GRATTAN Institute

Building the Bridge

How to make large solar projects viable

What's the problem?

Generally, traditional generation remains the lower cost and lower risk alternative

Costs	**Construction**	High	Moderate
	Finance	High	Low
	Grid connection	High	Low
	Fuel	Low	Moderate*
	Carbon	Low*	High*
Risks	**Technology**	Moderate	Low
	Regulatory	High	High

Preferred position

* Highly uncertain

Which raises the questions...

Should renewable technology be subsidised?

If so, what does "good" subsidy look like?

Where's the market failure?

There is an economic rationale for subsidising emissions reductions

No "first mover advantage"
No premium for innovation

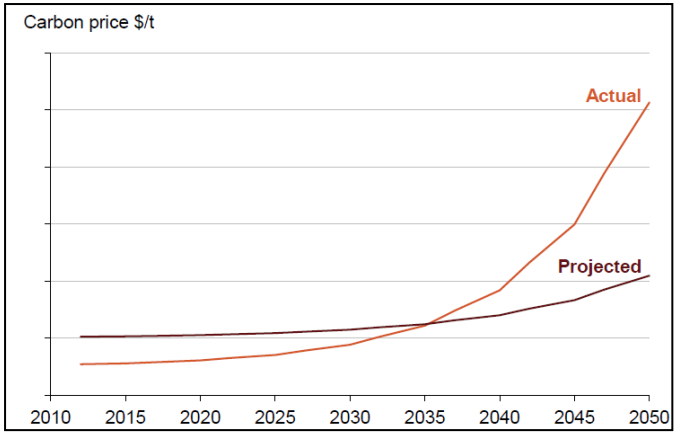
Grid connection costs
Connection rules disadvantage the first connection

Carbon market "credibility issues"
Limited scope for developers to manage political risks

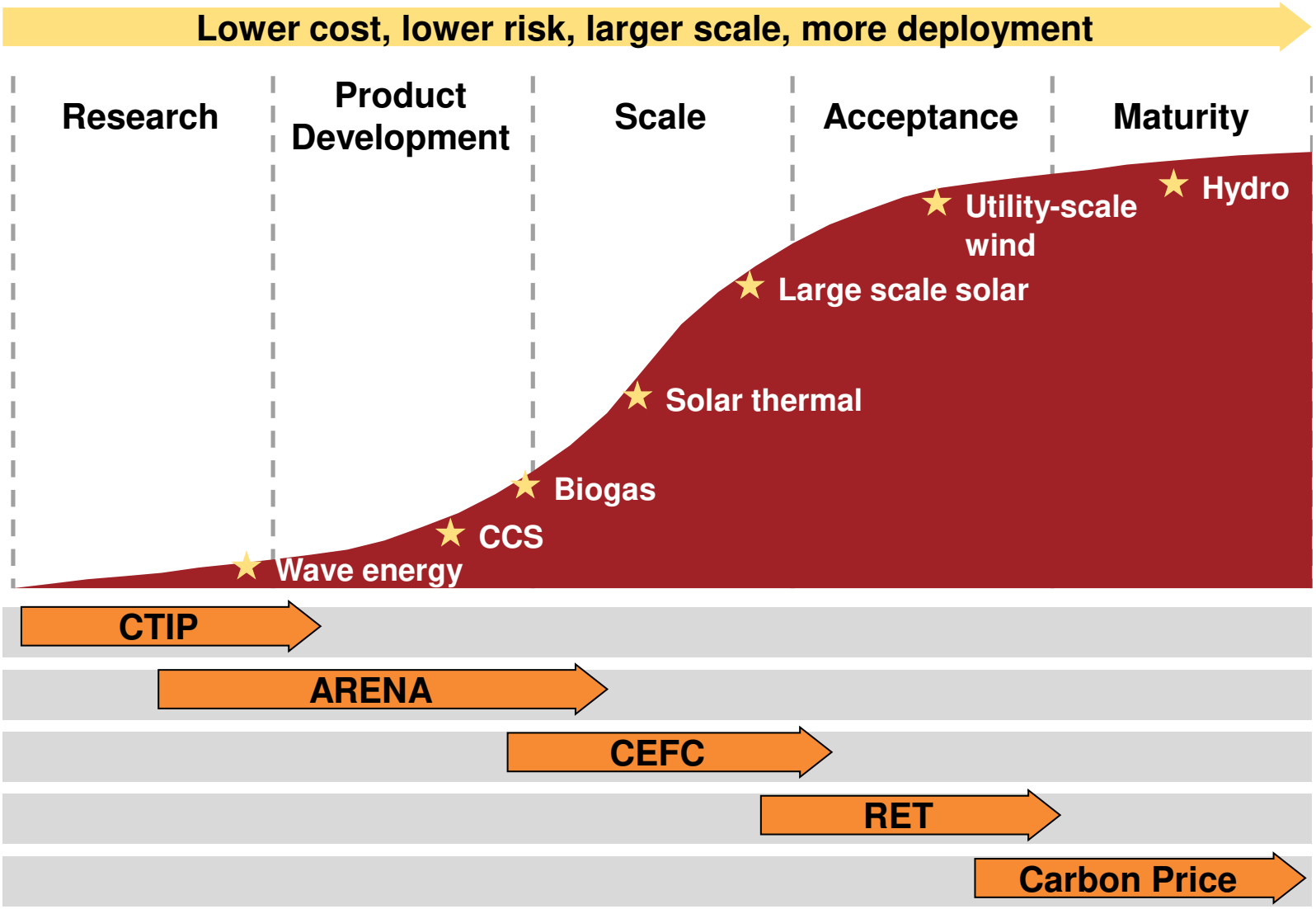
Skills "critical mass"
Technology, finance, development and operations skills are all required

Options are valuable
In a volatile market, options are valuable

Hotelling's rule
Lower total abatement costs through early action



Technologies move through a development cycle



Renewable Support Schemes

Scheme	Target	Description	ALP	Coalition
CTIP	$800m	Encourages investment in energy efficiency	✓	?
ARENA	$3.2b	Improve the competitiveness and increase the supply of renewable energy	✓	✓
CEFC	$10b	Overcome capital market barriers to lower emissions	✓	✗
RET	41TWh	Renewable energy deployment target for 2020	✓	?
Carbon Price	$23t$CO_2$-e	Pricing carbon emissions	✓	✗
Direct Action	TBA - tenders	Aims for lowest overall abatement cost	✗	✓

Subsidy types – incentive schemes

Grants and prizes, low cost finance

- Australian Solar Flagships and $10b CEFC
- UK £3b Green Investment Bank
- US state-based tender schemes
- German discounted loan program

✓

Effective for R&D
Incentivises early movers
Removes policy risk

✗

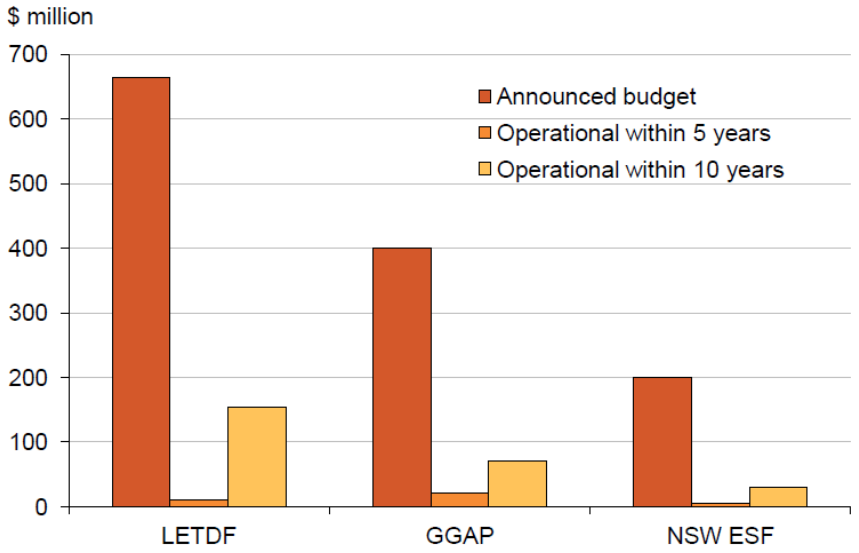
Low delivery rates
"Picking winners"
Limited incentive to reduce costs

Delivery is a major issue

Competitive bidding and upfront payments reward optimists!

Reduce risks through milestones, banding, bidding conditions

Capital grant expenditure for emissions abatement



Subsidy types – feed-in support

Feed-in tariffs and premiums

- Australian state-based FiTs (wound back)
- German solar schemes large deployment (at high cost)
- Spanish PV – closed 2 years early, nearly 8 x target capacity

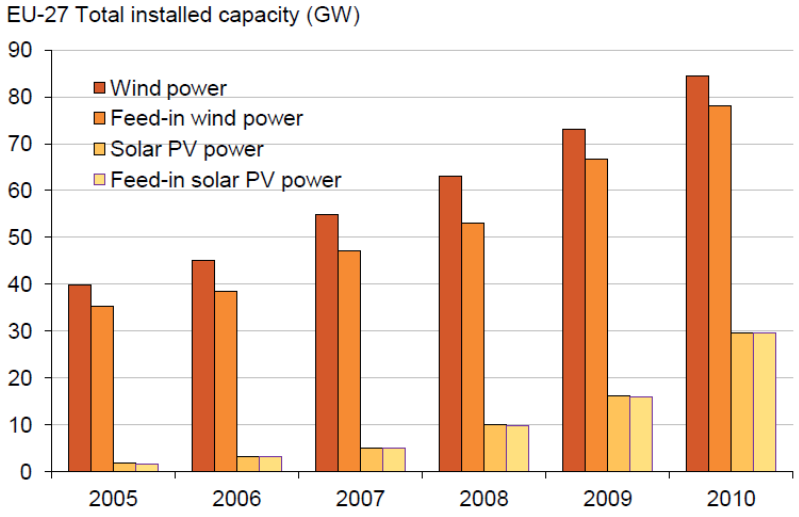
✓

Long term support
Government avoids non-delivery risks
Drive cost reduction

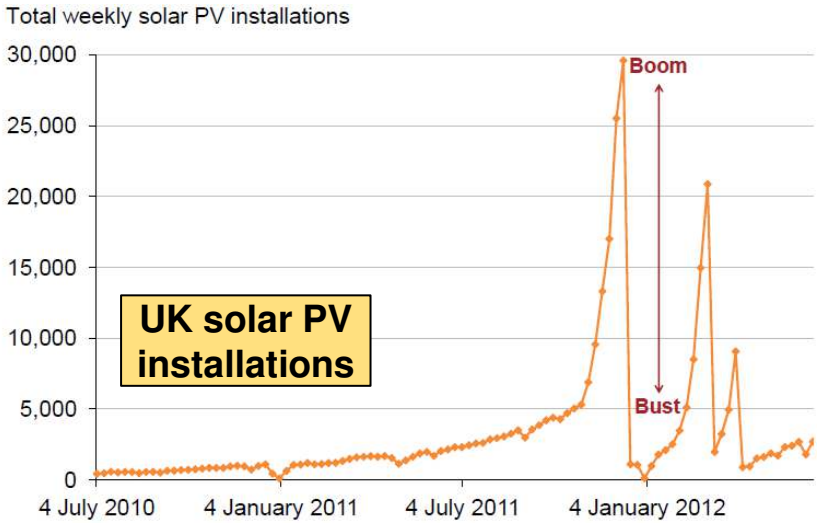
✘

Oversubscription risks
Technology bands
Regular reviews

Schemes have effectively deployed capacity....



... But have suffered from boom/bust cycles



Subsidy types – tradeable certificates

Tradeable certificates produced by "green" portfolio targets

- Australian RET
- UK Renewables Obligation
- US Renewable Portfolio Standard deployed 9GW in the decade to 2008

✓ Large scale development
Lowest cost first
"Off-budget" finance

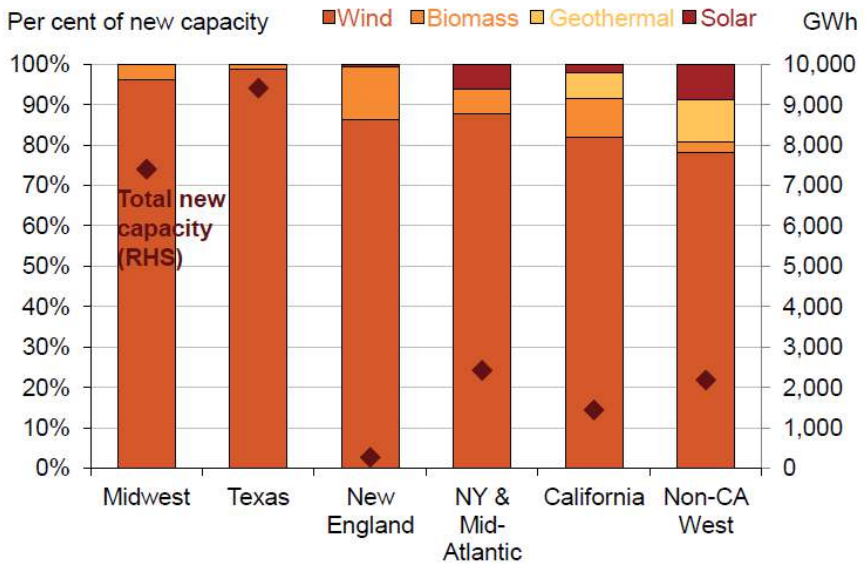
✗ Sensitive to regulatory changes
Adds market risk
Requires "bands"

Effectively incentivises lowest cost deployment

Banding, multipliers or carve outs are needed to support technology diversity

26 of 30 US states with RPS programs use banding

Renewable capacity deployed in US states with RPS: 1998-2009



Renewable subsidies

Design advantages and pitfalls

	Incentive schemes	Feed-in support	Tradeable certificates
Successful deployment record	✗	✓	✓
Drives cost reduction	✗	✓	✓
Delivers technology options	✓	?	✗
Developers take project risks	✗	✓	✓
Need for governments to pick "winning" technologies	High	?	Low
Sensitivity to changes in scheme design	Low	High	High
Risk to government budget	Low	High	Low

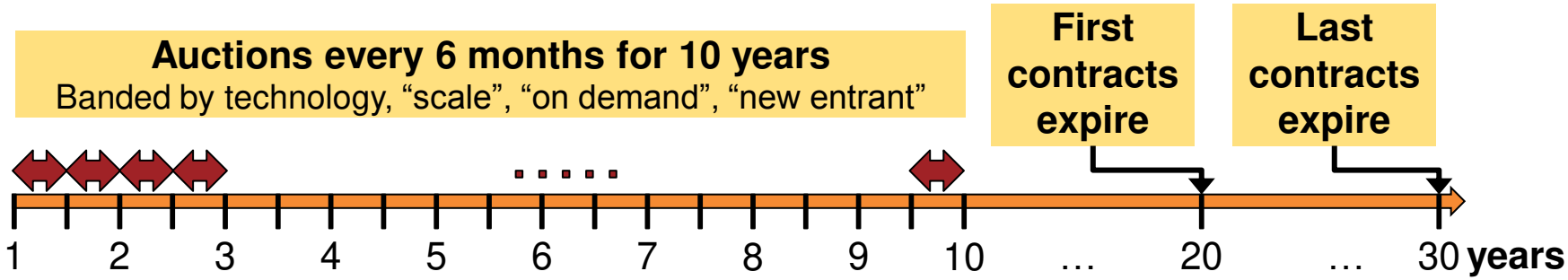
What does a good subsidy look like?

Capturing the best features of different scheme designs

Design feature	Rationale
Reverse auction for renewable energy output	Contracts are awarded to the lowest bidder, driving cost reductions
Government sets **technology capacity targets** for the first auction...	Multiple technologies to maximise options...
...after that, capacity adjusts based on **cost and price changes**	...while reducing governments "picking winners" and increasing support for the best performing technologies
Conditional finance must be in place before bidding	Promotes faster deployment, financial "approval" improves credibility
Multiple auction rounds are held, every six months for 10 years	Prices will fall through time, "losing" bidders can resubmit projects
Auctions are awarded based on the **lowest cost** "technology premium"...	Bidders retain electricity market risk...
...but bidders also receive a contract-for difference to **lock in a carbon price**	...but governments assume carbon market risks.

Building the bridge – learning from experience

What would a better scheme look like?



Design features

- Over time, the “best performers” receive a larger share of capacity
- Total capacity per round is set so as to drive “learning benefits”
- Competitive bidding promotes improvement and drives down costs
- Long term support is in place to reduce refinancing risk

Other support structures

What other types of support may be justified?

A **carbon price** or a “direct action” approach

Extensions to **transmission and distribution** networks

Support for **research and development**

Resource mapping to promote development

Streamlined approvals processes

Removal of subsidies for competing technologies