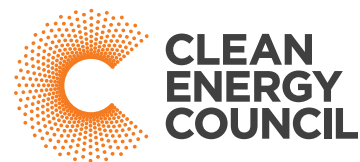


GUIDE TO INSTALLING SOLAR PV FOR BUSINESSES IN NEW SOUTH WALES



Sydney Theatre Company

visit cleanenergycouncil.org.au





The Clean Energy Council acknowledges the support of the NSW Office of Environment and Heritage (OEH) in producing this publication. For more information on the OEH, please visit <http://environment.nsw.gov.au>

Front cover image courtesy SMA Australia

CONTENTS

MINISTER'S MESSAGE	2
MESSAGE FROM THE CLEAN ENERGY COUNCIL	3
WHY INVEST IN SOLAR PV?	4
TOP SIX TIPS FOR INVESTING IN SOLAR PV	5
STAND-ALONE SOLAR PV SYSTEMS	6
GRID-CONNECTED SOLAR PV SYSTEMS	6
HOW MUCH DO SOLAR PV SYSTEMS COST?	7
FINANCIAL MODELS FOR INVESTING IN ROOFTOP SOLAR	8
IS SOLAR PV RIGHT FOR MY BUSINESS?	10
SMALL BUSINESS EXAMPLE	12
DO I NEED TO OBTAIN ANY BUILDING OR COUNCIL PERMITS?	14
WHAT IF I DON'T OWN MY BUILDING?	14
ARE THERE OTHER OPTIONS?	
RESOURCES AND INCENTIVES	15
RENEWABLE ENERGY CERTIFICATES	16
FEED-IN TARIFFS	19
CLEAN ENERGY FINANCE CORPORATION	19
DESIGN AND INSTALLATION	20
1. FINDING A SOLAR PV RETAILER	21
2. DESIGN AND FEASIBILITY	21
3. PRODUCT SELECTION	22
4. QUOTATION AND AGREEMENT	22
5. APPLY FOR ANY BUILDING APPROVALS	22
6. CONNECTING TO THE GRID	23
7. APPLYING FOR GOVERNMENT REBATES	24
8. NEGOTIATING A RETAIL AGREEMENT	24
MAINTAIN AND ENJOY YOUR SYSTEM	26
WHAT IF SOMETHING GOES WRONG?	28
SOLAR PV CHECKLIST	29

MINISTER'S MESSAGE



ROB STOKES MP

NSW Minister for the Environment, Minister for Heritage, Minister for the Central Coast, and Assistant Minister for Planning

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Renewable energy from solar photovoltaic (PV) systems is set to play an increasingly important role in the ongoing transition of our energy system. NSW is blessed with abundant natural resources and the further uptake of solar PV helps us maximise the benefit of our natural resources for current and future generations. Support for solar PV will also provide ongoing economic prosperity through job creation and new investment in green businesses and infrastructure.

With prices for mid-scale solar PV now comparable with peak power in some areas, the installation of solar systems for businesses is growing. The recent introduction of alternative financing options is aiding the uptake of solar and as a result, we are seeing profound changes in the way power is generated and distributed.

The Clean Energy Council's *Guide to Installing Solar PV for Businesses in NSW* is a valuable resource for businesses looking to invest in solar energy. Developed in collaboration with the NSW Office of Environment and Heritage, the guide helps businesses to make important decisions on the design, installation and financing of solar PV systems. An important addition to this NSW-specific guide is a discussion of the different finance models that have recently become available. These include solar leases, Power Purchase Agreements and Environmental Upgrade Agreements, which now provide alternatives to the traditional model of outright ownership.

There is a strong awareness among businesses in NSW of the benefits of power generated from solar PV. The government aims to provide further guidance and support in this area to ensure that NSW is leading the way nationally in the implementation of renewable energy projects.

A handwritten signature in black ink, reading 'Rob Stokes'.

MESSAGE FROM THE CLEAN ENERGY COUNCIL



KANE THORNTON

Acting Chief Executive of
the Clean Energy Council

With electricity prices rising, many businesses are now looking to solar PV as a way of generating their own clean electricity and keeping their operating costs low.

As the peak body representing solar and renewable energy companies in Australia, the Clean Energy Council has produced this guide in conjunction with the New South Wales Office of Environment and Heritage to help businesses make informed decisions when it comes to installing solar.

The Clean Energy Council represents and works with hundreds of leading renewable energy businesses, along with 4500 solar installers. We are committed to accelerating the transformation of Australia's energy system to one that is smarter, cleaner and more consumer-focused.

Over the last few years we have watched Australia's solar industry grow from a niche sector to a major player and way for both households and businesses to save money. More than 2 million small-scale solar systems have now been installed on household rooftops across Australia, and thousands of businesses are also realising the benefits. In 2014, the number of Australian businesses that had installed a solar system ticked over the 15,000 mark, with the total savings on power bills estimated at more than \$64 million every year.

More businesses in New South Wales have taken up solar than any other state in Australia. More than 5000 businesses across the state have installed solar systems, representing an investment of over \$160 million so far. As a result, New South Wales businesses are now saving about \$25 million per year on their power bills.

With the help of this guide, we hope many more businesses in New South Wales will be able to install solar, save money on their power bills, and ensure a more sustainable future for their business.

WHY INVEST IN SOLAR PV?

Electricity prices have increased over the last few years, resulting in increased operational expenses for businesses.

On the other hand, the cost of solar photovoltaic (PV) systems has declined, making solar an increasingly affordable option for businesses. By installing a PV system, you will be able to offset your electricity consumption and hedge against future price rises.

This guide details the key steps you will need to undertake to install solar PV at your business.

The use of solar photovoltaic (PV) panel systems has grown significantly in Australia this decade, and is now an increasingly affordable option for Australian businesses looking to hedge against the rising cost of electricity.

A number of new financing options are now available that could make it easier for your business to access the benefits of solar PV.

Solar PV systems generate power by converting the energy in sunlight to clean electricity. This conversion takes place within modules of specially fabricated materials that make up the solar panels. In most cases solar PV panels are connected to the mains power supply through a device called an inverter.

With a wide range of products and suppliers on the market, being an informed consumer has never been more important. This guide, intended for businesses wanting to invest in a solar PV system, provides an introduction to the technology and navigates the process for commercial-scale solar system installation.



TOP SIX TIPS FOR INVESTING IN SOLAR PV

1 UNDERSTAND THE ELECTRICITY CONSUMPTION OF YOUR BUSINESS AND CHOOSE THE RIGHT SIZE SYSTEM FOR YOUR NEEDS

Your consumption profile will determine the viability of solar PV for your business and help you decide what size system is appropriate.

2 INVESTIGATE FINANCIAL MODELS AVAILABLE

Different financial models are available to invest in solar PV, from upfront purchase, to solar leasing, power purchase agreements and Environmental Upgrade Agreements.

3 UNDERSTAND YOUR ELECTRICITY TARIFFS AND HOW THEY MIGHT CHANGE

The business case for investing in a solar PV system will depend on what electricity tariffs you pay and how these may change once your system is installed. Make sure you get all the information you need from your electricity retailer.

4 FIND A SOLAR PV RETAILER

Check if the company has signed on to the CEC Solar PV Retailer Code of Conduct, and make sure they only use CEC-accredited installers with experience in commercial systems. This will be critical to the design and installation of your system.

5 DO YOUR DUE DILIGENCE ON TECHNOLOGY, PRODUCTS, WARRANTIES AND GUARANTEES

There is a diverse range of products on the market that vary in price and quality. Make sure you do your homework on both the products you purchase and workmanship guarantees.

6 ENGAGE WITH YOUR ELECTRICITY DISTRIBUTOR EARLY TO UNDERSTAND GRID CONNECTION REQUIREMENTS

Connection to the grid should be discussed with your electricity distributor very early in the process so that they are aware of the project and you, or your accredited installer, are aware of any technical requirements that have to be met from an early stage.

STAND-ALONE SOLAR PV SYSTEMS

Depending on where your business is located, you may wish to install a stand-alone solar PV system. Stand-alone systems are not connected to the electricity grid and are typically installed in remote areas where there is limited connection to the grid, or areas of low electricity demand.

Unlike grid-connected systems, stand-alone systems usually have batteries and/or a back-up generator to supplement energy supply and provide electricity at night.

GRID-CONNECTED SOLAR PV SYSTEMS

Solar PV systems that are connected to the grid operate by transforming the electricity generated by the solar system (which is direct current (DC)) into alternating current (AC) electricity using an inverter, so that the power generated is compatible with the grid and ordinary business needs.

Businesses with solar PV systems use solar power first before sourcing electricity from the grid. When the panels are not producing enough power to meet load requirements the balance is drawn from the grid. This would be the case at night or on an overcast day.

According to Australian Safety Standards, if the grid is down, for example during a blackout, the inverter will shut down and the solar system will not produce any energy.

For systems with a battery backup, the inverter regulates the charge of batteries. The electricity stored in the batteries can be used at night or during blackouts.

HOW MUCH ELECTRICITY DO SYSTEMS GENERATE?					
<p>The output of a solar PV system depends on its efficiency, size and location. Commercial systems can range anywhere from 5 to 10 kilowatts (kW) up to a few megawatts (MW). This table shows the average daily production of some common grid-connected system sizes throughout New South Wales.</p> <p>The rated output is that achieved in perfect laboratory conditions. The CEC design summary software takes these de-ratings into account when predicting averages for any given system.</p> <p>Panels generate more electricity in summer than in winter and the table reflects the average daily electricity generated over a year.</p>	AVERAGE DAILY PRODUCTION				
	LOCATION	10 KW	20 KW	50 KW	100 KW
	BOURKE	43.9 kWh	87.8 kWh	219.5 kWh	439.0 kWh
	BROKEN HILL	44.9 kWh	89.8 kWh	224.5 kWh	449.0 kWh
	COFFS HARBOUR	39.5 kWh	79.0 kWh	197.5 kWh	395.0 kWh
	DUBBO	42.7 kWh	85.4 kWh	213.5 kWh	427.0 kWh
	LISMORE	40.1 kWh	80.2 kWh	200.5 kWh	401.0 kWh
	MILDURA (VIC)	43.2 kWh	86.4 kWh	216.0 kWh	432.0 kWh
	SYDNEY	39.1 kWh	78.2 kWh	195.5 kWh	391.0 kWh
	TAMWORTH	42.5 kWh	85.0 kWh	212.5 kWh	425.0 kWh
	WAGGA WAGGA	41.9 kWh	83.8 kWh	209.5 kWh	419.0 kWh
Source: Clean Energy Council					

HOW MUCH DO SOLAR PV SYSTEMS COST?

Solar PV systems vary in price and the CEC strongly recommends that you do your research on the technology, installer and warranty to ensure you get the most out of your system based on your needs. You may wish to consider monitoring and after sales maintenance agreements for larger investments.

The price of your solar PV system can be affected by a range of different factors, including:

- government rebates and support schemes
- location
- number of panels
- orientation of panels and whether tilt frames are required
- type, quality and efficiency of panels
- type, quality and efficiency of inverter
- system design and configuration
- shipping costs for equipment and parts
- contractor installation costs
- after sales service agreements
- monitoring equipment and agreements
- costs of the grid-connection process and equipment needed to connect
- removal of trees or other shading
- type of roofing
(for example, tiled or tin or concrete)
- height and accessibility of roof
- site preparation needs
(for example, condition of roof or ground)
- structural engineering, architectural and other professional services
- existing infrastructure upgrades
(for example, distribution board, meter or cabling)

The table below provides an approximate guide on the price range for grid-connected solar PV systems in New South Wales, bearing in mind different factors such as those listed opposite would add additional costs.

Government rebates such as Renewable Energy Certificates have already been factored into these figures and prices include GST.

ESTIMATED SYSTEM PRICE

SYSTEM SIZE	PRICE RANGE
10 kW	\$15,000 - \$20,000
30 kW	\$45,000 - \$60,000
50 kW	\$75,000 - \$100,000
100 kW	\$150,000 - \$200,000

Source: Assumed average price of \$1.50 to \$2.00 per Watt, based on a September 2014 representative sample survey

Any quote you receive should itemise the cost of the components and services included in your system.

In particular you should clarify:

- whether government rebates have been included
- whether an estimate of grid connection costs has been included. Grid connection may add up to 20 per cent to the capital cost of the system, depending on the size of your system and the requirements of your electricity distributor.

FINANCIAL MODELS FOR INVESTING IN ROOFTOP SOLAR

1. OWNERSHIP, CONVENTIONALLY FINANCED

A few years ago there was only one way for Australian households and businesses to invest in rooftop solar – to buy and own the system, financed by cash or a bank loan. This is still the most popular way of investing in rooftop solar in Australia.

The main disadvantage to this approach is that it requires payment upfront. Not everyone has the cash or credit available to buy solar.

Also, this financial model does not always work well for tenants in rental properties. If you are renting a commercial property, you may not want to invest in a system when the property does not belong to you, and you may not have secure enough tenure to recoup your investment.

Landlords might not want to spend money on a system either, if the financial benefits will go direct to the tenant. The law allows landlords to purchase solar systems for their tenanted property and charge tenants for the electricity at a lower rate than the retail electricity price, but this is not yet a common practice.

The owner of a solar PV system is also usually responsible for its maintenance, but many solar retailers will also offer maintenance contracts to ensure that systems continue to operate efficiently and reliably.

2. LEASING

A solar lease could lower your electricity bill with no upfront cost.

Solar leasing is a very popular financial model in some overseas markets (especially the US), but is still quite new in Australia. Solar leases are just like leases for other household goods. A company will install and maintain the solar PV system and the customer will make monthly payments. Some solar companies also offer leasing with a 'performance guarantee' that the system will produce a minimum amount of electricity. Normal weather variation and solar panel performance over time are taken into account and should the solar system fall short in producing the amount of energy stated in the contract, the solar provider is obligated to compensate the customer.

Leasing may not work well for small systems. Typically leasing agreements are worth at least \$10,000 over the life of the contract. Leasing contracts will have a minimum duration – typically five years, but sometimes longer.

In the long run, it could be cheaper to buy a solar system upfront or to lease – it will depend on the circumstances of your business and any tax advantages that may be available. Customers should consider seeking financial advice before signing a contract.

3. SOLAR POWER PURCHASE AGREEMENTS (PPAS)

Like solar leasing, solar PPAs can also lower your electricity bill with no upfront cost. The difference is that solar leases require you to pay by the month, and payment for PPAs is made per kilowatt-hour.

Under a solar PPA, a company agrees to install and maintain a solar system and the customer agrees to buy an agreed amount of electricity generated by the solar system at an agreed price (which is usually lower than the retail price of electricity from the grid).

Solar PPAs are generally suited to customers with a large demand for electricity. Solar PPAs have a typical duration of 10 to 15 years and will require a minimum duration of around five years. PPAs usually require the customer to agree to purchase a minimum amount of electricity, or a commitment to purchase the amount of electricity the system produces. It is therefore important to choose an appropriately-sized system to ensure the customer does not end up needing to purchase more electricity than they require.

A solar PPA might not be cheaper than buying your own system in the long run, depending on the circumstances of your business, whether upfront cost is an important consideration or if there are tax advantages to solar PPAs.

Customers should carefully consider the duration of the contract as a commitment up to 20 years is possible, during which time building ownership may be transferred. Consider seeking financial advice before signing a contract.

4. OWNERSHIP, FINANCED BY ENVIRONMENTAL UPGRADE AGREEMENTS (EUS)

EUs enable a financier to lend money to a building owner for upgrades, including installation of solar PV. Repayments are made as an EUA charge, which the council then passes on to the financiers. For building owners EUs are attractive because the loans are secured by being tied to the property rather than the owner. The added security of council involvement allows capital to be accessed at a competitive rate and for a longer term.

If the owner wishes to sell the property, the loan must be discharged. EUs are also attractive to business owners because there is provision for tenants to share some of the cost of the upgrade where the tenant benefits from the upgrade works.

SOME INNOVATIVE MODELS FOR FINANCING INVESTMENT IN ROOFTOP SOLAR HAVE RECENTLY EMERGED IN AUSTRALIA, EACH WITH THEIR OWN ADVANTAGES AND DISADVANTAGES.

The tenant is no worse off as they cannot be charged more than the amount they save in operating costs from the upgrade works. For example, where electricity from solar PV is cheaper than electricity from the grid, the financial savings on tenants' electricity bills can exceed the additional payments made through their lease.

The net result is that tenants can save money and benefit from improved amenity. Building owners benefit from improved building environmental performance, lower operating and maintenance costs, improved capital value and long-term attractiveness of the property to tenants.

Currently, the availability of EUAs is limited by state government legislation, and in states where EUAs are allowed, they are offered by a small number of local governments. The NSW Government has led the development of EUAs, which are now available for existing non-strata commercial buildings in City of Sydney, Parramatta, North Sydney, Lake Macquarie and Newcastle. Penrith and Wollongong councils are also currently developing their processes to provide EUAs.

COMPARISON OF DIFFERENT FINANCIAL MODELS FOR SOLAR

	OWNERSHIP, CONVENTIONALLY FINANCED	LEASING	SOLAR PPA	OWNERSHIP, FINANCED THROUGH EUA
FORM OF PAYMENT/REPAYMENT	\$ upfront (cash or bank loan)	\$ per month	\$ per unit of electricity	Repayments are made by a special environmental upgrade charge paid to the council.
SUITABLE SYSTEM SIZE/VALUE RANGE	Suited to any size systems	Usually for contracts valued at more than \$10,000	Usually for contracts valued at more than \$10,000	Usually for large contracts valued at over \$250,000
TYPICAL CUSTOMERS	Households and businesses	Usually businesses, some households	Usually businesses	Only businesses
BENEFITS	No ongoing contractual obligations	No (or minimal) upfront cost, lessor is responsible for maintenance	No (or minimal) upfront cost, PPA provider is responsible for maintenance	No (or minimal) upfront cost, addresses tenant/landlord 'split incentive'
DISADVANTAGES	Owner is responsible for maintenance	Not suited to small systems	Not suited to small systems and usually requires a long-term commitment	Not suited to small systems
COST OF FINANCE	Opportunity cost or bank loan rate	Higher than bank loan rate	Higher than bank loan rate	Similar to bank loan rate
AVAILABILITY	Available everywhere	Limited availability, but not restricted by law	Available in NSW	Only available in some councils within NSW

IS SOLAR PV RIGHT FOR MY BUSINESS?

The load profile (typical electricity consumption over a day) and electricity tariff are the main two factors that will determine the value of solar PV for your business.

Understanding your energy consumption is the first step in determining if solar PV is a viable investment. A detailed and professional analysis of your consumption patterns compared to the expected generation from your solar system should be provided by your CEC-accredited designer during the design and specification stage, as part of their load analysis. This process is crucial because it forms the basis of the financial returns from your system.

Also, some state and federal programs offer energy assessments for businesses either through government departments or business chambers. The New South Wales Office of Environment and Heritage Energy Saver program offers energy audits. For more details visit

www.environment.nsw.gov.au/business/energy-saver.htm

MATCHING SUPPLY AND DEMAND

As the financial reward for exporting energy to the grid is currently quite low, you are likely to receive the largest benefits from your solar system through 'self-consumption', which means you need to consume less electricity from the grid at a higher price. So, it is important that your installer matches your system size to your average consumption.

Your CEC-accredited designer should present various sizing alternatives that suit your facility and load profile, and discuss with you the projected economic return on investment of each alternative.

WHAT ARRANGEMENT DO I CURRENTLY HAVE WITH MY ELECTRICITY RETAILER?

The business case for installing a solar PV system depends heavily on your current and future electricity tariff.

It is important to understand the following:

- What tariff are you on? (Flat/time of use)
- What are your peak and off-peak rates, and at what times do they apply?
- Are you on a fixed term contract?
- If so, when does the contract expire?
- Does your energy contract have a minimum consumption clause and any associated penalties?
- How will your tariffs change once you install a system?

Your installer should assist you in this process by providing modelling that you can use to negotiate with your retailer. It is strongly recommended that you get written confirmation from your electricity retailer on what, if any, changes will occur to your tariffs under the proposed new arrangements.

BUSINESS CASE FOR SOLAR PV

In addition to your load profile, the economics of installing a solar PV system will depend on a range of factors including system cost, output and estimated savings, and desired return on investment.

RETURN ON INVESTMENT

Solar PV systems are becoming increasingly affordable, and in many cases offer an attractive internal rate of return (IRR). Comparing the IRR to other potential investments (e.g. leaving the money in the bank, or investing elsewhere) will help your business compare the solar investment to others and make an informed business decision.

To optimise the return on your solar installation, you should determine the total lifetime cost of a solar installation and total energy generated, and then compare this to what you would spend with your current electricity provider during that same period. In addition, you should consider any taxation and depreciation advantages for businesses that invest in solar equipment when calculating financial return.

An experienced CEC-accredited designer will be able to analyse your retail tariffs and current usage profile to propose a system that optimises your return on investment.

Your financial manager is most suited to calculate the IRR, taxation and depreciation potential based on the designer's proposal and internal business treatment of that expenditure.

A very simple example for illustrative purposes is given over the page. This example should not replace the analysis performed by your designer.

A SMALL BUSINESS CONSUMING 50,000 KILOWATT HOURS PER ANNUM THAT INSTALLS A 15 KW SYSTEM CAN DISPLACE AN AVERAGE OF 33 PER CENT OF ITS ELECTRICITY USAGE.

The exact savings in electricity costs will vary depending on the nature and location of the business and the electricity tariffs available.

CAN I SELL EXCESS ENERGY BACK TO THE GRID?

Yes, but you need to consider the financial incentive to do so. The rate received for any power exported will depend on your electricity retailer and location, as commercial feed-in tariffs vary between states and territories. Feed-in tariffs are discussed in more depth in the 'resources and incentives' section of this guide.

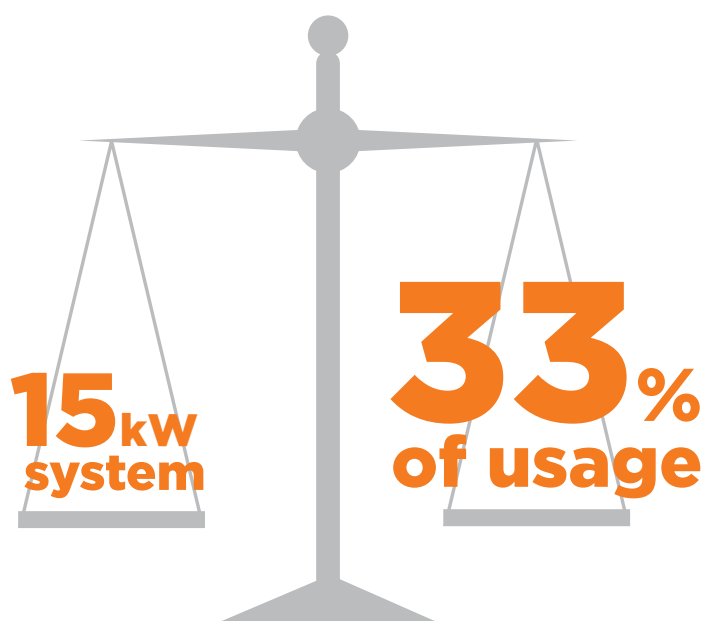
TAX TREATMENT

You will need to consider the tax implications of your investment in solar PV. These will vary depending on whether you buy your system upfront, lease it or enter into a power purchase agreement. If you treat your system as a depreciable asset, then any associated income may be taxable.

Also, the Australian Taxation Office (ATO) considers the supply of electricity from a solar owner to an electricity retailer as a separate supply to your purchase of electricity. If your business is registered for GST then it is likely that you will be liable for GST on all exported energy.

If you choose a solar lease or power purchase agreement the rental for your solar PV system may be tax deductible.

We recommend that you contact your accountant or the ATO for advice ato.gov.au



SMALL BUSINESS EXAMPLE

Business A is a small Sydney-based company with an annual electricity consumption of around 50,000 kWh. The business operates five days a week, Monday to Friday, and is located in a single storey commercial premise with a north-facing roof that can accommodate a PV system. The company is on a standard flat tariff of 26.18 c/kWh.

An analysis of Business A's daily electricity consumption including seasonal variation shows a maximum load of around 15 kW on weekdays. On weekends there is still a baseload of around 3 kW.

After talking with a CEC-accredited designer, Business A decides to install a 15 kW system. This has:

System cost = \$30,000

Average daily solar generation

= 58.5 kWh/day

The average daily usage on weekdays is approximately 175 kWh per day

This means that the solar generation will offset around 33 per cent of existing consumption, generating a daily cost saving of:

58.5 kWh/day x 26.18 c/kWh

= \$15.31 per day

The solar PV system will also offset around 18 kWh of baseload consumption on weekend days equating to a daily cost saving of:

18 kWh/day x 26.18 c/kWh

= \$4.71 per day

The total average annual savings are

= \$15.31 x 260 + \$4.71 x 105

= \$4475.15 per annum

This means that the system cost of \$30,000 is recovered in approximately 7 years.

Note this is a very basic example that doesn't take into account factors such as depreciation, rising costs of electricity and financing.

If electricity prices are assumed to increase 1 per cent annually, using a 7 per cent discount rate the IRR for the basic inputs above is around 13 per cent.

MAJOR SERVICES
ELECTRONIC
TUNING
BRAKE & CLUTCH
REPAIRS
GENERAL REPAIRS
TYPICAL ELECTRONIC

DO I NEED TO OBTAIN ANY BUILDING OR COUNCIL PERMITS?

As every building is unique you may or may not be required to obtain building and planning approval through your local council. We recommend that you seek advice from your local planning body as early as possible.

Factors to consider include:

- systems 10 kW or smaller are 'exempt developments', subject to conditions laid out in the legislation. Check the NSW State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 for further details
- systems larger than 10 kW and smaller than 100 kW are 'complying developments', subject to conditions and require a complying development certificate (CDC) to be issued by council or a private accredited certifier. Check the legislation for details
- systems larger than 100 kW require development consent. Check the legislation for details
- whether your property is within a conservation or heritage overlay
- the classification of your building under the Australian Building Code (Class 2-9 buildings may be subject to different approval requirements)
- the size and position of your solar PV system
- the total weight of your panels at any one point of attachment to the building
- the design of your system
- structural integrity of your building
- whether additional electrical or building work is required to accommodate the solar system

At the very least, your CEC-accredited installer will need to complete a building survey to ensure the panels will not compromise building integrity.

WHAT IF I DON'T OWN MY BUILDING? ARE THERE OTHER OPTIONS?

A common barrier to businesses installing solar PV systems is building ownership. As solar PV systems are long-term investments and involve making amendments to the building, it can be difficult for tenants to secure landlord permission and long-term finance arrangements.

You may wish to explore the option of establishing an agreement with your body corporate or landlord as part of your lease terms. This agreement could determine the responsibilities of both you and your landlord in installing and maintaining a solar PV system. The Federal Government has a range of resources available on Green Leases available online at ee.ret.gov.au/node/1306

If you are on a medium- to longer-term lease but cannot afford the up-front cost, you may be able to explore solar leasing arrangements or a power purchase agreement.

If you are unable to install solar PV panels on your building but wish to source part of your business's electricity from renewable sources, then you should explore GreenPower options greenpower.gov.au

RESOURCES AND INCENTIVES

WHAT GOVERNMENT SCHEMES ARE IN PLACE TO LOWER THE COST OF PURCHASING A SOLAR PV SYSTEM?

Several types of financial assistance are on offer for solar PV systems in Australia depending on your system size. These are:

- Renewable Energy Certificates:
 - Small-scale Technology Certificates (STCs)
 - Large-scale Generation Certificates (LGCs)
- Feed-in-Tariffs (FiTs)
- Clean Energy Finance Corporation (CEFC)
- Other

Please note that government programs are subject to change. The information listed here is current as of 25 September 2014. Please refer to the websites referenced for latest program updates.

PLEASE
COME IN

RENEWABLE ENERGY CERTIFICATES

SYSTEMS UNDER 100KW: SMALL-SCALE TECHNOLOGY CERTIFICATES (STCS)

A Renewable Energy Certificate is a measurement of renewable energy that can be traded or sold for a monetary value. Australia’s Renewable Energy Target, introduced in 2001, requires energy retailers to purchase a set amount of certificates each year, so there is a constant demand for these certificates. Depending on the size of your system, you will be eligible to create certificates under either the Small-scale Renewable Energy Scheme (systems under 100 kW) or the Large-scale Renewable Energy Target (systems above 100 kW).

Certificates under the Small-scale Renewable Energy Scheme (SRES) are called Small-scale Technology Certificates (STCs).

One STC is equivalent to one megawatt hour of electricity generated by your solar PV system. The price of STCs changes according to market conditions. As an owner of a solar PV system, you can register, sell, trade or surrender STCs for systems up to 100 kW.

There are two ways you can be paid for your STCs:

1. Assign your STCs when you purchase your solar PV system to a registered agent in exchange for a financial benefit. This may be in the form of a delayed cash payment or upfront discount on your solar PV system (most consumers take this option and usually this will be outlined in your quote).
2. Create the STCs yourself by finding a buyer and then selling and transferring them in the Renewable Energy Certificate (REC) registry.

For a list of registered agents, contact the Clean Energy Regulator (CER): ret.cleanenergyregulator.gov.au
The REC Agents Association is another good source of information: recagents.asn.au. Installers or retailers typically manage the application as part of your installation agreement.

RATINGS & POSTCODE ZONES FOR SOLAR PANELS IN NSW							
POSTCODES	ZONE	POSTCODES	ZONE	POSTCODES	ZONE	POSTCODES	ZONE
2000 to 2356	3	2401 to 2404	3	2555 to 2626	3	2875 to 2876	3
2357 to 2357	2	2405 to 2407	2	2627 to 2628	4	2877 to 2889	2
2358 to 2384	3	2408 to 2410	3	2629 to 2630	3	2890 to 2897	3
2385 to 2393	2	2411 to 2414	2	2631 to 2639	4	2898 to 2899	3
2394 to 2395	3	2415 to 2536	3	2640 to 2820	3	2900 to 2999	3
2396 to 2398	2	2537 to 2537	4	2821 to 2842	2		
2399 to 2399	3	2538 to 2544	3	2843 to 2872	3		
2400 to 2400	2	2545 to 2554	4	2873 to 2874	2		
ZONE	RATING	SYSTEM SIZE	DEEMING PERIOD	TOTAL STC ENTITLEMENT		TOTAL SUBSIDY	
2	1.536	30 kW	15 years	691		\$24,185 (691 STCs x \$35)	
3	1.382	30 kW	15 years	622		\$21,770 (622 STCs x \$35)	
4	1.185	30 kW	15 years	533		\$18,655 (533 STCs x \$35)	

SYSTEMS ABOVE 100 KW: LARGE-SCALE GENERATION CERTIFICATES (LGCS)

STCs may be created for solar PV systems in batches of either one-, five- or 15-year deeming periods. At the beginning of each successive one or five year deeming period, the CER must be satisfied that your solar PV system is still installed and is likely to remain functional for the next deeming period. In order to claim STCs for the full 15-year deeming period upfront – which is the most common option – your designer/installer must be accredited by the Clean Energy Council. More information is available in the ‘What you need to know about Small-scale Technology Certificates’ guide published by the CER available at ret.cleanenergyregulator.gov.au

The amount you will receive for your STCs will depend on a number of factors, including the location (also known as the zone) of the solar PV system, the size of the system and the price of STCs at the time the system was installed.

Australia is divided up into various zones based on how much renewable energy can be generated by a solar panel in a given area. Depending on where you are located in New South Wales, you could be located in zone 2, 3 or 4. The table opposite shows the average level of financial support available from STCs on solar PV systems across New South Wales by postcode.

If your system is above 100 kW then you can claim under the Large-scale Renewable Energy Target (LRET).

To participate in LRET you must formally register as a power station with the CER. Once you are accredited you will have a REC Registry account through which you can create Large-scale Generation Certificates (LGCs).

One LGC is equivalent to one megawatt hour of generation above a specified baseline for the power station.

Unlike STCs, LGCs can only be created once the generation has been proven, and need to be validated by the CER. Once this has occurred, you may sell your certificates to purchasers of electricity (such as your retailer) who have liabilities under the RET.

As you cannot deem your certificates upfront, participating in the LGC market can be more administrative work than STCs. To create certificates:

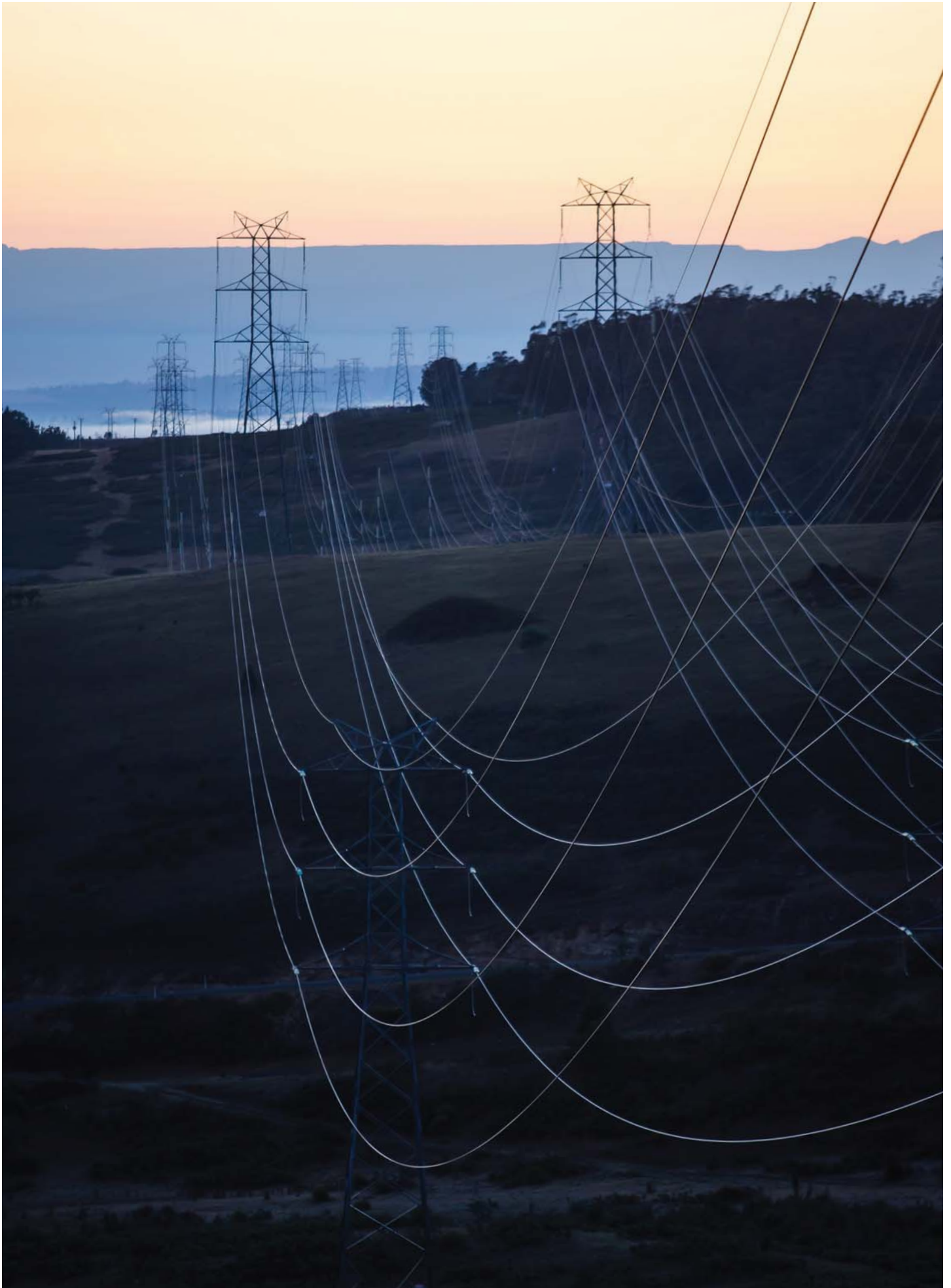
- The CER will assess LGCs on a monthly, quarterly or annual basis only.
- You must create LGCs for generation by the end of the calendar year following the year of actual generation.
- You are required to submit documentation on generation data to verify and calculate eligible electricity generated. (You must ensure you have adequate metering arrangements to collect this data, usually required on a half-hourly basis.)
- You must also ensure your LGCs are correctly created in the REC registry.
- As an accredited RET power station, you are also obligated to submit an Electricity Generation Return report annually to the CER. See the CER website for further details ret.cleanenergyregulator.gov.au/Forms-and-Publications/Forms/Generation-Return-Power-Stations

Once you have created and registered your certificates, you need to find a buyer, which may be either a liable entity (such as an electricity retailer) or a registered LGC Trader.

Once you find a buyer, you will need to:

- Negotiate the volume and price of the LGCs you wish to sell, and the method of payment (if you sell to your electricity retailer they may wish to credit your electricity bill rather than make direct payment).
- Enter into an agreement with the buyer, understanding that the sale of LGCs is a contract for the sale of goods and so must be accompanied by the appropriate documents.
- Once payment has been received, you will need to transfer your LGCs within the REC Registry to the buyer.

The negotiation of price and payment for your LGCs is your responsibility and the CER will not facilitate this process nor will they get involved in any disputes. The price of LGCs is set by the market, not the CER. Updated information on the price can be found on the websites of LGC traders, for example: <http://greenenergytrading.com.au/incentives/large-scale-generation-certificates/>



Feed-in tariffs (FiTs) pay you for the electricity generated by your solar PV system on either a net or gross basis. Tariffs are usually available for residential systems and do not necessarily extend to commercial customers, however in most cases you should be able to negotiate a rate with your retailer. The Independent Pricing and Regulatory Tribunal (IPART) has determined that for 2014/15 the benchmark range for unsubsidised solar feed-in tariffs is 4.9 to 9.3 cents per kilowatt hour.

Under a net feed-in tariff, you are paid for any excess electricity generated by your solar panels that goes back into the grid, over and above what you have consumed. So if you have surplus energy generated by your solar panels, you get paid for it, but if you use all of the energy you generate it will be offset against your normal electricity bill. Net feed-in-tariffs are the most common arrangement.

You need to apply to your electricity retailer to receive a feed-in tariff. When signing an agreement with your electricity retailer, it's important to be aware of all the terms and conditions. In particular, you should check with your electricity retailer about any tariff changes that will occur as a result of installing solar and carefully weigh up the advantages and disadvantages before making a decision. This should be considered before you make any changes to your tariffs.

Important questions to ask about feed-in tariffs include:

- What price will your retailer pay you for electricity exported (in cents per kWh)?
- What is the cost of the electricity you purchase from your retailer (in cents per kWh)?
- Will you lose your off-peak rates by moving onto a higher 'time of use' tariff?
- What will be the form of payment for electricity you produce? (It is likely you will receive the feed-in tariffs you earn by default as a credit on your electricity bill rather than cash.)
- What is the upper threshold on system size to be eligible for feed-in tariffs?
- Is there a threshold on the volume of electricity you can sell?
- Will your metering need to be upgraded so you can receive the feed-in tariff, and are there any costs involved?
- How will excess energy be calculated and summed? (e.g. instantaneously, daily or quarterly)

Other important questions to ask when signing an agreement with your electricity retailer are discussed in further detail later in this document.

The Clean Energy Finance Corporation (CEFC) is looking to provide a range of finance solutions to businesses to invest in solar PV. Packages may include lease and loan finance. Financial terms are tailored to individual projects and business cash-flow, and are generally limited to projects with value no smaller than \$100,000.

Further information is available on the CEFC website:

cleanenergyfinancecorp.com.au

DESIGN AND INSTALLATION



WHAT IS INVOLVED IN THE DESIGN, SPECIFICATION AND INSTALLATION OF MY SYSTEM?

The design and installation of your solar PV system can be broadly split up into eight steps:

- 1.** finding a solar PV retailer and ensuring they use a CEC-accredited installer/designer
- 2.** design and feasibility
- 3.** product selection
- 4.** quotation and agreement
- 5.** applying for any building approvals
- 6.** connecting to the grid
- 7.** applying for government rebates (if applicable)
- 8.** negotiating a retail agreement

Many of these steps should be undertaken in parallel.

Sydney Town Hall PV System

1 FINDING A SOLAR PV RETAILER AND CEC-ACCREDITED INSTALLER/DESIGNER

2 DESIGN AND FEASIBILITY

Finding the right person or company to manage the design and installation of your solar PV system is important. Although there is no physical difference between PV panels installed on residential and commercial properties, installation and inverter requirements can be quite different, so you need to ensure that your installer has the relevant experience for your system size.

The Clean Energy Council has developed a Solar PV Retailer Code of Conduct and companies that have signed on to the code can be identified by their use of the Clean Energy Council Approved Retailer logo.



Approved solar PV retailers have demonstrated their commitment to a higher level of quality and service, as well as a five year, whole-of-system warranty. It is also important to ensure that your solar PV retailer only uses CEC-accredited installers/designers.

Solar PV systems come with some responsibilities for the owner, including learning the basic safe operation and proper maintenance of your system or ensuring you have an ongoing maintenance agreement in place. Online and mail-order solar PV system suppliers who never visit your business may have difficulty recommending the most appropriate equipment. A comprehensive, on-site solar and load analysis and two-way interview can help ensure a thoughtfully-designed and well-planned installation.

We strongly recommend you do your due diligence and select a reputable solar PV retailer that will use a CEC-accredited installer/designer.

To find a CEC-approved solar PV retailer, visit approvedsolarretailer.com.au

To find an accredited installer near you, visit solaraccreditation.com.au/consumers/findaninstaller

Your designer will tailor your PV system based on how much you want to spend or finance, how much electricity you wish to offset, and the physical properties of your premises.

They will help you:

- establish your electrical loads over an average day using a load analysis
- determine the type of panels
- determine the size of your solar PV system
- decide the type of inverter
- establish the location of solar panels in relation to angles, available sunlight, shading and temperature
- determine what building surveys need to be performed

As part of the design and feasibility, your installer should give you an indication of what you can expect in terms of the performance of your system and the factors that may influence this.

3

PRODUCT SELECTION

Your designer/installer will help you choose the type of panels and inverter that best suit your needs. An inverter is a device that transforms the electricity generated by your solar panels from direct current (DC) to alternating current (AC) electricity, which is used by the grid.

There are numerous products on the market and they all vary in their quality and characteristics so make sure you ask your designer/installer if you are unsure.

When making your selection you should consider the following:

- Do the products meet Australian Standards?
- Do the other balance of system components that your designer/installer suggests, like the mounting hardware, meet industry standards?
- What warranties and guarantees come with the products? How do the warranties and guarantees compare to other products on the market? (Solar PV panels generally come with two distinct warranties: performance and product.)
- Performance warranties will include a warranted degradation factor over time. Degradation factors and time periods will vary between manufacturers so it is important to compare the value of each performance warranty as warranted degradation is a reflection of expected energy over time.
- Which warranties are your responsibility and which are the manufacturer's responsibility?
- The financial strength of the company providing the warranty will be a reflection of their ability to honour the warranty in the event of panel under performance or failure.

4

QUOTATION AND AGREEMENT

Following the design and specification you should request a detailed quotation for the installation of the system including a contract with the terms and conditions of sale. The quotation should provide specifications, quantity, size, capacity and output for the major components including: solar PV modules, mounting frames, structure, inverter, any additional metering or cabling, data-logging, travel and transport requirements, other equipment needed, any trench digging and a system user manual.

Additional to standard contract conditions, you should ensure that the following are included:

- clear itemisation of the component costs and whether the total price includes STCs (if system is under 100 kW), new metering changes, connection costs and safety features, system performance estimates (daily, monthly and annual) and system user manual
- what LGC or STC price you are being offered
- the responsibility of each party for all aspects of the process (e.g. building approvals, metering changes, grid connection, retail agreements, other paperwork)
- warranties and guarantees, including installer workmanship, schedule of deposit and progress payments
- service agreement
- provision of a Certificate of Electrical Standards

5

APPLY FOR ANY BUILDING APPROVALS

Early in the process you should contact your local planning authority to determine what planning and building permits you will need. Your designer/installer will then be able to take these into account in the design and feasibility stage.

For more information see page 14.

6

CONNECTING TO THE GRID

A Connection Agreement with your distribution network service provider (DNSP) is mandatory to connect a solar system to the grid. This agreement is a contract outlining the terms of your connection and must be understood and signed by the person responsible for the system post-installation: i.e. you, the business owner.

Interconnection should be discussed with the DNSP very early in the process so that they are aware of the project and you, or your accredited installer, are aware of any technical requirements that have to be met from an early stage. Your installer should assist you with this process.

Depending on the size of your system, the characteristics of the local grid you are connecting to and whether you are planning to export excess electricity, the technical requirements of DNSPs may vary substantially. The DNSPs have a responsibility to ensure the safety and reliability of the network for all their electricity customers, and to ensure that any generation connected to the network does not affect this.

You should ensure that you consult your DNSP prior to making the decision to invest in solar PV, as they have the right to refuse connection provided they have a sound technical basis for doing so. In some cases the technical requirements can create high costs and it is important that you get a picture of these costs early in the process. Your designer/installer should be able to facilitate this process and be aware of the benefits of consulting the DNSP early. You may wish to choose an installer who has worked with your local DNSP previously.

If you are planning to export electricity generated by your system to the grid, then you will also need to negotiate an Export Agreement with your DNSP. As your business will be supplying electricity (but is a non-market generator), there are technical and commercial conditions that you will need to satisfy.

You will need to pay the cost of connection as part of your system cost. The connection cost typically includes:

- network connection application fee (which varies by DNSP)
- connection feasibility study
- network stability study (if required)
- cost of network extensions or augmentations specific to connection
- metering charges (which varies by DNSP)

You need to ensure you are aware of these costs and how they will be charged.

As a system purchaser it is quite reasonable to expect your installer and/or designer to provide you with a compliant system that meets the DNSP's requirements. As the owner, it is your responsibility to ensure that the installer has done so, and completed all necessary paperwork and approvals.

When your solar PV system is installed you may also need to have a new meter installed depending on whether you already have a smart or interval meter. This must be installed by a relevant qualified professional, who may be different to your system installer. This may be organised by your accredited designer/installer, your electricity retailer, or your electricity distributor. Find out who will organise this for you, how it will be charged and how the new meter may affect your billing rates.

7

APPLYING FOR GOVERNMENT REBATES

Depending on the contract, your installer/designer may facilitate the application for STCs (if system size is less than 100 kW). If not, then these will be your responsibility and you should contact the relevant entities for information on how to apply.

8

NEGOTIATING A RETAIL AGREEMENT

DNSPs do not purchase or sell electricity, so even if you have an approved Export Agreement, if you plan on receiving payment for exporting electricity to the grid, you will need to negotiate an agreement with your electricity retailer. Not all electricity retailers offer solar-friendly tariffs so it is best to check and compare the following items prior to entering into an electricity trading agreement.

Questions to ask your retailer include:

- What price will they pay you for your electricity (in cents per kWh)?
- What is the cost of the electricity you purchase from them (in cents per kWh) and will you lose your off-peak rates?
- What will be the form of payment for electricity you produce?
- Will your metering register your net or gross output?
- Are there any penalty clauses (termination costs) or other administration fees?
- What are the billing/payment periods?
- Do you need to organise all the necessary metering changes and what are the associated costs?
- How will excess energy be calculated (e.g. instantaneously, daily or quarterly)?

Your installer should assist you in this process by providing modelling that you can use to negotiate with your retailer. It is strongly recommended that you get written confirmation from your electricity retailer on what, if any, changes will occur to your tariffs under the proposed new arrangements.



MAINTAIN AND ENJOY YOUR SYSTEM



ONCE YOUR SOLAR SYSTEM HAS BEEN INSTALLED, IT'S TIME TO START SAVING MONEY ON YOUR ELECTRICITY BILLS – BUT YOU ALSO NEED TO MAKE SURE YOUR SYSTEM IS MAINTAINED SO IT CAN CONTINUE TO OPERATE EFFICIENTLY AND SAFELY.

SYSTEM MAINTENANCE

A solar PV system is a complex electricity-generating piece of equipment, and to keep it safe and operating efficiently, it is vital to both maintain your system and operate it safely. A maintenance schedule will be provided by your solar PV retailer or installer that you must take note of and follow. This is necessary to ensure that:

- it is operating correctly
- the system performance is maintained
- the system is safe for everyone in the premises as well as for any electrical workers working on the distribution network

Make sure you engage a CEC-accredited installer to undertake maintenance work on your solar PV system. Maintaining your system means much more than just cleaning your panels. An accredited installer will check that the system is functioning safely and efficiently, allowing you to maximise the savings on your power bills for years to come.

Some distributors may request that an anti-islanding test of the inverter be carried out periodically. Check with your distributor as each will have different requirements.

If you have a power purchase agreement, it is likely that the provider will be responsible for system maintenance as part of your contract. Also, if you entered into a leasing arrangement, this may also include a maintenance component. Check your contract for details.

INSPECTIONS

Following the installation of your solar PV system, safety inspections may be carried out by the relevant electrical authority. The inspection may need to be carried out before the system can be connected to the grid.

UPGRADING YOUR SYSTEM

Your ability to upgrade your system in future may depend on receiving permission from your distributor, on suitable PV modules still being available, and on any upgrades meeting current Australian Standards. Upgrading your system may also result in losing your feed-in tariff. You will need to check with your electricity retailer and distributor to find out what the requirements are for upgrading your system.

WHAT IF SOMETHING GOES WRONG?

If you have an issue with any solar PV product while it is under warranty, you should first contact the supplier in order to have the product replaced or repaired.

If you are unable to contact the supplier, you should contact the manufacturer. Contact details should be provided on the warranty documentation.

The Australian Consumer Law also provides a range of protections for consumers in relation to warranties and faults. To find out more about whether your solar installation is covered by the provisions of Australian Consumer Law visit consumerlaw.gov.au

The Clean Energy Council deals with complaints involving a breach of the Accreditation Rules, Accreditation Code of Conduct or relevant Australian Standards. Complaints can be registered online at solaraccreditation.com.au

The Clean Energy Council does not handle issues of a commercial nature, like warranties.

The following list outlines who you should contact for different types of issues:

- **Commercial matter (for e.g. warranty issues):**
contact Fair Trading NSW.
fairtrading.nsw.gov.au
- **Technical compliance of your installation/tradespeople:**
contact Fair Trading NSW. fairtrading.nsw.gov.au/Tradespeople/Home_building_licensing/Licence_classes_and_qualifications/Electrical.html
- **Safety issues:** contact WorkCover.
workcover.nsw.gov.au/newlegislation2012/health-and-safety-topics/electrical-safety/Pages/default.aspx
- **Complaints about your electricity retailer or distributor:**
contact the Energy and Water Ombudsman NSW.
ewon.com.au

SOLAR PV CHECKLIST

1. Have you performed due diligence checks on your installer/supplier?

- ☐ Is your solar PV retailer reputable - have you checked their track record, backers and complaints forums?
- ☐ Does your installer/designer have CEC Accreditation and current electrical licences and OH&S certification?
- ☐ Is the company a member of the industry association?
- ☐ Is the company a signatory to the Solar PV Retailer Code of Conduct?
- ☐ Have you checked ASIC to ensure they are legitimate and currently registered?
- ☐ What experience do they have in commercial installations?
- ☐ How long have they been in the solar industry?
- ☐ How many systems similar to yours has the designer/installer completed?
- ☐ Are they up-to-date on the newest products, the latest regulatory issues and connection requirements?
- ☐ How well does the designer/installer know your local distribution network service provider (DNSP)?
- ☐ Will they conduct the work themselves or subcontract parts out? If so, what contractual agreements are in place to protect you?

2. The quotation and contract

- ☐ Is it professional and sufficiently detailed?
- ☐ Are the prices typical of industry benchmarks?
- ☐ What is explicitly included and excluded?
- ☐ If comparing quotations, am I comparing like for like?
- ☐ Are all obligations, responsibilities and liabilities clear?

3. The financial calculations

- ☐ Have they provided a detailed analysis of load and generation?
- ☐ Are the returns consistent with CEC guidelines?
- ☐ If financed, have you had independent tax depreciation advice?
- ☐ What if any performance guarantees are provided?
- ☐ Have you considered alternative methods of finance?

4. The products and services

- ☐ Have you been offered quality products that are well backed in case of warranty support?
- ☐ Have you reviewed the warranty terms and conditions?
- ☐ What written service obligations have been included?
- ☐ Have you been offered workmanship guarantees?
- ☐ Has system monitoring been included to allow ongoing performance checks and who is responsible?
- ☐ Are the products listed by the CEC as approved for use in Australia?
- ☐ Do you understand the limitations to support and service that are offered?

5. The grid connection and approvals

- ☐ Has your DNSP been contacted and approved connection? Are there connection costs and limitations?
- ☐ Has your retailer been contacted and agreed in writing any tariff impacts and/or export tariffs?
- ☐ Do you require building approvals and if so have they been sought and approved?
- ☐ Have metering and connection costs been calculated and agreed?

6. Information and support

- ☐ Have you received a detailed final contract including all relevant approvals?
- ☐ Do you understand exactly what products, services, support and maintenance you are getting and from whom?
- ☐ Have you been advised who or where to go to if you are unsatisfied?
- ☐ Have you received training on system operation and a detailed operations manual?
- ☐ During installation, did you monitor the general performance, behaviour and installation quality of the installers?
- ☐ Is the system performing as expected?

