

Financing solar energy through the innovation cycle

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Australian Solar Institute



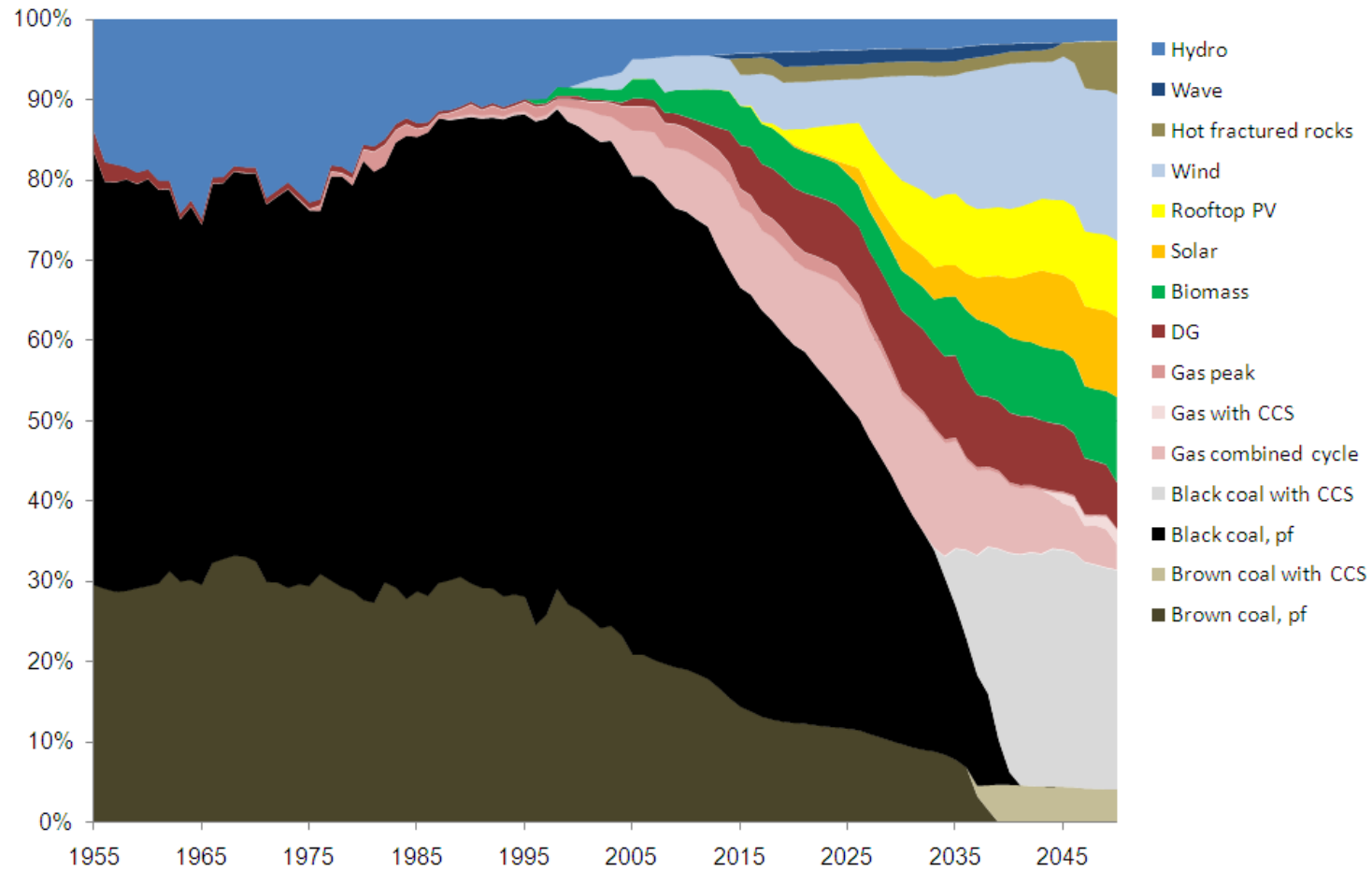
- Australian Government initiative for R&D into solar PV and CSP technologies
- Newcastle, Australia HQ
- ASI-funded solar R&D projects in research institutions and companies around Australia and internationally, supporting 100+ Australian researchers
- c\$220m portfolio of projects leveraged by c\$75m of Australian Government funding at ratio of 2:1+
- Australian Government's \$1.5b Solar Flagships Program – sharing learnings
- International engagement – USASEC; Fraunhofer Institute MoU; DLR MoU; strategic engagement with Asia

Outline



- Solar energy technology development
- ASI view on barriers and risks through the solar technology innovation cycle
- A public sector perspective on innovative financing solutions
- Multilateral financial institutions
- Clean Energy Finance Corporation
 - threshold issues
 - ASI submission

Future of solar in Australia- 20-25% by 2050

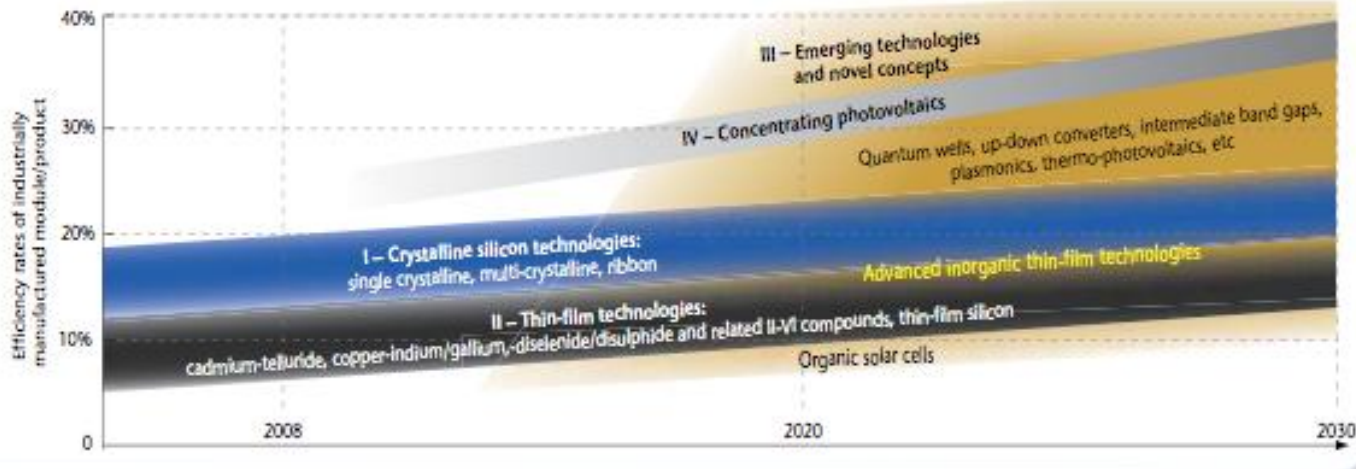


Source: ESSA; CSIRO ESM Mar 2011

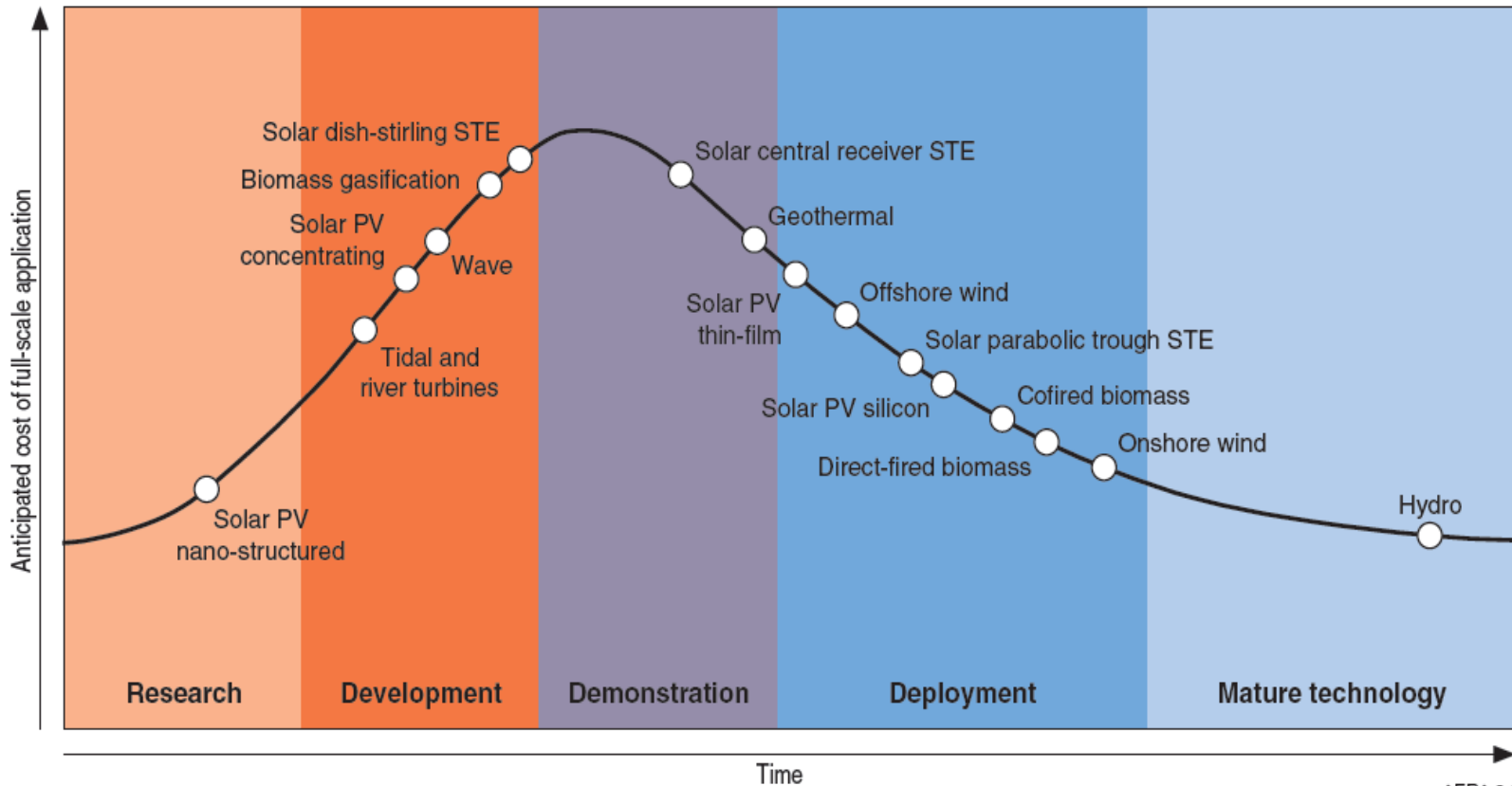
Current high level strategic technology roadmaps

- Today's technology will continue to evolve, lowering costs and increasing efficiency
- New technology emerging that will accelerate trends

PV technology status and prospects

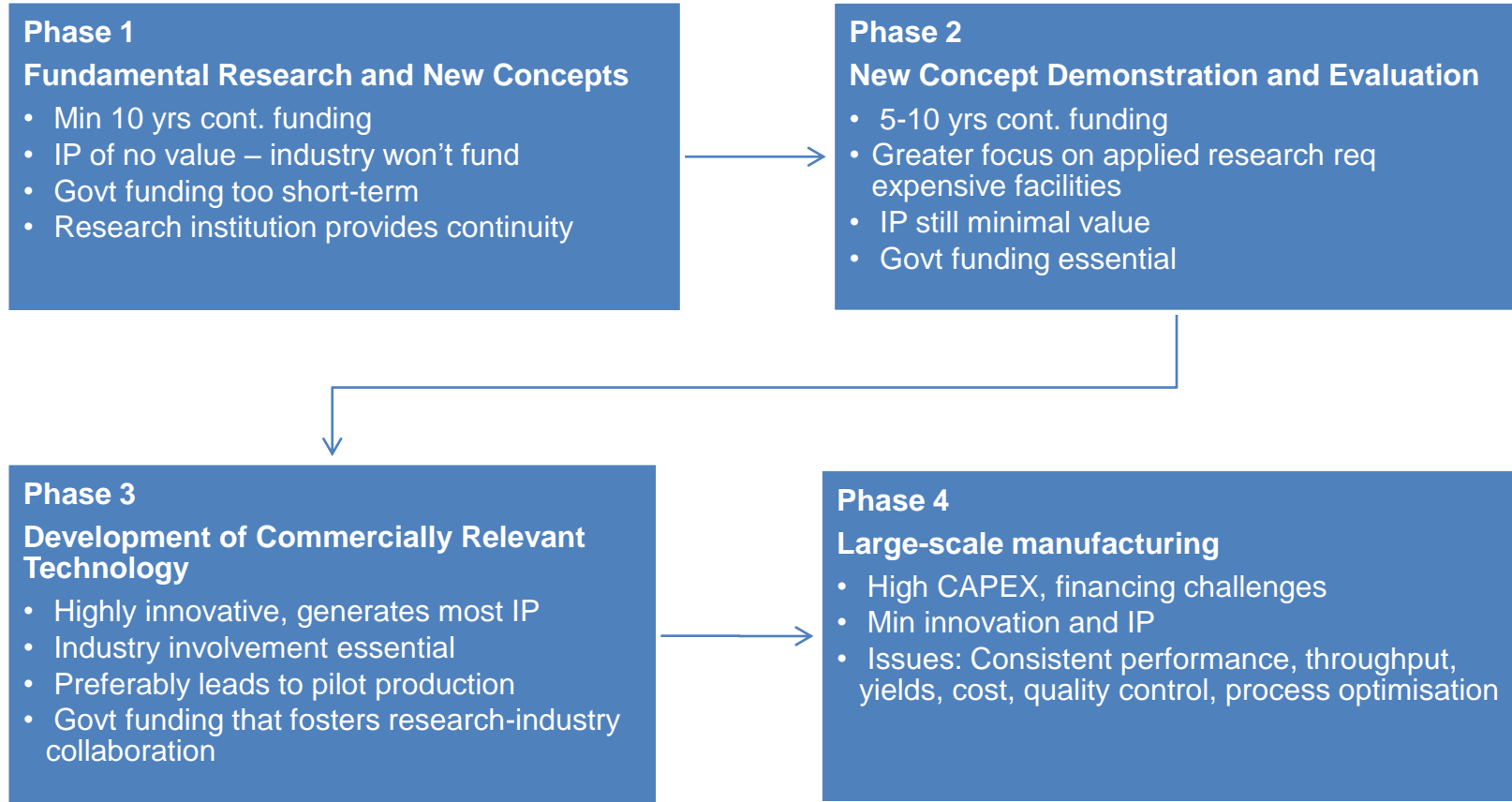


CAPEX learning curve for renewable energy technologies



Source: Wyld Group. ABARE and Geoscience Australia, *Australian Energy Resource Assessment, Chapter 2 Australia's Energy Resources and Market*, March 2010

4 Phases of Solar PV Technology Development

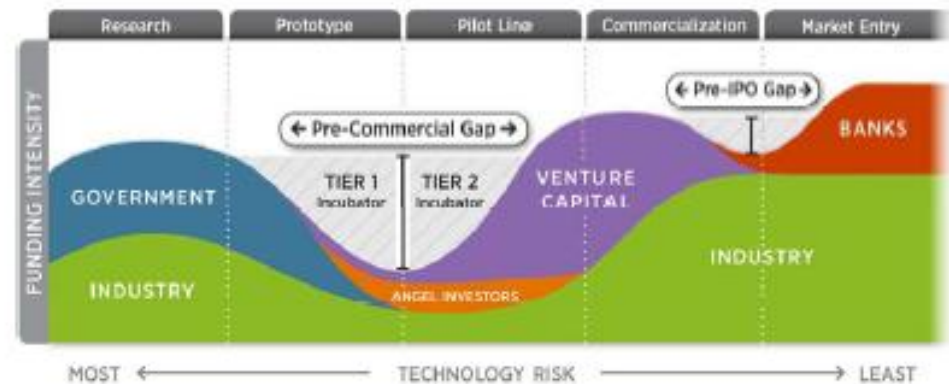


Derived from Professor Stuart Wenham presentation Baker & McKenzie RD&D Funding Models Report Launch, December 2010

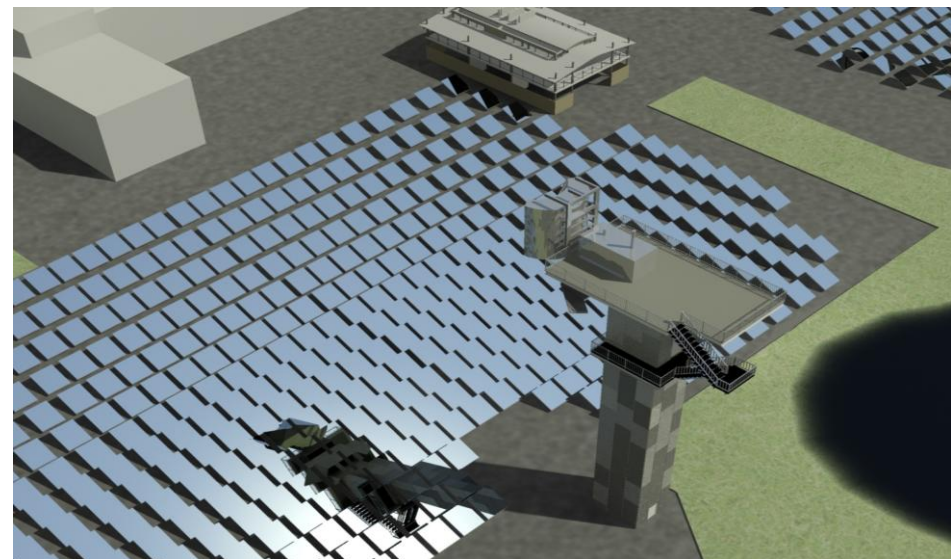
New technology requires demonstration to gain bankable capital market support – e.g. CSP Tower

- **R&D Pilot Phase (c\$5m)**
400kW - prove basic operation
- **Phase 1 Demonstration (\$10m)**
1MW - prove yield
- **Phase 2 Pre Commercial Demonstration (\$30m)**
4-5MW – prove reliability & revenue stream
- **Phase 3 Early Commercial Operation (\$200m) 50MW**
-prove financial return

Capital Finance Key Barrier

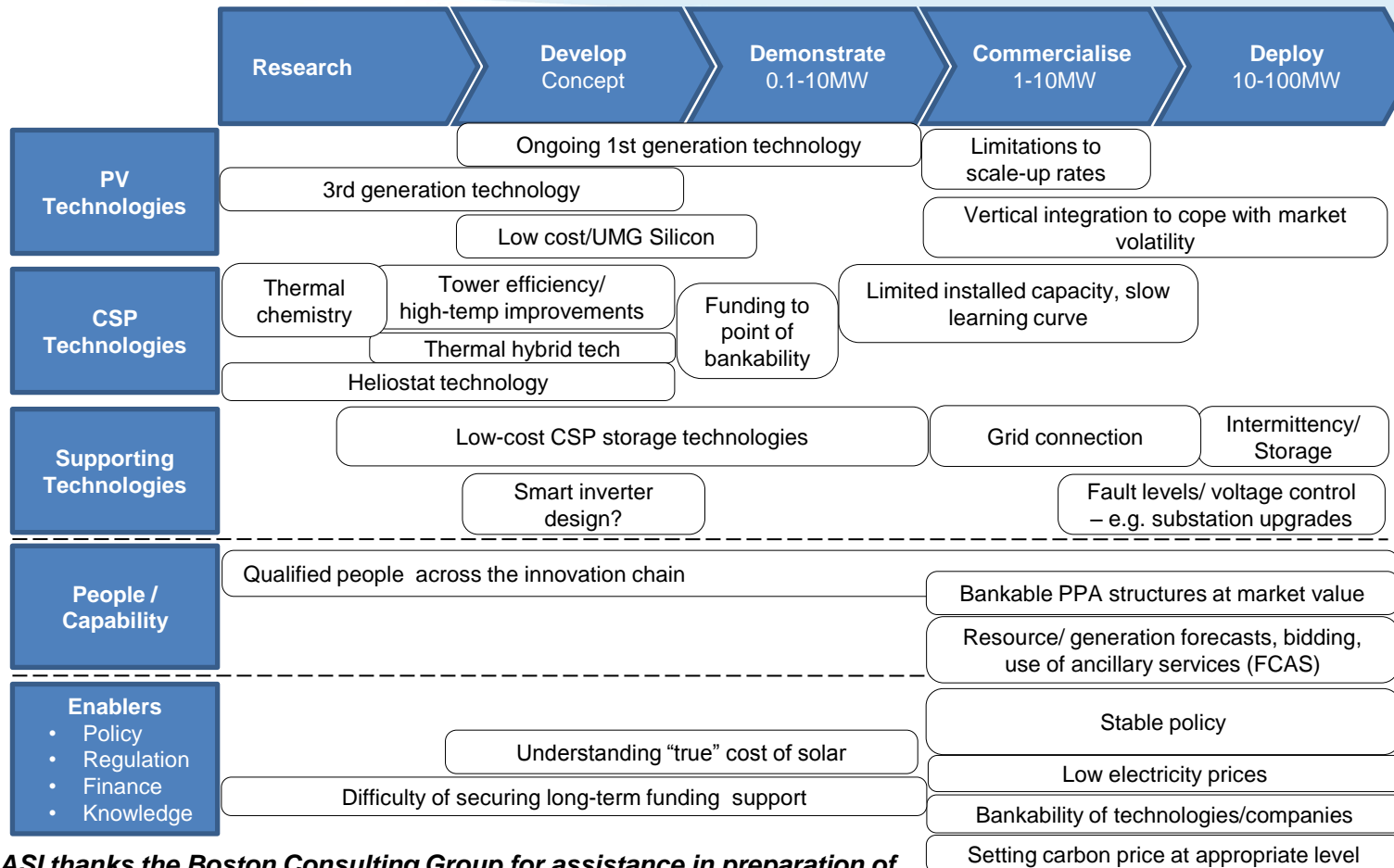


Source : US DoE 2011



Prize – Competitively priced solar electricity with hybrid / storage integration to provide firm supply

Summary of barriers on the solar innovation chain



ASI thanks the Boston Consulting Group for assistance in preparation of this slide: in particular Philip Hirschhorn – Principal, Energy Practice

Barriers to financing large-scale solar projects



Technology

- Performance risk, particularly for less proven technologies
- Solar technologies less cost competitive than conventional energy technologies and market-ready renewables

Project

- High initial capex + long project development and repayment timeframes
- Risks and costs associated with grid connection
- Political risk where project viability depends on policy support measures (e.g. FiTs)

Barriers to financing large-scale solar projects



Project cont'd

- Lack of long-term market data as basis for risk assessment
- Sophisticated, reliable solar resource generation forecasting methodologies

Market / Price

- Secure, long-term, competitively –priced electricity off-take arrangements
- Reduced risk appetite, heightened insolvency risk and increase in the cost of capital due to GFC and ongoing uncertainty in financial markets

Financing solutions – a public sector perspective

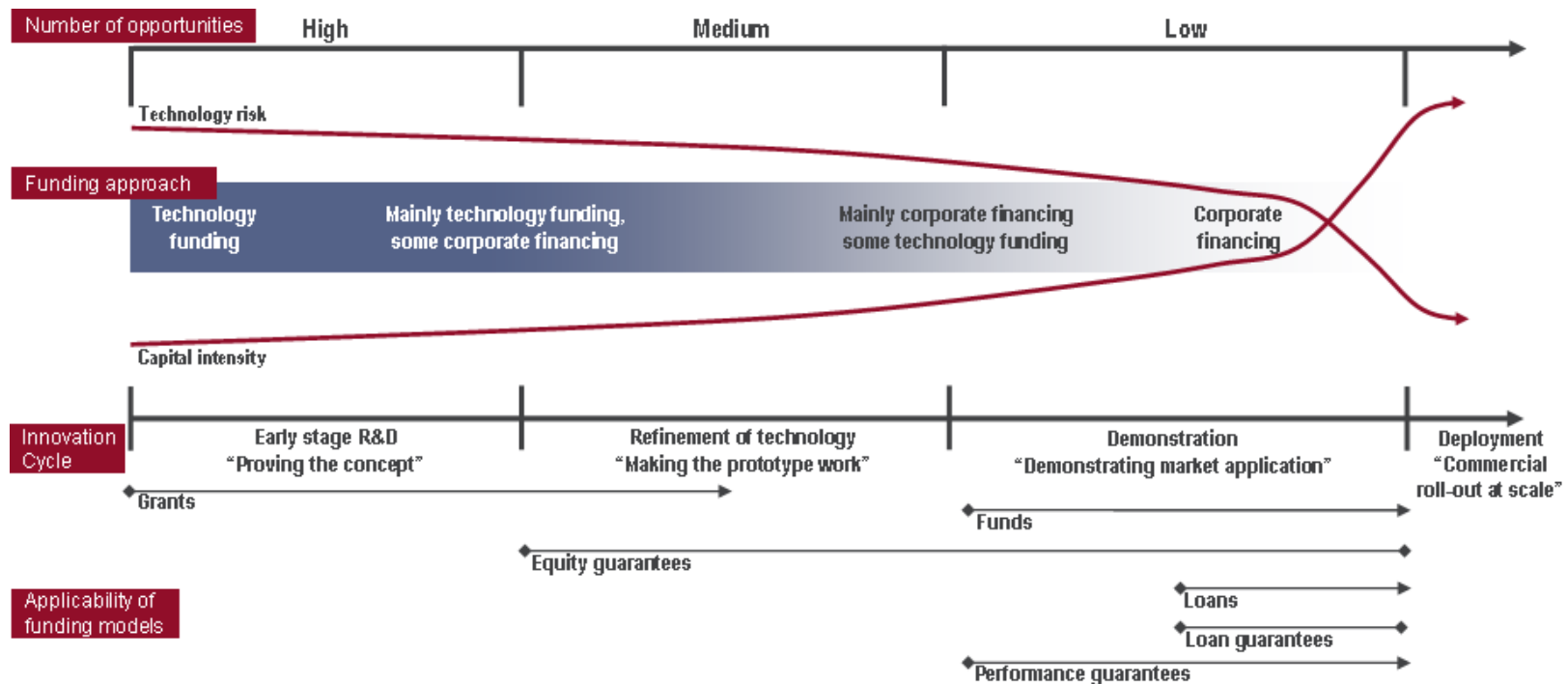


How can the public sector best catalyse and leverage private sector \$? Ideally:

- help create revenue streams that provide a sustained incentive for private investment
- mitigate risks and generate appropriate returns for risk exposure
- be suited to stage of technology development (R,D,D,D)
- be flexible and innovative – accommodate changing market circumstances
- minimise administrative and financial complexity

Baker & McKenzie - ASI Global Benchmarking Report (Nov '10): identify and analyse funding models used in Australia and internationally to finance solar and other renewable energy RD&D.

Financing needs through the solar innovation cycle



A Portfolio of Financing Instruments?



- Governments can employ different financial instruments across stages of the solar innovation cycle, e.g.:
 - Grants for early stage R&D, e.g. ASII funding
 - Equity guarantees for angel and early VC investments
 - Pooled public-private funds for equity investment in promising growth-stage solar companies, e.g. REVC Fund
 - Loans, loan guarantees, performance guarantees for demonstration activity and large-scale projects
 - Government-backed secure, long-term off-take arrangements (e.g. PPA, FiT)
- Consistency of government approach is key

Public sector loans



Commercial

- Direct credit on commercial terms to borrowers perceived as too high risk for commercial market lenders
- Capital-intensive but sustainable - assuming repayment

Concessional

- Borrower-friendly terms: low/zero interest, long tenors, balloon
- “Soft” terms limit commercial sustainability for lender
- Private investment incentive may mirror loan rounds, spike and then drop rather than be sustained

Subordinated

- Quasi-equity; has lower priority ranking than senior creditors
- Strengthens private investment incentive
- Increases lender’s exposure to borrower credit risk

Case study: Loans

- **EIB & EC Risk Sharing Finance Facility**

- Credit risk shared between European Investment Bank and European Community (& *partner banks*)
- Market-rated, non-subsidised loan with interest rates that reflect project specific risk margin
- **Med-long term** and **subordinated** to incentivise private sector lending – a vehicle for high-risk projects to be funded that would otherwise not be
- Min. loan size of €7.5M and max 50% of project cost (reqs in-kind contribution)
- E.g. Sener/Abu Dhabi's
- Gemasolar (€80M direct risk RSFF loan).



Public Sector Guarantees



Loan guarantees – catalysing private sector \$

- Guarantee of private sector loan to mitigate risk of loss should borrower default
- Similar risk assessment as for direct loans
- Guarantor exposure to borrower credit risk

Performance guarantees – mitigating technology risk

- Guarantee of technology performance using specific performance indicators
- Intensive risk assessment to determine credit and technology risks and apply performance indicators

Case study: Loan Guarantee

U.S.DOE Loan Guarantee Program

- Guarantee of up to 80% of loan amount (100% if lender is U.S. Treasury's Federal Financing Bank)
- Unusually long tenors – up to 30 years
- Not subordinated to other obligations of borrower
- “Step-in” rights to IP, technical data and physical assets
- E.g. February 2010: \$1.37 bn loan guarantee in favour of lenders to BrightSource Energy's Ivanpah project



NREL Renewable Energy Finance

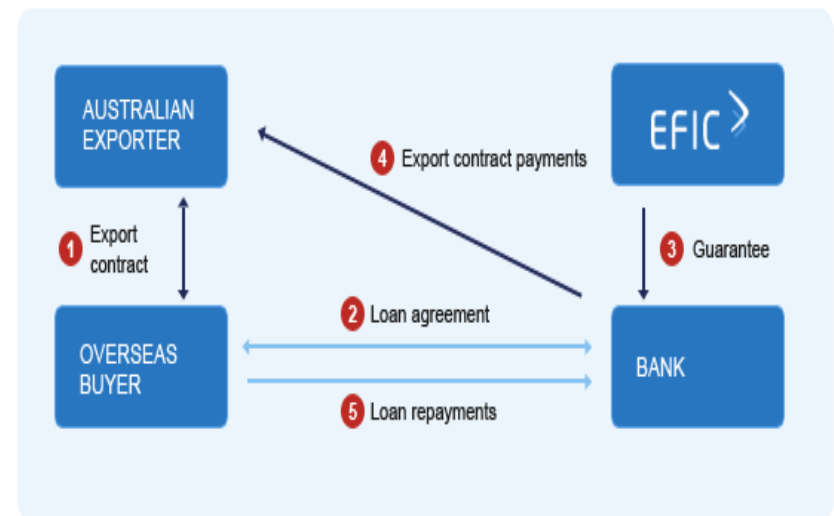
Tracking Initiative: <http://financere.nrel.gov/finance/REFTI>.

Tracks debt interest rates, equity returns, financial structure, PPA duration etc

Case Study: EFIC export finance guarantee



- EFIC assisted *BP Solar* with the second phase of its US \$32.2 million project to provide solar-powered drip irrigation systems to Sri-Lankan farmers.
- Export finance guarantee worth up to US \$13.7 million to HSBC, which partly funded the purchase of the kits by the Sri Lankan Government.
- Makes the sponsor's offer more attractive/ competitive
- Catalyses commercial finance in this case by protecting the lender against risk of sovereign default

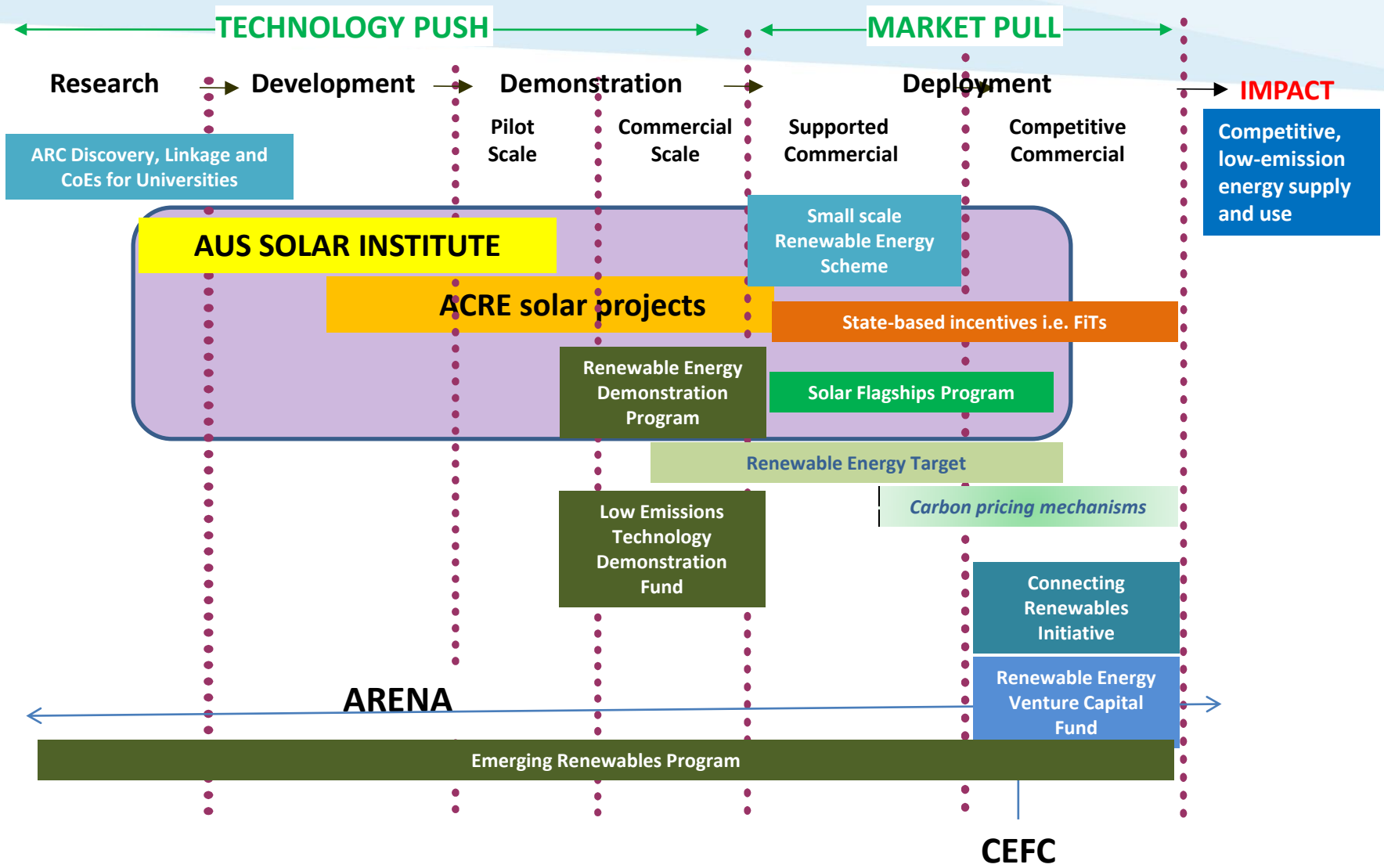


Taking a Lead from the Multilaterals



- Development / export finance context
- Financial product innovation
 - World Bank Group – seed funding for cleantech through to project finance and political risk insurance
 - Asian Development Bank – carbon funds
 - Export Credit Agencies
 - EKF Climate: carbon credit-related and technology performance g'tees - carbon credits as revenue stream
 - U.S. EXIM Environmental Export Financing: US\$3 billion portfolio of supported projects through working capital, insurance, long-term direct loans, loan guarantees and project finance
 - JBIC: carbon credit trading platform

Policy framework - market drivers



Clean Energy Future Package



- ARENA
 - \$3.2 billion investment to promote R&D, demonstration, commercialisation and deployment of renewable energy projects
- CEFC
 - \$10 billion for investment in commercialisation and deployment of ***renewable energy***, energy efficiency and low-pollution technologies, and ***manufacturing businesses providing input into these sectors***
 - Debt and equity financing

CEFC: threshold issues



- Investment mandate
 - Eligibility? How far up and down the supply chain?
Australian domiciled businesses only?
- Risk appetite
 - What is the ‘market gap’?
 - Creating a self-sustaining investment portfolio while assuming technology, price and scale-up risk
 - Portfolio approach to investments
 - Pricing / tenor: concessional terms to catalyse private investment v self-sustainability
 - Expected ROI? Financial returns or industry development / emissions reduction objectives?
- Co-financing arrangements: transaction specific or master agreements? Long lead times.

CEFC Expert Review

ASI submission key points



- ASI interest in seeing solar technologies progress through the innovation cycle to commercial deployment
- Key impediments to increased deployment of solar energy in Australia are commercial market perceptions of:
 - Technology risk
 - Price risk
- CEFC should develop a ***portfolio*** of financing instruments targeted to address these (and other) risks so that commercial financiers become more willing to assume or share them => market gap should narrow
- Limited funding for wide range of activity means CEFC investments must be strategic: diversified portfolio

CEFC Expert Review

ASI submission key points (cont)



- Industry development and emissions reduction objectives just as important as financial ROI – portfolio of projects that includes high-risk investments that may fail
- Support for commercial demonstration of technology especially important, to address the point at which gap between capital intensity and availability of commercial finance is greatest
- Target optimal project size to prove technology’s technical operation and yield as well as cost structures (but no larger)
- Clearly communicate investment mandate and risk appetite and apply underwriting criteria consistently
- Effective working relationship with ARENA and consistency with other policy mechanisms critical to streamlined public sector support for renewable energy deployment



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