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WHY CCS MITIGATION IS VITAL TO MEET CLIMATE GOALS

Mark Bonner, Global Lead – International Climate Change
COP 22, 7 November 2016



The Global CCS Institute

Our Vision for CCS:

CCS is an integral part of a low-carbon future

OUR MISSION
To accelerate the development, demonstration and deployment of CCS globally.

1

Fact-based, influential advice and advocacy

2

Authoritative knowledge sharing

- We are an international membership organisation.
- Offices in Washington DC, Brussels, Beijing and Tokyo. Headquarters in Melbourne.
- Our diverse international membership consists of:
 - governments,
 - global corporations,
 - small companies,
 - research bodies, and
 - non-government organisations.
- Specialist expertise covers the CCS/CCUS chain.
- www.globalccsinstitute.com



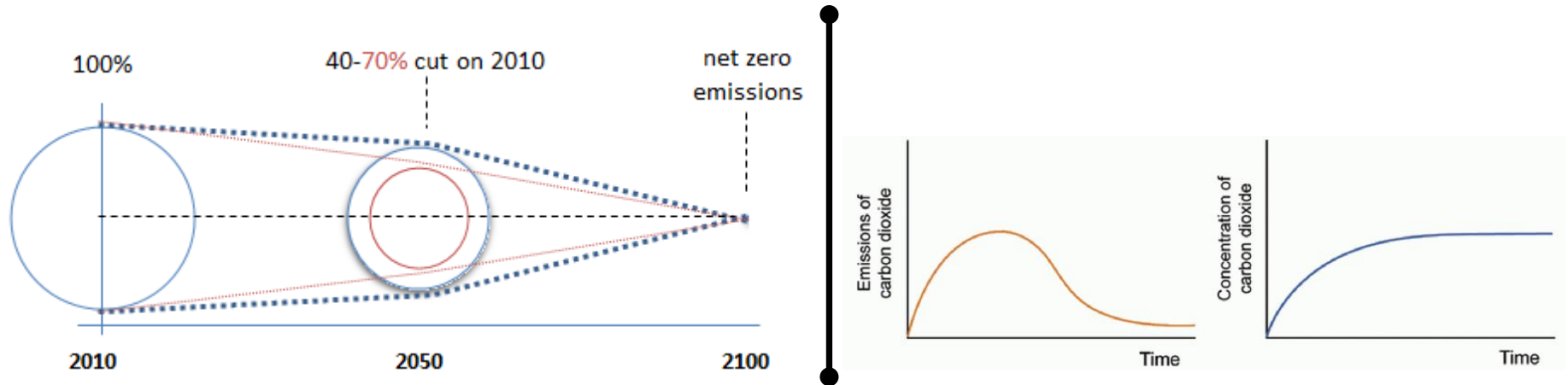
“CCS to the power of 8” (CCS⁸) – CAESAR/RN

1. **Cost** (competitive)
2. **Application** – industrial and power / CO₂ and non-CO₂
3. **Economic cost** (least)
4. **Scale** of mitigation
5. **Available**
6. **Retrofit**

7. **Negative emissions**
8. **Resource optimisation**



Inevitability of decarbonisation and net zero emissions



Source: (Intergovernmental Panel on Climate Change, 2014) page 20; graph GCCSI

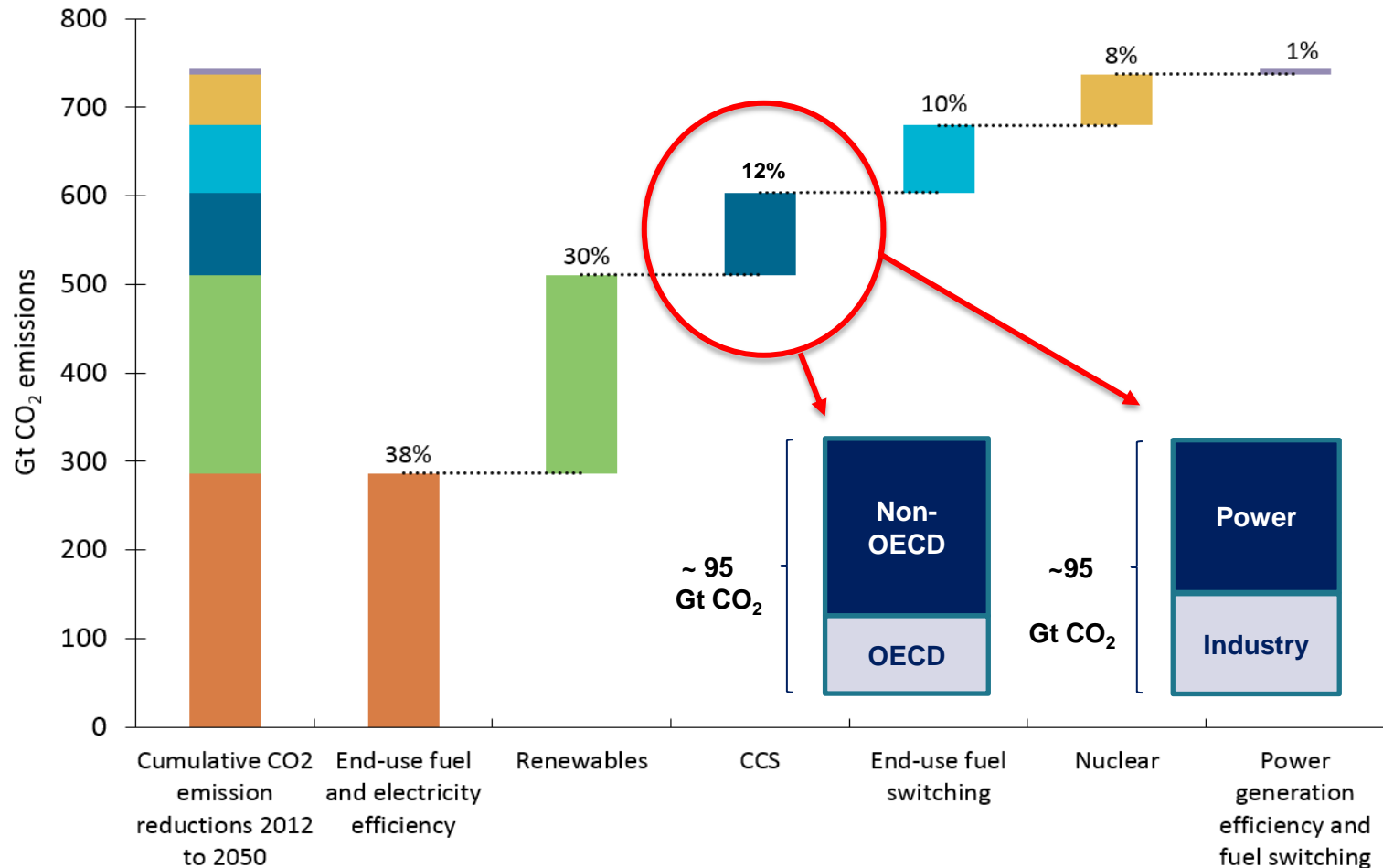
- Cumulative carbon budget (forever) for 2°C = 2,900 GtCO₂-e
 - 1GtCO₂-e is about equal to 40 years of emissions from 6 x 600MW coal plants
- Total remaining budget in 2011 = 1,100 GtCO₂-e
- Annual (anthropogenic) emissions ~50 GtCO₂-e (2010)
 - About three times the current mass of the human population (300Mt)
- At current emissions, budget is consumed in <23 years (2039)



CCS is critical in a portfolio of low-carbon technologies

HELE is not sufficient – only with CCS

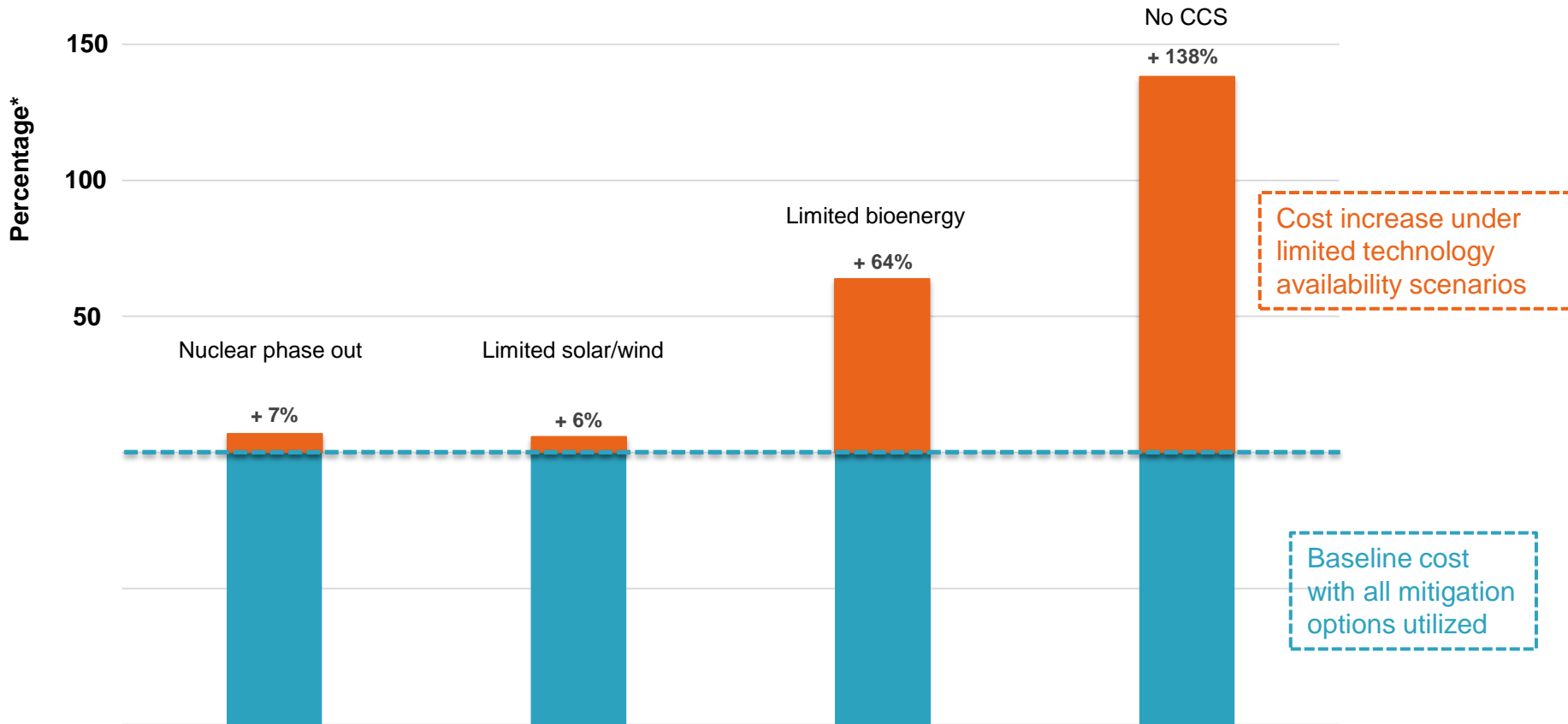
CCS contributes 12% of cumulative reductions required through 2050 in a 2DS world compared to 'business as usual'



Source: IEA, Energy Technology Perspectives (2015).



Mitigation costs more than double with limited CCS

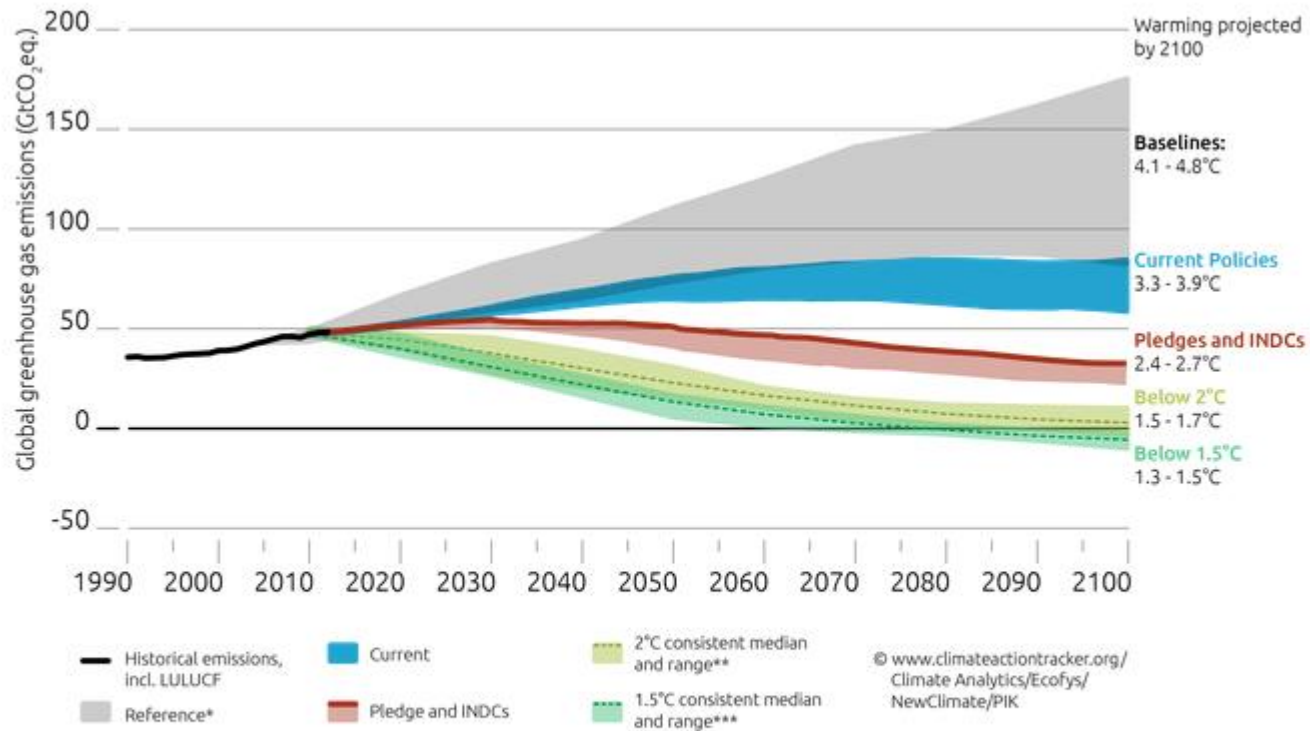


*Percentage increase in total discounted mitigation costs (2015-2100) relative to default technology assumptions – median estimate

Source: IPCC Fifth Assessment Synthesis Report, Summary for Policymakers, November 2014.



Effect of current pledges and policies



- * 5%-95% percentile of AR5 WGIII scenarios in concentration category 7, containing 64% of the baseline scenarios assessed by the IPCC
- ** Greater than 66% chance of staying within 2°C in 2100. Median and 10th to 90th percentile range. Pathway range excludes delayed action scenarios and any that deviate more than 5% from historic emissions in 2010.
- *** Greater than or equal to 50% chance of staying below 1.5°C in 2100. Median and 10th to 90th percentile range. Pathway range excludes delayed action scenarios and any that deviate more than 5% from historic emissions in 2010.

Source: <http://climateactiontracker.org/global.html>



CCS is under-represented in the INDCs

[A] INDCs CITING CCS		GHG SHARE		MITIGATION DETAILS		
UN GROUPING	COUNTRIES	%	UNCONDITIONAL	CONDITIONAL	BASELINE	END DATE
African States	EGYPT	0.6%	none listed	na	na	na
	MALAWI	0.0%	-0.7tCO2 per capita	na	BAU	2030
	SOUTH AFRICA	1.4%	Peak	na	na	2025
Asian States	BAHRAIN	0.1%	none listed	na	na	na
	CHINA	26.0%	-60%	-65%	/GDP (2005)	2030
	IRAN (ISLAMIC REPUBLIC)	1.7%	-4%	-12%	BAU	2030
	SAUDI ARABIA	1.5%	130MtCO2 per annum	na	na	2030
	UNITED ARAB EMIRATES	0.5%	none listed	na	na	na
Umbrella Group	CANADA	1.4%	-30%	0%	2005	2030
	NORWAY	0.1%	-40%	0%	1990	2030
TOTAL		33.4%				

[B] INDC PRESENTATIONS @UNFCCC SB42 (JUNE 2015) REFERENCING CCS						
Latin America & The Caribbean States	MEXICO	1.3%	-22%	-40%	BAU (2013)	2030
African States	MOROCCO	0.2%	-13%	-32%	BAU (2010)	2030
TOTAL		1.5%				
CUMULATIVE TOTAL (A + B)		34.9%				

[C] CCS NOT EXPLICITLY CITED IN INDCs BUT KNOWN TO SUPPORT CCS						
Asian States	INDONESIA	1.6%	-29%	-41%	BAU	2030
	KOREA	1.7%	-37%	0%	BAU	2030
Europe (EU-28)	EUROPEAN UNION (EU-28)	10.3%	-40%	0%	1990	2030
Umbrella Group	JAPAN	3.4%	-26%	0%	2013	2030
	UNITED STATES OF AMERICA	15.3%	-26%	-28%	2005	2025
TOTAL		32.4%				
CUMULATIVE TOTAL (A + B + C)		67.3%				

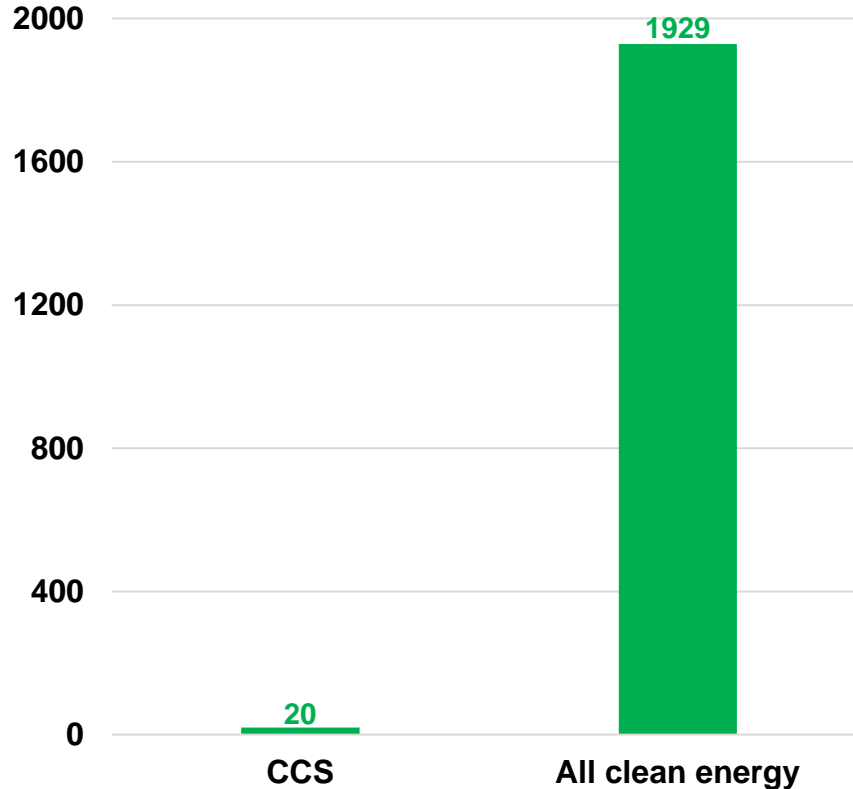
Source: MBonner, Dec 2015

- Countries must be encouraged to include CCS in the next wave of NDCs (access to affordable finance for projects may depend on it)
- CCS needs higher representation in developing country TNAs
- 10 countries cite CCS in INDCs – represents a third of global emissions
- We know of countries that are strategically engaged in CCS – they could represent > 65% of global emissions

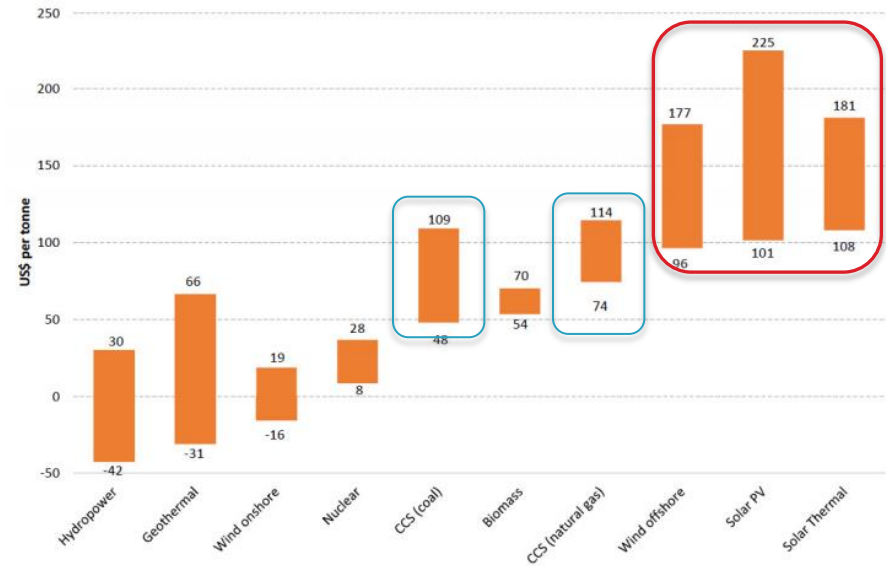


Strong policy drives investment – to get CCS onto a similar curve to RES ~ a level playing field is essential

USD billion



Avoided cost of CO₂ for plant in the US, (2014 US\$)



Source: Global CCS Institute analysis

Data source: Bloomberg New Energy Finance as shown in IEA presentation “Carbon Capture and Storage: Perspectives from the International Energy Agency”, presented at National CCS week in Australia, September 2014.

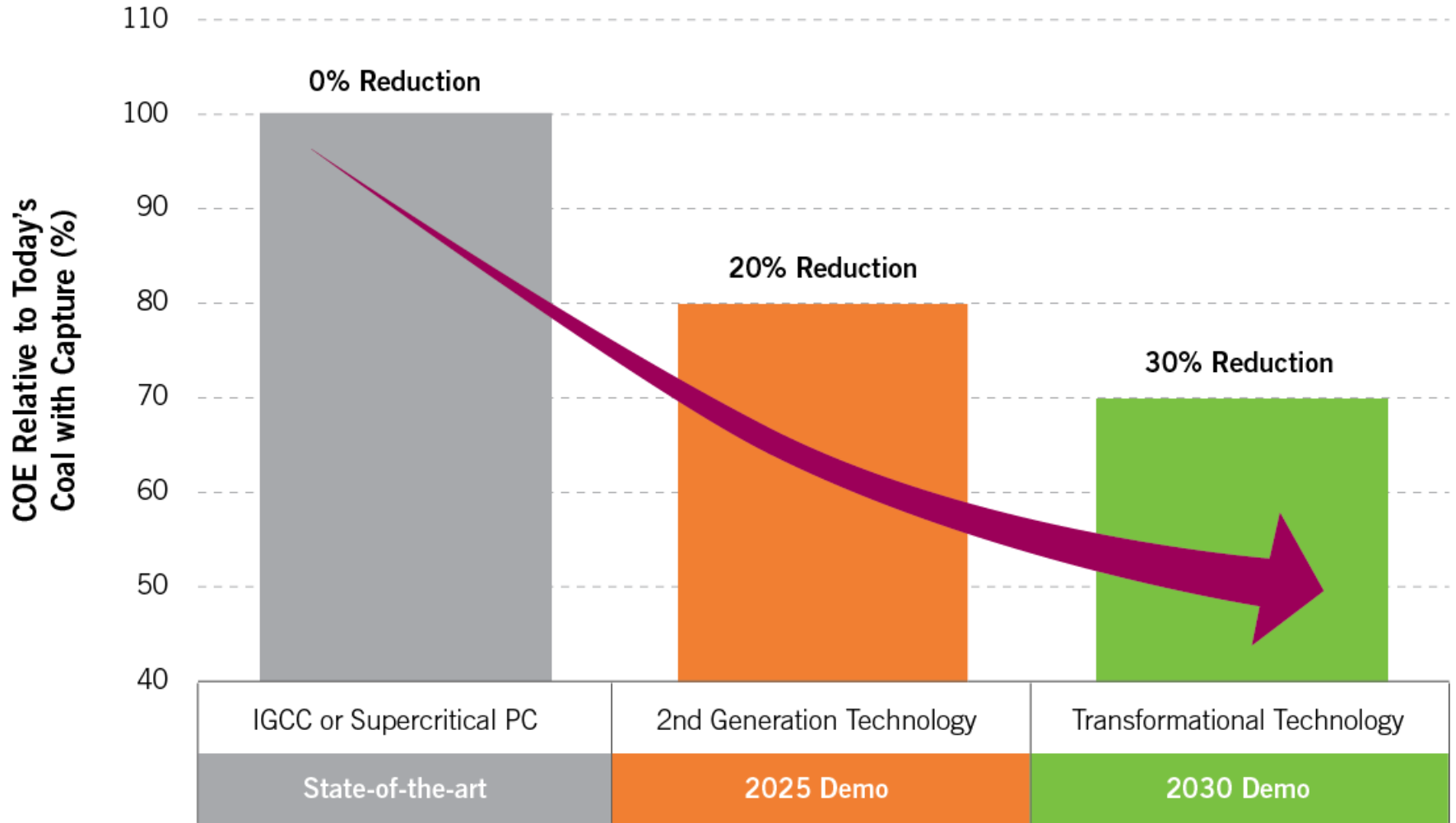


15 large-scale projects are operational ~ 40MtCO₂ pa





Relative US DOE cost reduction targets and timing for second generation and transformational carbon capture technologies



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