



Knowledge Sharing Report

This report was prepared by Community Power Agency, Pingala Community Energy & Komo Energy to share knowledge gained in establishing Australia's first large-scale solar garden. This project was proudly funded by the New South Wales Government's Regional Community Energy Fund.

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The views expressed herein are those of Community Power Agency, Pingala Community Energy and Komo Energy only and not representative of any other agency or government entity.

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Front Cover Photo Credit: Anna Meltzer

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EXECUTIVE SUMMARY

Haystacks Solar Garden pioneered a new way of doing solar, one that enables renters, apartment dwellers and anyone who doesn't own a sunny, suitable roof to share in the benefits from solar. This project has successfully created involvement in our energy system for those who otherwise wouldn't be able to.

This knowledge sharing report details how the project partners collaborated to bring this new model of solar to Australia, overcoming the combined challenges of a global pandemic, multiple energy crises, innovating in the Australian energy system and unforeseen project costs. Pioneering a large-scale solar garden in Australia is not a straightforward task, however with many willing and innovative partners including several hundred community members bringing their smarts and commitment to the table, Haystacks Solar Garden has been successfully implemented.

Haystacks Solar Garden pioneered Australia's first large-scale solar garden. A solar garden is a way to enable those who are locked out of installing rooftop solar, like renters, apartment dwellers or those with a shaded roof, to access the benefits of solar on their electricity bill too.

Key points

- Haystacks Solar Garden is housed within the 1.5MW Grong Grong Solar Farm located on a farm near the NSW Riverina town of Grong Grong.
- Haystacks Solar Garden Co-op raised \$735,000 via selling solar garden CCU plots to part fund the construction of Grong Grong Solar Farm via a loan.
- Grong Grong Solar Farm repays the loan over 10 years via the Haystacks Co-op to create on-bill credits for solar gardeners.
- The electricity retailer Energy Locals facilitates the on-bill credits to solar gardener's electricity bills.

This project came together using a cooperative model to involve community members in a democratic and inclusive way and utilised a little known legal tool called Cooperative Capital Units (CCUs). This approach was not without challenges, however ultimately produced almost unanimous agreement at key decision points in the project journey. The project team prioritised genuine community engagement using a range of techniques and in partnership with many allied organisations.



Image: Gerald in conversation with EPC contractors mid-construction.

Key challenges in creating Haystacks Solar Garden

- Fluctuating construction and component costs during the pandemic significantly affected the business model.
- Navigating cooperative laws and associated regulators, specifically involving CCU usage, with limited assistance or institutional understanding.
- Our grid connection required grid side upgrades of \$150,000 which were not identified in the original project budget.
- A little known tax rule meant more than \$270,000 in unexpected upfront tax on our NSW Government grant.

Key considerations & recommendations for future solar gardens

- Ensure sufficient paid project management & authentic community engagement staff.
- Build relationships with potential partners early.
- Grant programs for solar gardens must allow for substantial allocations to the community establishment and have at least 8 weeks in application time.
- DNSPs should establish clear pathways for connection and commission processes for mid-scale solar, and publish timeframes and expected costs.

Section 9 provides further commentary of future solar garden set-up considerations based on our experiences and learnings, followed by our policy recommendations.

1. INTRODUCTION

Haystacks Solar Garden is Australia's first large scale solar garden and has demonstrated how an 'in front of the metre' solar garden can exist in the Australian legal, financial and energy system.

This project represents a leap forward in innovation for domestic solar participation in Australia, finally allowing those locked out of owning solar (e.g. those who rent and live in an apartment) to share in the benefits of solar on their electricity bill too. The adoption of rooftop solar in Australia has simultaneously enabled countless homes to take control of their energy use whilst also inadvertently creating a 'have and have not' energy class system. Those locked out of having solar are more susceptible to rising energy costs and at greater risk of experiencing energy poverty. Solar Gardens help to enable a fair go for solar access to many more Australians for the first time.

While this project was designed to break down barriers, it was also designed to strengthen connections. Collaboration between commercial and not-for-profit sectors, the engagement of community and bringing together people with a common interest, a better understanding and connection to where our power comes from, and a robust discussion about the generation, transmission and consumption of electricity have all been outcomes of this project. Haystacks Solar Garden has successfully created involvement in our energy system for those who otherwise would not have been able to.

The project was made possible by a consortium of project partners as well as a legion of supporters. The project partners were Community Power Agency, Pingala and Community and Komo Energy.

1.1 Project Partners

Community Power Agency

Australia's leading experts in supporting community groups to own, design and benefit from renewable energy projects. Community Power Agency works towards a fairer and faster shift to our clean energy future through capacity building, innovation, expertise and advice.

Pingala Community Energy

Sydney-based community renewable energy association and co-op making energy that puts people first. Pingala helps communities and businesses access the benefits of renewables through building and investing in their own renewable energy projects.

Komo Energy

Komo Energy provides development services, funding and delivery support to the community and mid-scale solar and storage sector, helping communities and landholders partner with industry to deliver impactful projects.

1.2 Structure Of This Report

Those who have followed the journey of Haystacks Solar Garden from inception will know that the original project design and the final implemented project design are two very different models. Understanding the appetite for building more solar gardens in Australia, we have structured this report in such a way to clearly describe with detail the Haystacks Solar Garden model whilst also providing key considerations for future solar gardens so that they might leverage the deep learning from this groundbreaking pilot project. We have consciously chosen not to include a chronological account of the impacts of the global covid pandemic and how it influenced the design iterations of our project as this level of detail in such a unique moment in the global economic and energy landscape seems less valuable than outlining a bright way forward for solar gardens in Australia.



Image: Kristy Walters & Kim Mallee with Luke Melisi from Energy Locals at The Offer launch in Marrickville Library.

2. WHAT IS A SOLAR GARDEN?

A solar garden is like a community garden but instead of growing vegetables, members come together to harvest solar energy from a solar farm.

A member purchases a 'solar garden plot' and signs up to the participating electricity retailer (Haystacks partnered with Energy Locals) which then entitles them to receive a solar garden plot credit on their electricity bill. A key difference from other community-funded solar farms is that the financial benefit is received on members' electricity bills, rather than via dividends from shares.

Australians love solar, however approximately 30% are still 'locked out', unable to get the benefits of rooftop solar; because they rent, live in an apartment, or have an unsuitable roof. Similar to rooftop solar, a solar garden allows members to reduce their electricity bills, reduce carbon emissions, take action on climate change and transition the grid to a renewable energy future.

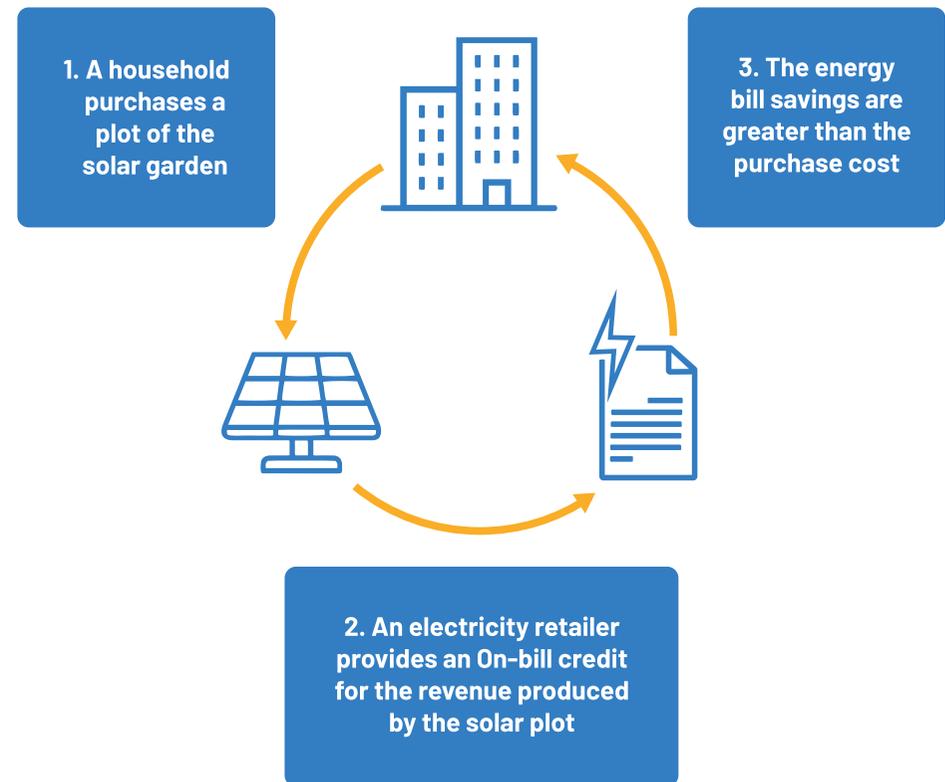


Figure 1: An electricity retailer provides an on-bill credit from the revenue produced by the solar garden plot

3. BACKGROUND OF SOLAR GARDENS

The shift to a renewable energy powered future is good for the planet and often it is good for the back pocket too. Over the past 20 years Australia has seen a rapid uptake of domestic solar that enabled many Australian households to take control of their energy production whilst also taking action on climate change and reducing their energy costs. The millions of rooftop solar installations and the numerous incentives that government and industry have applied to encourage this world leading uptake have been focused on homeowners with a sunny roof. Yet, nearly 30% of Australians who rent or live in an apartment are locked out of accessing solar. This highlights an incredible opportunity for further domestic investment in renewables that until now has been untapped.

The shift to clean affordable energy must be for everyone.

There are many reasons that Australians find themselves locked out of installing rooftop solar. They might rent, live in an apartment, have a shaded roof, slate roof, heritage listed building or simply not enough roof space to meet their energy needs from rooftop solar.

Increasingly people in Australia are seeking a sense of connection to where their energy comes from and using their purchasing power for positive climate action. Solar gardens can go one step further to meeting this desire for energy providence, in enabling everyday Australians to participate in the process and decision making for constructing new solar farms.

Solar Gardens are a popular method of connecting those who are locked out of owning solar with generation off site in both the United States of America and Germany with the USA having approximately 1600 projects in operation as of 2021.

The origins of the Haystacks Solar Garden start in 2016 when Gemma Purcell - a farmer in the NSW Riverina, Jonathan Prendergast- a solar project manager from Komo Energy, and Tom Nockolds - a community energy expert from Community Power Agency & Pingala met and found a shared passion of making renewables accessible for everyone and enabling communities more control of our energy future.

Gemma offered part of her farmland at Grong Grong in the Riverina for the solar farm, Jonathan helped figure out the technical details and Tom suggested starting a solar cooperative so lots of people could benefit through a solar garden. After 7 years of further conversations, lots of planning and with a grant from the [NSW Government's Regional Community Energy Fund](#), the Haystacks Solar Garden has come to fruition in 2024.

Prior to starting the Haystacks project, there was significant research and planning. In 2018 Community Power Agency in partnership with the Institute for Sustainable Futures at UTS delivered an ARENA funded research project to determine the financial and legal conditions required to theoretically establish a solar garden within the Australian energy system. See the Social Access Solar Gardens for Australia report for more information.

The Haystacks Solar Garden project represents an on ground pilot which started with the best case model that was identified through this research. As with many adventures through life, the theoretical versus reality has proven to be vastly different. However through many twists, turns and innovations the Haystacks Solar Garden project team has been able to demonstrate a viable and replicable model for solar gardens in the Australian energy system. The project team are thrilled to share the learnings from this exciting project.

We note the first solar garden of any kind in Australia was developed by Enova Energy in December 2019. Their project was a 'behind the meter' solar garden of 35 kilowatts and pioneered the systems and processes that distribute the benefits to solar gardeners who are North Coast Community Housing tenants. This project used a 'Social Access Solar Gardens' model, raising funds from others so there were no upfront costs for the participants.



Image: Haystacks supporters in the Northern Rivers, photo credit Anna Meltzer.

4. OUR VISION

Along our project development journey there were thousands of decisions to make. Some small, some large and some that made us choose between giving up or entirely turning our business model on its head. As we faced each junction of decisions we used the following objectives and guiding principles to influence our choice.

4.1 Objective

To demonstrate to industry, government and community that solar gardens are a viable solar solution for households locked out of installing rooftop solar in Australia through:

- Showing there is significant community interest in the model.
- Developing and implementing the legal framework of contracts that allow for a solar garden to be established either as a stand alone mid-scale project or by being part of a larger solar project.
- Creating a clear pathway for future solar garden projects.

4.2 Guiding Principles

The principles that guided our decisions were:

- **Create a replicable model** – A driving focus for the project team was to build capacity in the community energy sector to enable groups to plan and implement their own solar gardens. As most community energy groups are volunteer-led our project seeks to share as much information as possible to make their journey swifter and more streamlined.
- **Keep the business model simple** – The Australian energy system is complex. Wherever possible the project team tried to steer the project towards the options that kept things simple. Whilst this was not always possible it was a driving force behind our decision making processes.
- **Ensure community involvement in key decisions** – A fundamental ethos of community energy projects is empowering everyday Australians to actively participate in their own energy future. Where major project decisions were needed Haystacks Solar Garden cooperative put these decisions to the vote of the members to guide the project forward.
- **Ensure Australia's first solar garden delivered viable on-bill credits** – As Australia's first large scale solar garden, the project team was determined to deliver a project with as low of a risk as possible, coupled with as high as possible on-bill credits. We sought to demonstrate the financial viability of solar gardens in the Australian energy market.

5. THE HAYSTACKS SOLAR GARDEN MODEL

The essential features of any solar garden are bringing a group of people together who contribute to the cost of establishing a solar array (remote from their home) and then receive a credit from the solar farm on their electricity bill. To achieve this model, Haystacks Solar Garden members came together as a cooperative, purchased a type of debenture known as a 'Cooperative Capital Units' to pool funds and create a loan to Grong Grong Solar Farm (which is the company that owns the solar farm) for the construction of a 1.5 MW (AC) solar array. The loan repayments from Grong Grong Solar Farm to Haystacks Solar Garden Cooperative are funded through the sale of solar energy to the grid and make up the majority of the on-bill credits that solar gardeners receive.

Haystacks Solar Garden Cooperative sold 175 solar garden plots raising \$735,000 which was loaned to Grong Grong Solar Farm to partly fund the construction of the 1.5MW solar array.

In Australia, to issue (or interact) with an electricity bill requires an electricity retailing licence. For the Haystacks Solar Garden to be able to apply the solar garden credit to its member's electricity bills we needed a partnering electricity retailer. Energy Locals were the successful retailer in our competitive selection process and have been a steadfast and innovative partner in overcoming the unique needs of implementing Australia's first large scale solar garden on-bill credit system. Figure 2 below outlines the cash and energy flows between the organisations that bring Haystacks Solar Garden to life.

5.1 Haystacks Solar Garden Plots

The Haystacks Solar Garden Co-operative offered to its members the opportunity to purchase solar garden plots using Cooperative Capital Units (CCU). CCUs are a versatile type of debenture and the legal tool used to raise the collective funds. Anyone wanting to become a solar gardener and receive credits on their electricity bill needed to become a member of the Haystacks Solar Garden Cooperative first for \$51 before being able to purchase a solar garden plot CCU. The purchase price for a Solar Garden Plot CCU was \$4,200.

A solar garden plot in the Haystacks Solar Garden is a virtual 3kW portion of the 1.5MW solar farm and will function for a period of 10 years (which is the term length of the loan to Grong Grong Solar Farm). During this time an estimated minimum annual on-bill credit of \$505/solar garden plot will be provided to solar gardeners' electricity bills split across their bills for the year. This equates to an estimated effective feed in tariff of 12c/kWh for the entire solar plot generation from an equivalent 3kW rooftop system exporting all solar electricity with no curtailment. In comparison the NSW regulator IPART suggests a solar feed-in tariff for NSW solar customers between 7.7 and 9.4c/kWh in 2023.

The estimated annual on-bill credit is made up of \$455 from loan repayments from Grong Grong Solar Farm and \$50 from Energy Locals. The contribution from Energy Locals reflects their commitment to enabling solutions that create a fairer energy system for Australians. It is also testament to the collective value of a group of customers coming together in the form of a solar garden.

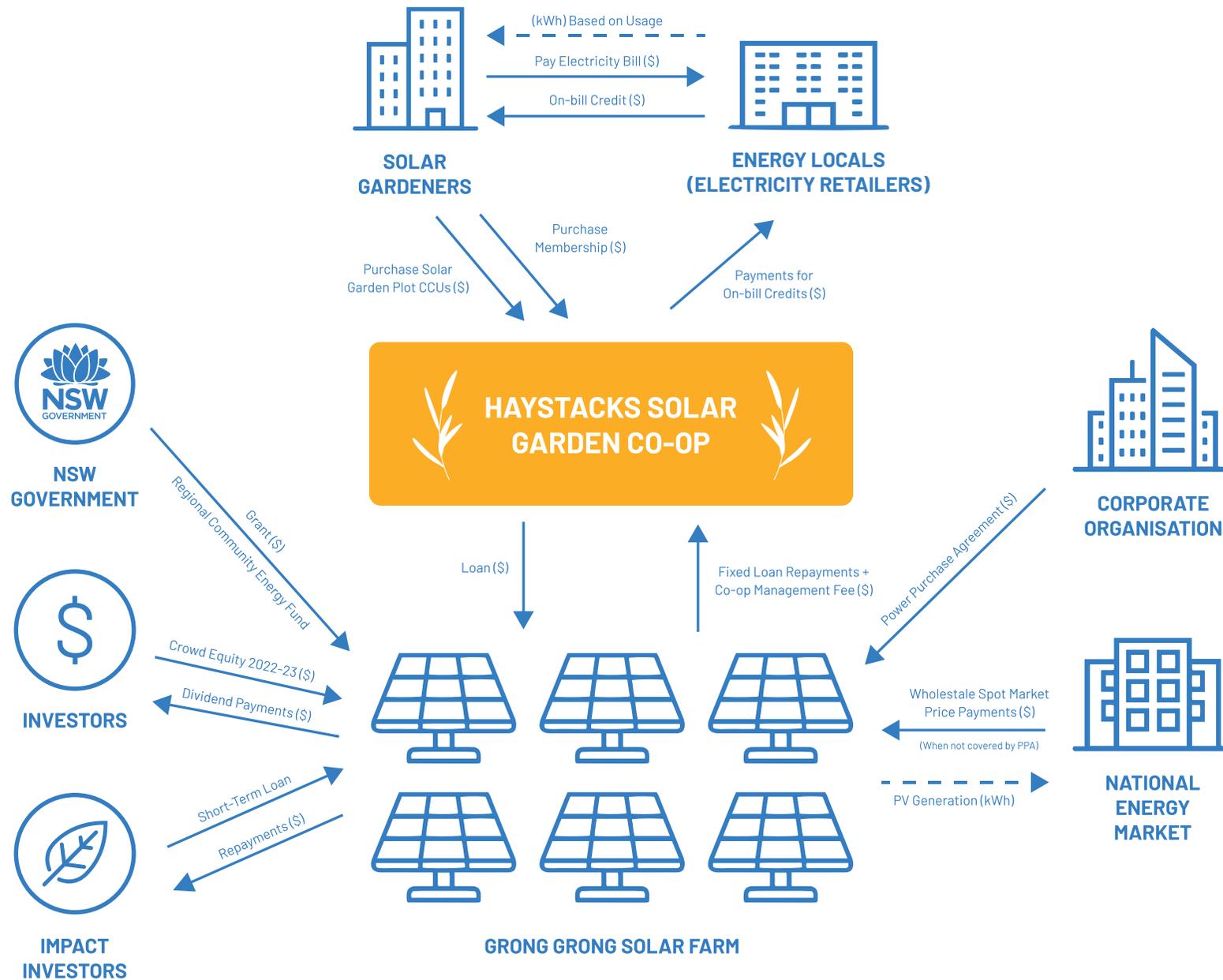


Figure 2: Cash and Energy Flows that enable Haystacks Solar Farm

In order to receive their on-bill credit, solar gardeners are required to switch to the partnering retailer - Energy Locals. Solar gardeners will see a separate line item on their Energy Locals electricity bill which will be calculated on a per day basis of their annual credits depending on their billing cycle. If a solar gardener changes address, they simply change their billing address with Energy Locals and their solar garden credit moves with them.

Table 1: Breakdown of Haystacks Solar Garden plot estimated on-bill credits

Term Length	Plot Size
Plot Size	3kW
Attributable average annual share of generation	4200 kWh
Average Estimated Equivalent Feed-in Tariff (Not limited to daily generation thresholds)	12c/kWh (\$505 ÷ 4200kWh)
Annual Retailer Contribution Per Solar Gardener	\$50
Annual Contribution from Grong Grong Solar Farm Per Plot	\$455
Total Estimated Annual On-bill Credit	\$505

If you move home - your solar garden on-bill credits move with you!

The beauty of using CCUs is that they act as a separate asset for both the Co-op and its members. This means that if a solar gardener wanted to sell or gift their solar garden plot in the future to another cooperative member or leave it in the estate of their will, they could do so completely independently of their Co-op membership or any other future solar garden they want to be involved with. The purchase price of a CCU decreases linearly each year by \$420 (one 10th of the original value) to match the time opportunity for membership in the project.

5.2 Our Community

Haystacks Solar Garden Co-op’s mission is to provide those locked out of rooftop solar access to participate and benefit in the solar revolution. This was made possible by a grant from the NSW Government’s Regional Community Energy Fund which aimed to enable “community energy projects that create innovative and/or dispatchable renewable energy and benefit the local community.”

The Haystacks Solar Garden Co-operative is made up of passionate members across NSW, Victoria, South Australia, Tasmania & South-east Queensland keen to see a new way of doing solar in Australia. By coming together the Co-op members wield greater bargaining power with electricity retailers and have the opportunity to enable mid-scale solar developments. This adds to the diversity of the renewable energy capacity of Australia and takes tangible action to combat climate change.



Image: Haystacks members celebrating the successful vote of our Offer document.

The Haystacks Solar Garden has members and solar garden plot holders who purchase CCUs (see Governance section 5.4 for more detail). There are currently 407 members and 149 CCU plot holders, aka solar gardeners, who purchased a total of 174 plots (an additional plot was purchased via donations from a crowd fundraising campaign, more on this in section 5.2.3).

5.2.1 Establishing Our Co-op

The journey to create the co-op business part of Haystack Solar Garden from inception to operation with receiving on-bill credits had ten main parts:

1. Draft the cooperative formation rules and disclosure statement and seek approval to establish the co-op as a legal entity with NSW Fair Trading (this will be different depending on the State).
2. Hold a formation meeting to elect first co-op directors and accept founding members.
3. Recruit members through in-person and online information sessions explaining the project and its potential.
4. Explain our solar garden model to our co-op members to upskill them in the energy system and deliberate on major project decisions collectively. Co-ops have a democratic decision-making structure built into their legal structure.
5. Develop and draft terms of issue for the CCUs.
6. Write and seek approval from NSW Fair Trading to issue an Offer Information and Disclosure Statement (similar to an investment prospectus) for our co-op members to be able to purchase CCU solar garden plots.
7. Promote and explain the solar garden plot offer to existing members and the public (potential new members) through many in-person and online events.
8. Coordinate the sale of solar garden plots and pool the collected funds (invoicing and receipts).
9. Complete an independent third party due diligence review of the final project design and present to solar garden plot holders to formally vote and approve the transfer of funds for the loan to Grong Grong Solar Farm for construction.
10. After commercial operation, establish and maintain administrative processes to receive loan repayments and distribute funds to our co-op members via Energy Locals as on-bill credits as well as manage any applications to sell or transfer solar garden plots.

Co-op Establishment Balancing Act, two potential avenues:

- Having your co-op established and filled with members can make it easier to negotiate with electricity retailers as you will have a better sense of how many participants you have secured. Also, if your project wishes to incorporate elements of matching demand load to generation production (e.g. peer to peer energy trading) you will be able to survey members and get a more detailed sense of what your collective energy profile represents. This will be easier to do with an existing membership base.
- Alternatively, it is far easier to attract prospective members to your project with the key details already known - this includes who the retailer/s are, the purchase price of a solar garden plot and the expected on-bill credits. Knowing these upfront can streamline engagement processes but can also reduce the connection to the project and decision making opportunities for participants.

5.2.2 Engagement Techniques

The scope of engagement activities for Haystacks Solar Garden extended to the six states where Energy Locals holds an electricity retailing licence: South-east Qld, NSW, Vic, ACT, SA and Tas. The vast majority of public engagement occurred during the pandemic years of 2020 and 2021 which rendered it online via interactive video info sessions and across social media platforms including Facebook, Twitter and Instagram. Once social gatherings became more possible some information stalls were held at markets as well as face to face info sessions and in person launch events.

Some communities identify themselves via a geographic region whilst others identify collectively over a common interest. As our community was potentially spread right across the eastern parts of Australia our collective identity comes from the desire to take action on climate change directly and innovate an energy system to create fairer participation in solar.

A fundamental feature of both our recruitment campaign for cooperative members and the fundraising campaign to sell solar garden plots were online info sessions co-hosted with allied organisations with aligned values. The project team completed 41 info sessions both online and in person of which 19 were jointly hosted with allied organisations. These partnerships were possible because the community engagement team in Community Power Agency and Pingala had several existing relationships and trust with these allied organisations, also the fact that our organisations are not for profits with similar aims. A list of our partnering organisations for info sessions is provided in Appendix B.

Another key feature of our engagement strategies was to provide easily understood, authentic, transparent and trustworthy information regularly. We did this through frequent newsletter emails to our subscriber list, follow up

information to anyone who attended an online information session and being very attentive to our general email, making sure to respond in a timely and friendly manner to every email.

Other engagement techniques included using SMS blasts to remind people about upcoming info sessions or meetings, encourage members to apply for CCU plots and remind members to pay for their plots. During the fundraising campaign we implemented an online system for members to book a one-on-one chat with someone in the project team using Calendly via our website and also personally called members that had attended an info session and were yet to apply for a plot. Through these techniques we were able to receive direct feedback that informed how we marketed the solar garden plot offer whilst also developing direct relationships with our members.

5.2.3 Donations Campaign

To provide even more social benefit from the project and demonstrate the social access donations model of a solar garden plot, a crowdfunding donations campaign was run in partnership with Enova Community Energy - the community arm of Enova Energy who at the time were the electricity retail partner for Haystacks Solar Garden.

The donation campaign raised most of the funds for one plot which will be gifted to a not for profit organisation in the Riverina region - where Grong Grong Solar Farm that hosts Haystacks Solar Garden is located - to help reduce energy bill stress of either their organisation or passed on to someone they recommend. Community Power Agency also received a large donation from a philanthropist to enable solar gardens and passed this onto Haystacks Co-op to enable discounted plots to several co-op members located in the Riverina as well as topping up the remaining funds for the gifted plot.

5.3 Major Milestones

The journey to establishing both Haystacks Solar Garden and constructing Grong Grong Solar Farm had the following major milestones outlined in Figure 3.

Figure 3: Haystacks Solar Garden and Grong Grong Solar Farm Major Milestones



5.4 Governance Of Haystacks Solar Garden Cooperative

The Haystacks Solar Garden is a distributing cooperative utilising Cooperative Capital Units (CCUs). Cooperative law is now harmonised across Australia, however co-ops are registered & managed at the state level. For example in NSW the registrar body is Fair Trading and in Victoria it is Consumer Affairs.

5.4.1 Why A Cooperative?

The cooperative model was chosen for the Haystacks Solar Garden project as a result of a research project entitled "[Social Access Solar Gardens For Australia](#)" conducted by the Institute for Sustainable Futures and Community Power Agency. One of the research objectives was to identify the particular barriers that would prevent the solar garden model from working in Australia. The use of the co-operative legal form was identified as in many cases the most appropriate model for the membership vehicle.

A fundamental ethos of community energy projects is empowering everyday Australians to actively participate in their own energy future. Cooperatives are participatory and democratic by nature which make their governance structure very values aligned for solar gardens.

5.4.2 Different Ways Of Raising Funds In Co-ops

There are essentially two ways a co-operative can approach raising capital for a project. One option is to link the membership shares to fund the project construction; the second option is to issue a nominal membership share in the co-op and then use Cooperative Capital Units (CCU) as a separate capital raising tool for the project.

Examples of linking the co-op shares to the offering of funding the solar array are Pingala Co-op and the Gouldburn Community Energy Co-operative. Haystacks Solar Garden Co-operative is an example of separating the membership shares from the capital raise. (e.g. Initial joining of a \$1 share in the co-op and then a later offering of \$4200 per CCU.) See Appendix C for a comparison between using shares versus CCUs in co-ops as they suit different project circumstances uniquely.

5.4.3 Why Use Cooperative Capital Units?

Cooperative Capital Units (CCUs) are a form of debenture that co-operatives can issue. They are separate from members' shares and require their own agreements and disclosure statements. For the Haystacks project, CCUs offered a way to create and sell independent solar plots to members, giving members a virtual asset to own and a tool for the Haystacks Co-op to use to start creating the solar garden.

The Haystacks Co-op found that issuing solar garden plots as CCUs potentially made questions around taxation somewhat simpler. They also provided the flexibility to design a plot that could be easily transferred, have a defined lifespan and not be redeemable. Utilising CCUs allowed interested and supportive community members to become involved in the Haystacks Co-op before the option to buy a plot was ready- namely through creating two tiers of involvement - first through joining as a co-op member, then purchasing a solar garden CCU plot. This two tier structure also allowed us to assess the level of interest in purchasing solar garden plots while we were still finalising the details of the solar garden offering. Furthermore, CCUs created the future option of Haystacks Solar Garden Cooperative being able to pursue another solar garden initiative in the future through offering a second issue of different CCUs should the opportunity arise.

CCUs have some distinct advantages:

- **Flexibility** - They can have different rights and requirements compared to members shares, and can be issued to non-members (whilst possible this was not a feature of Haystacks Solar Garden). Their flexibility comes through how their terms of issue are written.
- **Separate to membership** - Governance rights and membership responsibilities do not transfer to CCU holders unless specifically described in the terms of issue. The Haystacks Co-op requires in our terms of issue that its CCU holders be active members.. By creating a separate asset class, this allows the project to be quite stable as the project is tied to the terms of issue not general co-op governance.
- **Are non-redeemable** - Whilst CCUs are transferable they are not redeemable, meaning a CCU holder cannot request the co-op to take back the CCU at any time and refund them their money in the same way they can with a co-op share. This is important as solar garden plots were valued at \$4200 and the co-op would not have had the means to fund the cash flow itself of CCU holders wanting to redeem their CCUs at any time.
- **Time bound** - Unlike shares that exist as long as the co-op is operational, CCUs can be specified to have an end date. This was especially useful for the model Haystacks ended up with where the loan repayments are finite (10 years).
- **Project insulation** - to change the terms of issue requires 75% of the CCU holders, this ensures only the people who have a vested interest can change the conditions of the terms of issue. Useful if many new members join in the coming years they cannot influence the CCU terms without a majority vote of the CCU holders.

There are also some drawbacks to using CCUs:

- **Separate to membership** - CCU holders can be given a vote (within the terms of the CCU which is one vote per CCU held). This means it is not one-member-one-vote which is somewhat counter to the democratic values in a Co-op if people purchase more than one CCU. Using CCUs can also avoid active membership requirements. Haystacks retained a one vote per CCU held plus active membership requirements in its CCU terms of issue.
- **Extra approvals** - Terms of issue need to be approved by the state registrar (NSW Fair Trading for the Haystacks Co-op) and then the co-op members. This can create a feedback loop and cannot be done in parallel, this process can take 2-6 months or longer in complex projects (it took nine months in the Haystacks project). If the CCUs are issued to Co-op Members only (i.e. not to the public), an additional disclosure statement is required under section 338 of National Cooperative Law. ([Haystacks Offer Information and Disclosure Statement](#))

Appendix D outlines the various sections of the Cooperatives National Law relevant to Cooperative Capital Units.

Rights As A Solar Gardener CCU Holder

When a member purchases a Solar Garden Plot CCU we refer to them as solar gardeners, with the CCUs a separate class of equity ownership in the Haystacks Solar Garden Co-operative Ltd. This means that while solar gardeners have special voting rights regarding the project that their CCUs are funding, it doesn't change their rights and responsibilities as members of the Haystacks Solar Garden Co-operative Ltd (please refer to the [Disclosure Statement for the Haystacks Solar Garden Co-operative Ltd](#)).

As a solar gardener a member may do the following:

- Vote along with other solar gardeners on how the Haystacks Solar Garden Co-operative Ltd uses capital from the CCUs.
- Enter into an agreement with a participating retailer (Energy Locals) as a customer in order to receive on-bill credits.
- Sell the residual value of their CCUs to another Haystacks Solar Garden Co-operative member in the future if they desire.

For full terms please see the Haystacks Solar Garden Co-operative Ltd Solar Garden Plot CCU [Terms of Issue](#).

Requirements Of A Solar Gardener And CCU Holder

In order to purchase a CCU, our rules state an individual must be an active member of the Haystacks Solar Garden Co-operative Ltd and agree to the terms of ownership of the CCUs.

Additionally, a solar gardener must switch their electricity account to Energy Locals to receive their on-bill credits.

As a solar gardener they must remain an active member of the Haystacks Solar Garden Co-operative Ltd for the period of CCU ownership. Rules on active membership can be found in category 1.3B of the [Haystacks Solar Garden Co-operative Ltd Rules](#) and are as follows:

- Participate in at least one meeting in relation to a proposed solar garden each financial year, or;
- Purchase electricity from a retailer approved by the [Haystacks Solar Garden] Co-op

5.4.4 Tax Ruling For Solar Gardens

Haystacks began the process to achieve a private tax ruling on whether solar garden on-bill credits should be treated as income for tax purposes. However due to the level of detail required, significant tax and legal advice needed and time constraints imposed by the ATO to arrange all the former, the project team abandoned the private tax ruling in order to prioritise project hours during the pandemic to keeping the project financially viable.

We note that Enova Community sought a private ruling on the treatment of the on-bill credits for tax purposes for their behind the meter solar garden initiative in Lismore NSW. The result of their ruling was that in this instance, on-bill credits were not assessable as income tax for those residents receiving credits. The Enova private tax ruling is only somewhat helpful to the Haystacks Co-op. It means that this concept is not totally novel to the ATO, but there are some key structural differences that make it unique.

In the Enova model, the people who purchased the solar garden plots were not the people who are receiving the on-bill credit, the electricity is gifted to a community housing provider who distributes the credits to the residents who signed up to the scheme.

Warning - Tax rulings by the ATO are very specific and only cover the subjects of the ruling and are not a general rule on tax treatment.

5.4.5 Learnings In Using a Co-op Model

Cooperatives are very flexible yet not well understood by many. Only a small number of legal firms are familiar with cooperatives enough to advise groups who are innovating in the space.

Cooperative Capital Units (CCUs) are also not well understood in any sector - the Haystacks project is the seventh project of any kind in Australia to use CCUs. This meant that even the NSW registrar - NSW Fair Trading, were learning how to regulate this option and took over nine months to approve our first Offer Information & Disclosure Statement. There are very few legal firms with knowledge of how to use and design cooperative rules on CCUs.

Each state registrar for cooperatives has different procedures. In NSW the Offer Information & Disclosure Statement, detailing the offer of our solar garden plot CCUs, must be approved by NSW Fair Trading before the co-op membership can vote to ratify the public offer. We were informed that the order is reversed in Victoria.

The Business Council of Cooperatives and Mutuals (BCCM) were an excellent ally for Haystacks Solar Garden during our second CCU offer document assessment process - their assistance with NSW Fair Trading helped immeasurably.

Some of the biggest administrative hurdles for a co-operative are maintaining an accurate list of active members and reaching quorum in meetings in order to make decisions. This can be compounded if multiple meetings are required in a year, in addition to the Annual General Meeting to allow for membership votes on the developing project.

Quorum is important in a democratic structure to ensure that the agreed upon number of members in the co-op rules are present to make a decision. However, having a high percentage required for quorum and a growing membership base can make it difficult to reach the required membership number (quorum) to make the meeting & any decisions made valid, which complicates the co-op's ability to move forward on projects.

Ensuring that the membership is active and engaged is an important part of maintaining cooperative governance. It is a balance between baking in democratic processes and being realistic with what is possible.

Within Haystacks Co-op we made sure to include the ability to make decisions by 'postal ballot' or online voting systems so that members can cast their vote on key decisions over a longer period of time that does not rely on meeting attendance at a designated time. This has meant we achieve quorum on key decisions, although AGM attendance is still a struggle with our membership now over 400 and a 20% quorum percentage required.

Ultimately, co-operatives are about co-ownership and democratic governance - keeping to those principals takes more time, energy and resources yet in our experience results in better, more well understood outcomes. Decision making is a relatively slow process compared to other structures and with designated notice periods between 14 and 21 days, it should be expected that the decision making could take time and more resources. It is our strong belief that participation in the energy revolution actually involves creating governance opportunities such as those inherent in cooperatives, so whilst others may see this as cumbersome, the project team viewed our use of the co-op model as valuable.

6. OUR LEGAL ARCHITECTURE

There are a multitude of legal documents that allow the Haystacks Solar Garden model to function. From setting up land agreements, receiving grants, building the solar farm, connecting to the grid, selling solar garden plots and distributing credits on solar gardener's electricity bill; legal agreements are used to document the roles and responsibilities of each party. Whilst the concept of solar garden generating solar offsite and providing solar credits on members bills sounds like an elegant and logical initiative there are a number of legal agreements working behind the scenes to bring it to life.

Table 2 below outlines the 32 legal agreements across ALL parties that enable the Haystacks Solar Garden model and allow it to function from the paddock all the way to the home electricity bill. Note: many of these legal agreements would be present for any solar farm development and are not unique to solar gardens.

Table 2: Types of Legal Agreements Used

GRANT

Type	Name of Legal Agreement	Between Which Parties	For What Purpose	
Funding Agreement	Funding Agreement	NSW Government	Pingala - Community Renewables for Sydney Inc novated to Grong Grong Solar Farm Pty Ltd	Outlines the terms, conditions and responsibilities of the recipient to deliver the agreed project, and the terms under which the NSW Government administers the Funding Agreement. Includes: project schedules, budgets, and risk register, NSW Government funding contributions, recipient contributions, project milestones, milestone delivery timelines and reporting, and knowledge sharing activities.
Project Partner Collaboration	Consortium Agreement	Pingala - Community Renewables for Sydney Inc	Komo Energy Pty Ltd & Grong Grong Solar Farm Pty Ltd	Sets out the roles and responsibilities of the project partners to deliver the requirements set out in the Regional Community Energy Fund Funding Agreement and ensures continued standing of Pingala as community representative in the Project.

LAND

Type	Name of Legal Agreement	Between Which Parties	For What Purpose
Land Agreement	Head Lease	Land Owners	Long-term lease over the site.
Land Agreement	Sublicence	Komo Precinct Pty Ltd Grong Grong Solar Farm Pty Ltd	Long-term licence over the site.
Land Agreement	Step-in Deed	Land Owners Komo Energy Pty Ltd & Grong Grong Solar Farm Pty Ltd	Protects Grong Grong Solar Farm if Komo Precinct breaches the Head Lease

GRID

Type	Name of Legal Agreement	Between Which Parties	For What Purpose
Grid Connection	Funding Agreement	Essential Energy Grong Grong Solar Farm Pty Ltd	Sets out the terms of service provision and cost recovery by Essential Energy for connection investigation and grid modelling phase of the Grong Grong Solar Farm.
Grid Connection	Essential Energy Option to Proceed	Essential Energy Grong Grong Solar Farm Pty Ltd	Sets out the terms and conditions upon which Essential Energy will deliver the non-contestable works for the benefit of the Grong Grong Solar Farm Pty Ltd.
Grid Connection	Essential Energy Connection Agreement	Essential Energy Grong Grong Solar Farm Pty Ltd	Sets out the terms and conditions upon which Essential Energy will provide ongoing Network Services to Grong Grong Solar Farm Pty Ltd for the Grong Grong Solar Farm.

SUPPLY AND CONSTRUCTION

Type	Name of Legal Agreement	Between Which Parties		For What Purpose
Supply	Supply Agreement	Grong Grong Solar Farm Pty Ltd	Zimmermann PV-Tracker GmbH	Supply Agreement for the supply of foundations and trackers as well as commissioning services for the trackers.
Supply	Supply Agreement	Grong Grong Solar Farm Pty Ltd	Marici Australia Pty Ltd T/A FIMER Australia	Supply Agreement in relation to the supply of the PVS980-CS inverter and transformer skid as well as commissioning services for the inverter and transformer skid.
Supply	Supply Agreement	Grong Grong Solar Farm Pty Ltd	Jinko Solar Australia Holdings Co. Pty Ltd	Supply Agreement for the supply of solar modules.
Construction	Early Works Contract	Grong Grong Solar Farm Pty Ltd	MegaWatt Power Pty Ltd	Delivering the fencing works, care and custody of the site and performs the role of 'principal contractor'.
Construction	Civil Works Contract	Grong Grong Solar Farm Pty Ltd	ComplexCo Pty Ltd	Delivering the road turn-ins and internal road, perform the role of 'principal contractor'.
Construction	Mechanical Works Contract	Grong Grong Solar Farm Pty Ltd	Hunter Solar Pty Ltd T/A HCB Solar	Piling, mechanical tracker installation and mechanical mounting of photovoltaic modules.
Construction	Engineering, Procurement and Construction Contract	Watters Electrical Pty Ltd	Grong Grong Solar Farm	Contract for the delivery of the mechanical, LV electrical and HV electrical works, SCADA, grid integration, energisation, commissioning and testing

ENERGY TRADING

Type	Name of Legal Agreement	Between Which Parties		For What Purpose
National Energy Market Trading Services	FRMP Agreement	Diamond Energy	Grong Grong Solar Farm Pty Ltd	Contract regulating the sale of electricity into NEM and the creation and sale of LGCs.
Electricity Retailing Services	On-Bill Credit Agreement	Haystacks Solar Garden Co-op Ltd	Energy Locals Pty Ltd	Sets out the arrangement to transfer funds received from sale of solar electricity (for the repayment of the loan between Haystacks Solar Garden and Grong Grong Solar Farm) to solar garden CCU holder's electricity bills.

HAYSTACKS CO-OP SET UP

Type	Name of Legal Agreement	Between Which Parties	For What Purpose	
Co-op Governance	Rules (Constitution) of Haystacks Solar Garden Cooperative Ltd	Haystacks Solar Garden Co-op Ltd	For the public who want to be part of the Haystacks Solar Garden - the Rules set out how the cooperative will operate and member rights and responsibilities.	
Co-op Governance	Disclosure Statement	Haystacks Solar Garden Co-op Ltd	For the public to assess the risks and opportunities associated with the Haystacks Solar Garden Cooperative.	
Co-op Offer	Offer Information and Disclosure Statement	Haystacks Solar Garden Co-op Ltd	Individual Haystacks Co-op members who purchase a CCU	Details the specifics of the solar garden plot offer as an investment opportunity and its associated risks.
Co-op Offer	Terms of Issue of Solar Garden Plot Co-operative Capital Unit	Haystacks Solar Garden Co-op Ltd	Individual Haystacks Co-op members who purchase a CCU	Sets out the terms and conditions of Cooperative Capital Units for Haystack members who purchase a CCU. Includes details such as price, term length, how to transfer etc.

HAYSTACKS CO-OP CONNECTION TO GRONG GRONG SOLAR FARM

Type	Name of Legal Agreement	Between Which Parties	For What Purpose	
Finance	Loan Agreement	Haystacks Solar Garden Co-op Ltd	Grong Grong Solar Farm Pty Ltd	Enables Haystacks Solar Garden to loan \$735,000 to Grong Grong Solar Farm for the construction of the 1.5MW solar array. Outlines roles and responsibilities of each party, how the assets will be managed, how information will be shared and what to do in events of a default or conflict between the parties.
Finance	Security Deed	Haystacks Solar Garden Co-op Ltd	Grong Grong Solar Farm Pty Ltd	Provides security over all assets of Grong Grong Solar Farm which can be seized in the event of a default under the Haystacks Loan Agreement. Sets out details pertaining to triggers, remedy actions and roles and responsibilities of both parties.

GRONG GRONG SOLAR FARM PTY LTD SET UP AND CAPITAL RAISE

Type	Name of Legal Agreement	Between Which Parties		For What Purpose
Corporate	GGSF Constitution	Grong Grong Solar Farm Pty Ltd		The Constitution sets out how the company will operate and investor rights and responsibilities.
Corporate	Crowd Equity Offer Document	Grong Grong Solar Farm Pty Ltd		Explains the specific risks and opportunities for investment in the crowd-sourced funding offering.
Corporate	Crowd Equity Subscription agreement	Grong Grong Solar Farm Pty Ltd	Each investor	Sets out the terms governing the subscription process during the crowd-sources funding offering
Corporate	Hosting Agreement	Birchal Financial Services	Komo Energy	Regulates the hosting of the crowd-sourced funding offering on the Birchal Platform
Finance	SEFA Facility Deed	Social Enterprise Finance Australia	Grong Grong Solar Farm Pty Ltd	Syndicated construction finance facility provided to accelerate the construction of the Grong Grong Solar Farm pending investment by Haystacks Solar Garden
Finance	SEFA Syndicate Administration Deed	Social Enterprise Finance Australia	Grong Grong Solar Farm Pty Ltd & Various Impact Investors	Agreement that allows SEFA to syndicate a set of impact investors to provide the construction finance facility deed, appointing SEFA as both facility agent and security trustee.
Finance	SEFA General Security Deed	Social Enterprise Finance Australia	Grong Grong Solar Farm Pty Ltd	Security deed over all the assets of Grong Grong Solar Farm.
Finance	Convertible Note	Grong Grong Solar Farm Pty Ltd	Various Impact Investors	Convertible note agreements between Grong Grong Solar Farm and various impact investors.



Image: Solar gardeners Rolf, Colleen & Leah with Kristy promoting Haystacks Solar Garden at community stall.

6.1 Acknowledgement To Norton Rose Fulbright

One of our great learnings from the Haystacks Solar Garden project is the value of having legal advisors who fundamentally understand what you are trying to achieve in the world and who bring a 'can do' attitude to the task. We were lucky enough to be backed by the dedicated team at Norton Rose Fulbright in the many legal draftings of numerous agreements needed to bring the solar garden to life. We cannot thank Norton Rose Fulbright enough for their enduring contributions to the project and we know that Australia would not have its first large scale solar garden had it not been for them.

Norton Rose Fulbright offered pro bono support in the development and review of all documents between Haystacks Co-op and other parties. Legal agreements not involving Haystacks Solar Garden Co-op were drafted and checked by other parties.

6.2 Acknowledgement To Pegasus Legal

On the solar development project side, the Haystacks Solar Garden project was supported by Pegasus Legal, an industry-leading boutique legal practice working in the renewable energy sector. Pegasus Legal drafted and negotiated all documents that did not directly involve the Haystacks Co-operative and advised Grong Grong Solar Farm on those agreements between Grong Grong Solar Farm and Haystacks Solar Garden. A significant part of the work of Pegasus Legal was provided on a pro bono basis, as the project scope evolved and expanded.

7. FINANCIAL

In the development of any renewable energy venture there is an iterative process of refining a project from a concept to a viable commercial offering. This iterative process combines rounds of information gathering to develop more and more specific details around engineering design, cost estimates, incomes estimates and marketability of the proposed end product. Through this process, technical, financial and market variables all influence decision making until a viable option can be identified. At any point in time, obstacles can arise from various aspects which need to be overcome and can affect the structure of the entire project.

The key financial questions trying to be solved through this iterative process are:

1. How much will it cost to build (capex)?
2. How much will it cost to run (opex)?
3. What are the costs of finance or fundraising?
4. What are the expected returns for investors/participants?
5. Where will the funding come from to construct?
6. Where will the income come from to operate?

The following sections provide a summary of the project costs, operational costs, funding sources and estimated revenue sources for Haystacks Solar Garden and Grong Grong Solar Farm.

7.1 Project Costs And Funding Sources

Building a solar farm and establishing a solar garden have many different costs which in this project have been covered by a variety of funding sources. This section aims to shed some light on the funding mechanisms of Haystacks Solar Garden and Grong Grong Solar Farm.

The project costs and budgets below only include figures directly related to our project delivery from the three project partners (Community Power Agency, Pingala and Komo Energy). Operational overheads of the partner organisations are not reflected in the project budget nor are the substantial in kind project hours that were contributed above and beyond what was budgeted below for the Regional Community Energy Fund Funding Agreement.

Table 3: Project upfront costs

Project Upfront Cost	Amount
Establishment of Haystacks Solar Garden Co-op, community engagement and project management	\$554,000
Development costs (Engineering, planning and contracts)	\$503,000
Essential Energy non-contestable works	\$144,000
1.5 MW (AC) / 1.7 MW (DC) solar farm construction	\$3,316,000
Land leasing/licencing fees	\$126,480
Grong Grong Solar Farm fundraising and finance costs	\$333,000
TOTAL	\$4,976,480

Table 4: Project Funding Sources

Funding Source	Type	Amount
NSW Government Regional Community Energy Fund	Grant	\$1,970,565
Haystacks Solar Garden Cooperative Ltd	Loan	\$735,000
2022 Seed & crowd investment	Equity	\$1,179,000
2023 Seed & Crowd Investment	Equity	\$810,000
Impact investor	Loan	\$600,000
	TOTAL	\$5,299,565

Note: Total funding sources exceeds total project costs due to covering construction cash flow needs.

7.2 Operational Costs

Below are the indicative operational costs of the solar farm portion once the system is constructed and operating. These values may vary, but give an indication of the expected ongoing costs of running a solar farm.

Table 5 : Grong Grong Solar Farm Estimated Operational Costs

Solar Farm Operational Costs	Year 1 Estimate	Year 11 Estimate
Solar Farm Operating Insurance	\$10,000	\$10,000
Operations & Maintenance – preventative maintenance, allowance for reactive maintenance, weed management, panel cleaning (assuming decrease due to more efficient delivery)	\$26,000	\$22,000
Asset Management – managing O&M contractor(s), arranging insurance cover and managing insurance claims, managing component warranty claims, managing sale of electricity and LGCs, bookkeeping and accounting	\$24,600	\$15,400
Other costs – Essential Energy O&M charge for gifted assets and auxiliary load	\$5,000	\$5,000
Haystacks Solar Garden Cooperative Loan and Administration Fees to manage the Coop	\$89,800	\$0
Impact Investor Loan	\$57,622	\$0
TOTAL	\$213,022	\$52,400

Note: The operational expenditure indicated here excludes rent payments because these were negotiated to be paid upfront.

7.3 Estimated Revenue From Grong Grong Solar Farm

The potential Year 1 revenues from the sale of electricity and LGCs are summarised in Table 5 below.

Table 6: Estimated Revenue Sources From Solar Generation

Estimated Revenue Sources From Solar Generation	Year 1 Volume	Reference Price	Year 1 Revenue
Sale of electricity into the NEM (NSW market segment)	3,707 MWh	\$72 per MWh	\$267,000
Sale of LGCs	3,707 MWh	\$52 per MWh	\$193,000
		TOTAL	\$460,000

To determine the appropriateness of the reference price used in the above table, the table below summarises both the recent NSW wholesale market price for electricity and the weighted price that solar farms receive due to the time of day during which they generate. Solar farms generally receive a lower weighted price due to their failure to supply electricity during the, typically, higher priced evening peak.

Table 7: Electricity Price Averages

Year	NSW Volume Weighted Average Pool Price	NSW Solar Farm Generation Weighted Pool Price
2018	\$85.11	\$77.67
2019	\$88.55	\$79.20
2020	\$68.18	\$64.42
2021	\$81.76	\$46.24
2022	\$198.15	\$112.17
2023 (to 30 June)	\$128.26	\$76.30

The reference price of \$72 per MWh is used in the above example to provide an estimate of Year 1 revenues. The price for electricity and for LGCs is subject to market risk and prices can go up as well as down. We have estimated what revenue is required on a \$/MWh basis to cover annual OPEX and thereby remain cashflow positive. This is shown in the table below for years 1 and 11.

Table 8: Estimated required average electricity price for OPEX

	Year 1	Year 11
Estimated solar generation (MWh)	3,707	3,456
Estimated OPEX costs (ex CPI)(including land rent)	\$163,225	\$60,225
Required total revenue to cover OPEX (\$/MWh) to remain cashflow positive	\$44	\$17

The total revenue required to cover OPEX in terms of \$/MWh can be met with LGCs and/or NSW wholesale electricity sales. Therefore, for example, if in Year 11 LGCs (or equivalent 'green products') are trading at \$10, then only \$7 per MWh would be required from the NSW wholesale market to cover operational costs.

8. TECHNICAL

A solar garden is the coming together of a group of people seeking to have a direct connection to a solar project (whilst not installing solar panels on their roof and still) receiving the solar benefits on their electricity bill. For our project, the people and electricity bill credit functions are housed within the Haystacks Solar Garden Cooperative Ltd and the solar infrastructure project is housed within Grong Grong Solar Farm Pty Ltd.

Even though our project has two separate legal entities working together to bring our solar garden to life there are many different ways a solar garden can be established. A solar garden cooperative may develop and own their own solar farm asset directly, partner with a crowd funded mid scale developer (such as in our model) or even partner with a large scale solar developer using just a fraction of the energy generation to provide benefits to participants bills.

Whichever way a solar garden initiative combines with a solar infrastructure project there are a number of technical considerations to understand and navigate when building a solar farm. In this section we will firstly describe the technical details of Grong Grong Solar Farm then outline various parts to the technical development process from our mid-scale development process that may be helpful for future solar garden projects.

8.1 Grong Grong Solar Farm Technical Description

Grong Grong Solar Farm is located near the township of Grong Grong in the Riverina (NSW), with a footprint of approximately 5.27 ha and a capacity of 1.5 MW (AC) / 1.7 MW (DC) peak with an estimated Year 1 generation of 3,700 MWh p.a., sufficient to power up to 700 households and reduce NSW emissions by

approximately 2,700 tonnes of carbon dioxide annually. Following construction and commissioning, the Grong Grong Solar Farm is expected to operate for up to 34 years.

Grong Grong Solar Farm will produce enough energy to power up to 700 households each year and reduce NSW carbon dioxide emissions by approximately 2,700 tonnes annually.

The Grong Grong Solar Farm is composed of several key components, each contributing to its overall efficiency and functionality. The primary solar panels employed in this facility are Jinko 570N bifacial modules.

To optimise solar energy capture and increase overall efficiency, the modules are mounted on a single-axis PV-tracking system manufactured by Zimmermann. This tracking system ensures that the solar panels follow the sun's trajectory throughout the day, maximising sunlight exposure and consequently improving the solar farm's energy output.

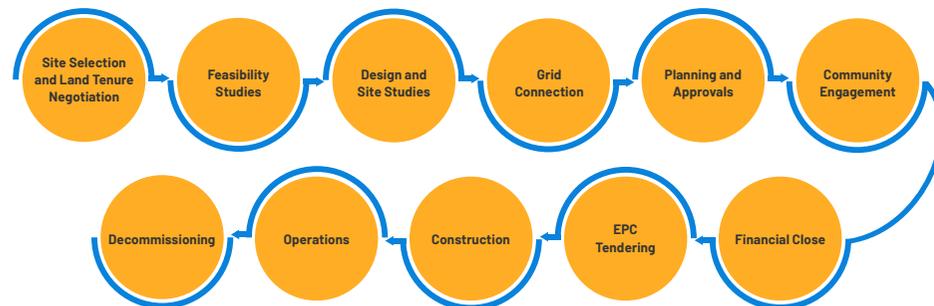
At the heart of the solar farm's power conversion process is the PVS980-CS inverter. Manufactured by Fimer, this inverter is a 'plug and play' solution. It converts direct current (DC) generated by the solar panels into alternating current (AC) for grid injection.

Whilst Australia has an enviable domestic rooftop solar market by world standards and a growing large scale market (5MW - 1GW and beyond), the mid-scale solar industry (1MW to 5MW) is not yet robust or diverse. Mid-scale solar farms are typically more expensive to construct per megawatt of capacity compared to large scale, they do however, represent a more nimble scale of development, with simpler grid connection approval processes, can be located on existing distribution lines and incorporated more easily into agricultural landscapes. They also represent a lower total investment needed per project which makes their scale more achievable for community solar projects.

8.2 Technical Development Process Considerations

The journey from solar farm project concept to operational solar farm has many steps and it is quite an iterative process depending on the types of information that is unearthed along the development pathway. Below is a diagram of the main project stages of a mid-scale solar farm.

Figure 4: Main project stages of a mid-scale solar farm. Note community engagement occurs throughout most project stages.



8.2.1 Site Selection

Choosing an excellent site can greatly simplify the development process of a solar farm. Sites which are flat, with optimal soil condition, with little flooding and fire risk, do not impact neighbours, are located close to unconstrained distribution lines and do not impact biodiversity, waterways or cultural heritage values will be less costly and quicker to develop. Finding a site which is supported by the local community is very advantageous. Grong Grong Solar Farm enjoys all of these qualities and the time taken in identifying an excellent site can save much development work further down the track.

8.2.2 Land Tenure

Establishing and maintaining a positive working relationship with the host landowner is critical for the success and timely delivery of a solar farm. There is much to negotiate throughout the development process such as site access for studies, fencing, integration with existing land uses, lease or licence provisions and much more. Where good relationships can be fostered with landowners they can become key advocates and allies representing your project locally and helping to disseminate information through community networks. Grong Grong Solar Farm and Haystacks Solar Garden make it a priority to involve the landowner in as many aspects as they are comfortable with, in our case even speaking to the media and being involved in videos promoting the project on several occasions.

Lease or licence payments can be negotiated in a variety of ways for solar farms. Payments can be made annually for the life of the project, paid as a lump sum at the beginning of the project or even be set as a nominal 'peppercorn rate' such as \$1 depending on the landowner.

8.2.3 Engineering Design Iterations

The engineering design process for a project typically progresses through distinct phases to ensure comprehensive planning and execution. The initial phase, 'concept design', involves an examination of the site, incorporating considerations for biodiversity, cultural and environmental impact to determine an optimal layout. The concept designs undergo thorough reviews by major component suppliers, ASP3 engineers, and the owner's engineer (the developer's own engineer). As these inputs are integrated, the design evolves to achieve a more comprehensive and integrated solution. The project advances to the 'detailed design' phase, marked by the development of a final 'Issued For Tender' design (IFT design). During this stage, all relevant design elements are refined, and dependencies are assessed to meet project requirements and comply with regulatory standards.

Subsequently, the engineering design progresses to the final stage – the 'Issued For Construction' design (IFC design), which serves as the basis for the actual construction process. The IFC designs are a culmination of collaborative efforts, incorporating feedback from all stakeholders involved in the project. Key dependencies during this phase include the details of approved permits, final selection of key components (solar panel modules, mounting system, inverter), contractor feedback and adherence to safety regulations.

The success of the engineering design process hinges on a comprehensive understanding of these dependencies, coupled with a consideration of various design elements ranging from structural integrity to environmental sustainability. Overall, the progression through these design phases is essential for delivering a well-conceived, environmentally responsible, and constructible engineering solution.

A key challenge for engineering design is knowing how much to invest in each design step and when.

There is a risk that a project over invests in engineering up front, and a portion of this work is lost later in the project when design changes are made due to a change in technology selection (eg. inverter, solar panel module), appointment of an EPC (Engineering, Procurement and Construction) contractor or other project changes. As the development and finance process can take 1-3 years, there is quite a high likelihood of project changes during this time. Generally projects seek to minimise early investment in engineering and perform the minimum needed to submit planning applications and undertake grid studies.

8.2.4 Surveying And Planning Approvals With Local Government

Land surveyors and planners are in high demand and can create delays due to availability. Where possible, engaging early with specialists so that they know when you are likely to need their services can help to mitigate this risk somewhat. Having available and motivated specialists can be challenging for a one off project or relatively new developer that has less track record of continual work for consultants. Additionally, taking the time to meet with Council early in the project to create a working relationship and

understanding of the project ahead of lodging a development application proved to be favourable strategies for Grong Grong Solar Farm. Site selection can significantly reduce planning time and risks - sites that have good access and are free of other risks are more likely to have an uncomplicated planning approval process.

8.2.5 Neighbour And Community Engagement

The development of a mid scale solar farm should be delivered with a proactive approach to neighbour and community engagement. This includes placing advertisements in the paper describing the project locally and having clear and easy contact points to staff with real knowledge of the project stage and details. It also includes regular phone calls with neighbour on the development process. Grong Grong Solar Farm in collaboration with Community Power Agency contacted neighbours at key milestones (e.g. DA lodgement and public exhibition), initial site works (e.g. fencing and driveway construction) and then throughout construction so that they knew when large trucks or cranes might be on the site or affecting traffic. The good working relationship with Narrandera Shire Council, coupled with sound neighbour and community engagement practices lead to Grong Grong Solar Farm receiving zero objections to its development application public exhibition phase.

8.2.6 Grid Connection

There are a number of steps to complete in order to gain approval to connect to the Essential Energy Distribution Network in NSW. The following is a simplified list of the major milestones to gaining full connection approval:

- **Preliminary Network Enquiry** - A free 2 month process of submitting initial enquiry to Essential Energy and receiving initial feedback of constraints or opportunity.
- **CISA** - Paying a deposit and signing a Connection Investigation Service Agreement with Essential Energy. This is a service agreement that establish a fees schedule to Essential Energy to support the connection process. (eg review of project's grid studies which include power systems modelling)
- **Obtaining Design Information Pack** - Essential Energy assembles grid information on which the grid studies are based.
- **Grid Studies** - Power systems modelling by consulting engineers to evaluate the impact of the solar farm on the local and broader network. This is a significant workstream and incurs substantial cost to the project.
- **Connection Access Standards** - An agreement between the solar farm and Essential Energy which includes technical requirements, safety protocols, and guidelines for connecting to the electrical network.
- **Option To Proceed** - After review and approval of the Grid Studies, Essential Energy provides an Option to Proceed noting the approval of the grid studies and setting out the estimated cost to the project and timeline of Essential Energy, including the process for delivering the grid-side 'non-contestable works'.
- **Connection Agreement** - outlines terms for connecting a project to the electrical network, detailing technical specifications and legal obligations.
- **ASP3 Design** - Design of the 'contestable works' (project side works) that connect the solar farm into the distribution network.
- **Certification of ASP3 Design** - Design sign-off by Essential Energy for the ASP3 Design.
- **Energisation and commissioning process** - an extensive process of testing, commissioning and energisation as well as production of substantial documentation.

8.2.7 Engineering, Procurement and Construction (EPC) Tendering

Engineering, Procurement, and Construction (EPC) tendering is a critical phase in the execution of the solar farm, and it involves the collection of bids from contractors to design, procure, and construct the desired facility. One common approach is known as a 'fully wrapped' EPC contract, wherein the Issued For Tender (IFT) designs are finalised before the EPC contractor assumes responsibility for all aspects of the project. Under this arrangement, the EPC contractor takes on the risk associated with procurement, construction, and commissioning, providing a comprehensive solution to the principal (the developer in our project). This option ensures a streamlined process and a significant risk transfer to the EPC contractor, but it does come at a cost premium for the EPC contractor taking on all that risk and coordination.

Alternatively, a 'partially wrapped' EPC contract divides the works into sections, allowing for more flexibility in project progression. In the case of the Grong Grong Solar Farm, a 'partially wrapped' EPC contract was deemed necessary to prevent delays. Critical components like inverters, modules, and trackers needed early procurement to reduce long lead times (involved in the ordering and shipping) and maintain project timelines. This approach allowed for the initiation of procurement and construction activities even as the IFT designs were still being finalised. While providing flexibility, a 'partially wrapped' EPC contract requires careful coordination between different contractors and requires responsibilities to be clearly outlined to avoid disruptions in the project timeline. Ultimately, the choice between 'fully wrapped' and 'partially wrapped' EPC contracts depends on project-specific factors, risk appetite, and the need for flexibility in the design and construction phases.

8.2.8 Local Labour Suppliers And First Nations Participation

Where possible, using local suppliers of labour and technical expertise can add value to a project in many ways such as deployment time, understanding unique site constraints and being able to leverage local subcontractors during construction through their existing work relationships. In the operational and maintenance phase, the significance of leveraging local expertise becomes more evident, particularly when swift responses are essential, such as in situations necessitating site shutdowns for Distribution Network Service Provider (DNSP) maintenance activities. Local suppliers possess a strategic advantage in promptly addressing logistical challenges, thereby minimising downtime. Additionally, providing opportunities to First Nations owned enterprises as well as individuals who identify as First Nations contributes to building a socially responsible industry, and can add valuable insights and wider social benefits to a project. The Grong Grong Solar Farm employed two First Nations people in the solar module construction phase.

8.2.9 Fluctuating Cost Parameters

Alongside the obvious costs of the physical parts and labour services needed to construct a solar farm and the price that electricity can be sold at in the National Electricity Market there are a number of other cost parameters that can affect the design of a project greatly. These cost parameters can have significant impacts on a project design particularly during unstable economic events (such as a global pandemic). These include the foreign exchange rate, commodity prices for copper, steel and aluminium, polysilicon, insurance costs, shipping cost and inflation.

8.2.10 Due Diligence On Final Design And Solar Business Model

For solar garden initiatives that decide to not develop solar assets to 'own and operate' they will likely choose to commission an independent due diligence review of the final project design and solar business model. A due diligence review is conducted to get a holistic sense that the project is being developed with quality parts, process and contractors as well as identifying any key risks that should be mitigated through negotiation between the developer and the solar garden cooperative. ITP Renewables provided a valuable "Red Flag" style due diligence report for Haystacks Solar Garden on the Grong Grong Solar Farm and both project partners found the process very conciliatory whilst also offering some great project improvements. A list of example documents that can be requested as part of a due diligence review is provided in Appendix A.

8.2.11 Recycling And Waste Management During Construction

Depending on the remoteness of the site chosen for a solar farm careful consideration needs to be taken for contractual provisions for recycling and waste management. In some rural areas there may not be recycling facilities which can lead to landfilling of otherwise valuable resources. Furthermore this can create unnecessary pressures on local landfill sites which may have very limited capacity.

During the EPC contract tendering and negotiation, recycling and waste management was a key stipulation from Grong Grong Solar Farm to ensure this was managed well, recycling was maximised and there was no unnecessary burden on local waste management infrastructure.



Image: Kristy & Jonathan on site for final solar panel installation.

9. FUTURE SOLAR GARDENS

Over the previous four years the project team likened the experience of creating Australia's first large-scale solar garden to being on a rollercoaster - there were many unexpected challenges yet also some fun times to bring us to this point.

Below we highlight some of the key challenges we faced, things that served us well and sum up with key considerations for future solar garden projects that are peppered with our learnings.

9.1 Key Challenges Haystacks Faced

The journey from solar farm project concept to operational solar farm has many steps and it is quite an iterative process depending on the types of information that is unearthed along the development pathway. Below is a diagram of the main project stages of a mid-scale solar farm.

- Community engagement was very difficult during the COVID19 pandemic and vastly changed our plans.
- Due to the pandemic, several energy crises seriously affected our financial model, meaning we had to change our business model multiple times. Our most major change was shifting from an equity to debt financed model.
- Due to the energy price crisis in June 2022 our electricity retail partner Enova Energy went into voluntary administration and we had 6 weeks to find a replacement electricity retailer.
- NSW Fair Trading (body that governs co-ops in NSW) had very little experience with CCUs, making the approval process on our Offer document extremely drawn out.

- Pioneering anything is challenging, let alone a new way of doing solar at a time where lots of varying rooftop solar 'deals' are confusing the average person.
- Our connection required a grid side upgrade of non-contestable works meaning the project needed to find an additional \$150,000 that was not identified in the original project budget.
- An unexpected tax amendment caught our project unawares which almost made the project unviable. The amendment to the ATO tax ruling 2006/3 precludes renewable energy projects from deferring their grant funding tax liability over the depreciation period of the project, as used to be customary for ARENA and other government grants. This amendment to the tax ruling appears to undermine the legal position in respect of "recoupable assessments". In consequence the project tax liability for grant funding was up front which essentially operated as a federal tax on state government grant funding, thus reducing the capital contribution made available by the NSW Government. This tax liability was not foreseen by the project team or any of our tax advisors.

9.2 Elements That Served Us Well

- **Key relationships** - The Business Council of Cooperatives and Mutuals (BCCM) were able to assist with key high level conversations to get our Offer document moving in the assessment process. We also connected with the Co-op Federation on early co-op advice.
- **Paid project management** - Having paid project management staff on the community engagement & co-op side (i.e. not just for those working on the

technical solar development side) meant that project challenges could be navigated and solutions found, which may otherwise have been too hard and the project ended if key staff were volunteers.

- **Authentic community engagement** - Despite our sometimes nail biting rollercoaster journey to create Australia's first large-scale solar garden, we were able to bring our members along with us, due to being transparent with challenges, holding many many info sessions and answering every question regardless of whether it reflected well on the project at the time.
- **Well networked** - A key part of our model was partnering with like-minded organisations to explain the opportunity of solar gardens to their members, luckily our project team were well connected in the environmental and civil society space to facilitate this aspect.
- **Skilled digital facilitators in project team** - Most of our engagement ended up needing to be online due to the pandemic and also the geographic spread of our members, luckily our team is highly experienced with online facilitation and other tools including Zoom and digital voting platforms. Having online meetings and info sessions that were fun and well run was a key part in maintaining our community's enthusiasm for the project over the four years.

9.3 Key Decisions & Considerations For Future Solar Gardens

In deciding to create a solar garden there are several key decisions that need to be made. Here we summarise and provide a brief commentary of considerations based on our experiences and learnings.

How do you want community members involved in funding the project?

1. Debt - usually in the form of a loan.

Pros: agreed upon repayments mean returns are predictable for the loan period, reduces many risk factors as another entity holds responsibility for operational and energy trading aspects.

Cons: Less control over project details, community members forgo higher returns if project performs higher than expected, generally will shorten length of involvement.

2. Equity - ownership shares in the project.

Pros: Ownership means more control over project details, higher returns are shared with investors, potentially a simpler offer, increased sense of pride from members, greater similarity to owning rooftop solar for life of product.

Cons: Responsible for the project operation, if the project is curtailed or performs lower than expected, returns to investors are lower. Exposed to energy market price fluctuations.

3. Fund all or part of the project - funding all of a project means community members can potentially be brought along the whole development journey and have more say on project design. Funding part of a project could mean less risk if a developer is taking on the majority, however could mean forgoing community input on key decisions.

Who will lead the project?

1. Community energy group - forming partnerships is crucial, ensure key staff have community engagement and project management experience with a minimum of 3 days/week staff time available for the project.
2. Council - provides a trusted body to lead, will be important to partner with a community group for outreach, important to resource the project management effectively.

3. Electricity Retailer - this would make the retailing side very straightforward, a solar garden plot could simply be another offering to customers.

Who will you partner with?

1. Solar developers - make sure your values are aligned and the developer understands how to communicate with a community group. Consider expectations of how you will work together, how much community involvement will there be?
2. Electricity retailers - start building relationships early to understand their needs.
3. Legal support - a crucial part in creating a solar garden are the legal agreements to make it happen, make sure you have a great team to support you. Some legal firms offer pro bono support.
4. Community partners - Invest time in transparent and authentic community engagement to both explain your project, the development process and what solar gardens are. This is a new concept for most people, with previous solar 'cowboys' eroding trust in the household solar market. Make sure sufficient staff resources are allocated for community engagement, as gaining community support and actual buy-in takes time.

What size will the project be?

1. Consider a solar and battery project size up to but under 4.99MW (over this size and the grid connection becomes more expensive and complex). This will have better LCOE and help to improve on bill credits. At 1.5MW the Haystacks Solar Garden had a high price per MW install due to its fixed costs. A larger project closer to 5MW will have better LCOE but will have higher total cost to be raised, meaning significantly more solar gardeners to be found or partnering with a developer to co-fund the project. Balancing these two aspects will be very important in project design for future solar gardens.

2. A solar garden could be a section of a much larger project, for instance 1MW solar garden housed within a 50MW solar farm. This could vastly improve on bill credits, however would need to be balanced with how solar gardeners and the project team can interact with the project overall, especially in the development journey.

When to secure project finances?

1. Securing a grant for your project serves two key purposes; first to build wide community support through the legitimacy of the grant and secondly to secure early funds for project management to develop key resources, deliver important early engagement and work with project partners on the design.
2. A key decision is when to ask community members to invest their funds - too early and you risk unhappy or confused community investors when there are project delays or changes, too late and it risks not attaining the required funds by key delivery dates, which can lead to even greater delays and potentially more expense if construction finance is then required.
3. One potential option to reduce this community expectation mismatch and be sure to communicate the correct project model is to secure capital funds from fewer, larger non-community investors and only once the project is in construction begin the community capital raise. Whilst this can simplify the finance phases it can also separate the community members from feeling like they were the driving force that enabled the project.

What does the solar garden offer look like?

1. Could you do a subscription model where an institutional investor pays for plots upfront to enable lower income people to participate via monthly/quarterly subscription fees that repay the institutional investor?
2. Are there different plot sizes? Keep in mind more complexity in the project offering usually leads to higher administration costs. However different levels of investment/plot sizes can increase the amount of people who can be involved.
3. Could you arrange 'time of use tariffs' where on-bill credits are linked to the solar gardener's household usage incorporating a peer-to-peer energy trading scheme?

9.4 Policy Recommendations

1. DNSPs should establish clear pathways for connection and commission processes for mid-scale solar, and publish a detailed summary of the requirements including timeframes and expected costs.
2. Solar garden grants must allow for substantial allocations to project management, community engagement and business (entity selling solar garden plots) establishment costs.
3. Grant programs that are seeking community involvement for the establishment of future solar gardens must have a minimum of a 6-8 week period from announcement of the program to lodgement date of grant application.
4. The Federal Government should adjust ATO ruling 2006/3 so that renewable grants are not adversely affected and are able to defer tax to the operational phase of the project.
5. ATO to establish a ruling that solar garden on-bill credits are treated as non-assessable income in a similar way that feed-in tariffs from domestic rooftop solar are currently not taxed.
6. State governments legislate at least a 100 MW community energy carve out of their renewable energy targets. This will create the market conditions required to spark interest from renewable energy developers and related stakeholders to explore community energy options such as solar gardens.
7. State or Federal Governments to make rooftop solar rebates available for renters and apartment dwellers to offset the costs of purchasing solar garden plots.

Appendix A - Example List of Due Diligence Documentation

Sensitivity test undertaken on financial business model	Heritage studies
Commissioning contracts	Inverter maintenance contract
Component data sheets	Land Agreements
Construction contracts	Land survey
Construction finance loan agreements	Last submitted company tax return
Construction insurances	Mechanical maintenance contract
Development application and any associated variations	Offer to connect and contestable works outline
Electrical maintenance contract	Operating insurances
Electricity sale strategy	PPA if secured or current state of negotiations
Environmental studies	Procurement contracts
Finance Agreements	Results of title search
Financial business model (excel)	Risk Register
Flood/fire risk studies	S.A.F.E.s - Simple Agreement for Future Equity
FRMP agreement	Solar Farm company financial statements
General security deed	System design
Geotech report	Yield reports/estimates
Grounds and land maintenance contract	

Appendix B - List of Allied Organisations for Online Info Sessions

2040 film producers / Damon Gameau	Lake Macquarie Council
Beyond Zero Emissions	Nature Conservation Council
Catholic Earth	New Economy Network Australia (NENA)
Community Owned Renewable Power Mullumbimby (COREM)	Parramatta City Council
Enova Energy	Queensland Conservation Council
Greenpeace	Renew
Inner West Council	Ryde City Council
Jenny Leong- Greens MP	Voices for Power campaign of Sydney Alliance
Jonathan Sriranganathan- Brisbane City Council Greens Councillor	WWF

Appendix C - Comparison of Using Shares Versus CCUs for Capital Raises in Co-ops

Model 1: Membership shares fund project	Model 2: Members join for a nominal fee & CCUs fund project
<p>Description: In model 1, the co-operative forms with as few members and as late (not always the case though) in the development process as possible. Membership shares are released in packages and prospective members apply for the amount of shares they would like to invest in the project. The purpose of the membership will be to fund construction and any remaining development.</p>	<p>Description: In model 2, members are able to join from formation for a nominal share price eg \$1 and potential fee (see membership criteria). Members are being asked to join on the promise of a future opportunity for a project. The co-op is then able to have members applying throughout the development process.</p>
<p>Pros: Members are made up of only people who invested in the project. The offer for membership is clear. If timed well this can create some successful hype and excitement once shares are released. Member shares can be priced at any amount (generally between \$250 - \$1000) so that people can purchase as many or as few shares as they like or can afford to.</p>	<p>Pros: This creates a community of members to share in the development journey and to be an engaged audience for feedback. Membership also then gives a good indicator of what interest there is to invest and what the investment appetite of members is. If a fee is charged, the early sale of memberships can help fund project management, early administration and due diligence on the solar garden.</p>
<p>Cons: It can be hard to gauge interest in the project until shares are offered. The co-op can remain small and under-resourced during early stages of development. A lower share price generally results in higher ongoing admin costs to manage dividends as more people are required to purchase shares to reach the funding goal.</p>	<p>Cons: Much higher administrative burden as memberships need to be tracked and requires an extra mechanism (e.g. CCUs or extra share class) to then raise the funds. Bringing members along on the journey also has extra communication responsibilities.</p>
<p>Examples: Pingala Co-op, Goulburn Community Energy Co-operative</p>	<p>Examples: Haystacks Solar Garden Co-operative</p>

Appendix D - Sections of Co-operative National Law That Relate to CCUs

Section	Observations/Comments
Division 1 s331-344	A CCU is considered a debenture or 'financial accommodation' under s347.
s337	This section invokes sections of the corporations act around debentures and fundraising that may or may not be relevant depending on the co-op structure and CCU terms.
s338	If the CCUs are only issued to existing members (e.g. only members can hold CCUs as with Haystacks), then this section requires an extra disclosure statement specifically for the CCU offer (i.e. separate from a section 68 disclosure statement used to establish the co-op and for membership sign up).
Division 2 s345-354	Relevant section for CCUs. Sections 349 & 350 have the requirements for the Terms of Issue and how they are to be approved.



Haystacks

SOLAR GARDEN