

A CARBON COST CURVE FOR ISRAEL

A McKinsey & Company study reveals the economics of greenhouse gas abatement opportunities in Israel

Publication of McKinsey & Company's carbon cost curve for Israel in November 2009 was an important milestone in the country's move toward a lower carbon economy. The report, commissioned by Israel's Ministry of Environmental Protection, provides the government with a quantitative database which should facilitate the implementation of a government decision on the preparation of a national climate change action plan. With the report findings in place, Israel can now examine the specific means it will take to reduce its greenhouse gas (GHG) emissions in the most effective and cost efficient manner possible.

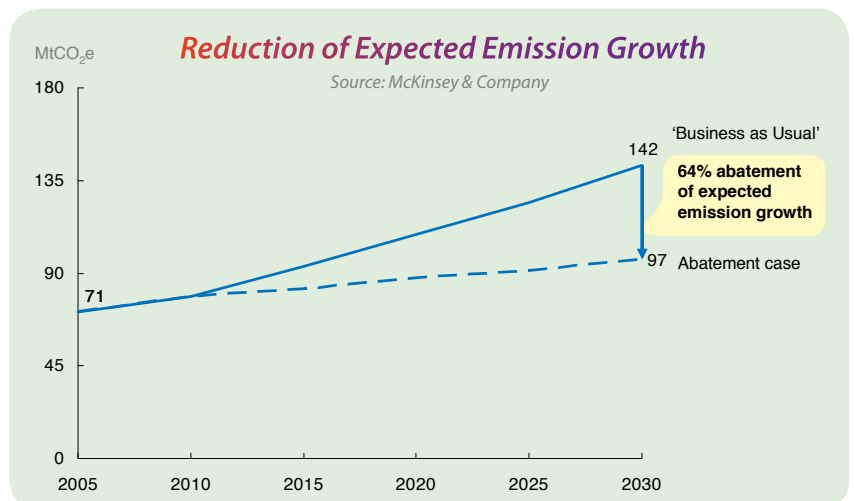
Main Findings

Doubling of GHG emissions by 2030

- Israel's emissions are expected to double from 71 million tonnes carbon dioxide equivalent (MtCO₂e) in 2005 to 142 MtCO₂e in 2030, primarily due to Israel's high growth of both population and GDP per capita compared to other developed countries.
- Per capita emissions are expected to grow by 40%, from 10.2 tonnes per person in 2005 to ~14.3 tonnes per person in 2030.

Two-thirds of Israel's expected emissions growth may be reduced by adopting technical abatement measures

- Israel's abatement potential stands at 45 MtCO₂e, if all the examined technical abatement measures are applied. This corresponds to approximately two-thirds of the expected GHG emissions growth and to ~32% of total business as usual emissions.
- Israel's emissions will be cut by some 20% in 2020, from 109MtCO₂e to 88MtCO₂e, if all examined technical abatement measures are implemented.
- Behavioral changes, including energy efficient lighting, public transportation, bicycle use, increased average building temperature and reduced meat consumption, could further reduce emissions by approximately 7 MtCO₂e in 2030.



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Most of the abatement levers fall into two categories – low carbon energy sources and improved energy efficiency

Levers to reduce the carbon intensity of Israel's energy include:

- Shifting from fossil fuels to renewables for power generation (25% of total generation in 2030).
- Shifting from coal to natural gas in power generation (36% of total generation in 2030).
- Shifting from fossil fuels to biofuels in transportation.

Levers to improve energy efficiency include:

- Using efficient light bulbs.
- Improving vehicle fuel consumption.
- Using more efficient electrical appliances (air conditioners, refrigerators, etc.).

Constraints limiting Israel's abatement potential

Israel's abatement potential compared to business as usual (~32%) is lower than in many other countries (average ~50%), due to:

- **Limited feasibility of many abatement levers** including carbon capture and sequestration (CCS), hydroelectric power, biomass and nuclear energy.
- **Low abatement potential in industry** due to the lack of a large heavy industry (petrochemicals, steel, metal and mining).

Net cost to the economy

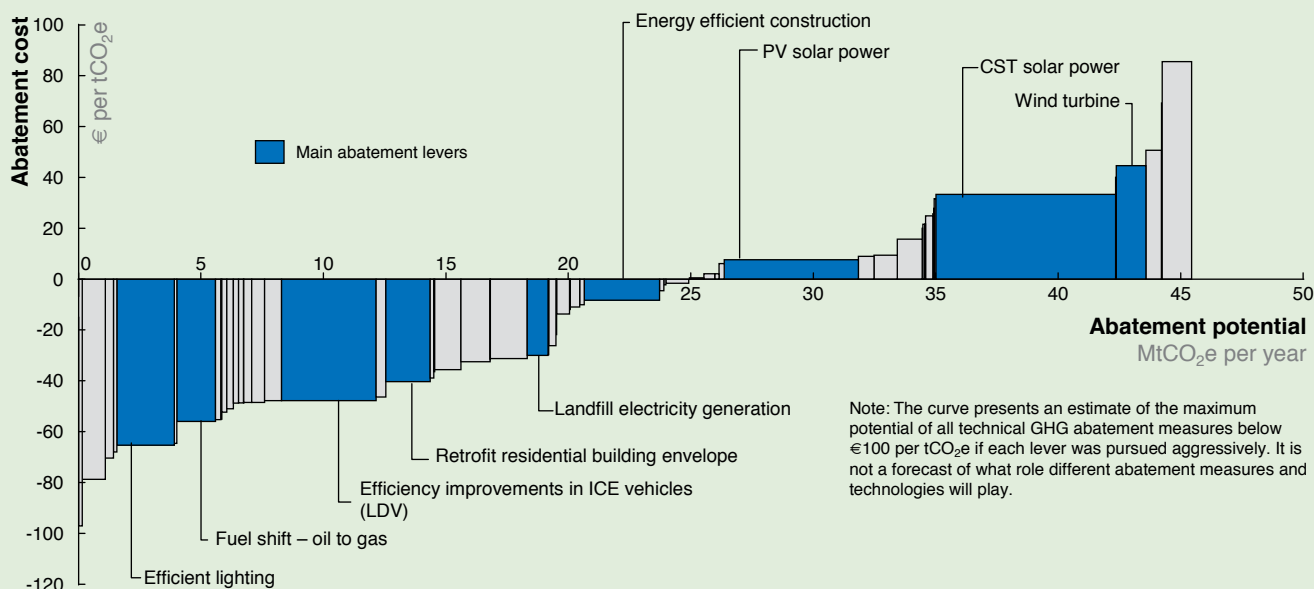
- Many abatement levers, such as energy efficient lighting, are net profit positive to the economy, making their implementation economically beneficial.
- The economic savings of the net profit positive abatement levers would neutralize the economic costs of the ones that bear a net cost, if all levers are implemented.
- The main barrier to implementation is the high upfront investment, particularly in buildings and transport.

Additional benefits

- Increasing Israel's energy independence and reducing its dependence on fossil fuel.
- Spurring economic growth by providing Israel with the potential to become a global leader in the growing market for clean technologies.
- Upgrading Israel's international environmental status.
- Reducing emissions of other pollutants, thereby contributing to the health and quality of life of Israel's residents.

Israel's GHG Abatement Cost Curve, 2030

Source: McKinsey & Company



Israel can reach 65% of its abatement potential by implementing 10 measures:

- 1 High penetration of concentrated solar thermal (CST) power generation.
- 2 High penetration of photovoltaic (PV) power generation.
- 3 Improved fuel efficiency of internal combustion engine vehicles.
- 4 Increased energy efficiency in new buildings by improved planning and insulation.
- 5 Use of efficient lighting (LED, CFL – compact fluorescent light bulbs) and lighting control systems.
- 6 Retrofit of residential buildings with improved insulation in order to improve heating and cooling efficiency.
- 7 Industry fuel transition – fuel oil to natural gas.
- 8 Use of landfill gas for electricity generation.
- 9 Increased penetration of electric vehicles and plug-in hybrids (assuming low carbon fuel mix).
- 10 Use of wind turbines for power generation.