AEMC

REVIEW

Australian Energy Market Commission

FINAL REPORT

Impact of the enhanced Renewable Energy Target on energy markets

Commissioners

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Final Report

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About the AEMC

The Council of Australian Governments, through its Ministerial Council on Energy (MCE), established the Australian Energy Market Commission (AEMC) in July 2005. The AEMC has two principal functions. We make and amend the national electricity and gas rules, and we conduct independent reviews of the energy markets for the MCE.

Executive Summary

In July 2011 the AEMC submitted to the Ministerial Council on Energy (MCE) a Draft Interim Report on our assessment of the impact of the enhanced Renewable Energy Target (RET) on electricity prices, emissions levels, and security and reliability of supply. The report was also circulated to the Commonwealth Departments, the Australian Energy Market Operator (AEMO) and the Australian Energy Regulator. Those stakeholders who expressed views broadly accepted the main conclusions of the report, including the potential for the Large Renewable Energy Target (LRET) not to be met by 2020 without a price on carbon emissions, and the challenges that had arisen as a result of the interaction between the Small Scale Renewable Scheme (SRES) and jurisdictional feed in tariffs. The Draft Interim Report included an analysis of the impact of the enhanced RET with and without a carbon emissions price. The carbon emissions price used for this modelling was very similar to the price recently legislated in the Clean Energy Future package.

In the light of the reaction to the Draft Interim Report and the modelling assumptions for the carbon emissions price being so close to the legislated prices, we have decided not to substantially update the modelling of the impact of the enhanced RET. Instead, we have undertaken limited additional analysis focusing on particular issues raised by stakeholders during consultation. In particular, we have:

- Modelled the impact of a lower demand forecast, which broadly matches the demand forecasts used by the Commonwealth Treasury for its modelling of the impact of Clean Energy Future package.
- Tested the outcomes from varying some specific assumptions about the Western Australian market, including allowing new coal plant to be developed if it is economic.

We have also updated the Interim Report to include recent changes to jurisdictional feed in tariffs. Therefore, stakeholders should read this report in conjunction with the Interim Report when considering the AEMC's overall analysis of the impact of the enhanced RET.

The analysis of a lower demand forecast shows significant changes compared to the results of the demand forecasts used for the original analysis, which were based on AEMO's demand forecasts from the 2010 Electricity Statement of Opportunities. In particular, the analysis shows that lower demand would lead to lower wholesale electricity prices, and make it harder for sufficient profitable new renewable generation to be able to meet the LRET by 2020. Given the emerging evidence from a range of sources, including AEMO's 2011 Electricity Statement of Opportunities, of lower forecast growth in demand in the coming years than in recent years, this conclusion may be particularly important for the cost of meeting the LRET. Under a lower level of demand, the cost of meeting the LRET may be higher if retailers choose to pay the penalty price rather than building additional renewable generation because it is more cost effective to pay the penalty price.

Where the constraint on the building of new coal plant is removed in Western Australia, additional coal plant enters the market in place of additional renewable and gas plant

under the reference case. The lower levels of renewable generation forecast also affects the achievement of the LRET in this jurisdiction under the reference case. However, renewable generation is significantly above the South West Interconnected System's assumed share of the LRET where a carbon emissions price is in place. Under the reference case, higher levels of coal plant result in higher levels of emissions when compared to previous modelling results. However, emissions levels are forecast to remain similar to the Draft Interim Report where a carbon emissions price is assumed.

In addition to the further analysis discussed above, this report includes some additional detail from the analysis in the Interim Report relating to the scenario where the enhanced RET is in place alongside a carbon emissions price. When the Draft Interim Report was submitted in July 2011 the carbon emissions price had not yet been legislated, so the main reference scenario did not assume a carbon emissions price.

We anticipate that the analysis in our Interim Report and this Final Report can feed into considerations by the Commonwealth Government during its scheduled review of the enhanced RET in 2012. We also anticipate that it can provide useful input into the consideration of further developments with jurisdictional feed in tariffs.

Contents

1 Introduction

1.1 Purpose of this Report

In September 2010, the Ministerial Council on Energy (MCE) requested the Australian Energy Market Commission (AEMC) provide advice on the likely impact of the enhanced Renewable Energy Target (RET) on energy markets, in relation to:

- the price of electricity for retail customers;
- the level of emissions; and
- the security and reliability of electricity supply.

The AEMC submitted its Draft Interim Report to the MCE on 8 July 2011 in response to this request. The AEMC's Draft Interim Report was also submitted for comment to the Commonwealth Department of Climate Change and Energy Efficiency (DCCEE), Commonwealth Treasury, the Office of the Renewable Energy Regulator (ORER), the Australian Energy Regulator (AER) and the Australian Energy Market Operator (AEMO).

During consultation on the Draft Interim Report, a number of stakeholders suggested additional modelling sensitivities and analysis be undertaken to test the AEMC's initial modelling results. Since the AEMC's Draft Interim Report has been released, the policy context for renewable generation has also changed with the release of the Commonwealth Government's 'Clean Energy Future' package which has recently been legislated in the Federal Parliament.

This Final Report sets out the additional modelling and analysis which has been undertaken by the Commission in response to the comments provided on the Draft Interim Report. It also provides greater detail on the modelling results from our carbon emissions price scenario, which was set out in the Draft Interim Report. The modelled carbon emissions price trajectory is relatively similar to the carbon prices announced under the Commonwealth Government's 'Clean Energy Future' package.

With the release of this Final Report, we have also updated the Small Scale Renewable Energy Scheme (SRES) results in a finalised Interim Report to reflect recent changes made to the Victorian, Australian Capital Territory (ACT), South Australian and Western Australian feed in tariff schemes. All other aspects of the Interim Report have remained unchanged.

This report has been written to be read in conjunction with the Interim Report. As a result, this report does not include a summary of the conclusions or modelling results from the Interim Report.

2 Additional modelling and analysis

This Chapter outlines the additional work that has been included in this report, including the detail of the additional sensitivities that have been undertaken. The modelling results and analysis are discussed in detail in Chapters 3 to 5 of this report.

2.1 Carbon emissions price scenario

The Draft Interim Report included modelling results for three main scenarios:

- a reference case scenario which reflected the continuation of announced policy settings as at late June 2011. Mid range economic growth, capital costs, demand and gas price forecasts were assumed. No new installations of coal plant (beyond committed plant as at late June 2011) were also assumed to reflect policy uncertainty during late June 2011 about the pricing of carbon emissions.
- a carbon emissions price scenario, which included the same key assumptions and policy settings as the reference case with the addition of a price on carbon emissions from July 2012. The carbon emissions price commenced at $24/t CO2-e in 2010/11 dollars and its trajectory reflected prices modelled by the Commonwealth Treasury for the Carbon Pollution Reduction Scheme for a minus five percent reduction in 2000 level emissions by 2020. For the Large Scale Renewable Energy Target (LRET), an additional carbon emissions price scenario was also modelled which had a starting price of $25/t CO2-e in 2010/11 dollars in July 2012 and had slightly higher prices between 2020 and 2030.
- a counterfactual scenario, which assumed there was no expanded RET or price on carbon emissions over the outlook period. Committed levels of renewable plant as at late June 2011 were capped, however jurisdictional feed in tariff (FiT) schemes were assumed to continue.

The Draft Interim Report focussed its analysis on the reference case results, with more limited detail on the carbon emissions price scenario and the counterfactual scenario results.

Following the release of the Commonwealth Government's 'Clean Energy Future' package on 10 July 2010, the Commission considered it may be useful to include greater detail on the modelling results from the carbon emissions price scenarios. The carbon emissions prices modelled for the Draft Interim Report were similar to those announced under the Clean Energy Future package, which will commence at $23/t CO2-e in July 2012.

For these reasons, we have included a summary of the carbon emissions price scenario results from our Draft Interim Report. No additional modelling has been included in this summary to that undertaken for the Draft Interim Report.

2.2 Treasury demand scenario modelling

During consultation on the Draft Interim Report, some stakeholders suggested that it may be useful to model a sensitivity using an alternative demand forecast. It was suggested that the Commission could use the demand forecasts used by

Commonwealth Treasury to model the impact of the carbon emissions price under the Clean Energy Futures package. Commonwealth Treasury's demand forecasts are between 2 to 10% lower each year than the demand forecasts used by the Commission for the Draft Interim Report. The Commission used mid range demand forecasts for the Draft Interim Report modelling, which were sourced from work undertaken by AEMO for the 2010 Energy White Paper and the 2010 National Transmission Network Development Plan.[1]

The Commission notes that since its Draft Interim Report was released AEMO has released its '2011 Electricity Statement of Opportunities', which includes energy demand and maximum demand forecasts which are between 1% and 5% lower for almost all regions in the National Electricity Market (NEM) than those set out in the '2010 Electricity Statement of Opportunities'. The reasons outlined by AEMO for the reduction in the demand forecasts include lower economic growth, new and ongoing energy efficiency policies, and extreme weather in Queensland.[2]

In light of these updated demand forecasts, the Commission considered it prudent to model an alternative demand forecast to assess the impact of lower demand on modelled outcomes. The Commission has used Commonwealth Treasury's demand forecasts to re-model the reference case scenario and the initial carbon emissions price scenario (which has a starting price of $24/t CO2-e in July 2012).[3]Some assumptions were required to convert the demand forecasts provided by Commonwealth Treasury into a format that could be readily used to undertake this modelling. All other assumptions for these scenarios remain unchanged from the Draft Interim Report. As a result, any differences in modelling results between the Draft Interim Report and the results in this report for these sensitivities are due to differences in demand forecasts.

It should also be noted that although the Commission has used Treasury's demand forecasts, differences in the modelling methodology as well as differences in other key assumptions such as capital costs and the outlook period amongst others, will contribute to differences in results between the Commission and Treasury. Some of the results that will be affected by differences in the assumptions used include the type and capacity of plant which is forecast, the timing of plant entry, the level of wholesale prices, the forecast level of emissions, and the extent to which the LRET is met, amongst others. As a result, differences in modelling methodologies and assumptions should be taken into account when considering the results in this report.

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1 The Commission used demand forecasts from Scenario 3 (Decentralised World scenario) in AEMO's 2010 National Transmission Network Development Plan.

2 AEMO, *2011 Electricity Statement of Opportunities,* AEMO, 30 August 2011.

3 The Commission considered the possibility of using the demand forecasts in AEMO's 2011 Electricity Statement of Opportunities. However, as these forecasts only extended out to 2020/21 rather than the 2030/31 outlook used by the Commission in its modelling, this was not considered feasible. The Commission also notes that AEMO assumed the introduction of a 10 $/t CO2-e carbon price in 2013–14, followed by a full emissions trading scheme in 2014–15 in its report. This is lower than the 23 $/t CO2-e carbon which is scheduled to be introduced in 2012-13 under the 'Clean Energy Future' package, which will be followed by a full emissions trading scheme in 2015–16. However, AEMO considers that the impact of these differing assumptions on energy and maximum demand are expected to be minimal.

2.3 Western Australian coal modelling and renewable generation analysis

This report includes two additional pieces of work which have been undertaken in relation to Western Australia only, following comments provided by the Western Australian Government. This additional work includes remodelling to relax the constraint on the installation of new coal plant and further qualitative analysis on the impact of additional renewable generation in Western Australia.

2.3.1 Relaxation of the no new coal plant constrain

During consultation on the Draft Interim Report, the Western Australian Government suggested that we model a sensitivity which relaxed the constraint on the installation of new coal plant for Western Australia. This sensitivity was suggested to reflect the possibility that new coal plant in Western Australia may be required to meet future demand due to the high domestic gas prices in this state, which are increasingly reflecting international liquified natural gas (LNG) prices. Further, as the electricity system in Western Australia is not connected to any other regions, Western Australia is required to meet all of its demand from within the state. This means that Western Australia has more limited supply options than the regions in the NEM and increases the probability that new coal plant may be required.

We have re-modelled the reference and carbon emissions price scenarios with the no new coal plant constraint relaxed for the South West Interconnected System (SWIS) in Western Australia. All other assumptions have remained the same as the reference and carbon emissions price scenarios outlined in the Draft Interim Report. This sensitivity has not been modelled for other jurisdictions, as the Commission considers that the constraint on the installation of new coal plant in all other jurisdictions is still a valid assumption, particularly following the legislation of the Commonwealth Government's Clean Energy Futures package.

2.3.2 Additional renewable generation analysis

In our Draft Interim Report, we modelled the impact of the LRET on energy markets by assuming that the LRET requirement is pro-rated according to demand. Three regions were used in pro-rating the LRET in relation to their share of national demand - the NEM, Western Australia and the Northern Territory, to reflect the three separate electricity systems in Australia. By using this approach, we assumed that Large Scale Generation Certificates (LGCs) from the LRET would not be traded between the three regions as energy and LGCs are generally bought as a package. This approach reflects a potential desire by retailers to limit the number of transactions required to both meet their load and their LRET liabilities.

If for instance, LGCs from a wind farm were produced in Western Australia and then sold to a retailer in South Australia, the South Australian retailer would be able to use the LGCs to to meet its liabilities but would be required to source its energy from a supplier in the NEM. This additional transaction would be required as electricity cannot be traded between the NEM and Western Australia as these electricity systems are not physically connected.

During consultation on the Draft Interim Report, the Western Australian Government suggested that LGCs in Western Australia were being sold to retailers in the NEM and that relaxing the assumption that regions must source their LGC requirement from within each region should be removed. This has the potential to increase renewable generation in Western Australia and the Northern Territory, particularly if there is a limited supply of LGCs in the NEM and renewable generation can be produced at a cheaper cost than in the NEM.

We have included qualitative discussion on the implications for renewable generation investment in Western Australia if the assumption that the LRET target is pro-rated across jurisdictions is removed, to recognise the trade in LGCs between regions. This qualitative analysis has not been undertaken for the Northern Territory due to the limited renewable generation in that region.

3 Carbon emissions price scenario results

This Chapter provides a summary of the carbon emissions price scenario results from the Draft Interim Report. It includes details on projected wholesale prices, the level of renewable generation, LRET compliance costs, retail electricity price impacts, emissions levels, and the cost of abatement under the carbon emissions price scenario. This Chapter does not include any additional modelling to that undertaken for the Draft Interim Report. Further details regarding the assumptions and methodology used for the carbon emissions price scenario are contained in the Draft Interim Report and NERA Economic Consulting/ Oakley Greenwood's consultant report for the AEMC on the impact of the LRET on energy markets.

As discussed in Chapter 2, two carbon emissions price scenarios were modelled for the Draft Interim Report. Under both of these scenarios, the carbon emissions price commenced in July 2012 and the price trajectory was based on the carbon emission prices modelled by the Commonwealth Treasury for the Carbon Pollution Reduction Scheme to achieve a minus five percent reduction in 2000 level emissions by 2020. The first carbon emissions price commenced at $24/t CO2-e in 2012/13 and increased to $48.62/ t CO2-e in 2029/30 in $2010/11. This scenario was modelling for both the LRET and the SRES. For the LRET, an additional carbon emissions price scenario was also modelled which had a starting price of $25/t CO2-e in 2012/13 and increased to $59.36/tCO2-e by 2029/30 in $2011/12.

3.1 Summary of results

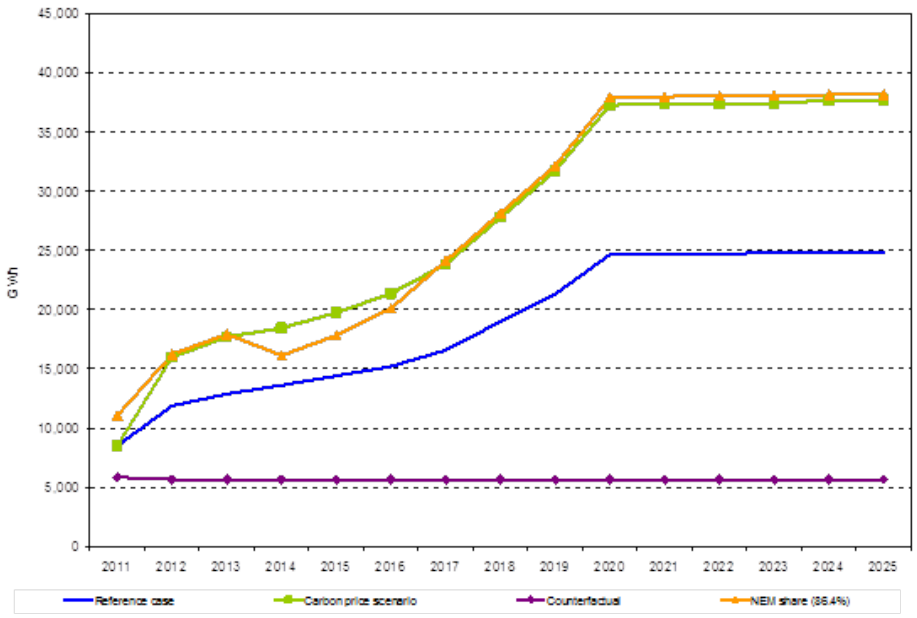
3.1.1 Achievement of the LRET under a carbon emissions price

Under both carbon emissions price scenarios, the LRET was found to just be met by 2020. Under a carbon emissions price, the LRET is met with a relatively low LGC price which is as low as $10 in some years of the outlook period. This occurs as higher wholesale prices under a carbon emissions price are able to provide sufficient revenue to renewable generators to ensure they remain profitable.

It should be noted that the modelled results do not include the impact of the recently announced changes to the Victorian planning requirements for wind turbines. Under these requirements, wind energy facilities are prohibited from specific locations in Victoria and where written consent from dwelling owners living within 2km of the wind turbine has not been provided.[4] These requirements may increase the resource costs of meeting the LRET as less economic sites may need to be used, and may reduce the level of future renewable generation in Victoria and affect the achievement of the LRET.

4 Further details regarding the new Victorian requirements for wind energy facilities can be found here:
http://www.dpcd.vic.gov.au/planning/planningapplications/moreinformation/windenergy#policy

Figure 3.1 Projected renewable generation in the NEM by scenario



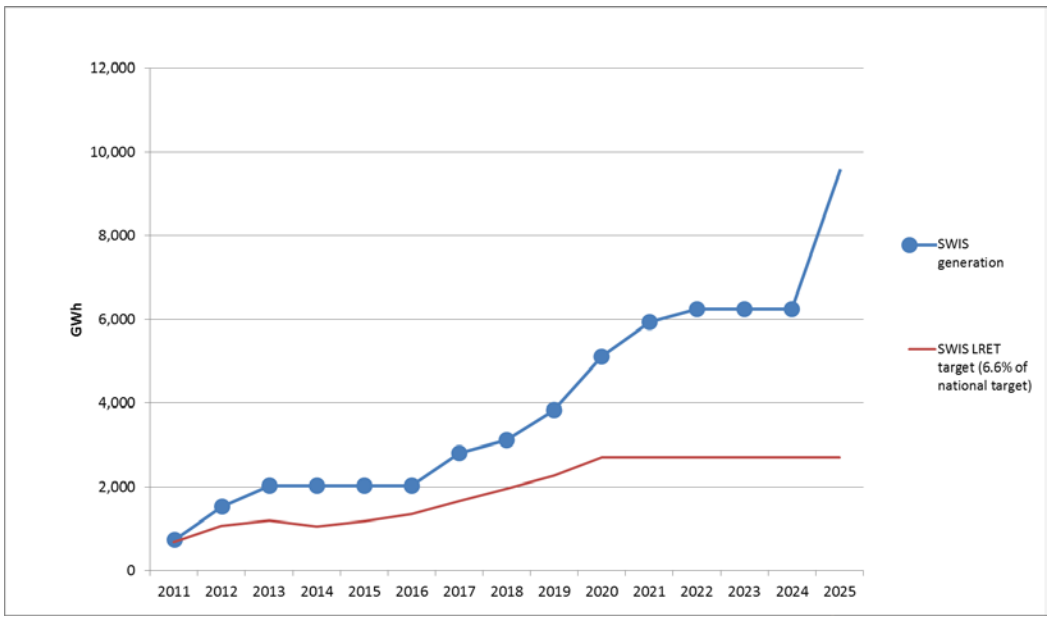
Note: Data represents financial years (e.g. 2011 is 2011/12)

As the outlook period for our modelling ends in 2030 to reflect the policy horizon of the LRET, results beyond 2020 should be treated with some caution. For investments which are forecast to occur following 2020, our modelling horizon may not fully take into account future revenues over the life of the investment. This may affect the modelled profitability of the investment, which may have implications for the overall level and type of investments which have been modelled from 2020 onwards. Given the policy horizon of the LRET, it will be the carbon price that increasingly drives investments in renewable energy beyond 2020 based on the cost effectiveness of different technologies.

In the SWIS in Western Australia, the level of renewable generation is above the assumed 6.6% SWIS share of the LRET over the entire outlook period. By 2019/20, the level of renewable generation in the SWIS is estimated to be 11% of the LRET. This is the result of incentives for renewable generation under the carbon emissions price, relatively high assumed gas prices for Western Australia, and the constraint imposed on new coal plant.

As discussed above in Chapter 2, for Western Australia we have undertaken a sensitivity to assess the level of renewable generation that may occur if the constraint on new coal plant is lifted. We have also undertaken qualitative analysis to assess the impact of increased renewable generation in Western Australia. The results of this additional analysis is discussed in Chapter 5.

Figure 3.2 Projected renewable generation in the SWIS under a carbon emissions price



Note: Data represents financial years (e.g. 2011 is 2011/12)

3.1.2 Profile of generation investment under the LRET under a carbon emissions price

Under a carbon emissions price, it is projected that 8,910 MW of renewable generation would be installed in the NEM by 2020/21. Under the second carbon emissions price scenario, it is projected that the level of renewable generation in the NEM would only be slightly higher by 2020/21 at 8,925 MW. The renewable generation which is projected to enter is predominately wind, with some biomass. Over 4,200 MW of additional renewable generation is projected under the carbon emissions price scenarios by 2020/21 compared to the reference case, which does not include a price on carbon.

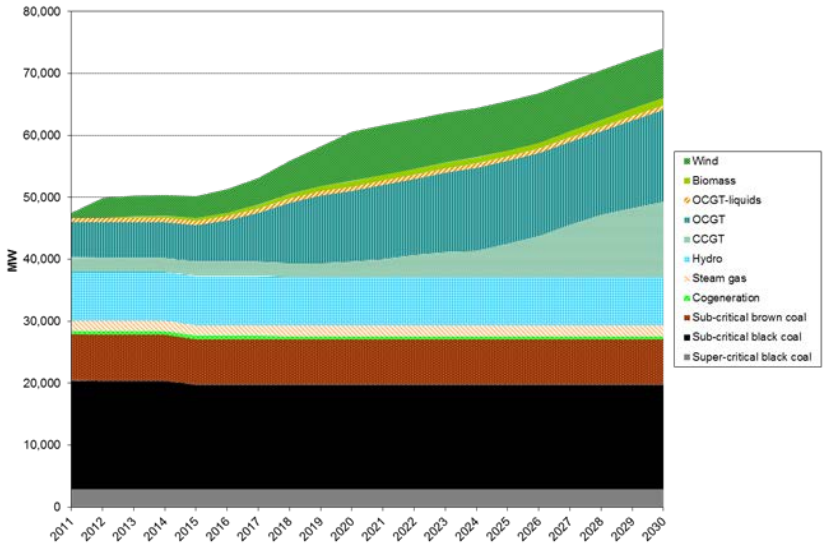
Under both carbon emissions price scenarios, around 11,000 MW of open cycle gas plant (OCGT) and 2,600 MW of closed cycle gas plant (CCGT) is projected to enter the NEM by 2020/21. This is slightly less than is projected to enter under the reference case, which is the result of higher levels of additional wind generation.

Higher wholesale prices under the carbon emissions price scenarios also serves to increase the profitability of coal plant, as wind will tend to displace gas relative to coal. Under the carbon emissions prices and outlook period modelled, coal plant does become more marginal however the carbon emissions price does not result in coal plant replacing gas plant as the marginal plant under the carbon emissions price trajectories that have been assumed.

By the end of the outlook period in 2030/31, existing coal plant appears to be approaching a breakeven position. However, no additional coal plant is projected to retire over the outlook period, beyond the coal plant that was announced to retire in AEMO's 2010 Electricity Statement of Opportunities. Retirement has been assessed by examining the operating profitability of existing coal plant in relation to projected market revenue compared to operating and fuel costs and carbon price related

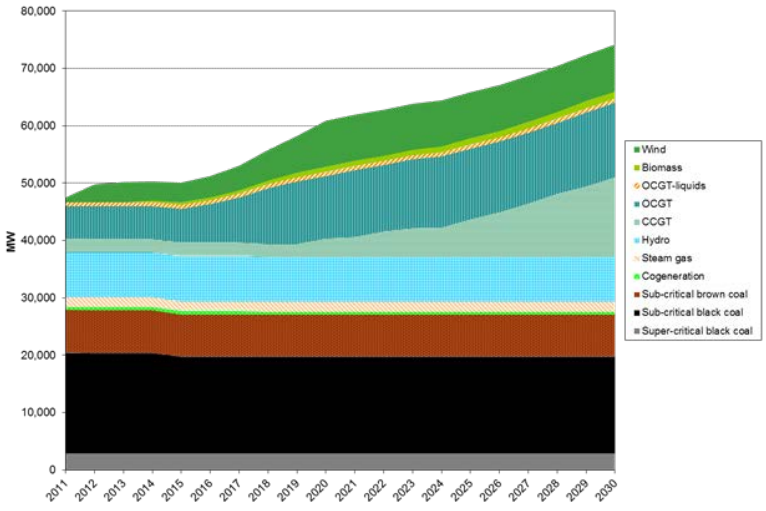
expenses. In reviewing these results, it should be noted that the impact of the Commonwealth Government's recently announced measure to support the closure of around 2,000 MW of highly emissions intensive generation capacity by 2020 has not been included in our modelling.

Figure 3.3 Projected installed capacity in the NEM - Carbon emissions scenario 1



Note: Data represents financial years (e.g. 2011 is 2011/12)

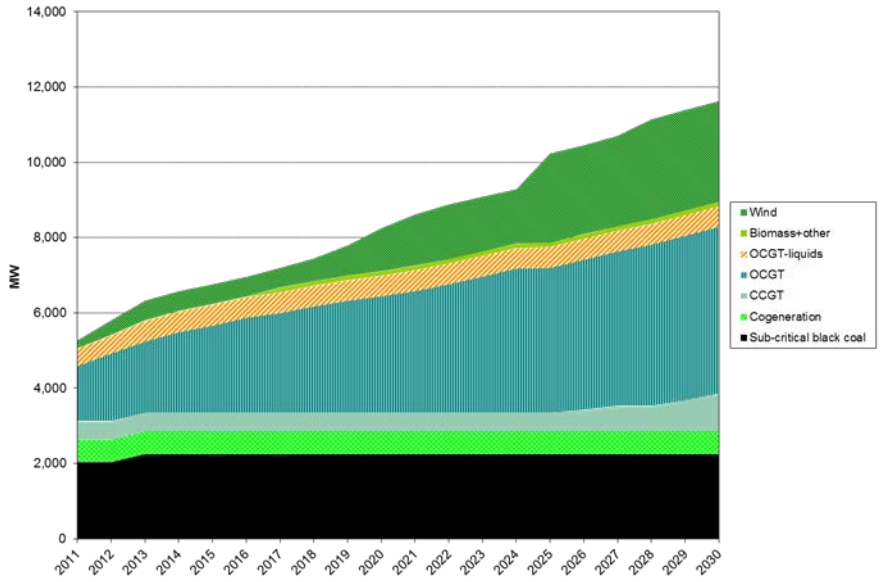
Figure 3.4 Projected installed capacity in the NEM- Carbon emissions scenario 2



Note: Data represents financial years (e.g. 2011 is 2011/12)

In the SWIS, 1,251 MW of renewable generation is projected under a carbon emissions price. This is over 700 MW more than the level of renewable generation which is projected under the reference case where a carbon emissions price . Similarly to the NEM, the installed capacity of OCGT and CCGT plant are expected to be slightly lower compared to the reference case as a result of the higher level of wind capacity under the carbon emissions price.

Figure 3.5 Projected installed capacity in the SWIS- Carbon emissions scenario



Note: Data represents financial years (e.g. 2011 is 2011/12)

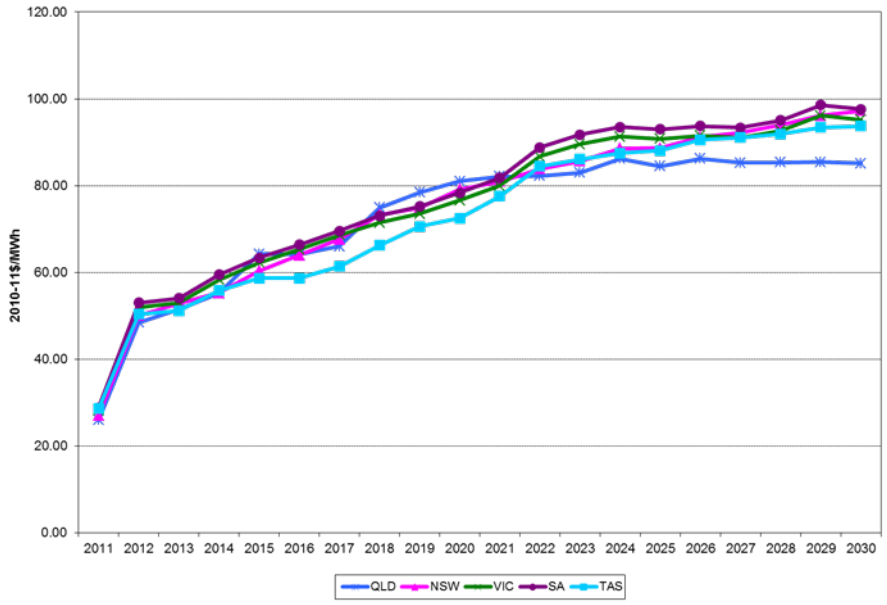
3.1.3 Projected wholesale electricity prices under a carbon emissions price

In modelling wholesale electricity prices, we have used a load block modelling approach which is useful for modelling trends in prices over the long term outlook period of this study but may provide less detail on likely short term price trends. We have also sought to model spot price outcomes rather than seeking to replicate the methodology used by jurisdictional regulators or retailers in setting the wholesale component of retail electricity prices, which generally also includes hedging and ancillary service components. For these reasons, our wholesale price forecasts may differ from other shorter term wholesale price forecasts set out by jurisdictional regulators or other modelling reports.

As well as differences in outlook periods and objectives, differences in modelling assumptions and methodologies can also contribute to differences in wholesale price forecasts.

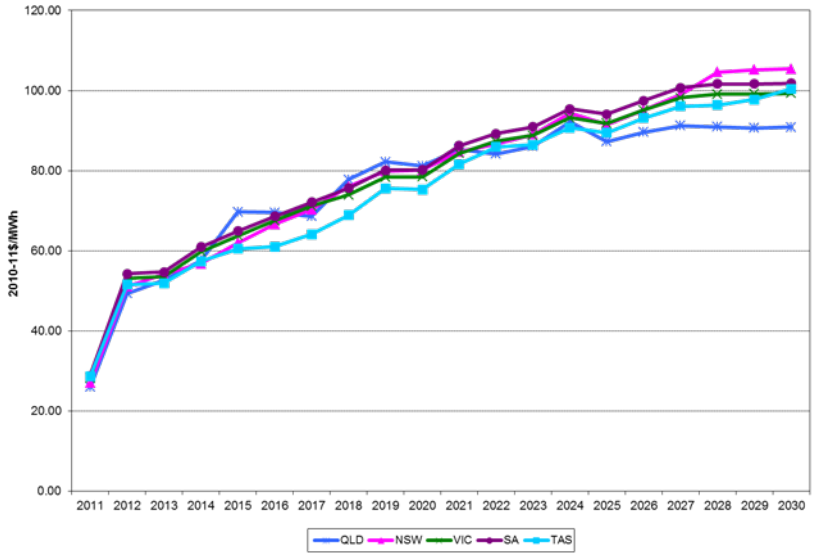
Under both carbon emissions price scenarios, the wholesale price of electricity reaches around $80/MWh in $2010/11 by 2020/21, which is around $30/MWh higher than the reference case. As discussed above, over the outlook period coal plant becomes more marginal as the impact of the carbon emissions price increases the cost of coal plant relative to gas plant. By 2015 in the second carbon emissions price scenario, CCGT begins to displace black coal, while brown coal is displaced in the first carbon emissions price scenario.

Figure 3.6 Projected NEM wholesale electricity prices- Carbon emissions price scenario 1



Note: Data represents financial years (e.g. 2011 is 2011/12)

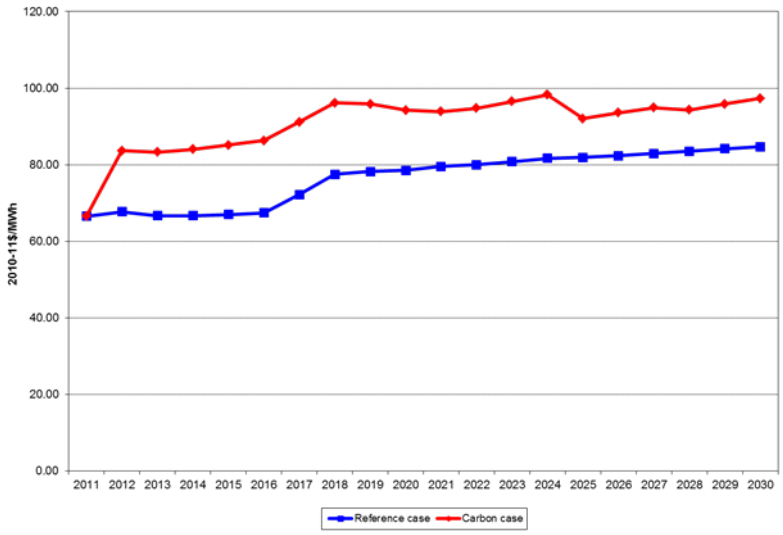
Figure 3.7 Projected NEM wholesale electricity prices - Carbon emissions price scenario 2



Note: Data represents financial years (e.g. 2011 is 2011/12)

In the SWIS, wholesale electricity prices reach around $94/MWh in $2010/11 by 2020/21, which is around $15/MWh higher than under the reference case. Wholesale electricity prices in the SWIS are projected to increase from around 2017/18 due to the anticipated expiry of existing gas contracts and the replacement with higher priced fuel.

Figure 3.8 Projected SWIS wholesale electricity prices- Reference and carbon emissions price scenarios

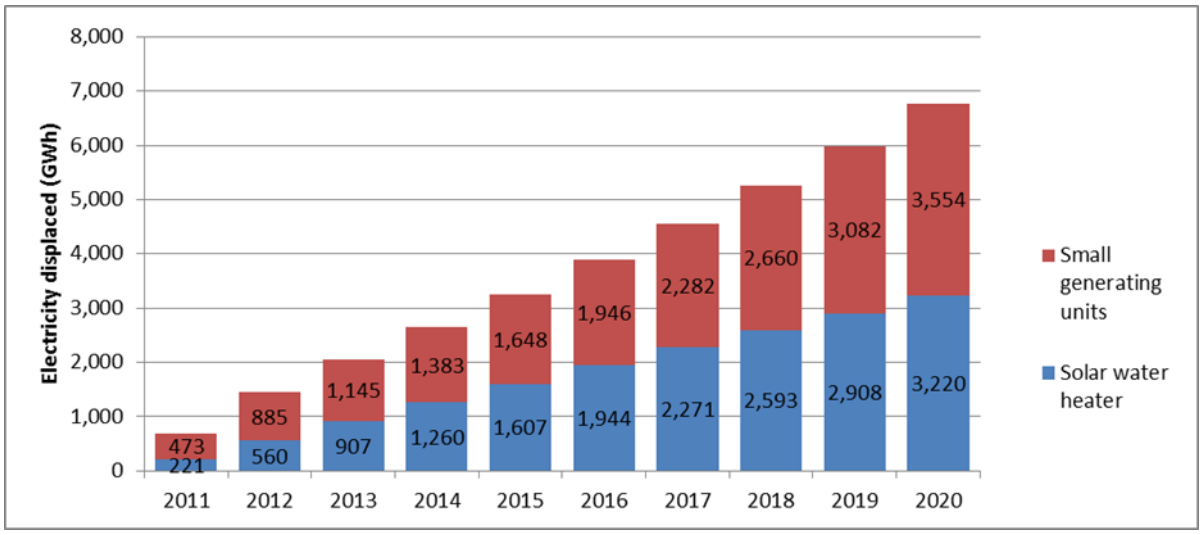


Note: Data represents financial years (e.g. 2011 is 2011/12)

3.1.4 Projected uptake under the SRES under a carbon emissions price

Only the first carbon emissions price scenario was modelled in relation to the impact of the SRES. Under a carbon emissions price, the level of small scale renewable generation which is installed as a result of the SRES and existing jurisdictional feed in tariffs is projected to reach 6,774 GWh by 2020. This is around 69% higher than the SRES' implicit target of 4,000 GWh by 2020, and is comprised of 3,554 GWh from the installation of solar PVs and 3,200 GWh from solar hot water heaters.

Figure 3.9 Aggregate electricity displaced under the SRES under a carbon emissions price



Installations of small generating units (i.e. solar PV) are projected to increase significantly under a carbon emissions price over the outlook period, as a result of higher retail electricity prices and falling solar PV costs which are expected to increase the financial payback associated with installation. The aggregate level of electricity

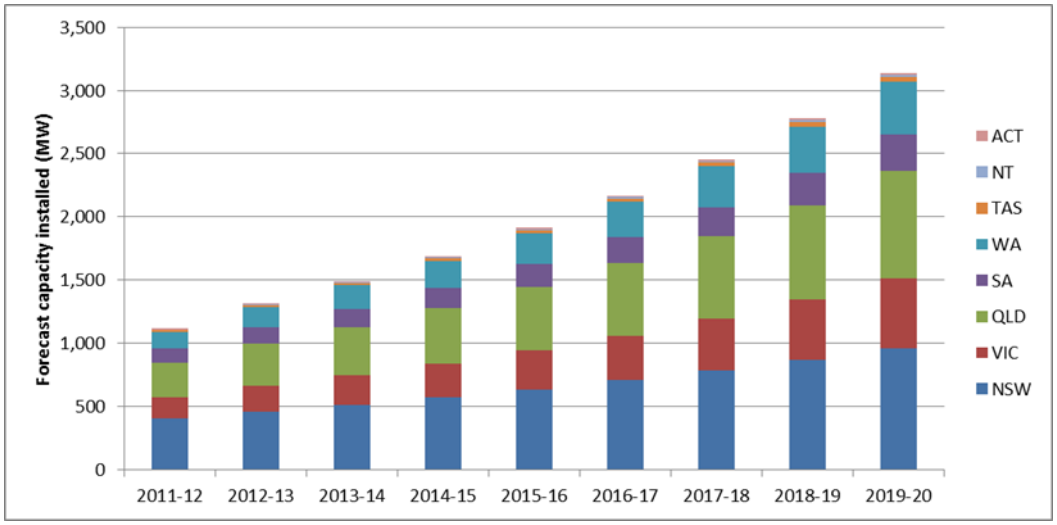
which is displaced under the carbon emissions price is around 384 GWh higher under a carbon emissions price.

Close to 118 million Small Scale Trading Certificates (STCs) are projected to be generated by 2019/20 under a carbon emissions price, with small generating units comprising just over 70% of all projected STCs. The projected level of STCs to be created is around 8 million more than are projected under the reference case.

Installations of solar PV are expected to comprise 3,136 MW by 2019/20. This is close to 300 MW higher than the solar PV capacity that is projected under the reference case where a carbon emissions price is not in place. The majority of solar PV installations are projected to occur in NSW (30%) and Queensland (27%), while a significant proportion of installations are expected to occur in Victoria (18%) and Western Australia (13%). The remaining jurisdictions are projected to comprise the remaining 12% of total installations. Differences in the level of expected installations of solar PV in each jurisdiction reflect differences in expected retail electricity prices, jurisdictional feed in tariff settings, and the level of solar irradiation in each jurisdiction.

In cumulative terms, the number of solar PV installations are projected to reach over 1.5 million by 2019/20, which is around 100,000 more installations than under the reference case, where a carbon emissions price was not assumed.

Figure 3.10 Projected capacity of solar PV installations by jurisdiction under a carbon emissions price



3.1.5 Impact on transmission and security of supply costs under a carbon emissions price

Overall transmission and security of supply costs associated with the LRET were projected to continue to remain a relatively small proportion of overall energy costs and retail electricity prices. Under a carbon emissions price, transmission costs were projected to be lower than if the LRET was not in place. This is the result of an increased level of biomass, which can meet load growth with limited additional network augmentation. The projected increase in wind generation was also assumed to locate close to the existing transmission network. In contrast, where the LRET is not in place under the counterfactual scenario it was assumed that a far higher level of gas

penetration would occur which would require significant augmentation to connect more remote gas fields over time.

In relation to security of supply costs, while the cost of Frequency control ancillary services (FCAS) are not projected to increase significantly in relation to overall energy costs, they are projected to increase significantly in absolute terms. However, as historical bids were used to develop projected security of supply costs, there is the potential that these estimates may overstate likely costs as the pattern of bids may change with increases in costs over time.

Under a carbon emissions price, the cost of FCAS is projected to increase from $10 million in 2010/11 to $177 million in 2019/20 in $2010/11, as a result of the increased fluctuations in supply and demand with the significant increase in wind generation. This is also projected to significantly increase the FCAS costs required to be paid by wind generators from 0.41 $/MWh in 2010/11 to $6.20/MWh in 2019/20 in $2010/11, under the caser pays methodology that operates in the NEM. Similar increases for load following ancillary services were also projected in the SWIS.

Modelled Network support and control ancillary services (NSCAS) costs were projected to remain relatively low by 2019/20. This reflects the strict technical requirements which exist for renewable generators in South Australia which require wind generators to install equipment to contribute to voltage control and the high level of wind generation which is expected to locate in South Australia to meet the LRET. Further no additional coal plant were expected to retire over the outlook period beyond what had been announced in AEMO's 2010 Electricity Statement of Opportunities, which reduces the need for additional sources of reactive power to provide voltage control.

Figure 3.11 Modelled security of supply requirements for the NEM and SWIS

	2010-11 ($Millions pa)		2019-20 ($Millions pa)		Wind FCAS costs ($MW/h)	
NEM	**FCAS**	**NCAS**	**FCAS**	**NCAS**	**2010**	**2020**
Reference	10	49	204	89	0.41	8.30
Counterfactual	10	49	5	53	0.41	0.17
Carbon	10	49	177	88	0.41	6.20
SWIS	**LFAS**	**NCAS**	**LFAS**	**NCAS**	**2010**	**2020**
Reference	22	49	58	50	0.42	2.24
Counterfactual	22	49	58	50	0.42	2.24
Carbon	32	49	160	52	0.42	5.92

Note: All figures quoted in this table are in Real 2011 dollars

3.1.6 Projected impact on compliance costs and retail electricity prices under a carbon emissions price

The total compliance costs of the enhanced RET are projected to decrease from 1.71 billon in 2011/12 to 1.5 billon in 2019/20 in $2010/111. In nominal c/kWh terms the total compliance costs of the enhanced RET are projected to decrease in from 0.93 c/kWh in 2011/12 to 0.64 c/kWh in 2015/16. Costs are then projected to increase slowly

over the second half of the outlook period to reach 0.77 c/kWh in 2019/20. This fall in compliance costs reflects the projected fall in solar PV installations under the SRES as the Solar Credits Multiplier ends and jurisdictional feed in tariffs close.

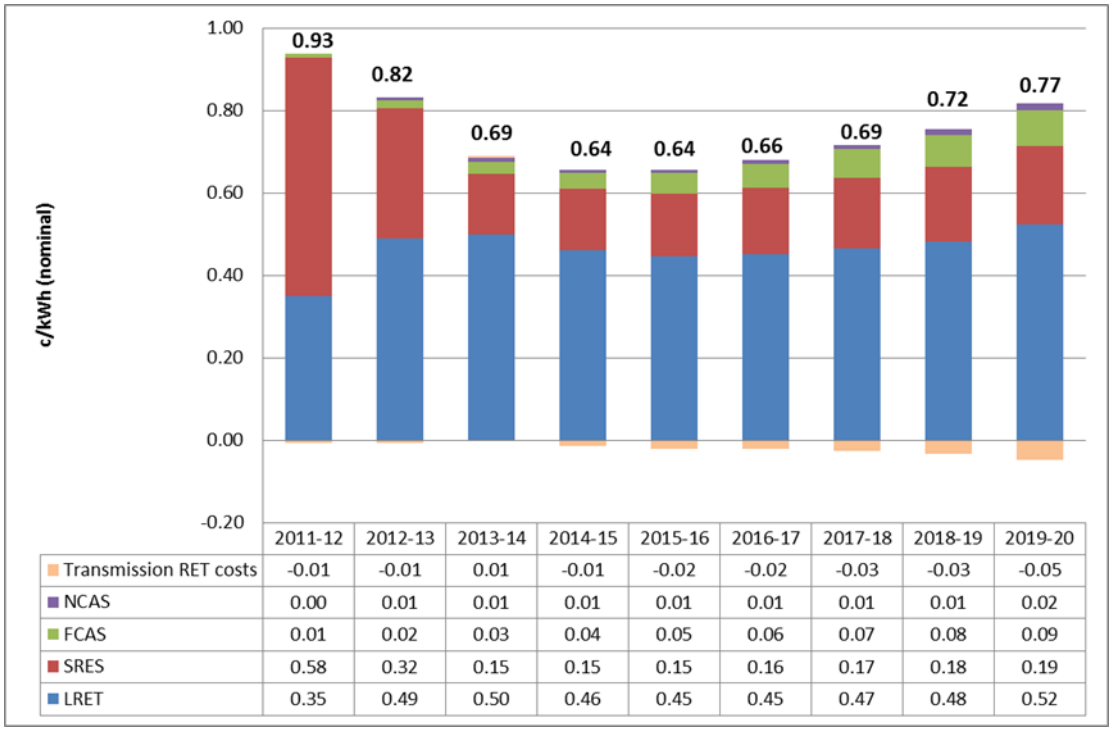
At the same time, the compliance costs of the LRET are projected to remain relatively low, as the profitability of renewable generators is less reliant on revenues from the sale of LGCs as wholesale prices are higher under a carbon emissions price. As a result, despite increasing annual targets, compliance costs under the LRET remain relatively stable.

Over the second half of the outlook period, compliance costs begin to rise as solar PV installations start to increase as the carbon emissions price leads to more significant increases in retail electricity prices and the cost of installations falls. The cost of frequency control ancillary services is also projected to increase over the second half of the outlook period. Additional services are required to manage to minute by minute fluctuations in supply and demand which are expected to increase in size with the large volume of wind generation under the carbon emissions price.

The LRET is projected to comprise around 60% of compliance costs associated with the enhanced RET over the outlook period, while the SRES will comprise around 30% and frequency ancillary control services around 9%. Network control ancillary services and transmission costs are projected to be relatively low over the outlook period, with transmission costs projected to be lower than if the RET was not in place as renewable generation is expected to locate close to the existing transmission network.

Over the course of the outlook period from 2011/12 to 2019/20, compliance costs are projected to decrease by 28% in nominal terms. In contrast, under the reference case compliance costs under the enhanced RET were projected to increase by 37% over 2011/12 to 2019/20. However, under the carbon emissions scenario, the lower compliance costs are offset in part by higher wholesale prices which contribute to the achievement of liabilities under the LRET.

Figure 3.12 Projected costs of the enhanced RET in the NEM under a carbon emissions price



	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Transmission RET costs	-0.01	-0.01	0.01	-0.01	-0.02	-0.02	-0.03	-0.03	-0.05
NCAS	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
FCAS	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
SRES	0.58	0.32	0.15	0.15	0.15	0.16	0.17	0.18	0.19
LRET	0.35	0.49	0.50	0.46	0.45	0.45	0.47	0.48	0.52

3.1.7 Projected impact on emissions levels under a carbon emissions price

Over 2012 to 2020 the enhanced RET is projected to abate 226 Mt C02-e compared to if the enhanced RET was not in place. Emissions abated are projected to increase from 18 Mt C02-e in 2012 to 35 Mt C02-e in 2020 over the outlook period. The total level of emissions abated over 2012 to 2020 are almost three times larger compared to the reference case where the carbon emissions price is not in place.

The LRET is projected to comprise 93% of the emissions abated over the 2012 to 2020 period, which reflects the significant increase in large scale renewable generation which is projected under a carbon emissions price. In contrast, emissions abatement under the SRES is only expected to increase slightly under a carbon emissions price. This is expected to occur as jurisdictional feed in tariffs and the Solar Credits Multiplier are expected to close in the next few years and the carbon emissions price is only anticipated to provide limited incentives for the installation of solar PVs.

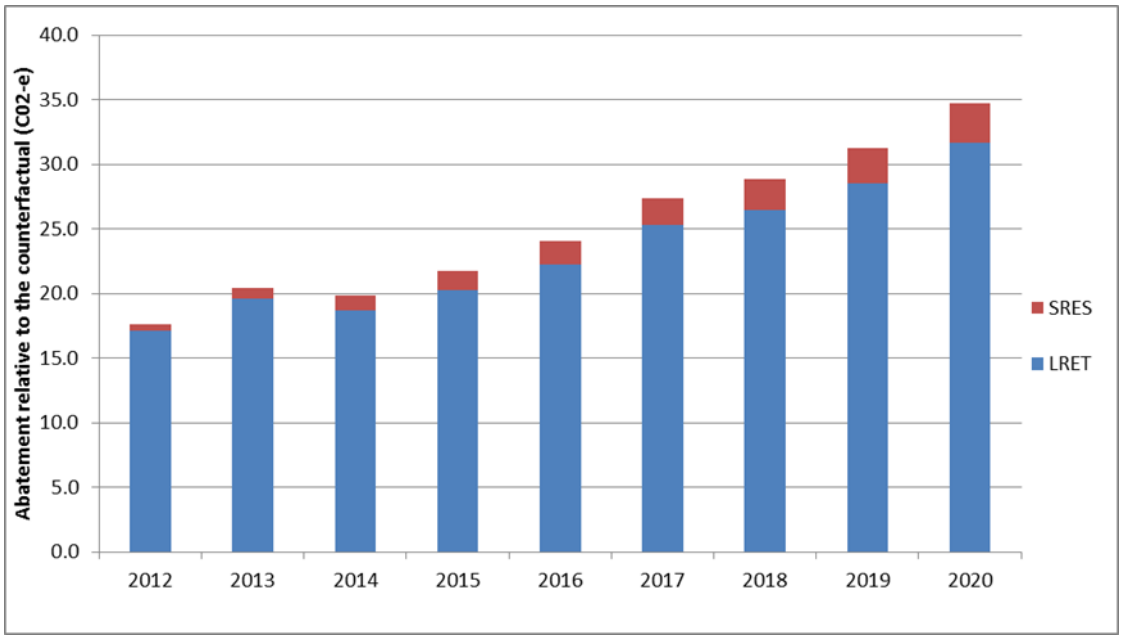
In projecting the level of likely emissions under our modelled scenarios, emissions have been reported in terms of fugitive and combustion emissions from the electricity generation sector in relation to the LRET.[5] It should also be noted that the cost of abatement has been recorded in terms of the annual cost of abatement each year, rather than in cumulative terms.

Emissions abatement has also been determined in relation to the counterfactual case, which has held current and committed levels of renewable generation as at late June 2011 as constant over the outlook period to 2030/31. As a result, the emissions

[5] Fugitive emissions comprise of greenhouse gas emissions from the extraction and distribution of coal, oil and natural gas associated with the electricity generation sector.

abatement levels and costs of abatement that we have reported do not include the cumulative abatement that may have been achieved prior to late June 2011, for example, under the expanded RET and Mandatory Renewable Energy Scheme. For these reasons, our emissions projections may differ from other projections that may have been made in other modelling reports.

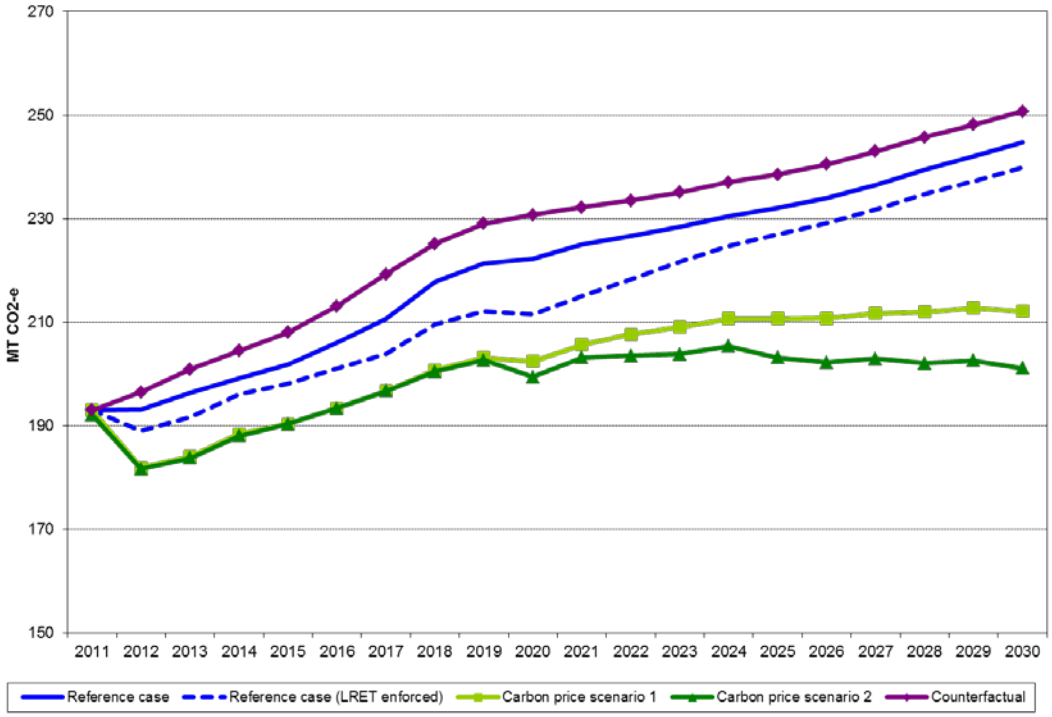
Figure 3.14 Projected total emissions abatement under the enhanced RET under a carbon emissions price compared to the counterfactual



Impact of the LRET on emissions level under a carbon emissions price

In the NEM carbon emissions from the electricity generation sector are expected to rise over the outlook period under a carbon emissions price. Under both carbon emissions price scenarios, emissions are expected to be around 4% higher by 2020/21 compared to 2011/12 levels. Between 2020/21 and 2030/31 more significant differences in emissions levels are projected between the two modelled carbon emissions price scenarios. Under the first scenario, emissions are projected to be around 10% higher by 2030/31 compared to 2011/12 levels, however under the second scenario, which has a higher carbon emissions price trajectory, emissions are projected to be around 5% higher than 2011/12 levels by 2030/31.

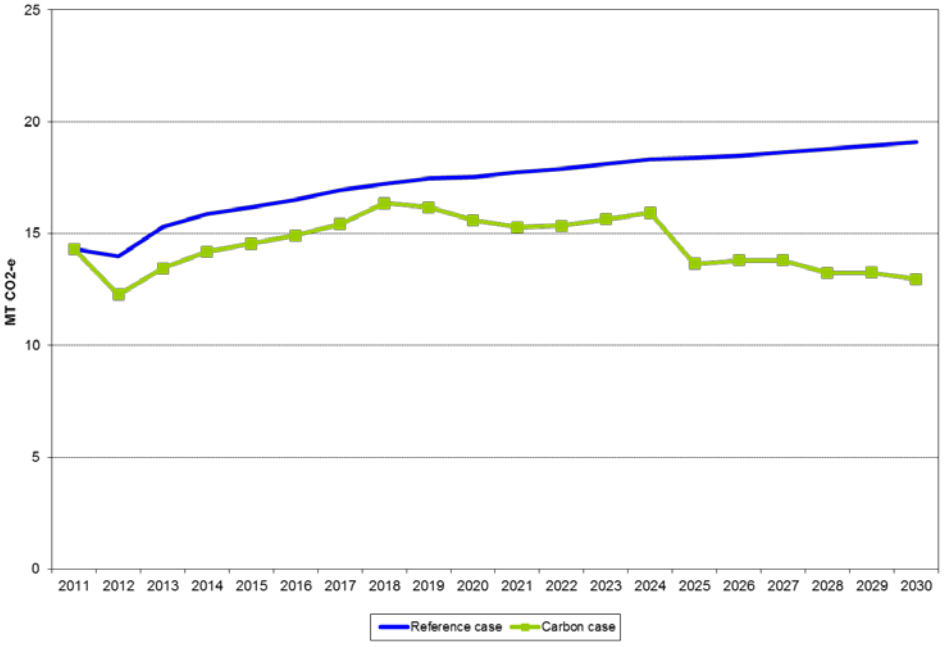
Figure 3.15 Projected emissions from electricity generation in the NEM



Note: Data represents financial years (e.g. 2011 is 2011/12)

In the SWIS, only the first carbon emissions scenario was modelled. Under this scenario, carbon emissions in the electricity generation sector are projected to increase till around 2018/19 where they will be around 14% higher than 2011/12 levels. However, for the remainder of the outlook period until 2030/31, emissions levels are projected to fall steadily. By 2030/31, emissions are projected to be around 9% lower compared to 2011/12 levels.

Figure 3.16 Projected emissions from electricity generation in the WEM

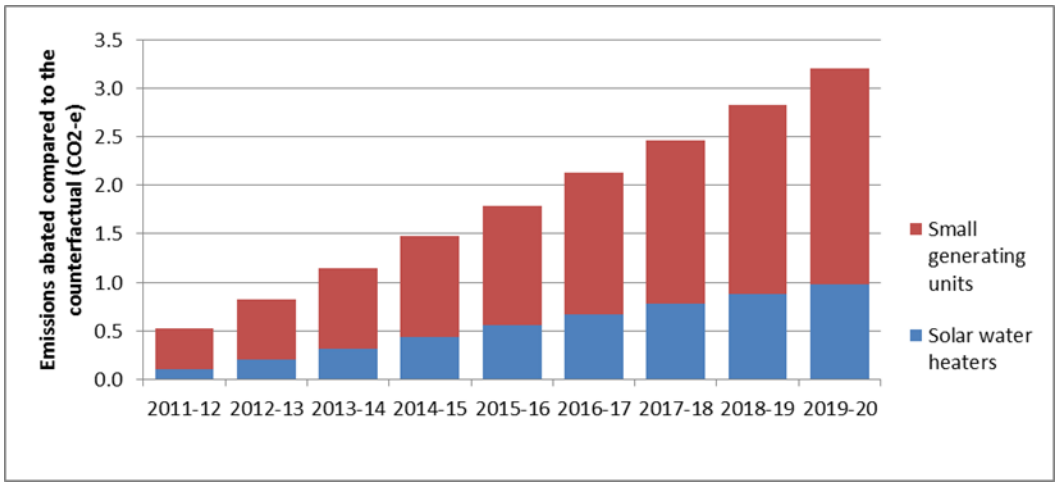


Note: Data represents financial years (e.g. 2011 is 2011/12)

Impact of the SRES on emissions levels under a carbon emissions price

In regards to the SRES, around 16.4 Mt CO2-e are expected to be abated over 2011/12 to 2019/20 compared to if the SRES was not in place. The level of carbon emissions abated is projected to increase from 0.5 Mt C02-e in 2011/12 to 3.2 Mt C02-e in 2019/20. Small generating units are projected to comprise around 70% of total emissions abated under the SRES. The projected level of emissions abated is around 23% higher than if the carbon emissions price was not in place.

Figure 3.17 Projected level of abatement under the SRES under a carbon emissions price

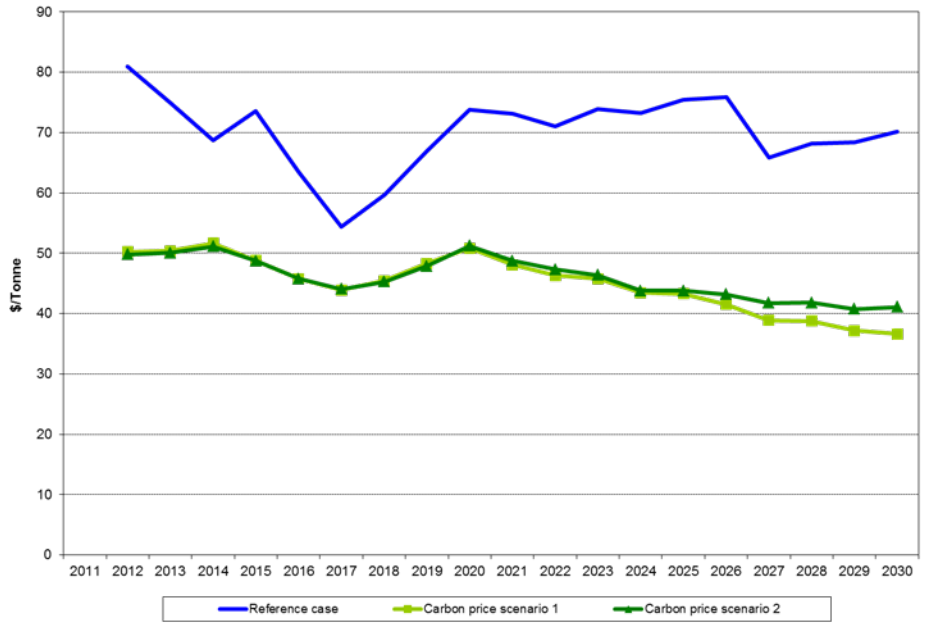


3.1.8 Cost of abatement under a carbon emissions price

The cost of abatement for the LRET is calculated in this report as the additional annualised operating and capital costs relative to the counterfactual, divided by the change in emissions.

Costs of abatement for the LRET under both carbon emissions cases ranges from around $50/tonne CO2-e to around $40/tonne CO2-e by 2030/31 under the LRET. This is significantly lower than the cost of abatement under the reference case, where there is no price of carbon in place. Under the carbon emissions scenario, higher levels of emissions are abated and demand is also lower which contributes to a lower cost of abatement than under the reference case. At the same time, under a carbon emissions price more expensive plant is used to generate electricity, but the impact of these higher costs are more than offset by the higher level of emissions abatement and lower demand.

Figure 3.18 Projected cost of abatement under the LRET

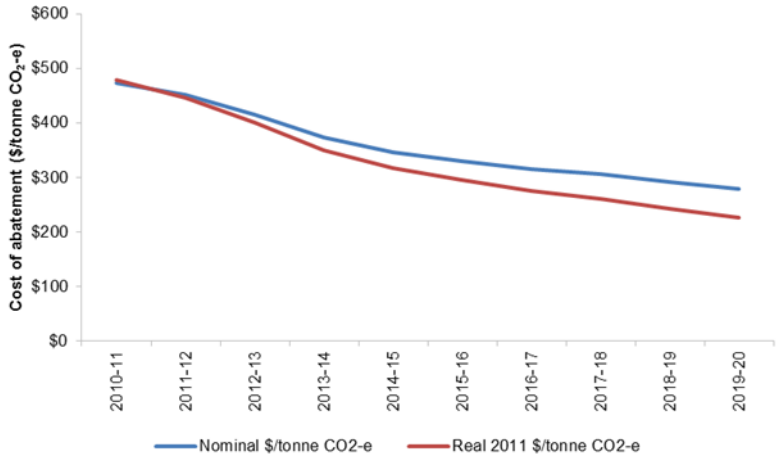


Note: Data represents financial years (e.g. 2011 is 2011/12)

Under the SRES, the cost of abatement is calculated in relation to the costs of abatement from solar PV installations, as this forms the main form of renewable generation which is installed under the SRES. Over the outlook period, the cost of abatement of solar PV installations is expected to fall from $447/t CO2-e in 2011/12 to $227/t CO2-e in 2019/20 in $2010/11. This cost of abatement is slightly lower than the projected cost of abatement under the reference case, which ranged from $480/t CO2-e in 2011/12 to $286/t C02-e in 2019/20 in $2010/11.

The cost of abatement is expected to be lower under a carbon emissions price as more solar PVs are installed, which acts to increase the total value of wholesale electricity which is displaced. Wholesale electricity prices are also higher under the carbon emissions price, which serves to further increase the value of displaced electricity. A higher number of lower cost solar PV installations are also expected under a carbon emissions price compared to the reference case, as more installations are installed over the outlook period. In comparison, under the reference case it is projected that the majority of installations will occur earlier in the outlook period and that more expensive models will be installed as a result of the Solar Credits Multiplier and jurisdictional feed in tariffs.

Figure 3.19 Projected cost of abatement under the SRES under a carbon emissions price

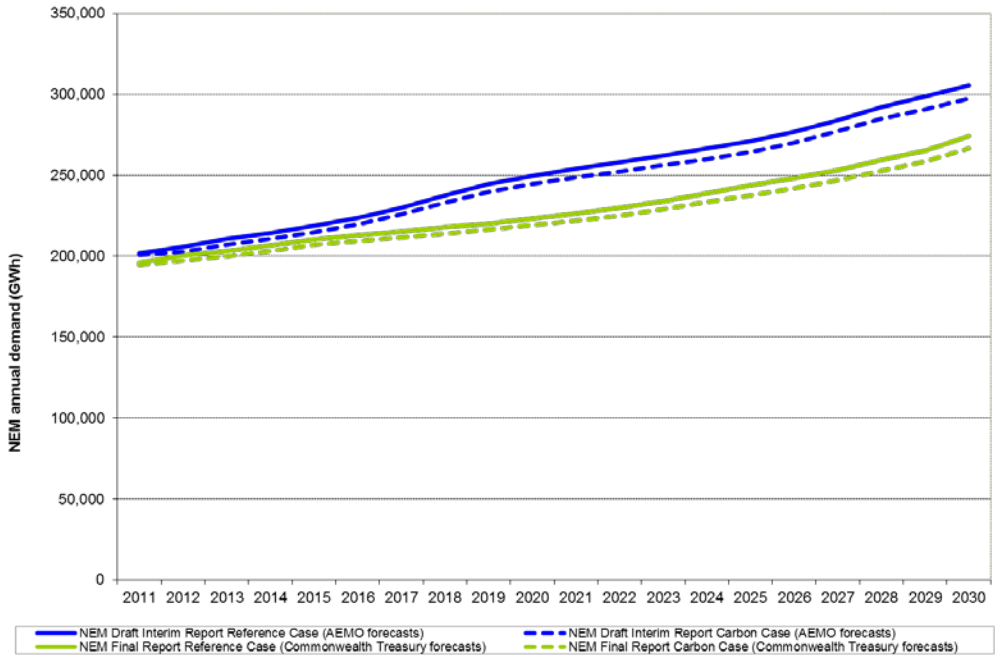


4 Treasury demand scenario modelling results

This Chapter outlines the results of an additional sensitivity we have modelled for the NEM, which includes demand forecasts provided by the Commonwealth Treasury. These demand forecasts were used by Commonwealth Treasury to model the impacts of the Clean Energy Future' package. Commonwealth Treasury's demand forecasts are slightly lower than the AEMO demand forecasts used in the Draft Interim Report modelling. Differences between Commonwealth Treasury's and AEMO's demand forecasts are outlined below.

The reference case and the initial carbon emissions price scenario have been re-modelled using Commonwealth Treasury's demand forecasts. All other assumptions remain the same as those initially included in modelling for the reference and carbon emissions price scenarios in the Draft Interim Report. Modelling for the SWIS and the Northern Territory has not been included in this sensitivity. Additional modelling to assess SRES and transmission and security of supply impacts has also not been undertaken under this sensitivity.

Figure 4.1 Differences between NEM annual demand forecasts - Commonwealth Treasury vr. AEMO



Note: Data represents financial years (e.g. 2011 is 2011/12)

4.1 Achievement of the LRET

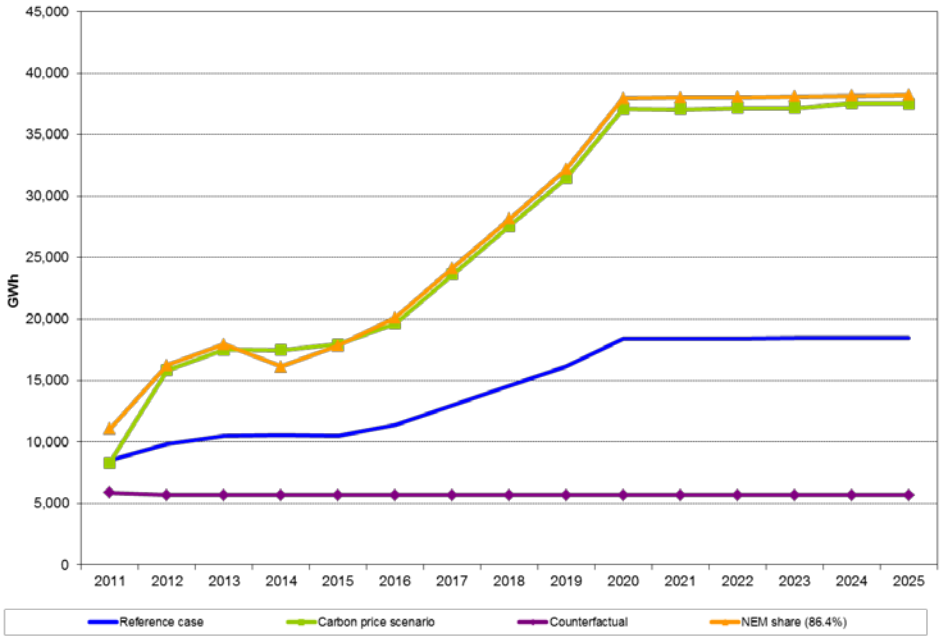
Under the reference case, the level of renewable generation falls significantly below the LRET in the NEM over the outlook period. From 2020/21, the level of renewable generation in the NEM is forecast to remain around 18,400 GWh, which is around 50% below the LRET's 38,000 GWh target for the NEM by 2020. In contrast, under the Draft

Interim Report reference case, the shortfall in the LRET was forecast to be around 35% by 2020.

The lower level of renewable generation occurs as the lower level of demand results in a lower level of dispatch. This in turns results in slightly lower wholesale electricity prices. This reduces the profitability of renewable generators, who are required to rely on revenue from the sale of LGCs to a greater degree to remain profitable. As a result, the penalty price on LGCs is reached earlier in the outlook period compared to the previous reference case.

Under the carbon emissions case, the NEM's share of the LRET is just met by 2020/21. This result is similar to the previous carbon emissions price scenarios that were modelled. This occurs as higher wholesale prices under the carbon emissions price are able to improve the profitability of a sufficient number of renewable generators to meet the LRET.

Figure 4.2 Forecast renewable generation in the NEM by scenario



Note: Data represents financial years (e.g. 2011 is 2011/12)

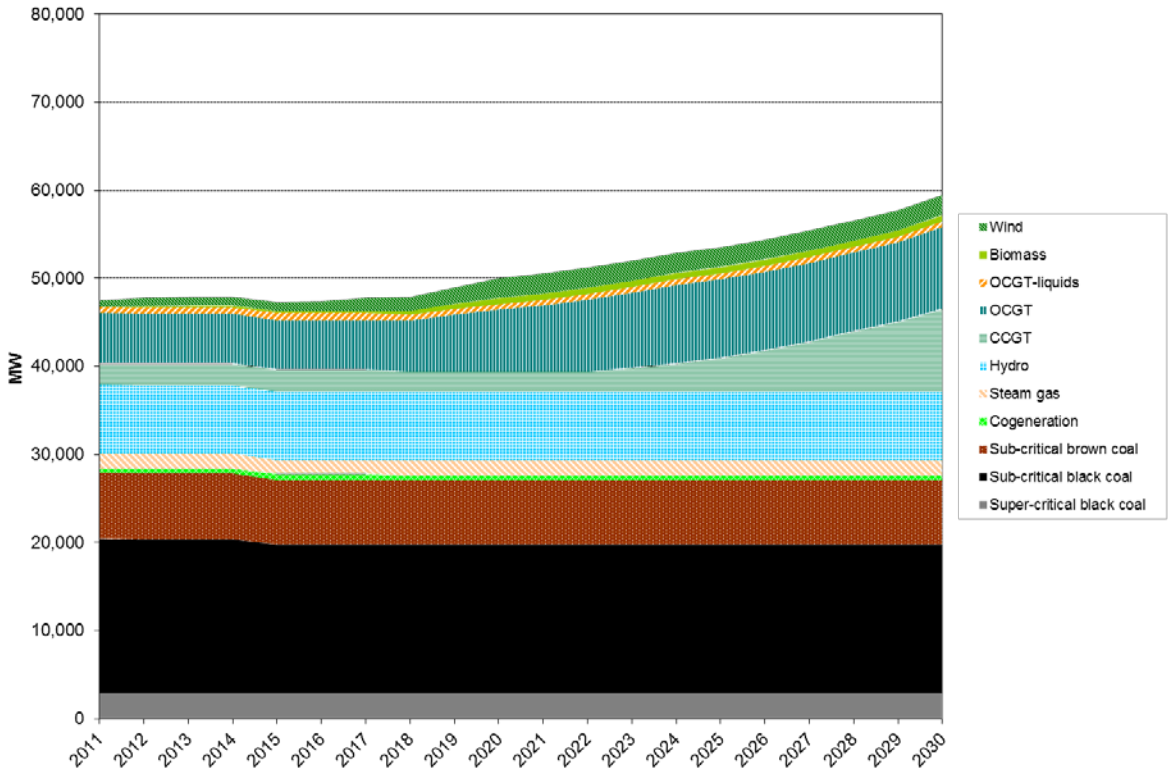
4.2 Profile of generation investment

Under the reference case, the level of wind and biomass generation is lower compared to the Draft Interim Report reference case due to a lower level of demand and lower wholesale prices. By 2020/21, the level of wind capacity is forecast to reach 2,243 MW and the level of biomass 688 MW. In contrast, under the previous reference case by 2020/21, the level wind generation was 1,530 MW higher and the level of biomass was around 200 MW higher.

The lower level of demand has also resulted in lower levels of gas plant, while the level of coal plant has remain unchanged under the no new coal plant constraint. Under the reference case, by 2020/21 there is forecast to be 2,305 MW of CCGT and 6, 976 MW of OCGT. This is around 1,000 MW less CCGT and 5,226 MW less OCGT than was forecast

in the previous reference case. The significant reduction in OCGT capacity reflects the lower level of wind generation which is forecast which has reduced the need for peaking plant to manage intermittent generation. It also reflects the lower levels of demand under this sensitivity. Overall, when compared to the previous reference case, the level of total generation capacity is around 14% lower by 2020/21.

Figure 4.3 Forecast installed capacity in the NEM - Reference case



Note: Data represents financial years (e.g. 2011 is 2011/12)

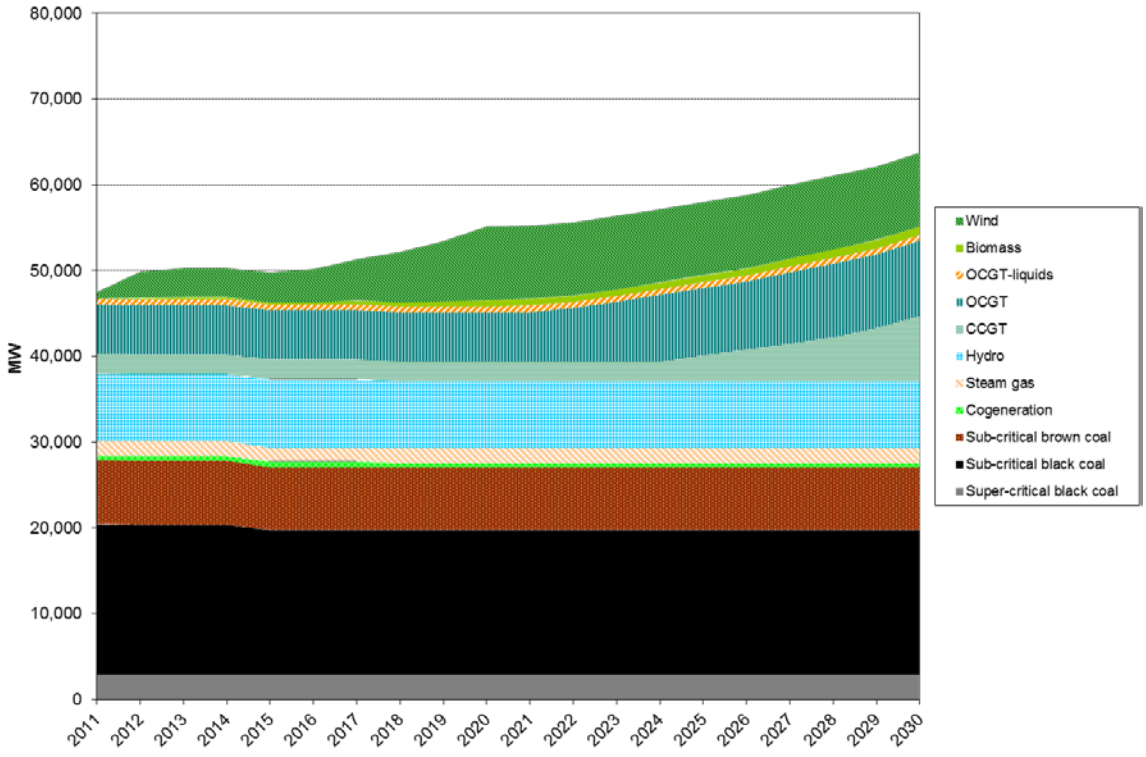
Under the carbon emissions price scenario by 2020/21, 8,555 MW of wind and 700 MW of biomass is forecast. The overall level of renewable generation forecast is similar to the previous carbon emissions price scenarios, which are discussed in detail in Chapter 3. However, slightly more wind capacity (500 MW) and slightly less biomass (200 MW) is forecast under the Treasury demand carbon emissions price scenario.

In regards to the level of gas capacity, around 2,300 MW of CCGT and 5,800 MW of OCGT is forecast. The level of OCGT is lower than the level forecast under the reference case as a result of the higher level of wind generation that is forecast under the carbon emissions price. In comparison to the previous carbon emissions price scenario, there is almost half the level of OCGT but similar levels of CCGT under the Treasury demand carbon emissions price scenario. This reduction in OCGT reflects the lower level of demand which has been assumed.

Similarly to the Draft Interim Report carbon emissions results, no additional coal plant was forecast to retire over the outlook period, beyond coal plant announced to retire in AEMO's 2010 Electricity Statement of Opportunities. However, the Commonwealth Government's recently announced measure to support the closure of around 2,000 MW

of highly emissions intensive generation capacity by 2020 has not been included in the modelling for this sensitivity.

Figure 4.4 Forecast capacity in the NEM - Carbon emissions price scenario

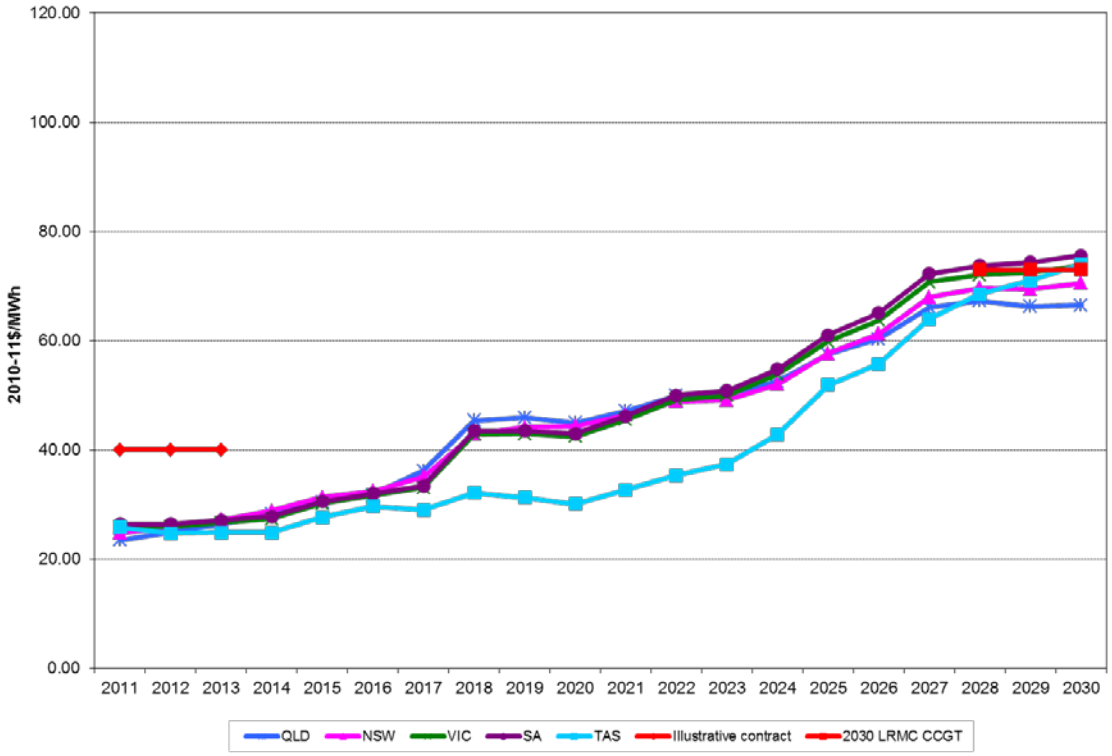


4.3 Wholesale electricity price impacts

Wholesale electricity prices in the NEM under the reference case are around $40/MWh in $2010/11 by 2020/21. This is around $10/MWh lower than wholesale prices under the previous reference case.

As in the Draft Interim Report reference case, wholesale prices are depressed by an increased volume of renewable generation capacity which is able to bid in a manner to ensure dispatch as they have an additional source of revenue from the sale of LGCs. As discussed above, lower wholesale prices means that renewable generators become more reliant on LGC revenue to ensure their profitability, which leads to an increase in the LGC price. As a result, the LGC price reaches the penalty price cap earlier in the outlook period than in the Draft Interim Report reference case. Wholesale prices are also slightly lower as a result of the lower level of demand, which reduces the need for additional capacity.

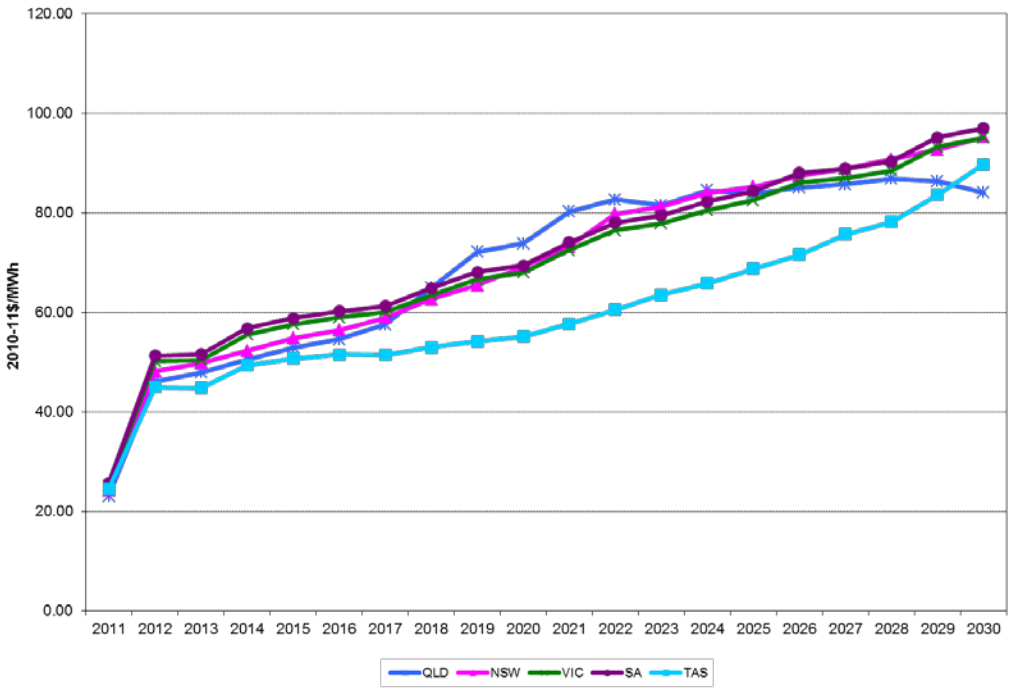
Figure 4.5 Forecast wholesale prices in the NEM - Reference case



Note: Data represents financial years (e.g. 2011 is 2011/12)

Under the carbon emissions price scenario, wholesale electricity prices are around $70/MWh by 2020/21 in $2010/11. Similarly to the reference case discussed above, this is around $10/MWh lower than the wholesale prices forecast in the previous carbon emissions price scenarios. Wholesale prices increase steeply from 2020/21 to 2030/31 as incentives for renewable generation fall away and increased gas plant is installed to meet demand.

Figure 4.6 Forecast wholesale prices in the NEM - Carbon emissions price case



Note: Data represents financial years (e.g. 2011 is 2011/12)

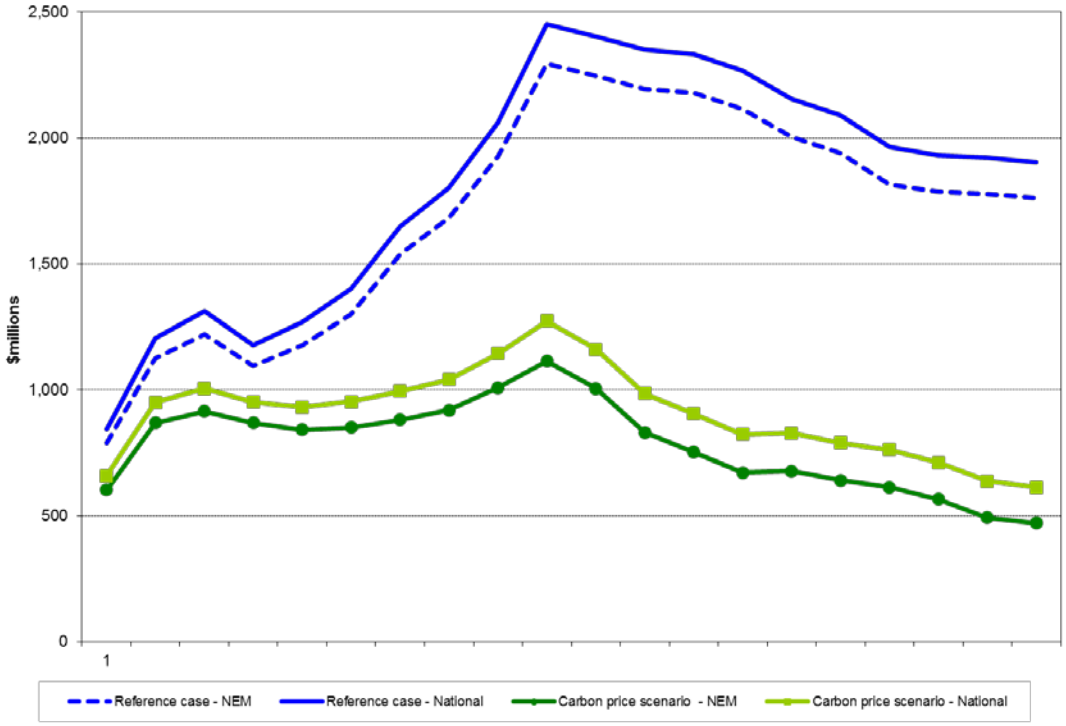
4.4 Forecast impact on LRET compliance costs

Compliance costs under the reference case are higher than the previous reference case, as the price of LGCs reaches the penalty price earlier in the outlook period. Under the reference case, the national cost of compliance increases steeply to peak at $2.45 billon in 2020/21 in $2010/11, which reflects the annual increase in the LRET requirements up to 2020. Between 2020/21 and 2030/31, the cost of compliance falls over time to $1.76 billon in 2030/31.

In contrast under the previous reference case, the cost of compliance was around $200 million lower by 2020/21 at $2.24 billon in $2010/11. This reflects the higher wholesale prices under this case and the lower required LGC prices. The costs of compliance remained around 10% (that is, $200 million) lower than the Treasury demand reference case over the remainder of the outlook period to 2030/31.

Under the carbon emissions price scenario, compliance costs are significantly lower than the reference case and peak at $1.27 billon in 2020/21 in $2010/11. This reflects the lower LGC prices required to maintain the profitability of renewable generators as wholesale prices are higher. Compliance costs under the previous carbon emissions price scenario are largely similar to the costs modelled under the Treasury demand sensitivity.

Figure 4.7 Forecast LRET compliance costs



Note: Data represents financial years (e.g. 2011 is 2011/12)

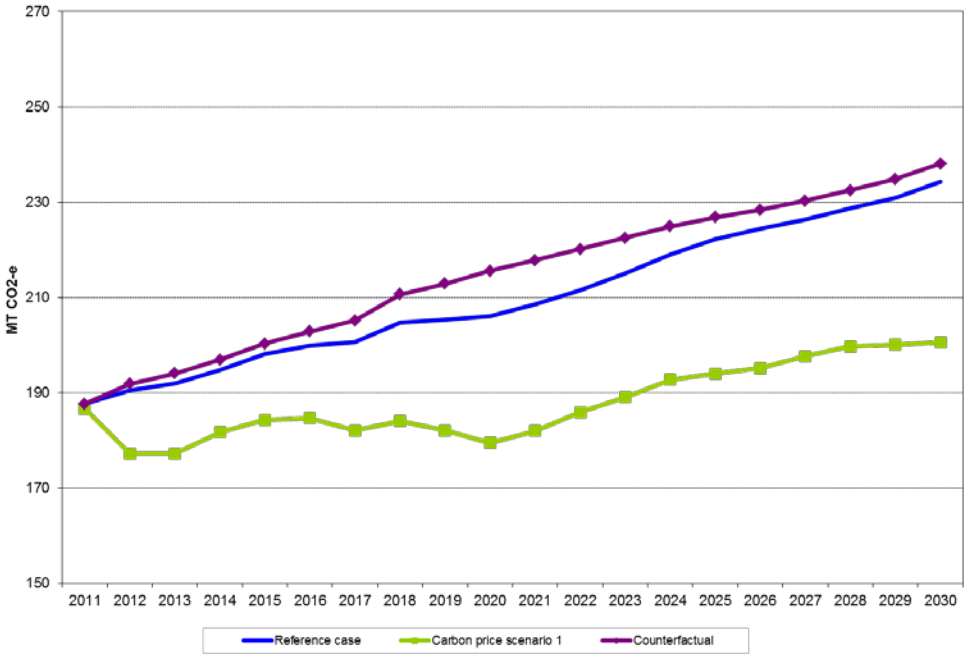
4.5 Forecast impact on emissions levels

As discussed in section 3.1.7, emissions have been reported in terms of fugitive and combustion emissions from the electricity generation sector in relation to the LRET. Cost of abatement has been recorded in terms of the annual cost of abatement each year, rather than in cumulative terms. Emissions abatement has been determined in relation to the counterfactual case, which does not take into account the cumulative abatement that may have been achieved prior to late June 2011, for example, under the expanded RET and Mandatory Renewable Energy Scheme.

Carbon emissions levels in the electricity generation sector rise steadily under the reference case and rise to a lesser extent under the carbon emissions price scenario over the outlook period. Under the reference case carbon emissions are around 10% higher by 2020/21 and 25% higher by 2030/31 compared to 2011/12 levels . However, emissions levels are around 7% lower than the emissions under the Draft Interim Report reference case, which reflects the lower level of demand.

Under the carbon emissions price scenario, by 2020/21 emissions are around 4% lower than 2011/12 levels. Between 2020/21 and 2030/31, emissions increase slowly and are around 8% higher than 2011/12 levels by 2030/31. The low level of emissions growth under the carbon emissions price scenario reflects the increased level of renewable generation, relative to the reference case. In comparison to the previous carbon emissions price scenario, emissions are around 11% lower as a result of the lower level of demand.

Figure 4.8 Forecast emissions from electricity generation in the NEM



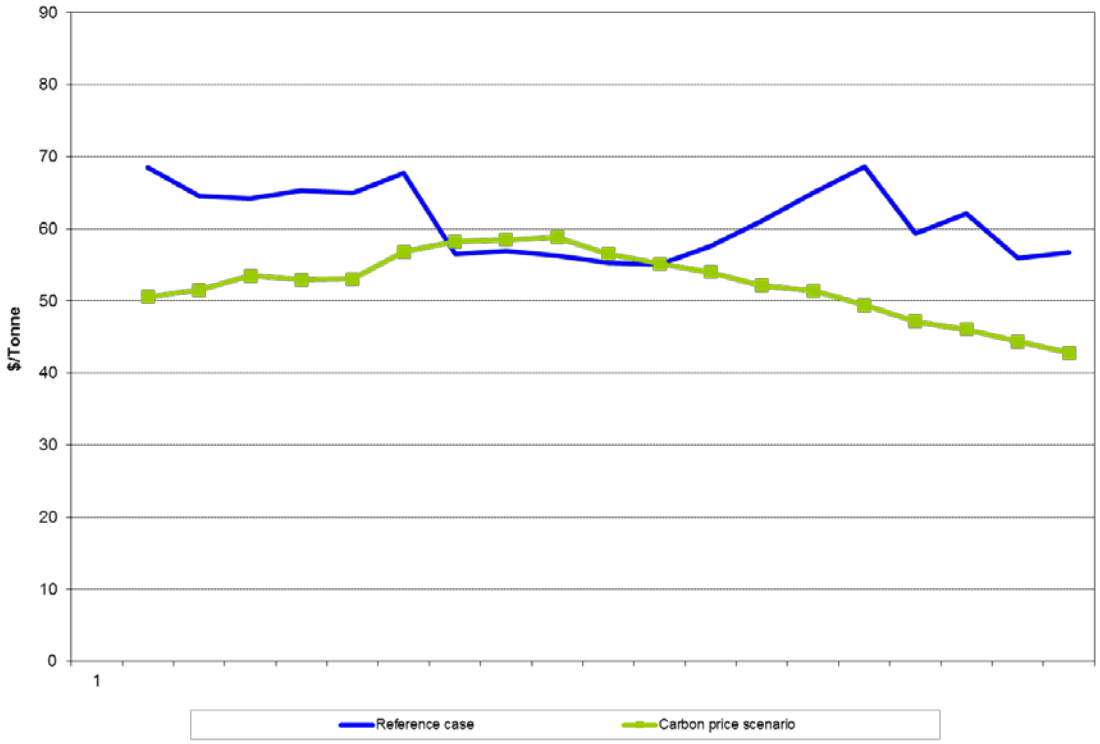
Note: Data represents financial years (e.g. 2011 is 2011/12)

4.6 Cost of abatement

Under the reference case the cost of abatement ranges from around $55/t CO2-e to around $70/t CO2-e in $2010/11 over 2012/13 to 2030/31. This is slightly lower than the previous reference case, which reflects the increased emissions reductions that are achieved under the Treasury demand reference case.

Under the carbon emissions scenario the cost of abatement is lower than the reference case for most of the outlook period. The cost of abatement ranges from around $43/t CO2-e to around $60/t CO2-e in $2010/11. This cost of abatement is similar to the cost under the previous carbon emissions price scenarios, however in some years the Treasury demand cost of abatement is slightly higher.

Figure 4.9 Forecast cost of abatement



Note: Data represents financial years (e.g. 2011 is 2011/12)

4.7 Conclusions

This Chapter shows that lower demand forecasts can have a material impact on the analysis of the impact of the LRET. This is particularly important given the emerging evidence that historical trends in demand growth may not continue in coming years. Lower demand will depress wholesale prices, and therefore increase the LGC price required to ensure the profitability of new renewable generation. This in turn will have implications for the future level of renewable generation and the achievement of the LRET.

5 Western Australian coal modelling and renewable generation analysis

This Chapter outlines the results of additional analysis we have undertaken in relation to the impact of the LRET in Western Australia. It includes the results of a modelling sensitivity where the constraint on new coal plant has been relaxed for the reference case and the carbon emissions price scenario. We have also undertaken some additional qualitative analysis on the impact of additional renewable generation in Western Australia.

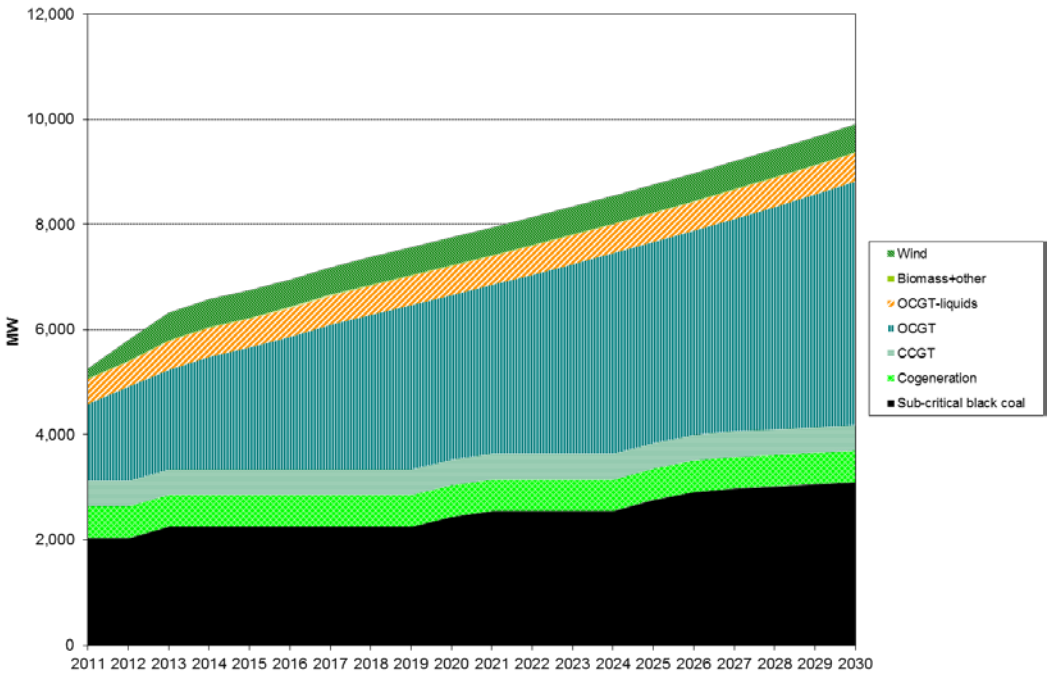
5.1 Relaxation of no new coal modelling results

In the Draft Interim Report, all of the scenarios we modelled included a constraint on the building of new coal plant to take into account the uncertainty around the pricing of carbon emissions. The Western Australian Government has suggested that this constraint should be relaxed in Western Australia, as new coal plant may be required in this state to meet growing demand, particularly in light of the relatively high domestic gas prices in Western Australia. Outlined below are the results of this modelling sensitivity in relation to the impacts on the profile of generation investment, wholesale electricity prices, achievement of the LRET in Western Australia, and emissions levels.

5.1.1 Profile of generation investment in the SWIS

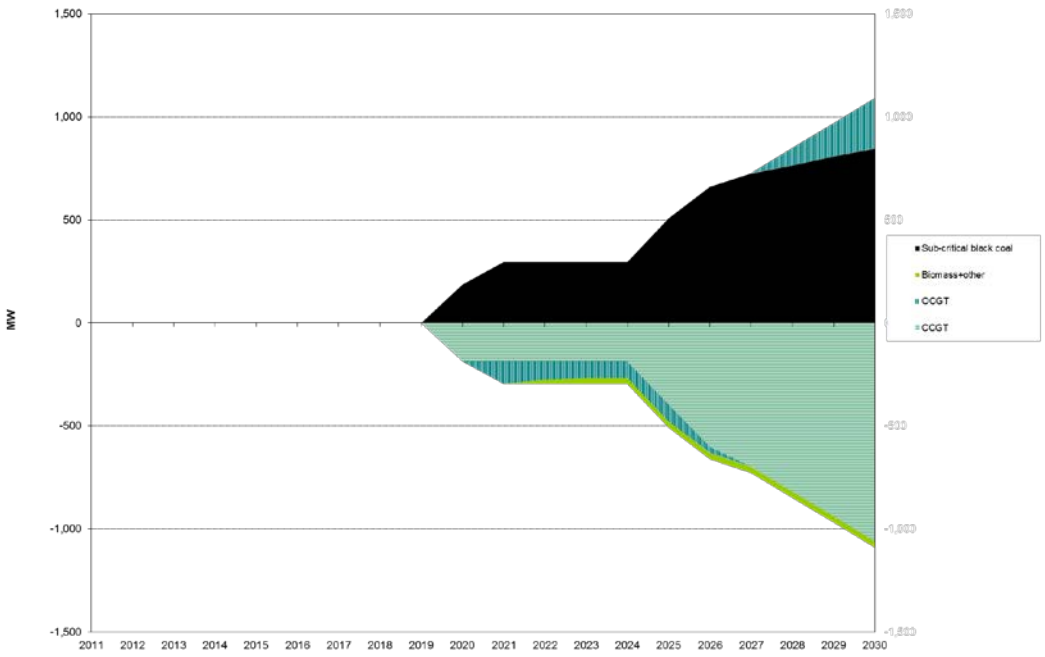
Where the restriction on the building of new coal plant is removed, around 900 MW of new coal plant is forecast to enter the SWIS to meet demand and the reserve margin out to 2030/31 under the reference case. New coal plant is forecast to enter between 2020 and 2025. This coal plant is built in place of CCGT, OCGT and biomass generation that would have been constructed if the building of coal plant had been constrained.

Figure 5.1 Forecast installed capacity in the SWIS- Reference case



Note: Data represents financial years (e.g. 2011 is 2011/12)

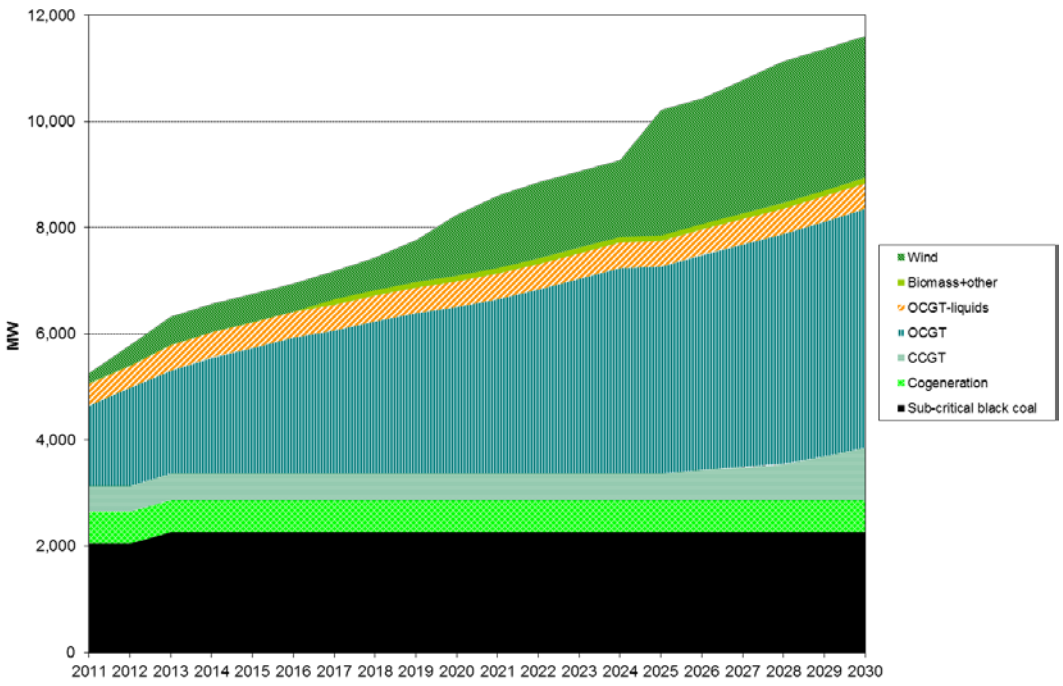
Figure 5.2 Difference in forecast installed capacity in the SWIS- Reference case



Note: Data represents financial years (e.g. 2011 is 2011/12)

Under the carbon emissions price scenario, the levels of renewable generation and gas plant are similar compared to the Draft Interim Report carbon emissions price scenario. By 2020/21, the level of coal plant is around 20 MW higher compared to the previous carbon emissions price scenario, and around 40 MW of additional OCGT plant is also installed.

Figure 5.3 Forecast installed capacity in the SWIS - Carbon emissions scenario



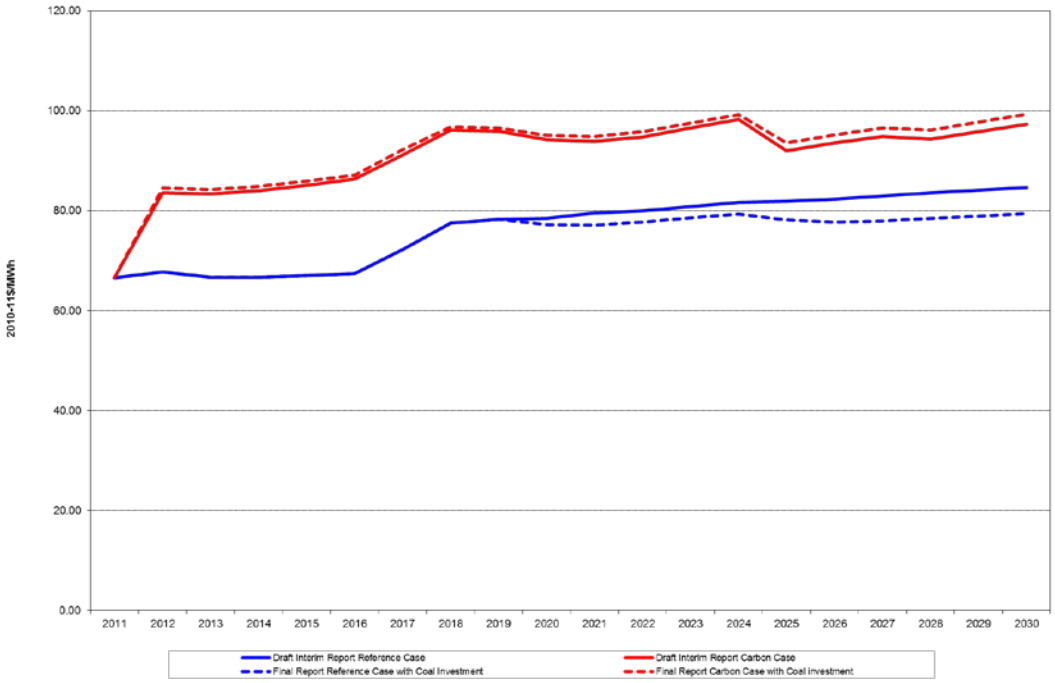
Note: Data represents financial years (e.g. 2011 is 2011/12)

5.1.2 Projected wholesale electricity prices

Wholesale electricity prices in the SWIS are slightly lower compared to the Draft Interim Report reference case, where the constraint on new coal plant is removed. This reflects the lower overall cost of coal plant when compared to the costs of new gas plant that would have been installed to meet increases in demand growth.

Under the reference case wholesale electricity prices are projected to be $77/MWh in 2020/21, and are projected to rise to $79/ MWh by 2030/31 in $2010/11. In comparison, wholesale prices under the Draft Interim Report reference case were projected to be $79/MWh by 2020/21 and $85/MWh by 2030/31 in $2010/11.

Figure 5.4 Projected wholesale electricity prices in the SWIS



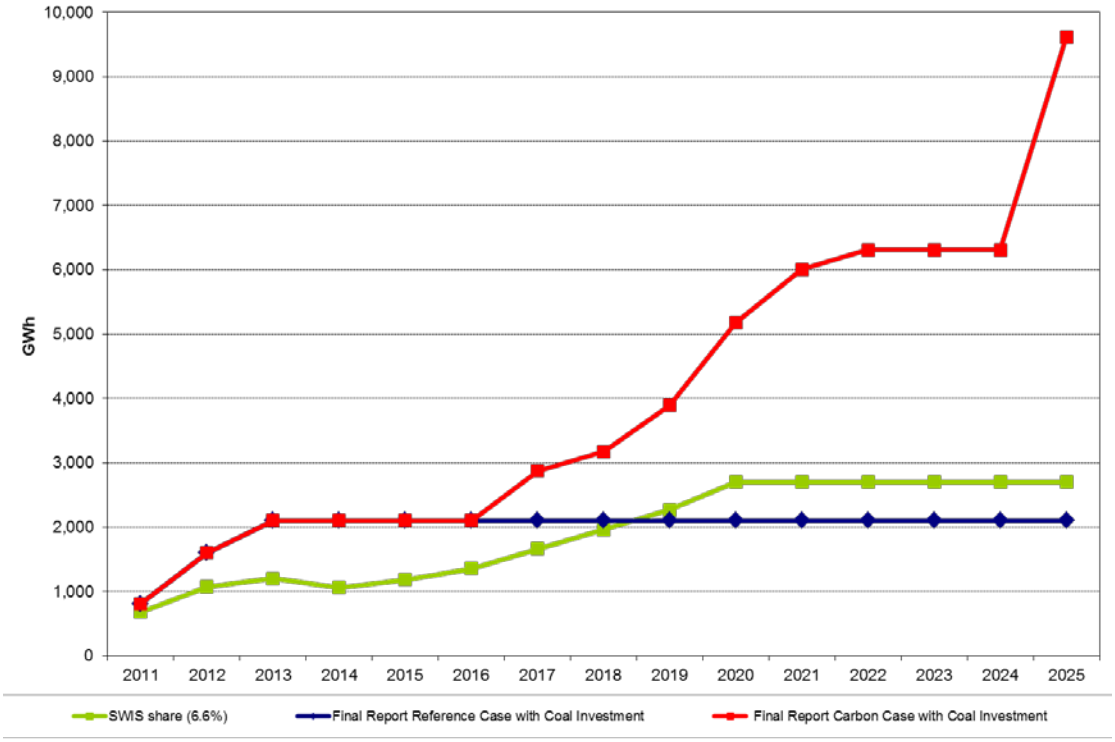
Note: Data represents financial years (e.g. 2011 is 2011/12)

Under the carbon emissions price scenario, wholesale prices are projected to be almost identical to projected prices under the Draft Interim Report carbon emissions case. Under the Final Report carbon emissions price scenario, wholesale prices are projected to reach $95/MWh by 2020/21 and $99/MWh by 2030/31 in $2010/11, which is around $2/MWh higher than the Draft Interim Report results.

5.1.3 Achievement of the LRET in Western Australia

As discussed above, additional coal generation results in less renewable generation being installed over the outlook period. This creates a 22% shortfall associated with the achievement of the LRET under the reference case by 2020/21, where a 6.6% SWIS share of the LRET is assumed. In addition, lower wholesale electricity prices from the additional coal generation, serves to increase the cost of LGCs. As a result, paying the penalty price becomes a more cost effective alternative to meet LRET liabilities than installing new renewable generation.

Figure 5.5 Projected level of renewable generation in the SWIS



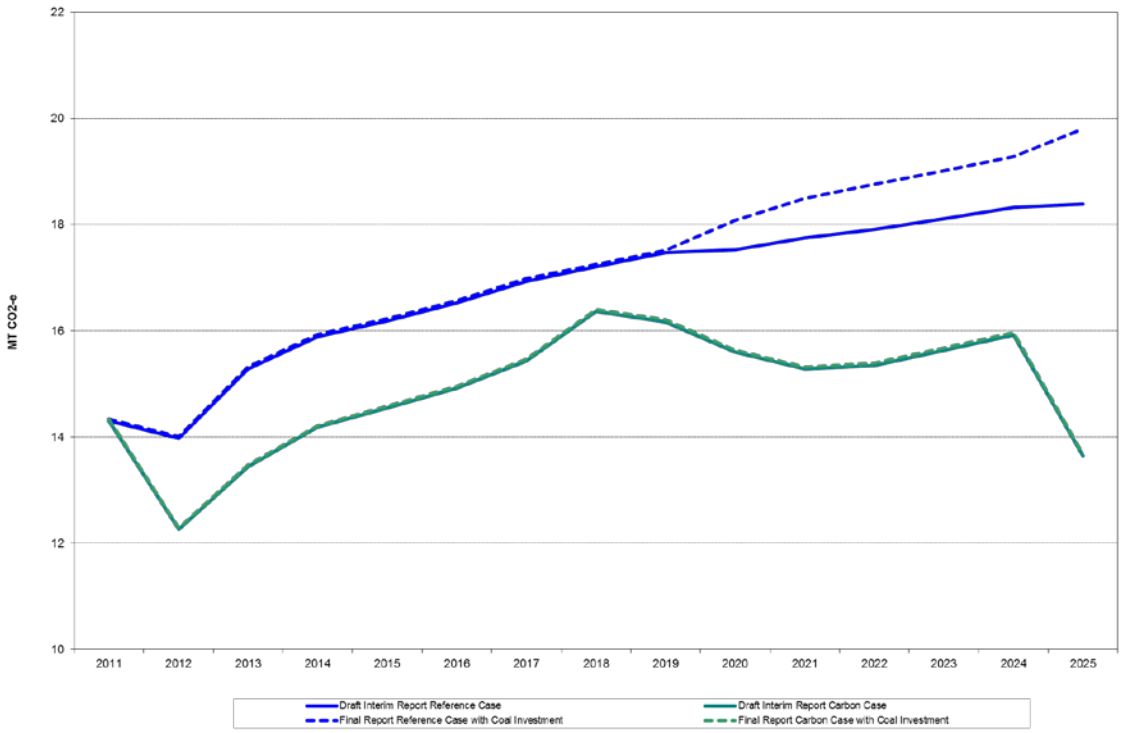
Note: Data represents financial years (e.g. 2011 is 2011/12)

Under the carbon emissions price scenario, the level of renewable generation is significantly above the SWIS pro-rata share of the LRET by 2020/21 and increases further out to 2030/31. This result is consistent with the Draft Interim Report carbon emissions price scenario.

5.1.4 Projected impact on emissions levels

The additional coal plant which is installed under this sensitivity and the lower level of renewable generation which is projected serves to increase the level of emissions from the electricity generation sector in the SWIS, compared to the reference case modelled for the Draft Interim Report. Over the outlook period for the reference case, emissions levels are around 10% higher by 2025 compared to the Draft Interim Report reference case. Emissions under the carbon emissions case are almost identical compared to the Draft Interim Report carbon emissions case, due to the limited change in generation capacity that is projected.

Figure 5.6 Projected emissions from electricity generation in the SWIS



Note: Data represents financial years (e.g. 2011 is 2011/12)

5.2 Impact of increased renewable generation in the SWIS

This section includes qualitative analysis on the impact of increased renewable generation in the SWIS, if the assumption that the LRET is pro-rated between the NEM, Western Australia, and the Northern Territory is removed. Removing this assumption would allow LGCs to be traded between these three electricity systems, which are not currently physically connected.

In the Draft Interim Report, under the reference case it was found that committed levels of renewable generation investment in the SWIS (as at late June 2011) would be sufficient to meet the assumed pro-rated share of the LRET. We assumed that Western Australia's LRET liabilities would be 12% of the national total as it comprises around 12% of total national demand. It was then assumed that the SWIS would comprise 6.6% of this 12% share and that the rest of Western Australia would comprise the remaining 5.4% share.

There is the potential that the SWIS share of the LRET may comprise a higher proportion of Western Australia's liabilities, because of the high level of consumption of off-grid mining towns outside the SWIS which are excluded from the LRET. If the SWIS share of the LRET was larger than we have assumed, this would have implications for whether the SWIS share of the LRET would be achieved under the reference case.

We did not investigate the possibility of additional renewable generation investment in the SWIS under the reference case beyond committed levels (as at June 2011), as there is a degree of uncertainty in relation to the cost and technical ability of the SWIS to accommodate additional intermittent generation. We consider that additional costs associated with network connections and ancillary services to accommodate the

increased level of intermittent generation would need to be taken into account, in addition to the suppressing impact on balancing market prices that would occur with any large increase in renewable generation. This has the potential to significantly reduce the commercial return and profitability of wind investments. For these reasons, it is unclear whether additional renewable generation investment in the SWIS would make a significant difference to the overall national shortfall in the LRET that has been projected under the reference case.

Under the Draft Interim Report carbon emissions price scenario, a significant level of additional renewable generation investment was projected for the SWIS beyond the assumed 6.6% SWIS share of the LRET. While we have undertaken separate analysis of the potential security of supply costs associated with this level of renewable generation, these additional costs were not included into our projections of the level of renewable generation investment.

As discussed above in Chapter 3, there is also a considerable level of uncertainty around the projected security of supply costs of additional renewable generation investment as large increases in security of supply costs have the potential to alter historical bidding patterns. Changes in bidding patterns may result in lower security supply costs than have been projected. As a result, further detailed study of the likely impact of network and security supply costs would be required to assess whether it would still be economic to install new additional renewable generation to meet LRET liabilities under a carbon emissions price.

Abbreviations

ACT	Australian Capital Territory
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CCGT	closed cycle gas plant
DCCEE	Commonwealth Department of Climate Change and Energy Efficiency
FCAS	Frequency control ancillary services
LGCs	Large Scale Generation Certificates
LNG	liquified natural gas
MCE	Ministerial Council on Energy
NEM	National Electricity Market
NSCAS	Network support and control ancillary services
OCGT	open cycle gas plant
ORER	Office of the Renewable Energy Regulator
RET	Renewable Energy Target
SRES	Small Scale Renewable Energy Scheme
SWIS	South West Interconnected System