2010 SOO Workshop

Generation scenarios

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Presentation outline

Work done since the GPAs 2009

Scenario key drivers summary

2010 SOO scenarios

Work done since the 2009 GPAs

- Coal and lignite price updated (PB report)
- Thermal O&M costs updated (PB report)
- Carbon charge ($12.5/t by 2012 and then scenario specific)
- DSM and coal generation will not be in the same scenario
- No thermal plants are allow to retire in the first 5 years
- Revise HVDC charge to include Pole 3 approval consistent with current TPM
- Introduce the photovoltaic and reciprocating engine technology

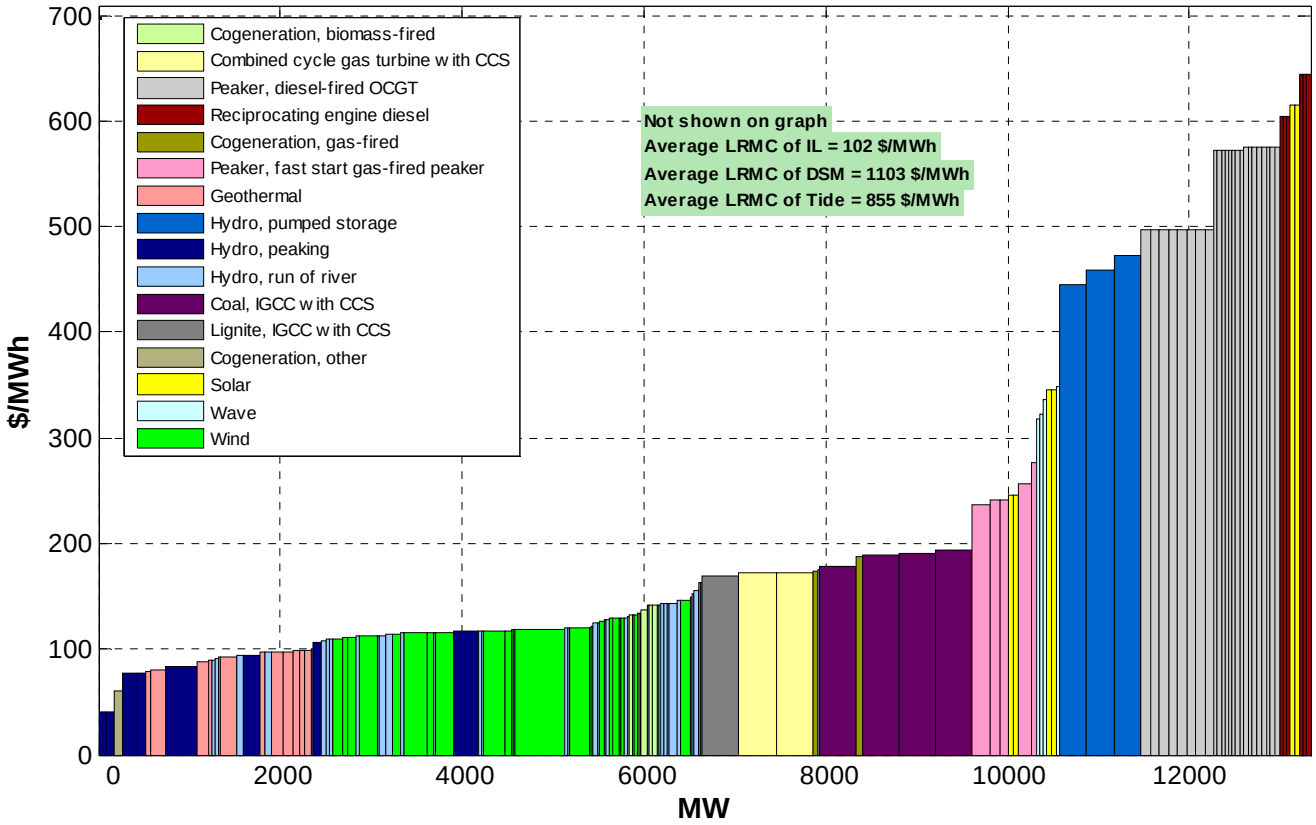
- 2010 SOO scenarios are similar to the 2009 GPAs

Key drivers summary

Scenario	Eventual carbon price ($/t CO_2e)	Renewables preference	Availability of gas	Renewables available	Demand-side
2010 Sustainable path	60	Restriction on baseload coal- and gas-fired stations. Coal and gas CCS is allowed	High price path; Liquefied Natural Gas (LNG)	Extensive hydro, wind and geothermal available. Biomass, solar, CCS, and marine are available later	Extensive participation; electric vehicles uptake, with vehicle-to-grid connectivity
2010 SI wind	50	Restriction on baseload coal- and gas-fired stations. Coal and gas CCS is allowed	High price path; Liquefied Natural Gas	Extensive wind, especially in lower SI; some restrictions on geothermal development. Biomass, solar and CCS are available later	Baseline participation
2010 Medium renewables	30	Restriction on coal-fired plants until 2019, gas scarcity 2020–2030	Moderate price path	Extensive wind and geothermal, and some hydro available	Minimal participation; Tiwai smelter phases out of operation around 2025
2010 Coal	20	Restriction on coal-fired plants until 2017, gas scarcity 2020–2030	Moderate price path	Extensive wind and geothermal available; little new hydro can be consented; some existing hydro must reduce output from 2020	Baseline participation; electric vehicles uptake
2010 High gas discovery	40	Restriction continues on coal until 2019, though CCGTs can be built after 2015	Low price path	Moderate amounts of wind and hydro available; some restrictions on geothermal development	Baseline participation

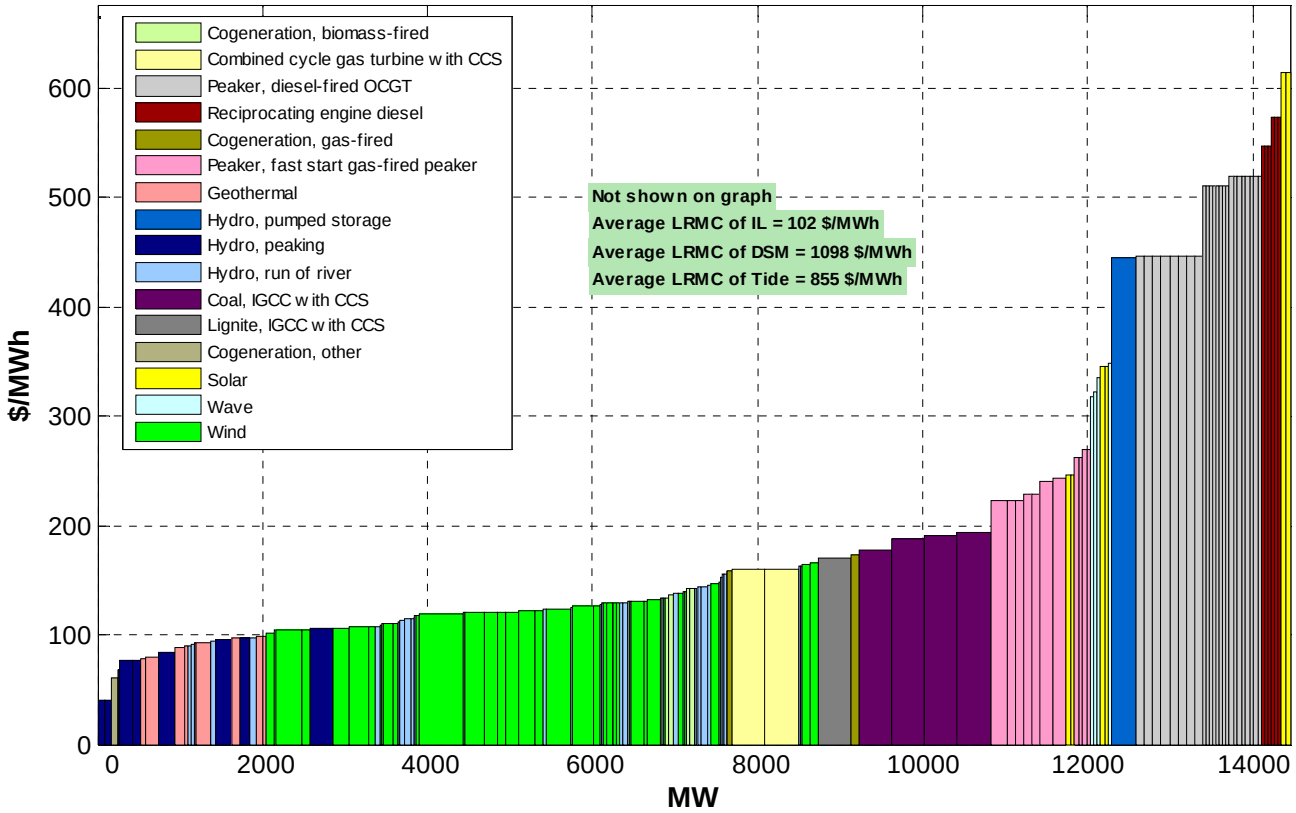
2010 Sustainable path

- High carbon charge ($60/t) and gas price (up to $25/GJ) make gas- and coal-fired stations uneconomic;
- Hydro and geothermal generation are the most economic options (less than $100/MWh);
- Gas and diesel peakers are expensive but are expected to run only for short periods of time and at peak times.



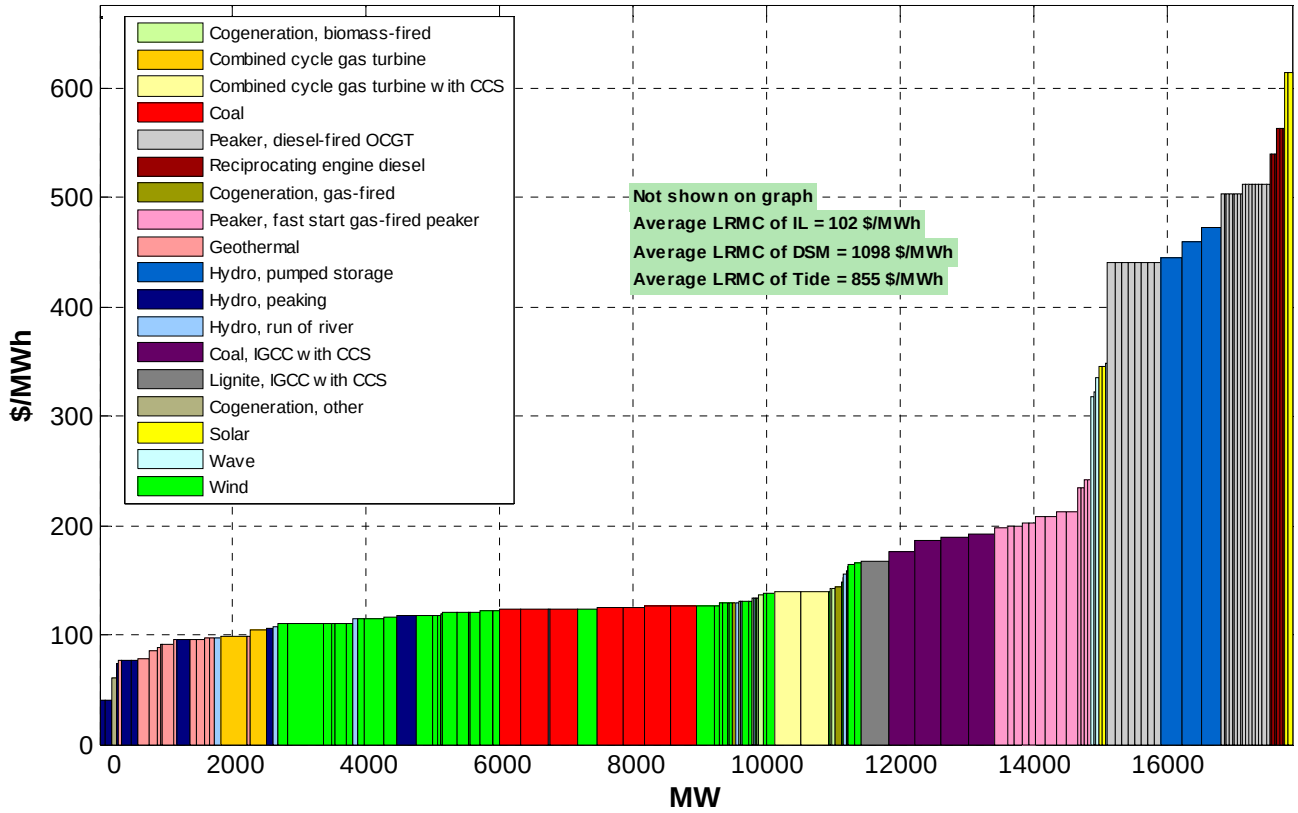
2010 SI wind

- High carbon charge ($50/t) and gas price (up to $19/GJ) make gas- and coal-fired stations uneconomic;
- The graph below shows that more wind is available, 4381MW compared with 2627MW in 2010 Sustainable path scenario;
- Again, in the 2010 SI wind scenario, hydro and geothermal generation are the most economic, but at a lesser availability than in the 2010 Sustainable path scenario



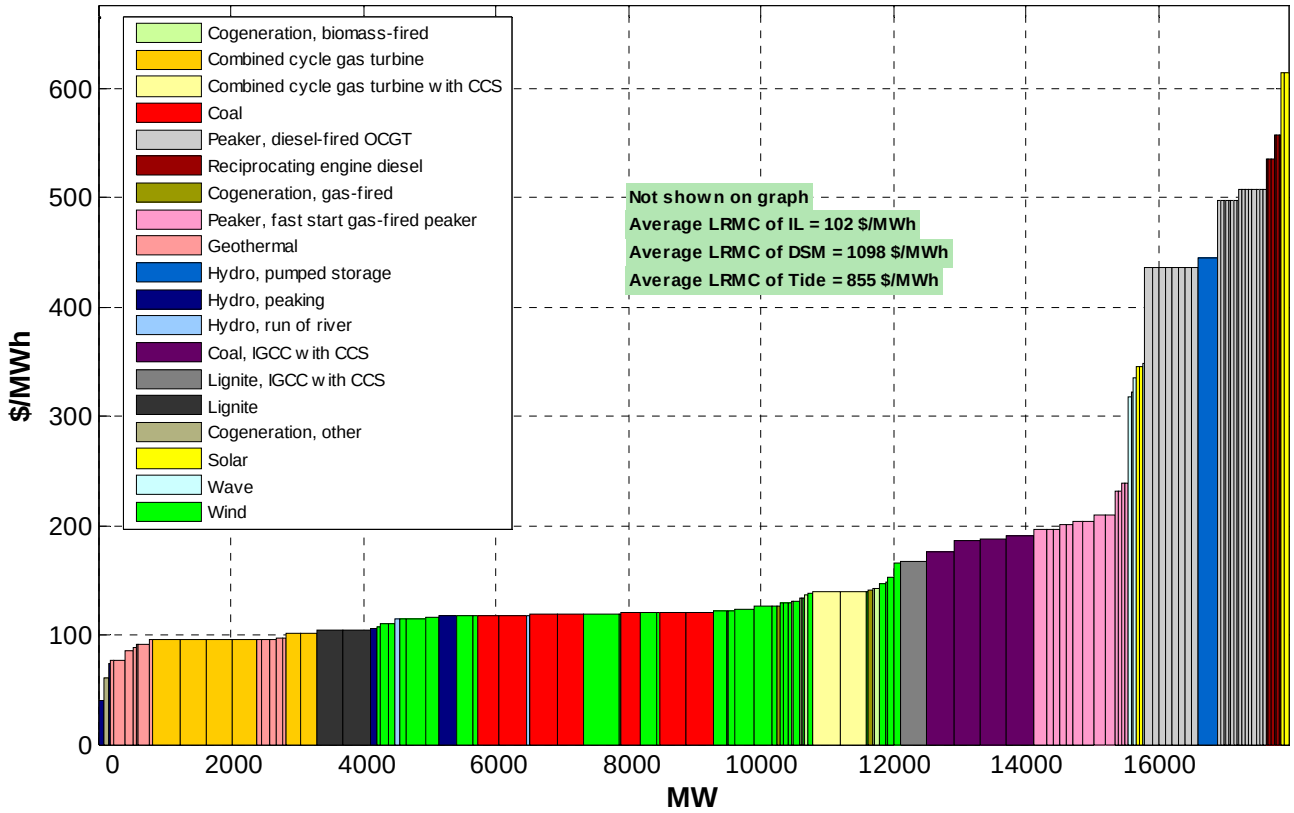
2010 Medium renewables

- In this scenario gas- and coal-fired stations are available, and a relatively low carbon charge and fuel price make them economic;
- Under these assumptions, coal and wind have similar LRMC value;
- Geothermal is available and fairly cheaply at between $77/MWh and $100/MWh.



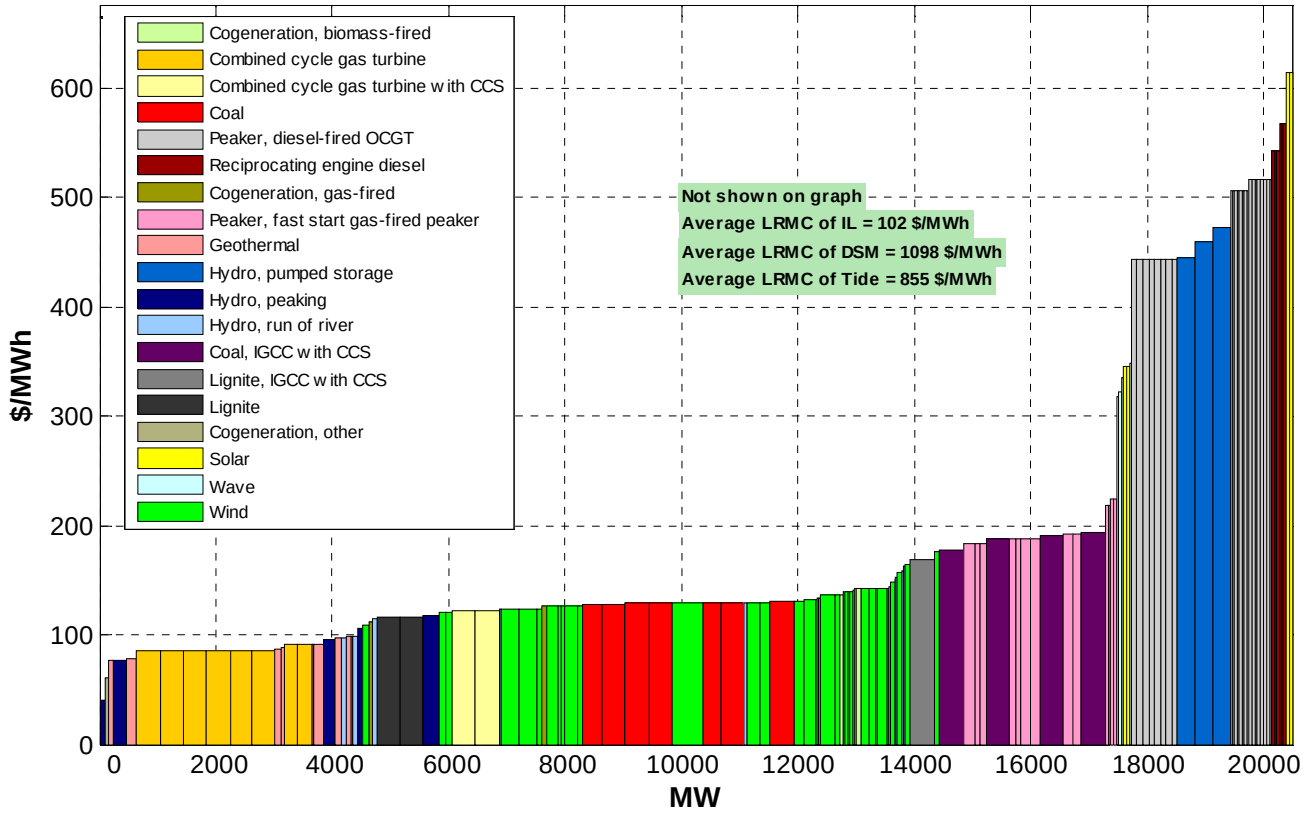
2010 Coal

- The availability of hydro generation is limited in the 2010 Coal scenario, making geothermal and baseload gas-fired stations very economic ($70 to $100/MWh);
- With a low carbon charge ($20/t), the LRMC of lignite plants could be as low as the most expensive gas-fired station at $100/MWh;
- Comparing the 2010 Coal and 2010 Medium renewables scenarios shows coal descending slightly in the merit order because of the lower carbon charge.

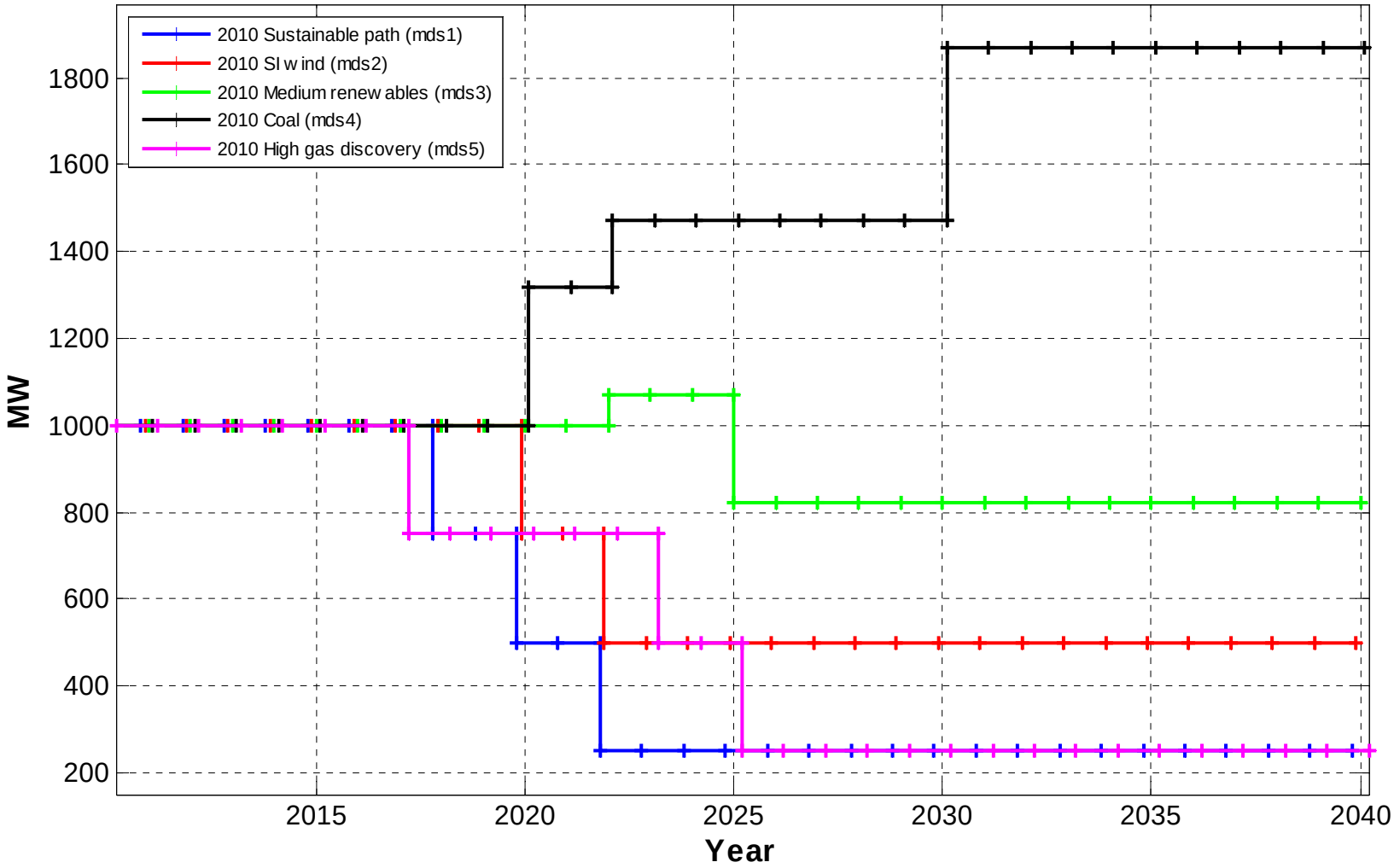


2010 High gas discovery

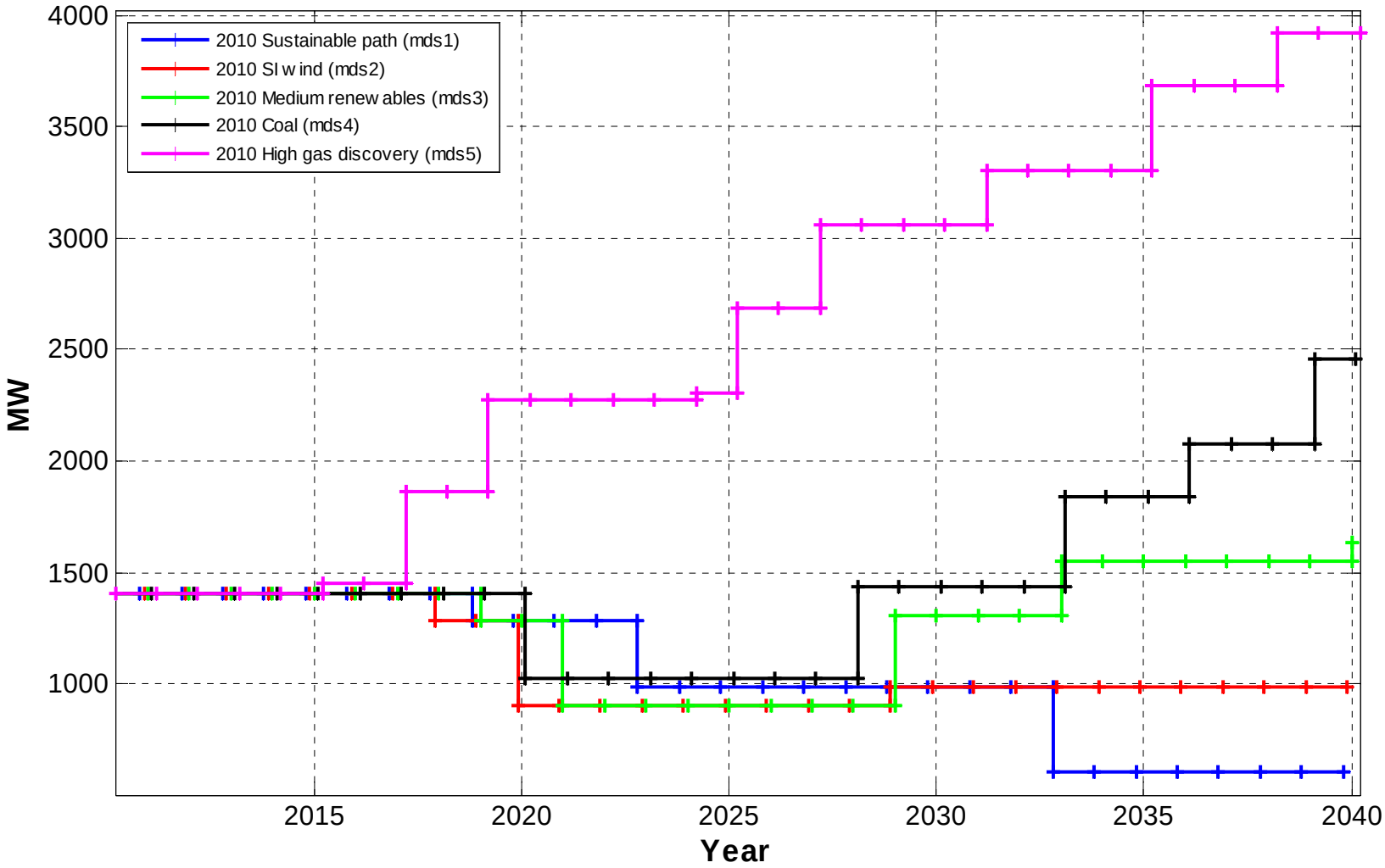
- In this scenario, a low carbon charge and gas price make baseload gas-fired stations the most economic option with an LRMC below $90/MWh;
- Geothermal is still a very attractive technology but in this scenario less geothermal generation is available;



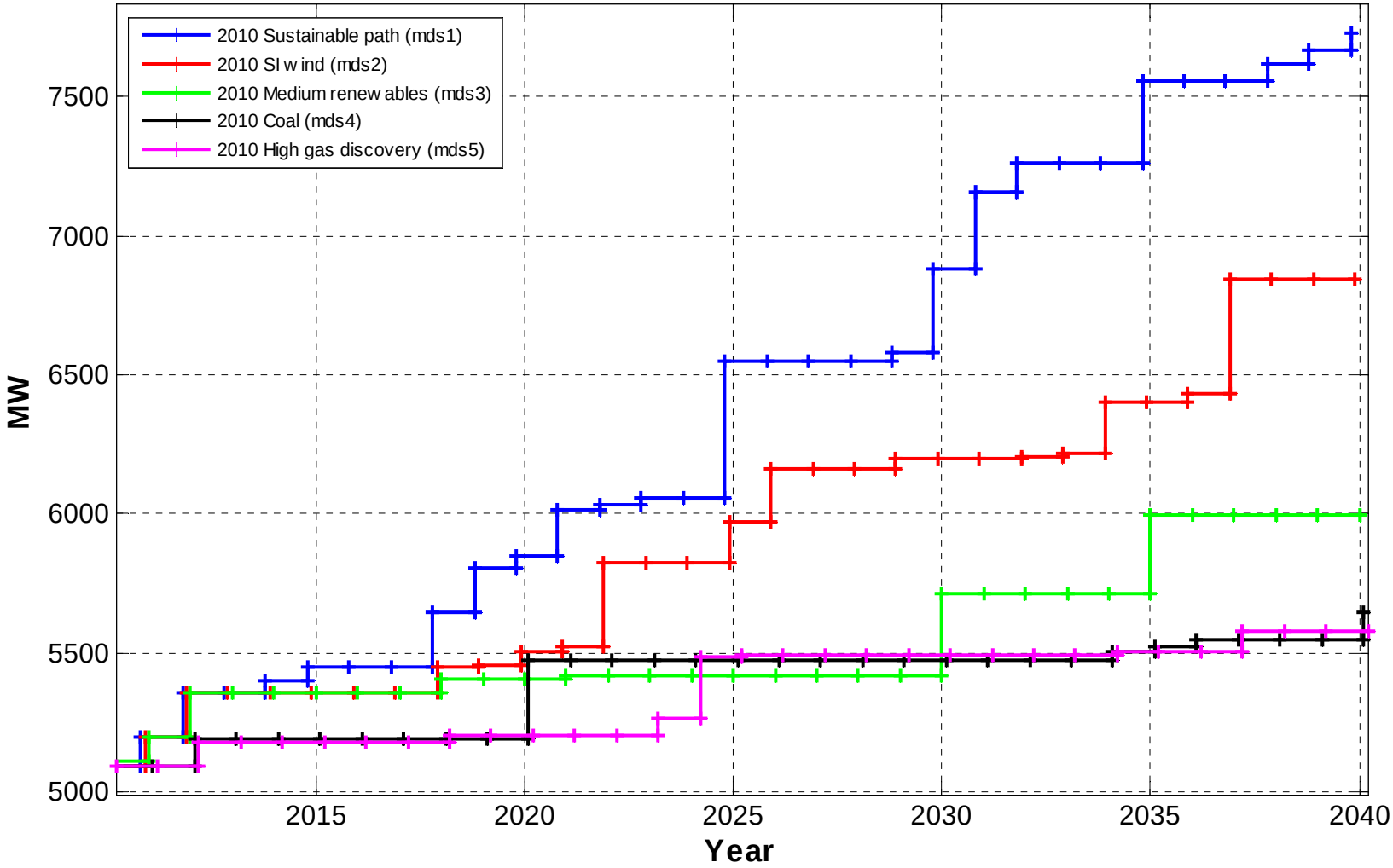
Installed capacity of Coal



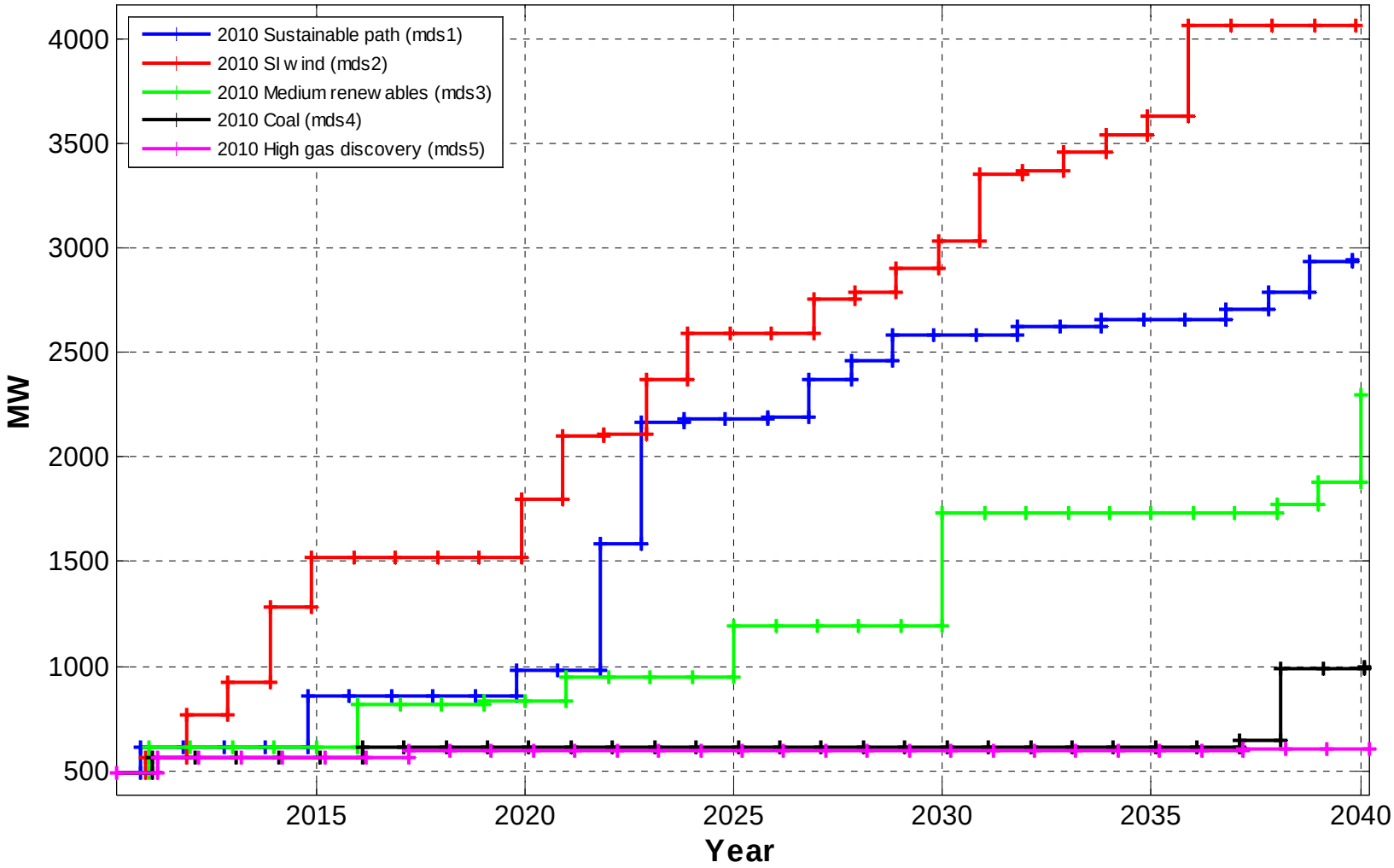
Installed capacity of Gas



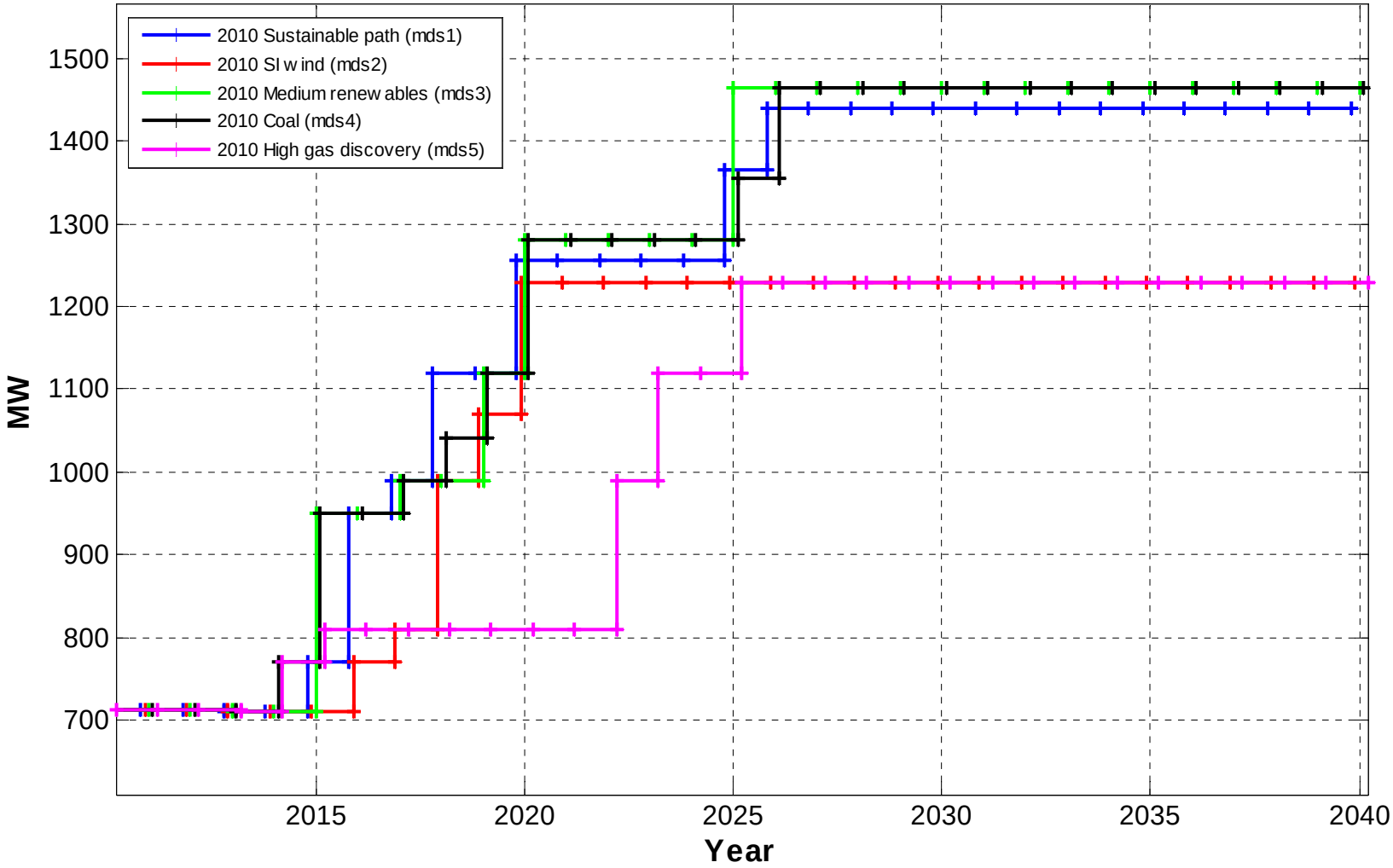
Installed capacity of Hydro



Installed capacity of Wind

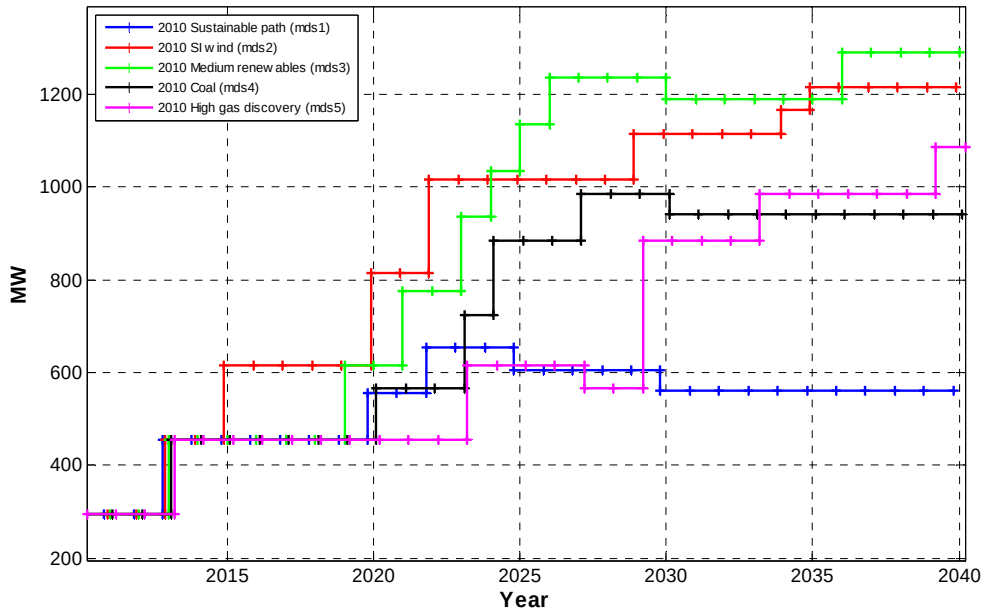


Installed capacity of Geothermal

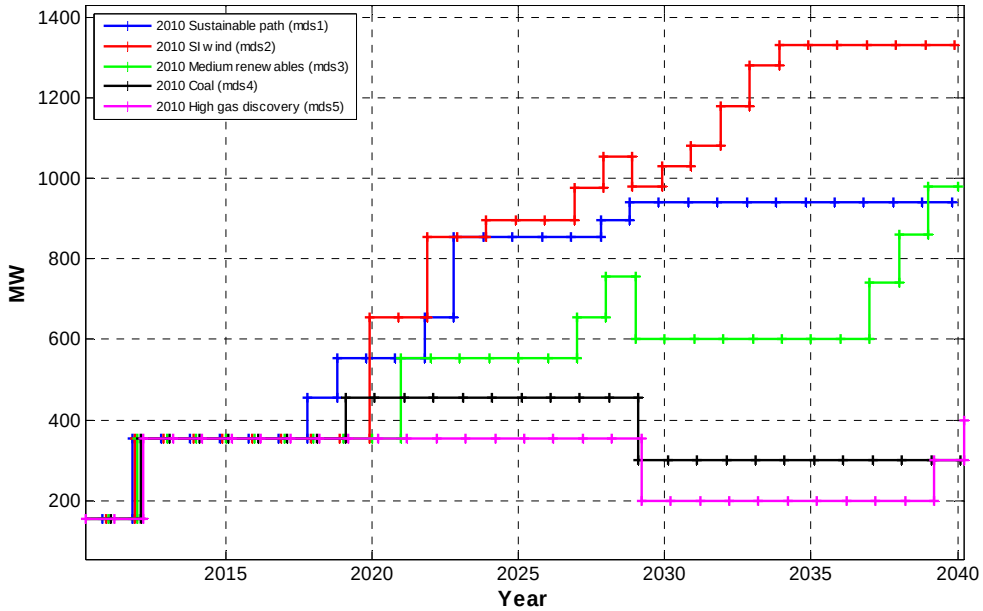


Installed capacity of peakers

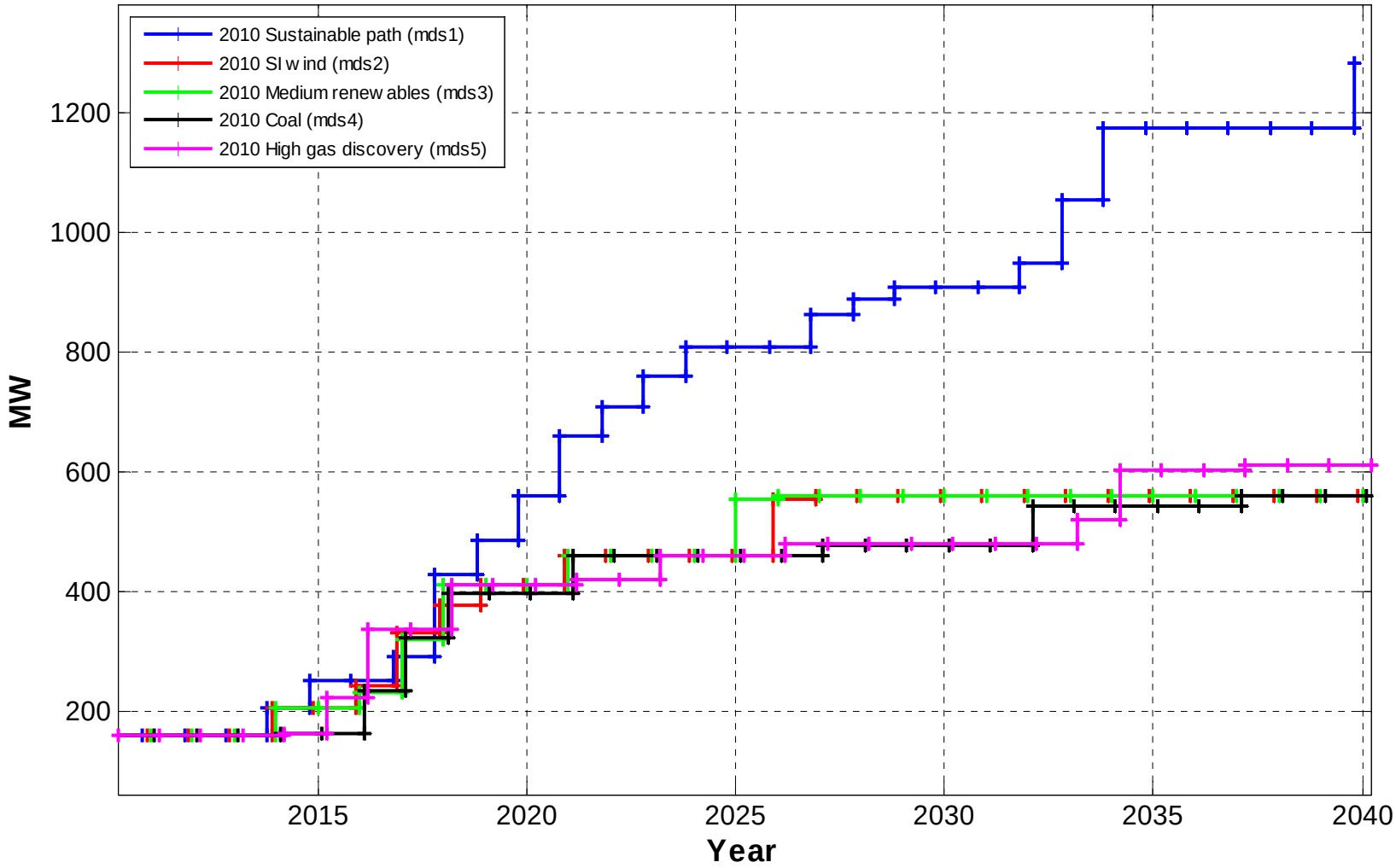
Gas



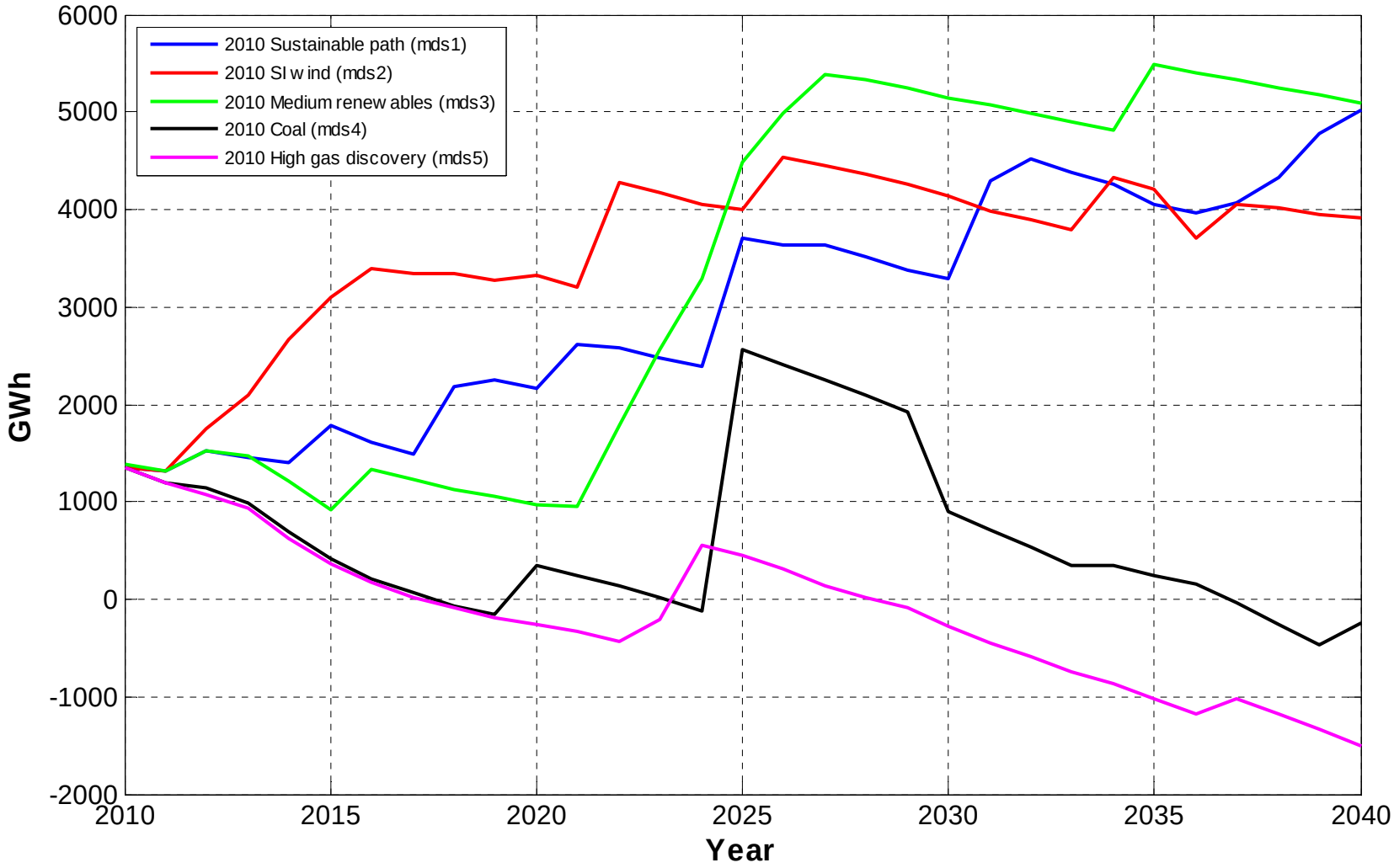
Diesel



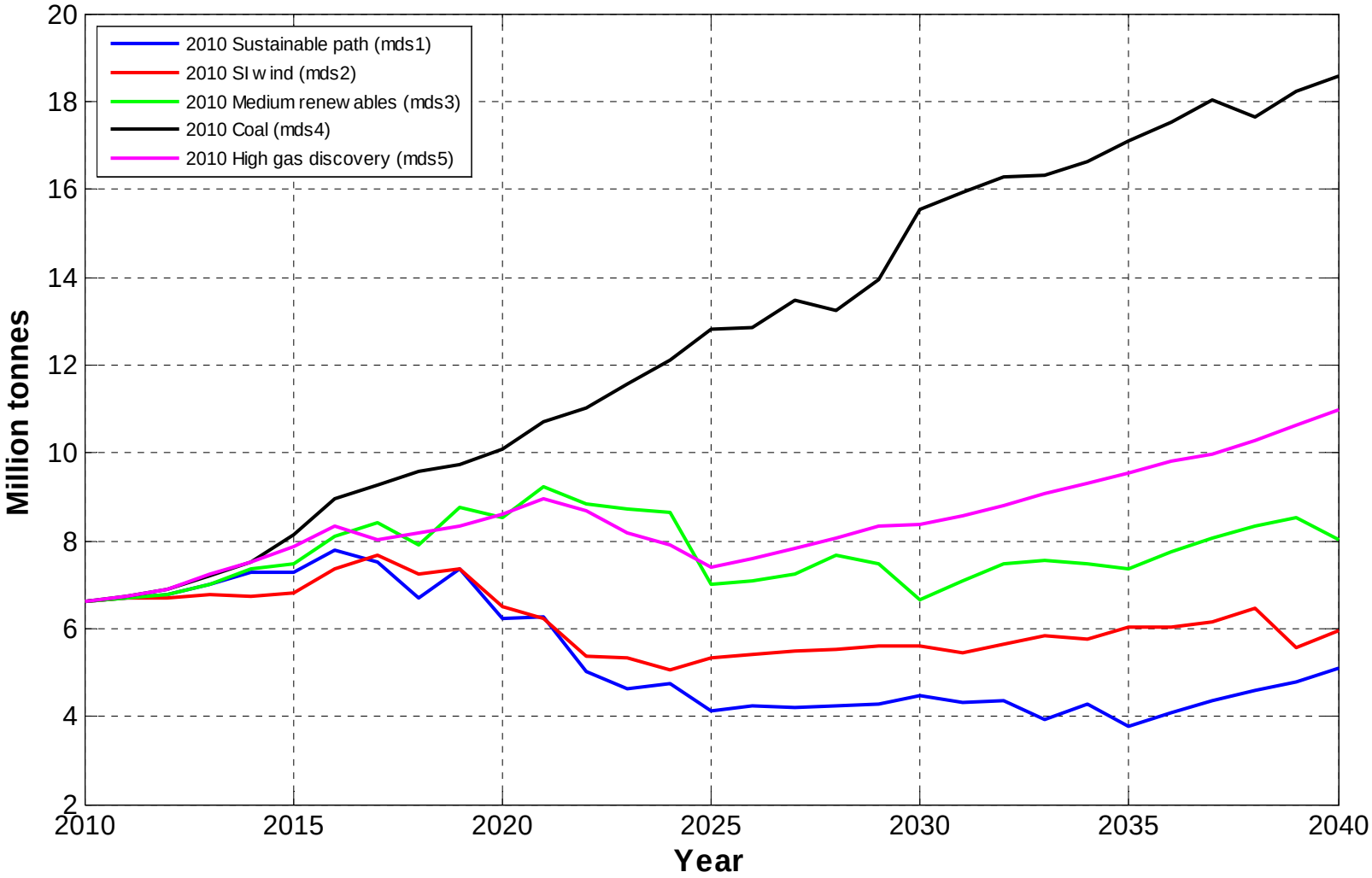
Installed capacity of IL and DSM



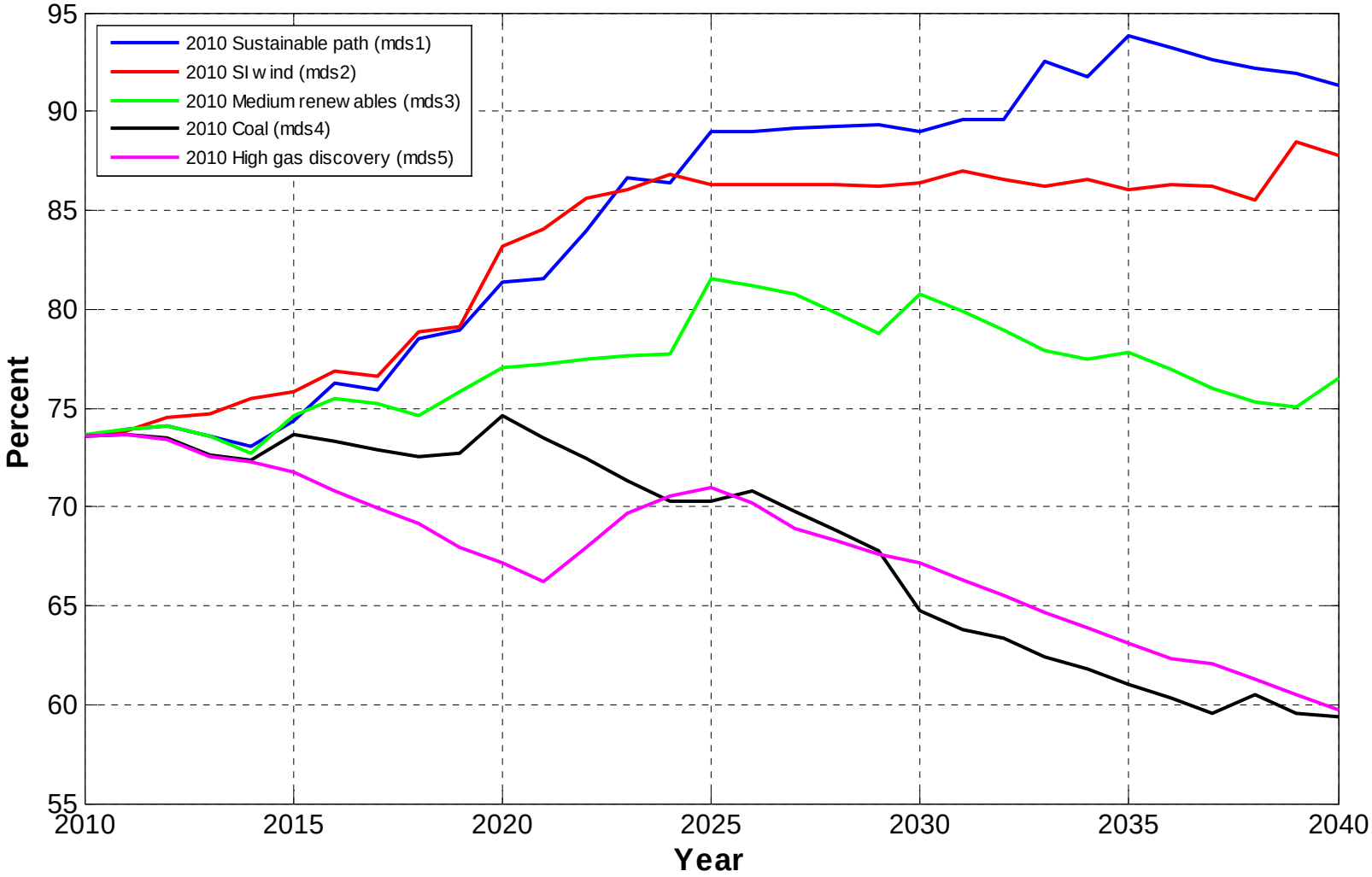
Net annual HVDC transfer



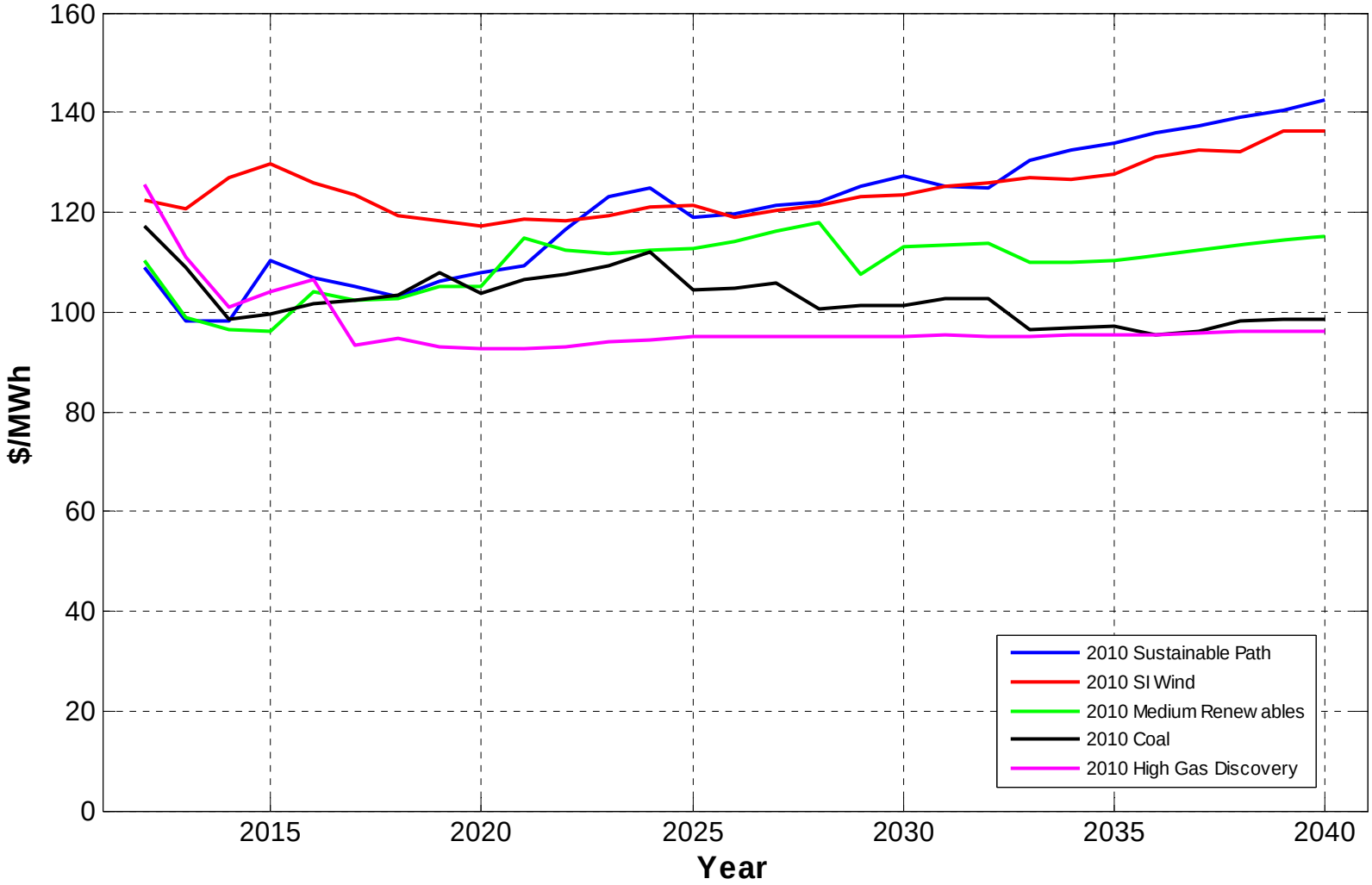
GHG emissions



Renewable energy share



Revenue adequacy



QUESTIONS?