Assessment of the impact of policies for renewable energy development in Victoria

Final report

29 October 2010

Table of contents

Index of Tables

Executive summary

The document is a report to the Clean Energy Council comparing existing and proposed renewable energy policies in Victoria and their potential impact on renewable energy development. The focus is on policy outcomes in terms of energy generation; investment and job creation.

It is generally not possible to separately attribute renewable investment, jobs or renewable electricity generation to either the Renewable Energy Target (as amended), state or federal capital subsidies or feed-in tariffs. The approach that we have therefore taken is to consider all relevant known support mechanisms in our calculation of future production, investment and job creation.

A summary of the main expected outcomes under the existing policies is as follows:

- In total around 3,000 MW of additional renewable capacity may be expected in Victoria by 2016;
- Total capital expenditure may exceed $9bn;
- Additional renewable generation in 2016 from renewable plant constructed between 2010 and 2016 will be around 6,000 GWh,
- Around 650 new jobs each year through to 2016 will be created in the construction and operation of renewable electricity production.

The CEC also sought projections that illustrate the effect of the policy of the Victorian Opposition policy on wind farms. A survey of relevant CEC members found that between and 50% and 70% of currently proposed wind farms in Victoria would not be developed if this policy was pursued. As a result of this policy difference:

- Additional capacity in wind generation can be expected to be 930 MW to 1,300 MW lower than the amounts under the current policies by 2016;
- Electricity production from wind in 2016 would drop by 2,000 GWh to 2,800 GWh from what it would otherwise be if the policy was implemented;
- Additional capital expenditure in wind generation would drop by $2,600m to $3,600m in the period from 2010 to 2016.
- Around 200 few jobs will be created in the period from 2011 to 2016

The Victorian Opposition policy is likely to result in less investment and fewer jobs in wind farm development. To the extent to which lower cost wind farm projects are impossible to develop, it is likely that the wind farm development will be on average more expensive than under the Labor Party policy. Additionally, the Victorian Opposition policy is likely to encourage wind farm development outside of Victoria.

This report has been produced quickly to meet the Clean Energy Council's requirements. There may be value in deepening the analysis and research of some aspects more fully than has been possible in the time available to complete this report.

1 Introduction

This document is a report to the Clean Energy Council comparing existing and proposed renewable energy policies in Victoria and their potential impact on renewable energy development.

The terms of reference of the analysis in the report is that it should include an assessment of the impact of the policies affecting renewable energy investment in Victoria in the period to 2016. The report should focus particularly on wind and solar investment, and should specify:

- The amount of clean energy generation that will result;
- The amount of investment in clean energy that will result; and
- The number of jobs that will be created.

The next section of the report describes our approach and defines the terms used to describe the results. It then presents the results in detail. An appendix summarises policies affecting renewable electricity generation in Victoria.

This report has been produced quickly to meet the Clean Energy Council's requirements. There may be value in deepening the analysis and research of some aspects more fully than has been possible in the time available to complete this report.

2 Approach and definitions

2.1 Approach

There are a number of policies supporting renewable electricity production in Victoria. The main one is the Renewable Energy Target which will be enhanced and the scheme separated to support small and large scale renewables from 2011. There are also capital subsidies from the Commonwealth and Victorian Government for large scale solar, expected feed-in tariffs for large scale solar in Victoria and feed-in tariffs for small scale solar. The Victorian Government is also in the process of developing a policy to encourage investment in medium scale solar.

The RET (and its enhancements) affect solar development as do the capital subsidies and feed-in tariffs. So, it is generally not possible to separately attribute renewable investment, jobs or renewable electricity generation to either the RET or the capital subsidies and feed-in tariff. The approach that we have therefore taken is to consider all relevant subsidies in our calculation of future production, investment and job creation. The specific subsidies affecting the various generation types are:

- For wind farms: the RET only.

- For large scale solar in Victoria, the Victorian and Australian Government capital subsidies and a feed-in tariff yet to be developed[1];
- For small scale solar in Victoria: the RET and Victorian feed-in tariff.

The rest of this section describes the core of our analysis and the main assumptions that it depends on. A large number of other assumptions and calculations are needed to complete the projections. We have not attempted to list these here, but would be happy to discuss them as required.

Wind farms

By far the greatest production, investment and job creation is likely to be in wind generation. Our projection to 2016 is based on our Renewable Generation Expansion (RGE) model. This model uses data in a renewable generation register that we maintain of all existing and possible future wind farms in Australia. The RGE model allows simulation of future wind investment using an economic calculation of when the expected present value of future revenues (electricity and REC sales) for a wind farm exceeds the expected present cost to develop and maintain that wind farm. If this criterion is satisfied, investment is calculated to occur and the resulting expected REC creation included in the projection of REC demand and supply to 2030.

The RGE model allows for simulation of the effect of all the main investment variables. For this study, we have used the RGE model to calculate wind investment in Victoria in two scenarios:

- **A high scenario:** This assumes that wind developers in Australia will expect REC prices to average $55/REC over the life of the wind farm, and that wind projects will be developed on time, according to their developers' stated intentions. The resulting wind generation investment in Victoria (and the rest of Australia) in this scenario is sufficient to ensure that the expected total large scale REC supply equals the expected REC demand over the term of the RET scheme to 2030.
- **A base scenario:** This assumes that wind farms will be developed one year later than developers' stated intentions, on average and that wind developers in Australia will assume REC prices will average $50/REC over the life of their wind farms.

We think the base scenario is likely to be more realistic than the high scenario.

We have also modelled the impact of the policy of the Victorian Opposition on wind farms. The CEC provided information based on a survey of its members that between 50% and 70% of the currently proposed wind farms in Victoria would not be developed if this policy is implemented. We have modelled investment, production and

[1] The Victorian Government's "Climate change white paper – The Action Plan" says on page 15 that the large scale solar will be outside the RET which we take to mean that the plant will not be eligible to create RECs or if it does, that these will be voluntarily surrendered.

employment based on these assumptions with 50% as the "optimistic" scenario and 70% as the "pessimistic" scenario.

Large scale solar

Our analysis is that large scale solar is significantly more expensive per MWh produced than typical wind farms. However, the Victorian Government's recent energy white paper has set out the Government's intention to ensure that 500 GWh of large scale solar plant is developed by 2014, and 2500 GWh by 2020. The combination of Victorian and Commonwealth Government capital grants plus as yet unspecified feed-in tariffs will be sufficient, we assume, to achieve these targets. Accordingly, our projections of investment, energy production and job creation to 2016 reflect this assumption.

Small scale solar

Our analysis on the basis of currently known costs, REC prices and feed-in tariffs is that net present value (to building owners) of installing typical 1.5 kW PV systems is significant. As such, building owners have strong incentives to install PV systems at present. We suggest that this explains the very rapid growth in PV installation over the last few years. The future in this area is however uncertain. In particular:

- It is not clear how the Victorian Government might vary the feed-in tariff once its goal of 100 MW of PV capacity has been met;
- It is not clear how the Office of the Renewable Electricity Regulator will vary the price of small scale RECs in future; and
- The cost of PV systems has declined in Australia. It is not clear how future costs might evolve.

Our projection is based on the assumption that the current very high rate of growth will not be maintained, but that political pressures will ensure that the rate of supply will steadily grow from current levels over the period to 2016.

2.2 Definitions

The next section presents the results in detail. It is important to be clear how the various terms have been defined. The definitions are set out in Table 1 below

Table 1. Definition of terms

TERM	DEFINITION
Additional annual production (GWh)	The additional electrical energy produced in the year that the capacity is added
Total annual production (GWh)	The total electrical energy produced in the year from all generation of that type
Capacity added (MW)	The additional capacity that is brought into operation in that year
Total installed capacity (MW)	The cumulative total of all operational capacity
Capital expenditure (2010 cost) ($m)	The capitalised expenditure costed at constant 2010 prices stated in 2010 dollars and assuming no change in unit cost.
Total undepreciated investment (2010 cost) ($m)	The undepreciated value of the cumulative investment in technology of that type at constant 2010 dollars and assuming no change in unit costs.
Additional operating expenditure ($m)	The expenditure required to operate and maintain the additional plant added in that year
Total operating expenditure ($m)	The expenditure required to operate and maintain all the installed plant of that type in that year
FTE (development)	The number of full time equivalent persons directly employed or contracted to assemble and install the capacity added in that year
FTE (operation)	The number of full time equivalent persons employed to operate and maintain the total installed capacity of that type in that year.

3 Results

Table 2. Results for wind generation (high scenario)

WIND (high scenario)	2009	2010	2011	2012	2013	2014	2015	2016	Totals (2010-2016)
Additional annual production (GWh)	397	217	-	282	1,300	1,454	2,063	2,290	8,003
Total annual production (GWh)	1,003	1,220	1,220	1,502	2,802	4,256	6,319	8,609	
Capacity added (MW)	192	-	-	199	703	310	1,099	554	3,058
Total installed capacity (MW)	428	428	428	627	1,330	1,640	2,740	3,294	
Capital expenditure (2010 cost) ($m)	$ 538	$ -	$ -	$ 557	$ 1,969	$ 868	$ 3,078	$ 1,551	$ 8,561
Total undepreciated investment (2010 cost) ($m)	$ 1,198	$ 1,198	$ 1,198	$ 1,756	$ 3,725	$ 4,593	$ 7,671	$ 9,222	
Additional operating expenditure ($m)	$ 6	$ -	$ -	$ 6	$ 21	$ 9	$ 33	$ 17	$ 92
Total operating expenditure ($m)	$ 13	$ 13	$ 13	$ 19	$ 40	$ 49	$ 82	$ 99	
FTE (development)	186	0	0	193	681	300	1064	536	
FTE (operation)	43	43	43	63	133	164	274	329	

Table 3. Results for wind generation (base scenario)

WIND (base scenario)	2009	2010	2011	2012	2013	2014	2015	2016	Totals (2010-2016)
Additional annual production (GWh)	397	217	-	-	282	1,300	1,076	1,395	4,667
Total annual production (GWh)	1,003	1,220	1,220	1,220	1,502	2,802	3,878	5,273	
Capacity added (MW)	192	-	-	-	199	703	40	893	2027.6
Total installed capacity (MW)	428	428	428	428	627	1,330	1,370	2,264	
Capital expenditure (2010 cost) ($m)	$ 538	$ -	$ -	$ -	$ 557	$ 1,969	$ 112	$ 2,502	$ 5,677
Total undepreciated investment (2010 cost) ($m)	$ 1,198	$ 1,198	$ 1,198	$ 1,198	$ 1,756	$ 3,725	$ 3,837	$ 6,338	
Additional operating expenditure ($m)	$ 6	$ -	$ -	$ -	$ 6	$ 21	$ 1	$ 27	$ 61
Total operating expenditure ($m)	$ 13	$ 13	$ 13	$ 13	$ 19	$ 40	$ 41	$ 68	
FTE (development)	186	0	0	0	193	681	39	865	
FTE (operation)	43	43	43	43	63	133	137	226	

Table 4. Results for large scale solar

LARGE SCALE SOLAR	2009	2010	2011	2012	2013	2014	2015	2016	Totals (2010-2016)
Additional annual production (GWh)						500	400	400	1,300
Total annual production (GWh)						500	900	1,300	
Capacity added (MW)						273	218	218	709.091
Total installed capacity (MW)			-	-	-	273	491	709	
Capital expenditure (2010 cost) ($m)	$ -	$ -	$ -	$ -	$ -	$ 764	$ 611	$ 611	$ 1,985
Total undepreciated investment (2010 cost) ($m)	$ -	$ -	$ -	$ -	$ -	$ 764	$ 1,375	$ 1,985	
Additional operating expenditure ($m)	$ -	$ -	$ -	$ -	$ -	$ 8	$ 7	$ 7	$ 21
Total operating expenditure ($m)	$ -	$ -	$ -	$ -	$ -	$ 8	$ 15	$ 21	
FTE (development)	0	0	0	0	0	264	211	211	
FTE (operation)	0	0	0	0	0	27	49	71	

Table 5. Results for small scale PV

SMALL SCALE PV	2009 (cumulative total)	2010	2011	2012	2013	2014	2015	2016	Totals (2010-2016)
Additional annual production (GWh)	16	25	27	30	33	33	33	33	230
Total annual production (GWh)	25	49	76	106	138	172	205	238	
Capacity added (MW)	13	20	22	24	27	27	27	27	187.22
Total installed capacity (MW)	20	40	62	86	113	140	167	194	
Capital expenditure (2010 cost) ($m)	$ 94	$ 140	$ 154	$ 169	$ 186	$ 189	$ 189	$ 189	$ 1,311
Total undepreciated investment (2010 cost) ($m)	$ 140	$ 280	$ 434	$ 603	$ 790	$ 979	$ 1,168	$ 1,357	
Additional operating expenditure ($m)									$ -
Total operating expenditure ($m)									
FTE (development)	179	267	293	323	355	360	360	360	
FTE (operation)									

Table 6. Totals for wind (base scenario), large scale solar and small scale PV

TOTAL (BASE WIND + LARGE SCALE SOLAR AND SMALL SCALE SOLAR)	2009 (cumulative total)	2010	2011	2012	2013	2014	2015	2016	Totals (2010-2016)
Additional annual production (GWh)	413	242	27	30	315	1,833	1,509	1,828	6,196
Total annual production (GWh)	1,036	1,278	1,305	1,335	1,649	5,784	7,968	10,792	
Capacity added (MW)	205	20	22	24	226	1,003	285	1,139	2,924
Total installed capacity (MW)	455	475	497	521	747	1,750	2,035	3,174	
Capital expenditure (2010 cost) ($m)	$ 631	$ 140	$ 154	$ 169	$ 744	$ 2,922	$ 912	$ 3,301	$ 8,973
Total undepreciated investment (2010 cost) ($m)	$ 1,387	$ 1,527	$ 1,681	$ 1,851	$ 2,594	$ 5,516	$ 6,428	$ 9,729	
Additional operating expenditure ($m)	$ 6	$ -	$ -	$ -	$ 6	$ 29	$ 8	$ 33	$ 82
Total operating expenditure ($m)	$ 13	$ 13	$ 13	$ 13	$ 19	$ 48	$ 56	$ 89	
FTE (development)	364	267	293	323	548	1304	610	1436	
FTE (operation)	43	43	43	43	63	160	186	297	

Table 7. Totals for wind (base scenario) assuming Victorian Opposition siting policy (optimistic assumptions)

WIND (base scenario)	2009 (cumulative total)	2010	2011	2012	2013	2014	2015	2016	Totals (2010-2016)
Additional annual production (GWh)	397	217	-	-	238	741	57	1,041	2,691
Total annual production (GWh)	1,003	1,220	1,220	1,220	1,459	2,199	2,256	3,297	
Capacity added (MW)	192	-	-	100	352	20	447	-	1,110
Total installed capacity (MW)	428	428	428	528	879	899	1,346	1,346	
Capital expenditure (2010 cost) ($m)	$ 538	$ -	$ -	$ 279	$ 984	$ 56	$ 1,251	$ -	$ 3,107
Total undepreciated investment (2010 cost) ($m)	$ 1,198	$ 1,198	$ 1,198	$ 1,477	$ 2,461	$ 2,517	$ 3,768	$ 3,768	
Additional operating expenditure ($m)	$ 6	$ -	$ -	$ 3	$ 11	$ 1	$ 13	$ -	$ 33
Total operating expenditure ($m)	$ 13	$ 13	$ 13	$ 16	$ 26	$ 27	$ 40	$ 40	
FTE (development)	186	0	0	96	340	19	432	0	
FTE (operation)	43	43	43	53	88	90	135	135	

Table 8. Totals for wind (base scenario) assuming Victorian Opposition siting policy (pessimistic assumptions)

WIND (base scenario)	2009 (cumulative total)	2010	2011	2012	2013	2014	2015	2016	Totals (2010-2016)
Additional annual production (GWh)	397	217	-	-	143	444	34	624	1,860
Total annual production (GWh)	1,003	1,220	1,220	1,220	1,363	1,808	1,842	2,466	
Capacity added (MW)	192	-	-	60	211	12	268	-	743
Total installed capacity (MW)	428	428	428	488	699	711	979	979	
Capital expenditure (2010 cost) ($m)	$ 538	$ -	$ -	$ 167	$ 591	$ 34	$ 750	$ -	$ 2,080
Total undepreciated investment (2010 cost) ($m)	$ 1,198	$ 1,198	$ 1,198	$ 1,366	$ 1,956	$ 1,990	$ 2,740	$ 2,740	
Additional operating expenditure ($m)	$ 6	$ -	$ -	$ 2	$ 6	$ 0	$ 8	$ -	$ 22
Total operating expenditure ($m)	$ 13	$ 13	$ 13	$ 15	$ 21	$ 21	$ 29	$ 29	
FTE (development)	186	0	0	58	204	12	259	0	
FTE (operation)	43	43	43	49	70	71	98	98	

Attachment A: Summary of support mechanisms

This section summarises the various subsidy and support mechanisms from the Victorian and Australian governments, that will affect the rate of investment and employment growth in renewables in Victoria in the period to 2016.

3.1 Support mechanisms for wind and large scale solar generation

3.1.1 The RET and LRET

The most important scheme affecting the future development of wind generation in Victoria is the Large Scale Renewable Energy Target. The Large Scale Renewable Energy Target (LRET) will be implemented from 1 January 2011 in partial replacement of the existing Renewable Energy Target.

The LRET annual targets are set at around 4000 GWh below the current RET. The LRET for 2011 is 10,400 GWh and increases to 41,000 GWh in 2020. The 41,000 GWh target is maintained until 2030. The eligible sources of renewable electricity certificates under the LRET is the same as the RET, but excluding small scale REC-eligible plant such as solar water heaters and PV. If small-scale renewable energy technologies are lower than expected (less than 4,000 GWh per annum) large-scale renewable energy could be deployed to meet the Small Scale Renewable Energy Scheme (SRES). Any change would follow a review of the SRES in 2014.

RECs created from small scale technologies installed prior to 31 December 2010 will be eligible to meet the LRET. RECs from small scale technologies can be created in 2011 as long as the installer is able to provide evidence to the REC Regulator that small scale technology was installed before 1 January 2011. Banked RECs at 31 December 2010 from all sources will be eligible to meet the LRET.

Liability under LRET will operate on a similar basis to the existing RET scheme. The Regulator will announce the Renewable Power Percentage (RPP) early in each compliance year to provide liable entities with an indication of the volume of RECs they will need to acquire to meet their obligation. A shortfall penalty of $65 will be imposed on liable entities that fail to meet their LRET obligation.

The Australian Government has said it does not wish to intervene in forward contractual arrangements for RECs. As a transitional measure, contractual agreements that are in place to purchase RECs from small-scale technologies beyond 31 December 2010, will be valid for use in the LRET. This provision will only apply to contracts that were entered into before 26 February 2010.

Individuals or organisations will be able to purchase and voluntarily surrender RECs in the LRET to drive additional renewable energy generation.

3.1.2 Additional subsidies for large scale solar

The Victorian Government is promoting solar electricity generation and has set a large-scale solar power target of 5% in 2020. This is estimated to be around 2,500 GWh. An interim target for large scale solar has been set at 500 GWh by 2014.

The Victorian Government's approach to large scale solar is designed to work closely the Australian Government's Solar Flagships Program. The Australian Government has committed $1.5 billion to support the construction and demonstration of up to four large-scale solar power plants in Australia using solar thermal and photovoltaic technologies. The Australian Government's aim is to establish up to a 1,000 megawatts of large-scale solar power generation capacity.

The first round of the Solar Flagships Program is expected to be decided in 2011 with a target of 400 MW of project funding. Funding to solar developers through taxable grant payments will be based on successful completion of project milestones.

It is important to note that proponents of large scale projects "will be required to demonstrate that they have sought funding for any project proposal at a ratio of at least two dollars from private and state or territory government sources for every dollar from the Solar Flagships program and that the proponent has exhausted private and state or territory government funding sources." It is in this context that the Victorian Government has committed $100m to assist the funding of a large-scale project in the first round of the Solar Flagships Program.

In addition to the $100 million earmarked for capital funding of large scale solar, the Victorian Government has said that it intends to introduce a feed-in tariff for large scale solar that "will provide the incentive necessary for investment in new large scale solar generation facilities in Victoria".

The Victorian Government has also established a medium-scale solar energy working group to encourage investment in medium-scale solar electricity generation. The group will advise the Victorian Government on the current barriers to investment and what additional measures are required to encourage the use of solar energy in business facilities across Victoria.

The Victorian Government has also committed $5m for up to 10 solar energy hubs. It is expected that this will lead to an additional 8.6 MW of solar electricity generation capacity by 2013.

At this stage the standard feed-in-tariff will apply to medium-scale solar power installations. This generally means that the electricity rate paid by a customer to consume electricity from the grid is the same rate that they will receive if they export to the grid.

3.2 Subsidies for small scale solar power generation

The Australian Government's Small Scale Renewable Energy Scheme (SRES) will be the major subsidy mechanism for photovoltaic (PV) plant in Victoria and the rest of Australia. The SRES will replace the REC eligibility of small scale PV under the current Renewable Energy Target (RET).

An unlimited volume of SREC's valued at $40 per SREC can be created from 1 January 2011. Mechanisms are currently being implemented to ensure that SREC costs are recoverable from energy users. The renewable energy regulator will have significant ability to vary the main parameters that affect SREC supply, including the SREC price. Specific reviews are specified in the current legislation.

PV is currently eligible to earn a multiple number of RECs for each unit of electricity produced. This will be extended under the SRES scheme. The REC multiplier for small PV is 5 up to 30 June 2012 and declines by 1 each year until it reaches 1 from 1 July 2016.

Under current arrangements, with a REC multiplier of 5, the number of deemed RECs created from the installation of a 1 kW solar pv system is 105. At a REC price of $40 the up-front subsidy through REC creation for urban Victoria is $4,200. For a typical 1.5 kW installation 159 deemed RECs are created from installing a PV, providing s subsidy worth $6,360.

The Victorian Government has complemented the RET scheme by introducing a premium rate for electricity produced exported to the grid by small scale solar installations. Under the Victorian feed-in tariff scheme, households, community groups and small businesses consuming no more than 100 MWh a year can access the premium tariff for installations up to 5 kW. The main elements of the premium feed-in-tariff are:

- The rate received under the premium feed-in-tariff scheme is 60 cents per kilowatt per hour for power fed back into the grid. This is commonly referred to as a net tariff and means that at the time in which PV is generating electricity, the premium rate applies to the difference between the volume of electricity generated and the volume of consumption at the site where the PV is installed. The feed-in tariff is available for 15 years from the data of installation.
- The premium feed-in-tariff will be credited against a customer's electricity bill, by their electricity retailer, with each bill credit available for a maximum of 12 months.
- New customers will be able to take advantage of the feed-in-tariff until the total capacity of systems participating reaches 100 MW. It is not clear what changes may occur once this target is reached.