Demand and supply of renewable energy in future transport scenarios: range of options

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IEA, transport and liquid fuels

Relevant publications

- **Medium term Oil Market Report**
  Horizon 2015, focus on oil
  Scenarios currently based on two different GDP growth assumptions

- **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** (Transport book)
  Moving towards sustainability
  Horizon 2050, all energy sources
  Builds and expands the work done on ETP
Let’s not forget oil security!

World oil production in the WEO 2009 Reference Scenario

64 mb/d of gross capacity needs to be installed between 2007 & 2030 – six times the current capacity of Saudi Arabia – to meet demand growth & offset decline
In the BLUE Map scenario, transport accounts for 23% of reductions. Additional savings accrue in "transformation", since less high-CO2 fuels (such as coal-to-liquids) are produced for transport use.
Passenger LDV sales by technology type and scenario: BLUE Map will be VERY challenging

In the ETP Baseline, sales are mainly conventional vehicles through 2050; hybrids reach about 20% of sales.

In BLUE Map, strong penetration of hybrids by 2015, PHEVs and EVs by 2020, FCVs after 2025. By 2050, plug-in vehicles account for more than two-thirds of all sales.
BLUE Map EV/PHEV global sales trajectory to 2050

How can we achieve this?

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
Projected electric and plug-in hybrid vehicle sales through 2020, based on national targets

Figure based on announced national sales and stock targets, with assumed 20% annual sales growth after target is met, if target is before 2020 (e.g. China’s target is for end of 2011).

EV / PHEV sales could reach seven million by 2020
Roadmap: some technical findings

- **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
Some cost estimates
Hybrids, PHEVs and EVs v. gasoline vehicle over time

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<th>Incremental vehicle cost</th>
<th>Fuel savings</th>
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Notes: PHEV-20= 20 km range, etc; fuel savings estimated over 160k kms of driving; base gasoline vehicle efficiency improves over time; oil prices $80/bbl near term, $120/bbl long term; battery costs decline over time from $750 to about $300/kWh
How do EV’s compare?
Life-cycle CO$_2$ emissions from EU light-duty vehicles

EVs generally cut CO$_2$ emissions today, though not in all comparisons; but in a BLUE Map future they will approach zero CO$_2$. 
GHG intensity of electricity production

By 2050, electricity generation radically decarbonised in BLUE Map – but not in Baseline.
Global Vehicle and Fuel Costs, 2010-2050 by ETP Scenario

Fuel cost savings mostly or fully offset the costs of advanced technology vehicles in BLUE Map.
Thank You

www.iea.org/techno/etp/index.asp