



Community Energy Model Maturity Index



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ABOUT THE AUTHORS

The Institute for Sustainable Futures (ISF) was established by the University of Technology, Sydney in 1996 to work with industry, government and the community to develop sustainable futures through research and consultancy. Our mission is to create change toward sustainable futures that protect and enhance the environment, human wellbeing and social equity.

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Disclaimer: The views and opinions expressed in this document are those of the authors and do not necessarily represent all C4CE member organisations.

1 INTRODUCTION

This document is intended to be read in combination with ARENA's Commercial Readiness Index document.¹

As clean energy technologies such as wind and solar PV reach commercial maturity, much of the innovation occurring in the clean technology sector can be found in new business, finance or deployment models. Internationally, the clean energy industry is seeing significant innovation that is allowing new actors to participate in and benefit from increased uptake of clean energy. New business models open up new markets, opportunities and increase the deployment of renewable and other sustainable energy technologies.

Governments internationally have played important roles in supporting clean energy business model, deployment and finance innovation. However, traditional frameworks for assessing technology innovation and readiness, while being a useful starting point, are not adequate for assessing or understanding the processes involved in community energy model innovation and taking a model to maturity.

Community energy is one of the types of deployment models that has played an important role in increasing uptake and acceptance of renewable energy internationally. Community energy is where a community comes together to develop, deliver, own and benefit from sustainable energy projects. Community energy groups are social enterprises, in that they have both financial and social/environmental purposes, and are not purely motivated by commercial aims.

Although there is no precise formula that can be applied to the evolution of all business and organisational models, there are common developmental phases that community energy projects (and the associated model used by each project) will go through. This Community Energy Model Maturity Index has been developed as part of the National Community Energy Strategy project and aims to provide a framework for classifying the stages of maturity through which community energy models evolve, and what each stage involves. It can be used to provide guidance to government agencies on tracking the progress of community energy projects and the models underpinning them along a maturity scale.

¹ <http://arena.gov.au/files/2014/02/Commercial-Readiness-Index.pdf>

2 COMMUNITY ENERGY MODEL EVOLUTION

Energy generation in Australia has historically been almost entirely owned and financed by large private companies or governments. However increasingly, renewable energy generators are being owned and financed by a range of new actors from households and businesses, to dedicated community renewable energy organisations and energy service companies. Alongside technology innovation, the diversification of delivery models in this sector is one of the biggest new areas of innovation and change.

There are many different types of delivery models operating at varying stages of maturity across the Australian energy sector. In a recent analysis², fourteen categories of energy delivery models were identified as operating or in development in Australia (Box 1). These models are operating within a rapidly changing environment and many adaptations of these may be occurring or emerging through different organisations across the country.

Box 1. Approaches to delivering energy projects

Approaches in order of potential for community benefit are:

- | | |
|--|--|
| <ul style="list-style-type: none"> - Community ownership - Developer & community partnership - Crowd-funding (investment)** - Bulk buy/brokering* - Environmental Upgrade Agreement* - Leasing* - Donation based fundraising* | <ul style="list-style-type: none"> - Urban/regional partnerships* - Energy performance contract* - Council partnership with energy company - Council ownership - Private ownership (residential) - Private ownership (business) - Private (developer) |
|--|--|

**Particular applications of these models could be considered community energy projects, depending on the host site and arrangements between parties, particularly the community. For example, an environmental upgrade agreement could be tailored to be a community energy financing mechanism, particularly if the finance was provided by the local community.*

***This model is very difficult to establish in the current Australian regulatory environment*

² Our Energy Future: Renewable Energy Master Plan, 2013. Prepared for the Southern Sydney Regional Organisation of Councils by the Institute for Sustainable Futures, UTS, www.ashfield.nsw.gov.au/files/Our_Energy_Future_Renewable_Energy_Master_Plan_-_Final.pdf

2.1 DEFINING COMMUNITY ENERGY MODELS

Community energy groups are social enterprises, in that they have both financial and social/environmental purposes, and are not purely motivated by commercial aims. Only some of the energy delivery approaches in Box 1 would be classed as 'community energy', in that communities could directly be involved and benefit from a project in broader terms.

The National Community Energy Strategy (National Strategy) uses a holistic approach to understanding models of community energy that differentiate community energy from commercial sustainable energy projects. In this document the definition aligns with that in the National Strategy and uses the term 'community energy models' to encapsulate three related elements associated with different models: 1) the traditional business/organisational model elements including identifying sources of revenue, the intended customer base, detailing the product and financing approach, for example 2) the delivery and deployment aspects of an energy business i.e. identifying the different owners, asset hosts, financiers and project developers of the renewable energy asset, and 3) the wide range of possible non-financial benefits that form a core component of community energy projects.

Projects in the context of this Index are considered the individual application of a model of operation and delivery to a specific location.



Photo: Repower Shoalhaven

2.2 FACTORS INFLUENCING COMMUNITY ENERGY MODEL EVOLUTION

Community energy can involve a large range of technologies and activities across a breadth of scales, determined by the local community needs, availability of local natural resources, technologies, funding and community support. It follows that these projects can operate in many different ways. Thus it is important to consider the key elements of, or factors that influence a community energy project.

Figure 1: Community Energy Development Framework



Source: Hicks et al, 2014

Figure 1 identifies the key components inherent to community energy projects that interact in concert with other external factors and thereby shape the evolution of a project and its underpinning business model.³ The vision and values of the group, the choice of organisational structure and governance, the group's approach to community engagement and communications, the technology and technical structures being employed and the model of financing will all significantly influence the end product. However, these alone will not determine the success of a community energy project.

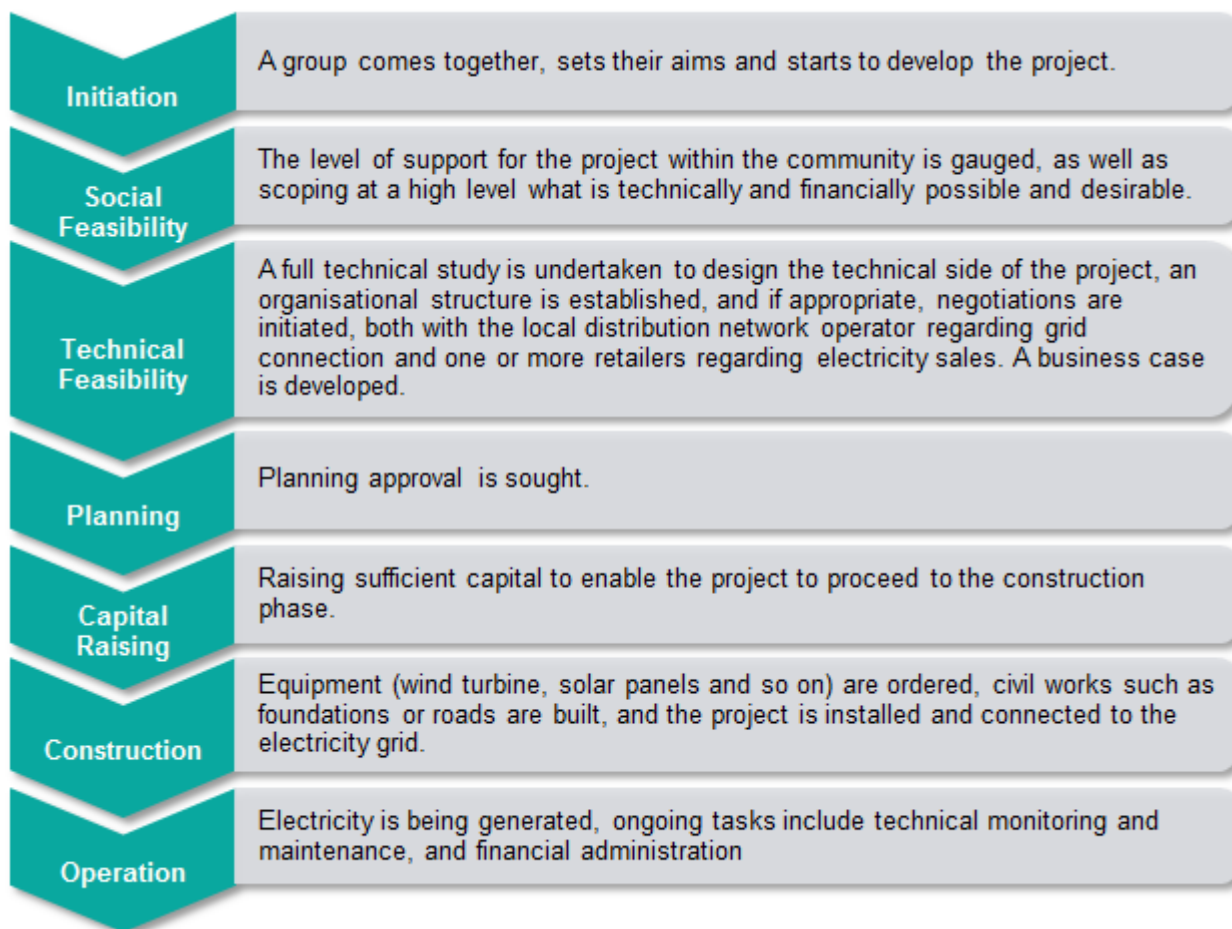
The external landscape – including regulatory, cultural, technological, economic, ecological and political factors – is critical to the establishment of community energy projects and the evolution of a community energy model. As a new sector, and one characterised by significant disruption - both positive and negative, the viability of any community energy model can be short-lived before it is out-competed by a better model or outmoded by changes in context. For example, the political and policy uncertainty surrounding the Australian Renewable Energy Target has resulted in stalled or unfeasible projects. Others groups, with access to the necessary resources and skills have adapted their approach and model of operation to encompass the uncertainty, however this requires a highly sophisticated level of knowledge of the economic factors and interlinkages in the energy and electricity system which some community groups may not have access to.

³ Hicks, J., Ison, N., Mey, F. and Gilding, J., 2014, Community-Owned Renewable Energy: A How to Guide. Accessible at http://cpagency.org.au/wp-content/uploads/2014/06/CPAgency_HowtoGuide2014-web.pdf

2.3 PROJECT DEVELOPMENT STAGES

As noted earlier, projects are the individual application of a model of operation and delivery to a specific location. As well as the context considerations, each community energy project will progress through temporal stages leading through to implementation that will vary from project to project. Figure 2. illustrates this process of a group initially coming together to identify their joint interests and aims for the project, followed by testing the social and technical feasibility of the idea before going through a formal planning process, raising funds to construct , followed by operation of the project.

Figure 2: Community Energy Implementation Stages



Source: Hicks et al, 2014

These project stages developed by Hicks et al (2014) have been directly incorporated into this community energy model maturity index, as will be shown below.

2.4 ADAPTING THE TECHNOLOGY AND COMMERCIAL READINESS INDICES

The Community Energy Model Maturity (CEMM) Index has been adapted from the ARENA Commercial Readiness Index⁴ for renewable energy technologies. The CEMM Index outlines the development phases that new community energy models go through, acknowledging the unique set of characteristics, drivers and goals of community-based energy generation compared with purely commercial models. It is intended to be used in conjunction with ARENA Commercial Readiness Index.

By understanding the status of community energy models and projects within this index, ARENA and other government departments can target support mechanisms to best fill gaps and progress sector development, while reducing investment risks and overcoming key barriers to successful project implementation.

The CEMM Index can also be used as a reference point for community energy groups to identify the most suitable models for the projects they are wishing to implement, in terms of how much further development work is required to take the model to maturity.



Photo: Jarra Hicks

⁴ <http://arena.gov.au/files/2014/02/Commercial-Readiness-Index.pdf>

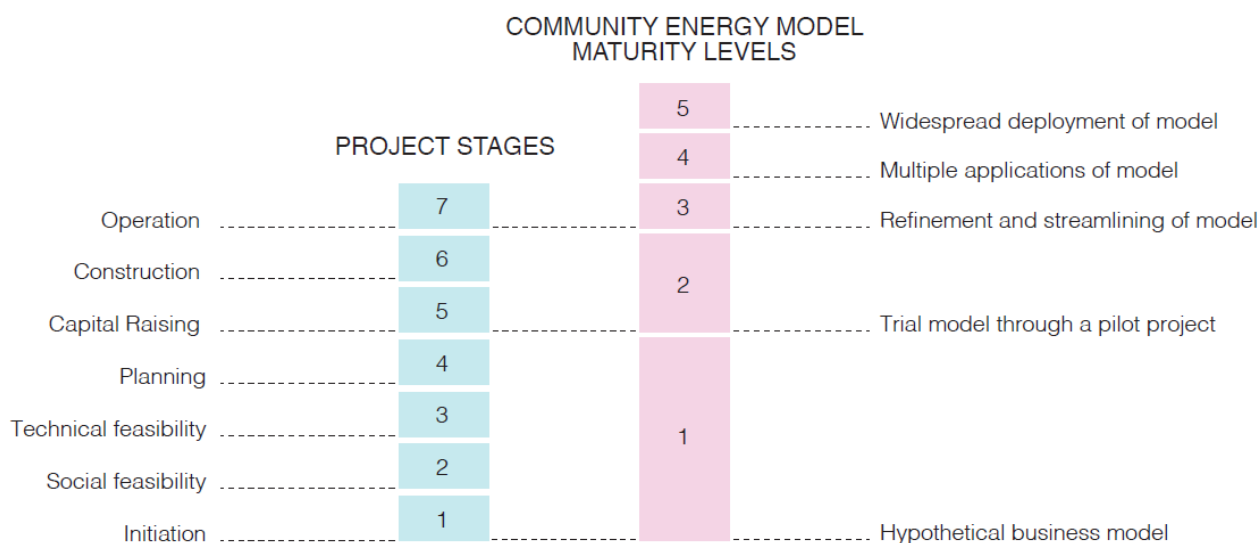
3 COMMUNITY ENERGY MODEL MATURITY INDEX

As outlined in Figure 3 a community energy project can be considered one application of a model, with the first project representing a pilot of the research and development process for the model. Figure 3 below shows how community energy projects move from feasibility to operation, and how both the community energy *project* maturity and community energy *model* maturity relate to one another in the context of later replications of a model.

The Community Energy Model Maturity (CEMM) Index demonstrates that to mature beyond a single project application, a new model will need to go through further phases of research and development, demonstration and deployment before becoming adopted on a wide scale, at which point it can be considered mature. As you move up through the maturity levels, project risk lessens and a community energy model becomes more reliable and viable.

Progressing through the seven Community Energy Project Stages will take a Community Energy Model through maturity levels 1 and 2. These seven project stages will then be repeated in Level 3 of the CEMM scale as another project is developed and the model refined. Finally, it is anticipated that these project stages will be repeated numerous times as multiple applications of the model (Level 4) and widespread deployment of the model (Level 5) are achieved.

Figure 3. Relating Community Energy Model Maturity to Community Energy Project Stages



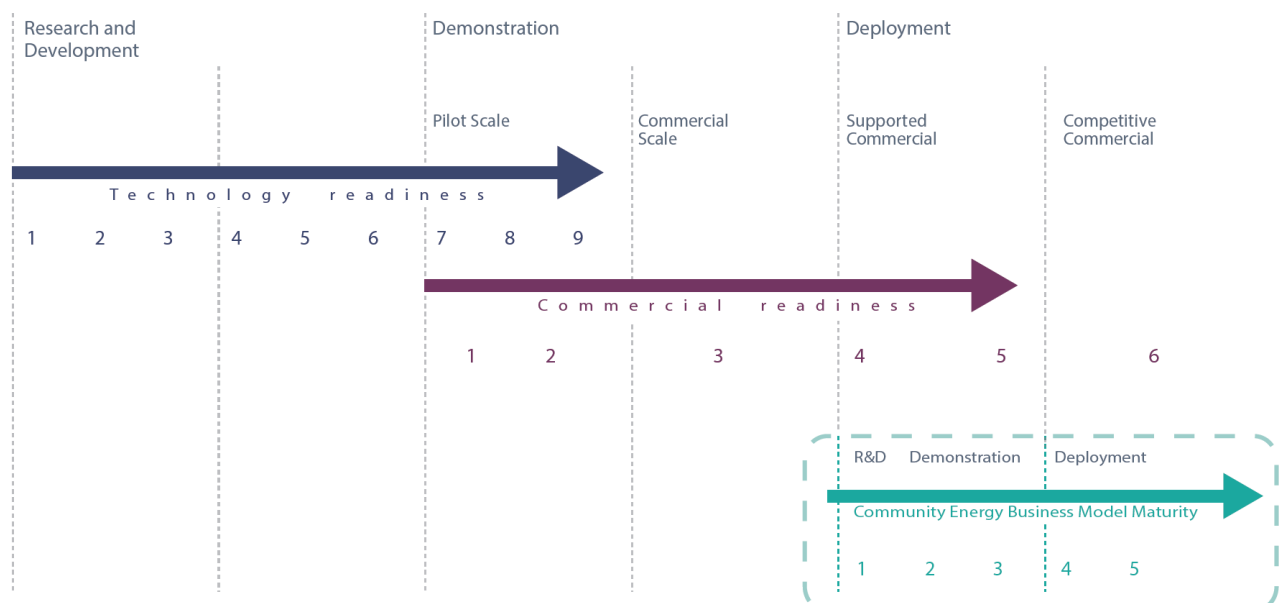
Minor adaptations of the community energy model will occur as a model matures, and particularly when a different group in a new context applies it (Levels 3-5). In some cases, while an existing model may form the foundation of a project, major adaptations will be required to make a project viable within a new context. Where major adaptations are required (typically in CEMM Levels 3-5), this may constitute a whole new model, and take it back one or more maturity levels in the index.

As already discussed, a community energy model is highly dependent on the external context. If there are major changes to the external context (for example removing the RET or changing the deeming size of STCs) this may make a model unviable or mean it requires significant adaptation, returning the adapted model to earlier maturity levels in the CEMM Index.

Given the very early stages of the community energy sector in Australia, it is not surprising that much of the support from government to the sector has focused on provision of grants to support the development of individual projects. As the sector grows and involves more varied actors, the mechanisms for support will also need to adapt to this changing landscape. For example, evaluation of grants conducted for the NSW Office of Environment and Heritage⁵ found that broader, sector-wide support is required to build the capacity of new community energy groups to tap into existing knowledge and networks, to build the sector and move beyond individual project support.

Figure 4 illustrates how the phasing of the CEMM Index relates to technology readiness and commercial readiness. Specifically, it shows that community energy model development and innovation tends to occur when renewable energy technologies are in the late commercialisation stage. The reason for this is that it is sufficiently risky for a community to take on the development of a new model, without having to take on the additional risk of a new technology. The major exception to this is the development of the Danish (and thus global) wind industry, where community wind guilds played a significant role in testing, scaling up and commercialising wind turbine technology.⁶

Figure 4. Phasing of CEMM Index relative to Technology and Commercial Readiness levels mapped on Innovation Chain



⁵ Institute for Sustainable Futures, 2014. Evaluation of the NSW OEH Funding Grants, unpublished report.

⁶ www.embarc.com.au/display/public/content/History+of+community+energy

Within the CEMM Index there are two key elements: a status summary and detailed indicators (shown in Table 1). The status summary is a single rating to indicate the level of maturity reached. It is based on an evidence-based assessment of the current situation of a community energy model.

Table 1. Summary Status and Indicators for Community Energy Model Maturity

			INDICATORS							
			Regulatory environment	Stakeholder knowledge and acceptance	Financial proposition – social and project costs	Financial proposition – revenue	Community participation	Sector support structures	Pathway to operation	Capacity of proponents/ CE groups to deliver
STATUS SUMMARY	Widespread Deployment of Model	5								
	Multiple Applications of Model	4								
	Refine and Streamline Model	3								
	Trial Model through Pilot Project	2								
	Hypothetical Business Model	1								

Table 2 below describes the key elements present at each level of maturity.

Table 2. Status Summary Descriptions

Status Summary		Description
5	Widespread deployment of model	Long-term policy and regulatory setting supporting widespread deployment of model. Significant evidence of social and financial benefits, capability, pricing and other typical market forcing driving uptake and investment. Support infrastructure and capability programs embedded.
4	Multiple applications of model	Multiple applications of the model are now evident. Verifiable data on financial and social benefit in public domain driving interest from variety of debt and equity sources, however still requiring government support. Core administration and documentation is streamlined and replicable through templates and existing examples. Regulatory challenges being addressed. Minor adaptations for application to different community contexts made where required.
3	Refinement / streamlining of model	Based on evidence from the trial and often (though not always) through the application of a second and third project, the model is refined. Core processes and costs are streamlined. Reduction in need for grants, donations and volunteer effort. Key project administration and documentation materials are refined but not remade.
2	Trial model through a pilot project	First of a kind project or major adaptation of mature model. Funded by grants, donations, significant volunteer or in-kind time and services and equity to develop one-off administration and documentation. Financial and social benefit evidence drawn from similar models in other contexts (other regions, international, etc)
1	Hypothetical business model	Untested and unproven. Model driven by community energy model enthusiasts, little or no evidence of financial and social benefit data to substantiate claims.

Within each of the levels, specific indicators are provided that are linked to common barriers and hurdles that a community energy business model will need to overcome to reach maturity. The following indicators adapt ARENA's assessment of commercial readiness indicators specifically for the community energy sector based on the Community Power Agency and Institute for Sustainable Futures knowledge of barriers to maturing community energy models. These have been reviewed by community energy specialists and other members of the C4CE. To progress along each of these dimensions will be essential to building a viable, replicable and adaptable community energy model.

Table 3. Summary of Indicators

Indicator	Summary of Indicators
Regulatory and policy environment	The maturity of the planning, permitting, standards and other policy and regulations e.g. grid connection, retailing, tax, etc., relating to the community energy business model. ⁷
Stakeholder⁸ knowledge and acceptance	The degree of knowledge by stakeholders of the specific community energy model and how they can engage and support it together with their willingness to do so.
Non-financial benefit	The availability of information on non-financial (e.g.. social, environmental) benefits of this community energy model. Includes the ability of the group/s applying the model to communicate these broader societal benefits and garner support and investment.
Financial proposition - social and project costs - revenue	The availability of robust, financial information linked to capital and operating costs and forecast revenues, increasing the financial viability of the model and ability to attract the necessary funding and financing including but not limited to community investors.
Maturity of community energy proponents and sector support structures	The development of established community energy groups and networks with the skills, knowledge and experience to replicate and adapt community energy models. Groups have established performance records. In addition the development of a support sector that provides training, resources, advice and expertise to support a viable community energy model.

In Appendix A, each of these indicators is described for each of the maturity levels.

⁷ See the Policy and Regulatory Reform section of the National Community Energy Strategy for the breadth of policy and regulatory issues relating to community energy.

⁸ Stakeholders are distinguished from community members, as they are the people and organisations that a community group needs to engage with to get a project operational, examples include host-sites, grid operators, retailers, council, other government agencies, etc. Community members are the a group seeks to engage with and empower as part of the social value proposition of a community energy project.

APPENDIX A: INDICATOR DESCRIPTIONS

Regulatory and policy environment

Stage	Summary of indicator
5	Regulatory, planning and permitting process documented and defined with ongoing process of review and refinement. Investment markets (including community investors) see policy settings as long term, robust and proven.
4	Where models sit on more 'commercial' end of community energy spectrum they are able to adapt to regulatory environment while facilitating the addressing of critical barriers. Where models sit on more 'community benefit' end of community energy spectrum, regulatory, planning and policy challenges are well understood and being resolved as "market pull" comes to effect. Regulatory bodies understand the complexity of the new models and support overcoming key barriers. However, unresolved challenges are becoming critical as penetration and the number of community energy support organisations grow.
3	Draft recommendations emerging to address key barriers. Early movers investing time and resources and significant community volunteer or in-kind time to address these barriers in local context, acting as demonstration for other jurisdictions. Policy settings moving, but significant coordination absent. Reform primarily being pushed by community groups.
2	Key regulatory and policy barriers often require project specific consideration, leading to individual projects bearing additional time and costs.
1	Undefined or uncertain regulatory environment including planning, standards. Knowledge and understanding of these new businesses by regulatory bodies, network businesses and policy makers is low. For example, timing and cost of network connection assumed but unknown.

Stakeholder knowledge and acceptance

Stage	Summary of indicator
5	Key project stakeholders have access to widely available knowledge and case studies of community energy models and can engage in meaningful dialogue and provide support for projects as they arise.
4	A growing evidence base and experienced and skilled community project developers and champions are emerging to inform stakeholders at the local and regional levels. Collaborations and networks are building across jurisdictions.
3	Broader stakeholder support issues emerging. Stakeholder concerns may strengthen as more examples of the model come into effect. Coordinated approach to solving issues required to facilitate maturity of the model.
2	Stakeholder support/opposition is on a case-by-case basis with community developer skills a critical success factor.
1	Stakeholder support/opposition is hypothetical

Non-financial Benefits

Stage	Summary of indicator
5	Non-financial benefits are clearly demonstrated and articulated across multiple applications and published widely. Global/local comparisons are available to provide nuanced analysis of the benefits of the model across different social and economic contexts.
4	A comprehensive database of co-benefits is captured across the application of this model and shared across the sector to build momentum and to drive stakeholder engagement.
3	Estimates of non-financial benefits are based on projections from single site / comparable site type application. Evidence through qualitative surveys or other methods begins to build a picture of the potential benefits across multiple applications and in different contexts.
2	Assumptions and estimates of non-financial benefits are tested through the pilot and used for further development.
1	Non-financial benefits for a project are predicted or drawn from similar models internationally. Little evidence to base these on.

Financial proposition – social and project costs

Stage	Summary of indicator
5	Detailed model costs widely published and accepted for multiple applications across different contexts.
4	Key cost elements of multiple projects understood, openly available and being used in new projects and for sector-wide development. Institutional costs are communicated to key stakeholders to generate roadmaps to overcome barriers.
3	Cost data is based on the application of the model at one site through one project. Key cost drivers for the project and overall social costs are understood within that context enabling broader market to judge long term potential of model. Some data being made publicly available to progress uptake of model.
2	Costs data based on quotes and projections. Comparisons with international or other jurisdictional examples can be made.
1	Cost data (if available) based on projections and forecasts with little or no local data to substantiate. Case built strongly from international examples available for comparison.

Financial proposition – revenue

Stage	Summary of indicator
5	Revenue forecasting proven and accepted by finance industry, specifically the impact/ethical investment industry with transparent benchmarking evident. Either a predictable revenue stream available or a range of income streams are available to the model.
4	Revenue projections backed by data. Price gaps understood and roadmaps in place to address. A range of revenue streams are being developed.
3	Revenue projections being tested through the application of the first project.
2	Investors invest because of social and other benefits and are willing to take a risk on the income stream and return projections.
1	Revenue data based on projections and forecasts with little or no prior data to substantiate. Projections based on revenue streams from other community energy models applying the same renewable energy technology.

Community participation and sector support structures

Stage	Summary of indicator
5	Multiple groups have experience and proven track records applying this model. Support structures to apply this model are readily available and widely used.
4	Community energy group expertise and track records have grown; likely multiple groups now have experience applying this model. Support structures to apply this model are available and used.
3	Community energy groups have a proven track record of one project and have access to or include people with all of necessary relevant expertise (e.g. renewable energy technology, project management, finances, legal, etc.). Support structures being developed to help replicate this model, such as training, resources, advice, etc.
2	Community energy groups have little track record, though are likely to have access to or include people with multiple skillsets, though not all of necessary relevant expertise (e.g. renewable energy technology, project management, finances, legal, etc.). Have ability to identify expertise gaps but not necessarily source experts to fill them. Any existing support structures starting to be tailored to this model.
1	Community energy groups have little track record, though are likely to have access to or include people with a few though not all of necessary relevant expertise (e.g. renewable energy technology, project management, finances, legal, etc.). No support structures tailored to this model.