

# AUSTELA

Australian Solar Thermal Energy Association Ltd

27 August 2012

Australian Renewable Energy Agency  
Submission—Draft General Funding Strategy  
By email: [submissions@arena.gov.au](mailto:submissions@arena.gov.au)

## **Submission in Response to ARENA's Draft General Funding Strategy**

Thank you for the opportunity to provide this submission.

ARENA has emphasised in communications with stakeholders to date a desire to:

- work quickly to define and begin to implement ARENA's first General Funding Strategy, and
- receive concise input from stakeholders, including innovative suggestions to assist ARENA to achieve its objectives.

AUSTELA supports this pragmatism and desire for focus, and will seek to make submissions in relation to a limited number of matters, and as concisely as possible.

## **Summary of Submission Major Points**

AUSTELA reiterates the contents of our presentation to ARENA's National Consultation Forum on 21 August 2012, (a copy of which is attached) and would welcome the opportunity to discuss and elaborate on the issues raised in that presentation.

AUSTELA supports:

1. The broad thrust of the draft General Funding Strategy
2. The proposed mix of strategies outlined at page 2 of the draft Strategy
3. ARENA's willingness to investigate a broad definition of 'grant', which (while limiting ARENA's maximum financial exposure in each case) facilitates funding structures that:
  - reward delivery of project outputs or milestones over time
  - reward the value of energy delivered, rather than notional installed capacity
  - incentivise renewable energy development that will contribute to overall electricity system efficiency, not simply lowest generation cost
4. ARENA's intention to implement innovative mechanisms and programs, recognising that experience has shown that:
  - grant funding is likely not to be the most effective form of support for renewable energy technologies at more advanced stages of development
  - the greatest impediment to acceleration of deployment of renewable energy in Australia is the lack of access to stable revenue streams for renewable energy asset development against which long-term finance can be raised – this is the area to which ARENA should devote most resource and where ARENA can have most impact
  - in order to unlock the substantial private sector investment required to accelerate renewable energy deployment in Australia, program mechanisms are also likely to be required to appropriately share technology risk (real or perceived) between the public and private sectors in order to retire technology risks in earlier projects
  - a program of smaller projects over time, providing a clear path for both project/technology proponents and for investors to increase investment over time is likely to:

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- be more effective than one or two large projects in delivering sustainable renewable energy industry capacity
  - enable ARENA to monitor whether projected benefits (such as progress with efficiency gains and cost reductions, and proof of value of outputs) are being realised
  - consequently assist ARENA to make the most informed judgements as to program rationalisation and refinement going forward
  - deliver leverage benefits for ARENA as cost reductions and efficiency gains are delivered and private sector capital becomes more freely available and less expensive for the renewable energy projects and technologies supported through the program
5. ARENA's plan to develop a coordinated funding strategy for each technology, and to tailor its funding programs to reflect those strategies' respective goals
  6. ARENA's intention to focus on programs that 'provide for ongoing sequential support' ... 'and for a pipeline of projects within a technology that will improve cost and performance benchmarks'.

AUSTELA also urges ARENA to:

7. In considering innovative options for program design, draw not only on experience from programs implemented by ARENA's predecessors, but also on program design in other jurisdictions (such as the UK) experiencing similar market constraint issues impeding the development of renewable energy. Specifically AUSTELA encourages ARENA to consider how ARENA can facilitate the implementation of 'Contracts for Difference' or similar measures, and measures to reward renewable energy firm capacity
8. Adopt a definition of its goals in relation to the 'development of renewable energy in Australia' which includes the development of renewable energy exports for Australia:
  - development of renewable energy industry capability that equips Australian businesses (including multi-nationals with operations in Australia or drawing on Australian capability) to compete in international markets for renewable energy technology and project expertise
  - development of Australian direct exports of stored renewable energy in the form of gas or liquids (such as solar fuels), to equip Australia with the capacity to provide low-carbon and renewable energy enhanced fuels to our major trading partners as they seek to reduce carbon intensity in their economies.

## **Why ARENA should support a substantial acceleration of deployment of Concentrating Solar Thermal Power in Australia**

Solar thermal power provides Australia with valuable options at an important time in the development of Australia's energy sector and electricity system, and in the development of renewable energy technology and industry internationally.

Impediments to Australia's realisation of the potential benefits of solar thermal power can largely be overcome through deployment in Australia of solar thermal power technologies. Lack of familiarity in Australia with solar thermal power developments in other markets, and reluctance to accept overseas experience, is a major impediment to deployment of solar thermal power in Australia. Deployment through a sustained, ongoing program of the type envisaged by the draft General Funding Strategy will prove market value, prove and deliver reductions in costs, and in doing so will attract the private investment needed to develop sustainable industry capability.

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Without seeking to diminish the prospects or importance of any other renewable energy technology, solar thermal has a particular, and major, potential role for Australia, because it offers versatility and benefits - including utility-scale energy storage, ease of hybrid application, and the potential for a major new export industry in solar fuels - the range of which no other renewable energy technology offers. Solar thermal power addresses many of the challenging aspects of Australia's transformation to a low-carbon electricity system and to the achievement of our long-term emissions reduction goals.

Although maturing quickly, solar thermal power technologies are still at relatively early stages of enhancement, and offer significant potential for performance improvement and cost reduction. The solar thermal industry remains in its formative stages internationally. Australia is a noted world leader in CSP research, science and commercialisation.

By accelerating deployment in Australia of solar thermal power systems, Australia will be well-placed to contribute to and benefit from international developments, for application in our domestic energy markets and to develop the foundations for an internationally competitive industry capability.

We suggest this breadth of benefits warrants specific exploration in ARENA's considerations. The solar thermal industry is keen to engage with ARENA early in ARENA's strategy development to assist ARENA to fully appreciate the potential role and value of solar thermal power in Australia, and Australia's potential for development of a vibrant solar thermal industry.

## **'Realising the Potential for Concentrating Solar Power in Australia'**

AUSTELA urges ARENA to take full account of the findings in the report 'Realising the Potential of Concentrating Solar Power in Australia' ('CSP Report'), prepared by IT Power (Australia) for the Australian Solar Institute and released on 6 June 2012. (CSP Report available at: <http://austela.com.au/index.php/what-we-do/itp-report-2012>)

This report is the most contemporary and thorough review yet undertaken in Australia in relation to solar thermal power development, and the value and market potential of solar thermal power in the Australian context. Importantly the CSP Report examines and highlights the value of thermal energy storage in Australia, not currently fully recognised by available market mechanisms.

The CSP Report is regarded by the industry as the most authoritative report on solar thermal power currently available for policy-makers and investors, and we recommend it as the primary resource for ARENA in your consideration of issues relating to solar thermal power in Australia.

## **AETA**

We also ask that ARENA note that data in the Australian Energy Technology Assessment (AETA) as to solar thermal power generation costs and cost trajectory is at odds with the CSP Report, with leading international and domestic research and with international industry experience, in key respects.

AUSTELA and our solar industry colleagues in the CEC and AuSES are engaged with the Bureau of Resources and Energy Economics (BREE) in the hope that it will be possible to reconcile important differences between the AETA and the CSP Report, in order to provide ARENA (and other agencies, including the Energy White Paper team) with a consensus view, supported by industry, of the status of solar thermal power costs and cost forecasts, to support planning.

## **Submissions on the General Funding Strategy**

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Page	Statement/issue	AUSTELA Submission
Section 1, Page 2	'...market pull programs are better suited to pater stage demonstration and pre-commercial deployment, as debt and project equity need to take a greater role.'	<p>AUSTELA supports this observation and notes that market gaps to be addressed in such programs include:</p> <ul style="list-style-type: none"> <li>- revenue certainty over project life, through measures such as contracts for difference</li> <li>- mechanisms (and financial products) to appropriately share technology risk in earlier projects while technical risks are retired</li> </ul>
Section 2, Page 3	[Need for a pipeline of projects and technologies, in light of the 'early stage' of much renewable energy technology]	<p>While AUSTELA acknowledges that there is a wide range of maturity of renewable energy technologies, ARENA's limited funds can only be stretched so far. ARENA's purpose - to support deployment of renewable energy - inherently means decisions must be made on an ongoing basis as to which technologies appear most prospective, and how 'development' of renewable energy technologies should be weighted in ARENA's funding priorities as compared with 'deployment'.</p> <p>Those technologies which:</p> <ul style="list-style-type: none"> <li>- have highest prospectivity, based on research and on project deployment internationally</li> <li>- appear to offer the most options and opportunity for Australia, and</li> <li>- have evident barriers to market (ie, clearest path to overcoming obstacles to private sector funding)</li> </ul> <p>would logically attract early and greater funding on a risk/benefit weighted basis.</p>
Section 2, Page 3	Hybrid technologies and energy storage	<p>AUSTELA strongly supports ARENA's intention to focus on technologies which provide efficiencies in overall electricity system operation and cost, including hybrid generation and energy storage.</p> <p>There has been an excessive focus in Australian energy policy on LCOE, based on Australian market experience that energy storage was not required (due to cheap fossil fuels); in that past market dynamic, cost of instantaneous generation was all that mattered. As Australia moves to a more complex and nuanced approach to electricity generation, distribution and use, with high volumes of variable energy sources in diverse locations across the system, the ability to manage electricity will become as important as the cost of its generation.</p> <p>The ability for renewable energy generation types to provide 'equivalent firm capacity' – through hybrid models and through</p>

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		energy storage – will be essential to the economically efficient electricity networks of the future.
Section 2, Page 3	[Mix of program and project types]	As noted earlier, AUSTELA agrees with and supports the proposed mix of program and project types outlined.
Section 2, Page 3	[Favouring innovations and collaborations of particular benefit to Australia ...]	<p>AUSTELA supports the principle that ARENA should seek to focus on innovation and collaboration with particular benefit to Australia. Renewable energy development, research and innovation is a growing market internationally, and it is not finite – as with all industries, innovation will continue over time, and early technologies may well be (indeed are likely to be) superseded by later innovation.</p> <p>Australia’s limited government and private sector resources mean necessarily that Australia must seek to leverage international investments wherever possible, in order that:</p> <ul style="list-style-type: none"> <li>- Australian innovation in those technologies (and in the finance and business models used for their deployment) can emerge through local deployment</li> <li>- Australian researchers and innovators have the ability to engage with international counterparts in order to advance Australian innovation.</li> </ul> <p>As reflected in ARENA’s comments in Section 6 of the draft, Australia must be cautious about assuming that there is net benefit in leaving other jurisdictions to pursue particular types of renewable energy development on the basis that Australia is best placed to be a technology taker. This approach neglects the cost reductions achieved through local experience and deployment, and risks missing opportunities for local innovation that could have potentially global, as well as local, significance.</p> <p>A better approach is to consider the underlying industry infrastructure and skills required in order for Australia to develop cost-effective indigenous industry capability and/or competitive export capability, and against those fundamentals, consider the merits of supporting local deployment of technologies in which international innovation may occur anyway.</p>
Section 3, Page 3	Sustained growth and development of industry capacity	<p>AUSTELA strongly supports ARENA’s focus on program design intended to provide clarity, predictability and longevity of program activity needed drive industry development, including the continuation of resourcing of research and academic capability.</p> <p>We note that R&amp;D investment is a function of competitive markets, and that one of the best ways for ARENA to facilitate strong industry capability along the innovation chain (including funds flow to</p>

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		<p>research and academic community) in renewable energy is to support the creation of a vibrant and competitive market for renewable energy in Australia.</p> <p>One way ARENA can contribute to the creation of such a market is to seek to illuminate and highlight the distorting effect of perverse incentives continuing to underpin fossil-fuelled generation in Australia, and to influence implementation of measures to more effectively level the competitive playing field between traditional (fossil-fuel) and non-renewable energy types, by removal of those incentives.</p>
Section 4, Pages 4-5	Knowledge sharing	<p>While AUSTELA supports the principle of knowledge-sharing, there is a need to be commercial and pragmatic in expectations as to the extent to which requirements for knowledge sharing should be built into program design.</p> <p>Inclusion of program requirements for research collaboration in previous renewable energy support programs provided by ARENA's predecessors contributed to complication in transaction structuring and finance arrangements; banks and equity investors can regard knowledge sharing requirements and research collaborations as distractions exacerbating risk. This is in part reflected in ARENA's comments at page 6 about the desirability of streamlining application processes in the context of the ERP.</p> <p>It is important that:</p> <ul style="list-style-type: none"> <li>- program goals are simple and clear</li> <li>- the goals are as few as possible</li> <li>- for larger projects, that every effort be made to remove rather than add complications which could distract the attention of financiers.</li> </ul> <p>Where the central program goal is renewable energy project delivery, while use of taxpayer funds creates a legitimate expectation that the community will share appropriately in the value of the learnings delivered by those funds, for larger projects, securing the private capital required must be the clear priority.</p>
Section 5, Page 4	Potential Funding Approaches	<p>AUSTELA supports the approach outlined in Section 5 and particularly ARENA's stated commitment to adopt an adaptable, innovative approach focused on delivery of outcomes and results.</p> <p>AUSTELA wishes to reiterate particularly our view that structures such as that described in paragraph 4 of section 5, where support is provided to improve the reliability and certainty of the project revenue stream, should be considered as a high priority.</p>

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		<p>In terms of program competitive/merit assessment, AUSTELA suggests that the ACT's Solar Auction process may provide important learnings, and recommends that AUSTELA and ARENA consult together (perhaps with inclusion of ACT Government personnel involved in the ACT's program design) to unpick the key learnings from that program and to assess the applicability of this design for large-scale solar thermal program deployment.</p> <p>However, care must be taken to ensure that the competitive basis for any 'reverse-auction' style program is aligned to the ultimate objective of value of output delivered. AUSTELA would recommend against structuring such a program:</p> <ul style="list-style-type: none"> <li>- on the basis of lowest LCOE alone (although LCOE must clearly be a factor), or</li> <li>- on the basis of cost per unit of installed nameplate capacity.</li> </ul> <p>Instead, such a program should seek to encourage projects designed to deliver maximum value of energy output for capital deployed. Where appropriate, other value benefits such as deferral of network augmentation costs, firm capacity, energy storage and ancillary services should also be taken into account.</p> <p>For projects involving earlier-stage solar thermal technology innovation, involving greater technical risk, an open program structure allowing proponents to choose the optimal time in their development cycle to seek support would potentially be most useful.</p>
<p>Pages 7 &amp; 8</p>	<p>Priority Technology Activities</p>	<p>AUSTELA of course strongly supports ARENA's consideration of a new program for the support of large-scale solar thermal projects including hybridisation. We would add that energy storage should also be a key component of such a program.</p> <p>We refer to slide 5 in AUSTELA's presentation to the ARENA National Consultation Forum on 21 August. That slide outlines an indicative approach to the structure of a new program for large-scale solar thermal energy development consistent with ARENA's proposed approach of providing ongoing sequential support for a pipeline of projects within a technology that will improve cost and performance benchmarks.</p> <p>AUSTELA is confident:</p> <ul style="list-style-type: none"> <li>- that such a program would receive strong support from the solar thermal industry</li> <li>- that leading solar thermal industry participants would be in a position, should ARENA seek to implement such a program as an early initiative, to move quickly to present high quality</li> </ul>

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		<p>project proposals in response.</p> <p>We also note that solar thermal power systems would likely qualify under the categories of both pilot and demonstration of storage technologies, and off-grid demonstration projects. This again illustrates the unique versatility of solar thermal power generation and CSP's option value for Australia.</p> <p>We would propose that ARENA consider adding specific reference to forms of renewable energy storage which convert renewable energy sources into gas or liquids, enabling their storage and transportation at large scale. Technologies for these processes exist today – including technologies developed in Australia.</p> <p>Development of industry capability and further development of, innovation in and commercialisation of these technologies can present Australia with major opportunities domestically and internationally.</p> <p>These technologies represent the potential for Australia to develop export markets for solar and other renewable energy, creating a new dimension of national value from the development and deployment of renewable energy.</p>
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While seeking to keep our submissions brief and to the point, AUSTELA notes that the market, policy (and political), regulatory and economic context in which submissions on the General Funding Strategy are sought is both highly complex and rapidly changing, and that the time available for consultation to date has been very brief.

As noted in our joint letter of 30 July 2012 (written with the Clean Energy Council's Solar Thermal Directorate and with the Australian Solar Energy Society), AUSTELA seeks a meeting with ARENA's Board to discuss in more detail than has been possible to date the specific opportunities available from and issues affecting solar thermal power development in Australia, and ideas to address them.

We look forward to working with ARENA to assist in the achievement of ARENA's goals.

Best regards



Andrew Want  
Chair, AUSTELA

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## Concentrating Solar Thermal – High value, dispatchable energy

High value peak output

Dispatchable, firm capacity

Commercially mature, utility  
scale energy storage

Australian industry potential

High value solar fuels



**ARENA National Consultation Forum, Melbourne 21 August 2012**

Andrew Want, Chairman, AUSTELA

## Preparing for a 'very different energy future'\*

Australia's generation fleet will be replaced by 2050

- 80% GHG reduction target requires zero-carbon stationary energy sector

In this very different, imminent future

- 'Firm capacity' (dispatchability) will replace the concept of 'base load'
- Energy storage will be integral to the system, enabling the most efficient network configuration
- Utility scale thermal energy storage will be a key element

CSP will make a major contribution to lower electricity prices

- Challenge is to deliver the most cost-efficient electricity system, not just lowest LCOE for generation
- CSP answers many of the pressing challenges in this transformation

\*Australian Energy Technology Assessment,  
BREE, July 2012

## CSP is the right technology to be supporting now

CSP's versatility provides important options and global opportunities for Australia

- High value peak output to meet peak demand, reduce network constraints
- Dispatchable, firm capacity – power when the market and network most needs it
  - Commercially mature, utility scale energy storage is available today
  - Hybrid versatility (CSP/gas, CSP/biomass, fossil/CSP-boost) provides flexibility
- Thermal inertia inherent in CSP – stable, reliable output in the 'renewable intensive' grid
- Genuine opportunity for Australian CSP industry to compete internationally
- High value solar fuels – an Australian solar energy export industry to power the 'Asian Century'

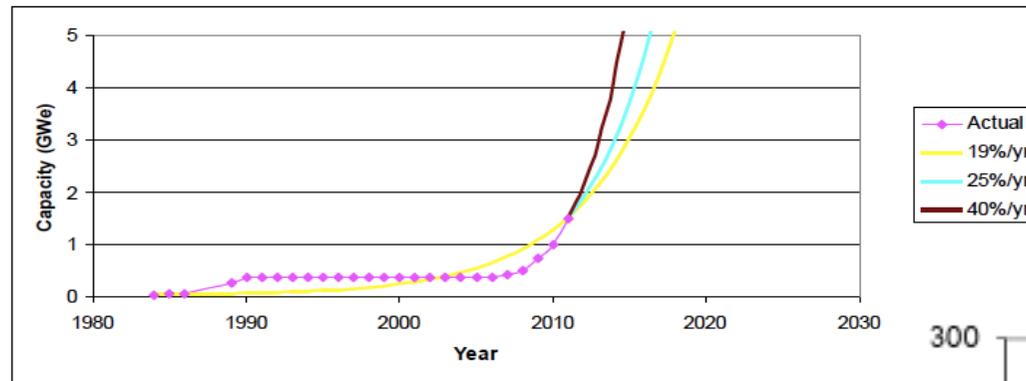
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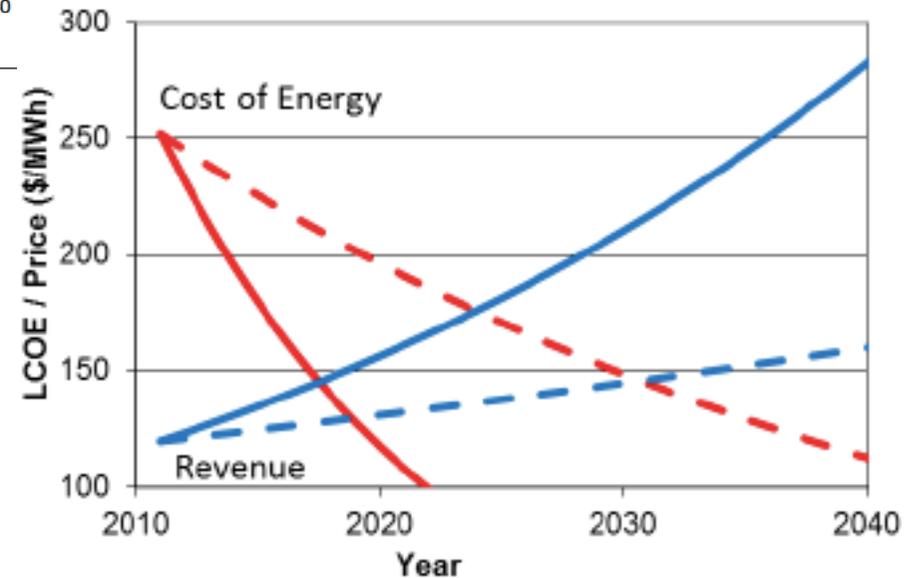
Australian can contribute to, and benefit from, global CSP growth

CSP growth is accelerating, rising to 40% pa since 2007 ...

Figure 2: Global installed capacity of CSP plants to end of 2011.



...and the revenue/cost gap will close with deployment



Source: 'Realising the Potential for CSP in Australia', 2012

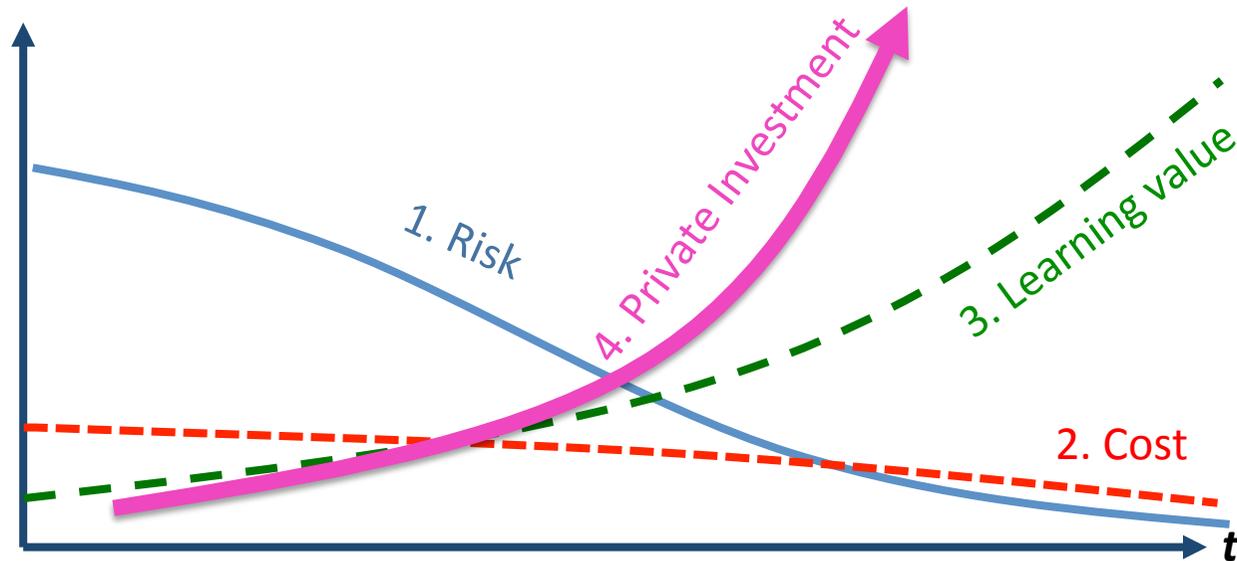
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## Staged program structure, market segment focus = improved ROI

1. Risk reduces
2. Cost reductions leverage program investment
3. Industry learnings and capability increase
4. Private capital inflow increases as risk reduces



		Year 1	Year 2	Year 3	Year 4	Year 5
Payments based on output delivered	Utility scale	4 projects 20-50MW	3 projects 2x50MW 1x100MW	2 projects 1x50MW 1x100MW	2 projects 1x100MW 1x250MW	2 projects 250MW
	Mining/Off-grid	5 projects 2-5MW	3 projects 1x2MW 2x5MW	2 projects 1x5MW 1x10MW	2 projects 1x10MW 1x20MW	
Lump sum grants	Pilot/demo	Open for applications at any time for projects 0.5MW-2MW Higher technical risk/innovation				

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## Summary: Program design to drive sustained private investment

1. Clear objectives, stable program, defined period
  - An investment path for project developers, investors and financiers
2. Structured to deliver a range of projects
  - Scale tailored to address identified market segments
  - Program investment spread over time
3. Facilitate project finance – revenue certainty for output delivered
  - Payments based on value of energy delivered (not just cost)
  - Structured to drive cost reductions through life of the program

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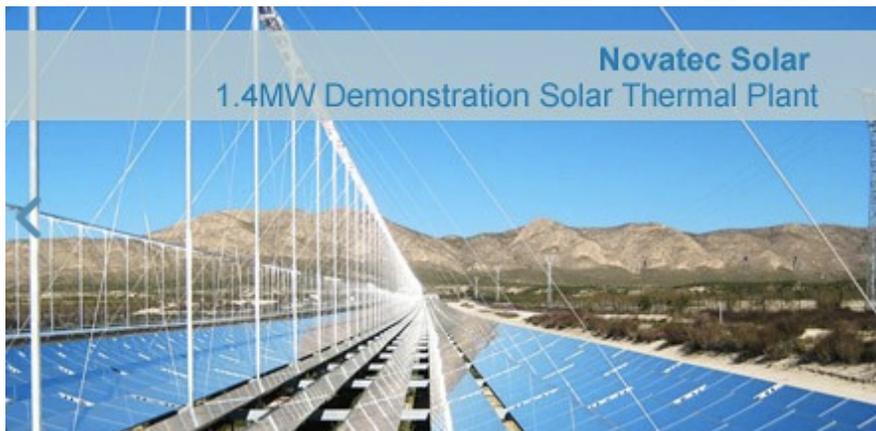
## CST technologies



Parabolic trough: >90% of global CSP ~2011



Central receiver 'power tower'



Compact Linear Fresnel



Parabolic dish