RENEWABLE ENERGY 2014

International Energy Agency

Sustainable Renewables in the Transport Sector

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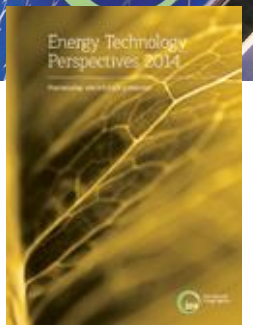
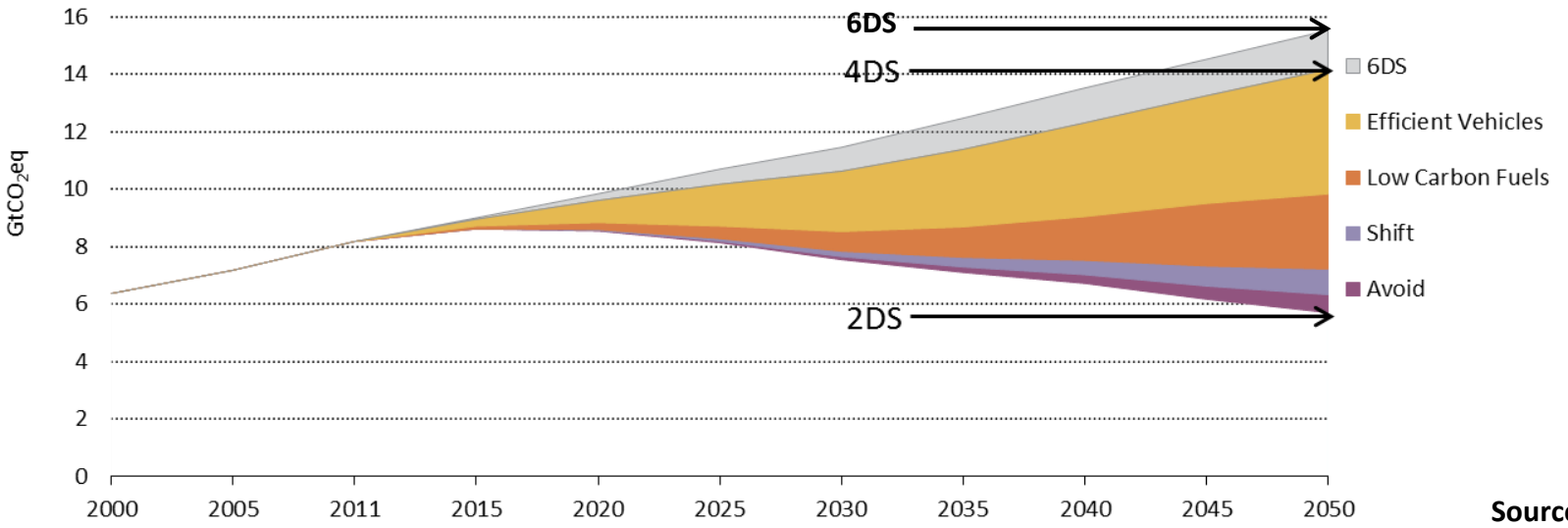
Renewables in the Transport Sector Brussels 31 March 2015

Avoid-Shift-Improve strategy





Source: IEA ETP 2014

Avoid Lower distances, optimized use of vehicles & infrastructure

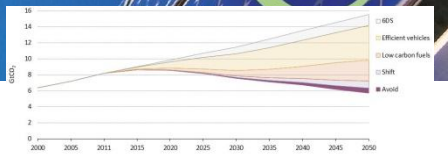
Shift Higher reliance modes with lower energy intensity (public transport, rail, navigation)

Improve Lower energy & emissions per unit activity in all modes (technology): efficiency, access & availability of low-carbon energy carriers, diversification

Multiple benefits: energy diversification, CO_2 emission reduction, improved health and environmental conditions (strategy compatible with pollutant emission reduction)

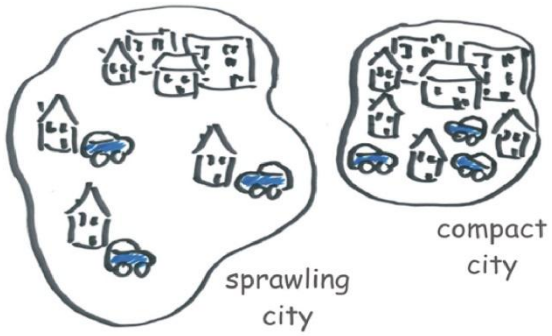
Avoid

Lower activity needs



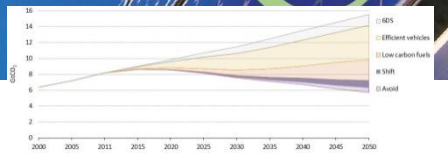
Lower distances and proximity of housing, employment and services (e.g. schools, markets)

- Compact urban areas (lower distances)
- Mixed use of land (residential, business, services)
- Planning instruments
- Property taxes
- Larger potential in fast growing urban areas (yet to be built vs. transformation)



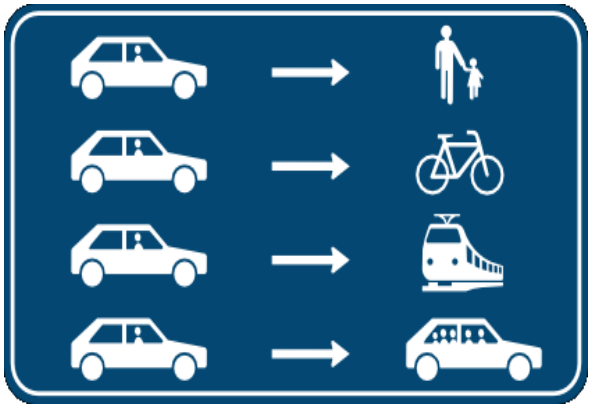
Shift

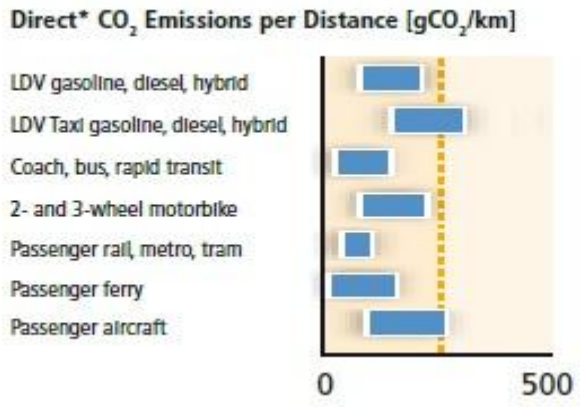
Higher reliance modes with lower energy intensity



Promote shifts toward energy efficient transport modes

- Synergy with *avoid*: compact urban areas well suited for public transport
- Effective public transport (PT): wide access to mobility, lower car use
- Integrated land use and transport planning. Transit oriented development example of effective solution for new urban developments
- Investments on public transport infrastructure needed
- Subsidies important (justified by benefits from reduced externalities)





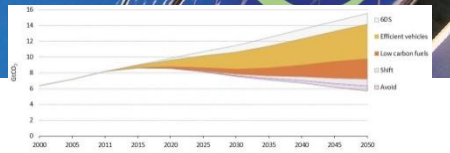
Improve

Reduced emissions per unit activity (vehicles, fuels)

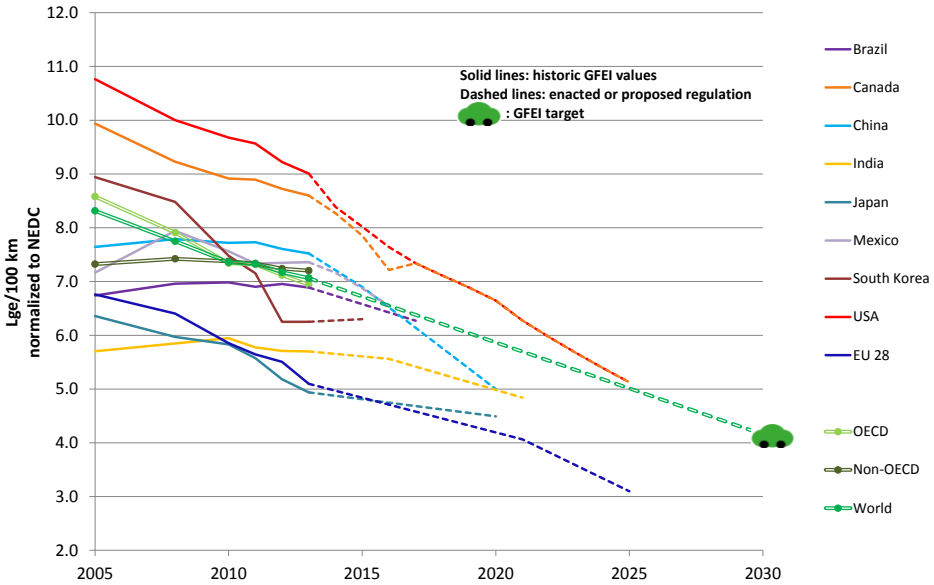
- Market pull for mature technologies in short-term
  - Scrapping fossil fuel subsidies, fuel efficiency standards, labelling, fiscal charges/incentives on vehicle purchase
- Technology push for high-potential but less mature techs
  - Support RD&D to reduce costs and foster tech uptake
  - Focus on specific techs (e.g. EVs)
  - Need for clear indications on long-term policy direction

Improve

Reduced emissions per unit activity (vehicles)



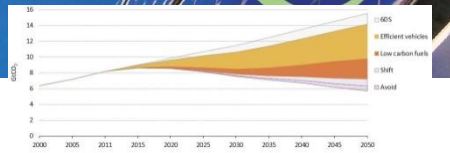
- Energy efficiency is the most important factor
- Policy instruments available include fuel economy standards (GFEI), taxation measures plus road pricing,
- Longer term and technology specific: fiscal and financial instruments direct RD&D support, market pull



Source: [IEA international comparison of light-duty vehicle fuel economy]

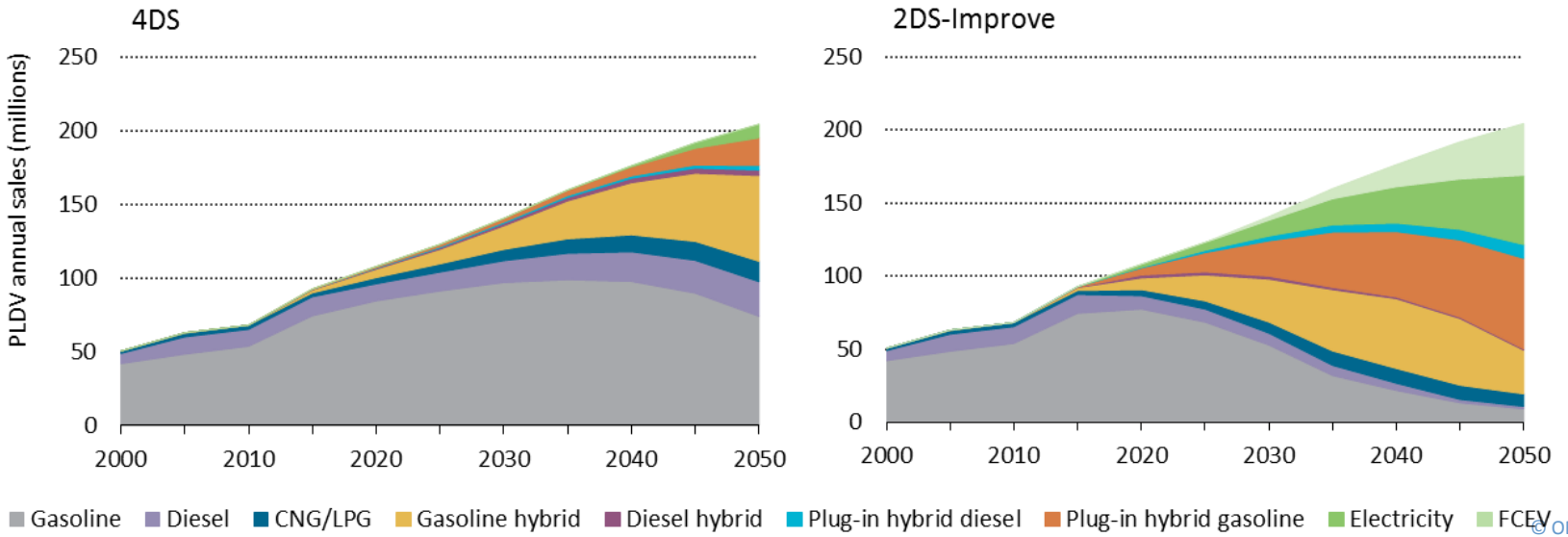
Improve

Reduced emissions per unit activity (vehicles)

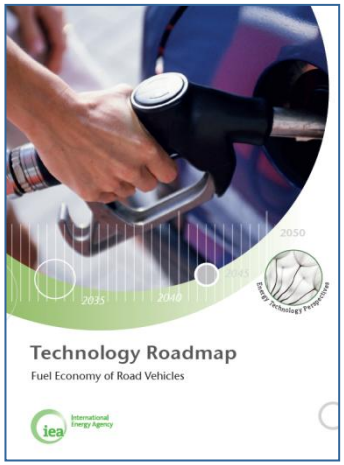


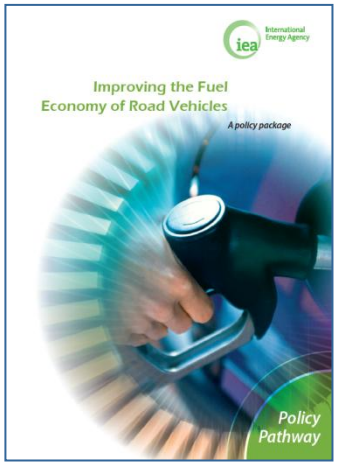
Prospects for personal light duty EVs are very different in IEA ETP scenarios

- In the 4DS (current strategies and limited changes in technology uptake), PHEVs and BEVs play a limited role until 2035
- In the Improve case (part of 2DS, the CO_2 emission mitigation scenario), there are 20M PHEVs and BEVs by 2020; BEVs, PHEVs and (eventually) FCEVs represent nearly three-quarters of new vehicles in 2050



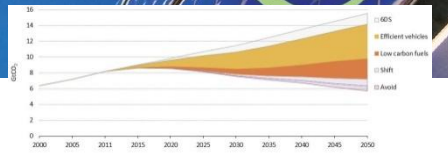
Roadmaps and Publications





Improve

Reduced emissions per unit activity (fuels)



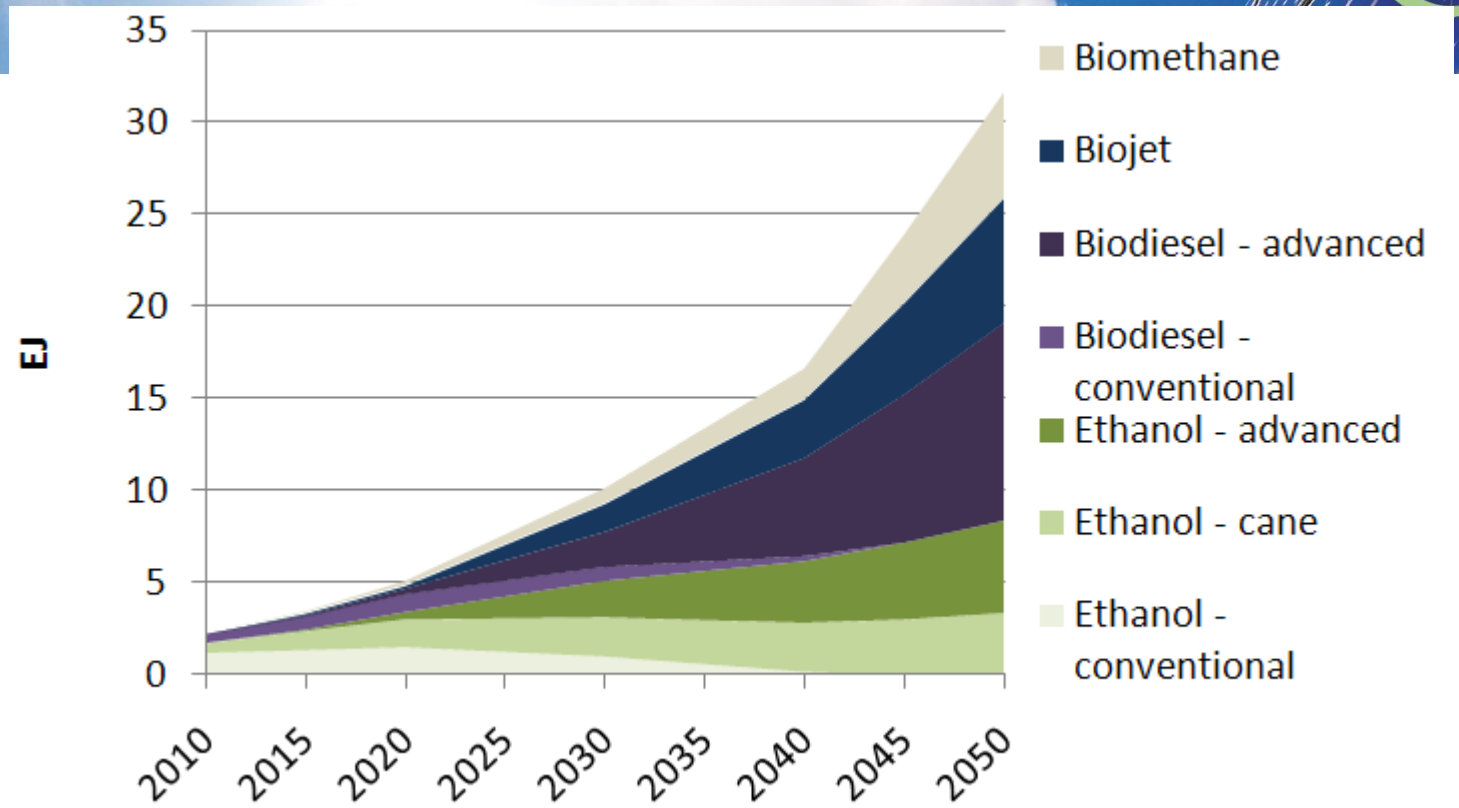
Technology roadmap

Bioenergy from heat and power: primary bioenergy demand in low-carbon ETP scenario increasing from 3 EJ today to 160 EJ in 2050: 100 EJ for generation of heat and power, the rest includes the supplies used for the **27 EJ of final energy demand in transport in 2050**

Key points

- Long-term biofuel use in transport focused on modes with lower chances to access to electrification (aviation, shipping and road freight)
- Advanced biofuels crucial for sustainability aspects. Cost reductions necessary.
  - Need for sound policy framework for issues related with direct and indirect land use change, trade will be increasingly relevant
  - **Need for support to bridge research gap, development of scaled-up demonstration facilities, as well as deployment investment**

IEA Biofuel Roadmap - Vision

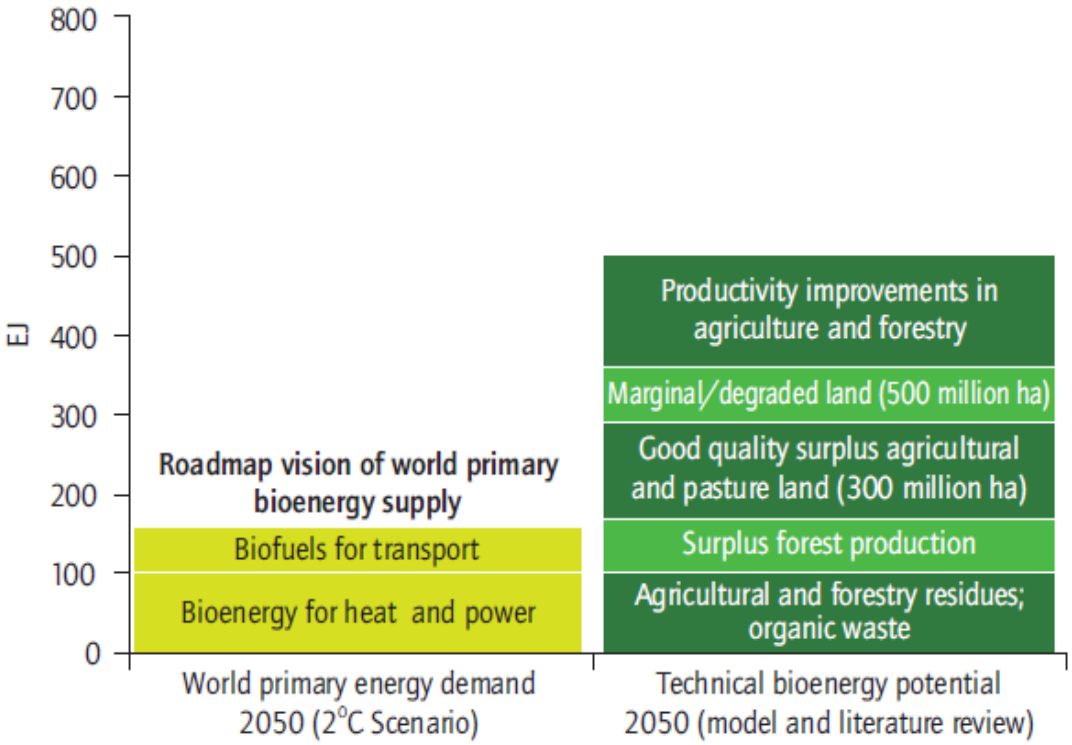


- Biofuel supply grows rapidly and reaches 32EJ in 2050
- Biofuels provide 27% of total transport fuel in 2050
- Diesel/kerosene-type biofuels particularly important to decarbonise heavy transport modes
- Large-scale deployment of advanced biofuels will be key

Biomass supply prospects - uncertainties remain

Uncertainties

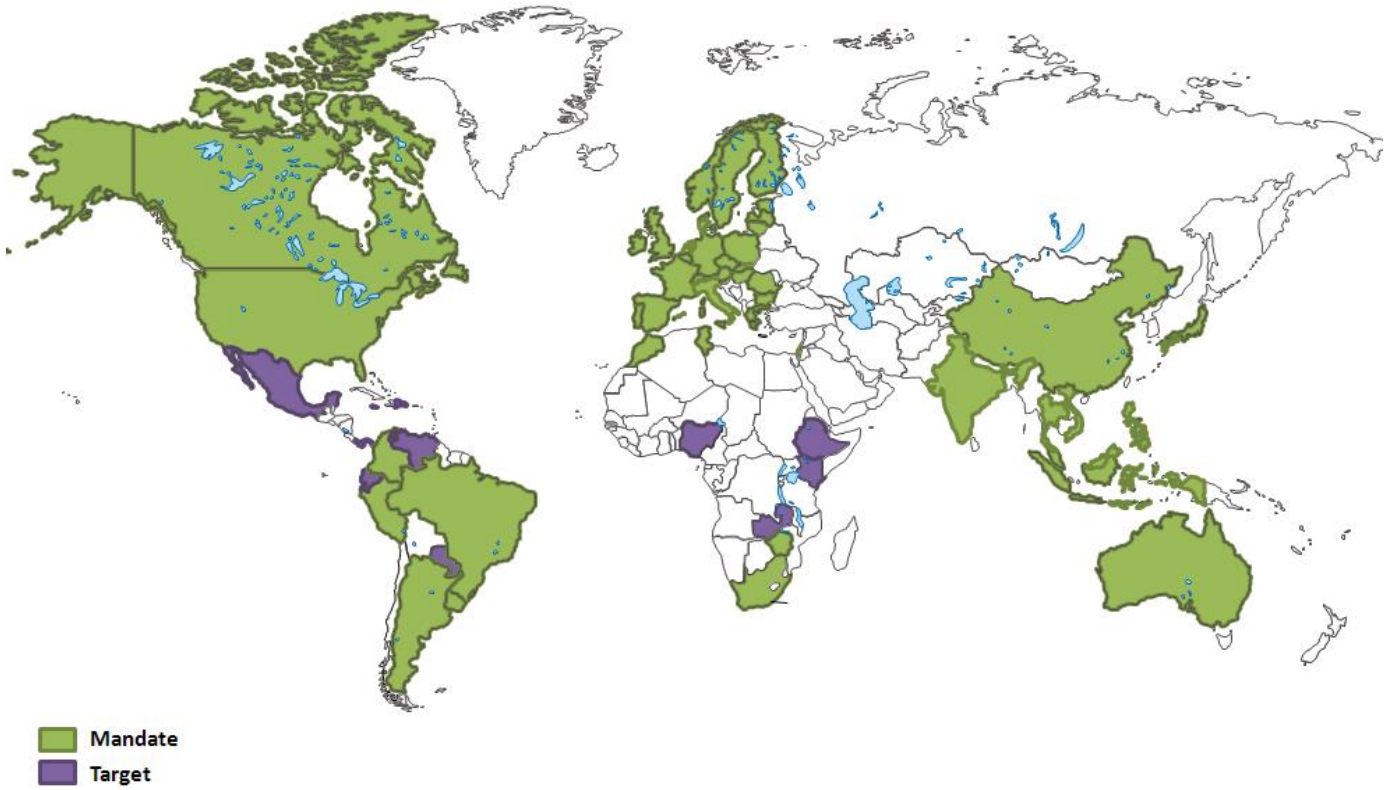
- GHG balance/ILUC?
- Competition for resource?
- Economic?
- Water?



IEA Bioenergy Heat and Power Roadmap, based on IPCC supplemented with IEA data

- **Biomass demand for heat and power reaches 5-7 billion tons in 2050**
- **Intermediate targets should be adopted to enhance international biomass trade, and assess costs and impact on sustainability**

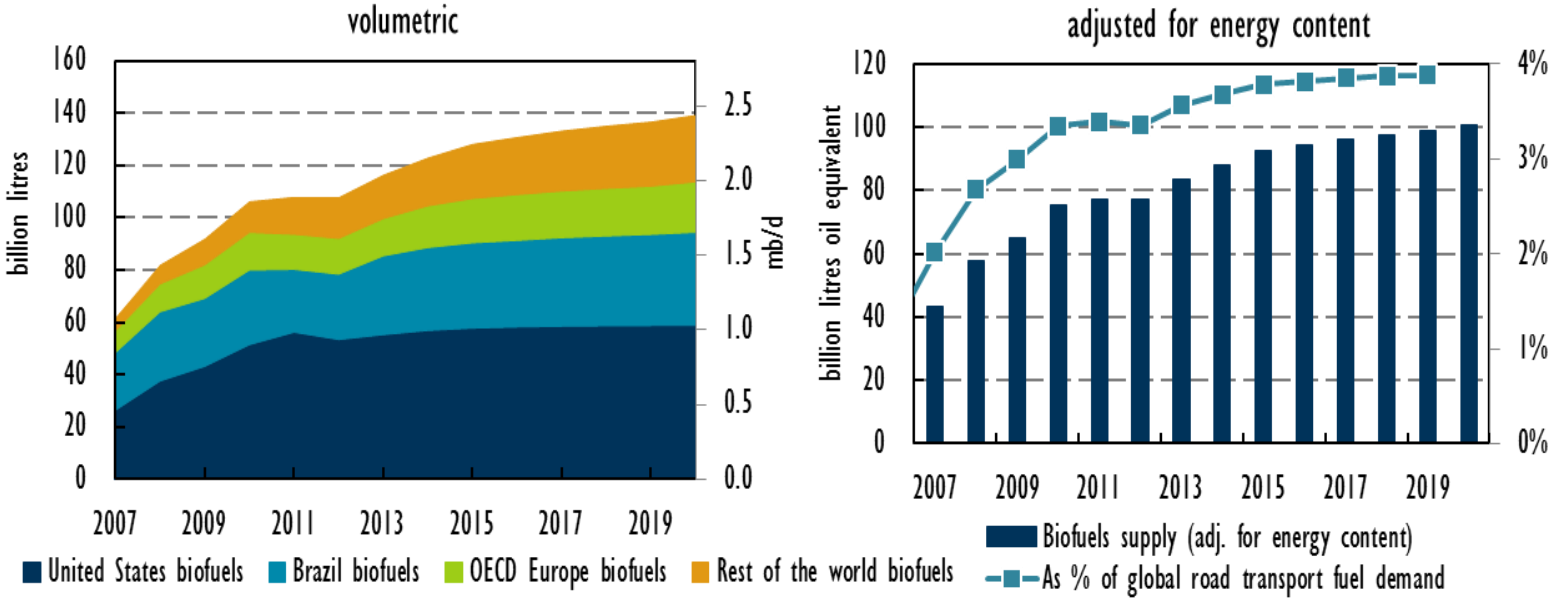
Policies remain key driver for the industry…



This map is without any prejudice to the status of or sovereignty over any territory, to the delimination of international frontiers and boundaries and to the name of any territory, city or area.

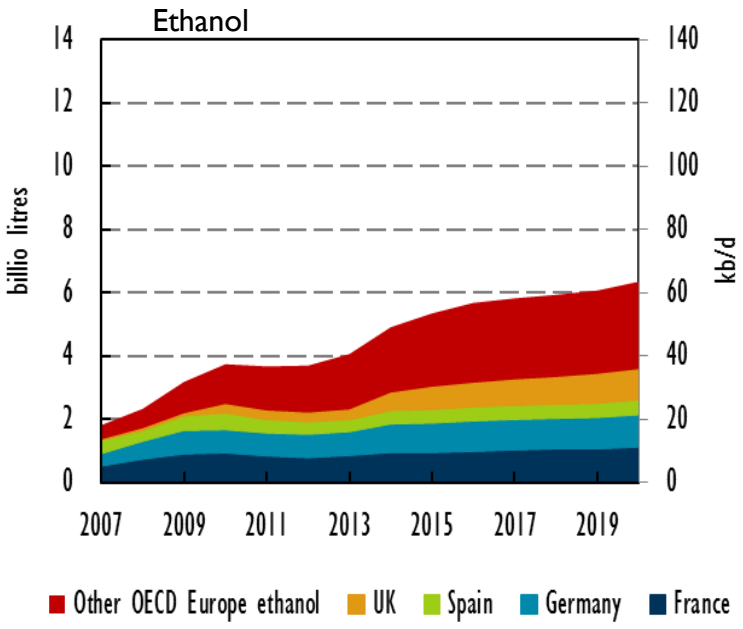
- **Key drivers for introduction of support policies:**
  - **Energy security / reduced oil import bills**
  - **Support for agricultural sector / rural development**
  - **Climate change mitigation**

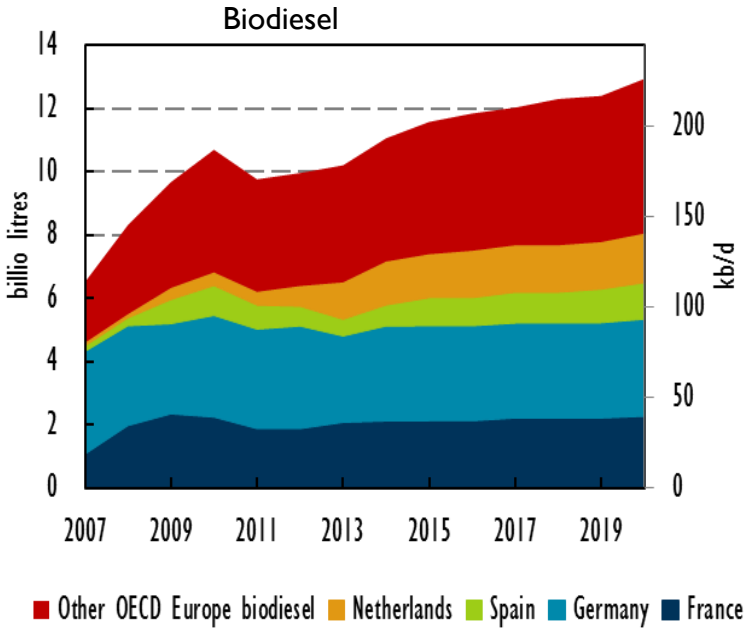
Shifting policy grounds slow down growth



- **After virtual halt in growth 2010-12, 2013 saw 9 billion litre (130 kb/d) increase in biofuel production**
  - → **biofuels accounted for 3.6% of world road transport fuel demand**
- **Global production set to grow by 2.6% /year to 139 bn L (2.3 mb/d) in 2020**
- **Growing political uncertainty in the EU and US might undermine the medium-term growth prospects, while emerging markets ramp up support policies**

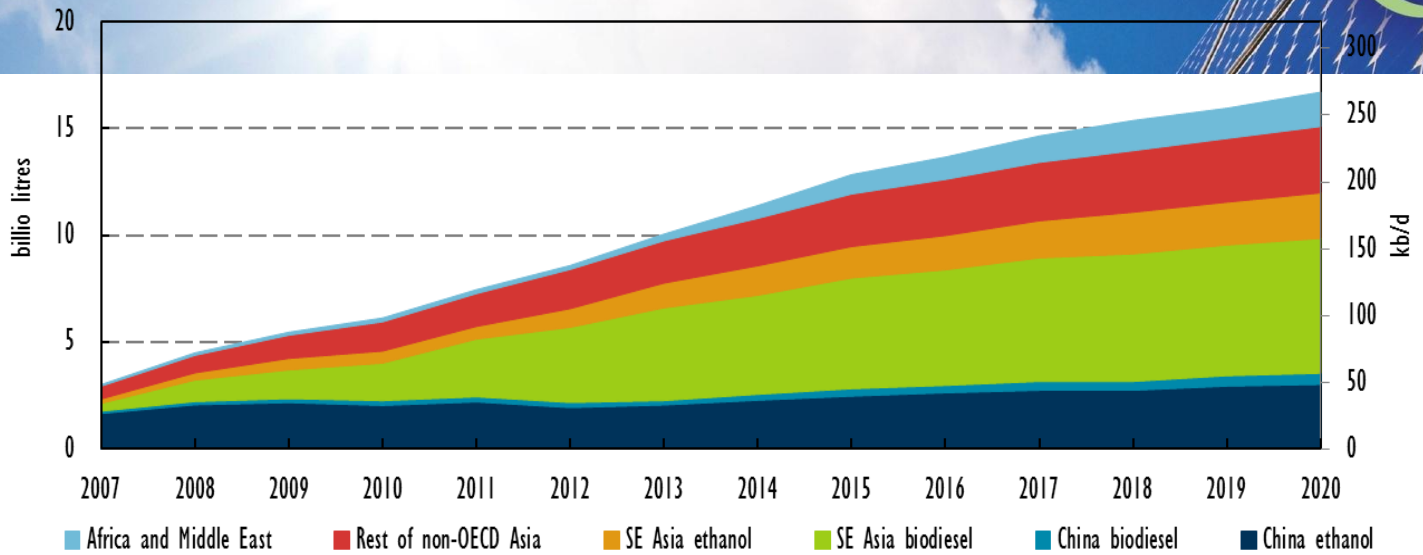
EU policy uncertainty





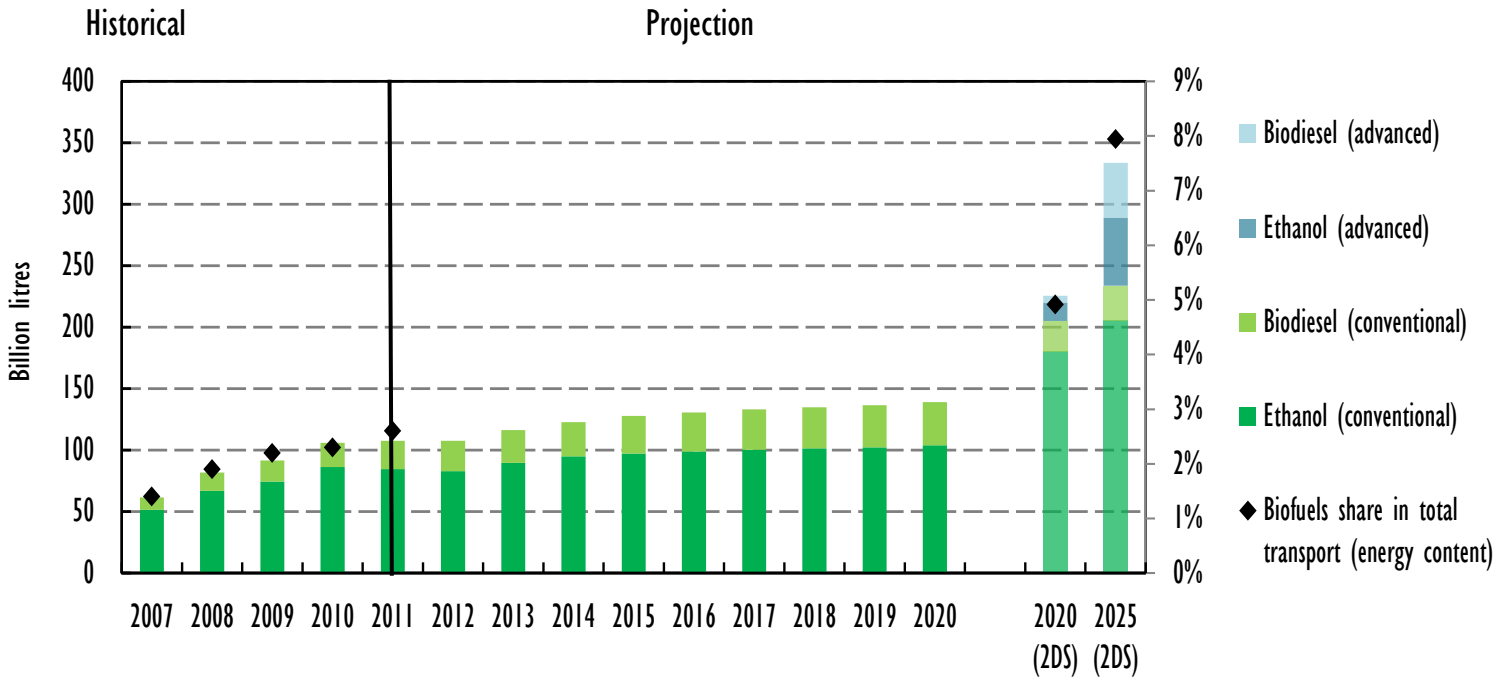
- **Proposed cap on conventional biofuels (7% of transport energy demand), increases uncertainty and limits growth prospects**
  - → **No significant capacity additions expected going forward**
- **Long-term future highly uncertain in absence of post-2020 framework**
  - → **Uncertainty over support for conventional biofuels after 2020**
  - → **Particularly relevant for advanced biofuels industry, where perceived investment risk is high**
  - → **Some advanced biofuel projects get shelved as they struggle to secure investments**

Emerging markets expanding rapidly



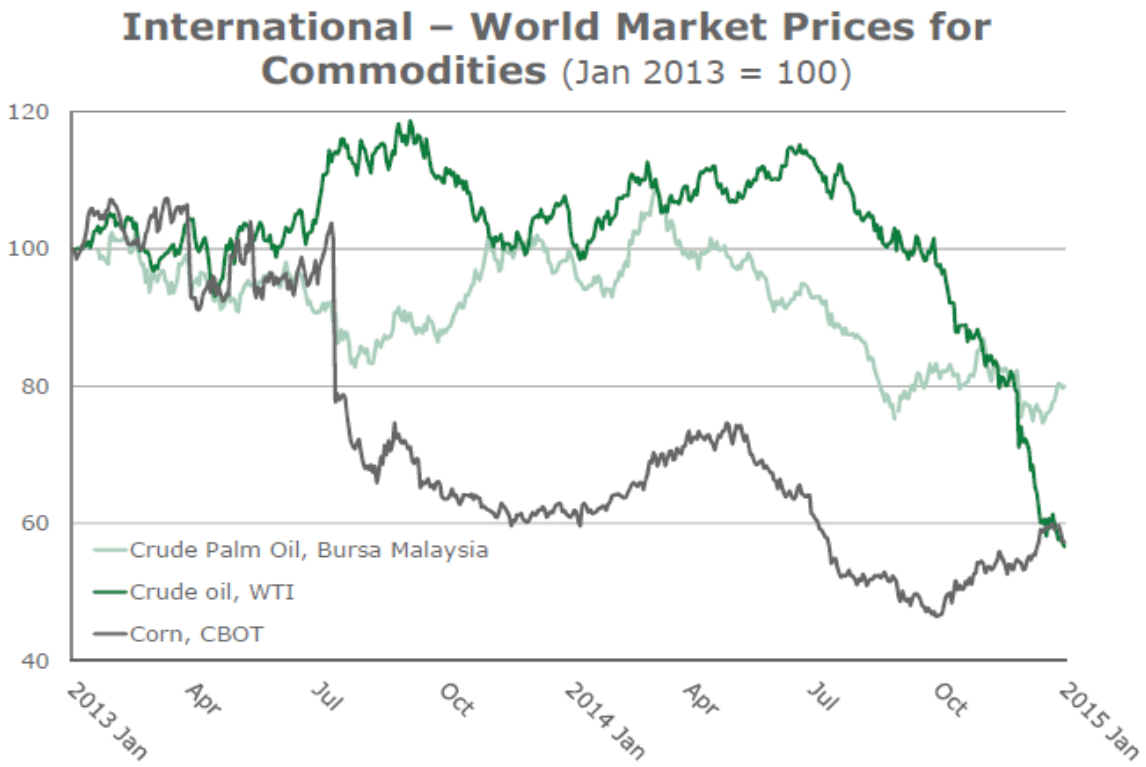
- **Production in several Asian and African markets expands rapidly driven by:**
  - → **Rising bills for fossil fuel subsidies and oil imports**
  - → **Vanishing export markets (EU, US)**
  - → **Support for agricultural sector**
- **Growing number of emerging markets in Asia and Africa with blending mandates**
  - → **India: E5** finally adopted, but meeting the target proves difficult
  - → **Indonesia: B10** as of Feb. 2014 as result of anti-dumping tariffs in the EU
  - → **Thailand:** subsidies for **E20; Malaysia (B5)** and **Philippines (B5, E10)**
  - → **South Africa:** introducing long-awaited **E2** and **B5** mandate
  - → **Zimbabwe: E10** as of Oct. 13, may rise to **E20** later in 2014

Biofuels production falling behind targets of IEA Biofuel Roadmap



Source: IEA (2014) *Tracking Clean Energy Progress*

Varied impact of lower oil prices on renewables in transport



- **Conventional biofuels attractiveness determined by blending requirements and agricultural fundamentals, in part influenced by oil prices**

- **For advanced biofuels, at a much more nascent level of development and with weaker policy support, lower oil prices may delay or lead to cancelled projects**

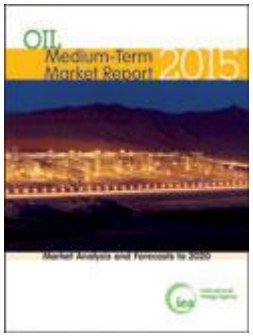
Conclusions

- Reducing transport emissions essential for a low carbon energy system
- Avoiding, shifting and improving all have a role to play
- Key role for biofuels particularly for long haul transport
- But
  - Shifting policy grounds in established markets undermine medium-term growth in biofuel production
  - Emerging markets continue expanding production
  - Advanced biofuels currently in the “valley of death” with promising projects coming forward – will they make it to the market – particularly at low oil prices?
  - Stable, long-term policy framework, including clear sustainability guidelines, will be vital for further growth

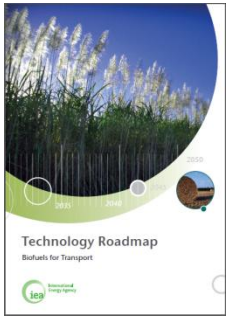
Thank you for your attention!

- **Medium-Term Renewable Energy Market Report 2014**
  www.iea.org/topics/renewables

- **Medium-Term Oil Market Report 2015**
  www.iea.org/publications/oilmarketreport/



- **Technology Roadmaps**
  www.iea.org/roadmaps



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