A long-exposure photograph of a city street at night. The image is heavily blurred, showing streaks of light from cars and a cyclist in the foreground. The street is illuminated by streetlights, and the overall color palette is dominated by blues and purples.

Transport, Energy and CO₂: Moving Toward Sustainability

Low Fulton, IEA/SPT
IEA Side Event, 16 December 2009,
Copenhagen

IEA and transport

Relevant publications

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- Medium term Oil Market Report

Horizon 2015, focus on oil

Scenarios currently based on two different GDP growth assumptions, includes biofuels projection

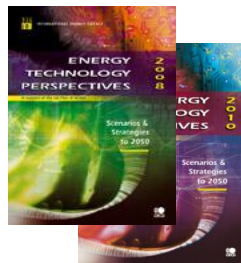


- World Energy Outlook (WEO)

Horizon 2030, all energy sources

Scenarios depicting different developments on the basis of policy actions

One underlying assumption for GDP and population growth
Includes a thorough analysis on the oil supply availability

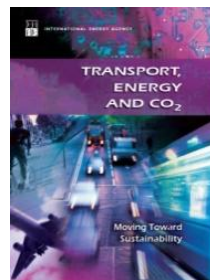


- Energy Technology Perspectives (ETP)

Horizon 2050, all energy sources

Scenarios that pay particular attention to the role of technology, especially on the demand side

One underlying assumption for GDP and population growth



- Transport, energy and CO₂ **Just Out!**

Moving towards sustainability

“Transport book”

Horizon 2050, all energy sources

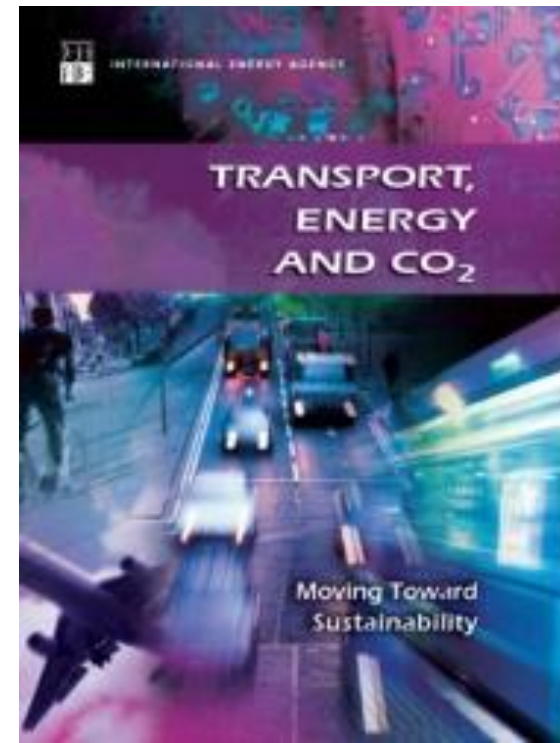
Builds and expands the work done on ETP

IEA's New Transport Publication

- Released 27 October, 2009
- Builds on ETP 2008, will feed into ETP 2010
- Transport analysis based on on-going development of IEA Mobility Model, supporting research
- Book features:
 - Indicator update and extension to more countries
 - Technology potential and cost updates
 - Fuel and Modal assessments (LDV, truck, aviation, shipping)
 - Detailed scenario analysis with regional detail – Baseline, High Baseline, Modal Shift, BLUE technology scenarios
 - Role of future technologies, modal shift
 - More regional detail than in ETP
 - Continuing development of CO₂ mitigation cost analysis
 - Policy considerations

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Technology Roadmap

Electric and plug-in hybrid electric vehicles (EV/PHEV)



International Energy Agency

IEA *Electric and Plug-in Hybrid Vehicle Roadmap* published October 2009

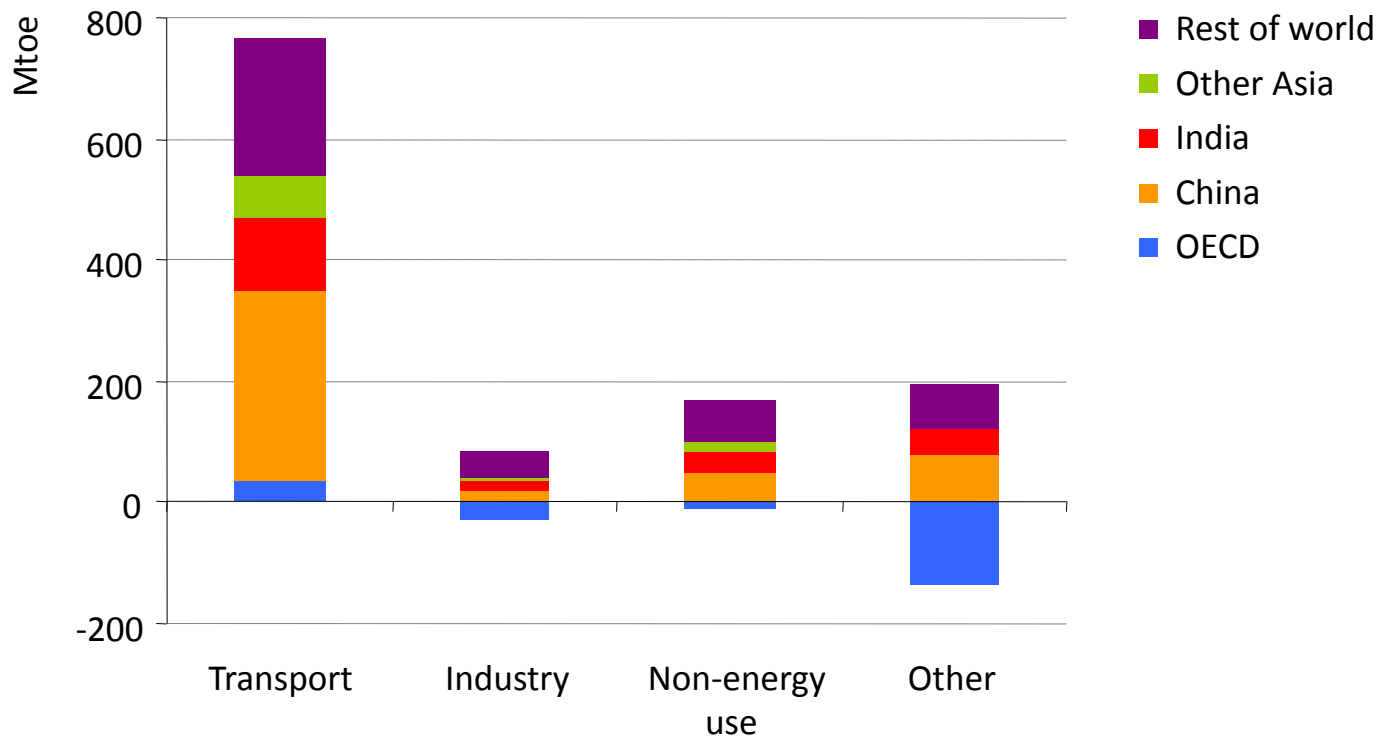


International Energy Agency

WEO 2008 Reference Scenario: Incremental oil demand, 2006-2030

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*Around three-quarters of the projected increase in
oil demand comes from transportation*

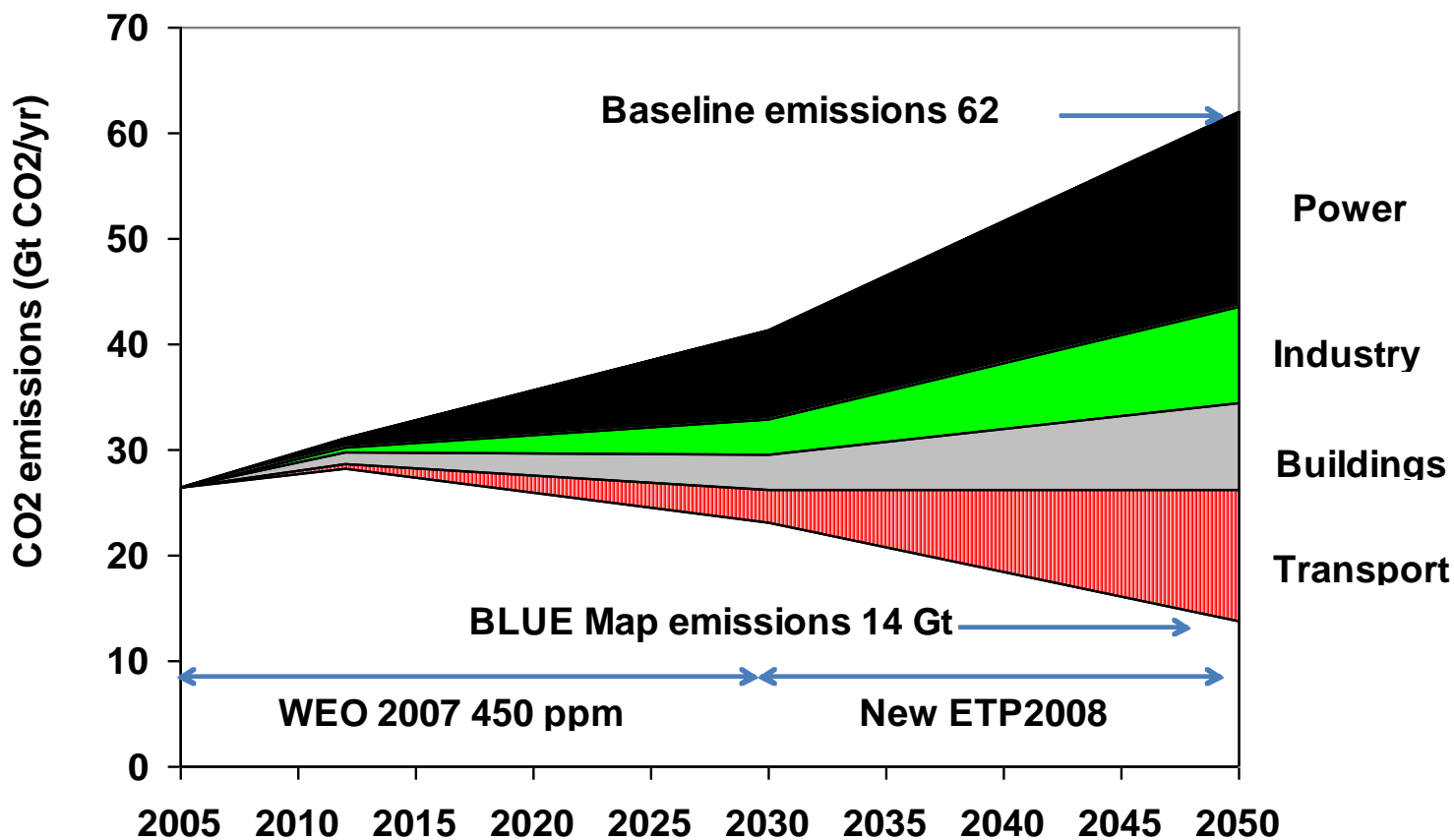


We need a global 50% CO₂ cut by 2050

IEA ETP 2008: Where reductions come from

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How do we get there? The IEA ETP BLUE Map approach

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- 1. Integrated transport planning and investment**
 - 25% reduction in growth of cars/air travel by 2050
 - Doubling of investment in and use of transit systems compared to baseline
 - Some motorised transport avoided (shorter trips, more walking/cycling, telematics)
- 2. Achieve 50% reduction in new car fuel intensity by 2030**
 - Existing, commercial technologies (including hybrid vehicles, better components, light weighting)
 - With fuel savings, near zero net cost from a societal perspective
 - 30-50% improvement potential for other modes (trucks, trains, ships, planes)



How do we get there? The IEA ETP BLUE Map approach

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3. **Widespread introduction of advanced technology vehicles by 2030, dominance by 2050**
 - **ETP BLUE Map: EVs/PHEVs reach sales of 7 million by 2020, 30 million by 2030**
 - ◆ Fuel Cell vehicles start ramp up after 2020
 - **Battery costs are dropping, must reach USD 300/kWh by 2020**
 - **Plug-in hybrids (PHEV) are a promising transition strategy**
 - **Low GHG electricity/hydrogen must be widely available by 2030**

4. **Use of advanced biofuels**
 - **Reach 12% of transport fuel by 2030, 25% by 2050**
 - **Feedstocks from residues, wastes, dedicated lignocellulosic crops**
 - **Must resolve land use change, soil carbon, ecosystem, food security issues**

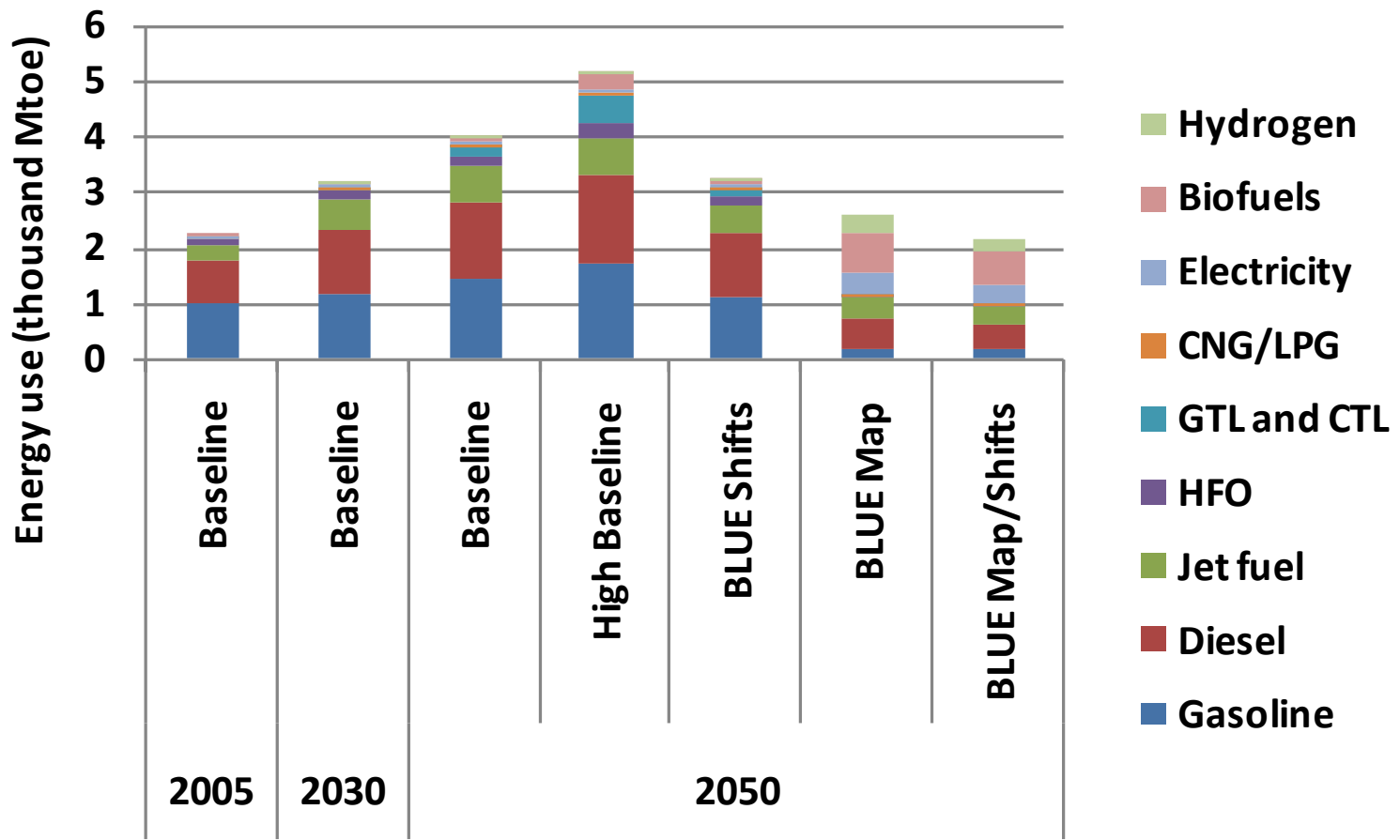


Energy use by scenario

In BLUE Map/Shifts, energy use returns to 2005 level, and with more than 50% very low CO₂ fuels

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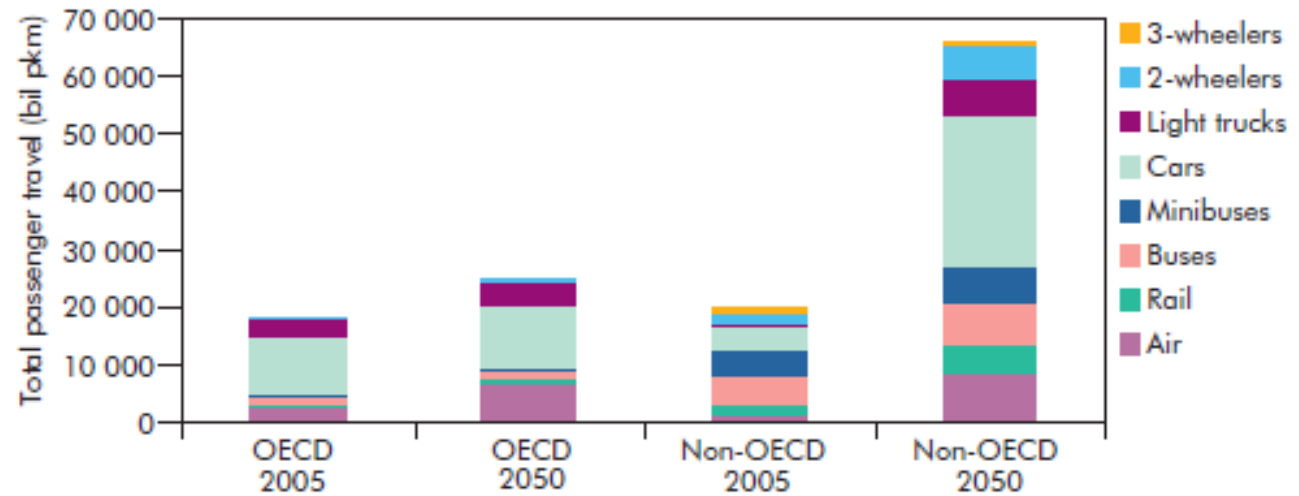
Motorised travel by mode and region, Baseline scenario

Non-OECD is where the growth happens, though from a far lower base per capita than OECD

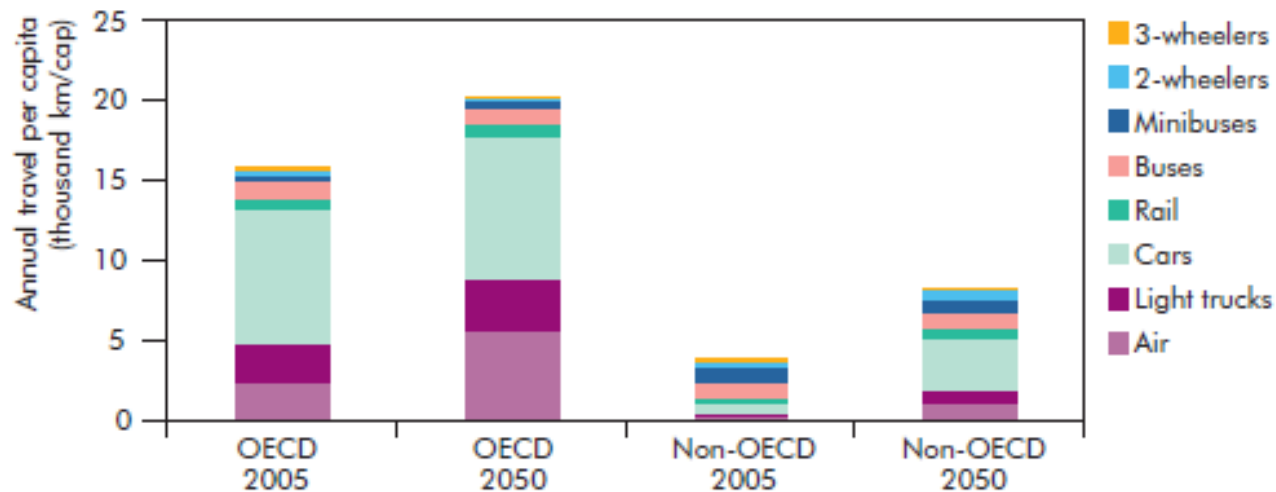
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Total



Per
capita

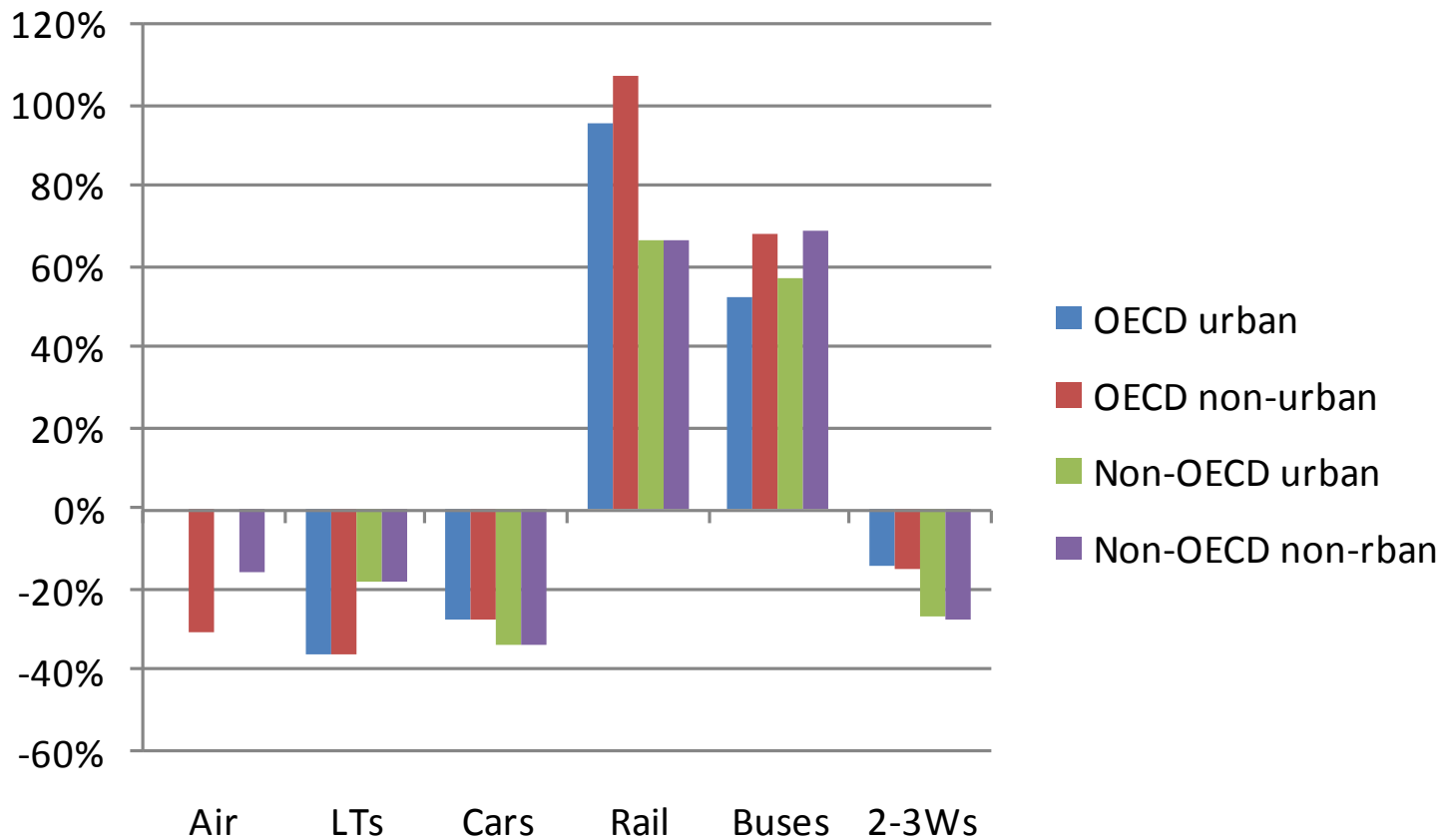


Passenger Travel: Changes from Baseline to BLUE Shifts Case in 2050

Shifting 25% of LDV and air travel can cut total energy use by 20% in 2050

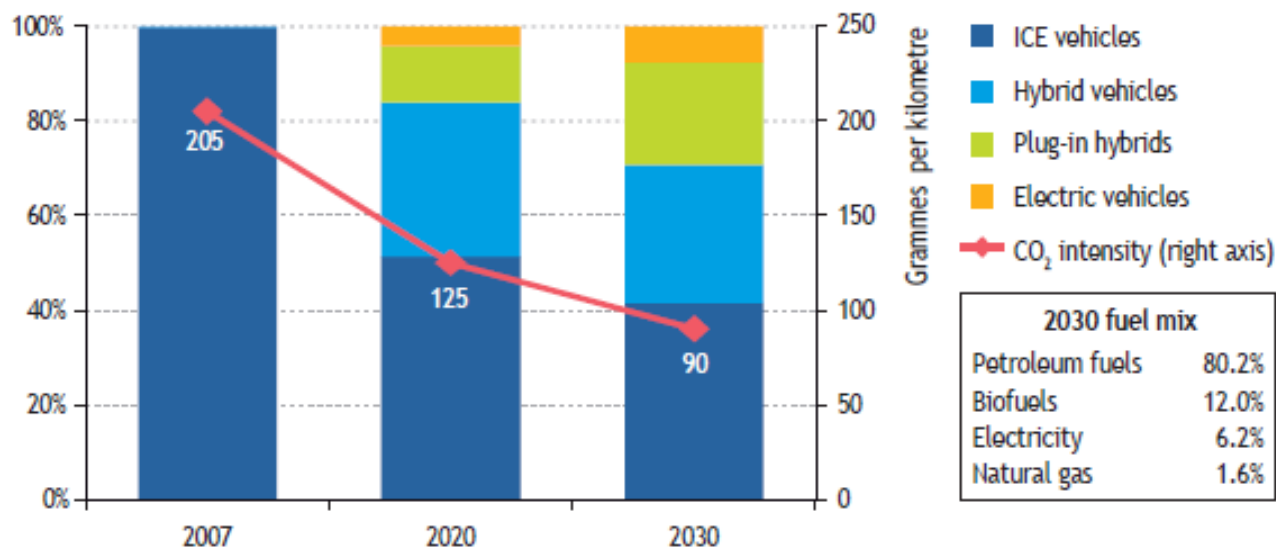
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WEO 2009 Excerpt – Passenger vehicles and fuels in 450 ppm scenario

Figure 5: World share of passenger vehicle sales by technology and average new vehicle on-road CO₂ intensity in the 450 Scenario



IEA work on vehicle efficiency

Linked to the Global Fuel Economy Initiative (GFEI)

- Launched on 4 March 2009 in Geneva by IEA, ITF, UNEP, and the FIA Foundation



- GOAL: reduction in fuel consumption per km of 50% by 2050 (for the vehicle stock) compared to 2005
- Roughly equivalent to an implementation of a 50% improvement by 2030 for new sales, worldwide
- Four main activity areas:
 - Analysis of global fuel economy trends and potential
 - Outreach to governments, assistance in policy development
 - Outreach to stakeholders, dialogue to improve coordination
 - Information campaigns

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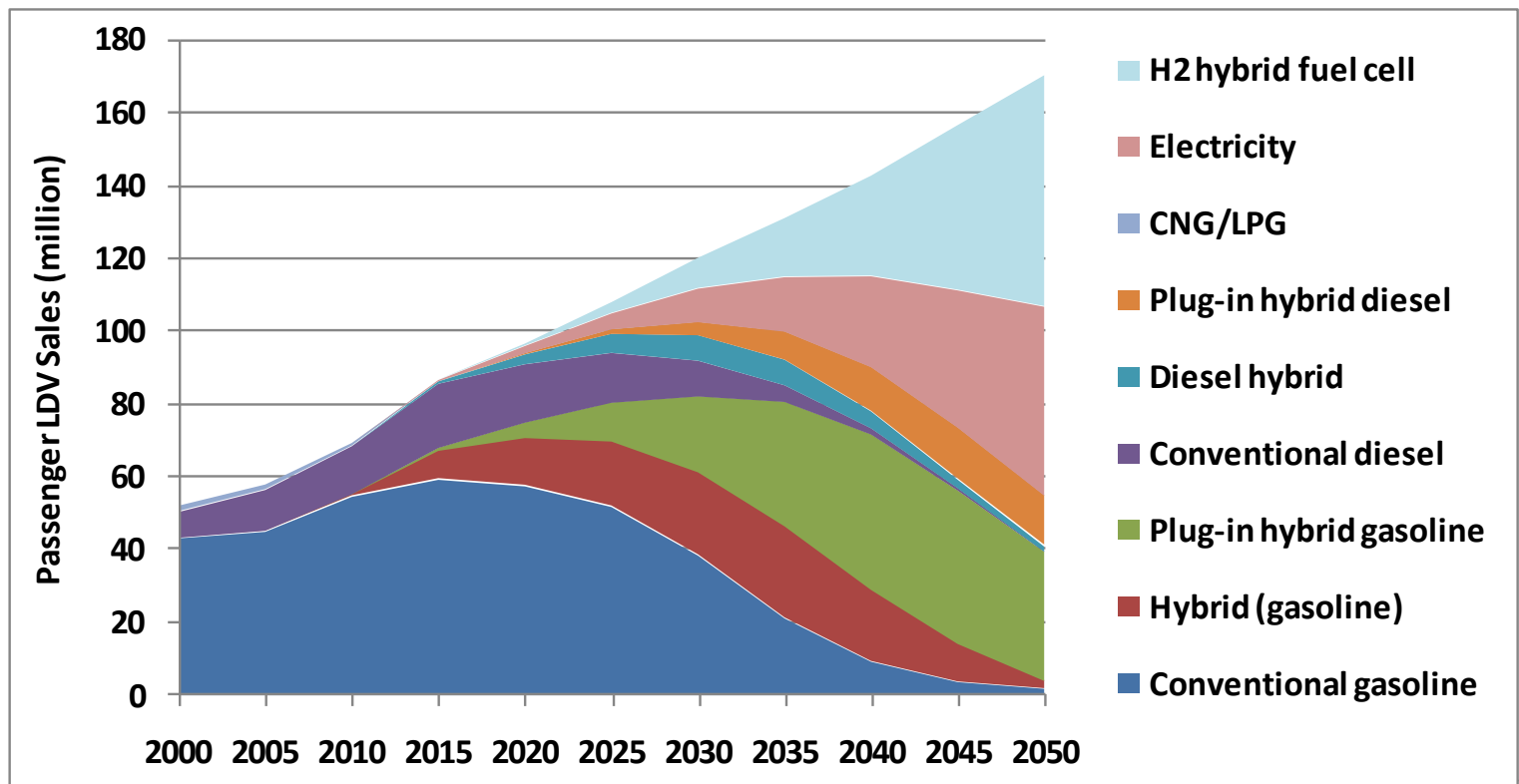


IEA ETP BLUE Map: advanced technologies must play a major role

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Unprecedented rates of change in market penetration of advanced technologies

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Roadmap: some technical findings

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- **EV incremental costs could be high unless all of these targets are met:**
 - Battery costs drop to \$300/kWh (target for 2015)
 - Vehicle range on batteries is limited (e.g. 150 km)
 - Batteries last nearly the life of vehicles (e.g. 15 years) and are amortized over this time frame
- **Electricity demand does not look like a significant issue on a regional scale before 2030**
 - 200 tWh in 2025 v. 13,000 OECD-wide
- **But...**
 - Could become an issue in specific areas
 - Availability of low-CO₂ generation will be key
 - Load management; grid integration issues emerge
 - EV/PHEV share of world generation could reach 10% by 2050

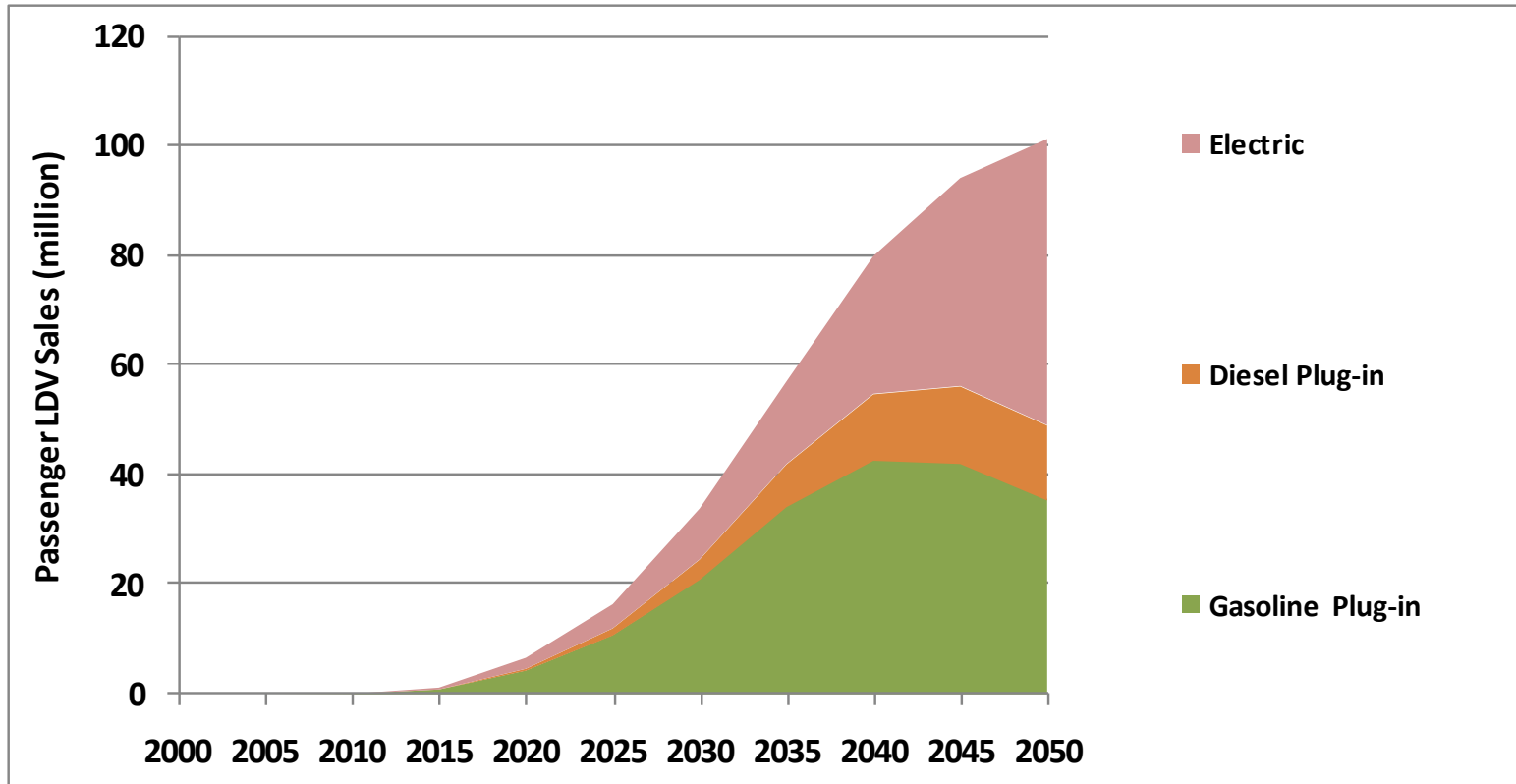


BLUE Map EV/PHEV sales trajectory to 2050

How can we achieve this?

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Annual sales targets:

2020: 7 million: e.g. 70 models selling 100,000 each

2030: 30 million: e.g. 150 models selling 200,000 each

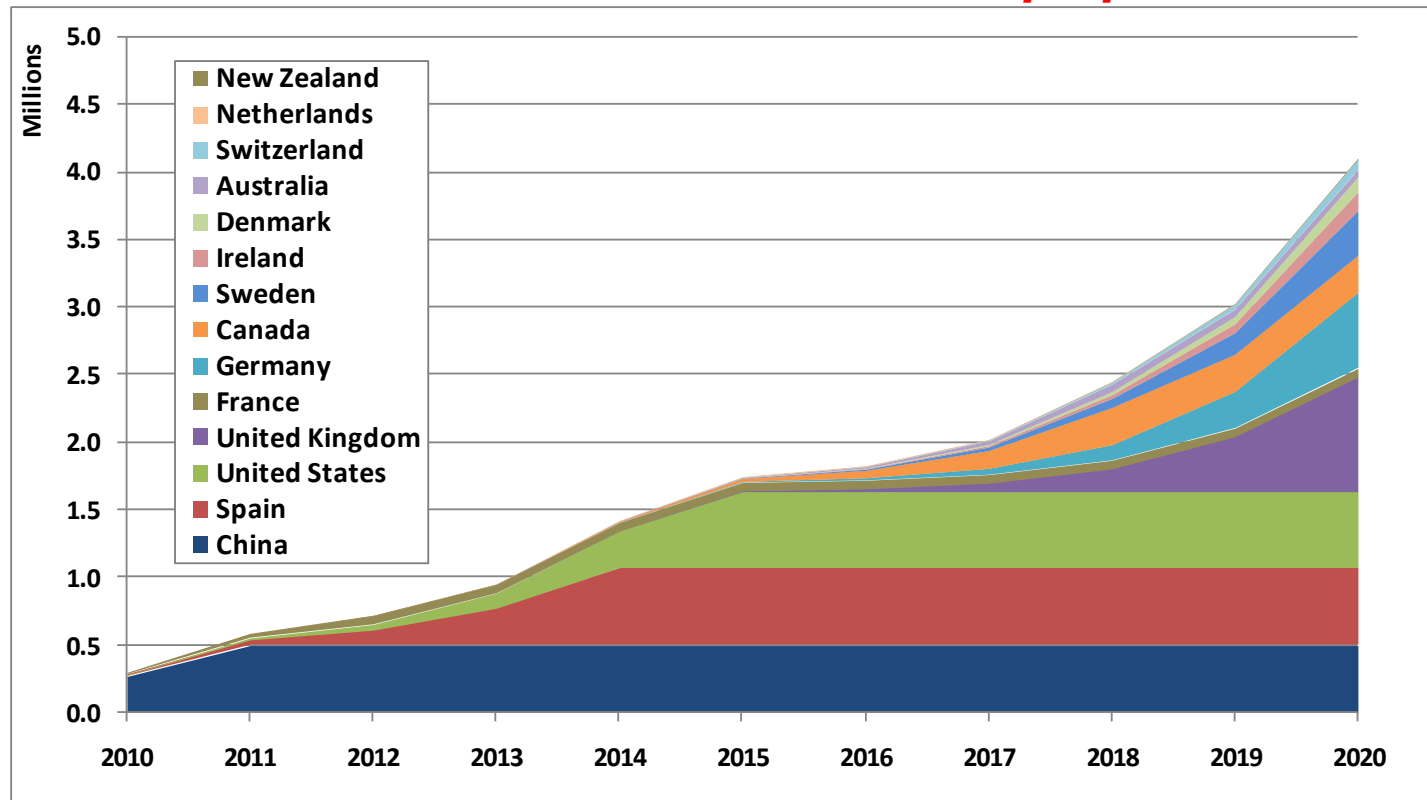
2050: 100 million: e.g. 400 models selling 250,000 each



Announced national targets for EV/PHEV sales

As of September 2009. Combined, the total reaches 4 million by 2020;

*However if EV/PHEV sales in each country continue to grow beyond when each target is met, and other countries also set and achieve targets, global sales levels could be far higher in 2020 than shown here. **Are manufacturers prepared for this?***



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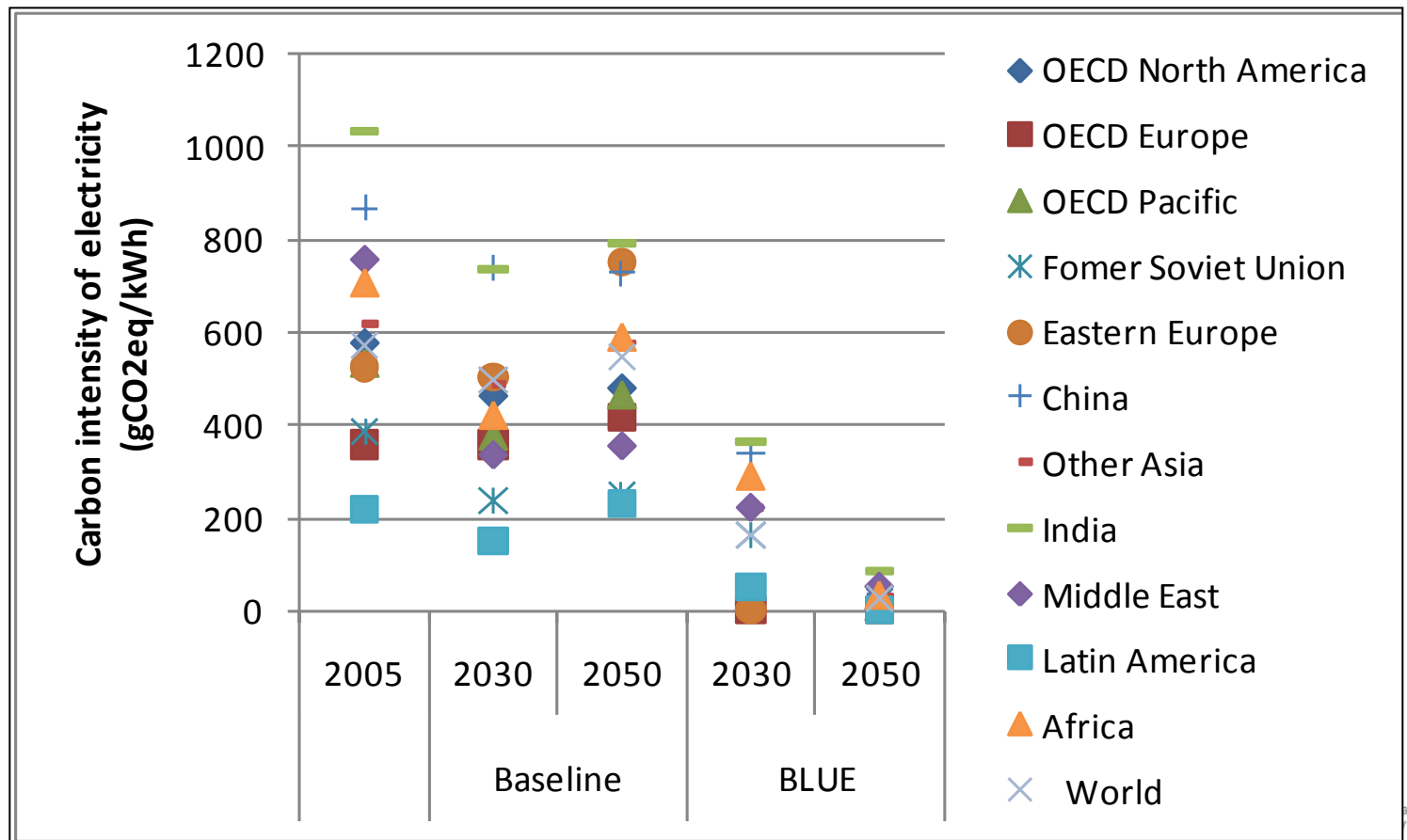


GHG intensity of electricity production

By 2050, electricity generation radically decarbonised in BLUE Map – but not in Baseline

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Um, Policies?

- **Clearly we will need strong policies both internationally and at national levels (and local!)**
 - (cross sectoral) cap and trade – yes, but time to implementation might be long
 - Carbon price, yes – but \$50/tonne is only \$0.12/litre for gasoline
 - Much bigger price changes can be achieved just by removing subsidies
- **National measures should include:**
 - Major increase in investments in the most efficient modes and related infrastructure
 - Fuel economy standards on all types of vehicles – 30-50% reductions in energy intensity by 2050 seem possible for most
 - 2nd Gen Biofuels – yes – but we should not push this too fast! Low carbon fuel standards can help
 - EVs/FCVs but relatively high cost and massive infrastructure investments and coordination will be needed – need to start now
- **Local level – integrated planning / land use/ modal shift policies (but national gov's can encourage)**

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