

Greenhouse gas abatement potential in Israel

Israel's GHG abatement cost curve

Translated executive summary, November 2009



Executive Summary

Background

At the December 2009 UNFCCC Conference in Copenhagen, over 200 nations will attempt to agree on global and national targets for abating greenhouse gas (GHG) emissions.

To prepare Israel for this challenge, the government established an inter-ministerial cross-ministry Director General's Committee to examine the implications of climate change for Israel and to assess Israel's ability to reduce GHG emissions (Israeli Government Decision No. 250 dated 24.5.2009).

To fulfil this mandate, McKinsey and Company was asked by the Ministry of Environmental Protection to quantify GHG abatement potential and costs in Israel by applying their globally recognized methodology. The methodology leverages proprietary analysis of over 200 technical levers aimed at reducing ('abating') GHG emissions across 10 sectors and the results are integrated into a single cost curve. The Israeli cost curve provides Israel's government and other stakeholders with a quantitative fact base to inform the debate around abatement targets and policy.

Beyond climate change considerations, there are other reasons which could motivate a transition towards a low carbon economy in Israel:

- **Energy independence.** Reduced dependence on fossil fuels is of strategic importance for Israel.
- **Economic development.** Israel has the potential to be a global leader in the growing market for clean technologies. Developing a local market for these goods and services is an important step in fostering global champions.
- **International status.** Climate change is among the top issues on the global agenda. Israel's willingness to be an active party to the discussion is important for its international stature, as well as its accession to the OECD.
- **Clean environment.** Many levers for abating GHG deliver complementary reductions in other pollutants – improving health and quality of life in Israel.

Main findings

With the current growth trajectory, Israel is expected to double its GHG emissions by 2030

In the absence of mitigating action, Israel's GHG emissions are expected to

double from 71 MtCO_{2e} in 2005 to 142 MtCO_{2e} in 2030. This growth is higher than other developed countries, primarily due to Israel's relatively high growth in population and GDP per capita. In per capita terms, this represents growth in emissions from 10.2 tonnes per person in 2005 to ~14.3 tonnes per person in 2030. For comparison, under a 'business as usual' scenario, 2030 emissions per capita would be 23 tCO_{2e} in the U.S., 10.7 tCO_{2e} in Western Europe, and 11.3 tCO_{2e} in China.

Israel could reduce its expected emissions growth by two-thirds through adopting the technical emission reduction measures identified in this study

McKinsey's analysis suggests an abatement potential of 45 MtCO_{2e} 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 BAU emissions. Technical abatement measures are defined as measures that do not have a material effect on the lifestyle of consumers. Detailed abatement potential and cost of each abatement measure can be seen in the cost curve.

In addition, a set of behavioural changes could achieve further abatement of approximately 7 MtCO_{2e}

Based on the feedback of expert panels, a specific set of behavioural changes were modelled, which in an optimistic case together could enable further abatement of approximately 7 MtCO_{2e} GHG emissions in 2030. Examples of the selected behavioural changes include reduced use of lighting, increased use of public transport, increased use of bicycles, increased average building temperature, and reduced meat consumption.

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

Examples of 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 gas in power generation (36% of total generation in 2030), and shifting from fossil fuels to biofuels in the transportation sector. Examples of levers to improve energy efficiency include using efficient light bulbs, improving vehicle fuel consumption, and using more efficient electrical appliances (air conditioners, refrigerators, etc.). 8% of abatement potential does not fall into these two categories. This abatement is primarily related to waste treatment and agriculture.

Implementing 10 measures with the largest abatement potential would capture 65% of the total abatement potential

These 10 levers are:

1. High penetration of CST (concentrated solar thermal) power generation.

2. High penetration of solar PV (photovoltaic) 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) 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 gas.
8. Use of landfill gas for electricity generation.
9. Increased penetration of electric vehicles and plug-in hybrids (assuming low carbon power fuel mix).
10. Use of wind turbines for power generation.

Israel's overall emission abatement potential is limited in comparison to other countries

Our analysis indicates a lower abatement potential in Israel compared to business as usual (~32%) than has been seen in many other countries (average ~50%). One of the reasons for this is the low feasibility of many abatement levers in Israel. Levers with less potential include hydroelectric power, biomass and CCS (Carbon Capture and Sequestration). The feasibility of nuclear power is still unclear. Another limiting factor is the absence of a large heavy industry (petrochemicals, steels, metals and mining), in which significant abatement potential is usually found.

The total net cost to the economy of implementing all technical measures would be approximately zero in 2030

Many of the abatement measures examined are net profit positive to the economy, i.e. implementation of these levers is economically beneficial from a society perspective. An example of a net profit positive lever is energy efficient lighting, for which the increased upfront cost of the light bulbs is more than compensated by the savings in power consumption cost. Moreover, should all levers be implemented, the economic savings of the net profit positive abatement levers would neutralise the economic costs of the ones that bear a net cost.

There are several implementation barriers that need to be overcome, otherwise one would expect that net profit positive levers are already being pursued under a business-as-usual scenario. The two primary barriers are: *Financing hurdles and rapid payback requirements* - The upfront investment itself, particularly in buildings and transport, can be significant and most consumers tend to want payback for their investment within two years. *Agency issues* - In many opportunities with net economic benefits, the consumer or company reaping the benefits of lower energy bills is not actually making the upfront investment. For instance, construction companies have

limited incentives to insulate homes beyond the level required in building codes, since it is to home owners and tenants that the benefits of lower energy bills accrue.

Realizing Israel's abatement potential requires action

Realizing Israel's abatement potential would require changes in policy, regulation, industry conduct and public conduct.

The Israeli government could consider taking four key steps to realize the described potential:

1. Establish ambitious national GHG abatement goals as government policy.
2. Formulate Israel's Low Carbon Growth Plan (LCGP) - a national abatement plan that defines the levers, the mechanism and the timing of implementation.
3. Translate the national abatement plan into detailed operational measures including ways to incentivize financing of the upfront investment.
4. Establish a central body to monitor progress in implementation and provide a fact base for ongoing decisions at the political and technical levels.

The full report is available in Hebrew