

The Economics of Geological Storage of CO₂ in Australia – an Update

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in Australia – an Update**

**Part of the GEODISC
Programme**

**Australian Petroleum
Cooperative Research Centre
(APCRC)**

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Sequestration

=

Capture (not part of GEODISC)

then

Storage (focus of this paper)

CO₂ storage economics input

* **Input**

* **Pipeline length**

* **Relative elevation**



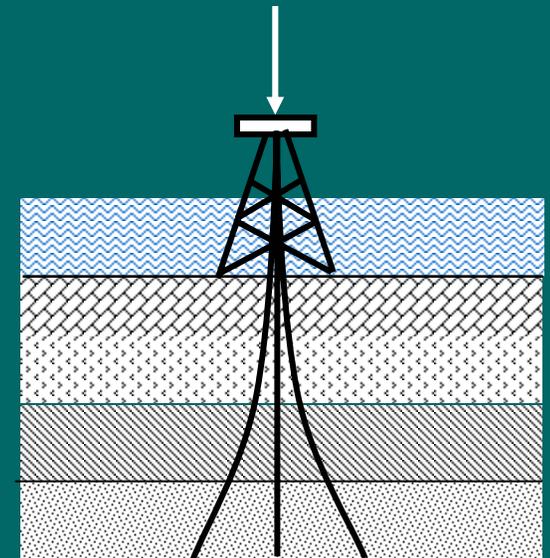
* **CO₂ rate**

Source

* **Water depth**

* **Reservoir depth**

* **Reservoir thickness**



* **Reservoir pressure**

* **Reservoir radius**

* **Effective permeability**

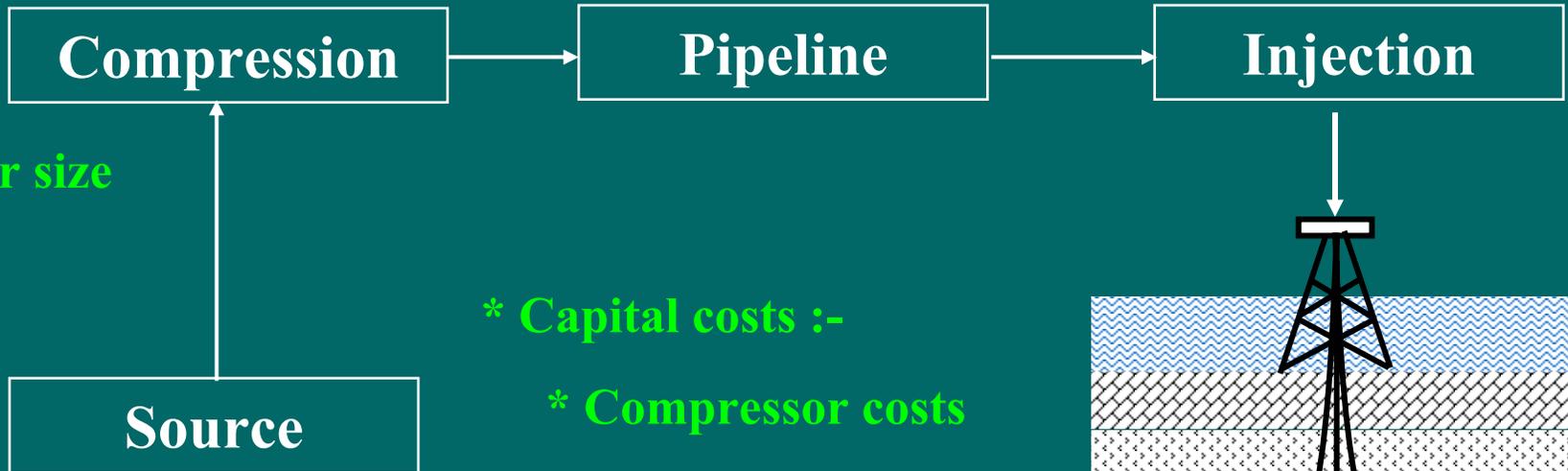
CO₂ storage economics output

* Output

* Pipeline diameter
* Pipeline thickness

* Second compressor if applicable

* Compressor size



* Capital costs :-

* Compressor costs

* Pipeline costs

* Platform costs

* Injection well costs

* Operating costs

* Number of platforms

* Number / type of wells

Representative offshore CO₂ storage example

Assumptions for hypothetical example

Flow rate – 400 MMcfd (about 8 million tonnes per year)

Distance – 300 kilometres

Water depth – 100 metres

Reservoir depth – 1,500 metres

Reservoir pressure – 2,000 psi

Reservoir temperature – 60°C

Reservoir permeability – 20 millidarcies

Stand alone (no cost sharing)

Cost estimates for hypothetical example

Real capital costs = US\$455 million

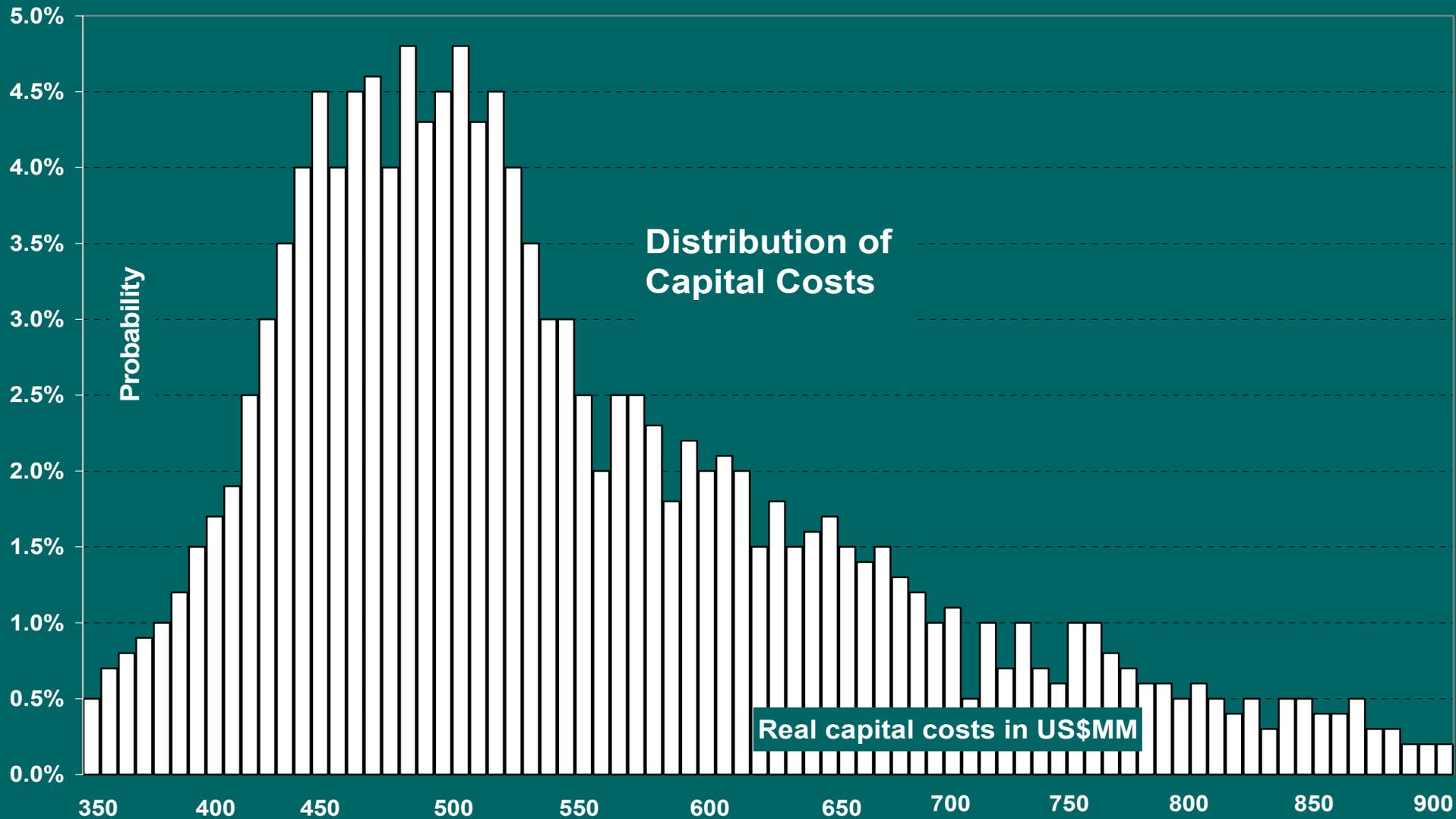
Real operating costs = US\$32 million per year

**Real breakeven carbon credit = US\$11.1 per tonne of CO₂
avoided**

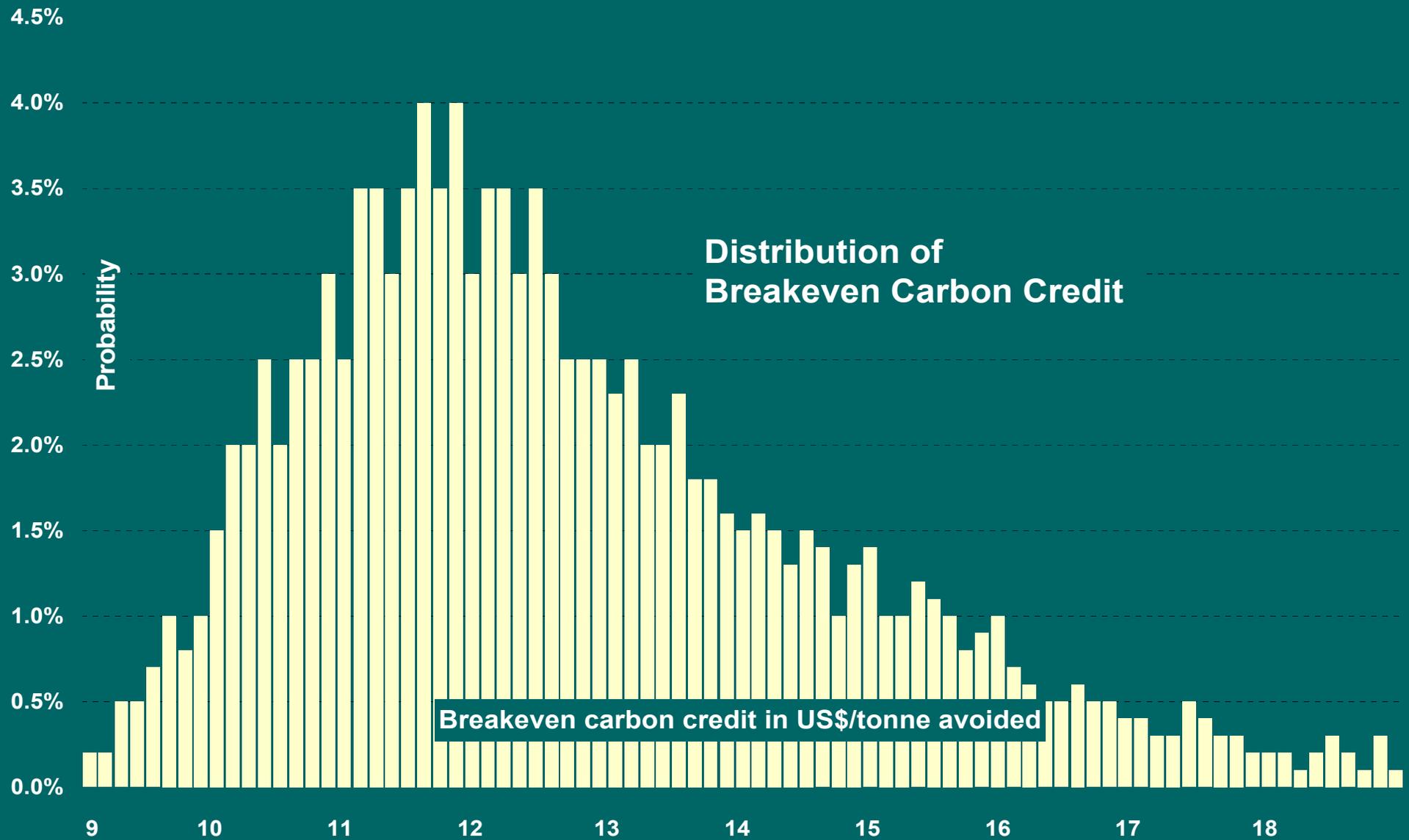
Uncertainty

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Storing CO₂ - Probability distribution of capital costs



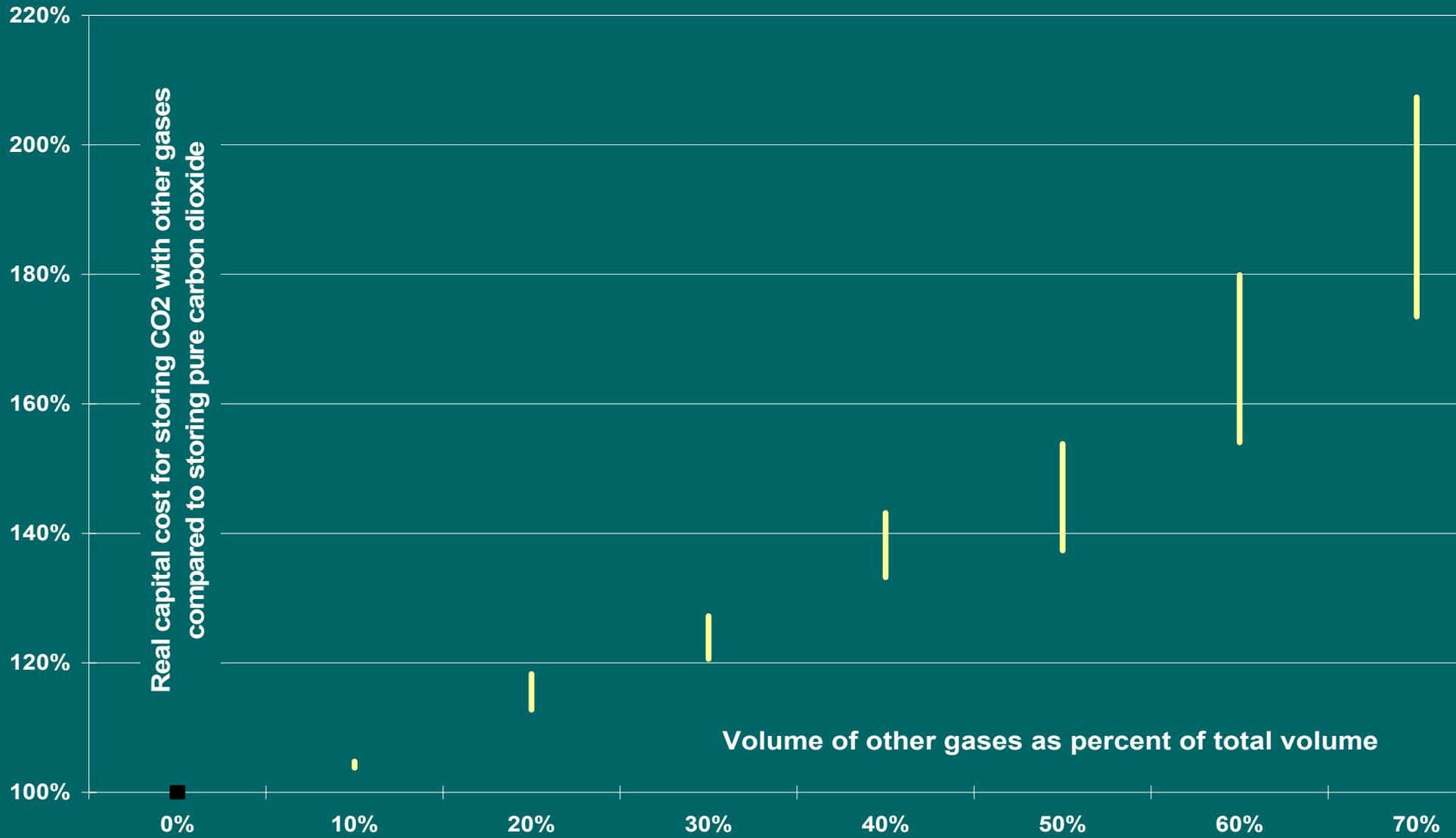
Storing CO₂ - Probability distribution of costs per tonne



Storing CO₂ with other gases

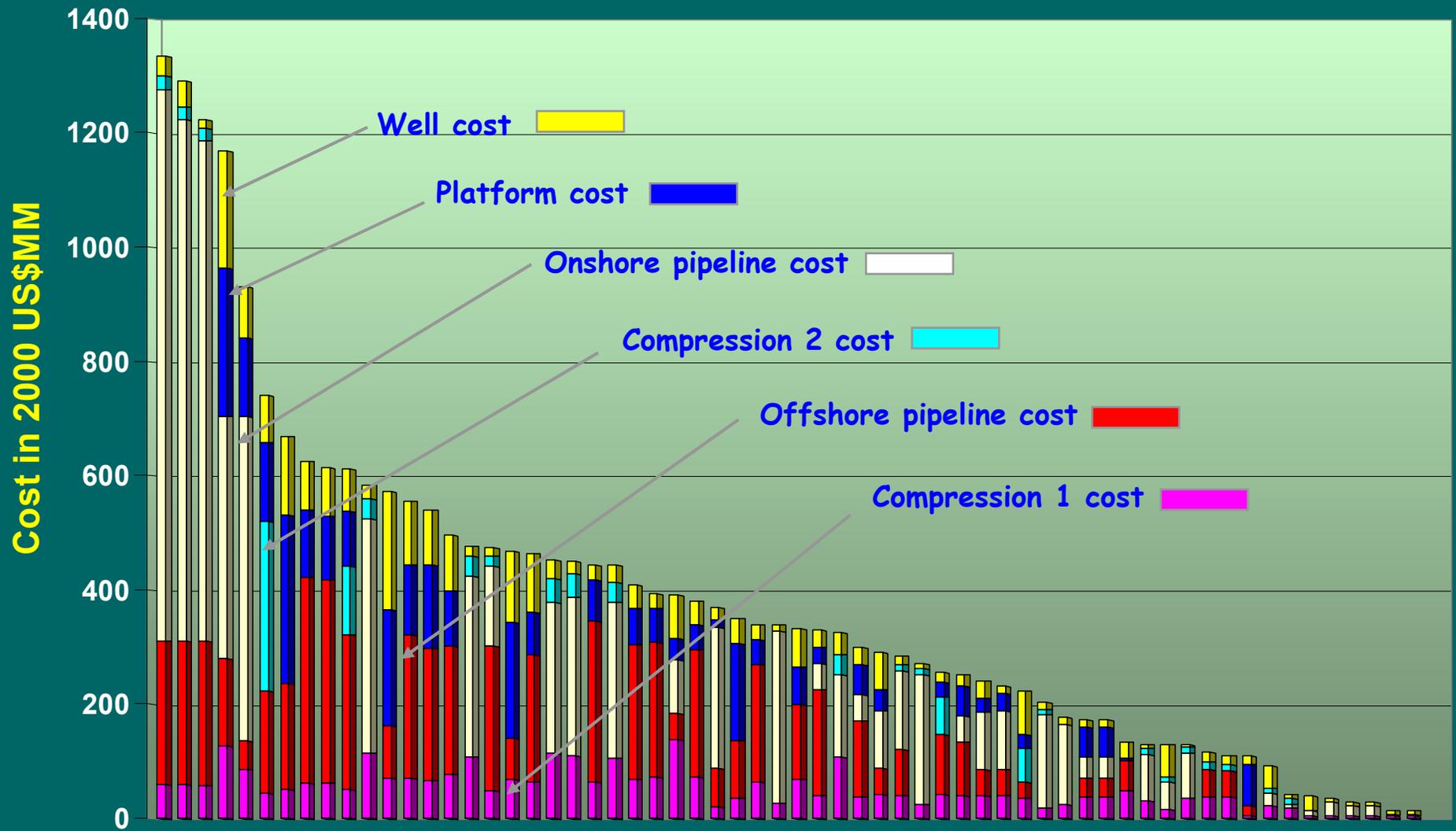
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Storing CO₂ with other gases – effect on capital costs



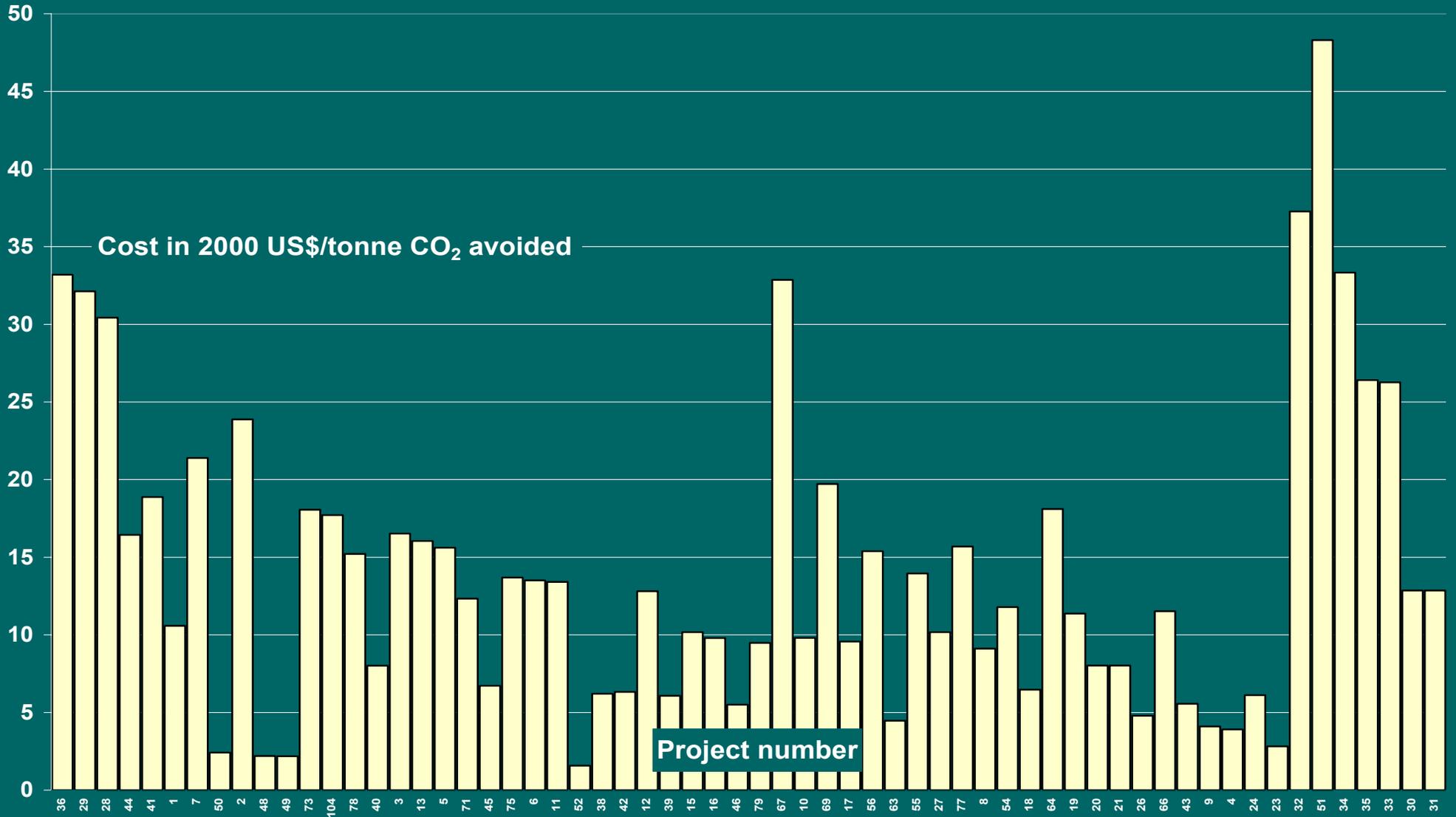
ESSCI costs

Real storage capital costs for potential CO₂ sinks in Australia



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Real breakeven carbon credit for potential CO₂ sources and sinks in Australia



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Economic storage potential (indicative only)

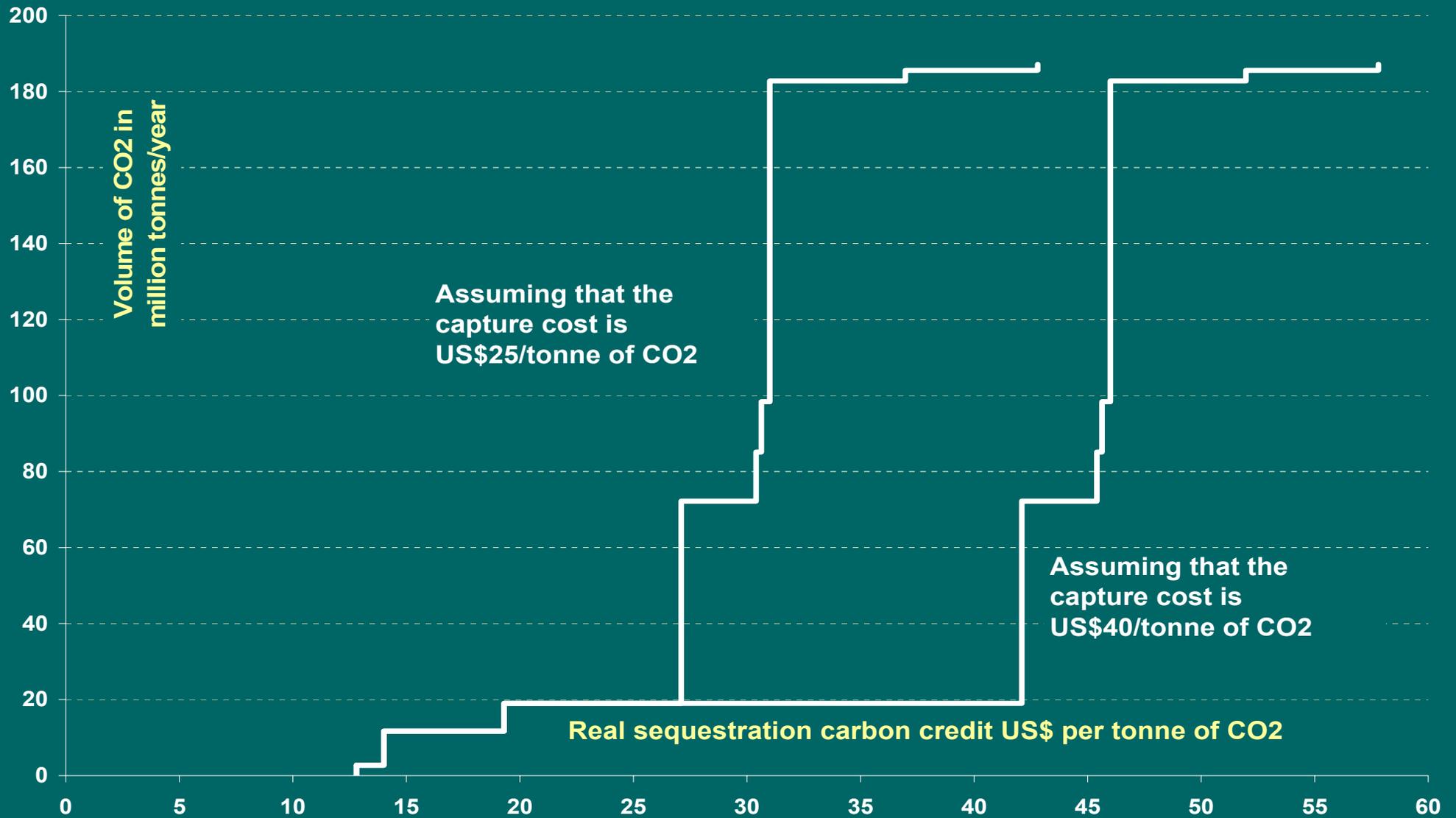
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Published power station capture costs (USA)

**Vary between less than US\$20 to over US\$70 per tonne of CO₂
Depending on the type and age of power station**

For our illustrative analyses, we assume US\$25 and US\$40 per tonne.

Required real breakeven carbon credit for potential CO₂ sources and sinks in Australia



**Total emissions of greenhouse gases = 480 MM tonnes
(year 1998)**

**(Stationary emissions = 240 MM tonnes
Power station emissions = 170 MM tonnes
Other industries = 70 MM tonnes)**

**Economic storage potential = up to 180 MM tonnes
with carbon credit up to US\$40 per tonne
(indicative only)**

Conclusions

There is a large potential variation in the costs of CO₂ storage (less than US\$5 to over US\$25 per tonne avoided for each site).

For any one storage project there can be potentially large uncertainties in the cost estimates.

Although it costs more to inject gas mixtures, the cost savings in capture might offset this.

The economic storage potential of Australian ESSCIs depends on the level of the carbon credit but could be up to 180 million tonnes per year (=50% of its stationary emissions).

Thank you

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