, 5) Diesel fuel with 7% FAME and 26% HVO
6) Abatement cost in existing vehicle: -67 EUR/ton CO_2 (high oil price), 7 EUR/ton CO_2 (low oil price)

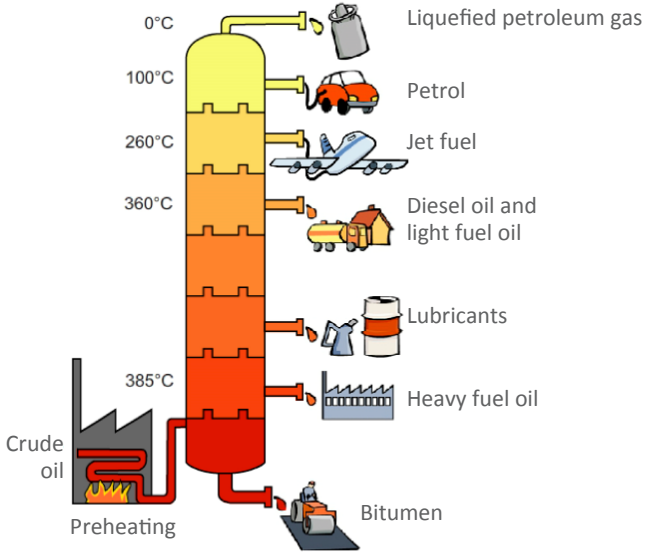
SOURCE: Integrated Fuels and Vehicles Roadmap to 2030+, Roland Berger

HYBRIDISATION COMBINED WITH ADVANCED BIOFUELS HAS MOST REALISTIC CO_2 ABATEMENT POTENTIAL BY 2030

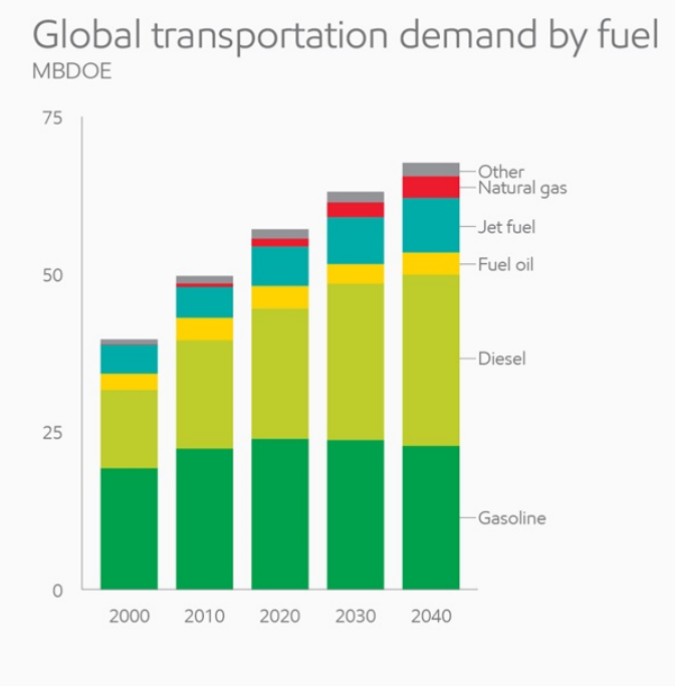
The global energy challenge

The challenge – oil refining products

- Crude oil refining produces always the same oil products:
  - light distillates, middle distillates, heavy distillates and residuum
    - i.e. if you produce Jet fuel, the process produces the other products as well



An example of the challenge: demand of jet fuel



- Jet fuel demand to rise by 55% as air travel keeps increasing world-wide (ExxonMobil Outlook)
  - Center for Climate and Energy Solutions estimate that:
    - Emissions from aviation make 2 percent of global emissions already in 2013
    - If global aviation were a country, it would rank as the seventh largest carbon dioxide emitter
    - In 2010 2.4 billion passengers and 40 million metric tons of goods
    - By 2050, that could grow to 16 billion passengers and 400 million metric tons of goods
- But no significant large scale renewable energy replacement developed

Bio-refining concept

- Use of existing fuels infra offers cost efficient potential to convert fossil fuels to global scale renewable fuels production

- Bio-crude need to fulfill the advanced biofuels criteria
  - Vide variety of bio-oils fulfilling the criteria are already available in the market
  - Bio-crude consumption increase leads to shortage in the market/price increase
    - In short/medium term wood industry residues and side products offer large scale cost efficient raw material potential for bio-crude production
    - In longer term new large scale raw material sources and technologies such as algae oil needs to be developed

- Fossil fuels refinery offers needed production synergies and blending options creating cost efficient route to convert fossil fuels production to renewable fuels step by step

- Target is to increase Gothenburg oil refinery bio-crude based production
  - The first step has been investment in an integrated ethanol production plant using food industry biowaste and residues as feedstock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