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ACT Solar Power Auction

Initial Report on Auction Design

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Summary of Recommendations

As a result of the analysis and modelling to date Heuris' recommendations in relation to the initial design of a FIT based solar auction and other essential risk management actions are as follows:

1. The ACT Government announce a 40 MWe[1] auction in 2011 with a firm commitment to accepting the lowest priced qualifying FIT bid for a minimum level of capacity:
    a. Such a firm commitment is necessary to ensure the robust competition from credible consortia necessary to achieve sharp FIT pricing.
2. The minimum recommended level of capacity for which the Government should commit to accepting the lowest qualifying bid(s) should be 20MWe. This creates the opportunity for lower FIT bids in subsequent ACT Solar capacity auctions to be "funded" by project experience, learning and risk reduction from solar projects supported by Federal Government and state governments:
    a. Scale economies are likely to have been captured at 20 MWe;
    b. Initial Australian utility scale PV projects will be higher risk due to supply chain inexperience;
    c. It is also possible that the international costs of the underlying PV modules or solar concentrating capture systems may fall as a result of international experience.
3. The Government reserve the right to accept bids from 20MWe up to 40MWe (or higher) if they represent value for money.
    a. The auction rules would therefore require bidders to submit a FIT bid for up to 20 MWe with the option to bid for further capacity. The Government thereby retain the option for a later auction for at least 20 MWe.
4. The final form of the auction be either a hybrid or sealed lowest FIT price:
    a. the applicability of the hybrid auction approach to the FIT auction should be reviewed with experts from the ANU School of Economics who have previously published on the subject.
5. The adoption of a "no market risk" FIT without any inflation escalation and no back loading.
    a. An ACT Government decision is required on whether to adopt a front loaded FIT profile (fixed annual rate of FIT reduction over the life of FIT) or a fixed flat FIT for the life of the contract.
6. The FIT tender process should be used to discover:
    a. The least cost term of the FIT contract by asking bidders to submit bids for different contract terms of 15, 20 and 25 years; and
    b. The expected long term market value of RECs by asking bidders to submit "REC inclusive" and "REC exclusive" FIT bid prices. The Government can then assess the public policy trade-off between additionality of CO2 reduction and increased FIT costs.
7. The bid timetable be extended to provide for bid submission by end Q3 2011 and FIT contract award by end Q4 2011, subject to confirmation in industry consultation:

[1] Megawatt electrical capacity

   a. Sufficient time should be made available to potential bidders to prepare bids that are not already shortlisted in the Federal Solar Flagships Program.
   b. Early consultation with "high potential" new bidders is recommended to assess the time requirements.
   c. The slight extension to the bid timetable would not impact significantly on the practical delivery date for the first tranche of capacity under the FIT auction.
8. The ACT Government should consider organising (possibly in conjunction with the Commonwealth Government) a conference in Canberra in Q1/2, 2011 on PV Balance of System cost reduction to assist in reducing FIT bids and garner industry awareness and support for ACT Government leadership in solar electricity generation.
9. The ACT Government should legislate:
   a. to entrench a standard FIT contract in law in order to maximise bidder certainty and confidence in the auction process and the long term value of the contract; and
   b. to establish a simple, accelerated planning approvals process for the winning tenderer(s) of the type adopted for critical infrastructure in other States.
10. Setting a credible timetable for performance under FIT contract:
   a. Subject to the results of industry consultation, Heuris recommends an earliest feasible development approvals timetable of end Q2 2013, and a commissioning completion date of end Q2 2015.
11. As part of the preparation for the bidding process, ACTPLA establishes clear design and construction standards and approvals processes for utility scale solar plants in the Territory.
12. The immediate installation of appropriate meteorological data recording systems (covering insolation and wind data) on nominated ACT Government or other land available for the initial project.
   a. This data would form part of a comprehensive information pack for bidders, including the terms of a standard offer contract/PPA, connection agreement and required ACTPLA standards for site development and construction.
   b. As part of this work, the ACT Government should establish the availability of ACTEW and ACTEWAGL sites to other bidding consortia.
13. The ACT Government undertakes/commissions an initial risk evaluation of the potential for community opposition to a utility scale solar plant sited in the ACT, drawing on available information on what are likely to be seen as the most favourable sites in terms of aspect/insolation and access to distribution infrastructure:
   a. To foster ongoing community support the ACT Government should consider a range of information and education measures explaining the nature and impact of the Territory's solar generation strategy.
14. The ACT Government endorses the proposed two stage approach to industry consultation focussed on:

a. Better understanding industry perceptions of project risk so as to enable the ACT Government to reduce the perceived level of risks under its control. A series of face to face interviews with agreed stakeholders prior to Christmas 2010 is proposed.
b. Encouraging new bidders to join the FIT auction.
c. Two key thrusts are recommended:
    i. Heuris briefings for leading Australian infrastructure project developers not already participating in the Solar Flagships PV bid round, followed as necessary by an open invitation industry briefing session hosted by the ACT Government.
    ii. An ACT Government/Heuris visit to China to engage with leading Chinese PV project developers

1. Introduction

The ACT Government announced on 13 September 2010 that it will expand its electricity Feed in Tariff (FIT) scheme to encourage the construction in the ACT of up to 210MW of large scale (i.e. over 200KW) generation facilities. This is in support of its legislated objective of reducing ACT greenhouse gas emissions by 40% from 1990 levels by 2020 (media release at Appendix 1).

As a first step in this process, the Government indicated its intention to use an auction process to identify the long term electricity FIT required to encourage the development of 40MW of solar based electricity generation within the ACT. The Department of the Environment, Climate Change, Energy and Water has asked Heuris Partners for initial advice on the design of the auction (the Terms of Reference for this study are shown at Appendix 2).

This Report addresses Items 2.1 to 2.7 of the Terms of Reference. The Report is in four parts. The first part reviews the issues in design of the FIT. The detailed design of the FIT defines the investment opportunity that potential bidders will be assessing.

The second part reviews the issues in the design of the auction process. The design of the auction process will likely have an important bearing on the level of competition and the quality of the bid consortia. By achieving strong competition between a diverse group of capable consortia, the ACT Government can expect to discover the competitive price for solar electricity from an efficient provider.

The third part reviews the risks to the ACT Government in implementing the utility scale solar FIT program. The fourth part addresses the nature and potential scope of industry consultation.

2. Feed In Tariff (FIT) Design

2.1. Introduction

A Feed In Tariff (FIT) is a long-term purchase agreement for the sale of renewable electricity. It is one of a variety of energy supply policies available to encourage the development of renewable energy. A FIT provides three key benefits to renewable energy developers: guaranteed access to the grid, guaranteed sale/purchase of electricity production over the life of the FIT, and reduced price risk. Depending on the FIT design, the price may be directly linked to an assessed cost of generation. Under a FIT the project developer retains significant project approvals, development, financing and operating risk but has reduced/no market risk (price risk), depending on the FIT design.

By contrast, the Federal Governments Solar Flagship Program is intended to provide a once off capital grant to winning bidders to subsidise the capital cost of development and so mitigate development risk. Those bidders remain exposed to the full market risk from the sale of electricity in addition to the project approvals, financing and operating risk.

FIT scheme design offers a large variety of policy based incentive choices for government. Establishing clarity and priority in the public policy objectives that these incentives are to serve is an important precondition for a successful FIT design. The core public policy objectives are twofold:

- Delivering a cost effective path to close the gap between fossil fuel and renewable electricity generation in order to support the delivery of the ACT Government's greenhouse gas reduction target.
- Maintaining public support for accelerated renewable energy deployment.

Subsidiary public policy objectives are also frequently found. These include supporting the development of higher risk, immature renewable energy technologies such as geothermal generation, and stimulating employment growth in the renewable energy sector.

In some circumstances, more focused /narrow public policy objectives are also sought such as the utilisation of specific waste streams (biomass focused FIT) or location specific benefits from distributed electricity generation.

The recent experience in NSW and Spain highlights the potential conflict between the pace of development and the bearable cost impost on the community, and illustrates the importance of successfully managing the tension between the two core objectives.

2.2. Matching FIT Objectives and FIT design options

This section reviews the key FIT design options relevant to the core objectives, and illustrates the potential tensions between the design options and objectives. In the subsequent section, we review

recent international experience. Finally we recommend a suite of FIT design features for the first round of the ACT utility scale solar FIT tender.

2.3. Delivering a cost effective path to close the gap between fossil fuel and renewable electricity generation

The fundamental rationale for a FIT is to accelerate CO2 emission reduction via the deployment of renewable energy capacity that would otherwise not proceed under existing market conditions and risks.

This objective is supported by two broad categories of FIT design options; those that reduce the non-market risks (and hence reduce the expected costs) to the developers and financiers, and those that reduce the market risks (and hence increase the expected revenue).

2.3.1. Reducing Non-market Risks to Developers and Financiers

The decision by developers and financiers to invest in renewable energy involves an evaluation of the combined risks of the project against the expected returns. As the perceived risks increase, an increase in expected returns is required to compensate for the risk. A corollary of this is that any investment risks in renewable energy that can be mitigated or controlled by Government are a priority focus area for FIT design. By assisting in controlling these risks through the application of public policy, Governments can anticipate that lower FIT prices will emerge in a competitive market of efficient providers.

Developers will evaluate a broad suite of potential risks in a renewable energy investment. These include:

- Technology risk. *Is the proposed FIT technology-focus technically proven in commercial scale development? Are the capabilities required for the technology deployment readily available? How do the costs of the technology compare with other renewable energy technologies?*
- Bid risk. *If the developer spends the money to prepare a properly researched and financed investment proposal with a reasonable return to investors, what are the risks that the bid will not be accepted? Is sufficient time available to prepare a properly researched investment proposal?*
- Land Access and Approvals risk. *If the developer wins the bid process, what are the risks that land access and the critical approvals required for the project to proceed will not be achieved in a timely manner at reasonable costs?*
- Development risk. *If the requisite approvals are granted, what are the risks that might lead to capital cost exceeding budgets and electricity output failing to match design expectations? (Capital costs, electricity output and electricity prices are the dominant economic drivers of investor returns)*
- Operations risk. *Once the project is commissioned, what are the risks that might lead to an increase in operating costs and/or reduced output?*

- Financing risk. *What are the additional risks that result in the optimum amount of debt at an appropriate cost (interest rate) and tenor (duration of loan) not being available to support the equity investment?*

These will be discussed in turn. Some provide greater and simpler opportunities for Government action on risk mitigation than others.

Technology Risk

Solar energy technologies are not all equal in regard to technology related risks. Solar thermal systems have been demonstrated at commercial scale in the United States of America for over two decades but industry cost structures remain high, in part because of lack of accumulated experience/installed capacity. More recent innovation in energy storage systems introduces additional technical risk. Photovoltaic systems are technically mature (although innovation in module technology continues) and commercially demonstrated at utility scale. Installed costs are falling as Chinese module manufacturing costs are driving down prices and Balance of System costs are falling with experience at utility scale.

If the public policy objective includes stimulating the development of higher risk and higher cost innovative technologies that offer the uncertain promise of greater future benefits, then technology specific FITs set at prices reflecting the higher risks and costs are the appropriate FIT policy option.

If the public policy priority is achieving the lowest cost emission reduction currently available, this leads to a FIT setting mechanism that is technology neutral. Depending on the level of FIT pricing, such technological neutrality will effectively exclude higher cost technologies.

Available evidence from international experience indicates that scale economies in solar concentrating generation are optimised at plant sizes greater than 200MWe, reflecting the need to cover the costs of thermal generating plant powered by the solar collector/concentrator system. Scale economies in solar photovoltaic, on the other hand, are optimised at smaller plant sizes. Much of the recent utility scale photovoltaic investment has been in 10MWe to 50 MWe size projects.

The Government's announced intent to limit the first tranche of large scale generation to be auctioned to 40MWe introduces a scale economy bias in favour of solar PV because solar thermal plants will be disadvantaged in a FIT tender process offering such a level of maximum capacity. These choices on limits to capacity on auction are principally driven by the ACT Government's decision to take an incremental approach to delivering up to 210MWe of large scale solar capacity in order to manage implementation risks and costs.

Provided the implication for the likely least cost technology bid in a first round FIT tender (and possibly later tranches), is recognized, there is no pressing rationale for the ACT Government to limit the FIT auction opportunity to any particular solar technology. Potential bidders will make the choice and the auction process will identify the lowest cost opportunity.

Bid Risk

Bid risk is addressed in the Section 4.2.2.

Land Access and Approvals Risk

Utility scale solar plants will require significant land area: for example, a 40MWe plant might require up to a square kilometre of land to accommodate the solar modules/collectors and supporting infrastructure. Uncertainty about the timetable to negotiate access terms to preferred land and the development planning approvals for suitable land packages will be a core concern for all bidders.

For wind projects, recent developer experience highlights the time and cost associated with negotiations with multiple land owners to secure lease-hold access to preferred land. By nominating the availability of land packages owned by the ACT Government that are deemed suitable for solar projects, bidders will see significant expected savings in cost and time.

It is expected that the ACT Government will constrain the FIT contract by various "conditions subsequent" to which the winning bidder will need to adhere.

The timetable for development is a Government priority as it pursues a legislated target for GHG emission reduction. The Government is also concerned to prevent winning bidders delaying the construction phase in the hope that future capital costs will fall and deliver windfall returns to the delayed development.

Potential bidders and their financiers will be very aware that, in the event that development approvals are not granted or subject to significant delays, then the allocation of responsibility for the failure to meet milestones and the penalties applicable to the winning bidder will likely be a source of dispute and of additional direct costs from any agreed liquidated damages clauses in the FIT contract. If the application of such penalty clauses is limited to the period from the granting of Development Approval, then this risk is mitigated for bidders.

It is also possible that the approvals process outcome imposes significant unanticipated costs on the proposed development making the investment uneconomic, thereby threatening the commercial viability and hence delivery of the winning proposal. The reputational costs to the ACT Government could be substantial.

Industry perceptions about the ACT Planning and Land Authority (ACTPLA) capacity and processes will be important in determining how bidders value the approvals risk, and the incremental FIT price they require to compensate for the risk.

Anecdotal comments related to the recent protracted attempt by Transgrid to permit the upgrading of an existing transmission line are likely to be well known to bid consortia and could be expected to result in increased capital cost contingency in developers' financial models. It is also likely that the duration of

the construction phase debt package, and hence the expected interest costs, will be increased by developers concerned about approvals risk. Both the increment in expected capital costs and the increments in construction phase interest will flow through to FIT bid prices.

Perhaps the worst case scenario is if adverse industry perceptions of approvals risk leads potential capable bidders to not participate and so reduce the competitive tension amongst remaining bidders with inflated approvals contingency costs.

The ACT Government needs to properly understand the expected FIT cost of approvals risk. Consultation with potential bidders is required to understand their perceptions of risk and their responses to the perceived risk.

The higher the perceived cost of approvals risk, the greater is the incentive for the ACT Government to reduce the risk.

Opportunities for the ACT Government to reduce the approvals risk include:

- Nominating Government owned land packages available for solar projects:
    - The Government owns significant parcels of land available for large scale solar development, either directly or through ACTEW or ACTEW/AGL, that are potentially suitable for development.
- Providing bidders with clear guidance on the public and privately owned areas/sites that are potentially available for utility scale solar plants, taking account of other agreed land uses and constraints:
    - It is not clear whether the sites within the ACT boundary are optimal in terms of solar insolation, connection, load balancing etc. or whether there would be benefit in a limited extension of site selection outside the immediate ACT boundary.
    - Consideration should therefore be given to allowing bidders to include sites close to the ACT but outside the Territory boundary.
- Legislating to establish a simple, accelerated planning approvals process for the winning tenderer(s) of the type adopted for critical infrastructure in other States.
- As part of the preparation for the bidding process, ACTPLA establishes clear design and construction standards and approvals processes for utility scale solar plants in the Territory.
- Pre-investment by Government in environmental baseline assessments of identified high potential land packages currently owned by Government

Development Risk

Development risk encompasses a large number of risk factors that can lead to capital cost increases, delays to completion (and the commencement of production and sales revenue), and design failures that result in actual electricity output not achieving the designed levels.

Capital expenditure in utility scale solar projects is approximately split 50/50 between the purchase of the solar capture (PV modules and solar field) and the Balance of System costs. The design challenge is to maximise the saleable output of electricity over the life of the project for every $ of capex and opex. The key design choices are in module/solar field selection (high efficiency and higher cost versus lower efficiency and lower cost), array design (fixed/lower efficiency/lower cost versus tracking/higher efficiency/higher cost) and Balance of System overall design for low cost manufacture and installation.

To manage successfully the development risk and deliver the lowest achievable FIT tender, Australian utility scale solar PV developers will need to have access to internationally experienced "whole of system designers", assured supply of cost-competitive modules/solar field and an ability to establish (and coordinate) the local (and international) supply chain.

The project developer would typically bring a module supplier/solar field supplier into the bidding consortium, thus locking in a specific technology choice and predictable supply cost. In the PV context, recent price reductions in higher efficiency Chinese manufactured polycrystalline PV modules have disrupted the market for lower efficiency thin film PV modules manufactured in the USA and Germany.

Balance of System (BOS) design optimisation involves a much larger variety of uncertainties. Site specific factors include insolation levels, distance to grid connection, available land area and land lease costs, slope and orientation to the sun, other weather factors such as wind loads on array support structures, fog, geo-mechanical issues that influence structural foundation and cable trenching costs, local vegetation and site security. Local supply chain capacity and experience, and labour market efficiency are important in determining array fabrication and installation costs, the cost of array tracking systems, and in the cost of fabricating and installing the site electrical system and electronic control systems. Choices in electrical system and control system design are important to maximizing output through the life of the project and in detecting module/array failure or under performance.

A recent report by the Rocky Mountain Institute (RMI)[2] highlights the importance of Balance of System cost reduction to achieving the goal of utility scale PV "grid price parity". In the USA BOS costs are estimated to contribute $1.60 (46%) of the total $3.50 capital cost/We for best practice utility scale PV. Near term achievable BOS cost reductions are estimated to be $0.72/We, 45% of current BOS costs and 21% of current total system costs.

PV BOS cost reduction is the focus of several recent PV industry conferences in North America and highlights the attention being paid to the BOS learning opportunities available to PV project developers. These opportunities are not protected by patents and high technology /high cost barriers to entry. They are available to disciplined systems engineering and "lean manufacturing" based companies.

[2] Rocky Mountain Institute, September 2010: Achieving low cost solar PV – Industry workshop recommendations for near term BOS cost reduction.

Development risk is not something that the ACT Government might traditionally identify as an area for government action. However, the immaturity of the utility scale PV sector in Australia suggests that government initiatives to accelerate the integration of international learning on BOS cost reduction into the Australian context could provide substantial near and long-term benefits. Cooperation between the ACT Government and the Federal Government in sponsoring, coordinating and hosting a PV BOS Cost Reduction Conference in Canberra in Q1 or Q2 2011 is a possible initiative. By sponsoring selected international participants, and inviting potential local supply chain participants as well as the lead developer constructors, such a conference could assist in reducing BOS costs and contingency assumptions in FIT bids, build local industry support and capacity, and contribute to public awareness and support of ACT Government leadership in solar electricity generation.

Assurance to bidders on the cost and timeliness of grid connection within the construction program is a key aspect of ACT Government development risk mitigation. The tender documentation must establish clear allocation of costs and assure a simple and transparent process whereby grid connection is to be made, possibly by the specification of connection arrangements in a standard contract. Expected grid connection costs from the boundary of identified land packages owned by the ACT Government should be estimated.

Evidence from the USA suggests that in some jurisdictions, local building and planning regulations can be optimised to reduce whole of system costs without compromising the public interest. Identifying such areas for regulatory fine-tuning would be one objective of the proposed PV BOS Cost Reduction Conference.

ACT Government can also reduce development risk by maximizing the quality, scope and ease of access to meteorological data (insolation *and* wind loads) relevant to high potential PV sites. While it is likely that some potential PV developers have already sought to gather their own data, if the ACT Government is to encourage new PV FIT bidders to participate in the FIT tender, this is a relatively simple and low cost means of support. The immediate installation of appropriate met data recording systems on nominated ACT Government land available for the initial project is recommended.

Operations Risk

Risks to the output levels of the PV plant after commissioning, and the level of ongoing operating and maintenance costs make up operations risk.

Whole of system design optimised on levelised costs (long run costs including capex and opex) is the key to reducing operations risk and is the responsibility of the developer.

The permit requirements for local vegetation control and site security are two areas where ACT regulations may contribute to operations costs.

Inflation in the Australian economy is also a factor contributing to operations risk. Some international FIT designs provide for an annual inflation adjustment factor. Others provide for a flat nominal FIT for the duration of the FIT. Both approaches provide certainty of revenue per unit output.

Unless the ACT Government has superior knowledge of the future pathway of overall inflation *and* its impact on the levelised cost of PV output compared with the developers, then there is no obvious benefit to the long term ACT community FIT burden from allowing a specific inflation allowance. Developers will include an inflation assumption in their cost analysis and have the advantage of understanding how specific inflation impacts (labour versus materials) change the levelised costs. The key to mitigating the risk of overpaying for future inflation expectations is the level of competition in the auction process.

It would be valuable for subsequent FIT tender rounds to require first round bidders to reveal their inflation assumptions and its impact on operating costs.

Risks to output from storm and fire damage are insurable and do not provide opportunities for specific ACT Government risk mitigation beyond the usual work of government in weather forecasting and fire risk management.

Financing Risk

The financing risk for the project is the uncertainty in the cost, amount and term (tenor) of debt available to fund the project. Financing risk is one of the three key risks to be managed by developers. Capital cost minimization and output maximization are the others.

Because interest payments on debt are deductible against Federal Government income tax liabilities, for companies with an expectation of future profits, the after tax cost of debt is substantially lower than the after tax cost of equity.

The simplistic extension of this fact is that the optimal financing structure for any project with sufficient profitability is 100% debt.

This is not the case in reality as high levels of interest payments (as a % of free cash flow) make the business susceptible to financial distress and potentially, insolvency, should unanticipated shocks to revenue (-) or expenditure (+) occur. Prudent borrowers and lenders recognize this and limit the amount of debt to equity (financial leverage) according to the expected cash flow volatility. Lenders may impose interest rate penalties as the upper limits of acceptable financial leverage are approached.

Maximising the level of debt to equity at the lowest possible cost of interest, with repayment terms matched to the life of the FIT, while avoiding the risk of financial distress is critical to achieving the lowest possible FIT.

The state of financial markets following the global financial crisis (GFC) has had important impacts on project financing risks.

- The cost of equity has risen as investors have increased their asset allocation to low risk assets such as cash and government securities. This means that developers are seeking to reduce the amount of equity they have at risk in projects (to extend the reach of their current balance sheet) rather than raising new equity at higher discounts to current market prices.
- The cost of debt has increased as banks have restrained lending to improve their capital ratios after major GFC asset write-downs and the post GFC imposition of higher regulatory capital ratios. The pool of available debt is reduced and interest margins have increased. Penalty margins for higher risk assets have widened again after nearly collapsing during the early part of the decade.
- The tenor of available debt, which initially shortened to 1-2 years at the height of GFC uncertainty, is now normalizing again.

Capital intensive long life infrastructure development projects in Australia (such as those anticipated in the Solar FIT tender) have evolved relatively similar financing structures. Financing occurs in two distinct phases with distinct models – the project development phase and the operating project phase.

Project development phase lending

During the project planning, approvals, development and commissioning phase, many critical risks are being managed. Risks to both equity investors and lenders are high. Equity investors with limited funds /constrained balance sheets will seek to minimize their exposure and increase the level of debt. Lenders will seek security beyond the project asset, limit the level of debt to equity according to their perception of risks in this phase of the project life, and charge higher interest premiums. Debt packages have draw down flexibility to accommodate the construction timetable and typically include the capitalization of interest during the construction period. The loan is structured as a “bullet” with no amortisation repayments over the term of the loan; the principal is repaid in one tranche at the end of the loan. The term of the loan is usually set to allow construction and commissioning contingency over-runs so that refinancing occurs once the project is operating and demonstrating an ongoing cashflow.

For a 3 year construction loan with 70-80% debt finance, the current indicative interest premium would be ~250 to 300 bps above the interest rate swap rate of ~ 5.4%.

Operating phase lending

Once the project has been commissioned, most of the risks to project value will have been resolved. Capex is known. Output efficiency is known and the current operating costs are known. The project is now only exposed to operations risk, market risk (price risk on output), Government risk (increased taxes, confiscation etc.) and community risks.

Project owners will then typically refinance the project using longer term debt at a lower interest cost, and increasing the amount of debt to equity (within the prudent limits set by expected cashflow volatility). By increasing the level of debt they immediately reduce their equity exposure, freeing up that cash for other investment opportunities, while retaining an ongoing stream of equity cash flow after operating and financing costs. Alternatively, they may sell down part or all of their equity to new equity owners such as superannuation funds and take an immediate profit on that equity in return for successfully managing the early high risk phase of the project lifecycle. Developers will often retain an ongoing operating and maintenance contract (and profit stream).

Where a capable operator is established, output risk is low, community support for enhanced development of solar power is strong and is sustained, where government support is strong, where stability of government policy is perceived to be high, and where market risk is effectively zero as a result of the FIT, the financing risks in the operating phase are small. Long term debt at lower interest rates and with high levels of prudent financial leverage (debt ratio of 70-80%) could be expected.

The ACT Government AAA credit rating, together with the ACT Government guarantee on the long term FIT, will mean that long term debt financing for the operations phase is likely to attract an interest premium from commercial banks of ~ 150 bps over the cost of long term ACT Government debt.

Opportunity Cost of Equity

Equity investors in the project will have an expectation of returns to equity appropriate to both the risks of the project and the alternative investment opportunities available to the firm. Equity investors with finite amounts of equity will allocate the equity to the highest risk adjusted return available in their portfolio of opportunities.

The Australian Energy Market Regulator has recently reviewed the Cost of Equity allowed in regulated electricity transmission and distribution assets. These assets are a reasonable proxy for the risk profile of a fixed FIT solar PV project but may be a lower risk asset class than a fixed FIT solar concentrating project. The AEMR determined a nominal after tax Cost of Equity of 10.88%. A critical underlying assumption in the AEMR determination (from the Capital Asset Pricing Model) is that there is no constraint to the level of available capital for investment.

Heuris modelling of FIT outcomes assumes a base case opportunity cost of equity of 13%, a low case of 10.88% and a high case of 15% (nominal, after tax). Our rationale for this is that the leading renewable energy developers in Australia have finite capital available and will allocate that capital to the highest return projects within their “opportunity space”. The low case assumption would require them to have a very constrained opportunity space. The high case assumption would imply limited effective competition in the auction.

2.4. Facilitating community involvement

The Government wishes to explore financing options that facilitate ACT residents' investment in the ACT solar project. The Government also wishes to understand the scope for facilitating funding from ethical investment vehicles, including superannuation funds.

This section provides a brief overview of recent developments in community investment in renewable energy projects and evaluates a range of options for community investment against the likely default option of a mixture of short and longer term bank finance typically used by commercial project proponents.

Accessing ethical investment sources is addressed separately in Section 2.4.4 below.

2.4.1. Potential benefits from and trends in community involvement

International literature and experience suggest a range of potential interlocking economic, environmental and social benefits associated with direct community involvement in renewable energy projects. These include:

- Keeping the economic benefits of the electricity production in the local economy, for example by facilitating the flow back of interest payments and operating profits to people in the region, thus serving to offset the generally higher costs of renewable electricity sources. The levels of funds staying within the local economy are significantly increased if the schemes are owned or part owned by local people themselves and the knock on effect of money generated from the industry remains within the economy.
- Building greater acceptance of new renewable energy technologies in particular localities, thereby addressing potential siting acceptance risks (the NIMBY - not in my back yard - syndrome). Community involvement schemes can be less contentious and are beneficial as ownership not only provides a steady stream of income but also allows people to be members of an entity committed to maximising social, economic and environmental benefits to the locality and providing a vehicle for local decision making.

Utility scale renewable power projects are typically built, owned and operated by either an integrated power utility company or a single purpose, standalone company (known as an Independent Power Producer, IPP) that sells the output to a utility or into a competitive power market. To date, the default ownership models in Australia have very largely excluded direct community involvement in either of these structures.[3] Integrated utilities are either privately owned (via public quoted companies on the ASX and/or overseas power companies) or are public trading enterprises with shareholdings held by owner governments (e.g. ACTEW). IPPs have invariably been privately owned.

[3] An exception, on a small scale, has been the Hepburn Wind Farm.

By contrast, experience in Europe and North America reveals a range of models for promoting community involvement in such projects, reflecting different public policy priorities, drivers, and settings. All generally involve a form of economic stake in the project, ranging from some portion of community funding (via loans or equity) to total community ownership and control.

Europe

The concept of community involvement/funding for renewables, rather than private or corporatised finance/ownership, is common practice across Europe. This is delivered via a range of models, including:

- Community-led investment, with projects established by citizens wanting action on environmental issues, successfully mobilising people's time and money. [4]
- Consumer-owned utilities that seek to deliver efficient, cost-effective and accountable public services, making long-term infrastructure investments.
- Co-operatives (e.g. of farmers/landowners) that enable their members to respond successfully to changing market conditions and regulations, improving their economic position and delivering wider community benefits.
    - Co-operatives have been a specific feature of the community renewables landscape in mainland Europe that is now attracting increasing attraction in the UK (see box on key attributes/principles).

Co-operative principles

- Voluntary and open membership: co-operatives are voluntary organisations, open to all persons able to use their services and willing to accept the responsibilities of membership.
- Democratic member control: co-operatives are democratic organisations controlled by their members, who actively participate in setting their policies and making decisions. Members have equal voting rights (one member, one vote). Elected representatives are accountable to the membership.
- Member economic participation: members contribute equitably to, and democratically control, the capital of their co-operative. At least part of that capital is usually the common property of the co-operative. Surpluses are allocated for: developing their co-operative; benefiting members in proportion to their transactions with the co-operative; and supporting other activities approved by the membership.
- Autonomy and independence: co-operatives are autonomous, self-help organisations controlled by their members. If they enter into agreements with other organisations, for example in order to raise capital from external sources, they do so on terms that ensure they maintain their autonomy.
- Education, training and information: co-operatives provide education and training for their members, elected representatives, managers and employees so they can contribute effectively to the development of their co-operatives.
- Concern for community: co-operatives work for the sustainable development of their communities through policies approved by their members.

[4] The recently launched Hepburn Wind Farm project is, at present, a rare Australian example of this approach. The Hepburn project involves the construction and operation of two 2.05 MW wind turbines at Leonards Hill, 10 km south of Daylesford, Victoria, with revenues secured on a power purchase agreement with The project has attracted more than 1350 investors, ranging from local families to philanthropic organisations and raised more than $8.3 million.

Sweden and Denmark have both put in place policy frameworks that have provided comprehensive and sustained support for efficient and renewable energy technologies. The two main drivers for these policies have been reduced reliance on fuel imports and sustainable development. Energy taxes and feed-in tariffs have been major drivers. These favourable conditions – sustained over nearly three decades – have enabled a range of investors, including co-operatives, to make the long-term investments, primarily focused on wind, biomass and small scale hydro. The enabling powers of the planning system have also been extensively used to support infrastructure investment.

Denmark has directed investment into district heating, creating heat markets which have enabled fuel flexibility and enhanced the viability of combined heat and power (CHP). Larger projects have also been delivered, such as the 40MW offshore wind farm, Middlegrunden, in Denmark. This project has been delivered and operated by energy co-operative, a partnership between 8,500 share members and the local utility company (Copenhagen Energy). In Denmark 2,465MW, or 14% of electricity consumption, is from wind power. Of this 58% is owned by individuals or farmers, 26% by co-operatives and 15% by power utilities. Similarly, in Germany some 50 per cent of all wind generation in Germany (~ 12,000 MW) is owned by local investors, with more than 200,000 people involved in co-operative programs.

North America

In North America, Minnesota has been a leader in developing community-owned wind generation, with 239 MW of community-owned projects operating and under construction, or about 10% of the 2,500 MW installed in the state. Nearly all of Minnesota's community-owned wind generation was installed under its Community-Based Energy Development (CBED) program. Minnesota's CBED and its forerunner were the state's version of an early feed-in tariff.

Most recently, the Ontario Power Authority (OPA) has signed standard offer feed-in tariff contracts for 384 MW of community-owned renewable energy projects, representing 16 per cent of Ontario's 2,500 MW of feed-in tariff contracts signed to date. This program is additional to OPA's small scale (e.g. residential rooftop, micro-generation FIT scheme), including, for example, the 20 MW, ten-turbine wind project near Toronto, the first phase of a 54 MW development. This project is a joint venture between the region's indigenous groups and the local energy co-operative, which will sell shares to local investors in the Greater Toronto Area.

Other experiences with attempts at community involvement have been more problematic. In British Columbia, for example, there have been over 400 applications for small hydro developments, the majority of which are from private IPPs or joint ventures between private IPPs and indigenous groups. Many of these proposals have been in rural areas where communities are in need of support and new development. The Regional District of Mount Waddington on Vancouver Island has had many requests from private IPPs, all promising that projects will stimulate "local development." In reality "local development" has not included profit sharing or investment in the community. This situation is regarded

as typical of experience with private IPPs, limited local benefits when compared to investments from community-owned or joint venture IPPs.

More generally, experience with smaller scale community sponsored IPP suggests significant challenges in overcoming resistance to the projects among utilities, local government planners and finance providers. This reflects systems familiar with the risks associated with large centralised utility scale plants coming to grips with entities and projects involving markedly different community capabilities, cost and risk profiles.

In summary, there are significant examples of community owned or financed utility scale renewable energy projects in Europe and, more recently, North America. Community wind ownership structures in Europe vary by country, and depend critically on local customs, conditions, and policy support programs. These examples range from complete ownership and control to joint ventures and/or community sourced equity participation. In addition, a strong wind project construction and O&M infrastructure is critical to cost-effective community wind power development.

The outcomes have been driven by strongly supportive policies including, but going beyond, technology specific FITs. Community wind thrives under revenue certainty where FITs have been set at levels that ensure profitability (e.g., Denmark, Sweden, and Germany). In large measure, these have driven utility scale community investments in wind but also small hydro and biomass i.e. essentially mature technologies. Heuris is not aware of any examples of utility scale PV projects with major community involvement. This is important context in considering the potential scale and evolving nature of community involvement in the ACT Government's large scale solar program.

2.4.2. Australian & ACT context

The development of 40MW of utility scale solar electricity generation is likely to be the first, or one of the first, of its kind in Australia.[5] As such, delivery of the ACT FIT contract will involve a range of "first in class" technology (BOS) , development and operating risks not associated with subsequent tranches of investment that will benefit from the learning derived from the designing, building and operating early solar projects. Effective project execution will require assembling and coordinating a range of specialist equipment suppliers, systems designers, constructors and project managers within tight cost and time constraints.

In addition, the absolute amount of upfront capital required is significant in terms of community financed investment in the Australia context. A single 40MW PV plant, for example, might involve capital costs of some A$150-200 million. Overall, Australia currently lacks any experience with significant direct community financial involvement or ownership of utility scale renewables projects of the type seen in

[5] This will depend on the award and execution of the ACT solar FIT contract opposite the outcome of the Solar Flagships Stage 1 competition.

Europe.[6] This reflects a policy environment that is not generally supportive of direct community ownership or involvement in the energy field. Recent history in the electricity sector has seen a strong shift to private ownership from publicly owned trading enterprises. And, as noted above, IPP developments have been overwhelmingly undertaken by the private sector.

More generally, there is no recent history of the use of project specific local/municipal bonds. All borrowing is undertaken by either State/Territory Governments or public trading enterprises as part of general financing activities, hence offering no direct "line of sight" between community engagement objectives and particular projects/activities.

2.4.3. Alternative community/government financing roles

This context argues for caution in seeking major direct community financial involvement and needs to be weighed carefully against the potential benefits in terms of recycling financial flows into the local region and community education and engagement. Appendix 3 summarises a range of alternative approaches to ACT equity and loan participation and their potential strengths and weaknesses. For the purposes of the analysis, it distinguishes between risk profiles of the FIT auction for the initial tranche of solar capacity (to which the Government will need to commit to establish strong competitive bidding) and subsequent tranches that benefit from the learning effects of the first element of the 40 MWe capacity requirement.

The key conclusion from this comparison is that, given the novel nature of utility scale solar plants in Australia, seeking significant direct community financing/involvement in the early stages of deployment would add significant complexity and hence cost to the auction process. This would be likely to add to bidding time and costs and/or diminish competitive interest in the opportunity, thereby increasing the FIT required to deliver an initial tranche of solar capacity.

An alternative proxy for community involvement in the first round auction could be for the ACT Government to provide the required elements of the operations phase long term financing package. In principle, it would provide the Government with the opportunity to minimise an initial tranche of FIT and earn a return on what will be a generally low risk project.

ACT finance could take one or both of two forms:

- Mandated minority ACT Government equity in the winning bidding consortium, offering a continuing return from the project's profit stream and a direct line of sight (via Consortium Board representation) into "first in class" project capex and opex, operating parameters etc. (thereby providing knowledge/input into second round auction). For example, a 10% equity position might

[6] Though the ACT Government has an element of public sector ownership of its electricity supply through its ownership of ACTEW, this is of a fundamentally different character than the direct community models used in Europe.

cost the ACT Government A$3 million (20 MWe @ A$5000/KWe with 30% equity/70% debt in construction phase).

- The ACT provides post-commissioning debt finance for the project via the ACT Government borrowing against its AAA rating and on-lending the funds to the winning proponent for a small premium of 30-50 bps. This has the potential to reduce the FIT by more than A$20/MWh (A$5000/KWe capex, 20 year FIT, 80% debt in operating phase, Cost of Equity 13% - see Figure 1).

This could be justified as a way of addressing the potential risk premium such a project would attract, given its novelty in Australia:

- Debt financing costs would be ~100 bps lower than funds from commercial banks.
- Interest costs would be recycled through the ACT Treasury at low risks.
- In the process this would put commercial debt providers under pressure to offer project proponents loan terms commensurate with the post-commissioning risks.
- The potential impact of this approach on FIT could be tested as part of the auction process by allowing bidders to offer FIT with either Government or commercial funding.

Figure 1: FIT - Government financing versus bank loans

			Government		Government
		Bank loan	financing	Bank loan	financing
Capex	A$/KW	$3,500	$3,500	$5,000	$5,000
Cost of equity		13%	13%	13%	13%
Duration	Years	20	20	20	20
Debt ratio		80%	80%	80%	80%
Debt margin		1.50%	0.50%	1.50%	0.50%
FIT	A$/MWh	$331	$315	$458	$436

By benefiting from the learning and demonstration effects from the initial tranche, subsequent auctions of capacity are likely to be regarded as lower risk by commercial bidders. They would hence be more comfortable in proving sharp terms for long term finance, thereby allowing the Government to step back from direct lending. Project proponents would also be more amenable to Government requirements for community participation and ownership via equity or loan finance.

Heuris understands, however, that ACT Government policy is to avoid direct financial exposure to this project and hence look to private sector sources of finance. This would seem to rule out a role in the provision of post-commissioning debt finance which for a 20Mwe plant would total some $60-80m.

By contrast, a 10% equity position might involve a total cost of ~$3m. At a low cost and risk, this latter option would offer a direct insight (via Board membership) into the operating parameters of the plant and hence powerful learning opportunities in relation to auctions of subsequent capacity tranches.

Community appetite for direct involvement/investment in solar plants could be evaluated in parallel, perhaps via the issue of a consultation paper. This could canvass some or all of the options listed in Appendix 3.

2.4.4. Role of ethical investment and super funds

For the reasons discussed in Section 2.3.1, any investment from ethical and/or superannuation funds would come at the post construction phase, as part of rolling over short term bank debt into more patient capital amortised over the life of the FIT contract. The relatively low operational risk of the project and the presence of cash flows secured on a long term FIT contract (with implicit rating close to the AAA of the ACT Government) would in principle make this an attractive investment to these funds.

The supply of such funds is not likely to be a constraint. Long term loan finance for a 20MW initial project would be no more than $80m. Core responsible investment of all kinds (including managed portfolios, community finance, green loans and ethical portfolios of charities and clients of financial advisers) stood at $15.83 billion in 2008/9. Of this amount, the great bulk of funds (some $14billion) were held in managed responsible investment funds which include a range of superannuation funds.[7]

The majority of such funds' investments, however, tend to be in the form of equity. To induce cornerstone investors in the project to sell down significant elements of their equity interest, a significant equity premium might be required. *For example, a project (post commissioning) that was delivering a 15% return on equity could be sold at a 40% premium to the initial equity value to an investor who was prepared to accept a long term 10% equity return*. Tax effectiveness favours debt finance over equity. This may limit the scope for ethical/superfund involvement.

The alternative source of loan finance – the banking sector – also offers an ethical approach to project finance via, for example, by the Equator Principles. The Equator Principles have been developed by private lending institutions as a way to encourage private lenders to consider social and environmental issues before funding projects. These principles have focused mainly on issues that arise as a result of project financing in developing countries and are defined as "a financial industry benchmark for determining, assessing and managing social risk in project financing"[8]

It would be possible to either mandate or give preference in prequalification to bidders that attract long term capital from ethical sources (e.g. from signatories to the Equator Principles). Imposing such requirements runs the risk of increasing transaction costs with little or no offsetting benefit. Given the nature of the project, in principle it would be unlikely to violate ethical investment principles and be inherently attractive from both an economic and broader societal viewpoint. We would not therefore recommend imposing conditionality/prequalification requirements related to the involvement of ethical funds.

[7] *Responsible Investment 2009*: Benchmark Report; Responsible Investment Association Australasia
[8] www.equator-principles.com.

2.5. Maintaining public support for accelerated renewable energy deployment.

This is the second core public policy objective constraining the overall design of FIT schemes. It provides necessary tension with the FIT design parameters focusing on accelerated deployment of renewable energy technologies that act to reduce the non-market risks (reducing expected costs) facing developers.

Evidence from Spain, Germany and New South Wales suggests that long term public support for FIT driven renewable energy deployment can be damaged by poorly designed schemes where FIT levels are set at levels that induce rapid growth in investment, incurring very high long term community costs.

The recent NSW experience where residential gross FITs, initially set a 60c/KWh were abruptly reduced to 20c/KWh as a result of an explosive level of community uptake (with an attendant explosive increase in the long term public cost penalty) highlights to developers and financiers the regulatory risk they face in undertaking such long term investments with high, up front capital costs.

Unless the ACT Government can put in place a suite of controls and initiatives to assure developers that the FIT structure will be robust to the expected uncertainties and pressures on community support over a prolonged period, then developers may tender higher FIT prices at auction to compensate for the perceived regulatory risk.

The following section therefore reviews the FIT design options that allow the Government to control the long term FIT cost imposts on the community while at the same time reducing the market risk (increasing expected revenues) for developers. These are the most important elements of Government action in support of this core objective. It also addresses a range of other risks arising from community reaction to the potential landscape/environmental impact of utility scale solar facilities and to the perceived economic and non-economic benefits to the community from the FIT scheme.

2.6. Controlling long term community costs of FITs

The level of the FIT, the term of the FIT contract, the capacity of renewable energy generation subject to the FIT (or more accurately, the amount of electricity sold under the FIT) and the future level of the underlying spot price of electricity are the main determinants of the community cost penalty associated with a FIT scheme.

This section will review the key public policy choices available to the ACT Government to control long term costs. These are:

- Mechanism of FIT price setting – administrative versus auction
- FIT pricing structure – Price Risk based versus No Price Risk

- Price Risk tariffs based on inclusion of Renewable Energy Certificates
- FIT pricing structure – technology specificity
- FIT term
- FIT profile over term (front loading versus flat, inflation adjusted versus flat nominal)
- FIT pricing for subsequent capacity offers (tariff degression versus periodic review)
- Capacity allocation – firm versus contingent
- FIT counterparty identity- who has the purchase obligation?

2.7. Mechanism of FIT price setting

Most international FIT prices are set to a level that seeks to cover the long term costs of the renewable energy (capital and operating costs) and a reasonable return to investors.

Most jurisdictions have used administrative processes to determine the level of FIT pricing required to cover long term costs. The critical weakness in such approaches is the information asymmetry between regulators responsible for setting FIT prices and the project developers who have much deeper knowledge of expected costs. This is a particular problem in markets such as PV where cost structures are rapidly changing and in markets such as solar thermal where the level of publicly available and verifiable cost data is minimal.

The unanticipated and rapid rate of uptake of renewable energy FIT contracts in Spain and NSW is likely evidence that the FIT pricing level set by administrators was excessive. A more generous interpretation is that the government placed much higher priority on the accelerated rate of renewable energy investment than on containing costs.

The alternative to administrative price determination is the use of the tender/auction processes. This is the path chosen by the ACT Government. Provided that sufficient competition between technically and financially capable bidders is achieved, auction processes are effective in discovering the competitive price of renewable energy.

The Government policy choices to ensure sufficient competition between technically and financially capable bidders are discussed in Section 4.2.

2.7.1. Overview of international FIT auction experience – lessons for ACT

Experience with auctions in relation to setting FITs is much more limited and recent than administratively determined FIT schemes and tends to have a mixture of bid elements in their application. Very little useful information is publicly available on the linkage between auction design and outcome that might inform the ACT decision process.

Governments in other contexts, notably in allocating wireless spectrum, have of course, used auctions/tenders extensively.

The following section provides an overview of recent experience with renewable energy FIT auctions/quasi-auctions in a number of jurisdictions.

Brazil

Brazil's FIT auctions have focused on wind, biomass and hydro projects (solar policies are focused on off -grid systems and do not include a FIT). The timetable of the auction process is unclear. At the end of the process in August 2010, Brazil signed FIT contracts for 89 projects representing 2.9GW of potential installed capacity, of which 713MW was for biomass capacity and nearly 2100MW for wind generation. The total value of all contracts signed was $US15.2 billion.

While the winning FIT bids for biomass projects appear consistent with prices required to provide a commercial return on investment, the wind bids were signed at an average of $US74.4 per MWh. This represents a 42 per cent decrease from those signed under Brazil's earlier Proinfa program.

Some wind projects anticipate capacity factors of 55 per cent, which may be evidence of strategic underbidding. The bid system does however have penalties built in for developers who sign contracts they cannot make good on. However, local developers could potentially drag their heels for years before paying these. The quick conclusion to be drawn from the Brazil experience is that auction processes are required to reduce the risk of strategic underbidding but that successful auctions of large scale renewable capacity can be managed.

Ireland

In 1993 the Irish Government committed itself to achieving an additional 75MW from renewable electricity sources via the Alternative Energy Requirement (AER) program which was launched in 1994. The program was intended to address difficulties that renewable facilities encountered when seeking financing. The AER offered guaranteed demand contracts for 15 years awarded in a competitive bidding process. Companies bid prices at which they were willing to sell electricity generated from various eligible renewable energies. The contracts were awarded to those who bid the lowest prices in particular technologies up to quantitative limits in that technology decided by the minister. The additional cost of the electricity is spread across all electricity consumers. The contract prices were increased partially in line with the Irish Consumer Price Index.

Eventually the Irish Government ran six AERs, of which four were for renewable energy involving bids for approximately 670MW of renewable electricity capacity. The great majority of the capacity bids were for wind projects.

All renewable AERs failed (except AER I) to reach the targets set, primarily as a result of the difficulties companies had in successfully developing plants, even with a guaranteed contract. These problems arose from the inability to obtain local planning consent or financing for the plant. A primary

precondition of entry to the fifth AER competition was a requirement to hold the necessary planning consents from local authorities and licences from energy regulator.

The AER tendering scheme was closed in 2005 and replaced in early 2006 by a fixed feed in tariff. Feed-in tariffs are guaranteed for up to 15 years, but may not extend beyond 2024. During its first year, 98% of the feed in tariff support was allocated to wind farms.

The Irish experience highlights the importance of having planning and licencing arrangements that are aligned with government policy objectives for the timing and scale of renewable energy development.

China

In July 2010, the Chinese government started a tender for 13 utility-scale solar PV projects expected to be completed over next two years (the Golden Sun project). The tender is arguably a proxy for a national solar FIT which China currently lacks.

The tendered projects total 280MW comprising thirteen projects in Xinjiang, Inner Mongolia, Gansu, Qinghai, Ningxia, and Shaanxi. More than 50 groups have submitted bids: key bidders were large state-owned utilities, renewable IPPs, and private solar companies. The winners from this round of bidding are expected to be entities with the lowest cost bids.

According to an analysis by Lazard Capital, power price bids ranged from RMB 0.80-1.30 / KWh (US cents 12-19/Kwh) across various provinces, with the lowest bids around RMB 0.80-0.85 / KWh in Qinghai, Inner Mongolia, and Gansu, and RMB 0.90-0.95 / KWh in Ningxia, Xinjiang, and Shaanxi. These prices are ~10%-15% lower than prior expectations of RMB 1.00-1.05 /KWh across a well-diversified solar generation portfolio.

The low level of some of the tenders can be looked at in two contrasting ways.

On the one hand, it suggests the future level of industry costs in China is going to fall more quickly than anticipated because of the pace of development and the mix of incentives from the National Government to drive reductions in carbon intensity in the Chinese economy. On the other hand, it raises issues about the near term commercial sustainability of the investments for the lowest cost bidders.

The lesson to the ACT Government from the Chinese experience is the potential opportunity to achieve lower FIT prices by attracting Chinese bidders.

USA

For the past two years Southern California Edison (SCE) has run a voluntary Renewable Standard Offer program, consisting of a fixed-price offer to buy renewable energy from systems under 20 MW in size, with the price set at the Market Price Referent ('MPR' is calculated annually by the Californian Public Utility Commission (CPUC); the 20-year levelised cost of energy of a combined-cycle natural gas plant,

meant to represent the next marginal unit of generation). The 20MW limit has been applied in order to attract projects that can come on-line quickly and do not need new transmission. In 2009, SCE contracted for 140 MW of PV under the program.

In August 2010, CPUC issued a proposed decision to launch a new renewable incentive program designed to drive mid-sized renewable energy development. The CPUC proposal establishes a 1GW pilot program for power from eligible mid-sized renewable energy systems. This modified feed-in tariff program will require investor-owned California utilities to purchase electricity from renewable energy systems between 1 and 20 MW in size that can be built within eighteen months. For installations between 1 and 10 MW, the local utility company is obliged to accept the new installations. But approval from the utility company is required for plants between 10 and 20 MW.

The program requires California's three largest investor-owned utilities to hold biannual competitive auctions into which renewable developers can bid. Utilities must award contracts starting with the lowest cost viable project and moving up in price until the MW requirement is reached for that round. The program will use standard terms and conditions to lower transactional costs and provide the contractual transparency needed for effective financing. Development security and relatively short project development timelines are intended to ensure project viability.

The design of the CPUC program is intended to overcome this jurisdictional challenge to FIT schemes by the Federal Energy Regulatory Commission (FERC) that has ruled that states do not have the authority to establish wholesale electricity rates that exceed utility "avoided costs." It does this by instead requiring utilities to purchase a certain type of energy (e.g. from renewable energy systems under 20 MW in size with particular power characteristics) and letting market mechanisms determine the price.

The CPUC 1GW pilot requiring California's large utilities to accept the lowest cost bids up to the MWe capacity on offer in the specific auction round is similar to the recommended approach in this report.

2.7.2. FIT Pricing Structure – Price risk tariff versus No price risk tariff

FIT price structures either expose developers to price risk or not.

Variable FIT prices typically link to the underlying electricity pool price volatility (although REC price inclusion in the FIT would be another type of variable FIT pricing design.) FITs that contain price risk typically are referred to as "premium" FIT price structures. This report adopts the term "Price Risk" rather than "premium" because it highlights the essential attribute of such schemes – on going exposure of the project to market price risk.

Any renewable energy project exposed to substantial market price risk will demand higher levels of equity returns, will have reduced capacity for financial gearing, and attract higher interest margins. All these will lead to higher levels of required FIT to justify the investment (Figure 2).

If the level of market price risk is only small in comparison to the level of certain revenue, then the FIT penalty will be small. But in such cases, any putative benefits of the variable FIT scheme will be similarly reduced.

In the ACT context where pool prices are based on the NSW pool price node, spot prices over the past 5 years have varied from 2005 levels of ~ A$35/MWh, to 2007 levels of ~A$70/MWh to 2010 levels of ~A$40/MWh. Set against a theoretical levelised cost for utility scale PV of A$350-450/MWh, a A$30-40/MWh level of revenue uncertainty is substantial.

Figure 2: FIT – No Price Risk FIT versus Price Risk FIT

		No Price Risk	Price Risk	No Price Risk	Price Risk
Capex	A$/KW	$3,500	$3,500	$5,000	$5,000
Cost of equity		13%	15%	13%	15%
Duration	Years	20	20	20	20
Debt ratio		80%	65%	80%	65%
Debt margin		1.50%	2.35%	1.50%	2.35%
FIT	A$/MWh	$331	$382	$458	$505

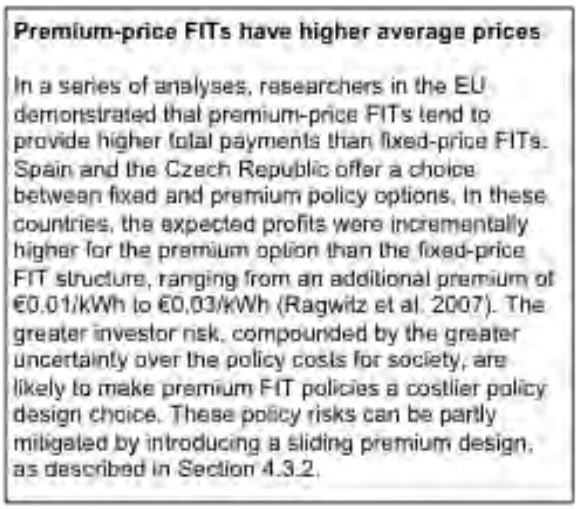
Looking to the future, NSW pool price uncertainty is likely to be high due to the uncertain outcome of the NSW electricity privatisation process and the current NSW state governments plan to provide deep cost subsidies to buyers of coal fired generation. Should future governments refuse to honour coal supply contract pricing, then fuel costs to the NSW base load generators would increase by more than 100%. These issues are not likely to be settled by the time the FIT tenders are submitted in 2011.

At the Federal level, the uncertainty in the future structure and level of carbon pricing, and the pass through implications in the electricity market, is an even greater risk to investors seeking to forecast electricity pool prices. This is also not likely to be settled during 2011.

This high level analysis suggests the underlying future pool price volatility perceived by bidders in a "Price Risk" FIT scheme will be high and can be expected to drive substantially higher FIT bids.

International experience with variable FIT's confirms that the above analysis based on the financing fundamentals is reflected in practice (Figure 3 below).

Figure 3: International experience with premium FIT[9]



Premium-price FITs have higher average prices

In a series of analyses, researchers in the EU demonstrated that premium-price FITs tend to provide higher total payments than fixed-price FITs. Spain and the Czech Republic offer a choice between fixed and premium policy options. In these countries, the expected profits were incrementally higher for the premium option than the fixed-price FIT structure, ranging from an additional premium of €0.01/kWh to €0.03/kWh (Ragwitz et al. 2007). The greater investor risk, compounded by the greater uncertainty over the policy costs for society, are likely to make premium FIT policies a costlier policy design choice. These policy risks can be partly mitigated by introducing a sliding premium design, as described in Section 4.3.2.

Heuris recommends the ACT Government adopt a No Price Risk FIT design. A Fixed (flat nominal) FIT price over the agreed time period is preferred to an inflating (back loaded) FIT price structure. A front loading FIT option is discussed later this report.

Under a fixed flat nominal FIT structure, in the periods when wholesale electricity prices go to VOLL (currently $12500/MWh) as a result of peak power demand or constraints to generation, the ACT Solar FIT would limit the revenue to the project owner to the FIT price. The electricity customers exposed to the solar FIT costs would thus be expected to benefit from the effective price cap on this small share of the ACT electricity load.

2.7.3. Price Risk tariffs based on inclusion of Renewable Energy Certificates

The ACT Government policy intent is to ensure that the large scale solar FIT scheme is additive to the Federal Government 2010 expanded Renewable Energy Target scheme. To achieve such an outcome, the ACT large solar FIT projects will need to be administratively or legislatively excluded from creating Renewable Energy Certificates.

If this policy intent was relaxed and FIT project developers were able to sell REC's in addition to selling electricity at a fixed FIT, then an additional revenue stream funded by the broader Australian community is added to the project at minimal extra administrative cost.

In this circumstance, while the REC revenue stream would be uncertain, it would be always positive and so be expected to reduce the FIT bid prices.

What expected value will FIT bidders place on the REC revenue stream?

[9] A Policymaker's Guide to Feed-in Tariff Policy Design: Technical Report NREL/TP-6A2-44849 July 2010

The expected long term REC price should reflect the expected difference in Long Run Marginal Cost of renewable energy generation versus fossil carbon based generation.

Wind generation is expected to maintain its position as the lowest cost renewable energy generation in the period to 2020. Recent Heuris analysis indicates that the LRMC of wind generation in Australia may fall substantially when Chinese turbine manufacturers achieve international reliability standards. All other things being equal, this would have the effect of constraining / lowering long term REC prices.

The high level of uncertainty in the outlook for carbon price pass-through under yet to be defined or legislated carbon pricing schemes is the critical issue for renewable energy investors setting a REC price forecast over the period to 2030 when the LRET scheme ends. Even ignoring the issue of carbon price uncertainty, estimates of the LRMC for CCGT based power generation are very sensitive to the gas price assumption. The outlook for long term gas prices in eastern Australia is also subject to considerable uncertainty as global LNG market dynamics are expected to begin to impact on domestic gas prices as a result of the development of Coal Bed Methane (CBM) based LNG export projects.

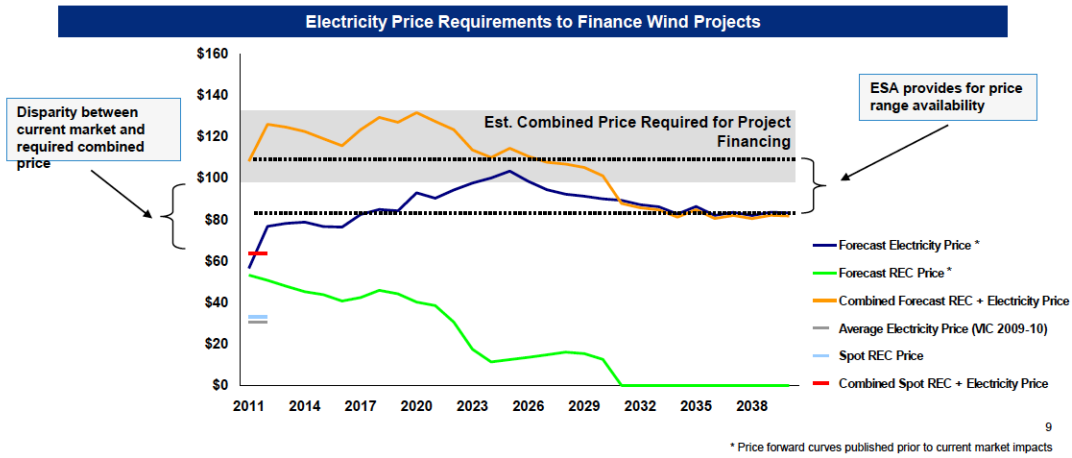
The 2010 Expanded Renewable Energy Target legislation has served to increase demand for large scale RECs. But forecasts of longer-term REC prices are still subject to high levels of uncertainty about fundamental supply and market liquidity.

- The combined impact of the current Federal Government Solar Flagship project (seeking to promote ~ 400 MWe of solar generation), the Victorian Government solar initiative and the ACT large scale Solar FIT initiative may be additional to the REC supply forecasts used by analysts of long term REC pricing.
- Because large energy retailers such as Origin Energy and AGL are able to source REC's within their own generation portfolios, the traded market in RECs has limited liquidity.

A recent extract (19 August 2010) of the AFMA forward curve for REC prices shows spot prices of $38.75 rising to $42.43 in CY 2012 and $51.94 in 2014. Liquidity is low and these forward prices have historically been very volatile.

A May 2010 presentation by Macquarie Capital Advisers on Financing Renewable Energy provided another perspective on long term REC prices, indicating a declining trend (Figure 4).

Figure 4: Wind project economics



Heuris considers that a long term REC price of A$30-40 is likely to be the range of expected prices that bidders might factor into a REC inclusive FIT. However, as the above discussion highlights, this is subject to much uncertainty in fossil fuel prices, carbon pricing and pass-through, wind power levelised costs and large scale REC supply.

Assuming a constant REC price to 2030 of A$35, the 20 year fixed FIT price for a 40 MWe PV project with capex @ A$3500/MWe, 80% gearing and Cost of Equity of 13% is reduced by ~ A$34/MWh (from A$331/MWh to A$297/MWh) .

Heuris recommends that the ACT Government use the FIT tender process to discover the expected long term market value of RECs by asking bidders to submit “REC inclusive” and “REC exclusive” FIT bid prices. The Government can then assess the public policy trade-off between additionality of CO2 reduction and increased FIT costs.

2.7.4. FIT pricing structure - technology specificity

As FIT price levels are expected to reflect the costs of efficient operators of renewable energy generation, how should the FIT price level adjust to different underlying cost structures between technologies?

Governments seeking to maximise the diversity of generation types can set technology specific FITs to enable higher cost technologies to enter the market. Such approaches increase the community financial burden. Unless there is an obvious offsetting community benefit from the diversification cost penalty, these approaches are likely to be counter to the high level objective of maximizing long term community support.

Wind generation potential in the ACT is currently limited by competing land uses. The announced policy focus on solar PV and solar concentrating generation reflects prior independent expert advice that the

next lowest cost large scale renewable energy opportunities in the ACT are likely to be solar. Heuris does not consider that further differentiation between a solar PV FIT and a solar concentrating FIT is warranted. The ACT Government's initial FIT auction process is a price discovery exercise. While it is possible that the size caps for the tender will be significantly below the sizes required for scale economies in solar concentrating, the point of the auction process is to discover the lowest cost options for the agreed capacity offer.

2.7.5. FIT term

International fixed price FIT schemes have typically adopted long term contracts to provide a sufficient period of revenue certainty to support the debt and equity investment. For any fixed FIT price scheme structure, the longer the term of the FIT contract, the lower is the level of required FIT price.

Spain offers a 25 year PV FIT. Germany and Ontario offer 20 year FITs for all technologies. Slovenia offers the shortest duration FIT, limited to 10 years for all technologies.

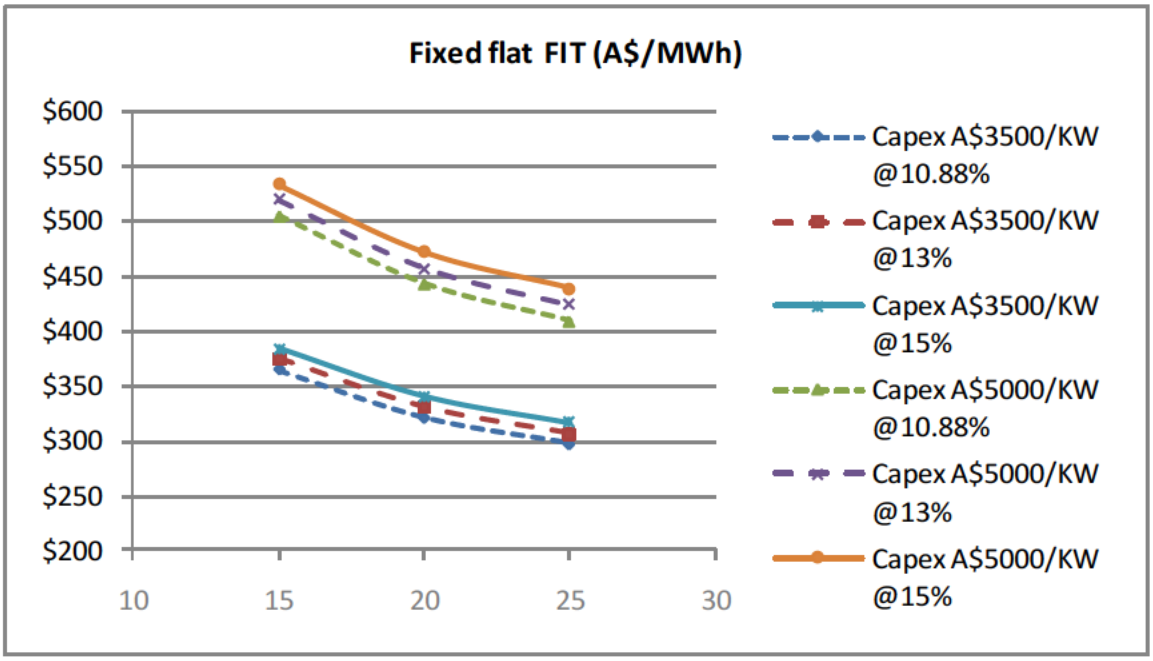
The choice of FIT duration is a decision about the relative social and political costs and benefits of lower FIT price levels at the outset (with longer duration FIT contracts) versus lower cumulative FIT costs to the community (shorter duration FIT contracts with higher FIT price levels). The evaluation requires clarity about the community discount rate. If the community and government have a relatively high discount rate (favouring lower financial costs today much more than lower financial costs tomorrow) then longer term FIT contract terms are preferred. An inter-generational equity perspective that was indifferent to costs today versus costs tomorrow, using a zero % discount rate would lead to a preference for the shorter duration FIT contract with a higher FIT.

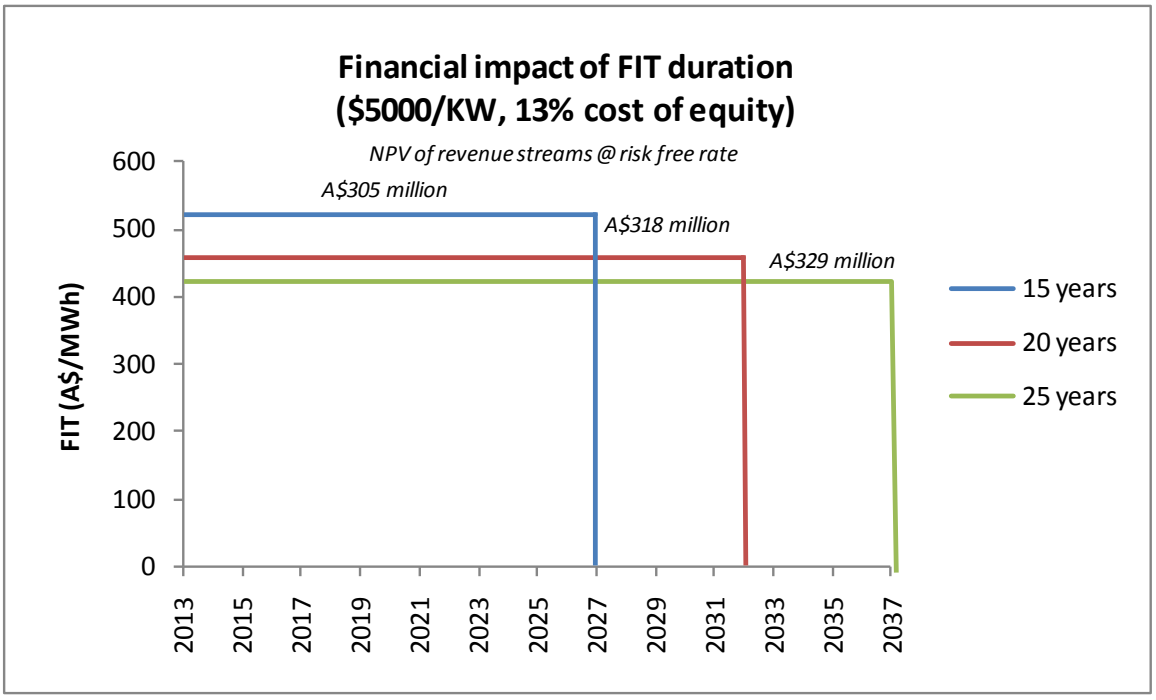
It should be noted that the timetable and expected amount of CO2 reduction is the same for the 15, 20 and 25 year FIT terms and so the time preference of the Government is not affected by the question of the value of avoided CO2 emissions.

Heuris has modelled the fixed FIT required for 15, 20 and 25 year contract terms for a notional ACT 40 MWe PV project using estimates of capex, electricity output, opex, and financing costs to illustrate the impact of FIT term on FIT prices and the Present Value of the cumulative FIT revenue stream from the community to the developer (Figure 5).

Figure 5: Fixed flat FIT with different terms (A$/MWh) – 17% capacity factor

Capex A$/KW	Cost of equity	Duration (Years)		
		15	20	25
3500	10.88%	$365	$321	$297
3500	13%	$375	$331	$307
3500	15%	$384	$341	$317
5000	10.88%	$506	$444	$410
5000	13%	$520	$458	$424
5000	15%	$534	$472	$439





The ACT Government can use the auction process to discover the different bidder time preferences simply by asking them to submit FIT bid prices for different contract terms. The Government can then assess the community benefits and costs of shorter versus longer term FIT contracts.

2.7.6. FIT profile over contract term - front loading versus flat nominal prices

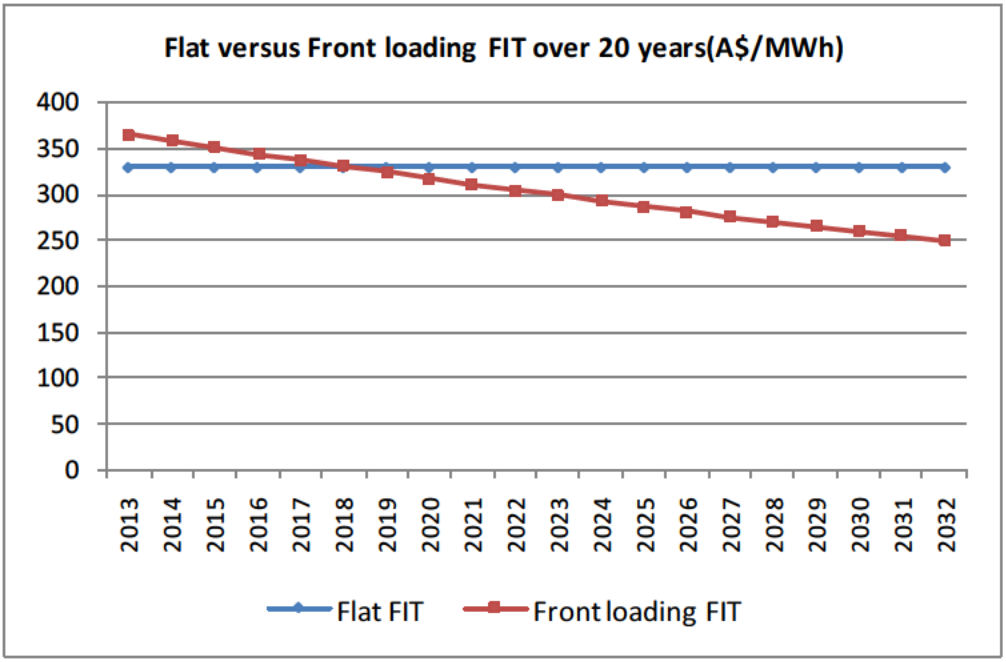
Some international FIT schemes offer additional enhancements to the fixed FIT structure by providing acceleration of revenues from later years to the early years (front loading). While the undiscounted value of the different revenue streams may be identical, if the developer has a higher opportunity cost (discount rate) than the community, the front loading models offer advantages. Provided the community today is prepared to bear the higher initial FIT levels due to front loading, the community in later years is subject to a lower FIT burden.

This is the same "time value of money arbitrage" question that is addressed in the discussion of the 15 year versus 20 and 25 year FIT contract terms.

Heuris has modelled a front loaded FIT for 15, 20 and 25 year FIT contracts where the FIT declines by 2% pa year on year throughout the duration of the contract period, to identify the difference in the long term FIT burden on the community (Figure 6).

Figure 6: FIT - Flat and front loading

		Flat	Front loading with 2% annual decline rate
Capex	A$/KW	$3,500	$3,500
Cost of equity		13%	13%
Duration	Years	20	20
Debt ratio		80%	80%
Discounted FIT revenue at risk free rate	Million A$	$230	$220
First year FIT	A$/MWh	$331	$367
Last year FIT	A$/MWh	$331	$250



2.7.7. FIT profile over contract term - inflation adjusted versus flat nominal prices

We have already discussed the option of inflation adjusted versus flat nominal FIT prices in the discussion of Operations Risk.

Heuris recommends against the adoption of an inflating (back loaded) FIT structure.

2.7.8. FIT sensitivity to output assumption

In addition to capex and financing costs, the FIT outcome is sensitive to the electricity output assumption from each MWe installed capacity. The output assumption varies with the site specific insolation (higher levels of solar energy input lead to higher levels of output), the choice of cell/module technology (crystalline silicon PV cells have higher energy conversion efficiency than thin-film cells for any level of solar insolation), and the array design (tracking systems allow module orientation to maintain optimum alignment with solar radiation for longer periods each day and throughout the year compared with fixed arrays).

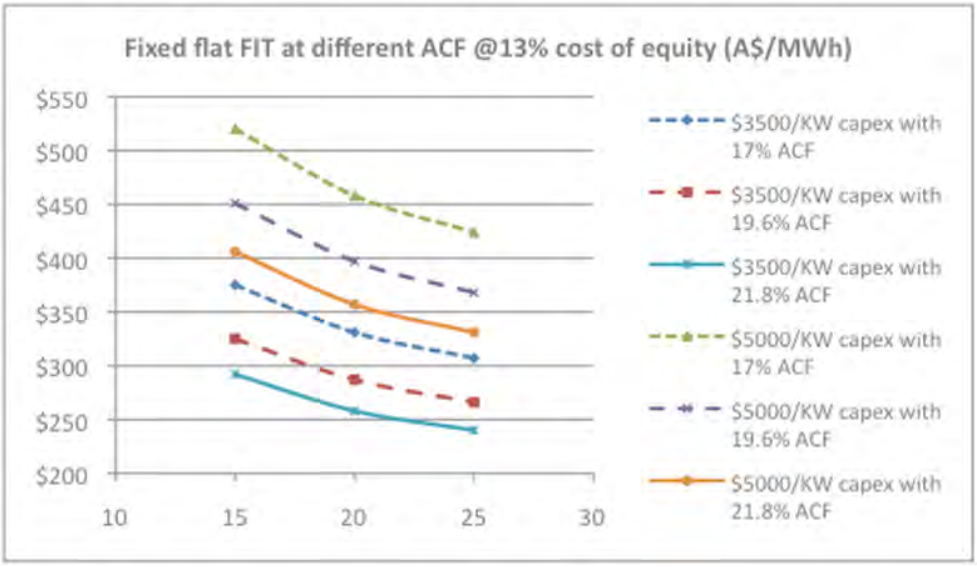
The simplest way to describe the output assumption is using the Capacity Factor. For a 1 KWe module exposed 24 hours a day 365 days per year (8760 hours in total), a 10% Capacity Factor implies the module is working at 100% output for 10% of the hours (876) resulting in electricity output of 876 KWh. A 20% capacity factor implies an output assumption of 1752 KWh per year from a 1 KWe module.

Heuris has tested the FIT outcome against a range of Capacity Factors. The low case (CF=17%) is based on the Clean Energy Council assumed output from a residential rooftop module in Canberra, the mid case (CF=19.6%) is based on the analysis of a fixed array in an optimised orientation in Wagga (from AECOM) and the high case (CF=21.8) based on published forecasts of the TRU energy Mildura solar PV project (Figure 7).

Figure 7: FIT sensitivity to output/capex assumptions

Fixed flat FIT at different ACF @ 13% cost of equity (A$/MWh)

Capex A$/KW	ACF	Duration (Years)		
		15	20	25
3500	17.0%	$375	$331	$307
3500	19.6%	$325	$287	$266
3500	21.8%	$292	$258	$240
5000	17.0%	$520	$458	$424
5000	19.6%	$451	$397	$368
5000	21.8%	$406	$357	$331



2.7.9. FIT pricing for subsequent capacity offers (tariff degression versus periodic review)

In Spain and Germany, where FIT prices have been fixed by administrative decision and the FIT is available for any qualifying projects over an extended period, the FIT level for newly qualifying projects is decreased year on year by a predetermined "degression" rate. The FIT rate for both projects will be constant over the FIT contract but the level of FIT will differ between the two projects. This means that a project that qualifies for a FIT contract in Y+1 year will receive a lower FIT over the life of the project than a project qualifying in the prior Y0 year.

Degression rates reflect administrative attempts to adjust for the information asymmetry inherent in this price setting approach, compared with auction based price discovery. Because FIT administrators don't know the real level of costs they attempt to reduce the risk of windfall profits by introducing an estimated average learning curve cost reduction benefit into the FIT model.

Unfortunately, the actual price trajectory of renewable energy technologies can deviate widely from assumed learning rates for long periods of time. When actual market prices are rising (e.g. wind turbine prices rising yoy from 2003 to 2009) FIT degression can force the abandonment of new projects. Conversely, when actual market prices are rapidly falling at points of supply and demand discontinuity (e.g. solar PV costs 2009- 2010), degression rates fail to prevent windfall profits.

The Ontario Government rejected the use of tariff degression in its Standard Offer FIT and instead plans to review the FIT level every 2 years. Portugal revises its FIT when capacity milestones for individual technologies are achieved. Spain has also now moved to quarterly PV FIT auctions.

As the ACT is using an initial FIT auction to set the FIT level for a limited offer of capacity, it does not need to determine the FIT level for future capacity offers at this time. There will be substantial learning in solar generation development costs in Australia over the next 2-3 years. There is likely to be substantial value in waiting to evaluate the actual trajectory of costs over this period before releasing additional FIT capacity to the market. (See next section)

At the appropriate time, the ACT can choose the structure of a further FIT auction to set prices on subsequent capacity tranches.

2.7.10. Capacity allocation: firm versus contingent, 20 MWe or 40 MWe

The expanded FIT scheme for large scale renewable energy generation in the ACT anticipates a total of 210 MWe of large scale capacity (individual projects greater than 200 KWe) being installed. 40MWe capacity will be available to bidders in the initial FIT auction in 2011. The Minister's media release of September 13 2010 anticipates that the 40MWe capacity may be allocated amongst more than one winning bidder.

"The Government's revised approach to establish a solar facility for the ACT could potentially result in more than one large renewable energy plant being established in the first tranche of the scheme."

The issue of increased bid risk (and reduced numbers of bidders entering the auction) is discussed in the Section 4.2.2 on Bid Risk. Heuris recommends that the ACT Government makes a commitment to accepting the lowest priced qualifying FIT bid for a minimum level of capacity in the 2011 auction. However we do not recommend the ACT Government necessarily commits to accepting the lowest priced bids up to 40 MWe capacity.

There are three competing issues at stake here:

- Capturing the "value of waiting" for solar generation project costs in Australia to fall as project developers build experience through projects sponsored in other jurisdictions.
- Achieving a minimum project scale so that the majority of the scale economies currently available in a 2012/2013 project development timetable can be captured.
- Minimising the cost and complexity of electricity sales via AEMO sales settlement.

Given the lack of experience in large scale PV in Australia, the initial large scale projects will bring higher risks for developers. Lack of experience in managing the particular venture structure integration issues between PV module supply, BOS supply and construction, together with uncertainties in project approvals, lack of local experience in project design, and limited local experience and capacity in the BOS supply chain will all add to expected costs and increase the financing costs.

If the FIT auction was conducted in 2 stages, an initial 20 MWe in 2011 and a second 20 MWe in 2013, the FIT bid price in 2013 could be significantly lower due to industry experience and learning. The

following analysis is illustrative only. A first 20 MWe phase with expected project capex of A$5000/MWe would translate into a FIT of ~ $450/MWh over 20 years (assuming a 13% cost of equity) and a total cumulative undiscounted revenue of approximately $270 million. If the second 20 MWe phase had a reduced expected capex of A$3500/MWe, this would translate into a 20 year FIT of $330/MWh and a total cumulative undiscounted revenue of ~ $200 million. The average FIT for the combined 40 MWe auction would be ~$390/MWh.

The value of waiting, achieved by splitting the 40 MWe capacity auction into two sequential auctions, is the $60/MWh reduction in the average 20 year FIT and the $70 million saving in undiscounted FIT charges over 20 years.

2.8. Summary of Recommendations on FIT design

- Adopt a "No Price Risk" FIT design.
- Use the FIT tender process to discover the expected long term market value of RECs by asking bidders to submit "REC inclusive" and "REC exclusive" FIT bid prices. The Government can then assess the public policy trade-off between additionality of CO2 reduction and increased FIT costs.
- Do not consider any further differentiation between a solar PV FIT and a solar concentrating FIT.
- Use the auction process to discover the different bidder time preferences for 15, 20 and 25 year FIT contract terms. The Government can then assess the community benefits and costs of shorter versus longer term FIT contracts.
- Determine the government preference for front loaded FITs versus flat nominal FITs.
- Use subsequent auctions to determine the FIT for subsequent utility scale solar capacity offers. (Do not use administratively determined tariff degression to set the FIT for subsequent solar capacity allocation.)

2.9. Treatment of ACT solar plants under Australian Energy Market Operator (AEMO) rules

2.9.1. ACT's Policy Objectives

The underlying policy intent from the ACT solar auction is to elicit the least cost FIT, consistent with ensuring the project proponent being a commercially and technically competent builder and operator of the facility. Anything that adds complexity to the bid process will generally militate against this objective since it will serve to drive up bidding/project delivery costs and/or reduce the number of bidders. How AEMO would treat an ACT solar plant could either help or hinder the project's attractiveness to a wide range of bidders, depending on the administrative and other overheads associated with different regulatory treatment. In particular, a requirement to become a market participant would call on a range of skills and capabilities beyond those of a plant constructor and operator that might then serve to narrow the field of bidders.

This section, therefore, briefly describes AEMO's role and the regulatory framework that might apply to an ACT solar plant.

2.9.2. AEMO functions and policies

Among other things, AEMO is responsible for orderly planning and coordinating the operations of the National Electricity Market (NEM) of which the ACT forms a part. As such, under the national Electricity Rules it regulates the addition of generation capacity and how the output of that capacity is integrated into the NEM through physical dispatch and market settlement systems.

Exemption

The National Electricity Law requires any person engaging in generation in the market to register. AEMO may exempt certain generators from the requirement to register if the nameplate rating of their generating system:

- is less than 5MWe, or;
- exceeds 5MWe but is less than 30MWe and exports less than 20GWh in any 12-month period; or
- extenuating circumstances apply.

Exemption means that persons who own such facilities are not required to pay Participant fees and do not have to be scheduled or settled in the market. Exemption is not automatic, but can be the subject of a derogation, or be otherwise exempt by AEMO from the requirement to register.

The treatment by AEMO under the NER rules is necessarily uncertain until such time as a ruling is sought But, given the scale of the initial tranche of ACT solar generation will likely lie between 20 and 40MWe, it would be prudent to assume that AEMO would require the project operator to become a registered (rather than exempt) generator regardless of whether the plant was solar PV or solar thermal.

Non-exempt categories of generators

For planning and management purposes, AEMO classifies non-exempt electricity generators under three headings - scheduled, semi-scheduled or non-scheduled generation:

- Scheduled generation includes existing and committed large scale coal-fired, gas-fired and hydroelectric generating plant.
- Semi-scheduled includes a generating unit (or combined units) with capacity of 30 MWe or more where the output of the generating unit is intermittent (unless AEMO approves its classification as a scheduled generating unit or a non-scheduled generating unit).
    - Intermittent applies to "generating units whose output is not readily predictable, including solar generators, wave turbine generators, wind turbine generators and hydro-generators without any material storage capability".

- Non-scheduled generation typically includes intermittent energy sources of less than 30MWe capacity where its primary purpose is supply of power for local use or where its physical and technical attributes are not practicable for it to participate in central dispatch. Classification of generating units as non-scheduled are subject to case by case approval by AEMO against these criteria. As a general rule non-scheduled generators do not participate in AEMO's central dispatch processes.

A Scheduled Generator and a Semi-Scheduled Generator must participate in the central dispatch process managed by AEMO while a Non-Scheduled Generator is not required to participate.

The other relevant distinction in relation to an ACT solar plant is between market and non-market generating units. A market generator will sell and send energy out into the network in accordance with AEMO's central dispatch and payments/settlement system. A non-market generator's entire output is sold and consumed locally; it is not settled in the same way as the output of a market generator. Somewhat confusingly, this definition does not directly affect the definitions above regarding semi-scheduled or non-scheduled generation.

In summary, generating systems with an aggregate nameplate rating of 30 MWe or greater are classified as scheduled or semi-scheduled generating units; less than 30 MWe are classified as non-scheduled generating units; and less than 5 MWe have a standing exemption from registration.

AEMO will therefore register a generator in one of six combinations of categories:

1. Market Scheduled Generator;
2. Market Semi-scheduled Generator;
3. Market Non-scheduled Generator;
4. Non-Market Scheduled Generator;
5. Non-Market Semi-scheduled Generator; or
6. Non-market Non-scheduled Generator

Regulatory treatment of ACT solar power generator

As no utility scale solar plant has been built to date in the NEM area, there is no extant definitive view on how AEMO would classify such a plant located in the ACT.[10] AEMO has, however, published examples of how different types, sizes and configurations would be classified (see Figure 8 below).

[10] It is possible, however, that AEMO have been approached by proponents in the Solar Flagship program and have formed views on the appropriate classification of the types of project under consideration.

Figure 8: AEMO Generator Classifications

		TYPICAL CAPABILITY	EXAMPLES
Exempt		Less than 5 MW	1 MW backup diesel generator in a high-rise building
		Less than 30 MW, and annual export less than 20 GWh	20 MW biomass-fuelled generator with limited fuel supplies
Non-Scheduled	Non-Market	Less than 30 MW, all purchased locally	10 MW, all purchased by a *Customer* at the same connection point
	Market	Between 5 MW and 30 MW, not purchased locally	10 MW generator supplying pool
Semi-Scheduled	Non-Market	Intermittent output, greater than 30 MW, all purchased locally	150 MW wind farm, all purchased under contract to a *Local Retailer*
	Market	Intermittent output, greater than 30 MW, not purchased locally	150 MW wind farm supplying pool
Scheduled	Non-Market	Greater than 30 MW, all purchased locally	40 MW hydro station, all purchased under contract to a *Local Retailer*
	Market	Greater than 30 MW, not purchased locally	2000 MW power station supplying pool

Judged against these examples, one of the critical determinants of the AEMO classification is likely to be whether the plant is judged by AEMO to be generating electricity essentially for "local purchase", rather than for sale into the wholesale power pool. The latter ruling would tend to favour existing integrated power supply companies who already have deep capabilities as experienced market participants.

Our default assumption for this report is that all the plant's output would be classified as for local purchase since even a 40MW would meet only some 2% of the ACT's annual load. The plant's output would either be for consumption by ACT consumers, either in general or allocated to the ACT Government for use within its own facilities. The output and revenues would be secured against a power purchase agreement (PPA) struck at the FIT bid by the winning tenderer. This contract would be either with ACTEW/AGL[11] (in which case the additional costs would be distributed across all ACT electricity consumers) or the ACT Government (with the costs effectively borne by ACT taxpayers via the budgets of ACT government agencies).

Securing AEMO agreement to classify the output for local purchase removes the need for the project operator to be a market participant: as noted above this would reduce the capability set required of the operator and hence help to broaden the number of potential bidders.

If output is treated as local purchase, then an initial 20MW solar PV (or thermal) plant arising from a first round ACT FIT auction could be expected to be classified by AEMO as a non-market, non-scheduled generator. A single 40MW plant would be classified as non-market, semi-scheduled generator, in which case the operator could be required to participate in AEMO's central dispatch process. This could

[11] A separate connection agreement, governing technical standards for metering, voltage control would be required with ACTEW/AGL Distribution. This could form part of a suite of Standard Offer Documents made available to tenderers as part of the bid process.

possibly add some modest complexity and cost to plant operations (e.g. in terms of control and reporting software). Again, the classification would probably be the same whether the plant was solar PV or thermal.

2.9.3. Summary & Conclusions on Counterparty Contracting and AEMO Treatment

Provided the successful bidder contracts directly for local purchase with ACTEW/AGL or the ACT Government (which thereby takes on the counter party risk), the first tranche of ACT solar capacity would not seem to require the operator to become a market participant, whether the Government decides to seek initial bids for 20 or 40MWe. These conclusions are based on publicly available AEMO documentation. Were this to be confirmed by AEMO, this would helpful in encouraging the broadest range of first round bidders.

A 40MWe plant could, however, be treated as a semi-scheduled generator and hence be required to participate in AEMO's central dispatch system.

Final confirmation of AEMO classifications would need to await detailed delineation by of the proposed design and operations of the plant(s). In order, however, to provide the maximum information base for potential bidders, it would be helpful if the ACT Government were to seek AEMO guidance on their likely attitude to the classification treatment of a 20-40MWe solar plant in the ACT dedicated solely to local supply. In particular, advice on the electricity sales and settlement process costs for a sequential 2 X 20 MWe project should be sought from AEMO. Any such guidance could then form part of the information made available to first round bidders.

2.10. Recommendation on Auction of Initial Tranche

Provided that a credible pathway can be identified for electricity sales settlement in an initial 20 MWe auction (via a PPA with ACTEW/AGL or the Government), Heuris recommends that the ACT Government announce a firm commitment to a accept the lowest bid(s) for 20 MWe in 2011, reserving the option for a second auction for at least 20 MWe to be held in 2013. It is possible the 2013 auction could be larger.

3. Designing the Solar FIT Auction Process to Maximise Value to ACT

3.1 Introduction

The goal of the ACT Government in the FIT solar electricity generation auction is to pay the lowest possible purchase price, subject to certain specifications such as technical capacity to deliver the stream of renewable energy on time.

The choice of auction rather than a fixed price sale is driven by the information asymmetry between the ACT Government and bidders. The ACT Government does not know the efficient cost of solar renewable electricity generation and is seeking to use the competitive interaction between buyers to establish the lowest possible price.

The key design issues for the auction process to achieve the lowest possible price are:

1. How to maximise the number of capable bidders participating in the auction?
2. How to minimize the perceived risks to the bidders so that the FIT bid price is minimized?
3. How to structure the auction bid format to achieve the lowest FIT bid price?
4. How to minimize the risk that successful bidders fail to deliver the expected renewable electricity production on time and at an appropriate level of quality.

This section will focus of 1, 3 and 4. The range of opportunities for the ACT Government to act to reduce perceived risks to bidders (2) has been discussed in Section 2.3.1.

Several subsidiary objectives are suggested within the higher level objective of “lowest possible purchase price from a capable bidder”. These are:

- Ensuring the capacity allocation via the auction process supports the required Government timetable for renewable energy capacity growth.
- Ensuring that the first round FIT auction winner does not gain an unreasonable advantage in subsequent bid rounds.

3.2 How to maximise the number of capable bidders participating in the auction?

Maximizing the number of consortia who commit to the expense of money and time in bidding in the FIT auction is a priority for Government if a competitive outcome from efficient providers is to be achieved. Any ACT Government action (or lack of action) that results in substantially lower levels of bid competition between capable consortia is likely to result in a higher FIT and therefore increased costs to the ACT community.

To maximise the number of capable bidders the ACT Government must reduce the perceived bidding risks and costs. In particular it should focus efforts on overcoming asymmetry of information between potential new bidders and those already shortlisted in the Federal Government Solar Flagship Program.

There are substantial costs incurred in establishing a consortium with the requisite capabilities, to adequately assess site-specific opportunities and risks, to evaluate technology, design, development and financing choices, to agree and prepare a bid document, and to participate in the tender process.

Substantial time may also be required if site-specific insolation and other weather data are required to reduce electricity output risk. Bids prepared under unrealistic time pressure are likely to have higher levels of uncertainty leading to higher levels of contingency and so higher required FITs.

Heuris recommends that the bid timetable be extended to provide for bid submission by end Q3 2011 and FIT contract award by end Q4 2011, subject to confirmation in industry consultation.

The parallel process of the Federal Government Solar Flagships Program is relevant to bid risk perceptions and information asymmetry. The work underway by the eight shortlisted consortia (four solar concentrating consortia and four photovoltaic consortia) is likely to reduce substantially the bid cost to these consortia should they choose to participate in the ACT FIT auction. As a result, this may limit the entry of any new consortia to bid in the ACT FIT auction.

A FIT auction process where the government reserves the right to not accept any bid (but does not declare a "reserve price") is a substantial bid risk and would further limit the entry of capable consortia.

A government decision to establish the FIT by auction leads naturally to a set of priority Government actions seeking to maximise competitive entry by capable consortia. The potential opportunities to reduce bid risk and increase competitive entry are:

- To provide clear documentary descriptions of the opportunity for sale. Relevant attributes are:
    - Draft FIT contract including proposed delivery timetable and liquidated damages clauses
    - Qualifying technologies
    - Capacity and energy sales minima and caps
    - Timetable to begin delivery of power into the grid, and performance milestones to maintain validity of the FIT award
    - Grid access process and cost allocation for grid access
    - Purchasing obligation details
    - Power quality, metering and generation forecasting requirements
    - Bidding Options
        - Front loading
        - FIT contract term (15 year versus 20 year versus 25 year FIT terms)

    - REC inclusive or REC exclusive
- To declare that at least one FIT contract for at least 20 MWe capacity will be awarded as a result of the tender process.
- To establish an auction governance system with stable rules, transparent processes and lowest possible participation costs.
    - For the CY 2011 auction, it is possible that the best governance approach consistent with the time pressures would be to establish the FIT auction under a time limited legislative instrument. Usual ACT Government probity and governance structures for commercial tendering processes would be expected to apply to the auction process.
    - In the longer term, if the Government adopted a capacity allocation process using sequential biennial FIT auctions, the FIT auction governance process could be migrated to an appropriate regulator in the ACT rather than continuing under direct legislative control.
- Identifying potential new consortia participants and communicating directly with them to ensure they are fully informed of the opportunity and bid process.
    - For example, only one of the leading Chinese PV manufacturers and project developers, Suntech Power Holdings, is participating in the Federal Solar Flagships Program. Other major Chinese corporations have demonstrated the financial and technical capacity to deliver utility scale PV projects in China (e.g. China Datang Renewables) and internationally (e.g. GCL Poly Energy Holdings). These large Chinese players may also bring low cost equity and debt capital to support their international growth aspirations. Provided that they can be joined by capable Australian construction companies who can manage the specific labour market and local construction supply chain relationships, it is possible that a Chinese led bid group could offer the lowest FIT price. A plan to identify and establish contact with other leading Chinese PV module suppliers and PV project developers could be executed. A degree of urgency is required to approve and initiate such work if the Q2 2011 bid timetable is to be maintained.
- To maximise ease of access for prospective bidders to important information such as insolation, wind conditions (affects structural loads on array supports), planning status of different land packages, approvals processes, grid access rules etc.
- Ensuring sufficient time is available to potential bidders who are not already shortlisted in the Federal Solar Flagships Program. Early consultation with “high potential” new bidders is recommended to assess the time requirements.

3.3 How to structure the auction bid format to achieve the lowest FIT bid price?

Various auction bid processes are available. Provided that bidders have independent perspectives on the value of the FIT contract and that a sufficiently diverse group of capable bidders have entered the auction, there is no strong evidence to prove that anything other than a simple "sealed bid + lowest price auction" should be employed.

Auctions can be broadly summarized into open versus closed bids. A further distinction between first price winning bids (in this case the lowest FIT price) and second price winning bids (the second lowest FIT price) can also be made.

Sealed (closed) bid auctions are based on "one best and final offer". Such a bid process avoids strategic gaming opportunities and potential for collusion available in open-bid auctions. They have the benefit of simplicity and are well understood in the Australian infrastructure industry.

A hybrid auction model using a first phase sealed bid first price auction is worth further analysis. If the lowest bid is lower than the next lowest bid by an agreed and announced margin, then the first phase lowest bid is declared the winner. If the first phase lowest bid is not lower by the determined margin than the second place bid, then all participants within the determined range of the lowest bid take part in a final sealed bid auction with the previous best sealed bid being the reserve price. Hybrid auctions have the potential to extract lower cost outcomes than a simple sealed bid auction.

Heuris recommends the applicability of the hybrid auction approach to the FIT auction be reviewed with experts from the ANU School of Economics who have previously published on the subject. The fall-back position we recommend is the simplicity of the sealed bid lowest FIT price model.

3.4 How to minimize the risk that successful bidders fail to deliver the expected renewable electricity production on time and at an appropriate level of quality?

The ACT Government is concerned to minimize the risk that successful FIT bidders fail to deliver renewable electricity production on time.

Such a failure might occur for two broad reasons; firstly, the incapacity of the bidder to successfully manage the project, and secondly, strategic gaming by the bidder to block entry by other players. While the ACT Government and community would not be exposed to financial burdens by the winning bidder's failure to perform, the pathway to CO2 emission reduction would be compromised and the Government exposed to criticism about policy implementation weakness.

3.4.1 Pre-qualification processes and criteria

Pre-qualification requirements that seek to establish the technical and financial capacity of the bidder to deliver the project are the most important tool to reduce the risk of the project not proceeding because of bidder incapacity and strategic gaming. The pre-qualification capacity requirements and assessment process could be adapted from the Federal Solar Flagship Program. A narrower scope is recommended, focussing on the capacity of the bidding consortia to manage the approvals, development, operating and financing risks. An initial draft is provided in Appendix 4.

There are broadly two design options for the pre-qualification process:

1. an upfront process through which any bidder must pass before being allowed to prepare and enter a bid, producing a shortlist of permitted bidders; or,
2. pre-qualification as part of the bid process, with bidders required to enter their claims against pre-qualification criteria alongside their FIT bid. Only FIT bids from tenderers that meet the pre-qualification criteria would have their bids opened.

While option 2 would possibly involve less administrative overhead for the Government, on balance Heuris believes the upfront process should be the preferred approach because of avoided effort for non-compliant bidders. It also provides the ACT Government with the opportunity to work with prospective bidders to enable them to put together a more capable bid consortium.

To ensure the substance and perception of procedural fairness, it would be desirable for the prequalification assessment panel to involve a panel of outside, independent experts operating with the necessary procedures and support to ensure a rigorous and defensible selection process.

3.4.2 Progress milestones

In addition to pre-qualification requirements, a series of project progress milestones could be established that have to be passed to maintain the integrity of the FIT contract. These *conditions subsequent* would likely focus mainly on the expected project approvals and capital expenditure commitment timetable and are designed to address any evidence of strategic gaming to delay investment. Reasonable construction timetable contingency must be allowed. Definition of what is reasonable will be part of the industry consultation phase.

Failure to meet agreed milestones would generate the requirement for formal advice to the Government by the project developer to demonstrate that appropriate corrective project management actions were being established and follow-up confirmation that the project was back on track. An independent appraisal of the project management status could be required.

Of particular concern to the ACT Government would be ensuring that delays in the project approvals process are not due to unreasonable or incompetent Government approvals processes. Once significant

capital expenditure commitments can be demonstrated, the opportunity for strategic gaming has passed.

Liquidated damages clauses should be limited to the performance for the period after Development Approvals are granted. (See Land Access and Approvals Risk in Section 2.3.1.)

Failure to meet agreed project milestones could result in the FIT contract being voided.

3.5 Ensuring the capacity allocation via the auction process supports the required Government timetable for renewable energy capacity growth.

The ACT Government's policy intent is to establish 240 MWe of renewable generating capacity in the ACT to support its 2020 greenhouse gas reduction target. Solar based renewable energy opportunities have been highlighted.

The 240 MWe capacity is proposed to be allocated between "micro generation" on residential roof tops (15 MWe total capacity, units up to 30 KWe), "medium generation" (15 MWe total capacity, units up to 200 KWe) and "large scale generation" (210 MWe total capacity, units greater than 200 KWe).

Our analysis has already identified the expected value in waiting for learning from project experience to be funded in other jurisdictions. This leads to our view that the first round of the large scale FIT auction should involve a commitment to accepting the lowest priced bids up to 20 MWe capacity. A minimum waiting period of two years before a second FIT capacity auction is recommended to allow learning to accumulate in the ACT first round 20 MWe project and the Federal Government Solar Flagship Program. It is also possible that the international costs of the underlying PV modules or solar concentrating capture systems will fall as a result of international experience.

An initial FIT capacity allocation limited to 20 MWe would prevent any Federal Solar Flagship winner gaining advantage over other potential bidders due to a Federal Flagship capex grant as the minimum project size for the Federal Solar Flagship Program is 30 MWe. Heuris analysis of this issue is discussed in Section 3.7

A biennial large scale solar FIT auction series with an increasing level of future capacity availability is the most efficient way in which the ACT Government can assure cost efficient progress to its capacity target. An illustrative pathway is set out below (Figure 9).

Figure 9: Suggested auction timetable

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Large scale FIT capacity auction award(MWe)		**20**		**40**		**80**		**80**		
Cumulative installed capacity @ year end				**20**	**20**	**60**	**60**	**140**	**140**	**220**

It is possible that by 2015, solar concentrating technology costs will be better understood and that the suggested 2016 and 2018 FIT capacity auctions might be combined to allow a sufficient scale for solar concentrating plants to capture the lowest cost position.

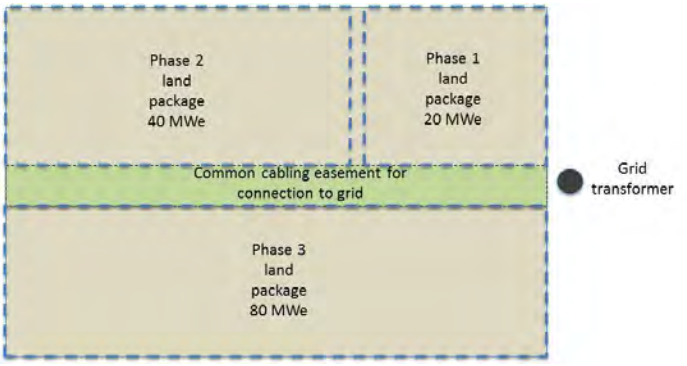
3.6 Ensuring that the first round FIT auction winner does not gain an unreasonable advantage in subsequent bid rounds.

The developer of the first round of large scale FIT capacity can reasonably expect to build competitive advantage in the higher risk first round that can be applied in subsequent bid rounds. Notwithstanding this, there may be some ways in which a first round winner could seek to sustain advantage in future bid rounds that should not be supported.

One example is the opportunity to capture advantage by locking up preferred land packages controlled by the ACT Government (that might provide lower cost grid access and relative ease in the approvals process) in the first round that are beyond the space requirements of the initial 20 MWe capacity project. For example, a solar PV bidder could establish an initial design plan with widely spaced PV arrays to lock up a large land package with a view to simply filling in the package in a second bid round. It is unlikely that a market-based land leasing cost set by rural land uses would provide an effective disincentive to such gaming.

This suggests that some pre-qualifying requirement or milestone performance indicator in project development is required to assure the Government that scarce “high value” publicly owned land is being efficiently used in the development and not being quarantined for future advantage. This could include a requirement that secures third party access rights to grid connection easements and infrastructure (see Figure 10 below).

Figure 10: Securing third party access to grid connection



The second broad area of concern is the extent to which learning within the first round project development is made available to second round bidders.

The Federal Government Solar Flagship Program has established that "Sharing technical and economic experience, know-how and information from *projects* is an objective of the program." The July 2010 Supplementary Guidance for Applicants states "The *Department* will work with *applicants*, *research partners* and other parties to design the contract clauses relating to knowledge sharing and information dissemination that will be included in the *Solar Flagships Deed of Agreement"* The Solar Flagships Program Administrative Guidelines Round 1 further state (Clause 26) that the information to be made public relates to "the performance and operations of the project within the electricity market".

It can be argued the competitive FIT bid process gives the winner the right to maintain commercial confidentiality on all aspects of the project beyond those public disclosures required of other businesses. At the same time, the FIT opportunity is only available as a result of the public policy commitment to the development of renewable energy generation and a preparedness of the community to bear the burden of electricity prices above that set in the non-renewable market.

Heuris recommends that the ACT Government adopt a more limited objective of capturing agreed confidential information from projects in its large scale solar FIT program so as to accelerate the attainment of lower community cost burdens. In particular, the winning FIT bidder should be required to make available to the ACT Government, on the commissioning of the project, audited data on the capital cost of the development by major cost categories, the final installed capacity (MWe), and the expected annual electricity net output to the grid (MWh). In addition, on the first, second and third year anniversary of operations, the winning FIT bidder should be required to make available audited data on the electricity output profile by half-hour of day by month, and the operating costs for the project by major expense categories.

Unlike the Federal Solar Flagship Program, the ACT Government will need to set these requirements prior to receiving FIT bids.[12]

An alternative or adjunct to this approach would be for the ACT Government to take a small equity stake in the winning consortium (see section 2.4.3. above)

3.7 Interaction with Federal Solar Flagship Program

Although AGL originally included an ACT site of at least 30 MWe in their proposed project scope, the company has now formally withdrawn the nomination. None of the other PV applicants have proposed an ACT site although the Solar Flagship rules do not prevent them from adding an ACT site in the final project. No solar thermal applicants proposed an ACT site.

Heuris has proposed that the initial FIT allocation be limited to 20 MWe capacity in order to capture value from the experience of large scale solar projects funded by the Federal Government. This 20MWe limit will prevent any potential for an ACT Solar FIT project to also benefit from a Federal Government capital grant. This is because the minimum project size within the Federal Solar Flagship Program is 30 MWe.

More generally, the Solar Flagship program will be helpful to the ACT in attracting greater interest and market participation in utility scale solar power developments and hence developing a body of well-informed and capable bidders for the ACT's solar auctions.

[12] An ACT Government equity share in the initial project would achieve the same result (see Section 2.4.3).

4. Managing Risks to ACT Government

4.1. Managing community impacts & reactions

The ACT minority Labour Party led Government has made greenhouse gas reduction a very high priority for public policy in the ACT. It has political support for this policy direction in the ACT legislature from the 'Australian Greens'. Current perceived levels of community support are high but the Liberal Party media commentary highlights the community cost burdens of the micro-generation and medium generation FIT schemes, and the very high CO2 abatement costs. It remains unclear if the Liberal Party will support the proposed large scale solar FIT program.

Recent increases in retail electricity prices across the NEM are largely due to regulated increases in allowable expenditure on transmission and distribution infrastructure upgrades. But the increase in retail prices is in part due to the costs of the Federal Renewable Energy Target scheme. High profile failures in policy design such as the NSW rooftop FIT have focused public and media attention on the current very high cost of PV generated electricity in Australia.

Heuris' opinion is that the level of expected future cost impost on the ACT community is the most important source of risk to the ACT Government. Our analyses and recommendations in this report have given the highest priority to managing this risk.

4.1.1. Impact on households

Figure 11 shows the results for a 20 MWe plant for three different business cases flexed by different capex, cost of capital and project roll out. This shows absolute increases in average electricity bills of $6-24 in 2014. (The results for a 40MWe plant are slightly more than double for each case – Appendix 5. All calculations assume REC exclusive FITs.

Figure 11: Utility scale solar 20 year FIT impact on average ACT residential customer bill in 2014[13]

		20MW				
		FIT ($/MWh)	Average residential customer bill with solar ($pa)	Average residential customer bill without solar ($pa)	Absolute increase ($pa)	% increase from without solar
Downside case	$5000/KW capex, 1 year construction delay, 15% cost of equity	528	1688	1664	24	1.4%
Central case	$5000/KW capex, no delay, 13% cost of equity	458	1682	1664	18	1.1%
Upside case	$3500/KW capex, no delay, 10.88% cost of equity, government financing	315	1670	1664	6	0 3%

[13] Heuris has modelled the potential impacts on residential customer bills of a 20MWe and 40MWe solar PV plant under a 20 year FIT contract - see Appendix 5 for full results and assumptions.

4.1.2. Scale and siting of solar facilities

The ACT Government has undertaken significant consultations with the community on both the development of an energy policy and the broader issue of the Territory's contribution to ameliorating the growth in Australia's greenhouse gas emissions. This provides a foundation for continuing community engagement and education about the path chosen towards an energy supply mix that is both carbon free and much more cost competitive with fossil fuel based electricity sources. An important element of this story is the switch in emphasis from small scale to utility scale solar plants, using a phased approach to capacity deployment that can take advantage of technical and cost improvements.

It is not possible to rule out the potential for significant public resistance to the implementation of the policy as the initial project is developed and exposed to planning processes. The recent experience with wind farm developments in Victoria and NSW is instructive. Despite seemingly majority support across the community/electorate for addressing climate change there has been considerable and growing opposition to wind farm developments. At the national level, this has resulted in the development of National Guidelines by the Environment Protection and Heritage Council (EPHC) as a way to align the approaches in different jurisdictions and to pave the way for a rapid transition to wind projects. These guidelines, however, have met with strong resistance from potentially affected communities and wind farm developers. In Victoria the Opposition has rejected the projections offered to communities as too weak and is proposing mandatory requirements for buffer zones, compensation etc.

In the absence of Australian experience in utility scale solar plants, it is difficult to judge the risk of a similar reaction to wind developments. While not involving the noise problems of wind turbines, the visual intrusion of a 20MW solar plant covering perhaps a square kilometre of land with glass modules and supporting equipment would be potentially large enough to create community opposition. In view of the ACT Liberal Opposition response to the new solar policy announced on 13 September, there is potential for community opposition to become a source of policy risk to the Government and hence to the project developer.

We therefore recommend the Government undertake an initial risk evaluation of the potential for community opposition, drawing on available information on what are likely to be seen as the most favourable sites in terms of aspect/insolation and access to distribution infrastructure, taking account of:

- restrictions to development under ACT planning and land use policies; and
- environmental and social values/attributes/sensitivities.

This work would form the basis of a risk matrix and mitigation plan for internal ACT planning purposes. Elements of this work would also provide useful input into the information pack for bidders.

4.1.3. Fostering ongoing community commitment

During both the development and operations phase of the initial project, a suite of measures could be adopted to foster continued interest and support for the Government's solar program by providing transparent information about the operation, cost etc. These could include:

- a requirement on bidders to make provision for a simple information/education centre at the plant;
- a section on the DECCEW (or perhaps ACTEW/AGL) website showing the real time output of the plant, the amounts of greenhouse gas avoided and the cost per tonne avoided; and
- an annual public report on the development of the solar strategy, including regular evaluations of the direct and indirect costs and benefits of the program.

Greater community support and involvement could be encouraged via the provision of a special 5MW re-allocation of sub-200Kwe to community sponsored/owned solar facilities.

4.2. Managing an effective auction and project delivery process

In addition to the future expected costs, the risks (and opportunities) for the ACT Government lie in:

- the perceived effectiveness of the Government FIT auction process in enrolling a capable group of bidders with sufficient diversity to create competitive tension,
- delivering a credible winning bidder in a timely manner,
- the timely achievement of a Development Approval
- timely development and commissioning of the approved project, and
- the delivery of broader economic and non-economic benefits to the ACT as a result of the large scale solar FIT program.

These risks have been addressed in the body of the report. In summary, the opportunities for ACT Government action to manage these risks are:

4.2.1. Bid Risk

- Establish a credible timetable for bidding consortia to form, evaluate land packages, set high level design, cost and prepare bid sign-off. Heuris recommends a bid submission timetable for end Q3 CY 2011 and FIT contract award for end Q4 CY 2011
- Government efforts to enrol new bidders
- Government commitment to prepare relevant data on nominated land packages

4.2.2. Auction Process Risk

- Establish simple and transparent bid pre-qualification process and bid award/FIT contracting process

4.2.3. Approvals Risk

- Identify nominated land packages under control of Government and immediately begin detailed environmental (and insolation) assessment.
- Government efforts to support the developer in mitigating NIMBY risks
- Establish legislated streamlined approval process after industry consultation.
- Allocate sufficient time for Development Approval. Heuris recommends an earliest feasible DA timetable of end Q2 2013, subject to the results of industry consultation.

4.2.4. Development Risk/Commissioning Risk

- Establish credible timetable for performance under FIT contract. Heuris recommends an earliest credible commissioning completion by end Q2 2015, subject to industry consultation.

4.2.5. Delivering perceived economic and non-economic benefits from large scale solar development

- Develop business development focus on Solar PV Balance of System cost optimisation with initial ACT Conference on PV BOS cost reduction in end Q1/early Q2 2011.
- Maintain a very high level of transparency of large scale FIT electricity and CO2 abatement costs in comparison to smaller scale solar initiatives.

5. Proposed Purpose, Scope and Process of Industry Consultation

The purpose of the proposed industry consultation process is:

- To better understand industry perceptions of project risk so as to enable the ACT Government to reduce the perceived level of risks under its control. This is expected to encourage competitive entry and reduce expected project levelised costs.
- To encourage new bidders to join the FIT auction.

5.1. Better understanding of industry perceptions of risk

To better understand industry perceptions of risk, the following consultation scope is recommended:

- Interviews with lead Federal Government Solar Flagship bidders (AGL Energy, TRUenergy, Infigen, BP Solar, Acciona Energy Oceania, Parsons Brinkerhoff, Wind Prospect CWP and Transfield)
- Interviews with Credit Rating Agencies (Moody's and Standard and Poors)
- Interview with Solar Flagship team

Heuris would conduct the interviews. The content of the interviews would be based on the risk framework set out in Section 2 and the auction process set out in Section 3. Face to Face interviews are strongly recommended to maximise the quality of information flow. The interviews should be conducted before Christmas 2010.

5.2. ACT Government efforts to enrol wider bid participation

Heuris has not had access to the names of respondents to the ACT's request for expressions of interests (EOI) for a grant of $30m for a solar power. Subject to this point, a review of the Federal Solar Flagship Program PV short list suggests that only a constrained level of competition will occur unless the number and diversity of the bidding consortia is expanded compared with the Solar Flagships PV short list (Figure 12).

Figure 12: Stage Winners - Solar Flagship Bidding Consortia

Solar Flagship Short listed PV bid consortia			
Project Leader	**Module Supplier**	**Project Developer**	**BOS Design**
BP Solar	BP Solar	Fotowatio (Europe and USA)	BP Solar
AGL	First Solar (USA)	Bovis Lend Lease	First Solar (USA)
Infigen	Suntech Power Holdings (China)	Tenix	Phoenix Solar (Europe)
TruEnergy	First Solar (USA)	Bovis Lend Lease	Worley Parsons

- Only one of those four consortia has a Chinese participant, Suntech Power Holdings (a leading Chinese module manufacturer).

- First Solar, a US thin film PV manufacturer is participating in two of the four consortia.
- Bovis Lend Lease is the project developer/constructor for two of the four consortia.
- An Australian electricity retailer is the Project Leader in three of the four consortia.

Given that the ACT Solar FIT project will entail no market price risk, there is no need in the ACT Solar FIT auction to have an electricity retailer as a consortium participant. In the case of the ACT FIT project, the critical risks to manage are the approvals and development risks, together with financing. Strong experience in Australian infrastructure development, expertise in PV systems design, and PV module supply are critical.

This suggests that one focus of the work to enrol new participants should be developing the awareness and interest of other Australian project developers such as those in the Leightons group of companies (Leighton Holdings, Thiess, John Holland), Transfield Services (one of the solar concentrating Flagship bidders), UGL Limited and Ausenco.

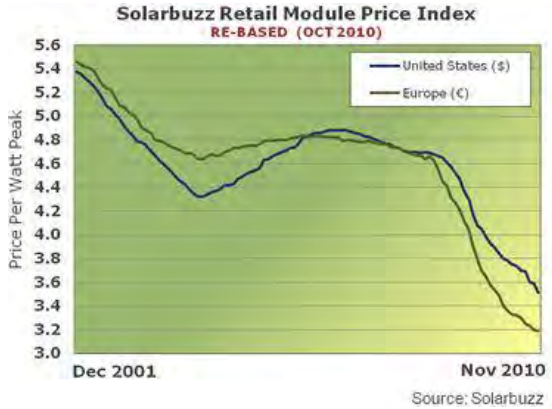
Heuris recommends that a brief information pack on the Solar FIT opportunity be prepared with a focus on PV. Heuris would then make contact with the lead business development executives to organise a meeting to test their knowledge and interest. We have existing relationships with Thiess, John Holland, Transfield Services and Ausenco.

This could be a precursor to an open invitation, industry briefing/workshop, hosted by the ACT Government, with all potential bidders (including EOI respondents). If thought necessary, this would enable key advisers and decision-makers in the ACT Government to provide a briefing on the proposed scope and timing of the auction process and receive industry feedback.

5.2.1. A special focus on Chinese participation

The prices for Chinese and Taiwanese manufactured polycrystalline modules are continuing to drive down observed retail prices for PV modules globally (Figure 13).

Figure 13: Trends in US and European PV Module Retail Prices 2001-2010



The combination of Chinese manufacturing innovation and the cost reductions achieved through scale economies and learning is also re-shaping the economics of utility scale PV globally.

Some large Chinese PV manufacturing companies such as GCL Poly Holdings are now expanding into utility scale PV development internationally rather than just supplying modules.

Given that the limited existing module supply competition in the Solar Flagships PV short list, Heuris recommends that a focused effort be made to enrol additional Chinese participation in the FIT auction. This would complement the efforts to increase the participation by experienced Australian project developers.

5.3. Recommended approach to consultation/participation

We recommend the following approach:

- Heuris identify high potential Chinese participants not already engaged as participants in Solar Flagship bids.
- Liaison via Heuris networks in China to establish contact network and introductions to target Chinese players
- ACT Government visit to China (with Heuris) to meet leading contenders and invite them to consider participating in the initial FIT auction via joint Chinese/Australian consortia. An invitation could be issued to participate in the proposed PV BOS Conference in Q1 2011 as part of the process of establishing more bidding groups.
    - An 8 day visit to China would be required to provide some flexibility on the Chinese side. Time available is limited by the Chinese calendar of holidays. China has a 3 day New Year holiday from January 1-3, 2011 and then the traditional Chinese New Year holiday from 2nd to 8th February. The two weeks prior to the Chinese New Year are not a good time to plan the proposed visit as Chinese companies will be focused on managing the Chinese New Year workforce issues. This leads to a preferred visit window from 4th January to 14th January 2011.

Appendix 1: ACT Government Feed in Tariff Expansion Media Release

LABOR DELIVERS ON MAKING CANBERRA AUSTRALIA'S SOLAR CAPITAL

The ACT Labour Government will establish Canberra as Australia's Solar Capital with the creation of an expanded feed-in tariff scheme for medium and large scale renewable energy generation, Energy Minister, Simon Corbell, said today.

"The expansion of the feed-in tariff will put Canberra at the forefront of renewable energy generation in Australia," Mr Corbell said.

The Government has agreed to establish an expanded feed-in tariff scheme with the following elements;

- An overall scheme cap of 240 MW of generating capacity;
- Large scale generation category for generators larger than 200 KW (category cap of 210 MW);
- Medium scale generation category for generators between 30KW and 200kw (category cap of 15 MW); and,
- Existing micro generation category (household rooftop) up to 30KW (category cap of 15 MW).

"The expansion of the scheme will occur in two steps, with medium scale generation suitable for larger areas such as shopping centres, warehouses and large office buildings, to occur first through amendments to the existing Electricity Feed-In (Renewable Energy Premium) Act 2008," Mr Corbell said.

"The second step will involve the introduction of separate legislation for large scale generation with provision of premium payments to be allocated through an auction process.

"The Government will make 40MW available to auction as the first tranche of the large scale generation category.

"This auction will allow the Government to test the market and analyse the effectiveness of the large scale scheme. The Government will then make decisions about any future auctions under the large scale category.

"The Government anticipates this auction will occur in the first half of 2011 and it will ensure that Canberrans get the highest possible level of renewable energy at the lowest possible price."

Mr Corbell said the Government would also amend the legislation to allow for community owned renewable energy generators access to the feed-in tariff scheme.

"This amendment will assist people who have not been able to utilise the scheme previously due to shared property ownership or poor solar access," Mr Corbell said.

As a result of this decision the Government will not be proceeding with the proposal process to establish a solar facility in the ACT. The previous funding of $30 million to support development of the solar facility will be withdrawn.

"Instead proponents interested in establishing large scale renewable energy facilities in the ACT will be able to bid for access to the feed-in tariff for large generators," Mr Corbell said.

"The Government's revised approach to establish a solar facility for the ACT could potentially result in more than one large renewable energy plant being established in the first tranche of the scheme.

"This approach has been taken following feedback received from industry during the solar facility process which indicated a strong preference for access to a feed-in tariff as an alternative to a one off capital payment."

The ACT Government will undertake further consultation with industry and key stakeholders about the administration process for the first auction.

Mr Corbell also announced that as part of the decision to expand the feed-in tariff scheme, the Government has also ruled out Kowen Forest as a possible location for a future solar facility. The other government nominated site at Ingledene remains available to proponents.

"As previously indicated, proponents will be able to pursue other sites on privately leased land as well as other territory owned land though the direct grant process," Mr Corbell said.

"The expansion of the feed-in tariff to medium and large scale generation will create significant economic opportunities for Canberra and will assist the city to make the transition to a low carbon economy.

"The ACT Government is committed to making Canberra Australia's Solar Capital, the expansion of the feed-in tariff establishes the policy framework needed to make that happen."

Statement Ends: Monday September 13, 2010.

Appendix 2: Heuris study terms of reference

Terms of Reference

Consultancy Agreement: Advice on ACT Solar Power Auction

1. Context

- The ACT Government is committed to achieving a 40% reduction in greenhouse gas emissions within the ACT by 2020, in comparison to 1990 levels.

- In May 2009, the Government issued a Call for Expressions of Interest (EOI) to Construct, Own and Operate a Solar Power Facility in the ACT, capable of supplying approximately 86,000 MWh/annum, supported by a $30 million capital grant. This process demonstrated that a $30 million capital grant was neither a sufficient level nor an appropriate mechanism of financial support for such a project. Respondents to the Call for EOI highlighted the need for a Feed-in Tariff (Fit) to reduce financial risk.

- On 13th September 2010, the ACT Energy Minister announced an expanded Feed In Tariff for medium and large scale renewable energy generation, encompassing up to 210 MWe large scale generation capacity (>200KWe), including a first tranche auction of 40MWe in the large scale generation category, to be conducted in the first half of 2011.

- The ACT Government is considering the interaction of its renewable energy initiatives with the Commonwealth Enhanced Renewable Energy Target (ERET) to maximise renewable energy that can be attributed to the ACT supply to address the Government's greenhouse gas target of 40% reduction in GHG by 2020 relative to 1990 levels.

- Key issues for the ACT Government are

1. Appropriate administration of an auction to determine the best price from a competent supplier

2. Achieving the schedule for production whilst avoiding the risk of "warehousing" of FiT entitlements.

3. Realising the lowest cost impost on ACT consumers

4. Aligning the most appropriate risk management with the parties in the best position to manage identified risks

2. Purpose of Consultancy

The ACT Government is seeking the following advice.

2.1. The Minister will seek cabinet agreement to the detail of the auction process by the end of November 2010 and may outline the auction process at the Solar 2010 Conference on 1 December 2010 and invite industry to comment before the auction is started in the first quarter of 2011. By 15 November 2010, the Consultant will:

- advise on a range of options for the form of auction that will achieve a competitive price for renewable energy from multiple suppliers offering a range of technologies, locations, sizes of facility, and consortia competency;

- recommend a set of preconditions necessary to establish the ability of the supplier to deliver energy at the offered price in accordance with an acceptable schedule; and

- provide advice on the scope and process for a consultation with industry that will inform Government of Industry's preferences and assist Industry to prepare for the auction.

2.2. The Consultant will review and comment on 'lessons learnt' from similar auctions or FiT price setting activities in other countries seeking solar energy production from facilities of between 200kW and 40MW capacity.

2.3. The Consultant will advise on the relative advantages of fixed or premium price FiTs from the perspective of achieving lowest price from the supplier, efficient administration of payments, and operation in the national electricity market. The Consultant will consider a range of options including but not limited to:

- FiT plus market price and operation under AEMO rules;

- FiT covering the total price with guaranteed purchase by a nominated retailer on behalf of all ACT energy users, the costs to be recovered through the distribution charge on all retailers; and

- Purchase by the ACT Government

The Consultant should comment on the effect that the term of guaranteed FiT payments will have on the long term price of renewable energy.

2.4. The Consultant will consider the implications on the overall cost, to meet the Government's greenhouse emission target, of operating either in the Commonwealth RET scheme (and hence receiving remuneration from RECs) or conversely operating outside the RET scheme (and voluntarily surrendering the RECs).

2.5. The Consultant will advise on the effect that the bidder's perception of the risks associated with delivering the project has on achievement of the lowest priced FiT bids and the possible actions by ACT Government to mitigate these perceptions of risks.

2.6. The Consultant will identify risks to the ACT Government and evaluate options to manage those risks.

2.7. The Consultant will present a range of finance options including allowing ACT residents the opportunity to invest in the project and to facilitate ethical investments by various parties including superannuation funds.

2.8. The Consultant will assist with the consideration of industry views subsequent to consultation and make recommendations as to how these views can be accommodated in the auction and subsequent purchase of energy.

2.9. The Consultant will provide advice on the process of auction assessment and preparation of the request for offer.

2.10. The Consultant will assist with the assessment of bids and preparation of a recommendation for Ministerial approval.

3. Delivery Schedule

Advice will be required throughout a program of activities consisting of consultations with industry and approvals by Government. Industry consultation will commence soon after the Solar 2010 Conference on 1 December and advice on the conduct of the auction and issues that might affect Industry's perception of risk is required by 15 November.

Other delivery dates are detailed in Table 1 below.

Item	Title	Date
2.1 -2.7	Details of the 'auction'	15/11/2010
2.8	Report on Industry views	1/2/2011
2.9	Advice on auction assessment	14/2/2010
2.10	Assessment of bids and recommendation	29/4/2011

Table 1 Consultant's Delivery Schedule

Appendix 3: Analysis of alternative community financing mechanisms

	Initial tranche			Later tranche		
Community involvement	**Strengths**	**Weaknesses**	**Issues**	**Strengths**	**Weaknesses**	**Issues**
Equity:						
1. Project proponent required to offer set %age of equity to ACT residents once project commissioned and refinanced	Promotes immediate community interest in project	Dilutes economic incentive for project proponent to bid Reduced level of financial gearing increases FIT	Size of equity offer to ACT? Pricing of the equity? Who participates? Impact on bid field? Negative impact on FIT bids?	Proponents benefit from learning with first phase: reduces possible risk premium for community involvement	Some dilution of economic incentives for proponents	As for initial tranche but more time to address design of participation
2. Project proponent bids partially assessed on basis of size community equity offered post commissioning	As above.	As above. Adds complexity to bid process, resulting in potentially high FIT bids	As above+ Which community organisation? How organised/resourced? What would be Government's role in facilitating development?	As above. Could run parallel second stage process (say 2X10MW) with one intended to be awarded on basis of strength of community involvement, engagement By signalling intention early could catalyse development of community capability & organisation	As above Added complexity may reduce bidder interest	As above
3. 100% community ownership via company or co-operative	High profile & ground breaking approach to community involvement	Unless community body on the same basis as other bidders, will likely reduce or vitiate any competition, leading	As above+ Would such an organisation be able to demonstrate required technical capabilities etc. to be able to meet	Variant of above would be effectively to run two separate competitions, with one tranche reserved for a	Broadly as for initial tranche.	As above

	Initial tranche			Later tranche		
Community involvement	**Strengths**	**Weaknesses**	**Issues**	**Strengths**	**Weaknesses**	**Issues**
		to higher FIT unless community group accepts lower return on equity	prequalification?	community owned entity.		
Loan finance:						
4. Project proponents required to offer/source all or a specified proportion of post-commissioning debt finance from ACT electricity consumers.	Lower risk way of garnering local interest & support for the solar project. Depending on ACT consumers' preferences, may lower overall costs of borrowing for the project.	Adds complexity to initial bid process and potentially higher transaction and hence FIT bid costs.	ASIC and tax implications for bidders? Under ASIC rules for vanilla bonds bidder must be listed and entitled to issue a transaction-specific prospectus.	Could foreshadow such a proposal sufficiently early for subsequent tranches to allow bidders to meet ASIC requirements and put in place cost effective structures.	As for initial tranche but possibly reduced impact.	As for initial tranche.
5. ACT Government seek FIT bids on the basis that the Government borrow on behalf of the winning project proponent and on lend at small premium for post commissioning phase of project	Lower transaction costs than 4. ACT AAA rating provides basis for lowest cost loan finance for project, even with small premium to basic borrowing cost. Given the novel nature of the solar plant, even post commissioning commercial debt	?	Would such borrowing & on lending be consistent with ACT Government legislation and/or policies?	As for initial tranche but requirement for "launch" finance less in face of commissioning and operating experience with first plant.	?	

	Initial tranche			Later tranche		
Community involvement	**Strengths**	**Weaknesses**	**Issues**	**Strengths**	**Weaknesses**	**Issues**
	providers may require higher yields. As such likely to minimise FIT.					

Appendix 4: Suggested Information Requirements for Pre-Qualification Assessment

Bidding Consortia

Applicants should provide a description of key partners, responsibilities, governance arrangements and relationships between all parties:

Consortium structure should outline members and identify proposed member roles including:

- applicant (lead member)
- technology partner
- project developer (s)
- proposed construction firm(s)
- proposed key suppliers
- equity and debt providers

Evidence should demonstrate:

- relevant experience and capability to manage the project design, approvals, financing, construction, commissioning and operating risks
- an awareness of the opportunity to reduce project levelised costs by the integration of solar energy capture technology supply choice and Balance of System innovation and optimisation.
- a governance plan, outlining the proposed design, operation, responsibilities and accountabilities of the consortium to optimise risk management.
- Intended supply contracts and guarantees
- Proposed Technology type e.g. thin film, polycrystalline, trough
- Evidence from the supplier of modules/solar collectors that the relevant components are able to be provided to the project in a timely manner.
- Evidence of ownership of, or access to, intellectual property required to undertake the project

Project Financing

Applicants should provide details of:

- Indicative financing requirements and details of key financial assumptions on which the project is formulated, including construction phase financing (tenor, quantum, margin, other financing costs) and any subsequent refinancing (tenor, quantum, margin, amortisation schedule, other financing costs, debt covenants such as Interest Cover Ratios and Debt Service Cover Ratios)
- Evidence of support from debt financiers
- Expected ratios of debt and equity
- Other forms of support (e.g. state and territory governments) and funding conditions.

Project Timetable

An indicative project timeline scheduling project commissioning by 30 June 2015, covering:

- Engineering design
- Approvals
- Procurement
- Construction
- Grid connection
- Commissioning schedule

Regulatory Approvals

Applicants should provide details of:

- A list of approvals and authorisations required for the project, and their status at the time of proposal submission
- A plan describing how relevant regulatory processes are to be finalised

Appendix 5: Modelled impact of 20/40MWe solar PV plants on residential customer bills

Assumptions:

	CAGR 2005-8 (%)	2008		2010		2014	
Customers							
Residential (1)		137582		139283		145929	
Non-residential (2)		13772		13772		13772	
Total Consumption (Gwh)							
Residential		1142		1156		1211	
Non-residential		1676		1676		1676	
Per customer consumption (Mwh)							
Residential		8.3		8.3		8.3	
Non-residential		121.7		121.7		121.7	
Average per customer total charge ($ pa)							
Residential(3)		1087		1513		1664	
Non-residential		17394		19472		21906	
Implied charge per kwh ($)							Change 2010-14
Residential		$0.13		$0.18		$0.20	9.72%
Non-residential		$0.14		$0.16		$0.18	12.50%
1. Customer numbers assumed to grow in line with popn							
2. Assumes no change in non-residential customer base							
3. 2008 figure from ICRC Compliance Report (June 2009):2010 figure from ICRC June 2010 Tariff determination for non contestable customers= 2.35% inc							
2014 assumes 10% increase in residential tariffs							
Consumption from 40MW solar (GWh)						59.6	
Consumption from other generation types (Gwh)						2828	
Total electricity consumption (Gwh)						2887	
Residential consumption from 40MW solar (Gwh)						25.0	
Residential consumption from other generation types (Gwh)						1186.2	
Non-residential consumption from 40MW solar (Gwh)						34.6	
Non-residential consumption from other generation types (Gwh)						1641.5	
Per residential customer consumption from 40MW solar (MWh)						0.2	
Per residential customer consumption from other generation types (Mwh)						8.1	
Per residenital customer electricity consumption (Mwh)						8.3	
FIT	$/MWh					458.0	
Average residenital customer bill after 40 MW solar						1704.2	
Average residenital customer bill without 40MW solar						1664.3	
Increase on average residential customer bill						2.4%	

Utility scale solar 20 year FIT impact on average ACT residential customer bill in 2014

		20MW					40MW				
		FIT ($/MWh)	Average residential customer bill with solar ($pa)	Average residential customer bill without solar ($pa)	Absolute increase ($pa)	% increase from without solar	FIT ($/MWh)	Average residential customer bill with solar ($pa)	Average residential customer bill without solar ($pa)	Absolute increase ($pa)	% increase from without solar
Downside case	$5000/KW capex, 1 year construction delay, 15% cost of equity	528	1688	1664	24	1.4%	528	1716	1664	52	3.1%
Central case	$5000/KW capex, no delay, 13% cost of equity	458	1682	1664	18	1.1%	458	1704	1664	40	2.4%
Upside case	$3500/KW capex, no delay, 10 88% cost of equity, government financing	315	1670	1664	6	0.3%	315	1680	1664	16	0.9%

14 December 2010

ACT Solar Power Auction

Phase 2 Report

Heuris Partners Ltd 102 Cardigan Street Carlton Vic 3053

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Summary of key findings and recommendations

Summarised below are the key findings and recommendations from the work covered by this report

Potential Bidder Interest

The interviews with both Solar Flagship Round Two participants and other players in the Australian solar utility PV market generally showed significant interest in participating in an ACT FIT auction, particularly on the basis of no market risk and government actions to expedite planning and grid connection processes.

Analysis of the Chinese PV supply chain, together with direct contact with a number of major companies already supplying the international market, also confirmed China as a source of highly competitive module supply and also potentially system design, integration capability and equity finance.

FIT Design – findings and recommendations

1. **Market risk/no market risk**: Heuris considers the no market risk FIT will also allow the potential for low cost ACT project opportunities in the 2-10 MWe scale to be more completely evaluated in the auction. These are less likely to be a focus of interest in a market risk FIT auction that is likely to be dominated by integrated electricity generators/retailers. Accordingly, Heuris recommends that the ACT Government adopts a no market risk FIT. contract duration.
2. **Contract duration**: the interviews confirm that a longer duration FIT (20 to 25 years) will likely support higher levels of financial leverage and so reduce the expected FIT price beyond that simply due to the extended duration, compared with a 10 or 15 year FIT term. Heuris recommends that the ACT Government adopt a FIT contract duration of not less than 20 years.
3. **Treatment of RECs**: The interviews confirmed that a REC inclusive FIT price will be substantially lower than a REC exclusive FIT price. But it is also likely that a REC inclusive FIT price will provide some degree of advantage to large integrated electricity generator/retailers as bidders as they are likely to be more confident in their valuation of REC's over the FIT period. Bidders with low levels of confidence in their understanding of the long term REC market will likely ascribe substantially lower expected values to REC's. In keeping with our initial report, Heuris therefore recommends that the ACT Government requires bidders to submit FIT bids on both the REC inclusive and REC exclusive basis so it can assess the market value of the REC stream before making a decision.
4. **Minimum and maximum size of qualifying bids**: Heuris recommends that the ACT Government set the auction rules to require bidders to submit bids for projects with capacity in the range of 2 to 20 MWe, and that it commits to accepting the lowest cost bids for 40 MWe capacity, guaranteeing that at least two separate winning projects will proceed.
   4.1. ***Maximum bid size***: The interviews confirmed that the effective likelihood that a solar thermal plant will win at 40MWe capacity is negligible. Opening the possibility for at least two winners within a total capacity auction of 40 MWe will encourage better bid development. This would,

however, require the ACT Government to commit to accepting bids for a total of 40 MWe (compared with the commitment to only 20MWe recommended in our initial report).

4.2. ***Minimum bid size***: Interviews indicate that international experience suggests the transition from "up to 1 MWe" to "greater than 2 MWe" size reflects a substantial transition in the financing and capability requirement of the project. By setting a minimum project size of 2 MWe, an automatic self-selection process will cull the great majority of the bids that would technically and/or commercially non-viable in the final bid round.

4.3. These recommendations are subject to the following caveats:

- that the ACT Government does not attach high priority to the delivery of one or two large scale ("demonstration") utility scale plants in the initial FIT auction process; and
- that smaller scale projects (e.g. embedded in commercial or community facility areas) would not be subject to greater DA risk and/or proportionate transaction costs than larger scale projects sited in rural areas.

  The former issue is a matter for judgment by the Government, taking account of the trade-offs in terms of competitive vigour in the FT auction process and other Government policy priorities. The latter could be addressed by appropriate changes to the planning regime governing such facilities, whether "embedded" or not.

FIT Auction Timetable & Processes – findings and recommendations

The interviews have suggested that for a 20MWe solar PV plant existing ACT planning approvals and grid connection processes would result in an elapse time of 27-31 months between auction announcement and the project generating electricity. If, however, expedited processes of the type used in NSW and Victoria were adopted in the ACT, this timetable could be reduced to 17-21 months.

The interviews revealed decidedly mixed views about the preferred Government role in site selection. The burden of interview evidence suggests, however, that, by nominating existing government controlled land packages thought suitable for large-scale projects, potentially higher value sites on private lease land will be disadvantaged.

Accordingly Heuris recommends that:

5. the ACT Government assess the NSW and Victorian planning processes being applied to the Infigen and TRUenergy Solar Flagship PV bids with a view to adopting similar processes with a goal of achieving DA within 6 months of commencement.
6. the ACT Government establishes close oversight of the Grid Connection Enquiry and Agreement negotiation process to ensure strict adherence to the timetable and process set out in law and regulation, and to ensure the Distribution Network Service Provider acts in a reasonable manner at all times in the negotiations.

7. the date for final bid submissions be set to occur not more than 2 months before the expected completion of DA and the Grid Connection Agreement (whichever is the critical path).
8. the ACT Government not get involved in nominating land packages but leaves this up to the bidders. A corollary of this is that the ACT Government does not get involved in the early establishment of solar resource assessment on specified sites.

1. Introduction

The ACT Government announced on 13th September 2010 that it will expand its electricity Feed in Tariff (FIT) scheme to encourage the construction in the ACT of up to 210MW of large scale (i.e. over 200KW) generation facilities. This is in support of its legislated objective of reducing ACT greenhouse gas emissions by 40% from 1990 levels by 2020.

Heuris Partners has been engaged by the ACT Government to provide advice on aspects of the FIT design and the FIT capacity auction process. An Initial Report on the ACT Solar Power Auction was prepared by Heuris Partners as the basis of discussion with the ACT Government on 15th November and the final version of this submitted on the 27th November 2010.

As a follow up to the Initial Report, Heuris Partners was asked to "execute some time critical elements of the solar power facility program leading to creation of underpinning legislation, execution of an effective auction and strong competition from bidders who will utilize the latest and most efficient technologies and balance of systems design". [1]

Specifically, Heuris was requested to:

1. conduct interviews with industry participants and write a report on industry's perception of risks that can be mitigated by the design of the auction and the mechanism for providing price support;
2. interview leading academics who have published in the area of auction design and report on the interview;
3. develop and execute a plan to represent the ACT large scale solar power opportunity to infrastructure developers and Chinese PV manufacturers who did not participate in the ACT EOI or the Commonwealth Solar Flagship programs; and
4. develop a program and identify appropriate participants for a conference hosted by ACT Government in March 2011 that would capture the latest thinking and best practices from recognized experts in the area of PV balance of systems design.

In view of the requirement to commence drafting legislation and completing cabinet submission and approvals by first quarter 2011, the work was requested to be completed by 15th December 2010.

Heuris was subsequently requested to not proceed with the work item on the development of a PV Balance of Systems Design conference.

This Report does not address Item 2 of the Terms of Reference (Consultancy Agreement-Support Industry Consultation and Market Development). While Heuris have established contact with Professor Flavio Menezes (Queensland University Department of Economics), he will be unavailable for an

[1] Terms of Reference are reproduced in Appendix 1

interview on the Hybrid Auction design question until his return to Australia on 18th December. Professor Menezes was the lead author of the 2003 article "Tendering and Bidding for Access: A Regulator's Guide to Auctions" cited in our Initial Report. He previously worked at the ANU.

The Report is in three parts.

The first part reviews the results of interviews with industry participants currently active in round two of the Commonwealth Solar Flagships program on their perceptions of risk and views on price support mechanisms. (Item 1 of the Terms of Reference).

The second part reviews the results of interviews with Australian infrastructure developers who are not currently participating in the Federal Government Solar Flagships program, to test their interest in the ACT large scale solar FIT capacity auction. (Part of Item 2 of the Terms of Reference).

The third part reviews the results of Heuris analysis of the Chinese PV supply and development industry and the results of our initial contact with leading Chinese PV developers.

2. Solar Flagship participant perceptions of risk and price support mechanisms

2.1. Summary of methodology

A Briefing Note was prepared by Heuris, in consultation with the ACT Government, to provide context to potential interviewees. (Copy included in Appendix 2)

Heuris then contacted senior executives in target companies by phone to introduce the purpose of the proposed interview, and to request time for a one to one and a half hour interview, either face to face or by phone with a relevant executive. A copy of the Briefing Note was sent by email to the nominated executive. Interviews were conducted by Anthony Baird and an electronic interview record prepared within 24 hours of the interview from hand written interview notes. The electronic record was then edited to remove all company identifiers, consistent with our commitment to interviewees and a copy was sent to the client.

Two of the companies contacted were unable to find time for an interview. Brian Hall, the CEO of Meridian Energy (Australia), a participant in the BP Solar bid in the Solar Flagships, was in New Zealand for much of the period available for the interviews. Ken Wooley, GM Development for AGL was on annual leave for the week prior to 6th December and cancelled an interview scheduled for 9th December when his travel plans changed on 8th December.

The names of the Companies and executives interviewed is summarised in Figure 1 below. The key messages from the industry interviews are summarised in the following sections under major issues. They report the executives' opinions on these issues, without Heuris interpretation or checking of underlying facts in individual cases. Heuris' inferences and conclusions in relation to the FIT auction process are shown separately in the discussion and recommendations section.

Figure 1: Executives & companies interviewed

Company	Solar Flagships Technology Focus	Solar Flagships first round outcome	Name	Title
TRUenergy	PV	Succeeded to second round	Mark Frewin	Manager Solar Flagships
Infigen	PV	Succeeded to second round	David Griffin	GM Development
Thiess	PV	Failed	Peter Valeontis Steven Walker	Manager Mechanical & Electrical Systems Bid Manager for Solar Flagship
John Holland	Solar Thermal	Failed	Bob Evans Ron Zahorodny	Senior Executive Manager Renewable Energy Strategy Development
Transfield Services	Solar Thermal	Succeeded to second round	Steve Macdonald	GM Business Development
Australian Council for Renewable Energy Australian Solar Council	Not applicable	Not appllicable	Bruce Godfrey	Director
Standard and Poors	Not applicable	Not appllicable	Parvathy Iyer	Analyst

2.2. FIT price support mechanism – "market risk" versus "no market risk" FIT design

All interviewees but one reported a clear preference for a "no market risk" FIT design as the path to a lowest expected FIT outcome. The interviewees favouring the "no market risk" approach included two companies who are currently electricity market participants in the NEM.

The factors cited in favour of the "no market risk" FIT design were:

1. Increase in expected number of bidders so competitive pressure in auction will increase. Bidders will no longer have to include a retailer or integrated generator/retailer in the bid group.
2. Several interviewees commented that a market risk approach would make it highly likely that ActewAGL would be the winning bidder. Their advantaged position as distributor would make it harder for other potential bidders to justify the expense of the bid process.
3. Financing support from banks will be stronger due to absence of market risk, particularly in a period of such high uncertainty about the future trajectory of wholesale electricity prices. Financing support will be evident most importantly in lower Debt Service Cover Ratios (DSCR's) leading to higher financial leverage for the "no market risk" approach.
    a. On a DSCR basis, the no market risk approach might attract a DSCR of 1.3 while the market risk approach would receive a DSCR of ~2.

   b. Two Interviewees specifically commented that with no market risk, debt/debt+ equity ratios of 70% would be readily achievable and perhaps higher given the low levels of output risk once the project was operating. Some small reduction in the debt margin was also seen as likely. By comparison, a market risk model was expected to limit the debt/debt+ equity to 55%.
4. Equity investors such as Australian super funds would be more attracted to the no market risk option and might reduce expected returns on equity from 14-15% to 11-12%. One interviewee commented that they had international equity investors from Europe and Japan who were looking for additional PV "no market risk" FIT investment opportunities. In Europe these projects deliver 7-8% equity returns but the higher interest rates in Australia and the FX risks meant that such investors would probably require a 10-12% return on equity.

One interviewee was ambivalent about the expected FIT price benefit that might flow from a no market risk FIT. He agreed strongly that the no market risk approach would increase bid competition but was less confident that the FIT outcome and total costs for the community would be less than in a market risk approach. In an extended discussion on this point, it became clear that his concern was focused on any large scale disturbance to electricity market rules. In the circumstances where the No Market Risk FIT auction was limited to 40 MWe capacity, he agreed that the project would be easier to debt finance and would attract a lower equity risk premium (provided that a technically capable bid was forthcoming and would not be a threat to the integrity of the market rules).

One interviewee highlighted that their starting point was that any FIT entailed sovereign/political risk and that their strong preference was for a substantial capital grant up front so they could then use the market to generate revenue in a way that was free of government interference. He highlighted the company's prior experience in major shifts in state and federal government policy, legislation and regulation that had "destroyed shareholder value".

2.3. Solar thermal versus photovoltaic?

No interviewee thought that solar thermal projects were advantaged at the 40 MWe capacity size. All but one interviewee expressed strong opinions that PV projects would be the lowest cost offers at this scale.

A company with international experience in solar thermal development commented that PV projects were likely to be lower cost at least up to the 100 MWe scale.

A less emphatic comment was made by a solar concentrating technology provider who said that at 40 MWe it would be "very challenging" for solar concentrating to compete against PV and argued "this was because of Chinese government subsidies". He asked whether the government would consider increasing the capacity at auction up to 80-100 MWe so that the solar concentrating technologies were better able to compete.

2.4. Key risks subject to ACT Government control

All interviewees highlighted the Planning/Development Approval Risk, Grid Connection Risk and the Power Purchase Agreement/Off-take Risk as three key project risks over which the ACT Government could exercise a critical controlling influence. In addition, Resource Assessment Risk was identified as an important risk in which the ACT Government could exercise substantial influence.

The interview data on these will be reviewed in turn.

2.4.1. Development Approval Risk

All interviewees saw Development Approval (DA) risk as one of the three key risks facing the project bidders. Without a DA, banks would not complete a debt financing package. Without debt support the project would not be built.

Two of the interviewed companies claimed to have some detailed understanding of the ACT planning process.

One of these had been involved in the 2009 EOI process. They identified the DA timetable as an "uncontrollable risk" given their understanding of the then administration of the ACT planning process.

Another company has more recently carried out an assessment of ACT sites for the Federal Government Solar Flagships bids. They identified a land package that they thought was highly attractive but required a planning approval to take the grid connection across a neighbouring piece of farm land. When they studied the details of the ACT planning process they abandoned the ACT as a potential site for a PV project. Their assessment was that the ACTPLA planning process offers no certainty of timetable or reasonable limits to opposition. They were also concerned about the potential for jurisdictional conflicts between the Federal Government, the National Capital Authority and ACTPLA. They contrasted it to the streamlined planning process available in NSW. They highlighted the key difference was the single point accountability within the NSW Government for running the process and integrating all the inputs from different government agencies.

This same company highlighted a concern about Native Title rights on certain categories of Crown Land that might frustrate development. They identified "TRIG Reserves" and "Crown Road Reserves" as land where any work that was not a public good would trigger a full Native Title process. They would not consider any PV project on land where Native Title had not been extinguished, claiming that placement of PV arrays on such land would not satisfy a public good test.

One of the interviewed companies described in detail a streamlined planning process for a solar PV site in another state. The company had identified a preferred land package. The government asked them to conduct a biodiversity survey, a cultural heritage survey and a three week community consultation process. At the conclusion of these processes with favourable outcomes, the Government passed a

legislated amendment to the regional planning scheme to specifically approve any PV project on the specified site subject to certain minimum conditions. This process took three months of elapsed time.

A copy of the legislated change to the regional planning scheme is attached in Appendix 3.

Interviewees had different perspectives on the likely elapsed time from the ACT Government announcing a FIT capacity auction process and the DA being granted by ACTPLA. The two companies with the greatest knowledge of ACT planning processes made the following comments.

- "Time table to DA once we have sourced land (2 months) is a minimum of one year and could be two years. Any environmental assessment will be expected to require a spring flora survey. This would occur in ACT in November 2011. So, difficult to see any DA being achieved before end Q1 2012. …By contrast, in NSW we are achieving DA's in 6 months for solar PV projects in Solar Flagships program."
- "We would estimate the time required to secure a land package and complete the DA in the ACT would be a minimum of 18 months"

Two other companies with experience in the DA process in Solar Flagships projects but no particular ACT experience both commented that the time they expected to spend in DA was about 18 months. Other companies with no ACT experience or knowledge of the ACT planning process commented they thought 6-9 months would be sufficient.

All the companies interviewed were clear that their FIT bids would be conditional upon the terms and conditions of the ultimate DA. They emphasised that the FIT bids could be called for prior to DA being achieved but that the bid would have a Condition Precedent linked to DA. The more immature the DA process is at the time of FIT bid closure, the greater the risked cost estimates for the remaining potential DA process costs and conditions that will be added to the FIT bid price.

Several companies discussed in some depth how this is a "game" that goes on in many project bid processes. Project developers are well experienced in submitting highly conditional but immature bids (that have cost them less time and money to develop) and then, following the award of the conditional bid, negotiating the value of the final unconditional price upwards. One of the most experienced project development companies interviewed said that they would take only 16-20 weeks from the announcement of the FIT auction to identify land packages, meet with the ACTPLA to understand the likely DA process, meet with ActewAGL to understand their attitude to Grid Connection, and then submit a conditional bid. But they emphasised the bid would be the subject of ongoing negotiations on Conditions Precedent including DA, Connection Agreements, final PPA and foreign exchange risk for the period between Bid Submission and Financial Closure.

The NSW Road Transport Authority was highlighted by one interviewee as a government agency who had learned to control this gaming by insisting on highly developed, mature bids that are close to financial closure. This means that they allow long time periods between calls for bids and closure of bids.

These same companies indicated they doubted that the ACT Government had strong experience and capability to manage any extended post- bid award negotiations. One highlighted that there are "clients agent" companies who are available to act for inexperienced clients opposite developers in managing these commercial negotiations.

2.4.2. Opportunities for ACT Government to reduce Development Approvals risk

Interviewees identified three opportunities for the ACT Government to reduce Development Approvals risk. These were to reform the existing ACTPLA planning process, to initiate Government sponsored DA applications for generic projects on nominated land packages, and for the Government to waive the ACT Government fees for the DA process.

These comments will be summarised in turn.

2.4.3. Reform of ACTPLA process

The company with recent experience in achieving planning approvals for Solar Flagship PV projects in NSW highlighted the "Critical Infrastructure Planning Process" as a "fantastic system" for project proponents. The key element was the role of the Department of Planning as the coordinating agency *and* decision maker. "They provide the fast track process timetable, handle all the intra-government conflicts and agendas, have constrained appeal rights and provide certainty of time frame."

The company with recent experience in achieving planning approvals in a Victorian PV project made similar comments about the critical role that the Department of Planning and Community Development played through providing strong leadership and coordination of the intra-government agendas.

This is consistent with Heuris advice in the 27th November report.

2.4.4. Government initiated DA process on nominated land packages

All companies were asked to comment on the risks and benefits of the ACT Government nominating one or two land packages under its control as the proposed site(s) and then initiating the DA process immediately with a streamlined process similar to that used in Victoria and NSW.

All the companies interviewed confirmed that this would likely reduce the elapsed time in the auction process before final DA by many months, and significantly reduce bid preparation costs.

Some noted that this was a process that could only apply to a PV project as the planning approvals issues in siting a solar thermal plant were much more problematic (noise buffers, visual buffers, toxic

chemical inventory management, air emissions from gas/solar hybrids, gas and water service connections).

Most companies commented that differences in insolation levels across the ACT were likely to be small for flat sites not subject to shadowing. The key economic siting issues were therefore grid connection costs and any conflicting land uses. Grid connection cost was critically dependent on distance to the grid and the status of the nearest substation. These companies thought that if the Government wished to drive to an early award of a FIT, then the balance of risks favoured the nomination of specific land packages with a Government driven DA for those land packages.

Three companies questioned the wisdom of ACT Government involvement in nominating land packages.

- One of these companies had prior experience in the 2009 EOI process. In the 2009 EOI process, they reviewed the land packages nominated by the ACT Government. They also conducted a "Constraint Mapping Site Optimisation Study" to identify all the high potential land packages in the ACT. They identified "several sites" on private land that offered better grid connection opportunities and were also more publicly visible (one of their criteria was for high levels of public visibility). The Constraint Mapping Study took approximately 6 weeks to complete. As a result of this experience, this company recommended that the Government either stay completely removed from land selection, or, if the political timetable requires something faster than the usual DA process, then the Government could conduct their own Constraint Mapping Study and put the 2 highest potential sites up as nominated sites (regardless of whether they are controlled by the ACT Government or are private leasehold). Estimated costs for such a study were $75-80,000. SKM, GHD, PB Power and Worley Parsons were all seen as capable of conducting such a study for the Government.
- One company with international PV project development experience was opposed to the idea of the Government nominating land packages with a view to facilitating 20 -40 MWe sized individual projects. They had a strong view that there were likely to be several siting opportunities for projects in the 2-10 MWe scale that offered significantly lower grid connection costs compared with single large projects at the 20-40 MWe scale. They advised that they were already working on a potential site for 2-3 MWe that looked to offer very low grid connection costs after some preliminary assessment of the grid access. Some of these sites might be ground based arrays and others might be on commercial buildings and infrastructure. This company also argued that a 40 MWe capacity auction should offer "prizes" for more than just one bidder. If there was only to be a single bid award, the risk of bidding was likely to be too high to justify the cost of bidding. They cited this as a significant problem with the Solar Flagships program.
- One company with experience in Australian infrastructure development also asked about the opportunity at the 2-3 MWe scale. They had identified several potential "building connected"

sites where grid connection costs were potentially lower than for large sites although they had not specifically investigated the cost of grid access.

2.4.5. Waiving of ACTPLA Development Approval fees

Several companies highlighted the cost of bidding as a significant barrier to their interest, given the track record of state and Federal government "initiatives" on renewable energy project funding.

They commented that the best outcome in the bid process was for the ACT Government to receive several well developed, technically mature and capable project bids and contrasted this with the 2009 EOI proposals and the Solar Flagship Phase 1 bids. They highlighted the conflicts faced by bidders in determining if money spent on maturing a bid through project design, grid connection negotiations and DA was worth the cost, or if they would be better placed by putting in lower priced highly conditional bids for much less cost and effort.

Several companies enquired if the ACT Government would consider supporting the final bid costs for a pre-qualified shortlist (as had been done for the second part of the Solar Flagship process). One company suggested that the minimum the Government should do was to waive the DA process fees.

2.5. Grid Connection Risk

All companies interviewed identified Grid Connection costs and timing as equal in importance to the Development Approvals risk. No financial closure was possible until a Grid Connection Agreement had been signed.

Several of the interviewees had very colourful opinions about the "unreasonable" attitudes and behaviours of Distribution Network Service Providers (DNSP's) in negotiating Grid Connection Agreements for wind and solar energy projects.

While all recognised the conflicting interests of the project developers and DNSP's they emphasised the important role of the ACT Government in ensuring that the Connection Agreement process timetable guidelines and requirements under National Electricity Law and Rules are adhered to by ActewAGL. One company cited a recent experience in NSW where they made a Connection Enquiry but the DNSP took 4 months to acknowledge receipt of the Enquiry.

The advantage that ActewAGL would be seen to have as a project bidder was highlighted by several companies in the context of grid connection risk. This was seen as an additional and important reason for an explicit ACT Government process of supervision of the behaviour of the DNSP in negotiating a connection agreement.

One company commented that the involvement of an experienced grid connection negotiation manager working on the side of the project developer could assist in any grid connection negotiation. (His company offered these services.)

Several companies commented that, in the context of the discussion about Government initiated DA processes for PV projects on selected land packages, there were some common parts of the Grid Connection Enquiry and evaluation/study process for all PV bidders that could be initiated in parallel with the DA process. While the final details would remain ultimately dependent on the project scale (10 MWe versus 20 MWe versus 40 MWe) and on the equipment selection (particularly the inverters and step-up transformers), substantial elements of the Grid Connection Enquiry process and work would be common to all.

One company highlighted the importance of early identification of "distribution loss factors" for each site, arguing that the loss factors were predominantly driven not by variations in the PV equipment configuration but by the pre-existing grid status at the site. They cited their experience of a wind farm that negotiated a Connection Agreement with a marginal loss factor of 0.92 only to have the DNSP subsequently downgrade this to 0.85. This change meant they lost 7% of sales revenue after the project had been built. The same company highlighted a wind site in another state that had a distribution loss factor assessed at 1.08 so they were gaining revenue.

2.6. Off-take Risk

All companies interviewed highlighted the importance of the Power Purchase Agreement (PPA) and the financial strength of the off-take counter party. Financial closure would not occur without a signed PPA with a credible counter party.

The duration of the PPA was important to the extent of debt available to the project. One interviewee commented that in a recent wind project PPA of 10 years duration, bank finance was limited to 50-60% gearing but that a 20 year PPA would allow for 70% gearing.

One interviewee highlighted their concern in signing a PPA with the ACT Government. Despite the relative protection of contract law, they would not want to have a contract that required the Government to make a budget allocation each year.

In the context of the "no market risk" FIT model, several interviewees commented that the Distribution NSP was the preferred off-take counter party. They believed that under AER rules, the DNSP could declare it was subject to a "change of law" and seek a specific jurisdictional scheme allowing it to "smear" the costs of the FIT across the retailers in proportion to their share of load. This would maintain the competitive neutrality of the retailers and was seen as consistent with the current NEM rules.

ActewAGL as the DNSP was seen as a financially strong off-take counterparty.

All companies agreed that the PPA and identity of the Off-take Counterparty were critical to the definition of the asset up for auction and would need to be almost fully specified very early in the bid process.

2.7. Resource Assessment Risk

All companies interviewed mentioned the growing awareness of banks about the importance of the quality of the resource assessment as this has important implications for output uncertainty.

The adverse experience of banks with over-optimistic output projections in wind farm developments over the past decade in Australia and internationally was cited as the reason for heightened bank interest in resource assessment.

The ongoing Solar Flagships Program has increased bank knowledge about solar resource assessments. Banks that might previously have been happy to finance a solar project on the basis of satellite assessments of insolation now expect to have a site-specific insolation assessment. Several interviewees suggested that the ACT Government should initiate site-specific insolation and broader meteorological and air quality studies (wind strength and dust levels) on any nominated land packages.

One interviewee said that banks were looking for a counter party to the insolation assessment who is prepared to offer a warranty on the assessment, thus accepting financial liability if the site insolation outcome is lower than warranted. He indicated that there are several engineering service companies in Australia (including his own) who offer such a service. He commented that he doubted the value of any insolation data package gathered by the ACT Government unless the project developer or the Government was prepared to take on the warranty risk.

This output risk minimisation focus is reported to be driving project developers to longer periods of site-specific insolation measurement. Several interviewees commented that banks want at least one year of site data to achieve the most favourable financing terms.

2.8. Discussion of findings and recommendations

2.8.1. FIT design - market risk versus no market risk

The interviews confirm that a “no market risk” FIT will likely attract a larger number of bidders and is likely to provide a lower FIT price outcome. This is due to expected heightened competition from technically and financially capable bid groups who might not otherwise enter the FIT capacity auction, and the lower cash flow volatility allowing higher expected levels of project financial leverage, lower debt margins and lower expected equity returns.

Heuris considers the no market risk FIT will also allow the potential for low cost ACT project opportunities in the 2-10 MWe scale to be more completely evaluated in the auction. These are less likely to be a focus of interest in a market risk FIT auction that is likely to be dominated by integrated electricity generators/retailers.

Accordingly, Heuris recommends that the ACT Government adopts a no market risk FIT.

2.8.2. FIT design- contract duration

The interviews confirm that a longer duration FIT (20 to 25 years) will likely support higher levels of financial leverage and so reduce the expected FIT price beyond that simply due to the extended duration, compared with a 10 or 15 year FIT term.

Heuris recommends that the ACT Government adopt aFIT contract duration of not less than 20 years.

2.8.3. FIT design - REC inclusive versus REC exclusive

The interviews confirmed that a REC inclusive FIT price (where the project is able to sell a stream of REC's in addition to selling electricity) will be substantially lower than a REC exclusive FIT price.

It is also likely that a REC inclusive FIT price will provide some degree of advantage to large integrated electricity generator/retailers as bidders as they are likely to be more confident in their valuation of REC's over the FIT period. Bidders with low levels of confidence in their understanding of the long term REC market will likely ascribe substantially lower expected values to REC's.

In keeping with our initial report, Heuris therefore recommends that the ACT Government requires bidders to submit FIT bids on both the REC inclusive and REC exclusive basis so it can assess the market value of the REC stream before making a decision.

2.8.4. FIT design - minimum and maximum size of qualifying bids

The interviews confirm that it is unlikely that a solar thermal FIT bid at 40 MWe will be competitive with PV project bids at 20 – 40 MWe scale. Indeed, it is not clear from the interviews that any solar thermal projects will be bid. Heuris cannot exclude the possibility that a consortium using the Wizard Power "big dish" technology would bid a 40 MW gas hybrid plant. The interviews and international analysis suggest that the technology risk, the insolation levels in the ACT and the additional costs of a gas hybrid augmentation will likely make such a plant uncompetitive.

If a single 40 MWe project bid (either PV or solar concentrating) is an acceptable bid size, the perceived bid risk (risk of not winning) for all bidders will be at least doubled compared to a maximum project bid size of 20 MWe or lower. Such a "one winner takes all" design in the Solar Flagships program was criticised by several of the interviewed companies as a major reason for poorly researched bids being submitted in Round One. One of the infrastructure developers specifically commented that unless there was a ratio of 3:1 or less for final qualified bidders: winning opportunities, then they would not expend money on detailed project design and cost estimation and so would submit a more conditional FIT bid. Such a pattern of behaviour, if replicated, would lead to a more complex FIT auction outcome for the Government as it sought to manage its interests in an extended game of negotiations on FIT "Conditions Precedent" clauses.

Heuris considers that, on balance, the maximum bid size should be no more than 20 MWe. The effective likelihood that a solar thermal plant will win at 40MWe capacity is negligible. Rather, by opening the possibility for at least two winners within a total capacity auction of 40 MWe, this will encourage better

bid development. This would, however, require the ACT Government to commit to accepting bids for a total of 40 MWe (compared with the commitment to only 20MWe recommended in our initial report).

A minimum bid size of 200KWe would appear to be possible within the currently announced details of the large-scale solar FIT policy. Allowing bids of this size into the FIT capacity auction can be expected to add significant work and potential risk to the Government. Many interviewees commented that allowing projects in the size range of 200KWe up to 1-2MWe would ensure that a large number of bids would surface from inexperienced groups without the capability to ensure financing and project delivery. These will need to be knocked out in the pre-qualification process to avoid a final bid process where larger, more capable players are expected to spend funds in maturing up high quality project designs against a large group of small players who they regard as incapable of delivery. It is possible that several of the larger and more capable bidders would not proceed in such circumstances and this would reflect badly on the auction process.

In consequence, if small size bids (say, less than 2 MWe) are allowed into the pre-qualification process, then a much more challenging pre-qualification screening process must be developed and applied.

Heuris considers that it is, on balance, preferable to set a minimum bid size of ~2 MWe. Interviews indicate that international experience suggests the transition from “up to 1 MWe” to “greater than 2 MWe” size reflects a substantial transition in the financing and capability requirement of the project. By setting a minimum project size of 2 MWe, an automatic self-selection process will cull the great majority of the bids that would technically and/or commercially non-viable in the final bid round, thus reducing administrative overheads and transaction costs. This also makes the process of pre-qualification simpler and less likely to generate challenge from excluded bidders.

Heuris considers that the 2 MWe minimum bid size will adequately allow the potential opportunities in various privately controlled sites to be explored in the auction. There is evidence that potential bidders have already identified such sites. A 20 MWe maximum project size might also reduce challenges from the Australian Energy Regulator on the appropriateness of a specific jurisdictional scheme to accommodate the “no market risk” FIT design.

Heuris recommends that the ACT Government set the auction rules to require bidders to submit bids for projects with capacity in the range of 2 to 20 MWe, and that it commits to accepting the lowest cost bids for 40 MWe capacity, guaranteeing that at least two separate winning projects will proceed.

These recommendations are subject to the following caveats:

- that the ACT Government does not attach high priority to the delivery of one or two large scale (“demonstration”) utility scale plants in the initial FIT auction process; and

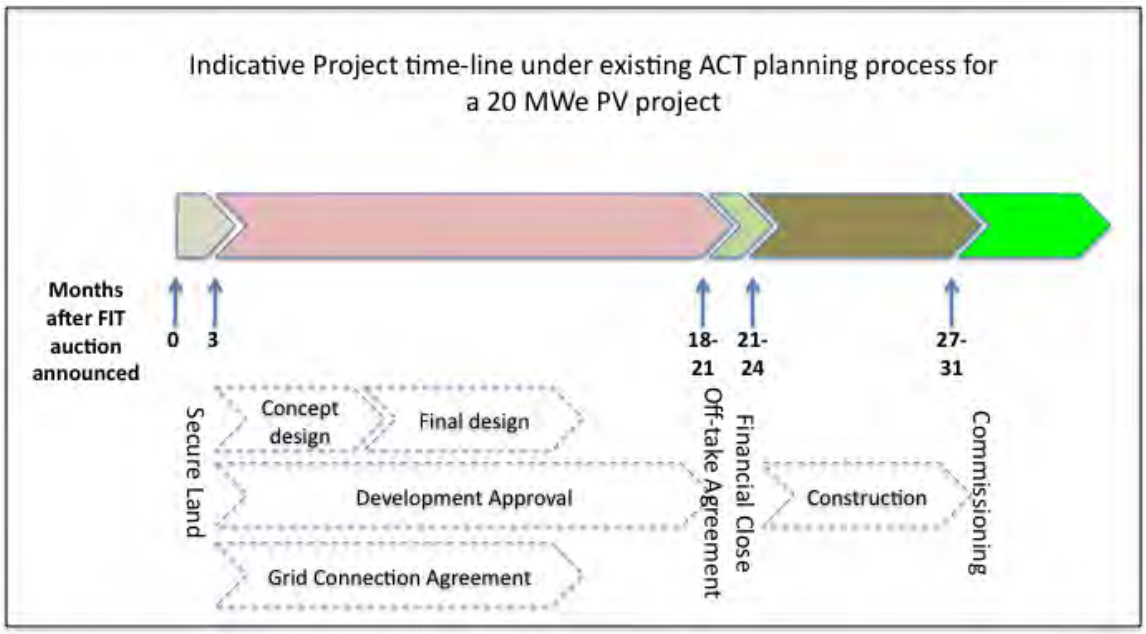
- that smaller scale projects (e.g embedded in commercial or community facility areas) would not be subject to greater DA risk and/or proportionate transaction costs than larger scale projects sited in rural areas.

The former issue is a matter for judgment by the Government, taking account of the trade-offs in terms of competitive vigour in the FT auction process and other Government policy priorities. The latter could be addressed by appropriate changes to the planning regime governing such facilities, whether "embedded" or not.

2.9. FIT Auction timetable linkage to Project Development timetable

The interviews suggest the following indicative project development timetable will apply to a 20 MWe PV project under existing ACT planning processes (Figure 2).

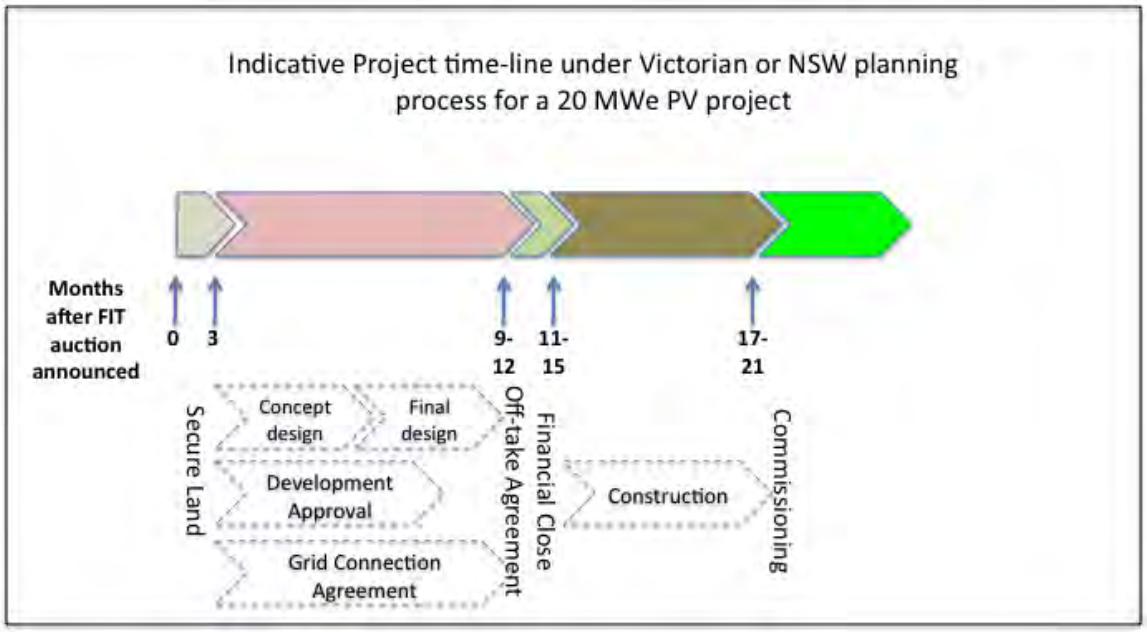
Figure 2: Estimated project delivery timeline - current planning processes



Development approval is expected by most interviewees to be the critical path element, beginning 2-3 months after the auction announcement when a preferred site has been identified. Development approval is expected to take 18 months during which time a Grid Connection Agreement will have been negotiated. A further 2-3 months is then expected while the off take agreement is signed and financial close occurs prior to the commencement of construction which will take 6-7 months. The project is expected to commence sales of electricity 27-31 months after the auction is announced.

Evidence from the interviews suggests that if the planning processes applicable to the current Solar Flagships PV bids by TRUenergy and Infigen in Victoria and NSW were applied in the ACT, a substantially shorter project timeline would be achieved. Development Approval could be achieved in 6 months after land was secured (8-9 months after the auction was announced). Grid Connection Agreement negotiations would likely become the critical path element. Construction would be expected to commence 11-15 months after the auction was announced and electricity sales would occur after 17-21 months (Figure 3).

Figure 3: accelerated project delivery timeline



Heuris recommends that the ACT Government assess the NSW and Victorian planning processes being applied to the Infigen and TRUenergy Solar Flagship PV bids and adopt similar processes with a goal of achieving DA within 6 months of commencement.

Heuris also recommends that the ACT Government establishes close oversight of the Grid Connection Enquiry and Agreement negotiation process to ensure strict adherence to the timetable and process set out in law and regulation, and to ensure the Distribution Network Service Provider acts in a reasonable manner at all times in the negotiations.

Heuris recommends that the date for final bid submissions be set to occur not more than 2 months before the expected completion of DA and the Grid Connection Agreement (whichever is the critical path). This is to reduce the level of conditionality of FIT bids.

2.10. ACT Government role in Site Selection

Our interviews have revealed conflicting views about the preferred Government role in site selection.

Three companies were against government involvement. One had acted as an engineering services consultant in the 2009 EOI process and believed that they had found higher value sites than government nominated packages.

Two companies interviewed have identified ACT sites suitable for PV projects in the 2-3 MWe scale that they believe might offer lower FIT prices than sites for large scale projects (10-20 MWe). This is because of lower expected Grid Connection costs.

Subject to Government policy judgments on the issue of appropriate minimum bid scale, Heuris considers that these opportunities should not be disadvantaged by ACT government action to nominate sites thought more suited to larger scale projects.

Support for ACT government involvement in nominating land packages was driven primarily by the desire to simplify the bid process and reduce bidder costs and risks in finding land. These companies had no prior experience in assessing ACT PV opportunities.

The burden of interview evidence suggests that, by nominating existing government controlled land packages thought suitable for large-scale projects, potentially higher value sites on private lease land will be disadvantaged.

On balance, Heuris recommends that the ACT Government not get involved in nominating land packages but leaves this up to the bidders. ACT Government action to strengthen the coordination in the ACT planning approvals process and strengthen the oversight of the Grid Connection Agreement negotiation process are therefore the key risk management actions we recommend to limit the development timetable.

A corollary of this is that the ACT Government does not get involved in the early establishment of solar resource assessment on specified sites.

3. Assessing the interest of companies who are not currently active in Solar Flagships Round 2

3.1. Summary of Methodology

Heuris identified potential target companies with experience in Australian infrastructure development projects and energy infrastructure operations who might be attracted to a FIT capacity auction if market risk was excluded from the project. The subset who are not involved in ongoing Solar Flagship bids are the three subsidiaries of the Leighton Holdings Group (Leighton Contractors, John Holland Construction and Thiess Ltd), UGL, Ausenco and Worley Parsons. Heuris has conducted interviews with all these companies other than Ausenco. Time constraints have prevented us interviewing Ausenco. Transfield Services was interviewed because of its role in a solar thermal bid group in the Solar Flagships but the interview was extended to understand Transfield Services interest in a PV focused bid.

In addition to these infrastructure players, we have conducted interviews with several solar thermal and PV companies who did not make it into the Solar Flagships Round 2 bid process. These are: Q-cells (a German PV module manufacturer and utility scale PV project developer);CBD Energy (an Australian renewable energy developer with strong ties to Chinese wind turbine and PV module suppliers); Wizard Power (an Australian solar thermal technology developer who is providing “big dish” solar concentrating technology to the Federal Government sponsored 40 MWe “Solar Oasis” project being developed by National Power and Sustainable Energy Partners at Whyalla); and Abengoa Solar (a Spanish solar thermal project developer and operator)

Companies were contacted by phone or email by Anthony Baird. All expressed an interest in being interviewed and were sent a copy of the Briefing Note (Appendix 2). Two interviews were carried out by phone (Worley Parsons and UGL) while the others were conducted face to face. A hand written interview record was transcribed electronically within 24 hours of the interview and then this was edited to remove any company identifiers. A copy of each unattributable interview record was sent to the client.

The names of the Companies and executives interviewed is summarised in Figure 4 .

Figure 4: Companies interviewed outside the Solar Flagship program

Company	Technology Focus	Name	Title
CBD Energy	PV	Jeff Bye	GM CBD Solar
Q Cells Australia	PV	Keera Single	Manager Business Development
Abengoa Solar	Solar Thermal	Alfonso Vega de Seoane	GM Business Development Australia
Wizard Power	Solar Thermal	Artur Zawadski	Manager Business Development
Leighton Contractors	Neutral	Graham King	Manager Business Development
UGL	Neutral	Paul Katz	GGM Operations and Development
Worley Parsons	Neutral	Paul Ebert	Subsector Lead, Future Energy

3.2. What would make your company interested in bidding for the ACT large scale solar FIT capacity?

All the companies interviewed said that the "no market risk" FIT structure makes the project relatively more attractive to them. They all shared the view that a market risk FIT tilts the competitive balance strongly in favour of integrated generator /retailers. Two of the Australian infrastructure developers/engineering service providers specifically said that if the FIT exposed them to market risk they would not consider bidding.

Because of their relatively strong balance sheets the infrastructure developers mostly indicated this made them more able to take some equity risk in the construction phase. Two infrastructure companies, however, said they would not take any equity risk post construction and as a bidder would ensure that they had pre-sold all equity in the post construction phase prior to bidding.

The infrastructure developers all had similar views on the importance of Development Approvals Risk, Grid Connection Risk and Off-take risk. As a group they saw they had much experience in dealing with bid opportunities where such significant uncertainty remained at the time of bid award. They were as a group much more comfortable with an early bid closure and a highly conditional FIT award. They saw this "highly conditional FIT award" as ultimately working in their favour as they were comfortable in managing the subsequent negotiations on the Conditions Precedent with an inexpert Government client.

While they acknowledged the opportunities available to the ACT Government in reducing these key risks, the infrastructure developers were less concerned by the uncertainty and so attached less value to the potential Government efforts at risk reduction.

Two of the infrastructure companies commented that there were unresolved strategic issues in their parent company or Board relating to the materiality of this scale of PV projects and the nature of the risk exposure. Given that the total project capex is likely to be less than $180 million for a 40 MWe project and that 50% of this will comprise PV equipment supply, the margin available to the developer (if not the PV supplier) is very small. The ongoing operations contract with a duration of ~ 20 years was, however, very interesting to several of the companies as they highly valued the cash flow stability this brought to a portfolio of more volatile project cash flows. It was the prospect that Australia might see a series of utility scale projects over the next few years, each with long term operations/maintenance contract options attached, that was particularly attractive to this group of companies. The longer duration FIT was seen as more valuable than a short duration FIT. One of these two infrastructure developers said they would not participate as a bidder as their business model was a simple one of taking EPC risk only (engineering/procurement/construction)

All the infrastructure companies appreciated the growing competition in the PV module supply market and saw themselves well placed to use the competitive pressures to find a quality module supplier. They all appreciated the opportunity to source quality modules in China as well as in traditional supply regions like the USA, Japan and Germany.

Some saw themselves forming Special Project Vehicles as the corporate structure best suited to managing the risks between module supply warranty, PV system design, planning risk and construction risk. The SPV would have an Australian infrastructure developer, an equity investor and a PV systems supplier/designer as the three key players.

Others with greater experience in PV system design saw a simpler bid structure where they would lead the planning approvals, system design, procurement and construction while using the competitive market to source PV equipment.

One of the solar thermal companies interviewed said they would bid a PV project into the ACT FIT auction rather than a solar thermal project as they had extensive international PV experience and a solar thermal plant would be much more expensive than PV at the 40 MWe scale.

3.3. Discussion

Heuris considers that it is reasonably likely that two of the Australian infrastructure developer/operators not currently involved in PV projects will look to form ACT PV bidding groups if a no market risk FIT is offered. Both will seek to bring equity investors into their bid groups though prior sales agreements conditional on project completion.

One of these companies is likely to seek to partner with an international PV module supplier and system designer. The other is likely to simply procure PV modules and equipment in a tender process.

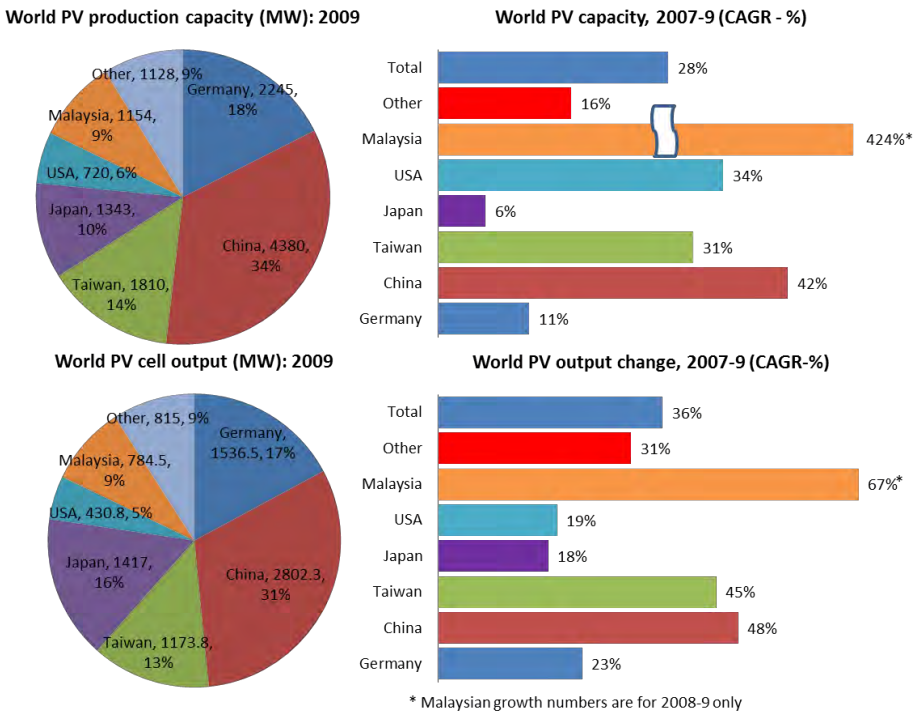
Heuris also considers it likely that both Q Cells and Abengoa Solar are likely to separately participate in a no market risk FIT capacity auction. Both will take the lead role in project design, engineering and procurement, look to find a local partner to assist with planning approvals and elements of project construction, and bring along international and potentially Australian equity investors.

4. Assessing the interest of Chinese PV suppliers in the ACT solar FIT capacity auction

4.1. China's place in the global PV industry

By the end of calendar 2009, global solar PV cell production capacity of all types totalled some 13Gigawatts (GW). Production totalled some 9GW. For the three year period 2007-9, total world PV capacity and output have grown at compound annual average growth rates (CAGRs) of 28% and 36% respectively. Over the same period China's solar PV production capacity and output recorded CAGRs of 42% and 48% respectively[2]. As a result of this rapid growth (mostly destined for export markets such as Germany, USA and Spain), China now accounts for more than a third of global capacity and output, nearly double that of its nearest rival, Germany (Figure 5). Increasingly, however, Chinese domestic PV demand will underpin capacity growth as China seeks to ameliorate the growth in its greenhouse gas emissions.

Figure 5: Changes in global solar PV capacity and output[3]



[2] These growth rates have only been exceeded by Malaysia where capacity has increased from virtually zero in 2007 to >1100MW in 2009 as a result of strategic decisions by the US companies, Q-Cells and First Solar, to open major new production facilities in the country.

[3] Hirshman, W. P.," Photon International, March 2010

There are two basic types of solar PV cell technology employed in module production, crystalline silicon (c-Si) and thin film – see Box for a description of the key attributes of the technologies. In 2009, over 80% of modules produced were based on c-Si.

China's predominant position in solar PV cells and modules production is likely to increase. Chinese companies are expected to account for seven (and, in practice, eight, with Chinese controlled Canadian Solar) of the ten largest solar cell and module manufacturing expansion programs in 2010 in the industry.[4] Including Canadian Solar, these Chinese companies are projected to expand their module manufacturing capacity in China by 7.3 GW in 2010, representing 80% of the total ~9GW increase comprising the ten largest capacity expansions (Figure 6).

Of these increases, 18% comprised c-Si capacity expansions, with most thin film manufacturers pausing to soak up existing capacity before possible expansions in 2011.

Box 1: Solar PV cell types

Module design and manufacture is based around two different technologies - crystalline silicon and thin film

Crystalline Silicon (c-Si)

Crystalline silicon panels are made by putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are then assembled together in multiples to make a solar panel. Crystalline silicon, also called wafer silicon, is the oldest and the most widely used material in commercial solar panels. There are two main types of crystalline silicon panels:

- *Monocrystalline silicon (also called single crystal):* the solar cells that are cut from a piece of silicon grown from a single, uniform crystal. These panels are among the most efficient yet most expensive on the market. They require the highest purity silicon and have the most involved manufacturing process.
- *Multicrystalline silicon (also known as polycrystalline)*: these solar cells that are cut from multifaceted silicon crystals and are the most common solar panels on the market, being less expensive than monocrystalline silicon. They are also less efficient, though the performance gap has begun to close in recent years.

Thin Film

Thin film solar panels are made by placing very thin layers of semiconductor material on to various surfaces, usually on glass. These solar panels offer the lowest manufacturing costs. There are three main types:

- *Cadmium Telluride (CdTe)*: a semi-conductor compound formed from cadmium and tellurium. CdTe solar panels are manufactured on glass and are the most common type of thin film solar panel on the market and the most cost- effective to manufacture. Today, CdTe is not as efficient as crystalline silicon, but CdTe panels perform significantly better in high temperatures.
- *Amorphous Silicon*: the non-crystalline form of silicon. It can be deposited in thin layers onto a variety of surfaces and offers lower costs than traditional crystalline silicon, but is less efficient at converting sunlight into electricity.
- *Copper, Indium, Gallium, Selenide (CIGS)*: a compound semiconductor that can be deposited on to many different materials. CIGS has only recently become available for small commercial applications.

[4] http://www.isuppli.com/Photovoltaics/News/Pages/Chinese-Companies-Dominate-Solar-Manufacturing-Spending-in-2010.aspx

Figure 6: Top ten additions to global solar PV module capacity- 2010

Company	Country	2009 module capacity (MW)	2010 Additonal module capacity (MW)
Motech	Taiwan	600	680
Jinko Solar	China	0	700
Trina Solar Energy	China	600	700
Canadian Solar	China	420	780
Tianwei New Energy	China	500	800
Yingli Green Energy	China	600	800
J A Solar	China	800	980
Suntechpower	China	1100	1000
REC	Norway	150	1100
LDK Solar	China	33	1500
Total		4803	9040
Of which Chinese capacity		4053	7260
Perecentage in China		84%	80%

Delivery of all these expansions would mean China would account for some 50% of global PV capacity in 2010/11.

4.2. The solar PV value chain

The solar PV value chain for crystalline silicone is shown in Figure 7 below

Figure 7: c-Si value chain

Based on where it sits in the value chain, a company can be defined as:

- Silicon supplier: producing high purity polycrystalline silicon production.
- Cell and module supplier: a producer of both cells and modules (some companies in this category also provide services in system design and installation).
- System provider: provision of design, installation and construction service to PV power plant development and/or undertakes project development.

Integrated supplier: a producer of high purity silicon, wafer, PV cells and modules and provider of engineering design and installation services for PV systems and large utility scale PV power plants.

4.3. Structure of Chinese PV industry

4.3.1. Coverage of the supply chain

China has 20 high purity silicon suppliers and over 500 solar PV related companies and research and design institutions. Most Chinese PV companies are cell and module suppliers using monocrystalline and polycrystalline technology, with polycrystalline products accounting for some two thirds of the total output. (Thin film production has just started, accounting for some 18% production capacity in 2009.)

Only a small number of Chinese PV companies are integrated to upstream high purity silicon production.

Solar PV power plant development is a relatively new field for China's PV industry. Of the current estimated global PV capacity of 22 GW, nearly 73% of the capacity is installed in European countries. China has so far only installed some 600MW of solar PV generation capacity. Chinese companies have therefore tended to act more as a cell or module supplier than system integrator.

The major players in China are:

- *Silicon supplier*: DAQO Group, Renesola.
- *Cell and module supplier*: Suntech Power, JASolar, Solarfun Power, TrinaSolar, Canadian Solar, Jinko Solar.
- *System provider*: China Technology, Golden Concord Limited (GCL), Poly Energy
- *Integrated supplier*: Yingli Green Energy (YGE), LDK Solar,

Compared with many other major industry sectors in China, the Chinese solar PV industry is predominantly owned and operated by the private sector. At the end of October 2010 twelve Chinese solar PV companies were listed in NASDAQ and New York Stock Exchange, i.e: Suntech Power, Yingli Green Energy (Subsidiary of Yingli Group), LDK Solar (Subsidiary of Saiwei Group), JASolar, Solarfun Power, TrinaSolar, CanadianSolar, Renesola, China Sunergy, China Technology, DAQO Group and Jinko Solar.

Operational and financial profiles for each of these companies are at Appendix 4. The reminder of this summary report provides an overview of the Chinese solar PV industry's competitive positioning and capabilities.

4.4. Chinese companies' competitive positioning

4.4.1. Export orientation

China's solar PV output is very strongly export oriented, with the development of the industry driven by European renewable energy policy, especially feed in tariffs for solar power in Germany and Spain.

Currently, about 95% of Chinese PV production is exported, the majority focused on European markets. For example, in 2009:

- ~71% of Solarfun Power's income came from exports to Germany.
- European sales accounted for 93%. of TrinaSolar's revenue; and
- Germany and Europe accounted for 63% and 90% respectively of Yingli Green Energy's sales revenue.

This strong export orientation is expected to continue. This is despite the ramp up of domestic demand via the central government's Gold Sun solar PV initiative originally launched in 2009 to mitigate the impact of GFC on domestic solar PV industry but also forming a part of China's greenhouse gas mitigation strategy.

4.4.2. Chinese manufacturing costs

Chinese PV manufacturing costs are competitive in international market, reflecting scale economies and low material and labour costs. Chinese manufacturing costs have declined quite sharply recently driven mainly by the collapse of polysilicon prices. The availability of high purity silicon has been a constraining factor for Chinese PV industry because of the absence of Chinese technical capability in this area. Until recently only eight companies in the US, Japan and Germany had the key technology for making high purity silicon for PV use. Prior to the financial crisis, shortage of supply and rising silicon prices prompted large Chinese investment in domestic high purity silicon production, albeit based on older generation equipment and technology. This capacity came into production at the same time as global demand had been sharply reduced by the GFC, leading to a sharp drop in silicon prices. Before the crisis, the price of high purity silicon peaked at some US$300/Kg, accounting for 75%-85% of total costs of cells[5]. During the height of the crisis it fell to US$40-50/Kg and has since stabilised at around US$100/Kg.

The rapid expansion of Chinese PV cell and module capacity described above is likely to put short term upward pressure on silicon prices but the industry believes the spot prices of both monocrystalline and polycrystalline silicon wafers will continue to fall in the long run as silicon wafer capacity catches up with demand.[6]

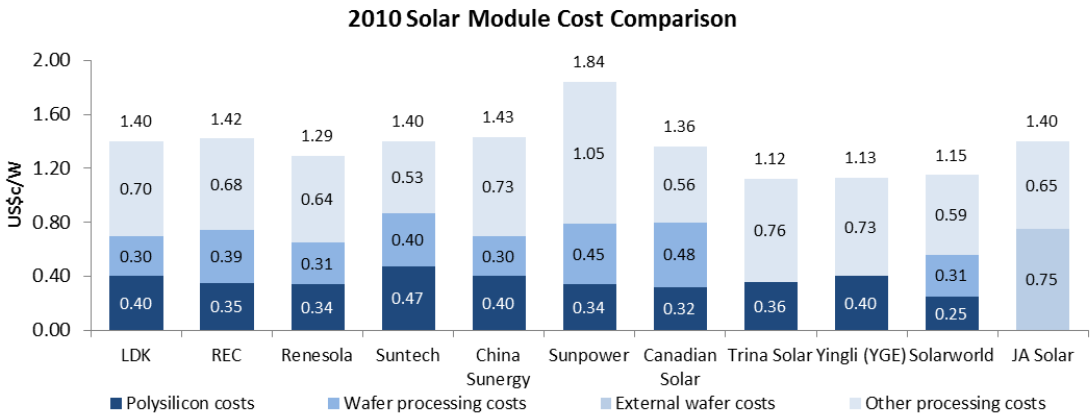
Following the fall in silicon prices, in January 2010 Chinese PV cell and module prices dropped by 30-40%, with PV cell and module prices quoted in the range US$1.3-1.75/KW and US$1.8-2.2/KW respectively. These data are supported by Barclays Capital analysis of US listed solar companies in April

[5] Photoelectric News website 21 Jan 2010 article "Chinese PV cell manufacturers grab overseas market with low price". www.ofweek.com

[6] "We believe near term tightness in silicon wafer capacity might lead to increases in the unit price of silicon wafers in the near term. However, ongoing rapid capacity expansion of silicon wafering capacity globally will alleviate such temporary wafer supply tightness in the second half of 2010 and beyond". (Suntech 2009 annual report)

2010 that showed average Chinese module costs were around US$1.35-1.40/KW, lying in a range US$1.12-1.83/KW (Figure 8).

Figure 8: Module cost structures for US listed Chinese PV module producers[7]



Innovation by leading Chinese PV companies is also driving down per KW PV module costs. For example, Suntech has increased its mono- and poly-crystalline cell conversion efficiency from 17% and 15% to 19% and 17%, equivalent to reducing the per KW cost by 10%.

In terms of current international competitiveness, the CEO of JA Solar has claimed the following Chinese cost advantages over US and European manufacturers, based on 2nd quarter 2010 data[8]:

- modules only - 10%;
- cell + module + installation - 22%; and
- silicon+ cell + module - 30%.

These advantages may have been eroded by the decline in the Euro. Future competitiveness will also be challenged both by any revaluation of the RMB and the expansion of PV capacity outside Europe and the US (for example, a major capacity investment by First Solar in Malaysia).

At the same time, however, Chinese companies are likely to remain fiercely competitive in maintaining/growing market share to validate their announced capacity expansions. By way of example, in a recent FIT auction for a 10MW solar project in Dunhuang, Gansu Province in China, more than 10 consortia bid below 2 Yuan/KWh (US$0.29/KWh)[9]. The winning bid was 1.09 Yuan/KWh (US$0.16/KWh).

[7] Heuris research/Barclays Capital

[8] Fang Peng, CEO of JASolar in an industry forum on 13 Oct 2010

[9] Dunhuang project is the third solar PV demonstration project in China under the Golden Sun initiative.

Companies participating in the auction claim that within two years Chinese companies will be able to bid in solar PV electricity projects at 1Yuan/KWh (US$0.14/KWh).

Competitive pressures are driving down the profitability in each segment in the value chain. Industry estimates suggest the gross margin for wafer production has fallen from 20% to 10%. Margins in PV cell manufacture are 5-6%. As a result, most Chinese solar companies are striving to become vertically integrated so they can capture more value along the supply chain. This mainly involves either investing in upstream polysilicon capacity or undertaking more integration services and project development.

4.4.3. Chinese PV quality accreditation

There is currently a range of quality standards for PV products, requiring manufacturers/suppliers to obtain multiple certificates to be able to sell to different countries/regions. The most commonly used certificates include IEC, CE, UL, TUV markings – these are described in more detail in Appendix 5.

As major suppliers to both European and the North American PV markets, the major Chinese companies addressed in this report are meeting the required standards (see Appendix 4 for accreditation by major supplier).

In order to supply the grid connected solar PV market in Australia, designers, suppliers and installers must ensure installations meet the most recent version of the Building Codes and a range of relevant Australian standards, also listed at Appendix 5. In addition the designer and installer must be accredited by the Clean Energy Council of Australia. These broadly accord with the international standards referred to above, suggesting that major Chinese equipment suppliers, working with local infrastructure designers and contractors, would be capable of meeting required Australian standards.

4.5. Discussion

In terms of ensuring the most cost competitive outcomes from an ACT FIT auction, there is a range of highly competent and cost competitive Chinese sources of both solar PV modules and system integrators and suppliers with demonstrated capabilities across export markets in Europe and North America.

As a basis for testing potential Chinese interest, Heuris Partners shortlisted eight potential candidates and contacted them direct to explain the ACT opportunity. The results of these approaches, together with relevant contact details, are shown at Appendix 6. They indicate a broad level of interest that has the potential to put downward pressure on the auction outcome via competitive pricing of both modules and broader system integration.

Appendix 1

Terms of Reference

Consultancy Agreement

Support Industry Consultation and Market Development

1. Context

- The ACT Government is committed to achieving a 40% reduction in greenhouse gas emissions within the ACT by 2020, in comparison to 1990 levels.
- In May 2009, the Government issued a call for Expressions of Interest (EOI) to construct, own and operate a solar power facility in the ACT, capable of supplying approximately 86,000 MWh/annum, supported by a $30 million capital grant. This process demonstrated that a $30 million capital grant was neither a sufficient level nor an appropriate mechanism of financial support for such a project. Respondents to the Call for EOI highlighted the need for a Feed-in Tariff (Fit) to reduce financial risk.
- On 13th September 2010, the ACT Energy Minister announced an expanded Feed In Tariff for medium and large scale renewable energy generation, encompassing up to 210 MW large scale generation capacity (>200kW), including a first tranche auction of 40MW in the large scale generation category, to be conducted in the first half of 2011.
- The ACT Government is committed to consulting with Industry to inform the drafting of supporting legislation, design the auction and to stimulate competition by competent bidders before April 2011.

2. Purpose of Consultancy

The ACT Government requires services to execute some time critical elements of the solar power facility program leading to creation of underpinning legislation, execution of an effective auction and strong competition from bidders who will utilize the latest and most efficient technologies and balance of systems design.

Specifically the consultant will:

2.1. conduct interviews with industry participants and write a report on industry's perception of risks that can be mitigated by the design of the auction and the mechanism for providing price support;
2.2. interview leading academics who have published in the area of auction design and report on the interview;
2.3. develop and execute a plan to represent the ACT large scale solar power opportunity to infrastructure developers and Chinese PV manufacturers who did not participate in the ACT EOI or the Commonwealth Solar Flagship programs; and
2.4. develop a program and identify appropriate participants for a conference hosted by ACT

Government in March 2011 that would capture the latest thinking and best practices from recognized experts in the area of PV balance of systems design.

3. Timetable

In view of the requirement to commence drafting legislation and completing cabinet submission and approvals by first quarter 2011, the work will need to be completed by 15 December 2010.

Appendix 2: Heuris industry consultation briefing note

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ACT Government Solar FIT Capacity Auction
Industry Consultation Briefing Note
November 25th 2010

The ACT Government announced on 13 September 2010 that it will expand its electricity Feed in Tariff (FIT) scheme to encourage the construction in the ACT of up to 210MW of large scale (i.e. over 200Kw) renewable generation facilities. This is in support of its legislated objective of reducing ACT greenhouse gas emissions by 40% from 1990 levels by 2020

As a first step in this process, the Government will conduct a FIT capacity auction during 2011 to stimulate the development of up to 40MW of solar electricity generation within the ACT.

The FIT will not differentiate between solar generation technologies and will not be available to outputs from hybrid projects when fossil fuels are used to support solar generation.

The ACT Government is committed to achieving the lowest possible FIT. It seeks to achieve this in three ways.

- By controlling the risks to the project developers/operators that are subject to Government influence.
- By maximizing the competitive tension in the auction process.
- By stimulating the transfer of international experience and learning about Balance of System design and cost optimization, into the Australian supply chain.

The FIT contract is intended to drive the timely development and commissioning of the solar generation project.

- The ACT Government is concerned to ensure that bidders have the organisational, technical and financial capacity to successfully execute the project. A pre-bid qualification process will be established to screen potential bidders according to published criteria.
- The ACT Government is also concerned to ensure that the successful bidder, through action or inaction, does not delay the timely development and commissioning of the project.

Heuris Partners Pty Ltd ABN 59 097 844 445

The Department of the Environment, Climate Change, Energy and Water has engaged Heuris Partners for advice on the design of the FIT and the FIT capacity auction

Anthony Baird, a Director of Heuris Partners, will conduct a series of interviews with potential bidders prior to mid December 2010 to gather information that will assist in the final legislative definition of the FIT and in settling details of the auction process. Information gathered in the interviews will be made available to the ACT Government on a non-attributable basis.

Guidance on Interview Questions

1. *What are the implications for the project developer of the inclusion or exclusion of wholesale electricity market price risk (including carbon price risk) in the FIT structure?*
2. *What are the other most important project risks that are subject to strong ACT Government influence? Where can Government action most influence the expected risk profile of the project?*
3. *What are the actions you would most want the Government to take to control those risks?*
4. *What are the critical criteria you will have in mind in reaching a decision to participate in the ACT FIT auction?*
5. *What is the likely expected time required for bid consortia to form, to evaluate solar generation opportunities in the ACT, and prepare a binding solar FIT capacity bid for up to 40 MWe?*
6. *Does Australia have access to the critical skills, capabilities and knowledge to deliver a cost effective solar plant of up to 40MW? What role could the ACT Government usefully play in addressing any key gaps (e.g. by convening global expertise via a Balance of System PV Conference prior to the bid process).*
7. *Once the bid is awarded, what is the likely range of time required to achieve Development Approval within the ACT? How can the Government assist in assuring a predictable and timely process?*
8. *Once Development Approval is achieved, what is the expected time required to build the project? How do you think the Government should seek to protect community interests against unreasonable delays in commissioning?*

Anthony Baird is co-founder of Heuris Partners. Anthony's earlier work experience includes appointments as Global Practice Leader for Strategy Development at BHP Billiton, Vice President Strategy-Australia/Asia BHP Petroleum, Project Coordinator, North West Shelf LNG Project and Division Manager Human Resources and External Affairs for BHP Petroleum (Australasia) and as Group Manager Safety Health and Environment for BHP Petroleum. Anthony leads Heuris practice in the analysis of oil, gas, coal and renewable energy markets.

2

Appendix 3: Victorian accelerated solar planning scheme

MILDURA PLANNING SCHEME
Mallee Solar Park Incorporated Document 2010

Introduction

This document is an incorporated document in the schedule to Clause 81.01 of the Mildura Planning Scheme. Despite any provision to the contrary in the planning scheme, pursuant to Clause 52.03 of the Mildura Planning Scheme the land identified in this incorporated document may be used and developed in accordance with the specific controls contained in this document.

If there is any inconsistency between the specific controls in this document and other provisions of the Scheme, the specific controls in this document will prevail.

Purpose

To provide for the use and development of the land for a Renewable Energy Facility (Solar Energy Facility) ("SEF") using Photovoltaic (PV) technology and associated uses and technologies to generate, store and transmit electricity from sunlight.

The Land

That land is that is the subject of the specific controls in this document is located on the north and south side of Rifle Range Road, Yatpool (known as Crown Allotment Lot 1 & 2 LP203129F, CA 20, CA 25, and CA 31 Parish of Yatpool, more particularly described in Certificate of Title Volume 09683 Folio 890 Volume 09683 Folio 891, Volume 10043 Folio 589 & 411 and Volume 07189 Folio 775) and abutting road reserves.

1.0 Table of uses Section 1 - Permit not required

USE	CONDITION
Caretaker's house	Must be for the SEF and meet the requirements of Clause 2.0
Education centre	Must be for the SEF and meet the requirements of Clause 2.0
Industry	Must be a SEF and meet the requirements of Clause 2.0
Interpretation centre	Must be for the SEF and meet the requirements of Clause 2.0
Research and development centre	Must be for the SEF and meet the requirements of Clause 2.0
Utility installation	Must be for the SEF and meet the requirements of Clause 2.0

Section 2 - Permit required

USE	CONDITION
Any use in Section 1 – if the Section 1 condition is not met	Must be for the SEF

2.0 Use and development of land – Solar Energy Facility

A permit is not required to:

- Use land for the SEF.

- Construct a building or construct or carry out works for a SEF including:
    - building or structures;
    - plant and equipment;
    - emerging renewable energy technology;
    - related facilities used in connection with the generation, storage or transmission of electricity by sunlight.
- Create or alter access to a road in a Road Zone Category 1.
- Reduce or waive a car parking requirement pursuant to Clause 52.06.
- Remove native vegetation.

The use and development must generally be in accordance with the Concept Plan as shown in Clause 8.0 of this incorporated document, or as amended in accordance with Clause 4.0 of this incorporated document.

The use of land for a SEF must not in the opinion of the Responsible Authority adversely affect the local amenity including through the:

- Transport of materials, goods, or commodities to or from the land.
- Appearance of any stored goods or materials.
- Emission of noise, artificial light, vibration, odour, fumes, smoke, vapour, steam, soot, ash, dust, waste water, waste produces, grit or oil.

3.0 Subdivision Exemption

A permit is not required to subdivide land where:

- lots created meet any minimum requirement in the underlying zone relating to minimum lot sizes; and
- lots created are generally in accordance with the Concept Plan at Cause 8.0 or as amended in accordance with Clause 4.0; or
- lots created are for a SEF or a utility installation for the benefit of a public authority or utility service provider.

Permit requirement

A permit may be granted to create lots that do not meet the minimum area requirements in the underlying zone relating to minimum lot sizes if the subdivision is for the SEF and is generally in accordance with the Concept Plan contained at Clause 8.0 or as amended in accordance with Clause 4.0.

Where the land is subdivided in stages, the lots should be consolidated with each subsequent stage to the satisfaction of the Responsible Authority.

Exemption from notice and review

An application is exempt from the notice requirements of Section 52(1)(a), (b) and (d), the decision requirements of Section 64(1), (2) and (3) and the review rights of Section 82(1) of the Act.

Decision Guidelines

Before deciding on an application to subdivide land, in addition to the decision guidelines in Clause 65, the Responsible Authority must consider, as appropriate:

- The State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies
- The need to have lots of less than 100 hectares

4.0 The Concept Plan

The Concept Plan may consist of a plan and other documents and may with the agreement of the Responsible Authority, be prepared and implemented in stages.

The Concept Plan should be prepared having regard to the following requirements, as applicable:

- The SEF and associated buildings or structures, plant and equipment and related facilities used in or in connection with the generation or storage of electricity are located only within the solar field.
- A buffer is to be provided around the perimeter of the solar field, as appropriate.
- No building to exceed a maximum height of 10 metres (excluding transmission infrastructure).
- The provision of adequate access and car parking in association with the SEF.

The Concept Plan may be amended to the satisfaction of the Responsible Authority and is exempt from any notice requirement provided that any amendment is generally consistent with the above requirements, as applicable.

If in the opinion of the Responsible Authority a requirement above is not relevant to an amendment to the Concept Plan, the Responsible Authority may waive or reduce the requirement.

5.0 Requirements prior to commencement of the SEF

Before the use or development commences on the land, the following should be prepared to the satisfaction of the Responsible Authority:

- Details of access points to be upgraded/constructed to the satisfaction of VicRoads (where applicable).
- An Environmental Management Plan (EMP) which shows as appropriate:
    - Goals and objectives of the EMP.
    - A Native Vegetation Management Plan that provides the details of management of native vegetation and any required native vegetation offsets. The Native Vegetation Management Plan should include:
        - Measures to be taken to ensure disturbance to native vegetation is minimised.
        - A preferred native vegetation clearance limit of 9 hectares (unless an approved Fire Protection Plan or planning permit authorises greater than this). Any proposed native vegetation clearance over this preferred limit should demonstrate how it meets the goals and objectives of the EMP and how it has considered „Victoria‟s Native Vegetation Management – A Framework for Action‟ (or successor document).
    - A Native Fauna Management Plan that provides the details of management of native fauna and any required mitigation of impacts on significant species. The Native Fauna Management Plan should include:
        - Recommendations for any surveys of significant species (if required).
        - Measures to be taken to ensure disturbance to native fauna is minimised.
        - Impact mitigation and management of any significant species.
    - Construction Management Plan.
    - Fire Management and Protection Plan.
    - Erosion and siltation control during construction and operation.
    - Restricted access areas and methods of access restriction.
    - A Cultural Heritage Management Plan (CHMP) prepared and approved in accordance with the Aboriginal Heritage Act 2006 and Aboriginal Heritage Regulations 2007 (or successor documents).
    - A detailed landscape plan.
    - A Water Management Plan that provides details of water collection, storage, reuse anddisposal.

Prior to the approval of the Environmental Management Plan (EMP), the Responsible Authority may consider, as appropriate, the views of the Department of Sustainability and Environment (DSE).

6.0 Permit requirement

A permit may be granted to construct a building or construct or carry out works which is not generally in accordance with the Concept Plan, or to amend the Concept Plan in a way which is not generally in accordance with Clause 4.0, provided the building or works are for the SEF.

Application requirements

An application for permit must be accompanied by the following information:

- A plan drawn to scale which shows:
  - The boundaries and dimensions of the site.
  - Adjoining roads.
  - Relevant ground levels,
  - The layout of any existing and proposed buildings and works.
  - Driveways and vehicle parking and loading areas.
  - Proposed landscape areas.
- Elevation drawings to scale which show the colour and materials of all buildings and works;
- Construction details of all drainage works, driveways and vehicle parking and loading areas;
- Construction details and elevations of any bund walls or fencing used to screen the development;
- A landscape layout which includes the description of vegetation to be planted, the surfaces to be constructed, a sites works specification and the method of preparing, draining, watering and maintaining the landscape area.
- Information regarding any additional traffic likely to be generated.
- The purpose of the development and the types of processes to be utilised.
- The type and quantity of goods to be stored, processed or produced.
- How land not required for immediate use is to be maintained.
- Whether a Works Approval or Waste Discharge Licence is required from the Environment Protection Authority.
- Whether a notification under the Occupational Health and Safety (major Hazard Facilities) Regulation 2000 is required, a licence under the Dangerous Goods Act 1995 is required, or a fire protection quantity under the Dangerous Goods (Storage and Handling) Regulations 2000 is exceeded.
- The likely effects, if any, on the local area, including:
  - Noise levels.
  - Air Borne emissions
  - Emissions to land or water.
  - Traffic, including the hours of delivery and despatch.
  - Light spill or glare.
  - Provision for water reuse / disposal.
- A context plan identifying:
  - Location and use of existing buildings on adjacent land.
  - Significant views to and from the site.
  - Location of significant vegetation or natural features on adjacent land.

Decision Guidelines

Before deciding on an application, in addition to the decision guidelines in Clause 35.07 and Clause 65, the Responsible Authority must consider, as appropriate:

- The visual impact of the proposal on the landscape;
- The contribution of the proposal to increasing Victoria˝s diversity and securing of energy supply and minimising greenhouse gas emissions;
- The economic and social impact of the proposal;
- The extent to the which the proposal has been designed to manage any potential adverse impacts;
- The likely amenity effects on the surrounding area;
- The drainage of the land;
- The availability of and connections to services;

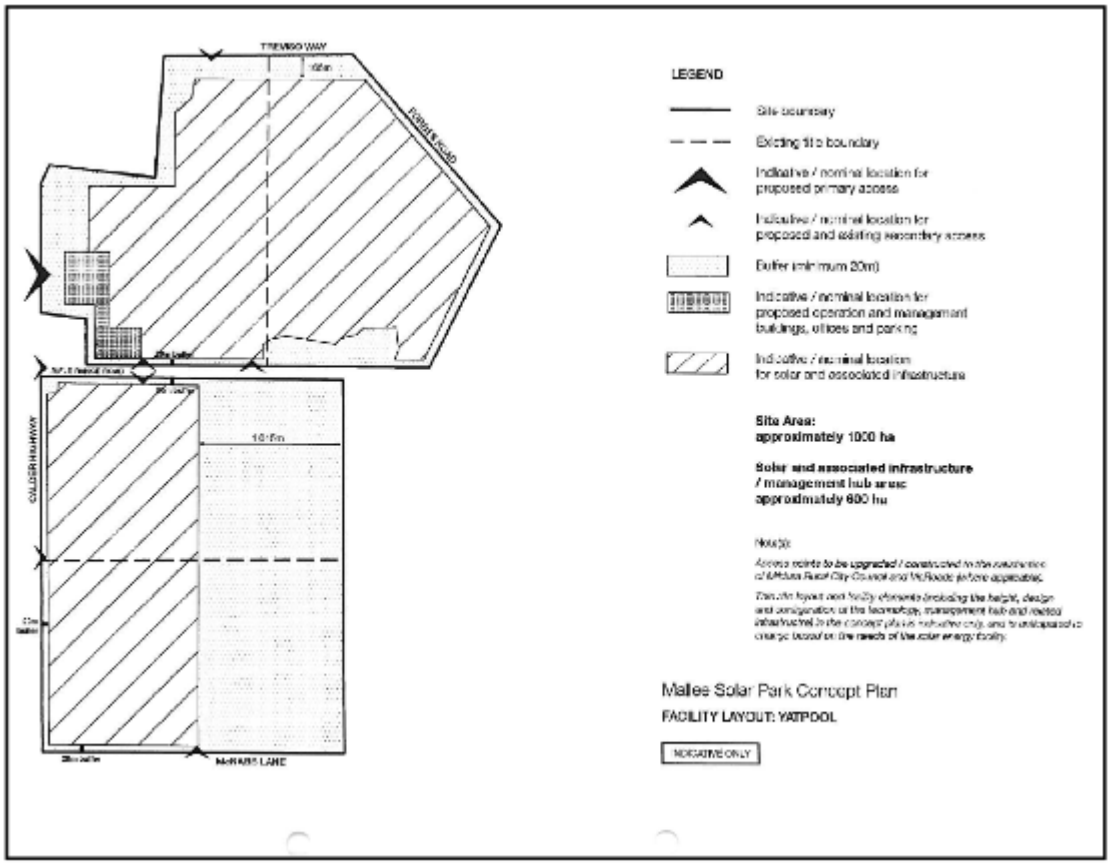
- The effect of traffic to be generated on roads;
- The interim use of those parts of the land not required for the proposed use;
- The location of on-site effluent disposal areas to minimise the impact of nutrient loads on waterways and native vegetation;
- The effect of the proposal on the operation of any road and public safety.

7.0 Expiry of Specific Control

The specific controls contained in this incorporated document expire if the development is not completed within 7 years of the date of commencement of construction.

The Responsible Authority may extend this period if a request is made in writing before these provisions expire, or within three months after the expiry.

8.0 Concept Plan



Appendix 4: Major Chinese solar PV companies

Integrated companies

Yingli Green Energy (YGE)

YGE is headquartered in Baoding Hebei Province and listed on the New York Stock Exchange in June 2007. YGE is an integrated company whose product lines include polycrystalline silicon, wafer, PV cells and modules. Its module capacity was 600MW at the end of 2009 and 1000+MW in 2010. It plans to further expand to 1700MW in 2011. YGE also provides solar PV power plant design, installation and construction.

YGE sells to many EU, American and Asian countries including Spain, Germany, Italy, France, USA, Portugal and Korea. In 2009, 63.1% of YGE's revenue came from Germany (89.5% from Europe). Although its products cover the whole value chain, the main products sold in overseas markets are PV cells and modules with customers being system providers.

Its utility scale PV project experience is mainly in Germany, Spain and Portugal. Projects include: 46MW in Portugal completed in November 2006 with system provider Acciona; 5MW in Spain completed in November 2006 with Acciona; 9.8MW in Spain completed in March 2008 with CYMI; 11.5MW in Spain completed in June 2008 with Elecnor; 4.3MW in Italy completed December 2008 with Mercorio; and 4.3MW in France completed March 2009 with Solaire Direct. In 2009 YGE signed an agreement with MAETEL to supply 33MW of PV modules from October 2010 to April 2011 to be used in Curbans project in France. The developer is GDF SUEZ. In the 2010 Dunhuang project auction, YGE and SDIC Power consortium bid RMB0.69 Yuan/KWh (US$0.10/KWh) but were not awarded the contract because of concerns about underbidding.

YGE has acquired IEC, CE, TUV, UL, MCS and PV Cycle certificates for its PV products and provides 25 year output guarantees.

Historically Chinese PV companies are weak in overseas marketing and sales. They normally authorise overseas distributors to do so. YGE was not an exception. However YGE has been trying to change that situation. They started to gain market knowledge by setting up a joint venture in Spain to produce 50MW PV cells annually in 2006. They are also undertaking research in polycrystalline silicon technology to achieve better quality and lower costs.

A summary of YGE's capacity and financials is shown below.

	2009	Q3 2010	2010e
Module sales output (MW)	525	Not available	1040

Module capacity (MW)	600	1000	1000
Module capacity outlook (MW)	1700MW by late 2011		
Product type	polycrystalline silicon, wafer, cell and module		
Module sales revenue (Million US$)	1049	479	1810
Estimated module cost (US$/KW)	1.52	Not available	1.18
Gross module profitability (%)	23.7%	33.3%	32.5%
Book debt ratio	49.6%	Not available	Not available

LDK Solar

Established in 2005 in Xinyu City Jiangxi Province, LDK Solar went IPO on New York Stock Exchange in June 2007. It is one of the fastest growing PV companies and biggest PV silicon manufacturers in Asia. LDK Solar manufactures polysilicon, mono and poly-crystalline ingots, wafers, cells and modules. The Company is also engaged in project development activities in selected segments of the PV market.

LDK Solar used to sell mono- and poly-crystalline ingots and wafers to cell and module producers. In 2009 it started to sell modules to distributors and system integrators. It acquired modules from Best Solar module plant in Suzhou City and subsequently bought the plant in February 2010. In 2009 total revenue was US$1098 million of which module sales were only US$58.9 million. It increased module capacity significantly in 2010 to 1500MW to support its strategy of capturing more value in the downstream products and services. LDK Solar sells its products mainly to Europe. In 2010, it supplied PV modules to Enfinity in Belgium totalling 50MW.

Other than cell and module sales, LDK Solar is also actively involved in downstream services. It signed an agreement in 2009 to cooperate with GPR (Global Power Resources Ltd, a US company that assists global customers with the purchase, sale, or service of power generating equipment) to build 100MW PV stations in Europe in 2010. LDK is responsible for engineering design, purchase, construction and module supply (EPC). GPR will gain ownership to the plants. The plants will supply France, Germany, Italy and Spain. LDK Solar also signed an agreement with Uni Land S.P.A. to build a 20MW PV station in Italy between 2010 and 2011. LDK is responsible for EPC services again in this project. Uni Land S.P.A will provide financing. LDK also sold its 1MW PV tracking plant in Italy to Uni Land S.P.A. LDK Solar is also the winner of the 10MW PV project in Dunhuang, Gansu in 2009. It also aims to build a 200MW PV plant in Xinyu, Jiangxi by 2012.

LDK Solar has IEC, CE, TUV, ETL and PV Cycle certificates and provides 20-25 year warranties.

	2009	Q3 2010	2010e
Module sales output (MW)	Purchased 32.7MW from Best Solar	94.1MW	Not available
Module capacity (MW)	0	760	1500
Module capacity outlook (MW)	Plan to increase to 2500MW in 2011		
Product type	polycrystalline silicon, wafer, cell and module		
Module sales revenue (Million US$)	58.9	Not available	Not available
Estimated module cost (US$/KW)	1.59	Not available	Not available
Gross module profitability (%)	11.5%	Not available	Not available
Book debt ratio	80%	Not available	Not available

Module suppliers

Suntech Power

Established in 2001, Suntech Power is a leading PV manufacturer globally. It had its IPO on the New York Stock Exchange in 2005, the first Chinese solar company listed on the NYSE. Based in Wuxi City Jiangsu Province, Suntech produces mono- and poly-crystalline PV cells and modules, as well as providing system design, engineering, procurement and construction services (EPC).

Suntech supplies its modules to customers in Europe, North America and Asia for agricultural, residential, commercial and utility scale power station applications. Utility scale projects using Suntech modules and system integration services include: an 8MW project in Alamosa Colorado US; a 10MWplant in Abu Dhabi UAE; a 14MW plant in Nellis Air Force Vase in Nevada US; a 5MW plant in Murica Spain; and a 5MW plant in Greece. Recently Suntech has won multiple module supply contracts for a 44MW PV plant in Thailand, a 4.7MW plant in Taiwan, and a 2MW plant in India.

Suntech has achieved certification from CE, UL and CSA. Its PV modules are covered by 5, 12, 18 and 25 year warranties against reductions of more than 5%, 10%, 15% and 20% of initial power generation capacity, respectively.

	2009	Q3 2010	2010e
Module sales output (MW)	704	Not available	1500

Module capacity (MW)	1100	1600	1800
Module capacity outlook (MW)	Aim to reach 1800MW by the end of 2010		
Product type	PV cell, PV module and system integration		
Module sales revenue (Million US$)	1606	Not available	Not available
Estimated module cost (US$/KW)	1.79	Not available	Not available
Gross module profitability (%)	21.6%	18.2%	17%
Book debt ratio	59.5%	Not available	Not available

JASolar

Established in 2005, JASolar was listed on the NASDAQ in 2007. It has a manufacturing base in Heibei, Jiangsu and Shanghai. Its main products are monocrystalline and polycrystalline PV cell with a cell capacity of 1000MW. JASolar has set up strategic alliances with module suppliers to OEM JASolar's cells. Its current module capacity is 300MW.

JASolar sells its cells mainly in China to module manufacturers. 73.8% of its 2009 revenue is from China. However it is actively expanding sales in overseas market, especially in Europe. In second quarter of 2010, its Chinese revenue share dropped to 54%.

JASolar modules have TUV and UL certificates and the company provides 5, 10 and 25 year power output guarantees.

	2009	Q3 2010	2010e
Module sales output (MW)			
Module capacity (MW)	300		
Module capacity outlook (MW)	Expected to more than double in 2010		
Product type	PV cell and module		
Module sales revenue (Million US$)			
Estimated module cost (US$/KW)			

Gross module profitability (%)			
Book debt ratio	35.9%		

Solarfun Power

Established in 2004, Solarfun Power listed on the NASDAQ in 2006. A global supplier of monocrystalline and polycrystalline PV cells and modules based in Qidong Jiangsu Province, Solarfun sells its cells and modules in a range of markets, including Germany, Italy, France, Spain, Netherlands, Belgium, USA, Canada and Australia.

Solarfun has a track record of supplying modules to large utility scale projects overseas. Solarfun and Scatec (a Norwegian solar company with presence in UA, South Africa, China, India and 5 countries in Europe) partnered and built three solar plants totalling 6.6MW capacity in Germany in 2007 and 2008. Solarfun helped build and supply modules to three utility scale solar parks totalling 22 MW in Spain in 2008. It also worked with different operators in South Korea and built 4 solar plants with total capacity of 5MW in 2008 and 2009.

Solarfun has IEC, CE, UL and TUV certification. It provides 5 year module defects and failure warranty and 10, 20 and 25 year module output warranty.

	2009	Q3 2010	2010e
Module sales output (MW)	342.8	223.9	785
Module capacity (MW)	700	900	900
Module capacity outlook (MW)	Plan to reach 1500MW in 2011		
Product type	PV cell, module and system integration		
Module sales revenue (Million US$)	554	327	
Estimated module cost (US$/KW)	1.43	1.35	1.35
Gross module profitability (%)	11.6%		
Book debt ratio	46.9%		

Trina Solar

Founded in 1997, Trina Solar is a manufacturer of monocrystalline and polycrystalline PV modules located in Changzhou City Jiangsu Province and is listed on NYSE. Its business includes the production of silicon ingots, wafers and cells to assembly into PV modules. Its modules are sold to Germany, Spain, Italy, US, Japan, Korea, India and other countries in Europe, North America and Asia.

Trina Solar has supplied modules to utility scale PV plants in Spain, Germany and Korea. The projects include: two 1.85MW plants in Spain completed in April and May 2006; 3.3MW plant in Germany completed in December 2007; 1MW in Spain in April 2008; 1.8MW in Korea in May 2008; 3.5MW in Spain in May 2008; and 26MW and 20MW plants in Spain completed in August and October 2008.

Trina Solar modules have most international quality and safety certificates such as IEC, CE, TUV, UL, ICIM and BBA. It provides 5 year defects and 25 year performance warranty for its modules.

	2009	Q2 2010	2010e
Module sales output (MW)	399	223	930
Module capacity (MW)	600	850	950
Module capacity outlook (MW)	Expect to expand to 1500MW in 2011		
Product type	PV cell, module and system integration		
Module sales revenue (Million US$)	845	371	
Estimated module cost (US$/KW)	1.52	1.13	
Gross module profitability (%)	28.1%	32.1%	
Book debt ratio	56.2%		

Canadian Solar

Canadian Solar was set up by Dr. Qu Xiaohua, a Chinese returning to China from Canada. It is headquartered in Ottawa Canada, manufactures in Jiangsu Province and listed on the NASDAQ in 2006. It produces monocrystalline and polycrystalline ingots, wafers, solar cells and modules, and provides solar power systems.

Canadian Solar sells to Germany, Spain, Italy, US, Japan and Korea. Its utility scale solar power project experience includes: 1MW in Italy completed in Jun 2010; 4 solar projects in Spain with capacity of 1.6MW; 4.7MW, 6MW and 15MW respectively completed in 2008; and one 4.4MW and one 3.5MW

project in Germany completed in 2007 and 2008. Recently it won a contract to supply modules for a 126MW power project in Ontario, Canada.

Canadian Solar has IEC, TUV and UL certifications.

	2009	Q3 2010	2010e
Module sales output (MW)	297	200	
Module capacity (MW)	820	1300	1300
Module capacity outlook (MW)	1500MW in early 2011 when adding 200MW new capacity from Canada		
Product type	Ingot, wafer, PV cell, PV module and system integration		
Module sales revenue (Million US$)	631	377	
Estimated module cost (US$/KW)	1.86	1.56	
Gross module profitability (%)	14.1%	17.3%	18-19%
Book debt ratio	55.1%	64.2%	

Jinko Solar

Established in 2006, Jinko Solar was listed in on the NYSE in May 2010. Its production line covers monocrystalline and polycrystalline ingots, wafers, solar cells and modules. It sells modules and provides solar power systems to customers in Europe, North America and Asia.

Jinko Solar's overseas experience includes PV power projects in US, Italy, Germany and Israel.

Jinko Solar has certifications from CE, IEC, UL, TUV and VDE.

	2009	Q3 2010	2010e
Module sales output (MW)		92.5	257-267
Module capacity (MW)		450	600
Module capacity outlook (MW)			
Product type	Ingot, wafer, PV cell, PV module and system integration		

Module sales revenue (Million US$)		215	
Estimated module cost (US$/KW)		1.55	
Gross module profitability (%)		33.5%	
Book debt ratio		62.1%	

System providers

China Technology (CTDC)

Founded in 1995, CTDC was one of the first Chinese companies listed on the NASDAQ in 1996. The company develops, designs, manufactures and delivers a variety of PV modules and system solutions. It is headquartered in Hong Kong. The major shareholder is China Merchants Group, a Chinese state-owned conglomerate with total assets of 40 billion US$ and three core businesses covering transportation, finance and property.

China Technology's main business is to build solar power plants. Its strategy is to complete the industry value chain integration and become a leading integrated solar energy platform through investment in on-grid solar power plants and merger and acquisition of high performing solar companies around the globe.

GCL Poly Energy

GCL Poly Energy is headquartered in Hong Kong and is listed in Hong Kong Stock Exchange. GCL cannot be classified as an integrated company in strict terms as it does not produce cell and modules. It used to be in the coal mining and coal fired power station business. In July 2009 GCL Poly Energy's biggest shareholder, Zhu Gongshan, injected the polycrystalline silicon business (Jiangsu Zhongneng Silicon) into GCL. Since then GCL became one of the biggest solar grade polysilicon producers in China.

Other than polysilicon and wafer production, GCL's business is investing and operating solar PV power stations. It currently owns (100% owner's interest) a 20MW solar plant operating in Xuzhou City Jiangsu Province, the largest solar farm in China. This power plant uses a combination of a fixed system, bi-axle tracking system and mono-axle tracking system. So far GCL have not had experience outside China.

GCL's 2009 revenue was US$640 million, 58% of which comes from polysilicon sales.

Appendix 5: International quality accreditation for solar PV

Overview

There is currently a range of quality standards for PV products, requiring manufacturers to obtain multiple certificates to be able to sell to different countries/regions. The most commonly used certificates include IEC, CE, UL, TUV markings.

The International Electrotechnical Commission (IEC) is the international standards and conformity assessment body for all fields of electrotechnology. It provides different certificates to cover different aspects of PV products, i.e:

- IEC61215 - the aging of crystalline PV modules.
- IEC61614 – aging of thin-film PV modules.
- IEC61730 - safety qualifications.
- IEC60364 - protection against electric shock.
- IEC62108 certifies concentrator PV modules.
- IEC61701 - resistance of PV modules against salt mist corrosion. In certification, the IEC System for Conformity Testing and Certification of Electrical Equipment and Components (IECEE) is available and, for photovoltaics, includes an IECEE PV Scheme.

North America

Underwriters Laboratories (UL) is the largest non-for-profit third party certification organisation in North America, one of the Nationally Recognized Testing Laboratory marks (NRTL) in the United States. Without NRTL certification, solar PV panels cannot be connected to the grid nor receive any government rebates or tax incentives in US. Since 1841 UL has been developing product safety standards and providing product testing and certification for US market. UL also actively participates in developing global International Electro-technical Commission (IEC) standards and harmonising the UL and IEC PV standards.

UL provides the trusted UL (US) and C-UL (Canada) certification Marks to PV manufacturers, offers compliance to the IEC standards and issues the applicable CB certifications to certify safety and performance conformity. UL-EU Mark is a high quality safety mark and allows PV products to sell to EU market.

Another certification body in North America is CSA International headquartered in Canada, which provides CSA certificate for entering US and Canada market.

EU

For the EU market, CE and TUV certificate are the most common ones. CE is a mandatory conformity mark on many products that are consumed in the European Economic Area (EEA): all 27 countries of the EU plus Iceland, Liechtenstein, Norway, Switzerland and Turkey. It certifies the product conforms to EU safety, health and environmental requirements. If a PV manufacturer wants to sell products to any of the countries in the European Economic Area he must obtain CE certification.

TüV (Technischer überwachungs Verein) is shorthand for Technical Inspection in German. TUV certificate is a proof of conformity to German safety standards and is widely accepted in EU market.

Australia

In carrying out the installation of grid connected solar PV systems, contractors are required to comply with the latest version of the Building Code and the following Australian standards:

- AS 5033 - Installation of PV arrays
- AS3000 – Electrical wiring rules
- As 3008 – Electrical installations: selection of cables
- AS1170 – Structural design (including wind loads)
- As1664 – Aluminium structures
- AS1400 - Steel structures
- AS4777 – Grid connections of energy systems via inverters
- AS2053 – Conduits and fittings of electrical installations
- AS3439 – Low voltage switchgear and control assemblies
- AS3013 – Electrical installations – wiring systems for specific applications
- AS4070 Recommended practices for protection of low voltage electrical installations

The designer and installer of a solar power system must also be accredited by the Clean Energy Council of Australia in order to carry out PV design and installation works.

Appendix 6: Chinese PV industry's interest in participating in the ACT solar FIT auction - initial results

After desktop research Heuris Partners has shortlisted 8 Chinese PV companies and made initial contact with them. We tested their interest in participating in the ACT solar FIT auction on the phone and requested email reply to confirm their interest. They are: Suntech Power, LDK Solar, Yingli Solar, Solarfun Power, Trina Solar, Canadian Solar, Jinko Solar, and GCL Poly Energy.

All the companies showed different levels of interest. Their feedback contact details are as follows:

1. Suntech Power
   Sydney office handles all the project and wholesale business in Australia. As one party in a consortium, they have made a bid for the Flagship Program and got shortlisted. They confirm they are interested in any solar project in Australia.

   Contact:
   Email:
   Tel: (
   Address:

2. LDK Solar
   The Overseas Marketing Department does not cover overseas projects. They do not have a systems integration department. We suspect it is because LDK Solar just recently moved into project development. We have sent a fax to a senior executive and are awaiting reply from them.

   Contact:

3. Yingli Green Energy
   Its Overseas Sales Department handles projects outside China. is responsible for Australian market. She mentioned they were interested in participating in the Flagship Program. But because they received the information late they didn't have enough time to prepare. She showed strong interest in the ACT solar FIT auction and said she would report to the management and came back afterwards. The same day she sent back an email saying they are very interested in the project and want to be informed of any updates of the project.

Contact:

4. Solarfun Power
   The international sales office in Shanghai indicated that all the Australian projects should go through its representative in Sydney. confirmed they would have interest in the auction and asked for more information. We have sent the briefing letter and are awaiting a reply.

   Contact:

5. Trina Solar
   , responsible for Australian market, just came back from Australia. He is interested in the project. He required more information on the auction and wants to be updated with new development of the project.

   Contact:

6. Canadian Solar
   Their previous overseas project experience was with engineering and procurement, with foreign companies handling construction. They also worked with an Australian company in the flagship program. The Australian firm (name unknown) was supposed to raise financing but failed to do so. Therefore they didn't enter a bid. The contact showed interest in the ACT project but was cautious about its feasibility. We have sent the briefing letter and are awaiting a reply.

   Contact:

7. Jinko Solar
   , Sales Manager responsible for Australian market, showed strong interest in the ACT project. He sent back the email confirmation of interest and company introduction.

Contact: [redacted]

8. GCL Poly Energy

[redacted] relied to the briefing letter and wants to know more details and keep them updated.

Contact: [redacted]

Solar Energy Auction Industry Briefing

1 Purpose

This briefing provides potential solar energy generators with details of an auction for access to a Feed-in Tariff for energy sent out from facilities within the ACT. The ACT Government wishes to:

- alert proponents to the opportunity and the preparation required;
- provide details of decisions made concerning the auction and the design of the Feed-in Tariff; and
- elicit comments on options.

2 Background

On 13 September 2010, the Minister for the Environment, Climate Change, Energy and Water announced that that the ACT would facilitate the construction of solar energy facilities in the ACT through an expansion of the Feed-in Tariff (FiT) scheme for facilities between 200kW and 40MW capacity with an overall scheme cap of 40MW. The auction would bring forward competitive bids for the FiT required to support a project. Bidders will be responsible for financing, constructing, owning and operating their facilities and the ACT Government will be responsible for legislation and administrative arrangements to provide a supported price for the energy sent out from the facility.

The solar energy facility should provide the following benefits for the ACT:

- utility scale generation of renewable energy that makes a significant contribution to meeting the ACT's greenhouse gas emission targets;
- economies of scale to reduce the cost of renewable energy generation in the ACT; and
- support a clean energy industry in the ACT.

3 Conditions of Auction

3.1 Sealed Bid Tender

Bidders will submit sealed bids containing:

- evidence of the bidder's capability to execute a project of the scale proposed including evidence of financial capacity;
- a description of the proposed location of the facility and evidence to support the likelihood that the proposed location will be suitable for Development Approval;
- proposed connection point to the ACT Distribution Network and claims to support the likelihood that the facility will be permitted for connection to the network;
- a schedule for completion of the project with demonstrable milestones that can be used to asses the progress of the project – due consideration for the time to complete EPBC, EIS and DA should be demonstrated; and
- the FiT required to support the project.

3.2 Tender Evaluation Phases

Phase 1 - Prequalification

In phase 1, bidders will be assessed against their capability and the likelihood that their project will achieve development approval and network connection approval. Capable bidders with feasible proposals will be invited to submit final offers during phase 2.

Phase 2 - Final Offer

Prequalified bidders will be invited to submit final price offers within three months of financial closure and project commencement. Bidders submitting final offers will be expected to have obtained, or be certain of obtaining, development and connection approval. Final offers will be assessed on the basis of the lowest FiT required.

3.3 Bidders' Capability

The ACT is seeking competent engineering, planning and construction organisations with demonstrable experience in executing projects of the scale proposed. Bidders will be assessed according to capability criteria prior to further assessment against other selection criteria.

3.4 Site Selection and Approval

Bidders will identify and describe suitable locations for their proposed facilities. In phase 1, bidders will be assessed on the likelihood that they will obtain development approval for their proposed locations. A set of key criteria will be provided for bidders to make their claims.

Bidders selected in phase 1 will be required to obtain Development Approval at the bidder's expense.

The ACT has retained a site at Ingeldene Forest. Bidders may propose to use part of this site and, if successful, will be required to obtain their own Development Approval. Proposals for the use of part of Ingledene must demonstrate that the remaining area is still available for other purposes.

Bidders could locate facilities either on leased or unleased land.

Bidders might identify packages of land under existing leases and make their own arrangements with the existing leaseholder for use of the land.

The ACT Government has a limited stock of unleased land that might be suitable. Potential bidders can seek information from ACT Land and Property Services as to packages that might be proposed and acquired.

Additional information is available at Appendix A.

3.5 Connection to the Distribution Network

Bidders will provide evidence that their proposed facility will be suitable for connection to the ACT Electricity Distribution Network. Evidence will include:

- statements of claim against connection criteria required by ActewAGL Distribution; and
- statements of claim against technical and safety requirements as advised by the ACT Planning and Land Authority Construction Services.

The successful bidder will pay for all network connection costs and recover these costs through FiT revenue.

3.6 Asset on Offer

The winning bidders will be awarded access to a FiT at the value offered by the bidder. The FiT will be fixed for a specified period and free of market risk.

Subject to further investigation by the ACT Government and passage of supporting legislation, the successful bidder will either receive:

- the fixed value FiT offered in the proposal through an arrangement with a single counter party; or
- a variable payment equal to the difference between a fixed price FiT offered in the auction and the price achieved through sale of the electricity to a market participant; or
- a fixed payment equal to a premium price FiT offered in the auction, paid in addition to revenue received through sale of the electricity to a market participant.

To enable the ACT to evaluate a number of policy options, bidders will provide separate prices for a FiT for:

- 15 years;
- 20 years; and
- 25 years

For each of the FiT durations above, the bidder will provide separate prices for the following cases:

- Renewable Energy Certificates remain the property of the generator to be traded by the generator for additional revenue; and
- Renewable Energy Certificates are voluntarily surrendered by the generator.

3.7 Schedule for Delivery of Project

As stated in section 3.1, bidders will be required to propose a schedule for execution of the project. A successful bidder will be required to meet proposed and agreed milestones to demonstrate progress. Failure to achieve milestones could result in the entitlement to the FiT being withdrawn and offered to another bidder.

3.8 Size of Facilities Offered

The aggregate capacity of all solar facilities will be less than 40MW.

At least 2 but not more than 20 winning bids will be awarded.

Individual bidders will submit bids for one facility, or multiple facilities, with aggregate capacity of between 2 and 20MW.

A single bidder may propose multiple sites of at least 200kW capacity provided that the bidder's total capacity on offer is greater than 2MW.

4 Matters for Consultation

The ACT seeks industry views on:

- the proposed timeframes for:
  - release of the prequalification RFT;
  - preparation of the prequalification bids;
  - submission of phase two bids; and
  - financial closure and project commencement;
- the form of the asset on offer to the winner of the auction and the preferred parties to a supported price agreement; and
- the suitability of the Ingledene Forest site relative to other sites in the ACT.

4.1 Comments

Interested parties may provide comments to EnergyPolicy@act.gov.au. All comments will be treated as confidential and will not be attributed to the source.

4.2 Questions

Interested parties may seek clarification or answers to questions relating to the conduct of the auction. Answers to common questions will be posted on the Department's web portal and the identity of the party asking the question will be withheld.

Appendix A
Land acquisition and development considerations

1) The proponent must ensure the development is permissible under the Territory Plan. The facility is likely to be considered under the following definition in the Territory Plan:

    - **Major Utility Installation/Power generation station** means equipment and associated *buildings* constructed for the generation of electricity utilising gas, coal or other fuel sources.

    Proponents shall note the following:

    - The non-urban zones development tables within the Territory Plan permit major utility installation (power generation station) as assessable development.
    - Major utility installation is not listed as permissible within the Commercial Zones. Proposals may be considered as ancillary where the panels are proposed to be placed in the roof of existing commercial premises. **Ancillary** means associated with and directly related to, but incidental and subordinate to the predominant use.

2) Any identification of land within non-urban zones needs to be cognisant of significant strategic planning processes already under way. It cannot be assumed that all unleased Territory Land is available for the required purpose.
3) From 1 February 2011, new Schedule 4 triggers for an EIS under the ACT's Planning and Development Act include electricity generating station (including solar) that is capable of supplying 4MW of power (unless a different amount is prescribed by regulation). Bidders should consider potential triggers that will require an EIS to be completed before a DA could be lodged.
4) Bidders must consider matters of National Environmental Significance (NES) under the *Environment Protection and Biodiversity Conservation Act 1999* (C'Wealth) that may require referral and be declared a controlled action. Proponents should contact the Commonwealth Department of Sustainability Environment Water, Population and Community (SEWPAC) for any considerations of NES matters.
5) The *Planning and Development Act 2007* (P&D Act) requires that both merit and impact track DAs are assessed for their probable environmental impact on the land, and the suitability of the land.
    a) Merit track development applications may be required to assess the environmental effects through the statement of relevant criteria.
    b) Impact track development applications have these considerations addressed through the statement of strategic directions, an Environmental Impact Statement (EIS) or exemption from an EIS under S211.
    c) An Environmental Significance Opinion (ESO) may be sought for some items in Schedule 4 of the P&D Act.
6) If the developer proposes unleased land, then the developer must secure a commitment from the Government to lease the land.
7) Bidders proposing to construct facilities on existing leased land are required to make their own arrangements for assured use of the land for the life of the project.
8) ACT Land and Property Services (LAPS) is responsible for direct sales of unleased land and is also one of the principal departments responsible for the Land Release Program including restricted auctions. LAPS have a major projects facilitation unit that may be able to assist in developing the framework required to manage the identification of available land.
9) Where the land parcel is already under lease, bidders must obtain their own guarantee from the lessee that the land is available should the bid be successful. The bidder should arrange for lease variation pay for Change of Use Charge.

Industry Briefing Paper

Summary of Recommendations and Comments

The Directorate received 81 discrete recommendations and 8 categories of comment to the Industry briefing paper.

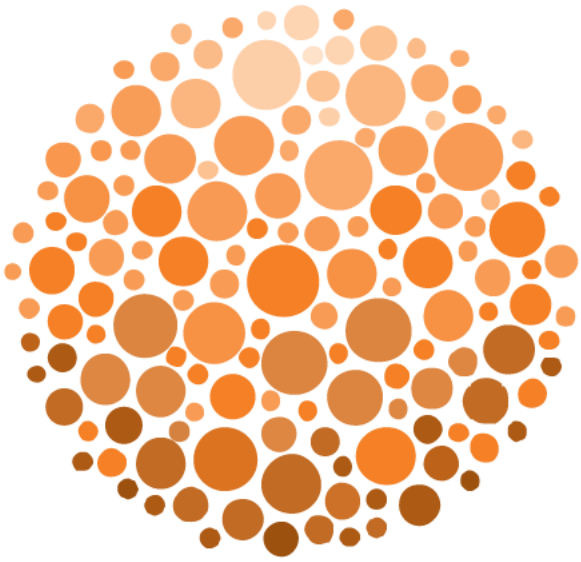
Larger experienced organisations were in agreement with the auction design with the following exceptions:

1) Most respondents were concerned about the security of ongoing price support and the difficulty in financing a heavily subsidised project if the subsidy is not secure for 20 years and the off-take party is not obliged to accept all output. A power purchase agreement with a single counter party was considered more desirable than a payment mechanism that required at least two invoices to different parties.
2) It was noted that the auction would produce a solar PV solution.
3) There were differing views from respondents concerning economies of scale. Some respondents preferred about 2MW others preferred larger than 20MW.
4) It was suggested that wind power will produce more efficient GHG reduction.
5) The electricity distributor preferred that fewer discrete applications for connection were made and that this was achievable if smaller bids (less than 1MW per generator and less than 5MW per bidder were ineligible). The electricity supplier recommended that bids up to the full cap 40MW should be accepted.
6) Experienced respondents wanted performance warranties that would discourage inexperienced bidders.
7) One experienced respondent suggested that projects under 20MW are too small to attract overseas finance.
8) Many respondents expressed concerns relating to the perception that the electricity distributor will not facilitate connection approvals and that the electricity retailer will have superior information concerning available capacity on the network.
9) One respondent, who has been preparing since the EOI, preferred to shorten the process. The Directorate feels that this would eliminate competition from organisations who did not participate in the EOI.

Respondents, considering large-scale solar in the ACT for the first time, had mixed and inconsistent concerns and comments.

1) One respondent preferred the German and Ontario standing offer FiTs.
2) Some respondents preferred considerable assistance from Government for land selection, development approval, network connection and off-take underwriting.

Many of the questions indicated serious interest in participation and the need for more details.



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ACT Government

Review of Industry Briefing Paper for Solar Energy Auction

energetics

In the business of climate change

Project Details

ACT Government Contact	Energetics Contact
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Description	Prepared By	Reviewed By	Approved By	Approval Date
Version 1: Report	David West	Nigel Hartnup		08/04/2011

About Energetics

Energetics is a specialist management consultancy in the business of climate change. In partnership with our clients, we help them transition to a carbon-constrained environment by managing risks, achieving cost reductions and identifying new opportunities. For over 25 years, Energetics has been providing clients with competitive advantage from the top to the bottom line.

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Executive Summary

Energetics has been engaged to review the Solar Auction Industry Briefing paper prepared by the ACT Government and suggest any improvements. This report summarises Energetics' findings and suggestions.

The briefing paper was analysed and comments have been made as to the utility of the document, the reader's understanding of the auction process and improvements for clarity of message.

Each section of the document was reviewed and the following are suggested as key improvements:

- Clear and early articulation of the fact there will be at least two winners of the auction, with a minimum aggregated bid size of 2MW.
- Outlining the 'Asset on Offer' using graphical representations.
- Outlining a timeline of key milestones.
- Addressing the treatment of embedded generation and the extent to which "The ACT Government will not prescribe the commercial arrangements of bidders with regard to the sale of electricity generated".

Table of Contents

Background

To facilitate the construction of solar energy generation located in the ACT and deliver 40MW of renewable energy, the ACT Government is proposing to expand its Solar Feed-in Tariff (FiT) scheme. An auction to grant access to a FiT for electricity generated by solar facilities of between 200kW and 20MW capacity is being proposed and an industry briefing paper has been prepared.

Energetics has been engaged to review the Solar Auction Industry Briefing paper and suggest any improvements.

1. Document Purpose

This report reviews the Solar Auction Industry Briefing paper and makes suggestions for improvement . Each section of the Industry Briefing paper is addressed and overall suggestions provided.

2. Assumptions

Assumptions are that the ACT Government:

- Has undertaken analysis suggesting that the scheme is viable and that the outlined auction format will produce the desired outcomes.
- Is open to accept industry views on the conduct of the planned auction.
- Wishes to ensure maximum clarity of message and minimum recourse in terms of required support and re-explanation to industry stakeholders.
- Is represented by the Distribution Network Service Provider (DNSP) in terms of payment to generators.

3. Review of Briefing Document by Section

In this section the existing document text for each section of the Briefing Paper is listed in order and is followed by Energetics" comments.

3.1. Briefing Document Section 1: Purpose

Existing Text

This briefing provides potential solar electricity generators with details of an auction to grant access to a Feed-in Tariff for electricity sent out from facilities constructed within the ACT. The ACT Government wishes to:

- *alert proponents to the opportunity and the preparation required;*
- *provide details of decisions made concerning the auction and the design of the Feed-in Tariff; and*
- *elicit comments on options for conducting the auction.*

Energetics' Comments:

This section of the briefing document is clear and unambiguous. No Improvements are suggested.

3.2. Briefing Document Section 2: Background

Existing text

On 13 September 2010, the Minister for Energy announced that that the ACT would facilitate the construction of solar energy facilities in the ACT through an expansion of the Feed-in Tariff (FiT) scheme for facilities between 200kW and 40MW capacity with an overall scheme cap of 40MW. The auction would bring forward competitive bids for the FiT required to support a project. Bidders will be responsible for financing, constructing, owning and operating their facilities and the ACT Government will be responsible for legislation and administrative arrangements to provide a supported price for the electricity sent out from the facility.

The solar energy facility should provide the following benefits for the ACT:

- *generation of renewable energy that makes a significant contribution to meeting the ACT's greenhouse gas emission targets;*
- *economies of scale to reduce the cost of renewable energy generation in the ACT; and*
- *support a clean energy industry in the ACT.*

Energetics' Comments:

Listing a maximum facility size of 40MW contradicts section 3.8, which stipulates a maximum capacity of 20MW. We suggest changing the wording highlighted above with "facilities between 200kW and 20MW" to be consistent with section 3.8. If left at 40MW the reader may believe there is potentially only a single auction winner. A simple statement to the effect that there will be a minimum of two winning bids with a minimum capacity of 2MW in this section should provide more clarity.

3.3. Briefing Document Section 3: Conditions of Auction

Subsection 3.1 Sealed Bid Tender

Existing Text

Bidders will submit sealed bids containing:

- *evidence of the bidder's capability to execute a project of the scale proposed including evidence of financial capacity;*
- *a description of the proposed location of the facility and evidence to support the likelihood that the proposed location will be suitable for Development Approval;*
- *proposed connection point to the ACT Distribution Network and claims to support the likelihood that the facility will be permitted for connection to the network;*
- *a schedule for completion of the project with demonstrable milestones that can be used to assess the progress of the project – due consideration for the time to complete EPBC, EIS and DA should be demonstrated; and*

- *the FiT required to support the project.*

Energetics' Comments:

This section of the briefing document is clear and unambiguous. We suggest expanding the acronyms listed (EPBC - Environmental Protection and Biodiversity Conservation, EIS - Environmental Impact Statement) and develop consistent use of "DA".

As a further consideration the ACT Government may wish to increase the rigour here or in capability criteria if there are concerns about the long term solvency of prospective bidders. This issue has had major impacts on solar generation projects both domestically and internationally. If there are specific known financial criteria required as part of capability assessment they could be placed here. Energetics" experience with the Solar Flagships program suggests that many aspiring generators were less than capable with regard to governance, probity and risk management.

Subsection 3.2 Tender Evaluation Phases

Existing Text

Phase 1 - Prequalification

In phase 1, bidders will be assessed against their capability and the likelihood that their project will achieve development approval and network connection approval. Capable bidders with feasible proposals will be invited to submit final offers during phase 2.

The Government plans to release the RFT for prequalification in the last quarter of 2011 and to receive responses and notify prequalified bidders by the second quarter of 2012.

Phase 2 - Final Offer

Prequalified bidders will be invited to submit final price offers within three months of financial closure and project commencement. Bidders submitting final offers will be expected to have obtained, or be certain of obtaining, development and connection approval. Final offers will be assessed on the basis of the lowest FiT required.

The Government will determine a suitable time for submission of best and final offers from the information provided by bidders in phase 1. All bids must be submitted before the determined time.

Energetics' Comments:

This section or an additional complimentary section would deliver improved clarity using a graphical timeline or table covering all important milestones towards the auction conclusion. This could also clarify when, for example, capability criteria will be made available or when to close off input for industry views on the process.

We suggest amending the first sentence in the "Phase 2 – Final Offer" section for ease of understanding. The terms "financial closure" and "project commencement" require defining within the document. The first sentence in the second paragraph for Phase 2 could be construed as being at odds with the first sentence in paragraph one in that one sentence suggests a timeframe for submission of final prices and one sentence suggests that this is yet to be determined. Again these points may be addressed using a graphical timeline showing a window of opportunity for submission of final prices.

Subsection 3.3 Bidders' Capability

ExistingText

The ACT is seeking competent engineering, planning and construction organisations with demonstrable experience in executing projects of the scale proposed. Bidders will be assessed according to capability criteria prior to further assessment against other selection criteria.

Energetics' Comments:

This section of the briefing document is clear and unambiguous. No Improvements are suggested.

Subsection 3.4 Site Selection and Approval

ExistingText

Bidders will identify and describe suitable locations for their proposed facilities. In phase 1, bidders will be assessed on the likelihood that they will obtain development approval for their proposed locations. A set of key criteria will be provided for bidders to make their claims.

Bidders selected in phase 1 will be required to obtain Development Approval at the bidder's expense.

The ACT has retained a site at Ingeldene Forest. Bidders may propose to use part of this site and, if successful, will be required to obtain their own Development Approval. Proposals for the use of part of Ingledene must demonstrate that the remaining area is still available for other purposes.

Bidders could locate facilities either on leased or unleased land.

Bidders might identify packages of land under existing leases and make their own arrangements with the existing leaseholder for use of the land.

The ACT Government has a limited stock of unleased land that might be suitable. Potential bidders can seek information from ACT Land and Property Services as to packages that might be proposed and acquired.

Additional information is available at Appendix A.

Energetics' Comments:

This section would also benefit from clarity around when "criteria will be provided for bidders to make their claims".

Appendix A ("Land Acquisition and Development Considerations") suggests that facilities development for solar generation would be permissible under the Territory Plan. However, it would be considered a "Major Utility Installation/Power generation station". Only ancillary generation would be allowed on commercial buildings in commercial zones. Potentially this may limit some of the opportunities where embedded generation could be undertaken on large commercial sites. This would be subject to the ACT Government's view on the requirement for electricity to be distributed by the DNSP.

Subsection 3.5 Connection to the Distribution Network

ExistingText

Bidders will provide evidence that their proposed facility will be suitable for connection to the ACT Electricity Distribution Network. Evidence will include:

- *statements of claims against connection criteria required by ActewAGL Distribution; and*
- *statements of claims against technical and safety requirements as advised by the ACT Planning and Land Authority Construction Services.*

The successful bidder will pay for all network connection costs and include them in the capital cost of their project.

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Energetics' Comments:

This section of the briefing document is clear and unambiguous

Given the extent of the requirement for connection to the network it may be prudent to include a representative from ActewAGL as part of the tender evaluation team.

Subsection 3.6 Asset on Offer

Existing text.

The winning bidders will be awarded access to a FiT at the value offered by the bidder at auction. The FiT will represent the total revenue required by the bidder over the life of the generator on a $/MWh basis. This arrangement is intended to ensure maximum certainty for bidders with regard to total revenue from the generator free of market risk.

The ACT Government will not prescribe the commercial arrangements of bidders with regard to the sale of electricity generated. Bidders may choose, for example, to register as a market participant and sell energy into the NEM (spot market) either directly or through a registered intermediary. Alternatively, bidders may enter into off-market arrangements for the sale of electricity to a market customer of their choosing. Bidders will be required to ensure that proposed commercial arrangements with regard to sale of electricity are fully consistent with AEMO requirements.

The ACT Government intends, at the time of auction, to have in place legislation to require the DNSP to pay a 'price support payment' to the generator in relation to the FiT. The value of the payment by the DSNP will be limited to the value of the agreed FiT minus the spot-market equivalent price for that electricity. Therefore, while the total value of the FiT is fixed, the FiT is constituted by 'electricity sales revenue' and revenue from a 'price support payment' from the DNSP. The value of each of these two constituent sources of revenue will vary in accordance with changes in the spot market. Payments will be made on receipt of evidence of the sale of electricity, and evidence of the spot-market equivalent price for that electricity.

The ACT Government expects that bidders will only opt for off-market arrangements if they can assure themselves of being able to receive higher electricity sales revenue than the spot-market equivalent value. Should the revenue from sales through an off-market arrangement exceed the spot-market equivalent value the additional revenue would belong to the generator. In any 30 minute NEM trading interval where the spot-market equivalent value of the electricity exceeds the total value of the FiT, the difference would constitute a 'credit' for the DNSP and would be subtracted from subsequent price support payments to the generator.

To enable the ACT to evaluate a number of policy options, bidders will provide separate prices for a FiT for:

- *15 years;*
- *20 years; and*

25 years

Generators will be required to register with the Renewable Energy Regulator under the Commonwealth Government's Large-scale Renewable Energy Target (LRET) scheme and create Large Scale Generation Certificates (LGCs) for all eligible generation.

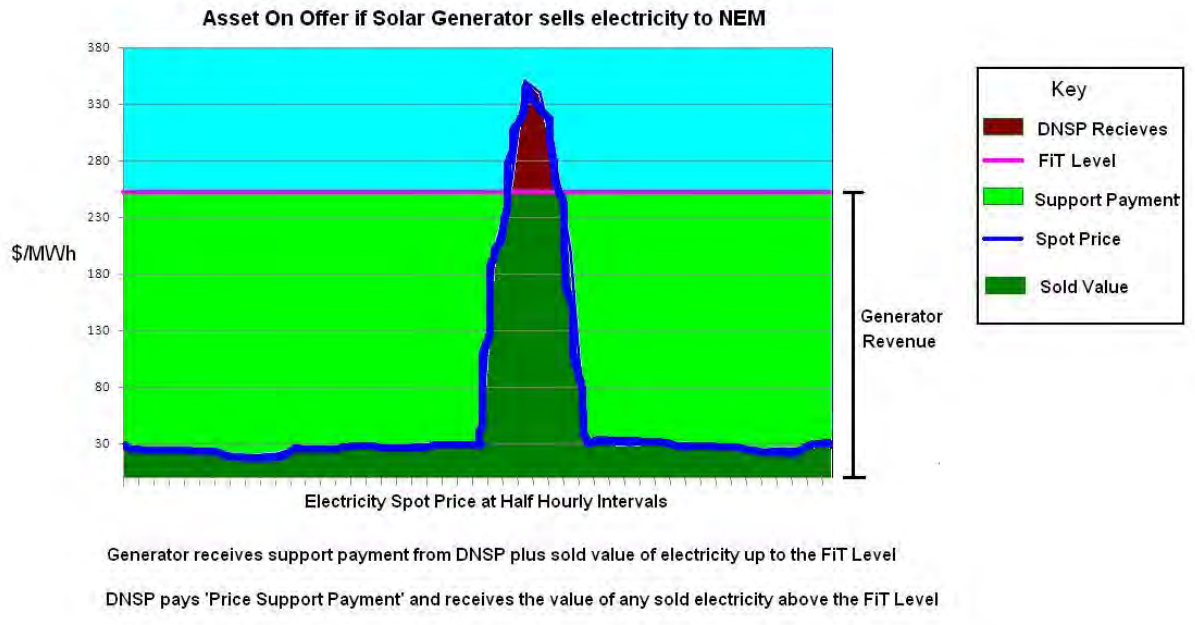
For each of the FiT durations above, the bidder will provide separate prices for the following cases:

- *LGCs remain the property of the generator to be traded by the generator for additional revenue; and*
- *LGCs are voluntarily surrendered by the generator in exchange for a higher FiT.*

Energetics' Comments:

We believe this section is critical to the clarity of explanation of the briefing document. The primary recommendation here would be to include graphical representation to reinforce the explanation. As a minimum, two graphs displaying a National Electricity Market (NEM) participant scenario and an off-market seller scenario would be highly beneficial.

A mock up of the NEM Participant Scenario could be similar to the diagram below:



Clarity regarding treatment of embedded onsite generation should be stated here as enabling this would reduce the required FiT prices and, in turn, lower price support payments by the DNSP. This concept is in agreement with the statement that "The ACT Government will not prescribe the

commercial arrangements of bidders with regard to the sale of electricity generated." However, it would contradict the treatment of facilities under the Territory Plan. The ACT Government's position should be clarified for potential bidders.

Given the structure of the support payments the ACT Goverment (in the form of DNSP payments) carries the market risk of the difference between the Spot price and the FiT. That is, as the spot market price decreases the required DNSP payments increase. The assumption is that the ACT Government is comfortable with taking on this fluctuating cost risk and that it would assist in reducing the level of the Fit and support payment. If further cost certainty (on behalf of the ACT Government) was sought, then the Support payment could be set exclusive of revenue generated from electricity sales which may encourage creative low cost generation solutions. On balance, we believe both processes to be transparent and promoting a fair market opportunity.

Each bidder will be supplying pricing covering six scenarios when addressing FiT durations and treatment of Large Scale Generation Certificates (LGCs). As long as capability criteria is rigorous then any analysis should be minimised. If not, then this may require a reasonable support effort.

In terms of wording the following is suggested:

- All references to bidder should be made plural where acceptable to reinforce the concept of multiple winning bidders.
- The Acronym DNSP needs expansion in its first instance.
- Add Government after "ACT" in paragraph 5.

Subsection 3.7 Schedule for Delivery of Project

Existing text.

A successful bidder will be required to meet proposed and agreed milestones to demonstrate progress. Failure to achieve milestones could result in the entitlement to the FiT being withdrawn and offered to another bidder. The ACT might require a security deposit from successful bidders.

Energetics' Comments:

This section of the briefing document is clear and unambiguous except for the reference to the security deposit. It is suggested that the Briefing Document stipulates in which cases a security deposit may be required (for example, failure to satisfy the ACT Government of creditworthiness).

Subsection 3.8 Size of Facilities Offered

Existing text.

The aggregate capacity of all solar facilities awarded FiTs under the first auction round will be less than 40MW. Each individual bidder will submit bids for one facility, or multiple facilities, with aggregate capacity of between 2 and 20MW.

At least two winning bids will be awarded.

A single bidder may propose multiple sites of at least 200kW capacity provided that the bidder's total capacity on offer is greater than 2MW.

Energetics' Comments:

As noted previously, it is recommended that reference to minimum aggregated capacity (i.e. 2MW) and the concept of multiple winners should be positioned earlier in the document.

3.4. Briefing Document Section 4: Matters for Consultation

Existing text.

The ACT seeks industry views on:

- *the proposed timeframes for:*
  - *release of the prequalification Request for Tender (RFT);*
  - *preparation of the prequalification bids;*
  - *submission of phase two bids; and*
  - *financial closure and project commencement;*
- *the form of the asset on offer to the winner of the auction and the preferred parties to a supported price agreement; and*
- *the suitability of the Ingledene Forest site relative to other sites in the ACT.*

Energetics' Comments:

This section requires clarity of the terms „financial closure" and „project commencement". Additionally, a timetable for response may be seen as beneficial to potential bidders.

Subsection 4.1 Comments

Existing text.

Interested parties may provide comments to EnergyPolicy@act.gov.au. All comments will be treated as confidential and will not be attributed to the source.

Energetics Comment:

As previously, this section would also be improved with a timetable for responses.

Subsection 4.2 Questions

Existing text.

Interested parties may seek clarification or answers to questions relating to the conduct of the auction. Answers to common questions will be posted on the Department's web portal and the identity of the party asking the question will be withheld.

Energetics' Comments:

This section of the briefing document is clear and unambiguous. Details regarding the availability of the portal would be of use if available.

3.5. Briefing Document Appendix A

Existing text.

Appendix A

Land acquisition and development considerations

1) *The proponent must ensure the development is permissible under the Territory Plan. The facility is likely to be considered under the following definition in the Territory Plan:*

   - ***Major Utility Installation/Power generation station** means equipment and associated buildings constructed for the generation of electricity utilising gas, coal or other fuel sources.*

   Proponents shall note the following:

   - *The non-urban zones development tables within the Territory Plan permit major utility installation (power generation station) as assessable development.*
   - *Major utility installation is not listed as permissible within the Commercial Zones. Proposals may be considered as ancillary where the panels are proposed to be placed in the roof of existing commercial premises. **Ancillary** means associated with and directly related to, but incidental and subordinate to the predominant use.*

2) *Any identification of land within non-urban zones needs to be cognisant of significant strategic planning processes already under way. It cannot be assumed that all unleased Territory Land is available for the required purpose.*
3) *From 1 February 2011, new Schedule 4 triggers for an EIS under the ACT's Planning and Development Act include electricity generating station (including solar) that is capable of supplying 4MW of power (unless a different amount is prescribed by regulation). Bidders should consider potential triggers that will require an EIS to be completed before a DA could be lodged.*
4) *Bidders must consider matters of National Environmental Significance (NES) under the Environment Protection and Biodiversity Conservation Act 1999 (C'Wealth) that may require referral and be declared a controlled action. Proponents should contact the Commonwealth Department of Sustainability Environment Water, Population and Community (SEWPAC) for any considerations of NES matters.*
5) *The Planning and Development Act 2007 (P&D Act) requires that both merit and impact track DAs are assessed for their probable environmental impact on the land, and the suitability of the land.*
   a) *Merit track development applications may be required to assess the environmental effects through the statement of relevant criteria.*
   b) *Impact track development applications have these considerations addressed through the statement of strategic directions, an Environmental Impact Statement (EIS) or exemption from an EIS under S211.*
   c) *An Environmental Significance Opinion (ESO) may be sought for some items in Schedule 4 of the P&D Act.*
6) *If the developer proposes unleased land, then the developer must secure a commitment from the Government to lease the land.*

7) *Bidders proposing to construct facilities on existing leased land are required to make their own arrangements for assured use of the land for the life of the project.*
8) *ACT Land and Property Services (LAPS) is responsible for direct sales of unleased land and is also one of the principal departments responsible for the Land Release Program including restricted auctions. LAPS have a major projects facilitation unit that may be able to assist in developing the framework required to manage the identification of available land.*
9) *Where the land parcel is already under lease, bidders must obtain their own guarantee from the lessee that the land is available should the bid be successful. The bidder should arrange for lease variation pay for Change of Use Charge.*

Energetics' Comments:

This section of the briefing document is clear and unambiguous but as noted previously it may deter bidders proposing smaller scale developments of between 200kw and 4MW if they were expecting, for example, to embed the generation within existing commercial sites.

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BRIEF

ACT Government
Environment and Sustainable Development

Submission No	201100147
Schedule No	2011SCO 00259
Rec'd Minister's Office	.../.../...

To:	Minister for the Environment and Sustainable Development
From:	Director-General Deputy Director-General
Date:	23 May 2011
Subject:	Industry consultation and legislation drafting – Large-scale Feed-in Tariff Auction

Recommendation

1) That you approve the attached industry briefing paper for release via the Directorate's web site.
2) That you authorise ESD Directorate to develop draft legislation in conjunction with the PCO that would support conduct of the auction and payment of the price support, and note that the draft legislation may be refined after comments on the briefing paper are received from industry.

Critical Times/Urgency

The Directorate anticipates that industry will require at least four months prior to commencement of the auction to identify suitable land packages and secure the right to propose the package as part of an auction bid. The industry briefing is intended to alert industry to this aspect of the auction process and so allow industry time to investigate land availability in advance of the auction.

The auction date will be after passage and enactment of supporting legislation. If legislation is to be enacted before the end of 2012 then it will need to be presented to the Assembly on 18 October.

Background

Cabinet decided (10/0612/CAB of 6/09/10) to promote the establishment of 40MW of solar energy generation in the ACT by legislating for a Feed-in Tariff (FiT) determined by an auction process, whereby bidders compete for access to the FiT based on lowest FiT price offers. The FiT would be funded by a levy imposed on ACT electricity customers.

Heuris Partners have advised the ACT Government on how to obtain best value offers through an auction process. Legal advice has also been obtained from the Australian Government Solicitor on constructing a FiT that complies with National Electricity Law. In a separate briefing (number 201100334) the Directorate recommended that the solar power generator sells electricity in the National Energy Market, or to a willing retailer at the market price, and receives a subsidy (referred to as a price support payment) for the remainder of the FiT price through the Distribution Network Service Provider (DNSP). This has previously been referred to as a 'fixed revenue/variable subsidy' option.

Performance Assessment

DUE DATE: ...../...../..... **DATE RECEIVED:**...../...../.....

SATISFACTORY ☐ **UNSATISFACTORY** ☐

According to criteria specified in *ACT Government Policy Performance Measures*

Signature ..../ .../....

Industry Briefing Paper

The chief purpose of the briefing paper is to inform the market of the timing and key aspects of the auction. This information will encourage bidders to prepare for the auction. Timing is consistent with recent project plans provided by the Directorate to the Minister's office which has a two-stage auction process commencing in December 2011 with prequalified tenderers announced by April 2012.

The briefing paper provides information in relation to:

- the purpose of, and background to, this initiative;
- the expected content of bids, including site selection and associated approval and network connection requirements;
- the form of the asset (FiT) on offer; and
- the likely structure of bids.

Consultation Process

The process is also expected to elicit feedback from industry. Industry comments will guide the Directorate on the adequacy of timeframes for proponents to develop their proposals and secure approved locations with network connection approvals.

The briefing paper will be made available on the Directorate website. An announcement will be made by the Minister, an advertisement placed in the Canberra times, and developers, associations and societies who have previously expressed interest will be alerted.

The Directorate will accept comments and post answers to questions via the web site. If proponents request a face to face briefing before the auction, it will be provided.

Issues

The ACT has a unique electricity distribution and supply system that creates opportunities, as well as constraints, for large scale solar power generation. The legislative framework proposed for the auction is derived from the existing micro and medium scale FiT arrangements, but accommodates some significant differences.

1. The small scale schemes rely on an existing supply arrangement between a retailer and consumer. Large scale generation cannot rely on this arrangement.
2. The small scale schemes cannot be scaled up (by up to 10,000 times) without causing retail competition issues.
3. Large scale generation must be considered by Australian Energy Market Operator (AEMO) so that system supply and demand stability is maintained.

To submit an auction bid, industry will be required to identify suitable locations that could subsequently be used subject to successful acquisition and development approval. More bids might be received if the ACT Government retains the Ingeldene site for possible use by bidders who are unable to otherwise locate suitable land. Even if sufficient other sites are identified in the first 40MW tranche, Ingeldene might be useful for subsequent auctions.

Heuris advised that the ACT will benefit from increased competition if the opportunity for multiple winners, and for facilities of 2MW capacity or higher, is provided. However, it needs to be noted that this necessarily means that the ACT will be required to accept both the 'best' and 'second best' bids.

Previous public consultations concerning a solar power facility in the ACT, the draft Sustainable

Energy Policy and the expansion of the FiT for large facilities did not reveal public objections to a facility located on unused land away from the urban environment. The FiT auction might bring forward proposals for facilities located near the urban environment. An example might be a 5MW facility located on landfill at the Belconnen waste treatment site.

The Government Solicitor's Office is advising the Directorate on probity issues regarding release of information about the conduct of a competitive auction.

Media Implications
An announcement will be required to alert interested parties to the availability of information concerning the auction. The Directorate recommends that the Minister issues a press release when the details of the auction are available on the Directorate's web site.

Bob Neil
A/g Director
Water Energy and Waste

Action Officer James O'Brien **Phone** 70322

AGREED/SIGNED/NOT AGREED/NOTED

Simon Corbell MLA 26/5/11