

CARBON CAPTURE AND STORAGE

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AGENDA

- Introduction
- The role of CCS in delivering emissions reductions
- How have CCS projects been financed to date
- Prerequisites for attracting private finance to CCS projects
- Questions



THE GLOBAL CCS INSTITUTE

The Global CCS Institute is an international think-tank backed by governments, businesses and NGOs and our mission is to accelerate the deployment of CCS globally

- Not-for-profit entity limited by guarantee, incorporated in Australia
- Offices in Washington DC, Brussels, London, Beijing and Tokyo. Headquarters in Melbourne
- Specialist expertise covering the complete CCS/CCUS chain



OUR VISION
CCS is an integral part of a low emission future

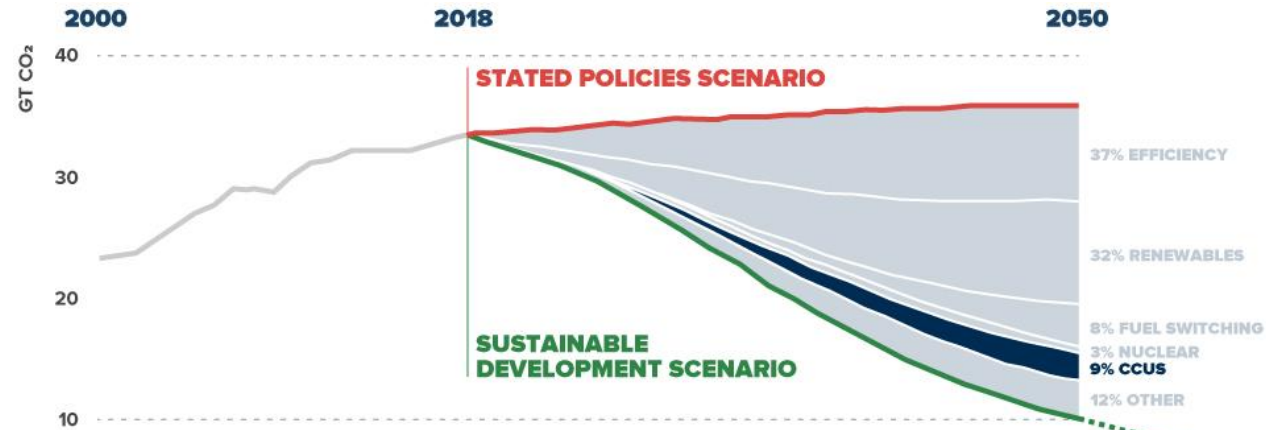
OUR MISSION
To accelerate the deployment and commercial viability of CCS globally

OUR STRATEGIC IMPERATIVES
We're a Member led organisation
We're a sensible, but bold, risk taker
We're agile and we embrace change
We're financially sustainable
We expand and leverage the CCS community
Our focus is on valued and impactful work

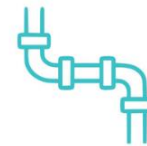
OUR IDENTITY
We're recognised and sought out as the premier CCS body



CCS IS VITAL TO OUR PARIS COMMITMENTS



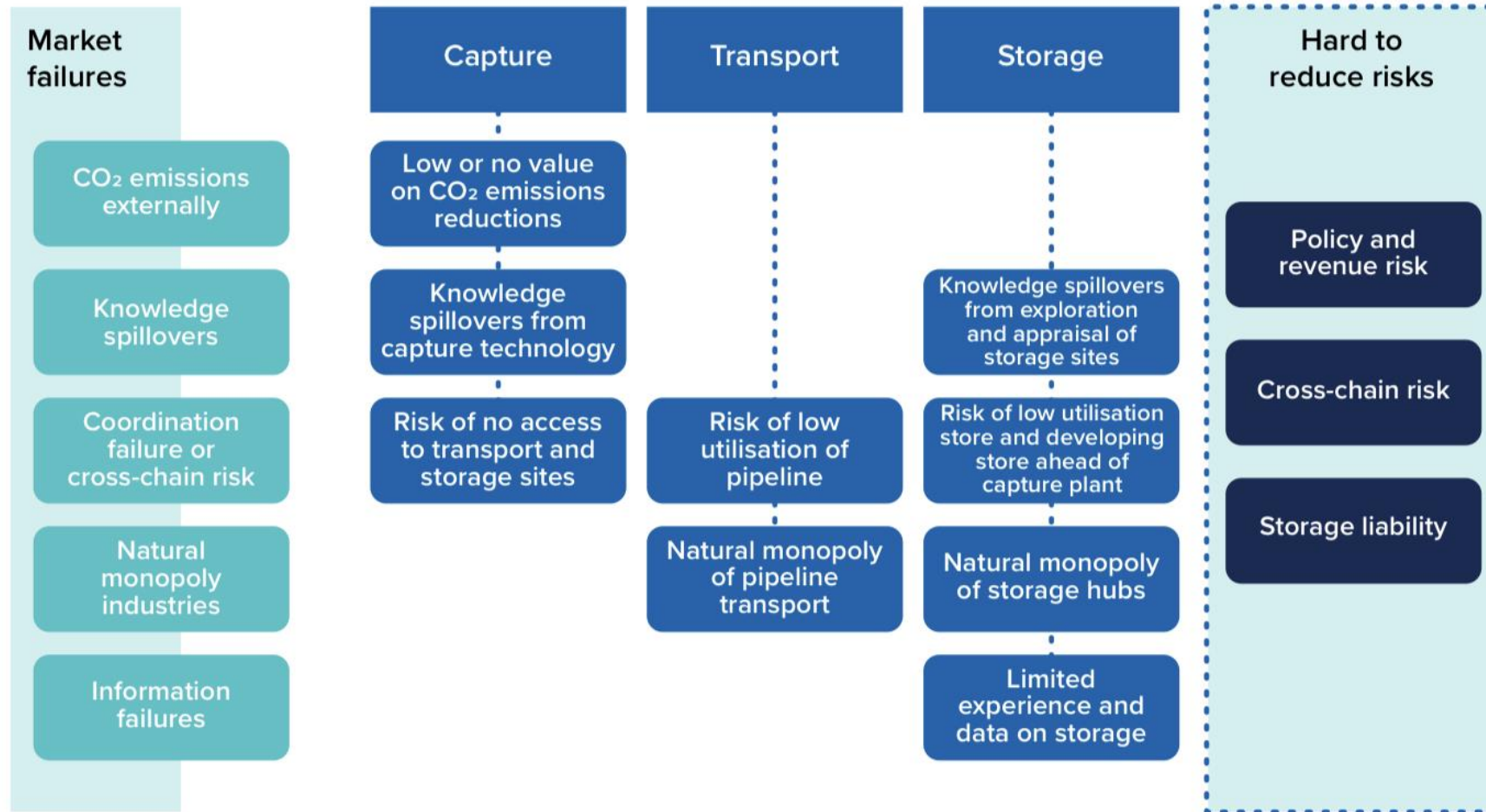
EMISSIONS REDUCTIONS IN THE IEA'S SUSTAINABLE DEVELOPMENT SCENARIO (SDS)



	CAPTURE FACILITIES	PIPELINES	STORAGE SITES
TOTAL IN 2050	MORE THAN 2,000	200,000 KM	400
ANNUAL BUILD RATE TO 2050	70 - 100	5,200 - 7,200 KM	10 - 30



BARRIERS TO CCS DEPLOYMENT



ENABLING CONDITIONS FOR EXISTING PROJECTS

Policies & project characteristics	 Carbon tax	 Tax credit or emissions credit	 Grant support	 Provision by government or SOE	 Regulatory requirement	 Enhanced oil recovery	 Low cost capture	 Low cost transport and storage	 Vertical integration
US									
Terrell						○	●	●	
Enid Fertiliser						○	●	●	
Shute Creek					●	○	●	●	
Century Plant		●				○	●		
Air Products SMR		●	○			○			
Coffeyville		●				○	●		
Illinois Industrial		●	○				●	●	●
Great Plains						○	●		
ZEROS Project*		●				○			
Canada									
Boundary Dam			○	●	●	○		●	
Quest		●	○						●
ACTL Agrium			○			○	●		
ACTL Nutrien			○			○	●		
Brazil									
Petrobras Santos				●		○	●	●	●
Norway									
Sleipner	●			●			●	●	●
Snøhvit	●			●	●		●		●
UAE									
Abu Dhabi CCS				●		○		●	
Saudi Arabia									
Uthmaniyah				●		○	●	●	●
China									
CNPC Jilin				●		○	●	●	●
Sinopec Qilu*				●		○	●	●	
Yanchang*				●		○	●		
Australia									
Gorgon			○		●		●	●	●

FIGURE 6 CONDITIONS THAT ENABLED LARGE-SCALE FACILITIES



INVESTMENT IN CCS HAS RELIED ON FOUR KEY

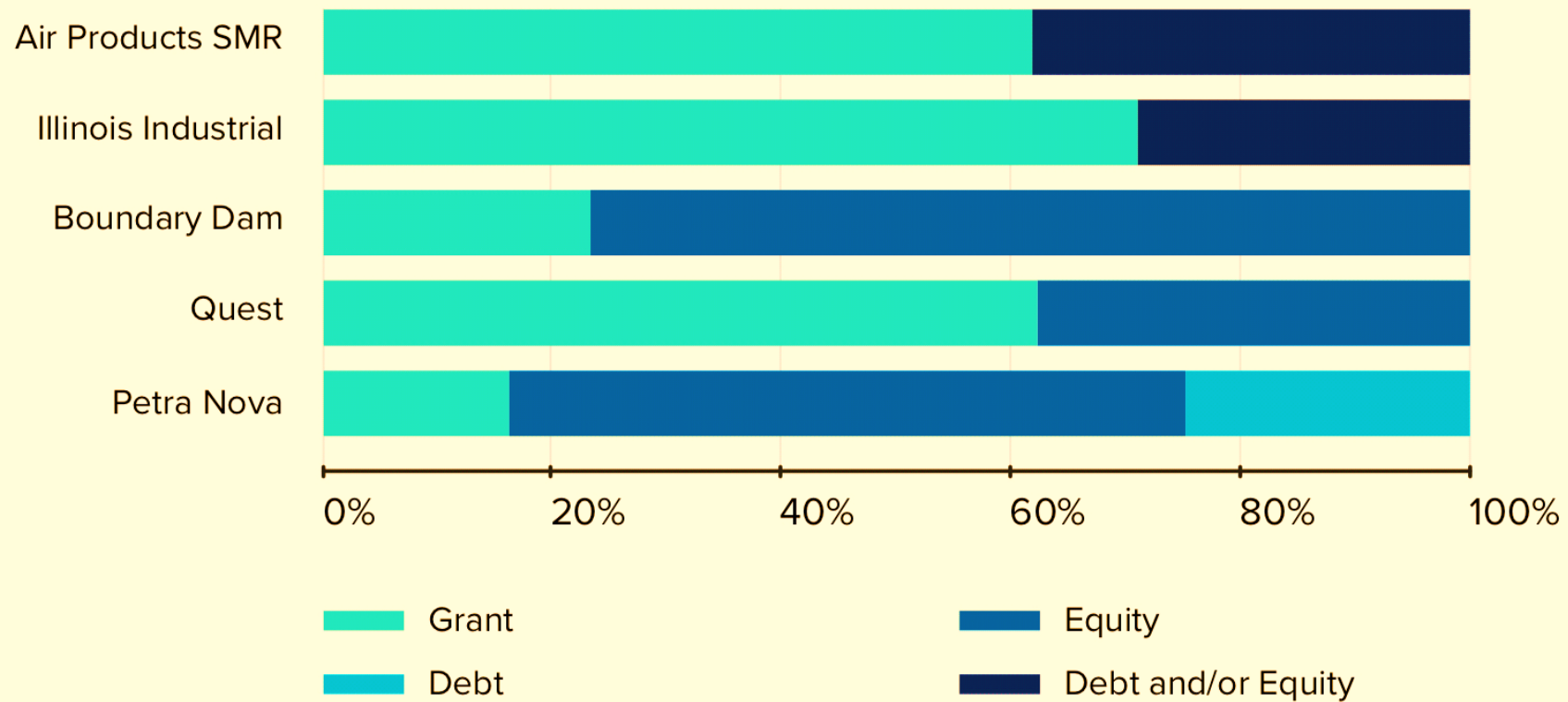
ELEMENTS

- A sufficient value being placed on CO₂ either through EOR or a government incentive such as a carbon tax or carbon credit
- In most projects, investments have only gone ahead when an offtake agreement between the capture facility and a transport and storage facility exists
- A legal and regulatory framework that clearly denotes storage liabilities over the operational phase of a project as well as post-closure
- Even with all of the above conditions being met, CCS project risks will still have been too high to attract debt financing. Instead, most projects to date have come to rely on significant grant contributions to supplement equity



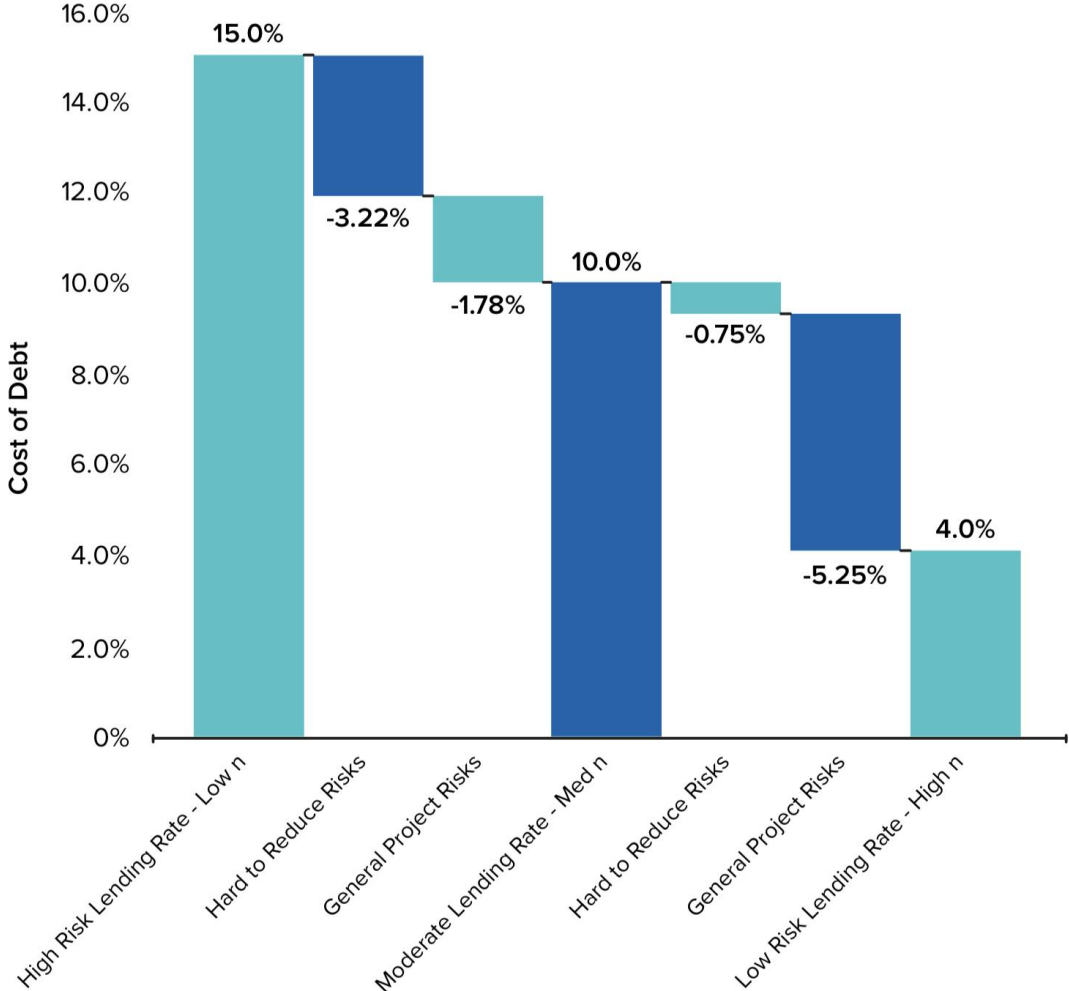
CAPITAL STRUCTURE OF PROJECTS REACHING POSITIVE FID

Figure 4: Proportion of grant funding provided to selected projects

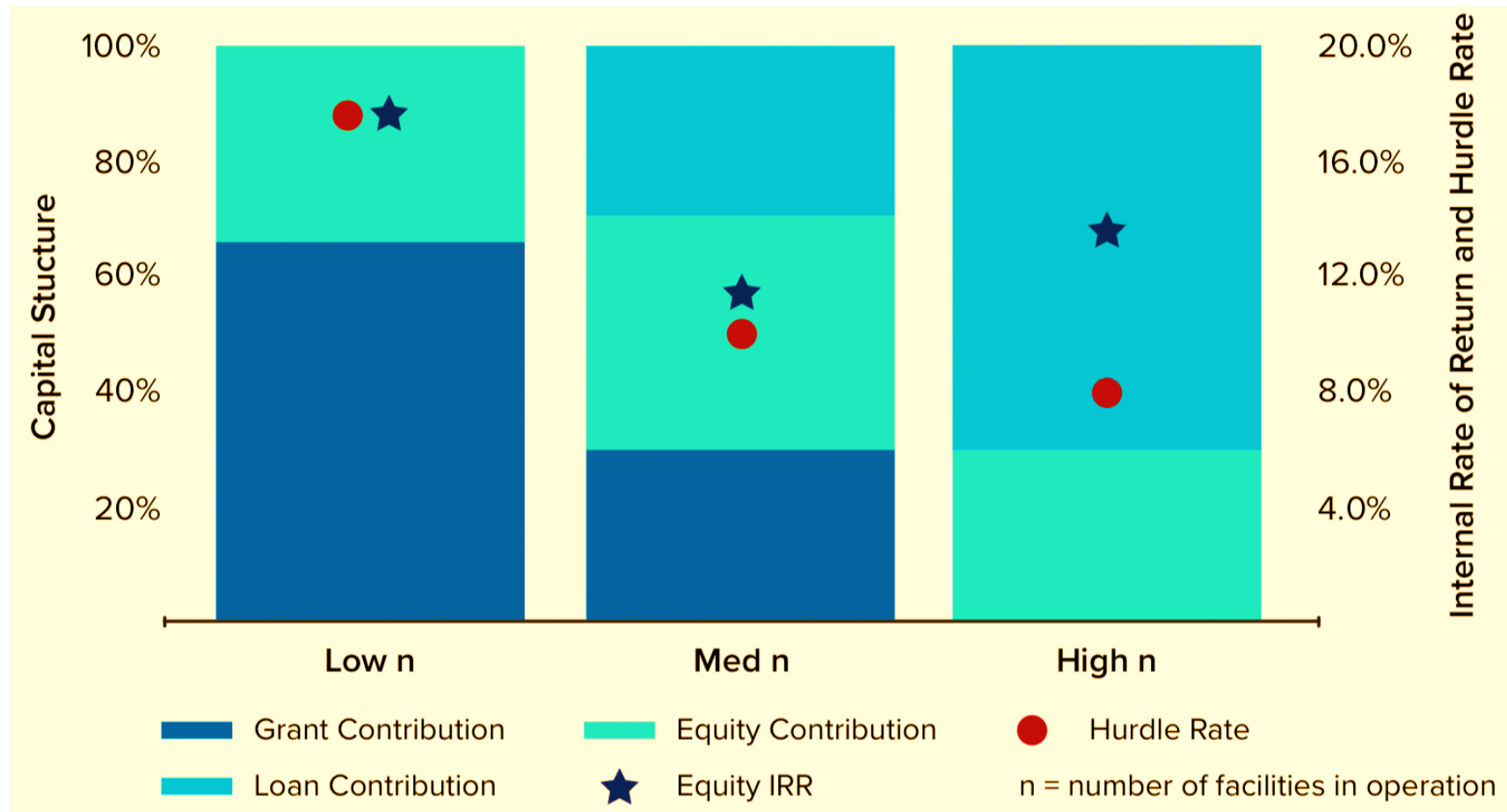


THE MATERIAL COST OF RISKS

Figure 11: Cost of Debt Waterfall



DIMINISHING COST OF CAPITAL WITH INCREASING VALUE ON CARBON AND NUMBER OF FACILITIES



KEY POLICY DEVELOPMENTS

- Different incentives and levels of support across different countries
- USA provides the 45Q and grant funding from DOE, and recently CCS has been included among the technologies that can be applied to generate credits under the California Low Carbon Fuel Standard
- Norway has relied on a carbon tax and state-owned enterprises
- The EU's Innovation Fund is estimated to provide some €10B of funding for mitigation, including CCS projects
- The Netherlands' SDE++ provides support for the 'unprofitable' part of a technology – up to €300/tCO₂



KEY POINTS

1- The lack of a robust business case is a significant barrier to private investment

- Most existing projects are in lower-cost industrial applications and in jurisdictions where there is a robust value on carbon (tax, tax credit, EoR etc.)
- In order to be investible, projects require a strong business case, bearing in mind projects must compete for capital

2- Derisking is necessary to qualify projects for debt financing

- Reducing project risks is essential to attracting debt financing, and subsequently, reducing the cost of capital
- Hard to reduce risks can be addressed through risk management and government initiatives (e.g. storage liability)¹²
- Further derisking involves understanding and quantifying project risks from the points of view of lenders and equity investors
- Over time, lenders and equity investors will gain confidence in the technology, reducing the risk premium associated with CCS



THANK YOU



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