

Medium-Scale Solar Discussion Paper



Medium-Scale Solar

Discussion Paper

Medium-Scale Solar Working Group
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Glossary

ACT	Australian Capital Territory
AEMO	Australian Energy Market Operator
AMI	Advanced Metering Infrastructure Program
ASI	Australian Solar Institute
ASIF	Spanish photovoltaic industry body
AZCC	Arizona Corporation Commission
BIPV	Building Integrated Photovoltaics
BoS	Balance of System
CEC	Clean Energy Council
CHP	Combined Heat and Power system
CIRG	Community and Industry Reference Group
CPUC	Californian Public Utilities Commission
DCSVS	Data Collection Storage and Visualisation System
EEG	Erneuerbare Energien-Gesetz – Renewable Energy Act 2000
EPIA	European Photovoltaic Industry Association
ESI	Victorian Energy Saver Incentive Scheme
ETIS	Energy Technology and Innovation Scheme
FIT	Feed-in Tariff
GW	Gigawatt
HV	High Voltage
IEA	International Energy Agency
LGC	Large-Scale Generation Certificate
LRET	Commonwealth Large-Scale Renewable Energy Target
LV	Low Voltage
MW	Megawatt
MWh	Megawatt hour
MSATS	Market Settlements and Transfers System
MSSWG	Medium-Scale Solar Working Group
NAB	National Australia Bank
NABERS	National Australian Built Environment Rating System
NEM	National Energy Market
OH&S	Occupational Health and Safety
PFIT	Victorian Premium Solar Feed-in Tariff
QVM	Queen Victoria Market
R&D	Research and Development
RAM	Renewable Auction Mechanism
REC	Renewable Energy Certificate
RET	Commonwealth Renewable Energy Target
RPS	Renewable Portfolio Standard
SFIT	Victorian Standard Feed-in Tariff
SFP	Solar Flagships Program
SHCP	Commonwealth Solar Homes and Communities Plan
SRES	Small-Scale Renewable Energy Scheme
STC	Small-Scale Technology Certificate
SWER	Single Wire Earth Return
VLSSFIT	Victorian Large-Scale Solar Feed-in Tariff
VLSSP	Victorian Large-Scale Solar Project

1 How to Use this Paper

The purpose of this Discussion Paper is to provide an opportunity for interested stakeholders to identify and comment on current barriers to investment in medium-scale solar, the opportunities that such investment is likely to provide and potential solutions to addressing any barriers that have been identified. The document has been prepared by the Medium-Scale Solar Working Group. The material contained in submissions to the Discussion Paper will be considered as input into a final report to be provided by the Working Group to the Minister for Energy and Resources in December 2010.

The Discussion Paper has been divided into the following broad sections:

- Background to the establishment of the Medium-Scale Solar Working Group and the release of this Discussion Paper;
- Definition of Medium-Scale Solar;
- Identification of current barriers to investment in medium-scale sector;
- Potential benefits provided by medium-scale solar; and
- Potential solutions to addressing the barriers to investment in the medium-scale sector.

The Discussion Paper is accompanied by a set of Appendices which include:

- A brief outline of some of the existing and planned support measures for solar at a Commonwealth and State level available in Victoria;
- A number of Case Studies of existing Australian solar installations that could potentially be defined as “medium-scale”; and
- An overview of a number of domestic and international measures which have been undertaken in relation to solar.

All questions included in the Discussion Paper are also included in a separate “Medium-Scale Solar: Questions for Response” document for ease of reference.

All documents are available on the website of the Office of Solar Energy.

The process for making submissions to this Discussion Paper is outlined in Section 8: Next Steps.

2 Background

2.1 *The Victorian Climate Change White Paper Strategy*

On 26 July 2010, the Victorian Government released a 10 point *Victorian Climate Change White Paper Strategy – Taking Action for Victoria’s Future*. The White Paper Action Plan, to be supported by a *Climate Change Bill*, includes the following high level objectives:

- Setting a target to reduce Victorian emissions by at least 20% by 2020 compared with 2000 levels;
- Achieving around 20% of Victoria’s energy supply from renewable sources by 2020, consistent with the National Renewable Energy Target (RET), mostly from wind;
- Sourcing approximately 5% of Victoria’s electricity from large-scale solar by 2020, in addition to the 20% RET target;
- Creating jobs by taking advantage of opportunities in a low carbon economy; and
- Keeping Victoria ‘ahead of the game’ in relation to the eventual introduction of a carbon price.¹

3 Establishment of the Medium-Scale Solar Working Group

Action item 3 of the *Victorian Climate Change White Paper Strategy – Making Victoria the Solar State* - outlines the Victorian Government’s plan to offer the most comprehensive support for solar of any Australian jurisdiction, via a number of measures, existing and new. This includes the establishment of a Medium-Scale Solar Working Group (MSSWG).² The purpose of the MSSWG is to help advise Government on current barriers to investment and uptake of solar and what additional measures, if any, are required to encourage the use of solar energy in this sector across the State.

3.1 *Terms of Reference of the Working Group*

The Medium-scale Solar Working Group (Working Group) will provide the Victorian Government with independent advice regarding the development of measures to encourage the use of solar energy in organisations across the State at a scale that complements existing policies at the individual household and utility scale levels.

The Working Group is chaired by Mr Tony Wood and comprises technical experts in the solar and finance industries, as well as representatives of the commercial building sector and the community. All members of the Working Group will be appointed by the Minister for Energy and Resources.

¹ *Taking Action for Victoria’s Future: Victorian Climate Change White Paper – The Action Plan*, Victorian Government Department of Premier and Cabinet, Melbourne, July 2010, p 3.

² *Ibid.* pp 15-16.

The Working Group will also convene a Community and Industry Reference Group of specific stakeholders likely to be impacted by any policy recommended by the Working Group.

The Working Group will deliver a report to the Minister for Energy and Resources in December 2010. This report will include advice on:

- Confirmation of the scope of the Working Group's task.
- Assessment of the potential for medium-scale solar generation to contribute to Victoria's energy capacity.
- Assessment of current support for medium-scale solar in Victoria from all tiers of Government.
- Identification of organisations best placed to drive the uptake of medium-scale solar energy.
- A review of measures in other jurisdictions, both domestic and international, which are successful in stimulating solar energy adoption at the medium-scale.
- Identification of existing financial, technical, regulatory and other barriers to the widespread uptake of solar energy at a medium-scale.
- Identification and assessment of measures that would overcome these barriers.

The term of the Working Group and the tenure of appointees will conclude upon delivery of the report in December 2010.

3.2 Discussion Paper

The current Discussion Paper is being released as a first step in the work being undertaken by the MSSWG and will provide an opportunity for interested stakeholders to provide comment and input into the Working Group's consideration of the potential need for support of medium-scale solar and how this might best be achieved. The submissions period for the Discussion Paper will close on Tuesday 9 November 2010.

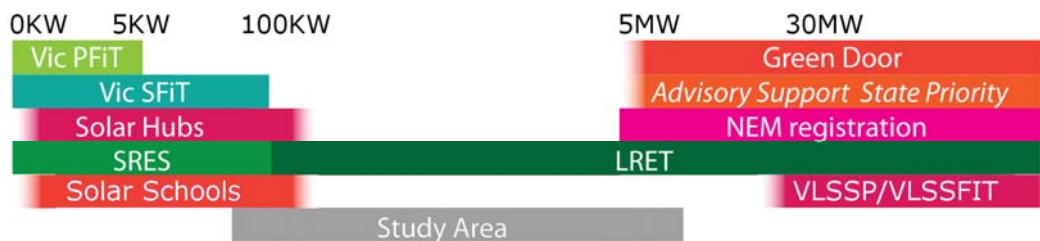
3.3 Report and Recommendations

Input received in response to the Discussion Paper will be considered in a final report to the Minister for Energy and Resources to be delivered on 1 December 2010. The report is intended to provide recommendations on:

- what measures might be suitable for implementation in the relative short term;
- what specific areas require further investigation and analysis;
- the benefits and costs of medium-scale solar generation capacity in Victoria; and
- whether the market is likely to deliver solar outcomes suggesting no case for government intervention in this sector.

4 Definition of Medium-Scale Solar

In order to identify current barriers to medium-scale solar as well as potential benefits of increased uptake of medium-scale solar, it is first necessary to provide an adequate definition of what is meant by “medium-scale”. The categories of small-scale, medium-scale and large-scale solar are generally conceived of in terms of size, however, there are currently differing views as to where the boundary between each category might be set.³ Whilst there are a number of support mechanisms underpinning the uptake of solar at both the small-scale and large-scale, there is currently little formalised support over the 100kW mark until one reaches utility-scale installations (where support has been provided by such programs as the Victorian Government’s Large-Scale Solar Project (VLSSP)), requiring generation of 330GWh per annum.⁴



4.1 Defining a Lower Limit for Medium-Scale Solar

Support at the lower end of the scale is available via the Commonwealth’s Small-Scale Renewable Energy Scheme (SRES) and associated Solar Credits scheme. At a state level, Victoria has two feed-in tariff regimes; the premium solar feed-in tariff regime (PFIT), which applies to solar photovoltaic systems up to 5 kW in size; and the standard feed-in tariff regime, which includes wind, hydro, biomass and solar systems up to 100 kW in size.

Victoria’s Solar Hubs program provides support for community engagement, including in the medium-scale sector, however, is not aimed at addressing the issue of high upfront capital costs. Project proposals are therefore more likely to be concentrated at the lower end of the scale.

The National Solar Schools Program allocates differentiated funding for solar PV systems greater than or less than 2kW in size. The program’s website notes that surplus electricity generated by solar power systems on weekends and during school holidays can potentially be sold back to the electricity grid for extra income. For schools wishing to sell back to the grid, the size of their system will therefore most likely be constrained, at least in part, by feed-in tariff cut-off points (i.e. systems are again likely to be concentrated at the lower end of the scale).

³ Please refer to Appendix B for examples of how such boundaries can be set.

⁴ Please refer to Appendix A for an overview of current and planned support measures for solar at the Commonwealth and State Government levels, including the programs listed in this section.

One option is therefore for the lower limit for medium-scale solar to be set at 100kW. Setting a lower limit of 100kW would avoid overlap with existing Victorian feed-in tariff support mechanisms. It is also likely that there would only be limited overlap with the Solar Hubs and National Solar Schools Program.

An alternative option would be for the lower limit of medium-scale solar to be set at 5 kW, i.e. anything too large to qualify for the premium feed-in tariff rate. This would produce some overlap with existing support mechanisms. The issue of how any potential support mechanisms might align with other jurisdictions in future is also worth consideration.

The Commonwealth RET scheme distinguishes between small and large-scale installations with the cut-off point being set at 100kW. Setting a lower limit for medium-scale solar at 100kW would therefore provide consistency with the RET. Setting the medium-scale lower boundary at 100kW also conforms with models which set domestic at 10kW, small-business between 10 and 100kW and medium-scale at over 100kW. Care would need to be taken that a potential influx of installations in the medium-scale sector not lead to a depression in certificate prices, thereby rendering large-scale projects unviable.

Systems greater than 100kW proponents are able to receive some financial support through the Commonwealth LRET scheme and are able to trade Large-Scale Generation Certificates (LGCs) in the market place. Whilst the price of LGCs is not set (as is the case for Small-Scale Technology Certificates or STCs), the division of the RET scheme into large and small-scale is expected to alleviate the issue of falling certificate prices due to flooding of the market by small-scale systems such as solar hot water heaters. Limited uptake in the medium-scale sector suggests that this may not, however, provide sufficient return on investment or that there are other more significant barriers preventing uptake, for example administrative and connection issues. As the RET is a least cost mechanism, proponents of solar may also find that they are in competition with other lower cost forms of renewable generation such as wind.

4.2 Defining an Upper Limit for Medium-Scale Solar

At the upper end of the scale, the Victorian Government is seeking to increase electricity supply from large-scale solar to approximately 5% by 2020 (the equivalent of around 2500GWh per annum) via the establishment of a “large-scale feed-in tariff”. An interim target has been set at 500GWh by 2014. This is expected to lead to the establishment of a number of new plants across Northern Victoria.

The Victorian Large-Scale Solar project (VLSSP) involved a competitive tender process for a large-scale solar plant supplying at least 330GWh of electricity per year back into the grid over at least 20 years. The tender for \$100 million (net present value) in funding was awarded in September 2010 dependent upon matching funding being made available via the Commonwealth’s Solar Flagships (SFP) program.

In terms of non-financial support, the establishment of a ‘Green Door’ program for renewable energy projects is expected to provide a valuable facilitation tool in relation to the application and planning process. The program is divided into two streams: the State Priority stream applying to projects over 30MW (at the large-scale end of the

spectrum) and the Advisory Support stream applying to projects under 30MW, however, the level of support provided by this second stream is not as extensive.

The projects listed above do not, however, suggest a clearly defined cut-off point between medium-scale and large-scale solar generation. One option would therefore be to define any upper limit in relation to the Australian Energy Market Operator's (AEMO's) NEM registration requirements, as once a generation facility reaches 5MW in size, it must register on the market.

If the upper limit were to be extended beyond 5MW, then the distinction between unscheduled, semi-scheduled and scheduled generation could potentially come into play. Non-scheduled generation refers to generating systems with an aggregate nameplate capacity of less than 30 MW and equal to or greater than 5 MW. Semi-scheduled generation refers to any generating system with intermittent output with an aggregate capacity of 30 MW or greater. A semi-scheduled classification gives AEMO the power to limit generation output that may exceed network capabilities, but reduces the participating generator's requirement to provide information. Scheduled generation refers to any generating system with an aggregate nameplate capacity of 30 MW or more, unless it classified as semi-scheduled, or AEMO is permitted to classify it as non-scheduled.

Setting an upper limit at the high end of the scale, will also by default suggest the type of system configuration eligible for support. It would be difficult to find buildings large enough to support systems in the MW range (either rooftop mounted or integrated into buildings (BIPV)). Indeed existing projects in the MW range have tended to spread the solar installation over several buildings. A higher upper limit also suggests the proponent's primary aim would be to generate an income stream, rather than offset consumption.

Alternatively the medium-scale category could remain uncapped. Depending on the type of support envisaged, however, this could introduce the risk of significant costs which could unduly impact on the community as a whole.

4.3 Subdivision of medium-scale

There is potential for the "medium-scale" category to be further sub-divided to avoid a "one-size fits all" approach as differently scaled installations are likely to face different barriers. Different solutions could then potentially be applied to these medium-scale subsets. For instance, were "medium-scale" to be defined as anything between 100kW and 5MW, this could be further divided between systems under 1.5MW and over 1.5 MW, to provide one example.

4.4 The Aggregate Model

The definition of medium-scale solar should be sufficiently flexible to allow for adoption of an aggregate model, should this prove to be an effective means of generating uptake in the medium-scale sector. The aggregate model allows individual participants to invest in a small portion of a medium or large-scale installation accruing those benefits which relate to their portion of the entire system. For example the Central Victoria Solar Cities program allows participants to rent the equivalent of a 2kW portion of a 300kW solar park and receive the benefits relating to their

individual portion via a feed-in tariff.⁵ Although such an aggregated model does not directly offset consumption, its drivers are different to the commercial model outlined above.

QU1: *Is it appropriate to define medium-scale solar as falling between 100kW and 5MW?*

QU2: *Do you agree with such a definition and if not, why not?*

5 Identification of Potential Barriers to Uptake of Medium-Scale Solar

5.1 Current Uptake of Medium-Scale in Victoria

To date there appears to have been limited uptake of solar PV in the “medium-scale” market segment with a total of 1.17 MW of installed capacity as at mid September 2010. This compares with approx. 27 MW of subscribed capacity since 1 November 2010 under the Victorian premium solar feed-in tariff scheme for small-scale installations under 5 kW⁶.

Owner ⁷	Location	Commission Date	Unit Configuration	Installed Capacity
Central Victoria Solar City	Ballarat	Dec 2009	1 x .3 MW	0.3 MW
Central Victoria Solar City	Bendigo	Dec 2009	1 x .3 MW	0.3 MW
Melbourne City Council	Victoria Market	2003	1328 x 0.000143MW	0.19 MW
Tullamarine Calder Alliance	Tulla Calder Interchange	2007	210 x 0.00114MW	0.24 MW
Silex Systems	Bridgewater	Oct 2008	1 x 0.14MW	0.14 MW
			Total Installed Capacity (MW)	1.17 MW

There also appears to be limited uptake in the 5kW to 100kW segment, with one distributor advising they have only 24 solar PV systems registered on their systems in the 5 to 10 kilowatt range and only 3 systems in the 10 to 20 kW range.

⁵ Please refer to Appendix A for further details.

⁶ Informal reporting from distribution businesses as at 31 August 2010.

⁷ Data provided by the Clean Energy Council.

A range of barriers appears to be preventing widespread uptake in the medium-scale solar sector to date. These barriers can be broadly divided into financial barriers, such as the difficulty of obtaining sufficient return on investment and ensuring the bankability of projects, procedural barriers relating to complex administrative and connection requirements and physical barriers, such as availability of roof space or suitable land. A number of these barriers, although not necessarily all, are discussed in this section.

5.2 Financial Barriers

5.2.1 Cost of Projects

There appears to be general consensus that one of the primary barriers to uptake in the medium-scale sector is the cost of projects. Based on the Case Studies included in Appendix C, project costs can range from the hundreds of thousands at the lower end of the scale to the millions at the upper end of the scale. In addition to system and installation costs, there can also be a range of “hidden” costs such as upgrading of meter boards, potential requirements for network augmentation and administrative and legal fees associated with the planning and connection process. This generally leads to lengthy payback periods before the costs of implementing and operating a system can be recouped. Support mechanisms that involve long payback periods will not necessarily alleviate the burden of the initial upfront outlay, although they may provide enough of a guarantee to encourage upfront third party finance. Proponents also need to consider ongoing maintenance and operational costs.

5.2.2 Uncertainty around a Carbon Price

Whilst the Commonwealth Government has announced the establishment of a Climate Change Committee to discuss various options for the introduction of a price on carbon, it has not as yet formally committed to a carbon pricing policy. It could be argued that uncertainty around when, and indeed if, a carbon price will be introduced is impacting on proponents’ willingness to invest in renewables, including solar, pending grid parity being achieved via other means. Whilst the introduction of a carbon price could produce a more level playing field for investors in solar technologies, other areas of uncertainty for investors would still remain. Solar would also remain in competition with other forms of renewables such as wind.

5.2.3 Potential Impact of Foreign Exchange Rates

Given the current limits on local manufacture of solar, reaching the solar energy targets as defined within the Climate Change White Paper Action Plan would be largely dependent on organisations’ ability to import the necessary components from overseas. Up to three quarters of any one system might need to be imported. This could render organisations considering investment in medium-scale solar particularly vulnerable to fluctuations in foreign exchange rates. A large fluctuation in the value of the Australian dollar could make an otherwise viable project unworkable.

5.2.4 Barriers to Third Party Investment

Given the significant up front costs involved in medium-scale installations, there may be a need for third party investment. Third party investors currently face a number of barriers in relation to medium-scale projects. The first of these is the difficulty of ensuring the security of the assets that have been invested in. For example, what guarantees can be provided that the asset will still be in place in three or four years

time? Third party investors are also faced with the difficulty of capturing the returns on their investment thereby creating a credit risk.

5.2.5 Cash versus Credits

The Victorian premium solar feed-in tariff scheme places a minimum requirement on retailers to provide eligible customers with a rolling-twelve-month credit for excess electricity fed back to the grid. The legislation does not, however, mandate a cash payment.

With regards to the standard feed-in tariff, which offers a one-for-one rate for systems up to 100 kilowatts, it is at the retailer's discretion whether it offers a cash payment or simply credits and offsets the customer's account. Similarly it is at the retailer's discretion whether the customer can choose to apply excess credits to another account they may hold with that retailer.

5.2.6 Split Incentives

It appears that many buildings which would be appropriately sized for a medium-scale solar installation are leased by businesses or other organisations. Generally speaking, electricity is billed to the tenant and therefore any generation from a solar installation would benefit the tenant through an offset to their electricity bill. Existing feed-in tariffs also currently accrue to the customer who is billed for electricity at the site. The question therefore arises as to how to adequately incentivise the actual building owner to make the required upfront investment in a solar installation.

5.2.7 Justification of Expenditure

It can be potentially difficult for an organisation to justify significant capital expenditure on a medium-scale project where energy related objectives are not related to that organisation's primary purpose. For example it might be difficult for a hospital to justify significant expenditure on a solar installation, even where this represents only a small portion of overall expenditure, because there may be a perception this investment is detracting from the provision of health care services, or is not delivering as good a return compared to other environmental initiatives, such as energy efficiency.

5.3 Physical Barriers

5.3.1 Suitability/Unsuitability of Sites and Potential Configurations

Proponents of medium-scale solar are able to choose from a range of system configurations (roof-mounted, ground-mounted and building integrated).⁸ The physical barriers to uptake will in large part depend upon the type of configuration the proponent selects. There are also a number of network based constraints relating to such issues as voltage regulation and the potential need for distribution or transmission upgrades.

5.3.2 Rooftop versus Ground-Mounted

Broadly speaking, an individual solar panel is approximately 1.6 metres long and 0.8 metres wide. At the smaller end of the scale, a 1kW solar panel system requires

⁸ Another potential configuration is to place solar systems on under-utilised space, such as car parks. It appears this may be a relatively cheap solution from a structural point of view. Such a configuration can provide additional value to the use of the land, can provide shading to cars, and may also be more flexible in terms of orientation.

around 8-10m² of roof space, and a 1.5kW solar panel system requires around 12 m².⁹ Extrapolating from these figures, a 200 kW system could require around 1,600-2,000 m² and a 1 MW system around 8,000-10,000 m². For example, the 1MW installation at the Adelaide Show Grounds required 9,200 m² and the 200 kW installation at the Queen Victoria Market required 1,675 m².¹⁰

Solar panels are available in different wattages, however, and the amount of roof space required will vary depending on the type of panel installed. Thin film or amorphous panels, for example, tend to be less efficient than mono- or polycrystalline panels, requiring approximately twice as much square metre coverage to produce a similar output.¹¹

Whilst an organisation may have enough overall roof space to install a “medium-scale” array, not all of this roof space will necessarily be at an optimal orientation. In Australia, panels should ideally face north to maximise electricity output. Roof pitch also needs to be considered, with a recommended minimum tilt of 10° to allow for self-cleaning of panels via rainfall.

Whilst roof-mounted systems are viable at the lower end of the capacity scale, once systems enter the MW range, it is unlikely that companies and organisations will have sufficient roof space available, particularly given that not all available roof-space will be optimally oriented from an efficiency point of view. In addition, some proponents may already have used a significant portion of the available roof space for plant such as air-conditioning. Given the large surface areas required for optimal “medium-scale” installations, some proponents might therefore consider a ground-mounted installation to be more appropriate.

5.3.3 Availability of Free Land

Those located in an urban area may find that there are limits on the amount of available free land, particularly in a site directly adjacent to their operations. Planning restrictions may also be more onerous. Those located in a regional area with greater land availability may find this less of a constraint.

5.3.4 Visual impact considerations

Ground-mounted installations tend to have greater visual impact in so far as they cover a larger surface area, however, if they are located in a relatively isolated rural area, this may not be of particular concern, unless the site is considered to have particular aesthetic value.

Consideration would also need to be given to whether medium-scale installations are likely to create amenity issues through increased glare and concentrated reflected light.

5.3.5 Existing Structures versus Building Integrated Photovoltaics (BIPV)

Solar panels can be integrated either into the façade of buildings, replacing glass windows, or can serve a dual purpose as sun shades. The viability of BIPV as a

⁹ Consumer Guide to Buying Households Solar Panels (Photovoltaic Panels). Clean Energy Council. Volume 3: 2 September 2010: p 12.

¹⁰ See Appendix A: Case Studies.

¹¹ Consumer Guide to Buying Households Solar Panels (Photovoltaic Panels). p 13.

solution will largely depend on whether the proponent is upgrading an existing structure or building an entirely new structure as it is generally far more difficult and costly to retrofit BIPV into an existing structure. BIPV is also relatively untried in the Australian context and there is still some uncertainty as to how well it performs.

5.3.6 Structural roof-load issues

Proponents considering whether to install a medium-scale solar array on a rooftop need to consider the ability of the existing structure to support the associated deadweight. A structural engineer would generally need to be engaged to assess the existing structure and determine whether it can handle additional load. This assessment and any recommended structural upgrades (such as strengthening of support columns or trusses) would need to be considered as part of the overall project costs.

5.3.7 Uplift Issues

The issue of uplift, particularly in the context of more frequent and more severe windstorm events, appears to be of greater concern in relation to medium-scale installations. Whereas small-scale residential arrays are generally not large enough to generate uplift problems, the larger the system, the greater this problem becomes. The applicable wind loading standard – AS1170/2 2002 Wind Loading of Structures – covers a number of different rooftop appurtenances including solar PV.

Ground-mounted systems generally require frames as well as solid foundations and concrete footings to provide greater stability in high winds. These additional balance-of-system components would add to the overall expense of a project. There appears to be little specific data available, however, in relation to potential uplift issues around medium-scale installations. This would need to be considered when evaluating the relative merits of roof-top and ground-mounted installations.

5.3.8 Access and Maintenance Issues

Proponents of medium-scale solar also need to consider how installations can be accessed for the purposes of ongoing maintenance, such as cleaning of panels, fixing of electrical wiring or resetting of tracking devices. Ground-mounted systems, for example, are likely to be located in relatively remote or outer urban areas. Such systems can therefore be more expensive to maintain as it will take time for maintenance staff to reach the site, even where the actual work required is quite simple to undertake. Where panels have been integrated into a building in the form of sunshades, it might not be possible for automated cleaning devices to move up and down the façade of the building and consideration would need to be given to “self-cleaning” mechanisms or other more manual cleaning mechanisms.

5.3.9 Metering requirements

Ground-mounted installations will not necessarily be located adjacent to the operating premises of an organisation. This could mean that it becomes more difficult to accurately offset generation against consumption as the import and export flows would not pass through the same meter.

5.3.10 Voltage Regulation

Voltage levels should be maintained within a certain range. If voltage levels move fall outside this range, then there is a risk of damage to equipment and appliances at

the household level. The use of intermittent or unscheduled generation such as solar where output can suddenly drop or increase due, for instance, to changing cloud cover conditions, can affect voltage regulation. Where embedded generation is concentrated in a particular area, such voltage regulation issues are more likely to occur. There is an increased risk of such problems with larger medium-scale installations where the aggregated capacity of one project may be enough to reach critical mass.

5.3.11 Grid Stability

Large uptake of renewable installations could have the ability to impact upon grid stability. Consideration needs to be given to whether increased uptake of medium-scale solar is likely to increase the difficulty of keeping the electricity supply system within its technical operating limits, given that these limits are quite demanding, and at what point issues are likely to arise.

5.3.12 The potential need for network upgrades

Even though medium-scale assets are more likely to be connected to distribution than transmission systems, depending upon the concentrations of new embedded generation, there may still be a need for system upgrades potentially leading to increased project costs and delays in the commissioning of systems. Medium-scale solar, particularly in the MW range, has the potential to trigger redesign or replanning of the LV networks. The five Victorian distributors already require additional system checks at the small-scale level to ensure the network can adequately deal with feedback (at 10 kilowatts for four of the distributors and at 4.5 kilowatts for the fifth).

5.4 Procedural and Administrative Barriers

5.4.1 Short Regulatory Timeframes

It has been argued that regulatory timeframes in the electricity sector are currently set in a way that does not allow proponents of medium-scale projects to adequately forecast beyond the short term.

5.4.2 Ability to Participate in the Energy Market

The Australian Energy Market Operator (AEMO) defines small generation as anything with a nameplate rating of under 5MW. Such generation is generally connected to the distribution network and is therefore also referred to as embedded or distributed generation. In December 2009 AEMO released a Discussion Paper aimed at identifying and addressing barriers to the participation of small generators in the energy market. A reference group was convened in March 2010 to assist in the development of a Small Generator Framework Design and a determination of principles to be pursued was published on 2 August 2010.¹²

One of the issues identified during this process was the non-scalability of registration fees. Proponents who wish to register with the NEM in order to access wholesale market prices must currently pay a one-off registration application fee which is significant compared to the cost of a small generation installation. The charge is the same regardless of the system capacity of the individual unit or the proponent's ability

¹² *Small-Generator Framework Design*, AEMO, Document No. MD_SG_001, Version 1.0.

to pay. The combined costs can contribute to making a medium-scale installation financially unviable.

5.4.3 Ability to Dispatch

Commercially available storage facilities are currently unavailable for solar PV (although solar thermal does provide more options). Solar PV therefore has limited ability to respond to rapid changes in demand in the market place. Therefore solar PV is not able to be fully dispatched but, if a suitable solar forecasting process can be developed, it may be able to operate in the National Electricity Market as semi-dispatched generation.

5.4.4 Availability of Standards and Guidelines for Medium-Scale Systems

There are a number of standards applying to solar systems including the AS5033 (relating to the installation of photovoltaic (PV) arrays) and the AS4777 series (relating to grid connections of energy systems via inverters). It appears that the current AS4777 series largely focuses on small-scale installations (10kW, or up to 30kW in the case of three-phase installations), although a review of these standards is currently underway.

QU3: What are the immediate financial short-term barriers to investing in the medium-scale solar sector and how do these differ from investment in small or large-scale solar?

QU4: What are longer-term financial barriers to investing in the medium-scale solar sector and how do these differ from investment in small or large-scale solar?

QU5: Have all the relevant barriers to uptake of medium-scale solar been identified in this Discussion Paper, and if not, what are they?

QU6: Can these barriers be differentiated by market segment (for example, are business entities likely to encounter different barriers to government organisations or community groups?)

QU7: What is the most significant barrier affecting your particular market segment?

6 Potential Benefits from Medium-Scale Solar and Opportunities for Uptake in Victoria

Medium-scale solar has the potential to provide a number of benefits in relation to both individual proponents and the wider Victorian community as a whole. The following section examines:

- How medium-scale solar might contribute in meeting a number of broader policy objectives;
- Specific drivers likely to influence individual proponents looking at investing in medium-scale solar; and
- An overview of the potential for medium-scale solar in Victoria.

6.1 Broader Policy Aims for Medium-Scale Solar

There are a number of policy objectives at play that could potentially be met via increased uptake within the medium-scale solar sector as outlined below.

6.1.1 Meeting of Electricity and Renewable Energy Related Targets

A primary aim would be to assist in meeting reduction and renewable energy targets. As noted above, Victoria is aiming to reduce its greenhouse gas emissions by 20% by 2020. It is also seeking to source 20% of its electricity from renewable sources by the same date under the Commonwealth RET scheme. These are ambitious targets, and will require action on a number of fronts.

6.1.2 Contributing to Security, Reliability and Affordability of Supply

Medium-scale solar has the potential to contribute to the security, reliability and affordability of Victoria's electricity supply, except perhaps in relation to the issue of voltage regulation. It can for example assist in the reduction of peak demand, particularly where solar generation during daytime hours coincides with increased air-conditioning load. It can also contribute to affordability of supply by allowing proponents to reduce their electricity consumption from the grid, as well as providing a potential means of hedging against rising electricity prices.

6.1.3 Promoting Local Industry and Creating Job Opportunities

An additional policy objective is to promote growth in the local solar industry, to create additional employment opportunities and provide a means of reinvigorating regional economies. Consideration would need to be given to whether some geographic areas of Victoria are better placed to provide benefits in relation to the uptake of "medium-scale" solar, whether particularly solar industry sectors are better established than others (for example manufacturing and production as opposed to installation and associated wiring or construction work) and the ability of Victorian industry to compete with well-established international market participants. Consideration might also be given to whether medium-scale solar could provide an additional opportunity for primary producers.

Jobs for the Future Economy: Victoria's Action Plan for Green Jobs outlines the Government's primary aims in this area including: securing more jobs in construction; securing more jobs in energy, developing sustainability skills, driving low emissions industry growth, and promoting innovation.

6.1.4 Public and Community Engagement in the Mitigation of Climate Change

Increased uptake of "medium-scale" solar can provide benefits to the community as a whole. For example it has the potential to contribute to reductions in greenhouse gas emissions providing long term benefits to society. It also has the potential to help the community to consider and understand the impact of energy usage through increased visibility of renewable installations in the public space.

Consideration could also be given to how communities might best be engaged in this space, for example through an aggregated model. Such a model could allow individuals who might otherwise be unable to install solar (for example due to space constraints) to contribute towards the costs of a medium-scale system with any resulting benefits also being shared amongst the group. Uptake of locally or community owned projects in the medium-scale space, could have the potential to

build social acceptance of and social licence for Government to achieve its goals in relation to larger scale solar developments.

QU8: What level of uptake would be required for medium-scale solar to make a significant contribution to meeting renewable energy and greenhouse gas reduction targets and how feasible is such a level of uptake?

QU9: What contribution is medium-scale solar likely to make to the security and reliability of supply?

QU10: How does this contribution differ from the contribution that is likely to be made by small or large-scale solar?

QU11: What are the opportunities for establishing local manufacture and production of solar technologies? To what extent are these regionalised?

QU12: What are the benefits of increased community engagement in this space over and above financial benefits? To what extent can these be quantified or do they remain largely intangible?

QU13: What support models for medium-scale solar are likely to provide the greatest opportunities for community engagement?

QU14: Are there any further broad policy aims which should be considered?

6.2 Specific Drivers for Investing in Medium-Scale Solar

6.2.1 Return on Investment

One of the principal deciding factors for commercial entities or other organisations considering investment in medium-scale solar continues to be whether they will receive sufficient return on investment and over what period of time. Investors generally require certainty around system costs and performance, payback periods and ongoing maintenance and operational costs before committing significant funds.

The need to obtain sufficient return on investment could be further divided into those proponents who are seeking to recoup their costs by offsetting their emissions and hence avoiding electricity costs, and those who wish to recoup their investment via the generation of a new income stream.

6.2.2 Protecting against rising electricity prices and preparing for a carbon price

Individual proponents of medium-scale solar projects may seek to protect themselves against potential price rises in electricity. Such price increases are most likely to result from the introduction of a price on carbon, but may also occur in the absence of a price on carbon as the result of other market factors. Protecting against such price rises could be achieved through the generation of renewable energy to offset consumption costs thereby avoiding the purchase of electricity at retail market rates.

Alternatively, and depending upon what financial incentives are potentially put in place for excess solar electricity fed back into the grid, proponents could generate an additional income stream to assist in offsetting price increases.

Care would need to be taken that any potential solution that is considered does not in itself generate price increases. The Victorian premium feed-in tariff scheme, for example, includes a provision that the annual average cost of this scheme should not exceed \$10 per electricity customer. This is to ensure that customers who cannot afford solar installations are not unduly impacted by increased electricity prices resulting from the costs of a scheme which directly benefits only a sub-section of the population i.e. those than can afford solar panels.

6.2.3 Potential for Increased Industry Development and Employment Opportunities

Given the limited number of players currently operating in the solar manufacturing sector in Australia and the likely continuing availability of competitively priced products from overseas, it is unlikely, in the short term, that job creation would be a primary driver for individual developers in the medium-scale space. Developers will be looking to obtain panels and other balance-of-system components at least cost, regardless of whether they are sourced locally or overseas. The distribution and installation sectors of the industry, on the other hand, have already seen rapid growth and would be seeking to further consolidate their position.

6.2.4 Corporate or Organisational Social Responsibility

Corporations or other organisations may be driven by a desire to behave in an ethical and environmental way. The question arises whether organisations that prioritise “ethical” behaviour, are required to absorb the cost of a solar installation in return for more “intangible” benefits or whether the adoption of an “ethical” approach can be complimentary to economic concerns. In other words, an organisation with strong green credentials may find it can access new markets and increase its rate of return. Corporations or other organisations may also need to consider whether investment on the grounds of social responsibility becomes more or less viable in an economic sense depending upon the scale of the installation that is proposed.

***QUI5:** What are the immediate short-term financial drivers for investing in the medium-scale solar sector?*

***QUI6:** What are longer-term financial drivers for investing in the medium-scale solar sector?*

***QUI7:** What other drivers exist for investment in medium-scale solar and to what extent are these differentiated by different market segments (for example business, government and community groups)?*

***QUI8:** What is the primary driver in your particular instance and why?*

6.3 Potential for Medium-Scale Solar in Victoria

The following section provides a brief overview of Victoria's solar potential in relation to available sunlight, access to the grid, global and local market conditions, including availability of local product and the current labour force.

6.3.1 Available Sunlight

The Clean Energy Council has produced a *Solar PV Consumer Guide* which contains information on some of the major Australian cities and the associated average daily production from solar photovoltaic systems. Clean Energy data is provided for small-scale systems ranging from 1 to 4 kilowatts. Extrapolating from this data to medium-scale installations and assuming a constant rate of output per 1 kilowatt of panels, the following average daily production rates can be assumed.¹³

Average Daily Production					
City	1kW system	5 kW system	100kW	200kW	1MWh
Adelaide	4.2 kWh	21 kWh	420 kWh	840 kWh	4.2 MWh
Alice Springs	5.0 kWh	25 kWh	500 kWh	1 MW	5 MWh
Brisbane	4.2 kWh	21 kWh	420 kWh	840 kWh	4.2 MWh
Cairns	4.2 kWh	21 kWh	420 kWh	840 kWh	4.2 MWh
Canberra	4.3 kWh	21.5 kWh	430 kWh	860 kWh	4.3 MWh
Darwin	4.4 kWh	22 kWh	440 kWh	880 kWh	4.4 MWh
Hobart	3.5 kWh	17.5 kWh	350 kWh	700 kWh	3.5 MWh
Melbourne	3.6 kWh	18 kWh	360 kWh	720 kWh	3.6 MWh
Perth	4.4 kWh	22 kWh	440 kWh	880 kWh	4.4 MWh
Sydney	3.9 kWh	19.5 kWh	390 kWh	780 kWh	3.9 MWh

As can be seen from this table, Melbourne, along with Hobart, rates towards the lower end of the scale, however, solar irradiation levels vary across the state and are higher in the north. For example, Mildura receives 90% of Brisbane's solar radiation levels. Average yearly global exposure¹⁴ for Victoria ranges between 12-20 Megajoules per square metre per day ((MJ/m²/day). Victoria also ranks favourably with other countries where there has been strong uptake of solar.

Location ¹⁵	solar energy (KWh/m ² /day) - GHI
Kramer Junction, California	5.38
Seville, Spain	4.92
Berlin, Germany	2.68

¹³ As noted, this table extrapolates from data relating to smaller-scale systems. Potential efficiencies of scale would also need to be factored in.

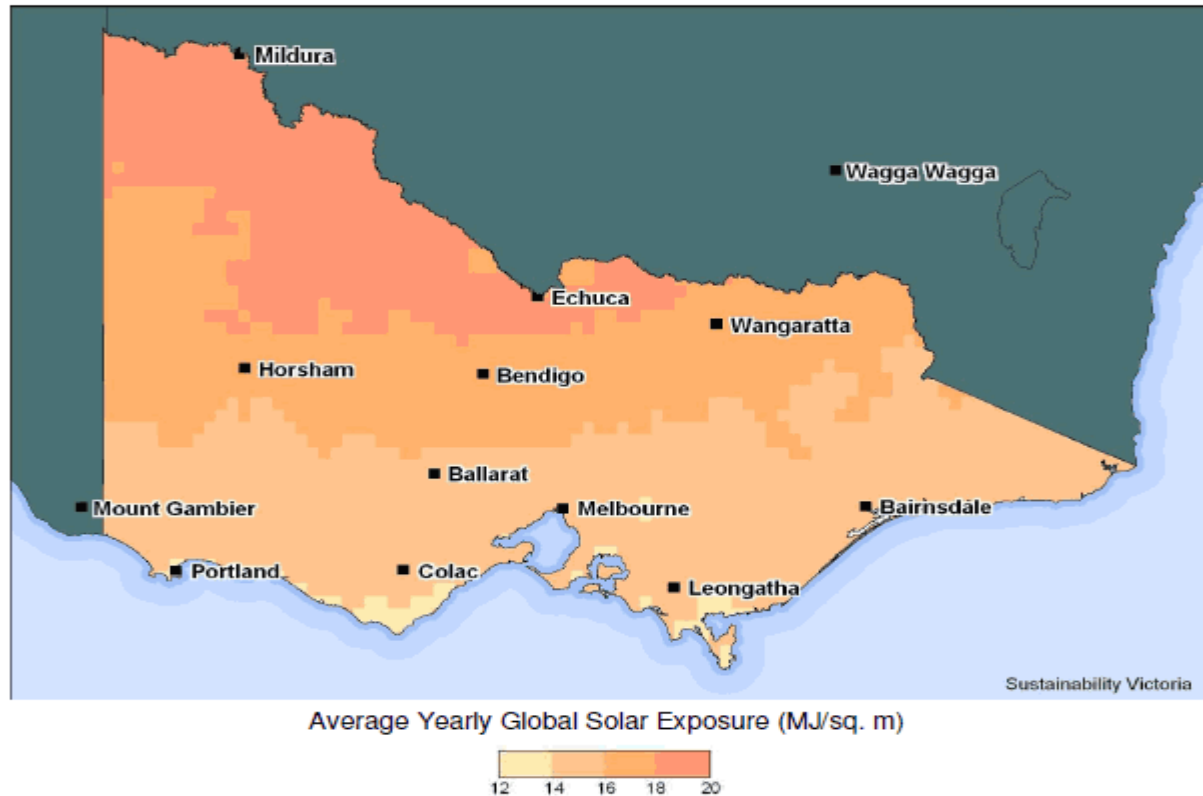
¹⁴ Global solar exposure is the total amount of solar energy falling on a horizontal surface. The daily global solar exposure is the total solar energy for a day. Typical values for daily global solar exposure range from 1 to 35 MJ/m² (megajoules per square metre). The values are usually highest in clear sun conditions during the summer, and lowest during winter or very cloudy days.

¹⁵ NASA LARC (Langley Research Centre) - satellite data, average daily global horizontal irradiation (kwh/m²/day)

Potential Benefits from Medium-Scale Solar and Opportunities for Uptake in Victoria

Mildura, Victoria	5.15
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Average Annual Global Irradiation¹⁶



6.3.2 Victorian REC Zonings

Owners of solar PV systems are potentially eligible to generate Renewable Energy Certificates (RECs). The number of RECs that can be generated will depend on the geographic location of the system. Under the federal *Renewable Energy (Electricity) Regulations 2001, Schedule 5 - Zone Ratings and zones for solar (photovoltaic) systems*, Australia is divided up into 4 zones.¹⁷ Zone 1 has the highest levels of solar irradiation and systems located in this zone can therefore generate more RECs than those located in zone 4, which has the lowest levels of irradiation. Victorian postcode are divided between zones 3 (e.g. Mildura, Swan Hill, Nhil and Shepparton) and 4 (e.g. Melbourne, Ballarat, Bendigo, and Wodonga). Postcode zonings are listed in Appendix C.

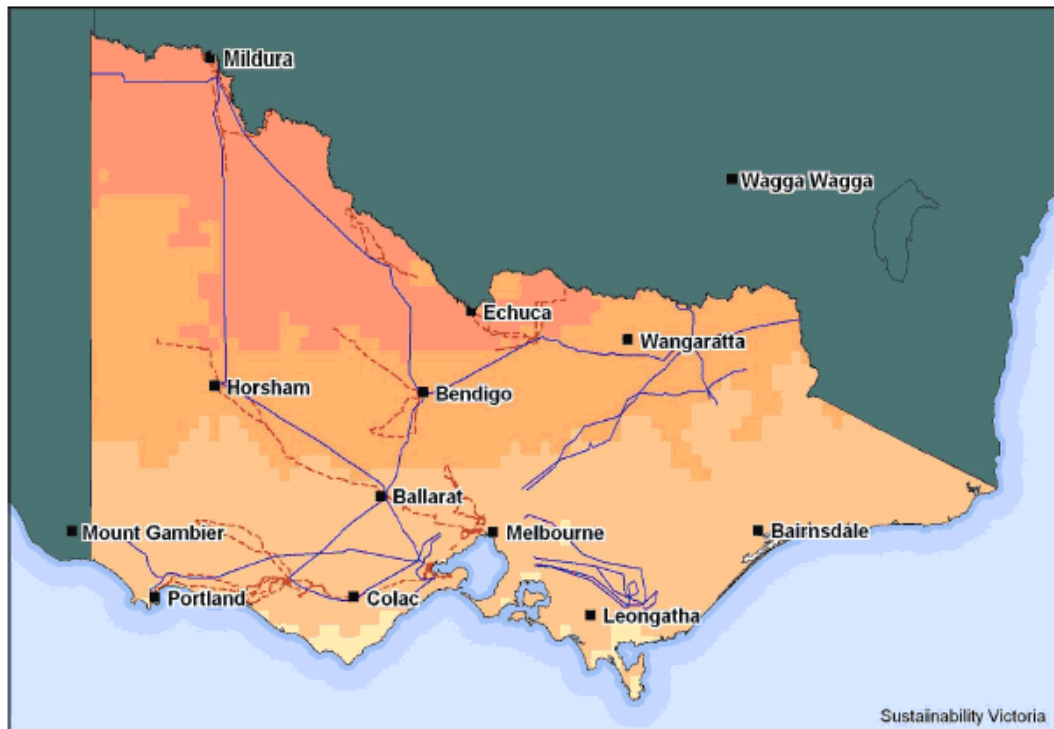
6.3.3 Grid Coverage and Accessibility

Victorian generally provides good electricity grid coverage across the state, which is likely to facilitate the connection of embedded generation. This being said, there is still the potential to incur large costs in relation to network upgrades for sites with no current electricity infrastructure, even where existing infrastructure is reasonably close. This aspect of project expenditure should therefore not be underestimated.

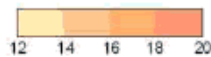
¹⁶ This and the following chart are sourced from www.new.dpi.vic.gov.au/energy/projects-research-development/solar/vlssp/victorias-solar-resource-details.

¹⁷ *Renewable Energy (Electricity) Regulations 2001*, pp 108-110.

Access to the Electricity Grid



Average Yearly Global Solar Exposure (MJ/sq. m)



— Electricity Transmission line
 - - - Electricity 66 kV line

18

Commonwealth data for systems installed under its now closed Solar Homes and Communities Plan (SHCP) show that whilst there was a dramatic increase in the number of grid-connected installation, off-grid installations remained low and hardly increased over the period in question.

Victorian installations under the Commonwealth SHCP ¹⁹		
	Grid-Connected	Off-Grid
September 2009	10,470	1,193
December 2009	14,942	1,194
March 2010	20,662	1,195
May 2010	27,395	1,196

When considering appropriate support mechanisms for medium-scale solar in relation to grid-connected and off-grid systems, policy intent comes to the fore. If the intention is to offset consumption at a particular site, then off-grid systems could be viable. If the primary intention is to provide excess electricity sourced from renewable sources back to the grid, thereby meeting Victoria's overall renewable energy targets, then support for off-grid systems would not be appropriate.

¹⁸ www.new.dpi.vic.gov.au/energy/projects-research-development/solar/vlssp/victorias-solar-resource-details

¹⁹ www.climatechange.gov.au/en/what-you-need-to-know/renewable-energy/solar-homes/history.aspx

On the other hand, off-grid systems could provide an attractive source of electricity in the context of increased risk of bushfires and the potential risk associated with Single Wire Earth Returns (SWERs).

6.3.4 Global Market Outlook for Solar²⁰

In late 2008 the global solar market experienced a transition from a supply constricted to a demand driven market which saw the price of solar modules significantly decrease. This was primarily due to:

- The development of manufacturing in low cost countries such as Malaysia, Taiwan, China and the Philippines;
- Engineering innovation and process controls;
- the decreasing cost of materials for solar module production; and
- the ability to capture economies via increased module production.

Instability in the market in 2008 allowed Asian manufactures to acquire market share through lower cost modules. With low cost per watt being a determining factor for solar companies' growth and profit margins, a number of leading manufacturers of solar modules are now moving their facilities to countries with lower labour costs such as Malaysia, China and Taiwan.

The spot price of poly-silicon has decreased from \$400/kg in 2008 to less than \$50kg in 2010. Despite this reduction in material costs, some solar manufacturers locked themselves into long term poly-silicon contracts in 2008 (which was deemed prudent at the time). Acquiring a competitive pricing advantage in the market has and will continue to be determined by a company's ability to renegotiate new poly-silicon contracts. New manufacturing methods are also evolving to reduce the material costs of solar modules.

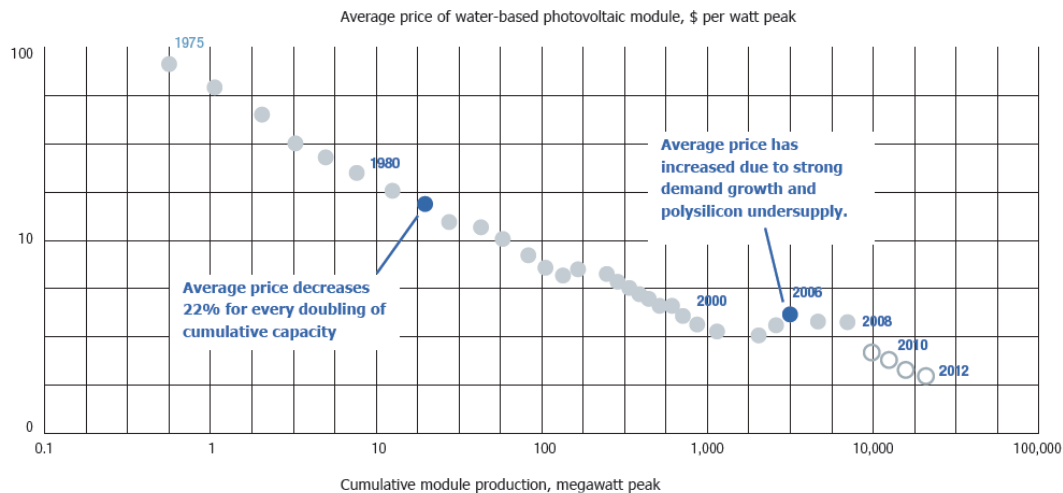
Demand has also been driven by a range of Government policies such as generous solar feed-in tariffs in Germany and Spain, although the Spanish market has since collapsed. In 2010 and beyond, it is anticipated that countries such as Italy, the United States, Japan and France are likely to further add to demand.

Analysis by PikeResearch has estimated that there are more than 190 major cell and module manufacturers. With so many players in the market a gross oversupply of solar modules is likely to occur and "total available module capacity by the end of 2010 could reasonably add up to more than 30GW"(pg 2). This oversupply of solar modules is expected to place increasing downward pressure on module prices, potentially opening up the market to a variety of smaller and emerging markets. PikeResearch estimates a 25% compound annual growth rate from 2010. It also predicts that solar produced power in many of the world's energy markets will reach grid parity by 2013.

²⁰ Cavanaugh, Dave and Wheelock, Clint, *The New Solar Market: Implications of the Shift to a Demand-Driven Market: Key Differentiators to Watch in 2010 and Beyond*, Pike Research, Published 2Q 2010, passim.

The chart below reflects the price reduction of solar modules as measured in \$US/per watt since 1975 and forecasts that solar modules will continue to decrease beyond 2010 to less than \$US4/per watt.

The Economics of Solar Power: The Learning curve



Source: McKinsey Quarterly Website

6.3.5 Australian Outlook for Solar

Given that Australia is a price taker in the global solar market and has little manufacturing presence in the solar industry, it is likely that Australia will follow the global outlook outlined above for solar modules pricing trends.

Two key factors, outside of global market events, are likely to determine local demand for solar panels: the strength of the Australian Dollar, given the high proportion of system components that must be imported from overseas, and the regulatory environment (for example the introduction of a number of premium feed-in tariff regimes across various jurisdiction, primarily aimed at the residential market). To date it has been the latter which has provided the main stimulant for the growth of the solar industry in Australia.

A report commissioned by the Clean Energy Council in early 2010 has noted that estimated price decreases for the first half of 2010 average out at around 5%, followed by a period of stabilisation in the second half of the year. It has also forecast that Australia will not reach grid parity before 2012 given the continuing low cost of fossil fuels and in the absence of a price on carbon²¹.

The Clean Energy Council has also noted that supply chain management will be of the utmost importance in 2010. Rapid recent growth in the solar sector and the lack of a manufacturing base in Australia means that it will be difficult to meet installation schedules without such management procedures. A number of companies, for example, experienced supply shortages of both inverters and panels early in 2010.

²¹ *Solar PV Australia 2010: A Global Outlook*, Clean Energy Council Report, February 2010.

For medium-scale projects where project timelines are crucial to managing overall costs, delays could significantly impact on the viability of a project.²²

Whilst the cost of solar panels is rapidly decreasing, and it appears there may be significant economies of scale on the production side, it could be argued that, because of its modular price, the scalability of solar PV is relatively flat. This means that opportunities for economies of scale in relation to individual medium-scale installations are potentially limited. Medium-scale projects would also need to take into account costs associated with balance of system (BoS) components such as inverters or concrete footings. The cost of BoS components may actually increase with larger installations.

6.3.6 Availability of Local Product and Other Services

Currently, there is only one producer of solar cells and modules in Australia, Silex Solar which is based in Homebush Bay, Sydney. 12 MW of cells and modules were produced in Australia in 2009 at the Homebush Bay factory from imported wafers.²³

6.3.7 Current Australian Solar PV Labour Force

Currently, the Australian Solar PV labour force is largely concentrated in the distribution and installation sectors. There appears to be a relatively high labour intensity in comparison with other countries due to the current emphasis on small-scale as opposed to commercial or utility-scale installations.²⁴

Estimated PV-related labour places in 2009²⁵	
Research and development (not including companies)	300
Manufacturing of products throughout the PV value chain from feedstock to systems, including company R&D	200
Distributors of PV products	1400
System and installation companies	3100
Utilities and government	200
Other (market analysts, financiers etc)	100
Total	5300

²² Ibid. p 44.

²³ Watt, Muriel and Wyder, Joe, *National Survey Report of PV Power Applications in Australia 2009*, May 2010, IT Power Australia with support from ASI for the Australian PV Association: Australia's only solar PV manufacturer, BP Solar, closed its factory in Homebush Bay in March 2009 so the figure for 2009 is only based upon 3 months worth of manufacture. The factory was subsequently purchased by Silex Solar.

²⁴ Ibid p 31.

²⁵ Ibid. p 31.

6.3.8 Number of Currently Accredited Installers

As at September 2010 Victoria had 735 Clean Energy Council accredited solar PV installers, the highest number of any jurisdiction²⁶:

	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Mar 2010	34	428	15	381	153	46	536	251
Sep 2010	41	725	15	549	215	51	735	395

QU19: To what extent is increased uptake of medium-scale solar a regionalised opportunity?

QU20: Should differentiated support mechanisms be considered, depending upon the type of connection?

QU21: To what extent is the need to import system components likely to impact on a project's capital costs (for example through foreign exchange rates and increased distribution costs)?

QU22: Is labour density likely to increase or decrease when investing in larger-scale installations? In other words, is the relationship between kilowatts installed and number of jobs created a constant, or are medium-scale installations likely to require more or less employees than smaller-scale installations?

QU23: How are safety and OH&S concerns best addressed when implementing medium-scale solar?

QU24: Is there a need to modify or extend current accreditation procedures in relation to medium-scale solar?

QU25: What opportunities are available for increased training in the solar sector?

7 Potential Solutions to Addressing Current Barriers to Uptake of Medium-Scale Solar

When examining how current barriers to the uptake of medium-scale solar might best be addressed, consideration needs to be given to how each potential solution meets the following general policy principles:

²⁶ Data supplied by Clean Energy Council.

Cost Efficiency:

A least cost solution principle dictates that a policy objective should be pursued at minimum cost.

Adaptability:

The solar market and policy environment is difficult to predict and has undergone significant changes over the recent past. The most robust policy is therefore the one which is most flexible in order to ensure the original policy objective are fulfilled in the most effective and timely manner.

Investment predictability:

While adaptability is desirable, individual investors will also require a level of certainty over future revenue streams in order to secure finance on commercial terms. Further, investors will need to have confidence that the policy upon which such revenue streams depend is one which will not be suddenly withdrawn by future governments over the course of a project's life.

The Case for Non-Intervention:

Alternatively, the information provided in response to this Discussion Paper, may suggest that no immediate action in this space is necessary, because the market will deliver a level of outcomes suggesting there is no case for government intervention.

7.1 *Potential Solutions to Addressing Current Barriers to Medium-Scale Solar*

The following section provides a brief overview of a number of potential solutions aimed at addressing current barriers to the uptake of medium-scale solar.

7.1.1 Pilot Study of Medium-Scale Solar

Given the relative lack of expertise in the Australian market in relation to the medium-scale market, it might be appropriate to consider a pilot study with support initially being provided for only a limited number of projects (for example 5). Such a pilot study would provide the opportunity to gather learnings in relation to technical issues, cost and funding related issues and administrative and procedural issues. Such learnings could then potentially be fed into a more broadly targeted support mechanism.

7.1.2 Potential for a Medium-Scale Feed-in Tariff

If one of the primary barriers to uptake of medium-scale solar is the difficulty of recouping costs, then a feed-in tariff could provide one potential financial support mechanism.

Feed-in tariffs allow for upfront costs to be paid off over a period of time and provide some level of guarantee to investors that they can recover at least a portion of their up front investment. The European Photovoltaic Industry Association's (EPIA's) 'Photovoltaic Observatory' recently released a number of policy recommendations in

relation to solar PV.²⁷ One of its key recommendations is to allow for the fine-tuning of feed-in tariff schemes via a number of control parameters. Such control parameters could include, but not be restricted to differentiation by technology, configuration (for example, roof-mounted, ground-mounted or integrated into buildings (BIPV), region, for example higher irradiation levels attracting higher tariffs. They could also include differentiation by year of commissioning and time-of-day. Another design feature that is generally considered in relation to feed-in tariff regimes is the inclusion of a regular review mechanism which would allow for adjustments to the rate applying to any new installations, although it is generally recommended that the rate for existing installations remain unaffected to provide investor certainty. Other features requiring consideration are potential funding mechanisms, the provision of caps and scheme duration.²⁸

7.1.3 Reverse Public Auction Process

Reverse public auctions are a relatively new phenomenon in use, for example, in the US and UK as well as in the Australian private and public sectors. Put simply, a reverse public auction process allows multiple suppliers to compete with each other in selling their product(s) to a single buyer. Suppliers can make multiple bids within a set period of time. It is the reverse of a traditional auction process in that the price is pushed down rather than up. The system usually relies upon an internet-based procurement tool and is therefore also sometimes referred to as a ‘Reverse Online Auction’.

The reverse public auction process is considered to have a number of advantages and disadvantages.

Those in favour of the process argue that it can offer both cost reductions and reduced tender cycles by limiting price negotiation times. It is also considered to provide a level playing field for smaller players in the market who may only have limited marketing resources at their disposal. A further argument made in its favour is that it encourages business efficiencies through the introduction of increasingly innovative processes and investment in new equipment. Finally, it provides a transparent and auditable process.²⁹

On the negative side, it has been claimed that reverse public auctions have the potential to reduce profitability by depressing profit margins. It has also been suggested that there is the potential for collusion amongst organisations. Other potential problems include reliable internet access to the procurement tool and objections to the procurement tool being used which could lead to a reduced number of offers.³⁰

²⁷ EPIA Photovoltaic Observatory: Policy Recommendations, 1 September 2010.

²⁸ Further detail relating to potential feed-in tariff design components can be found in the Appendices.

²⁹ Major, Cornelia, *Reverse Auctions: A Suitable Procurement Tool for the WA Public Sector?*, WA Department of Treasury and Finance in association with the Curtin Business School www.dtf.wa.gov.au/cms/uploadedFiles/CorneliaMajor_Reverse_Auction-A_Suitable_Procurement_Tool_for_the_WA_Public_Sector.pdf

³⁰ Ibid.

The Californian Public Utilities Commission (CPUC) has submitted a proposal for a Reverse Public Auction System whereby developers would compete for renewable energy projects sized between 1 and 20 MW.³¹

7.1.4 Capital Grants or Loans

Alternatively, and given the significant costs associated with the installation of medium-scale systems, support might best be aimed at providing support in relation to the initial up front capital costs of projects.

7.1.5 Solar Power Purchase Agreements

Under the power purchase agreement model, energy services companies install solar arrays on the roofs of large companies or organisations. The energy service company maintains ownership of and operates the installation. It recoups its costs by selling electricity to the building owner at prices that are lower than those offered by their utility. This means that the building owner has no capital investment or maintenance costs and is able to lock in electricity rates over a set period thereby hedging against rising electricity costs. The model has been used by, amongst others, SunEdison which recently entered into a joint venture with private equity firm First Reserve to finance, build, and operate solar photovoltaic projects.

7.1.6 Funding through Council Rates

Once funding model which could assist third party investors in medium-scale solar is to recoup project costs via Council rates. The third party would cover the costs of the initial installation, however, the actual owner of the installation would then be charged higher Council rates over a period of time to cover these upfront costs. The third party investor would be able to recoup its costs from the Council. This would provide a more formalised method of recovering costs and would provide greater surety than relying on individual system owners to make cheque payments. This is similar to the design adopted by the Melbourne City Council's 1200 Buildings program whereby owners of buildings can obtain financial assistance for retrofits via a range of funds and these costs are then recouped by charges attached to council rates notices.³²

7.1.7 Certificates Scheme

As noted above, the Commonwealth RET scheme has been divided into two parts: the LRET for large-scale generation allowing for the creation of LGCs; and the SRET for small-scale generation allowing for the creation of STCs. Whilst some financial support could be provided to medium-scale proponents of solar, either via the SRES or the LRET depending on where a lower limit is set, limited uptake of medium-scale installations to date suggests that this will not, in itself, provide a sufficient incentive for investment in the medium-scale sector and that there are other barriers which must also be addressed.

7.1.8 Inclusion of Medium-Scale Solar under Energy Efficiency Programs

A number of energy efficiency programs currently operate within Australia. Such programs generally offer participants rebates and assistance to purchase more energy efficient appliances. Other programs provide advice on choosing high efficiency

³¹ See Appendix D for further information.

³² Please refer to Appendix A for further details of the 1200 Buildings Program.

appliances, offer free home sustainability assessments or other incentives for a defined range of activities such as the installation of new energy efficient appliances or more generalised upgrades to facilities. There are also a number of rating tools available, such as NABERS and Green Star Ratings.

Some programs, such as the Victorian *Energy Saver Incentive scheme (ESI)*, encourage consumers to become more energy efficient by offering discounts or incentives on specified energy efficient products and services. These ‘white certificate schemes’ are largely geared towards the residential sector but also include the business/commercial sector in some jurisdictions.

The National Strategy on Energy Efficiency aims to encourage and support innovation in energy efficient technologies and approaches. The Strategy is designed to substantially improve minimum standards for energy efficiency and accelerate the introduction of new technologies by improving regulatory processes and addressing the barriers to the uptake of new energy-efficient products and technologies.

Further investigation would be required as to how appropriate the inclusion of medium-scale solar would be under such programs and what discount factors would potentially need to be applied.

7.2 Interaction with Other Policies

When considering appropriate support measures for medium-scale solar, the issue of additionality should also be considered. For example if a feed-in tariff were considered to be the most appropriate option, and depending on the capacity definition for medium-scale solar, then it should be stipulated that proponents cannot claim a medium-scale tariff in addition to a standard tariff. Similarly, if medium-scale installations are already able to claim under the Commonwealth RET scheme, then double-dipping should be avoided.

7.2.1 Addressing Market Participation Issues

With regards to the current annual registration fees required for market registration on the NEM, there is potential to separate registration of the participant entity from the registration/classification of the generating units/system. This would allow streamlining of the AEMO registration process and the charge for registering a small-generating system could be significantly reduced. If the registration can be managed through the Market Settlements and Transfers system (MSATS), as is the case for new non-scheduled market loads, then the cost to register would be effectively zero.

7.2.2 Addressing Connection Issues

A review of current network connection related issues, including for owners of small to medium-scale distributed generation, is being conducted by the Department of Primary Industries as part of Victoria’s *Jobs for the Future Economy - Victoria’s Action Plan for Green Jobs*. Output from this review could potentially be used to address medium-scale solar network connection issues.

QU26: *Given the barriers you have already identified as being the most significant for you, what measure/s would provide the most appropriate means of overcoming these barriers and why?*

8 Next Steps

8.1 *Providing a Submission to the Discussion Paper*

Interested members of the public and solar industry are encouraged to make a submission to this process. Please note that there is no requirement to provide an answer to all of the questions posed in this Discussion Paper. To ensure the efficiency and effectiveness of this consultation process in informing medium-scale solar policy development, submitting parties are asked to adhere to the following principles:

8.1.1 Evidence claims

Where a claim is made in a submission it should be supported by evidence. For example, if a party states in a submission that “policy option A will result in higher transaction costs to my business than policy option B”, some attempt should be made to demonstrate this. In the above example, it would be useful to specify how many staff would be required to service a particular type of transaction; how much staff time would be involved; and what the salary rate that staff member is.

Not all statements in a submission will lend themselves to strict quantification. However where it is possible to quantify a claim or statement, it provides greater rigour to an argument. Quantifiable evidence will tend to be of greater use in determining an effective policy than unquantifiable claims.

8.1.2 Indicate clearly where material is commercial-in-confidence

The Medium-Scale Solar Working Group will assume that any material provided to it through a public submission process is suitable for publication, *unless the party expressly states otherwise*. Where any statement, document or other material is confidential in nature, the submission should make this clear.

Preferably any confidential material will be documented separately to material which is suitable for publication. This will facilitate efforts to publish submissions provided without breaching confidentiality.

Parties may if they wish have their identity, and their entire submission, regarded as confidential. Once again this should be clearly indicated in the submission.

8.1.3 Format and timeframe

Submissions should:

- be received by 5:00pm Australian Eastern Summer Time, Tuesday 9 November 2010;
- be lodged electronically to the following email address:
mediumscale.solar@dpi.vic.gov.au
- Or be mailed to:
Medium-Scale Solar Working Group
Energy Sector Development Division
Department of Primary Industries
GPO Box 4440
Melbourne VIC 3001

- not exceed 20MB in size; and
- clearly indicate the organisation or individual which is making the submission.

8.2 Community and Industry Reference Group

A Community and Industry Reference Group (CIRG) Forum will be organised during the submissions period and consultation will be undertaken with members of the CIRG in preparation for the release of the final report in December 2010.

8.3 Final Report

A report will be provided to the Minister for Energy and Resources in December 2010 summarising the findings from submissions and the Community and Industry Reference Working Group.

9 Bibliography

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