CAMBRIDGE MODELLING

The Low Carbon Simulator

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There is currently insufficient information available for businesses, investors, governments and non-government organisations to effectively plan for—and succeed in—the transition to a low carbon economy. The Low Carbon Simulator, developed by Cambridge Modelling, is the first model that truly addresses this problem by accurately identifying the best opportunities and most favourable low carbon strategies for each of these sectors.

Prior to the Low Carbon Simulator, greenhouse gas abatement models either took an economic approach (which ignores real-world industrial constraints) or an industry approach (which doesn't account for market dynamics). The Low Carbon Simulator is the only model of its kind able to combine these two capabilities in one fast, integrated and easy to use system.

Consequently, the Low Carbon Simulator is the first model that is able to accurately forecast the role different abatement measures and technologies will play under region-specific economic, industrial, resource and policy conditions. In addition to showing how the demand for each low carbon opportunity develops over time, the Low Carbon Simulator is also able to accurately assess the true costs (and savings) involved in this process. This makes the Low Carbon Simulator the most advanced model for accurately predicting which technologies and measures will be favoured during the low carbon transition.

What Can It Do?

For policy makers and researchers:

The Low Carbon Simulator provides the most comprehensive evidence base available to underpin policy research and formulation. It provides clear insight into a chosen country or region by combining global market data with specific national and regional resource, economic and policy information. In this way, the Low Carbon Simulator can be used to:

- Assess the impact of existing climate change policies (such as renewable energy targets, carbon pricing, feed-in tariffs, etc.) and the efficacy with which they meet current policy commitments and emissions targets.
- Test for limitations and dislocations in current policies and identify new or complimentary policy opportunities to address these areas.
- Identify the technologies and abatement strategies that are most favoured by current policies and pinpoint corresponding policy options that ensure a sustainable and resilient low carbon transition.
- Test the robustness of the existing policy set to changes in economic conditions and business practices and identify the most cost-effective policy combinations.
- Identify unanticipated, high-impact Black Swan Events in the context of greenhouse gas abatement and to test the rigour of potential risk mitigation strategies.

For businesses and investors:

The Low Carbon Simulator's ability to predict which technologies and measures will be favoured by any given combination of economic, industrial, resource and policy conditions makes it possible to:

- Determine the most favourably positioned low carbon opportunities for a given business or investor in the context of their particular regional and business environment. The Low Carbon Simulator is able to simultaneously account for micro-scale factors (such as local resources and operating conditions) and macro-scale factors (such as national and global market conditions).
- Determine the optimal investment strategy, portfolio width and acquisition timing for individual businesses and investors. This can be combined with NPV and IRR analysis if required.
- Assess the robustness of the investment options available. The ability to quickly test various scenarios makes it possible to evaluate the sensitivity of each investment option to possible changes in the business, economic and policy environment and to assess potential risk mitigation strategies.
- Identify new business opportunities based on identifiable gaps in the market and long-term industry development implications.

Example Outputs:

The Low Carbon Simulator can produce all outputs commonly used in low carbon analyses along with a host of additional information that was previously unavailable. Some examples of the kinds of outputs produced by the Low Carbon Simulator are shown below:

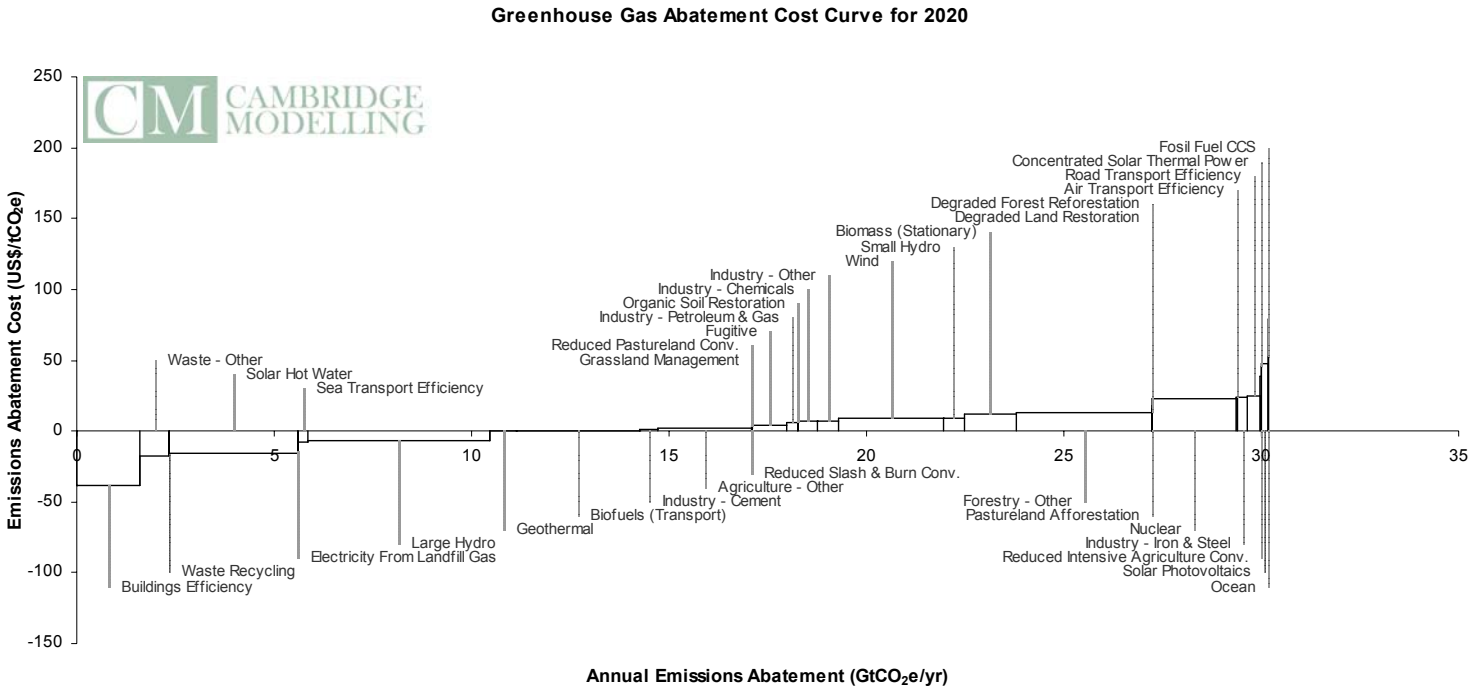


Figure 1: The Low Carbon Simulator instantly produces fully labelled cost curves for any desired year.

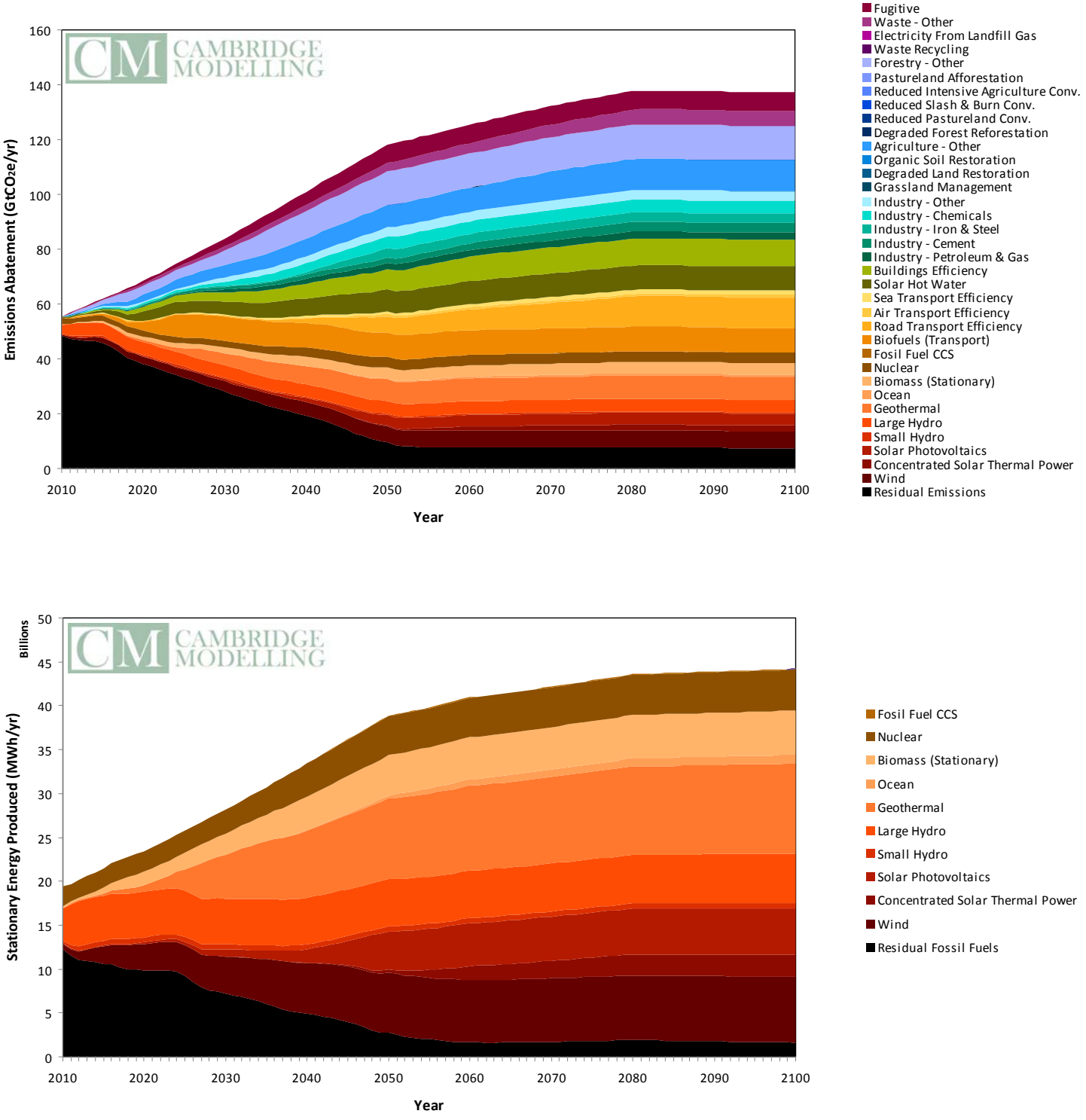


Figure 2: Typical emissions abatement and stationary energy wedge diagrams produced by the Low Carbon Simulator.

The cost curves and low carbon adoption wedges shown in the figures above can all be set to show the maximum abatement potential or, more importantly, the actual amount adopted for each abatement opportunity taking into account the relevant market, policy and industry forces. The Low Carbon Simulator is the only model of its kind to offer the later of these two options.

A further advantage of the Low Carbon Simulator is that it can accommodate the "locking-in" of assets and hence the cost of abatement from these resources over their lifetime (see Figure 3 and Figure 4). Prior to the Low Carbon Simulator, it was only possible to deal with the "real-time" cost of each abatement measure which fails to consider how long-life assets (such as those generally found in the energy sector) "lock-in" operational costs until they are replaced, slowing the decrease in cost of these opportunities with time.

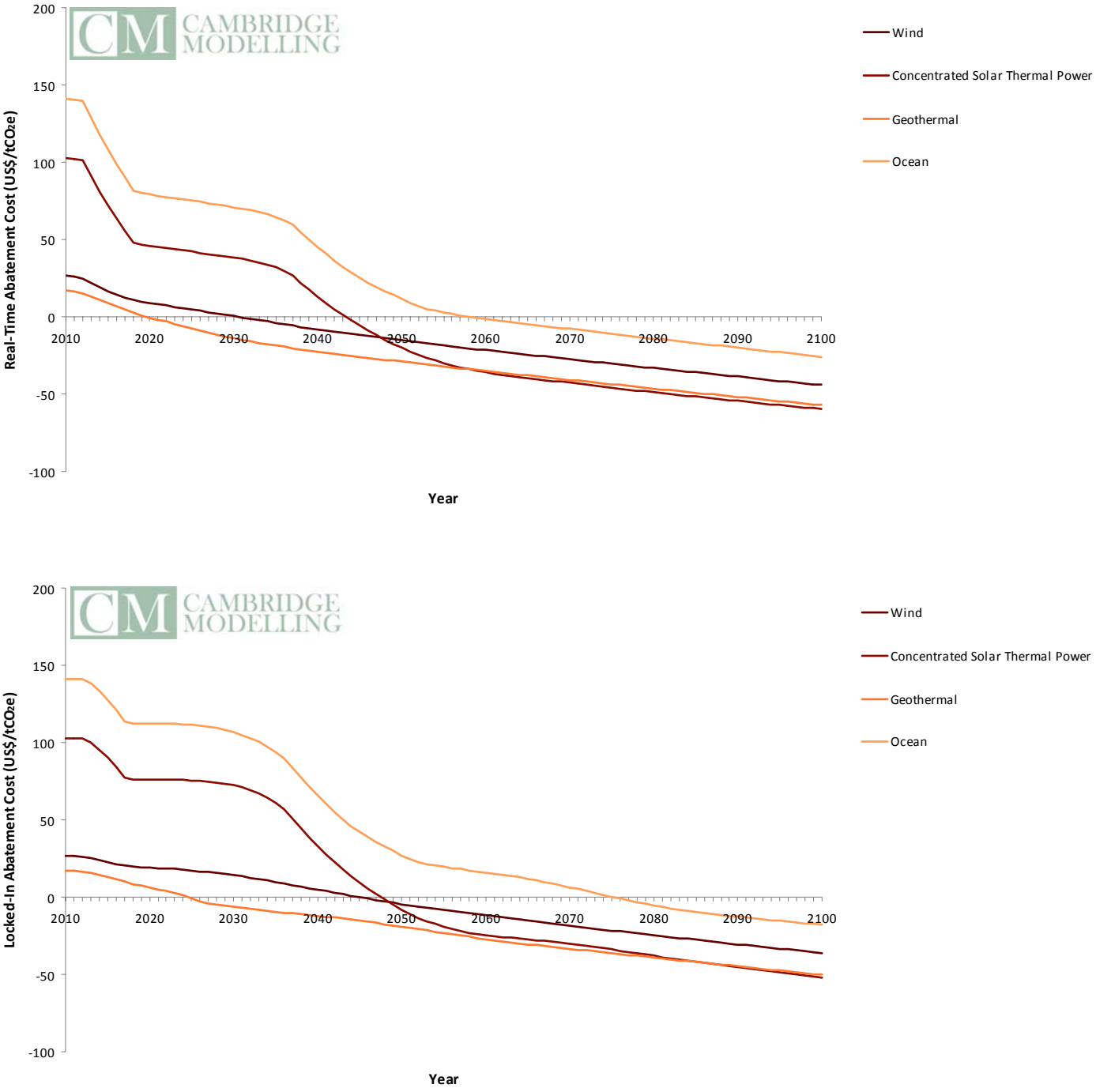
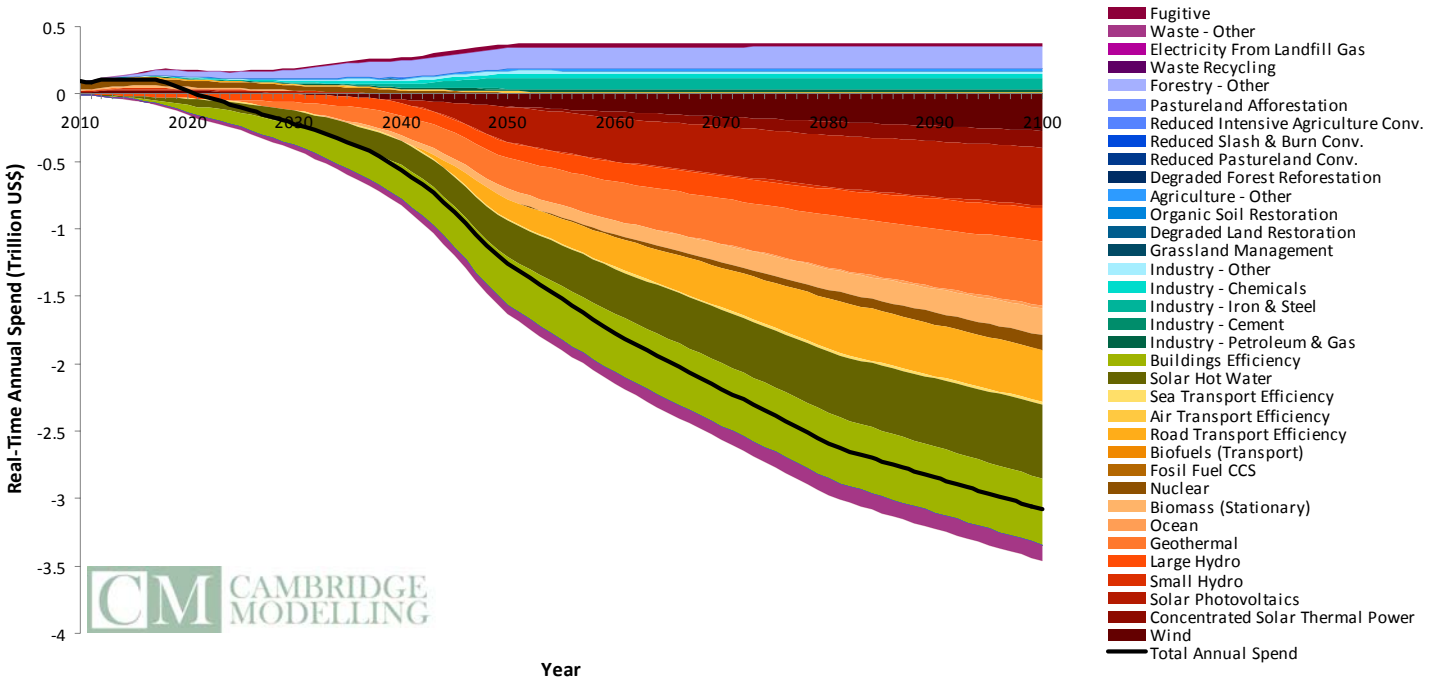


Figure 3: The Low Carbon Simulator enables comparison of the "real-time" cost evolution of abatement opportunities with the cost of the same opportunities when their costs are "locked-in" over the relevant asset lifetime.



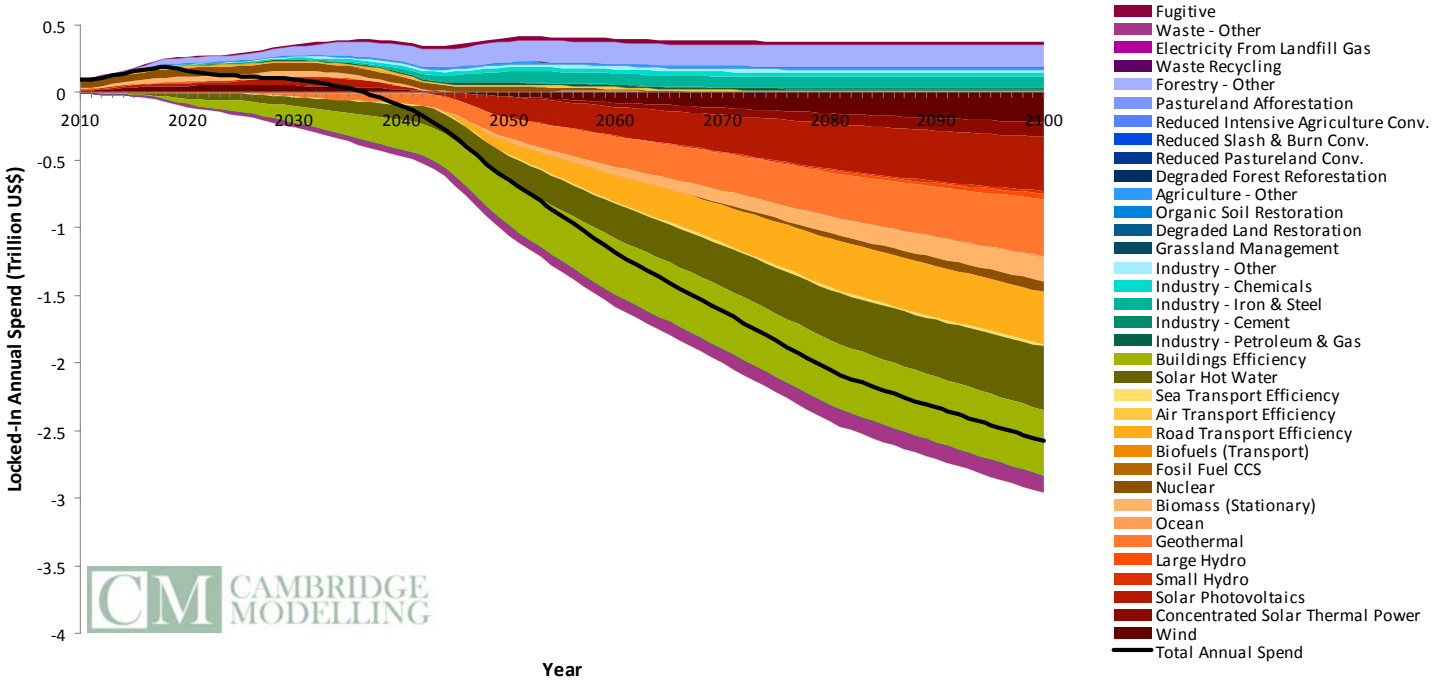


Figure 4: The Low Carbon Simulator can also show the total annual spend (or saving, as indicated by negative spend values) on each abatement opportunity—an important consideration when developing cost-effective policies and business strategies. Again, the Low Carbon Simulator can determine these values using the "real-time" costs of the abatement opportunities or their "locked-in" costs over the relevant asset lifetime.

The Low Carbon Simulator is also able to determine the effect of abatement opportunity costs on consumer parameters, such as the cost of electricity, highlighting the net effect of switching to low carbon opportunities.

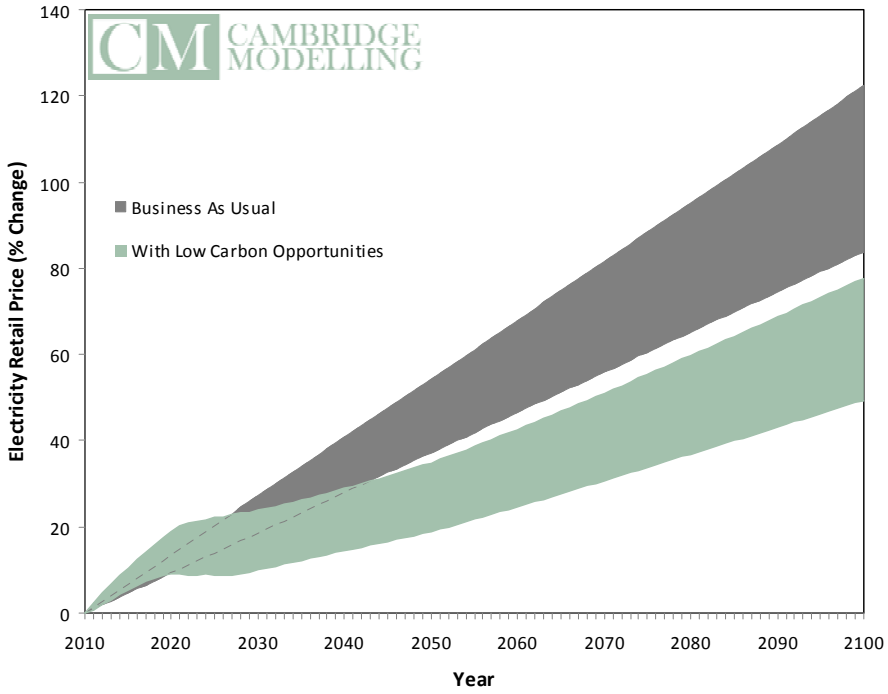


Figure 5: A Low Carbon Simulator comparison of electricity prices under business as usual compared to a scenario involving a 20% renewable energy target for 2020 and an 80% emissions reduction target on 1990 levels by 2050.

The Low Carbon Simulator makes use of Monte Carlo modelling methods that enable it to accommodate ranges of expert opinions and possible future scenarios. By doing so, the Low Carbon Simulator is able to offer pertinent information on the likelihood of various outcomes and the key sensitivities therein. The speed of the Monte Carlo analysis used in the Low Carbon Simulator makes it possible to test multiple scenarios in real time enabling the rapid assessment of different low carbon strategies.

By accounting for more real-world economic, industrial, resource and policy influences (and the synergies between them) than any other model of its kind, the Low Carbon Simulator gives new and indispensable insights into the low carbon economic transition. For this reason, the Low Carbon Simulator is a vital tool for informed businesses, investors, governments and non-government organisations during the transition to a low carbon economy.

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