8 December 2011

Ms. Jillian Broadbent AO
Chair
Expert Review Panel
Clean Energy Finance Corporation

By email cefc@treasury.gov.au

Dear Ms. Broadbent

Clean Energy Finance Corporation Expert Review

Australian Solar Institute Submission

On behalf of the Board and management of the Australian Solar Institute (ASI), thank you for the opportunity to make a submission to the expert review on design of the Clean Energy Finance Corporation (CEFC).

Attached is the ASI's submission for the expert review panel's consideration.

The ASI looks forward to working with the CEFC in seeking to accelerate the commercial deployment of solar energy in Australia.

Please contact me on (02) 4960 6302 or at olivia.coldrey@australiansolarinstitute.com.au should you wish to discuss any aspect of the ASI's submission.

Yours sincerely

Olivia Coldrey
Investment Director

Attach.

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CLEAN ENERGY FINANCE CORPORATION EXPERT REVIEW

AUSTRALIAN SOLAR INSTITUTE SUBMISSION

8 DECEMBER 2011

A. EXECUTIVE SUMMARY

The Australian Solar Institute (ASI) regards the Clean Energy Finance Corporation (CEFC) as a key institution in the Australian Government's commitment to securing a clean energy future for Australia. Working with other Commonwealth and State government agencies, including the Australian Renewable Energy Agency (ARENA), and the private sector, it has the potential to make a demonstrable difference to the amount of solar energy deployed in Australia through an innovative approach to risk management and co-financing with the private sector.

The ASI is an Australian Government-owned company that invests in research, development and pilot-scale demonstration (together, RD&D) of solar energy technologies. The ASI has a keen interest in seeing the technologies it supports progress through the innovation cycle to commercial deployment. From late 2012, the ASI will form part of ARENA.[1]

Since it began operations in 2009, the ASI has drawn a number of technical and economic learnings from its portfolio of solar RD&D investments and involvement in the Solar Flagships program. This has helped to identify various barriers along the innovation chain to increased deployment of solar energy, which has in turn informed our ideas about appropriate ways to target public sector support to reduce those barriers. Key factors limiting the commercial deployment of solar energy in Australia are the commercial market's perception of technology and future price risk. To the extent the CEFC can develop financing instruments that address these risks in a manner that makes commercial market financiers more willing to assume or share them, the market gap in commercial market finance for solar energy deployment should narrow. The CEFC has a greater chance of success in helping to create a healthy and sustainable commercial finance market for renewable energy projects if it is very clear about its investment mandate and risk appetite.

The ASI recommends the use of a portfolio of public sector financing instruments to retire risk and maximise private sector co-finance as the most efficient means of increasing the commercial deployment of solar energy in Australia. To complement ARENA's and State and Territory government investments in early stage RD&D, principally through capital grants, the CEFC has the potential to play a critical role in providing a range of debt and equity instruments to support later-stage commercialisation and deployment of solar energy technologies. In so doing, the CEFC will need to balance considerations of self-sustainability with the need to assume the real risks that exist in financing the large-scale deployment of solar energy technologies at this stage of their lifecycle.

The ASI's experience is that there is a significant market gap in funding for later-stage solar energy technology demonstration activity, beyond pilot scale demonstration. In this regard, we recommend that special attention be given to coordinating efforts between public sector funding agencies, especially the CEFC and ARENA, to ensure streamlined support for solar energy technologies progressing through this crucial phase of the innovation cycle.

Our response to the call for submissions on design of the CEFC is organised according to the review's key themes.

[1] Further information about the ASI and its activities is contained in Appendix 1.

B. SCOPE FOR THE OPERATIONS OF THE CLEAN ENERGY FINANCE CORPORATION

1. Focus on Solar Energy Technologies

This submission focuses on the CEFC's potential role in overcoming capital market barriers relating to the financing, commercialisation and deployment of solar energy technologies and related enabling technologies. Consequently we do not address capital market barriers associated with other renewable energy, energy efficiency and low emissions technologies, except to the extent they relate to solar energy technologies.

The ASI has a keen interest in seeing solar technologies supported through the innovation cycle from early-stage research and development through to commercial deployment. It considers the CEFC has a crucial role to play in the Australian market in supporting the increased deployment of solar energy technologies through financial and other support to "pull" these technologies along the innovation chain. This support should complement and act as a natural progression of the funding support to be offered by ARENA, State governments and early-stage private investors to "push" technology through the RD&D phases of the innovation cycle.

More generally, the amount of money available to the CEFC for its investments, particularly the amount available for investment in renewable energy of which solar energy is only a sub-set, is not large in comparison with the overall investment required in the Australian energy sector over coming years. Consequently, the CEFC's investments will need to be strategic in nature.

2. Prioritising Commercial Scale Demonstration of Solar Energy Technologies

A critical point along the innovation chain for solar energy technology developers is securing sufficient capital to demonstrate their technology at commercial scale. Mindful of the CEFC's mandate to be self-sustaining, the ASI considers the Corporation nevertheless has a role to play in funding demonstration activity, potentially in collaboration with ARENA, as in the ASI's view this is the point at which the gap between capital intensity and availability of funding support is arguably greatest. Further, the fact that many solar energy technologies are at a relatively early stage in their lifecycle means that the costs associated with their current learning curves are higher than the commercial market is willing to bear. Accordingly, there is a key role for the CEFC and other public sector funding agencies to help bring those technologies down their cost curves.

The CEFC should prioritise investment in the demonstration of promising solar energy technologies, even if this involves placing some of its capital at risk. The risk of loss on such investments could be managed by, for example, quarantining a pre-determined percentage of the CEFC's capital for such high-risk investments and diversifying investments across various promising technologies, ideally backed by a good track record of those technologies' progress through the earlier RD&D phases of the innovation cycle.

Consideration should be given, especially in consultation with ARENA, on the optimal project size required to prove a particular solar energy technology's technical operation and yield as well as the cost structures associated with deploying the technology at scale. This should help make most efficient use of public sector funds by avoiding over-

investment in projects that are larger than necessary to reduce the barriers and risks associated with the technology's deployment at scale.

3. Risk Appetite in Project and Corporate Financing Initiatives

Financing needs differ across solar technologies. Deployment of solar PV technology lends itself to scale-up using a modular approach to standardised inputs according to desired plant size. By contrast, development of a CSP plant is a less modular task and, for large plants, typically requires a commitment to very high upfront capital expenditure.

In respect of commercial and utility scale solar power projects using relatively mature technology, feedback from the ASI's stakeholders indicates that the commercial market has an appetite to finance these projects but that equity and debt investors remain cautious about (actual and perceived) technology and price risks associated with them. Accordingly, the ASI's view is that the CEFC has a key role to play in assuming the technology and price risks associated with solar power plant development, to a level that acts as a catalyst for what would otherwise be relatively willing private sector debt and equity capital. In other words, CEFC project investments should act to mitigate the financial risks of private sector co-investors, including potentially through the CEFC underwriting higher risk than the commercial market will bear. However, this should occur without the CEFC seeking a commensurately higher risk premium on its investments – or at least not to the extent that such a premium would make projects un-economic. In order to catalyse private sector investment, the CEFC's expected return on its project investments may need to be lower than might be anticipated if its investments were made on commercial terms.

The quantum of the CEFC's investments may need to be significant in the context of a solar project's total funding needs in order for its investments to influence the commercial market's appetite to commit to co-financing these projects. For utility scale solar power plants, the experience of the Australian Government's Solar Flagships program suggests that investments of the order of $300-$500 million are necessary if provided as capital grants to catalyse private sector investment, and may need to be larger if provided as government-backed project debt or equity.

To the extent the CEFC makes corporate debt or equity finance facilities available to support, for example, companies developing solar energy technologies (as distinct from projects in which risks are quarantined), an additional layer of counterparty risk applies.

Regardless of the types of debt and equity finance facilities the CEFC makes available, it is essential that the Corporation is as clear as possible about the risks it is prepared to assume in respect of each type of activity it wishes to support. This risk appetite should be transparent to external stakeholders so that those stakeholders are clear about the eligibility criteria for CEFC investments and can therefore form a view about the residual risks they will be expected to assume and manage. Internally, the CEFC's risk appetite and funding criteria should be formalised in underwriting guidelines that are administered in a fair and consistent manner.

C. OVERCOMING THE MARKET GAP IN FINANCING LOW EMISSIONS TECHNOLOGIES

1. Phases of Solar Energy Technology Development

In the experience of the ASI's stakeholders, the development of solar energy technologies is an expensive and time-consuming process. This has implications for public and private sector investors in technology development, which in turn helps to identify the challenges in financing the technologies through the innovation cycle and resultant market gaps.

By way of example, it is possible to summarise the development of a solar PV technology into four phases[2], namely:

a. Phase 1: Fundamental Research and New Concepts. This phase requires continuous, long-term (minimum 10 years) funding, which is largely provided by support from the host research institution. Typically, strategic industry investors have little interest in providing funding for this work as intellectual property arising from it has little or no value. Government can make an important contribution through program funding for the relevant research group, for example through initiatives such as the Australian Research Council's Centres of Excellence program.

b. Phase 2: New Concept Demonstration and Evaluation. This phase of research continues to require medium to long-term funding and additionally, as the work becomes more applied in nature, is more reliant on capital-intensive facilities. Intellectual property arising out of this phase is still of minimal value, resulting in difficulty in attracting private investors. Government grant funding is essential to help advance technologies through this phase.

c. Phase 3: Development of Commercially Relevant Technology. This phase of technology development is highly innovative and generates most intellectual property, which is typically jointly owned by the developers. Strategic industry involvement is essential to ensure that research outcomes are commercially relevant and preferably lead to pilot production. Government funding that fosters collaboration between research institutions and industry is valued in this phase.

d. Phase 4: Large-Scale Manufacturing. At this stage of the cycle there is minimal innovation and intellectual property creation but the high capital intensity of this phase of the technology's development – and deployment - can raise significant financing challenges.

These findings are borne out by the ASI's experience in its solar RD&D project investments. In fundamental research projects, the ASI is typically the sole cash contributor with the relevant research institution contributing in-kind support through researcher salaries and use of facilities. Applied research projects, in which the technology under development is closer to commercial deployment, almost invariably involve one or more industry partners working with a research team at a university or the CSIRO and often feature significant industry investment through cash and/or in-kind support. In these latter cases, industry project partners typically seek preferential rights to project intellectual property and expect a first-mover advantage in the market for the technology once it is deployed.

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[2] Derived from presentation by Dr. Stuart Wenham, Scientia Professor, University of New South Wales and Chief Technology Officer, Suntech Power Holdings Co., Ltd at the launch of "Global Benchmarking Report – Solar RD&D Funding Sources and Models Report for the Australian Solar Institute", Sydney, December 2010.

From a financing perspective, each stage of solar energy technology development will likely be better suited to a different form of financing and attract different types of investors. From the point of view of governments interested in supporting technology development through the innovation cycle, this means that each stage may require different public funding and incentive structures to attract private investment.

2. *The Market Gap in Funding the Development of Solar Energy Technologies through the Innovation Cycle*

In 2010 the ASI commissioned Baker & McKenzie to prepare a report benchmarking financial instruments used internationally to support solar RD&D. The results of this work were released in November 2010 in a report entitled "Global Benchmarking Report – Solar RD&D Funding Sources and Models Report for the Australian Solar Institute." The report is attached as Appendix 2 to this submission.

The aims of the report were to assist the ASI to leverage private finance for RD&D of solar energy technologies in Australia, by:

- identifying and analysing, using qualitative assessment criteria, various funding models used in Australia and internationally to finance both solar-specific and broader renewable energy RD&D;

- assessing the advantages and disadvantages of different funding models; and

- making high-level recommendations as to which models offer the greatest potential to leverage private investment into solar RD&D in Australia.

The report notes that the R&D and demonstration components of solar RD&D differ in important ways. Solar technologies at the R&D stage in the innovation cycle face relatively long timeframes to market readiness, while technologies at the demonstration stage have a comparatively short commercialisation horizon but require more funding to finance capital-intensive demonstration facilities and activity. While the report focuses on RD&D activity, its findings may be extrapolated to later stage demonstration and deployment of solar energy technologies by reference to financing models used internationally to support solar energy technologies through the innovation cycle.

Figure 1 below attempts to summarise the applicability of various financing instruments to different points along the innovation cycle for solar energy technologies. A key finding is that early stage research and development activity is largely the domain of public sector funders, principally through capital grants, reflecting long timeframes to technology commercialisation, a commensurate lack of value in technology intellectual property and a relative lack of interest from private sector strategic and financial investors. As technology concepts are proven, early-stage private investors (for example, strategic industry investors, angel investors and early stage venture capital) demonstrate increased willingness to support technology development, especially as intellectual property begins to emerge as a valuable asset. At this stage there is greater scope for public and private sector co-funding of technology development through mechanisms such as equity guarantees and pooled investment funds.

Once technology is more developed and technology-related risks retired, the capital intensity required to advance the technology to full-scale commercial deployment increases. Consequently, while early-stage technology development can be supported by relatively modest amounts of capital from the public sector and equity investors, the substantial amounts of capital required to construct large commercial and utility scale

solar power plants require all but the most highly capitalised project sponsors to seek significant amounts of debt finance. At this stage, government-backed debt support can take the form of for example, loans (including on subordinated or concessional terms) or loan guarantees to catalyse and complement commercial market participation in projects. Other risk mitigants to increase confidence among private sector investors include government-backed technology performance guarantees. If governments have the appetite to participate in energy markets, they might provide revenue support through underwriting power purchase agreements (PPA) at a level that ensure project bankability, or enter into contracts for difference.

The report concludes that the different technology risks and capital requirements of solar energy technologies as they progress through the innovation cycle suggest that a portfolio of public sector funding models may be the most appropriate way of supporting these technologies through to commercial deployment. The ASI endorses this approach and commends it to the CEFC.

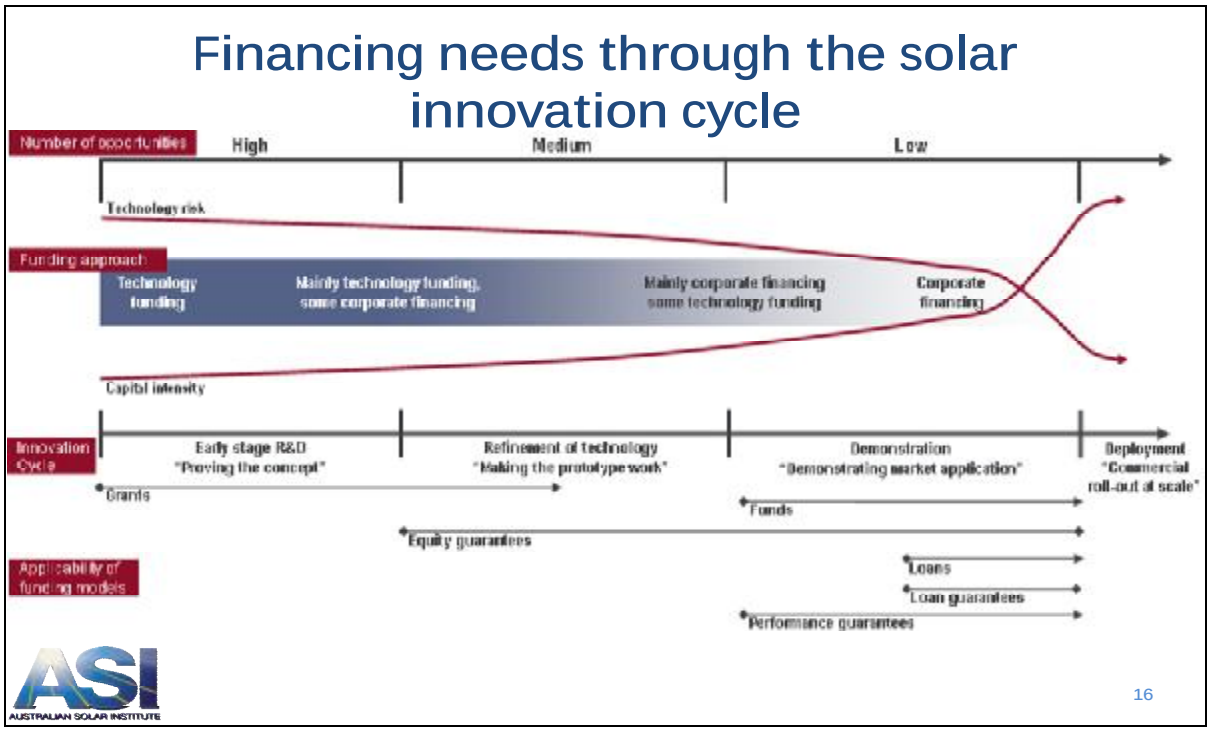

Figure 1

3. *The Market Gap in Financing Large-Scale Commercial Deployment of Solar Energy Technologies*

Some of the barriers identified to financing the commercial deployment of solar energy technologies, beyond the RD&D phases of the innovation cycle, both in Australia and internationally, include[3]:

- lack of critical mass and pipeline of projects;
- lack of cost-competitiveness of solar energy technologies relative to conventional energy technologies and other, more market-ready renewable energy technologies;
- relatively high performance and technology risks, particularly for more innovative/less proven solar technologies;
- scale-up risk in first-of-a-kind projects, exacerbated where the technology or project developer has a small balance sheet;
- in Australia, the limited market for solar energy projects within the context of a broader electricity market in which satisfactory power purchase arrangements may be difficult to secure given the domination of a small number of vertically integrated wholesale electricity purchasers, leading in turn to a correspondingly limited availability of finance;
- long project development and repayment timeframes coupled with high initial capital costs;
- risks and costs associated with grid connection;
- risks associated with regulatory uncertainty (as a result of the current dependence of most solar energy technologies on regulatory support measures in order to be viable);
- lack of long-term market data to be used as a basis for risk determination, including in relation to sophisticated, reliable solar resource generation forecasting methodologies;
- more attractive investment opportunities offshore due to larger market capacities and a greater availability of public and private capital (e.g. China and the United States); and
- reduced risk appetite, coupled with heightened insolvency risk and an increase in the cost of capital, due to the global financial crisis.

Figure 2 sets out the ASI's view of technological and other barriers to increased deployment of solar energy.

[3] "Global Benchmarking Report – Solar RD&D Funding Sources and Models Report for the Australian Solar Institute", Baker & McKenzie, November 2010, page 15.

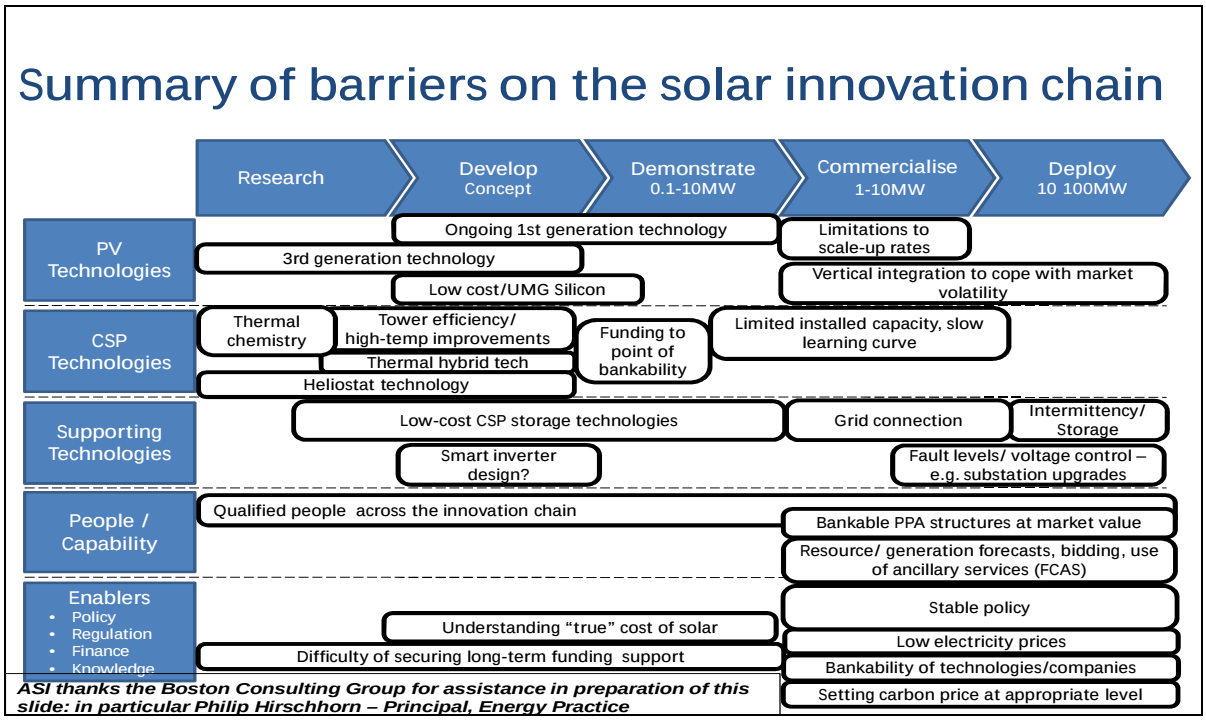

Figure 2

We note that risks to later-stage commercialisation and deployment are focused as much (or more) on market and price risk as technology-related risk.

A key financing barrier in renewable energy projects is that even with a comparable levelised cost of electricity these projects are significantly more capital intensive than fossil fuel projects. Consequently, the cost of finance for these projects is a much more significant contributor to long run marginal costs and as such, security of revenue flows is a critical factor in sponsors' ability to raise debt and equity. Accordingly, the CEFC's strategy towards managing the risks of bankability of project revenue flows will be a critical consideration in its support for renewable energy projects.

Currently, PPAs for solar-generated electricity do not provide an accurate reflection of future electricity prices including the value of time of day and dispatchability of generation. Removing price related investment risks could significantly reduce the need for government subsidies and help catalyse the transition of the Australian energy sector to more renewable, including solar, energy. In this context, it will be critical for the CEFC to align with broader government policy in respect of which market participant(s) is best placed to assume and help mitigate price risk, thereby limiting risks for other financiers to technology, credit and project risk.

In view of the diversity of the risks and the still relatively early stage of solar energy technologies in their lifecycle, it is essential that the CEFC clearly articulate its appetite for project failure and the risks (technical, market, price, policy or otherwise) it is prepared to help manage, to provide a clear signal to potential commercial market co-financiers of solar projects. This information should be made clear to external stakeholders in the eligibility criteria for CEFC investments.

To the extent the CEFC can help address the identified barriers and risks, particularly by assuming greater financial risk than the private market is willing to bear - on terms that recognise the risks but are not prohibitively costly to sponsors - our view is that the market gap in commercial finance for solar energy projects should narrow as private sector debt and equity providers become more comfortable in assuming or sharing the risks.

D. WORKING WITH OTHER GOVERNMENT AND MARKET ORGANISATIONS

1. ARENA

ARENA has been established to incorporate measures currently managed by the ASI, the Australian Centre for Renewable Energy, and the Commonwealth Department of Resources, Energy and Tourism. It will consolidate a range of existing renewable energy measures and manage a total of $3.2 billion in funding, with $1.7 billion in uncommitted funding to be invested in renewable energy and enabling technology projects between 2012 and 2020. ARENA will commence operations on 1 July 2012.

The ASI considers that the success of the Australian Government's Clean Energy Future policy, insofar as it relates to increased deployment of renewable energy, depends heavily on a strong working relationship between the CEFC and ARENA. Specifically, these agencies should be clearly and transparently aligned in respect of their technology development strategies.

ARENA has been established to support the "push" of renewable energy, including solar, technologies through the innovation cycle and as such, the CEFC should complement rather than duplicate such support by providing incentives to "pull" these technologies through the cycle.

2. Coordination between the CEFC, the Commonwealth and States and Territories

The ASI endorses a coordinated approach among governments at Commonwealth and State level, to help support solar energy technologies through the innovation cycle and especially, through to commercial deployment. Accordingly, we recommend the CEFC adopt a whole-of-government approach to supporting the development of solar energy technologies by partnering with relevant Commonwealth and State and Territory agencies, to deliver support.

Critically, a number of important measures to facilitate the increased deployment of solar energy are currently only able to be performed at State level. These include facilitation of solar energy projects through streamlined permitting and approval processes.

The ASI's own experience of working with State and Territory governments, which incorporates co-funding of solar R&D projects, contributions to policy initiatives and information exchange, has resulted in the following outcomes:

- improved leverage on ASI funds through co-funding of individual solar R&D projects;
- leveraging of the ASI's technical expertise in solar energy technologies through ASI early stage R&D funding to facilitate later stage, follow-on funding by State and Territory governments;
- demonstrated cooperation in solar R&D management in respect of co-funded projects;
- strong relationships at individual staff level, leading to better information exchange and development of new partnership opportunities.

This experience may help inform the CEFC's relationships with other Commonwealth agencies and State and Territory governments.

E. RECOMMENDATIONS

To help accelerate the commercial deployment of solar energy technologies in Australia, the ASI recommends the CEFC:

1. Prioritise investment in solar energy technology development and deployment, including investing in commercial-scale demonstration of promising solar energy technologies.

2. Use a portfolio of financing instruments to retire risk, especially technology and price risk, and therefore maximise private sector co-finance in CEFC investments.

3. Be transparent about its risk appetite in making debt and equity finance available to support solar energy companies and projects, and clearly communicate eligibility criteria for its finance facilities to the market.

4. Adopt a whole-of-government approach to support for solar energy technology development and deployment by partnering with Commonwealth agencies and State and Territory governments. A strong working relationship between the CEFC and ARENA, particularly in setting solar energy technology development strategies, is especially important.

APPENDIX 1

ABOUT THE AUSTRALIAN SOLAR INSTITUTE

1. Introduction

The Australian Solar Institute (ASI) is a $150 million commitment by the Australian Government to keep Australia at the forefront of solar innovation. This includes funding of up to $50 million for the United States – Australia Solar Energy Collaboration (USASEC). The ASI aims to drive collaborative, focused research, development and pilot demonstration activity (RD&D) that will have a major impact on the efficiency and cost-effectiveness of photovoltaic (PV) and concentrating solar power (CSP) technologies.

The ASI fosters greater collaboration between solar researchers in Australian universities, research institutions and industry, and helps forge strong links with peak overseas solar research organisations. The ASI also acts as a catalyst and champion for Australia's leadership strengths in solar innovation.

A key focus for the ASI is disseminating the results and learnings of solar energy technology development for the benefit of the Australian and global solar communities and the Australian public. This includes sharing experiences from the Government's Solar Flagships program in the ASI's capacity as the Government's knowledge sharing agent and expert industry development assessor for that program.

2. Link to Australian Renewable Energy Agency

The ASI will form part of the Government's announced Australian Renewable Energy Agency (ARENA) from late 2012. ARENA will take the ASI forward and ensure continued support for solar energy technologies through the innovation cycle.

3. Portfolio of Solar Research and Development Investments

Since commencing operations in late 2009, the ASI has committed approximately $76 million to support over two dozen excellent RD&D projects with an aggregate value of approximately $220 million. The projects cover various PV and CSP systems and technologies and span applied research for incremental improvement to relatively more mature solar technologies to more fundamental research into technologies still a number of years from commercialisation. Projects are led by a range of Australian research institutions and companies, many working in collaboration with Australian peers and prominent international companies and research institutions. Through its RD&D project investments, the ASI is supporting more than 100 of Australia's leading solar researchers.

The ASI's leverage ratio for its investments exceeds $2 for every ASI $1 invested, with the balance of project funding taking the form of cash and in-kind contributions from project consortia including research institutions and Australian and international industry.

In addition to investing in solar RD&D projects, the ASI administers a Skills Development program that provides PhD Scholarships and Postdoctoral Fellowships to young and mid-career solar researchers to undertake study or research in Australia, to help consolidate the skills base of the next generation of solar researchers.

The ASI supports enabling research to complement its investments in technology development. Currently the ASI is working with the Australian Energy Market Operator (AEMO), CSIRO and other stakeholders to support an extension to the Australian Wind

Energy Forecasting System to create an Australian solar energy forecasting system. The ASI has also commissioned a review of the potential for CSP in Australia. This work engages a reference group with membership drawn from key industry associations and a final report on the outcomes of the review is expected to be released publicly in the first half of 2012.

Finally, the ASI is actively engaged internationally, including through formal relationships with two leading German research institutes, Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V. (Fraunhofer Institute) and Deutsches Zentrum für Luft- und Raumfahrt (DLR), and as the agency managing Australian Government funding of up to $50 million for USASEC. Many ASI-funded solar RD&D projects involve international project partners from research institutions and industry.

APPENDIX 2

BAKER & MCKENZIE GLOBAL BENCHMARKING REPORT – SOLAR RD&D FUNDING SOURCES AND MODELS REPORT FOR THE AUSTRALIAN SOLAR INSTITUTE

[PDF ATTACHMENT]