CARBON CAPTURE AND STORAGE

International Energy Agency

Current and Future Energy Trends

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Ambassador Richard H. Jones
Deputy Executive Director
International Energy Agency

CARBON CAPTURE AND STORAGE

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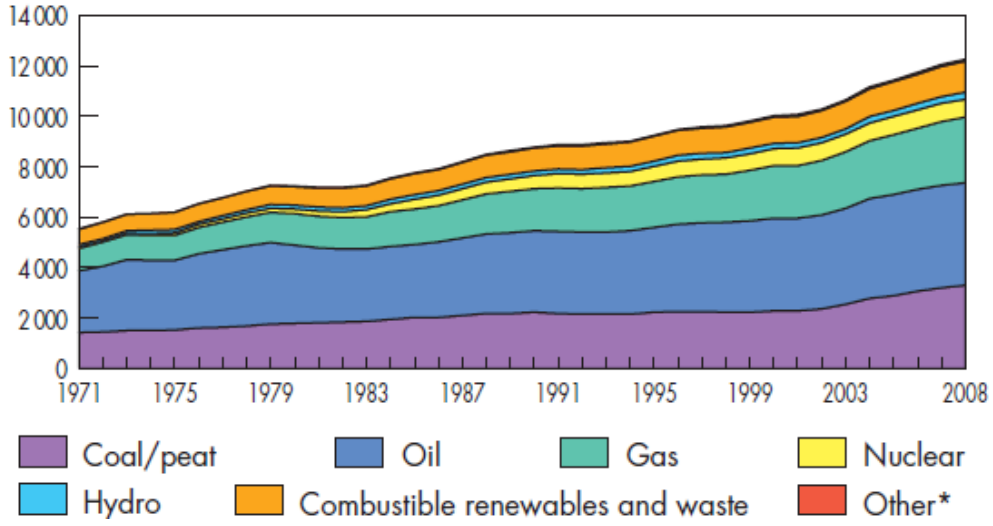
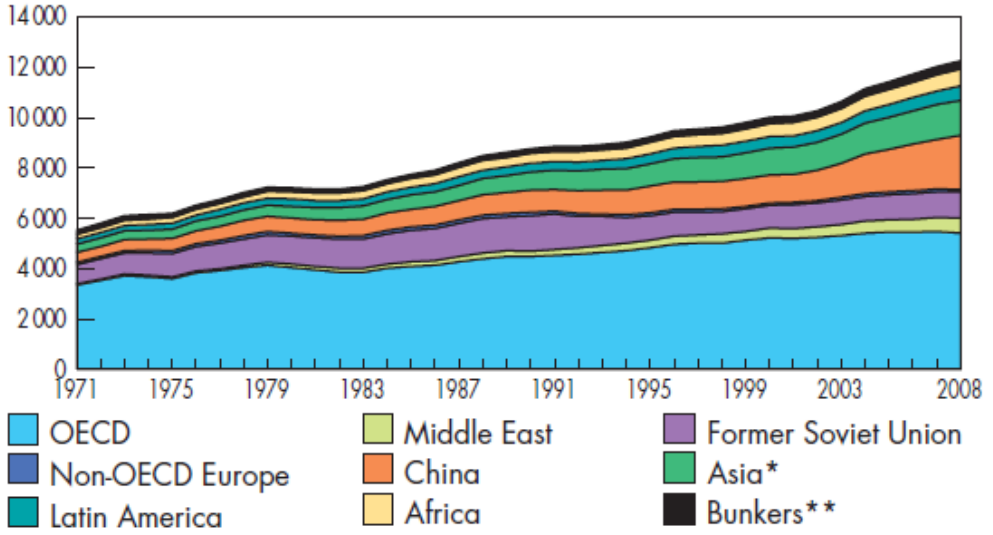
GLOBAL DEMAND x2 IN 40 YEARS





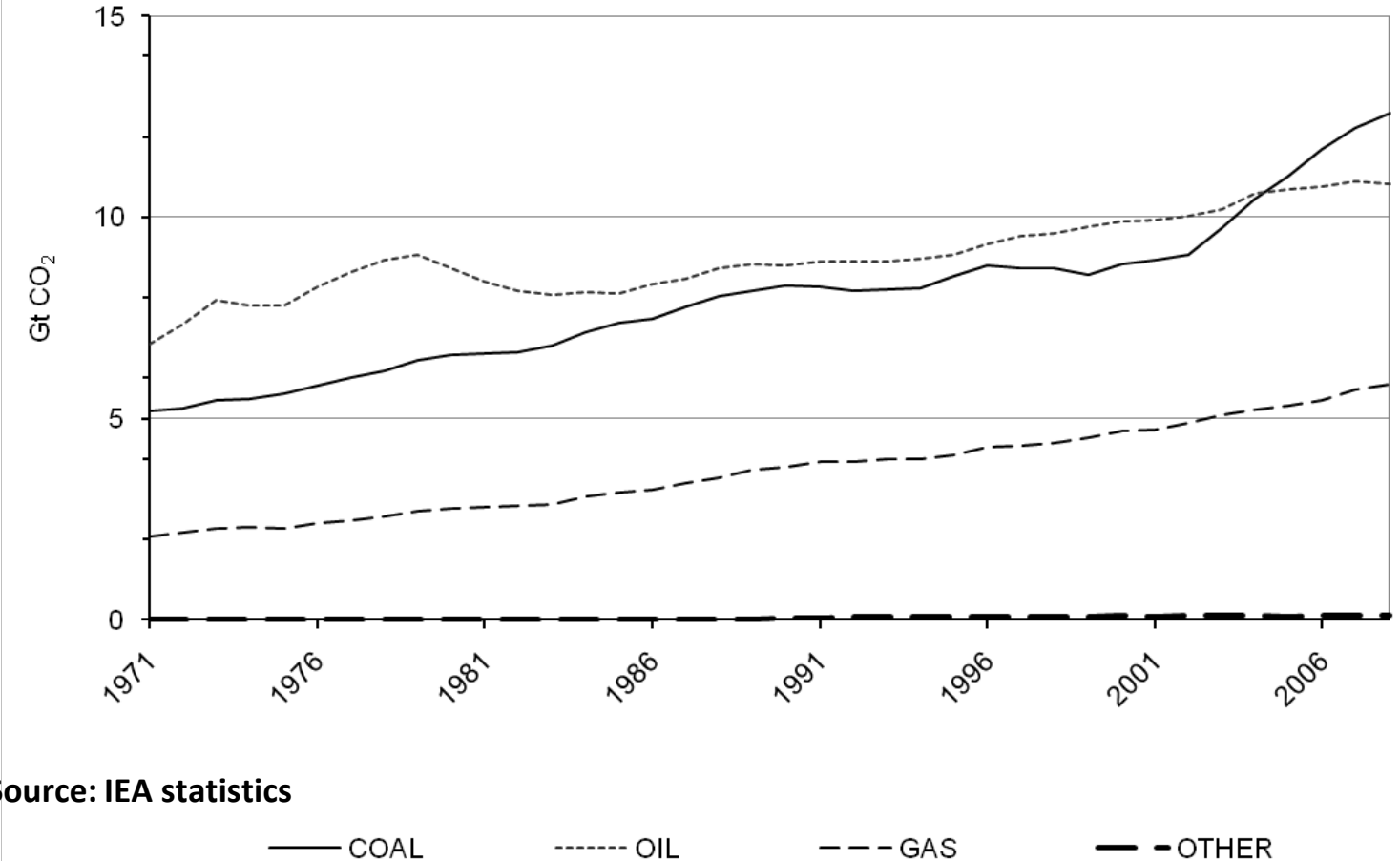
- From 6115 Mtoe to 12 267 Mtoe
- 75% of the increase is from fossil fuels

- Moderate increase in OECD world
- Rapid demand growth outside OECD

Source: IEA statistics

GLOBAL CO_2 EMISSIONS DOUBLED

- Oil-related CO_2 emissions used to dominate…
- …since 2004, coal is leading source of global emissions at ~13Gt pa, up 135% from 1971
- Gas-related emissions have tripled from 2Gt in 1971 to 6Gt in 2008



Source: IEA statistics

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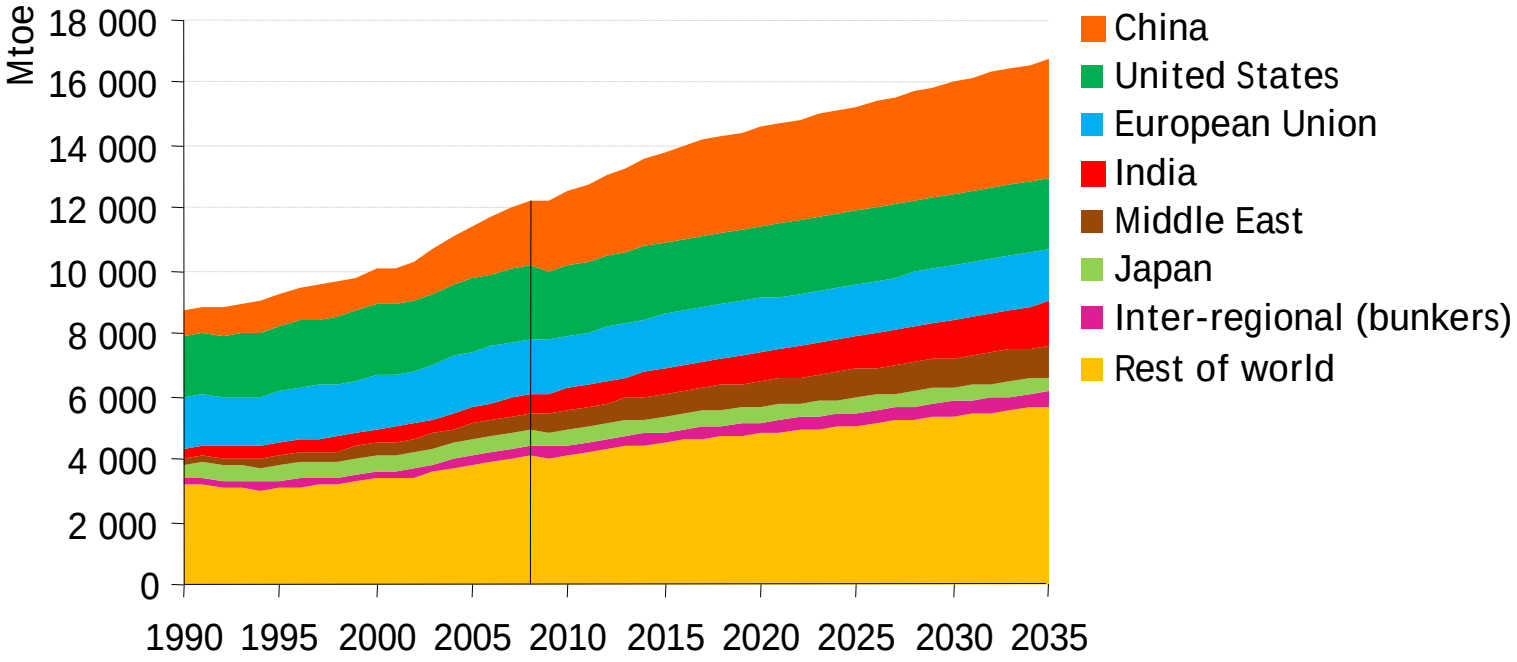
ENERGY DEMAND CONTINUES TO GROW

- Energy demand +35%
- China: 35% of global incremental demand
- OECD demand stagnates



Source: "New Policies Scenario", IEA World Energy Outlook 2010

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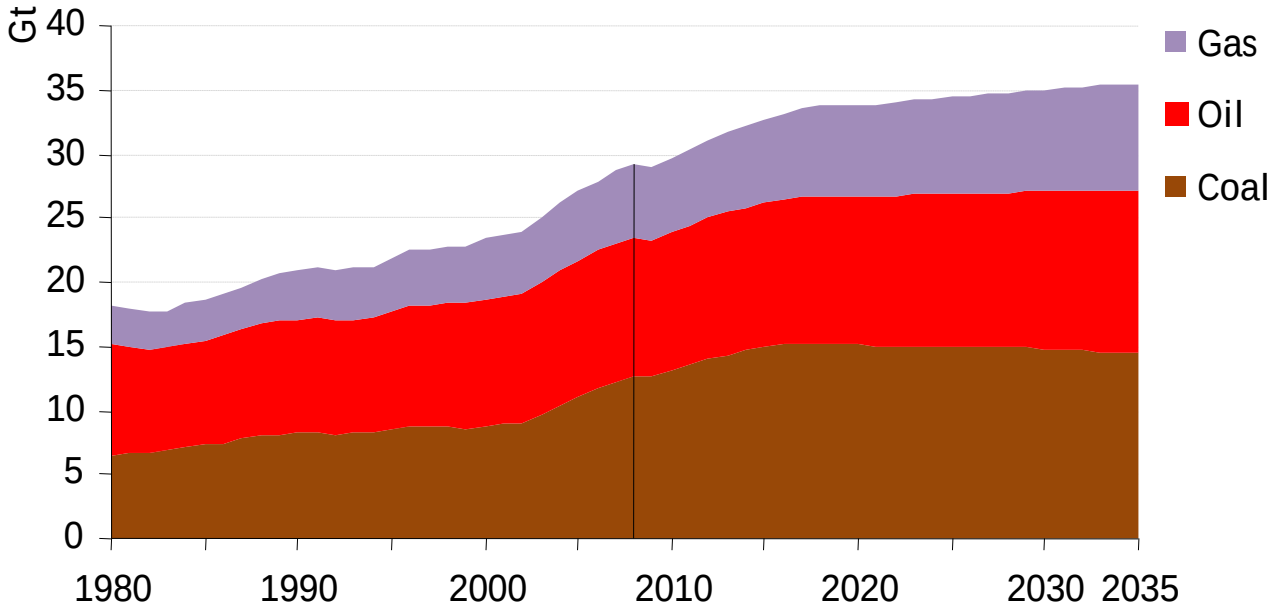
CO_2 EMISSIONS CONTINUE TO GROW

- Energy-related CO_2 emissions 35 Gt by 2035
- Growth from non-OECD countries
- Gas-related CO_2 emissions grow fastest (1.3%pa), followed by coal (0.5%pa)
- 650ppm CO_2-eq pathway



Source: "New Policies Scenario", IEA World Energy Outlook 2010

World Energy Outlook 2010

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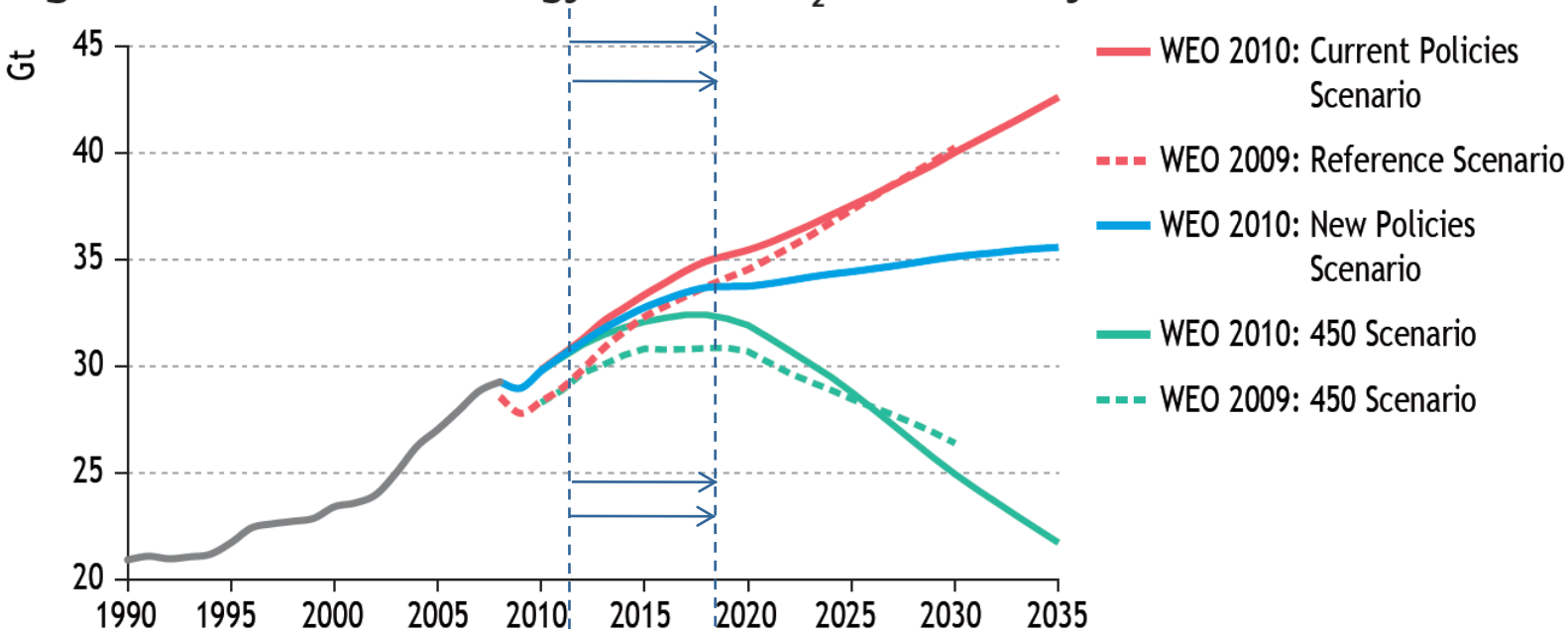
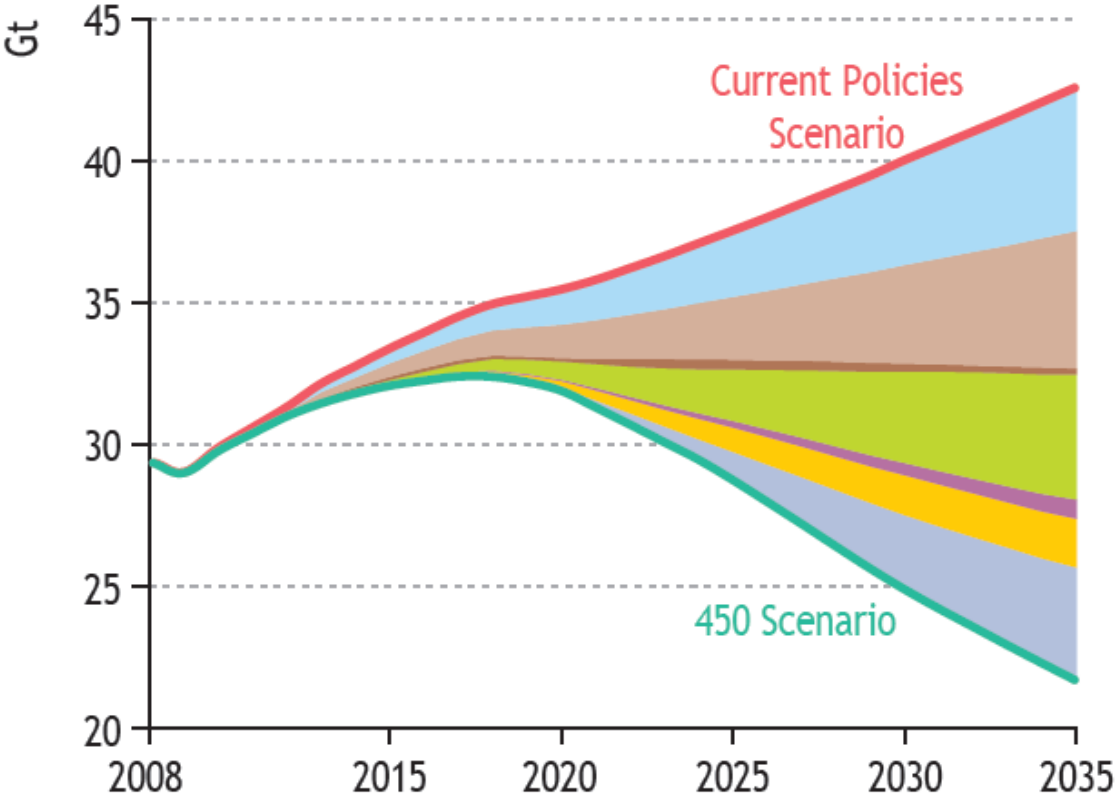
TOWARDS SUSTAINABLE FUTURE

- Current policies or "reference scenarios" unsustainable
- Policy ambitions now often target "450 ppm scenarios" (Climate models suggest 50-50 chance to keep temperature increase at ≤2°C)
- Time window for limiting CO_2 to 450 ppm is rapidly closing

Figure 13.2 • World energy-related CO_2 emissions by scenario



THE CRITICAL ROLE FOR CCS IN "450" SCENARIOS



	Abatement		
	2020	2030	2035
Efficiency	71%	49%	48%
End-use (direct)	*34%*	*24%*	*24%*
End-use (indirect)	*33%*	*23%*	*23%*
Power plants	*3%*	*2%*	*1%*
Renewables	18%	21%	21%
Biofuels	1%	3%	3%
Nuclear	7%	9%	8%
CCS	2%	17%	19%
Total (Gt CO_2)	3.5	15.1	20.9

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LIMITED ROLE FOR CCS WITH TODAY'S KNOWN POLICIES...

- We project constant improvement of average efficiency of global coal-fired power fleet
- But share of CCS in coal-fired power remains below 10% in 2035 (and only 3% of total power generation)
- No gas-CCS
- No or very limited industry-CCS

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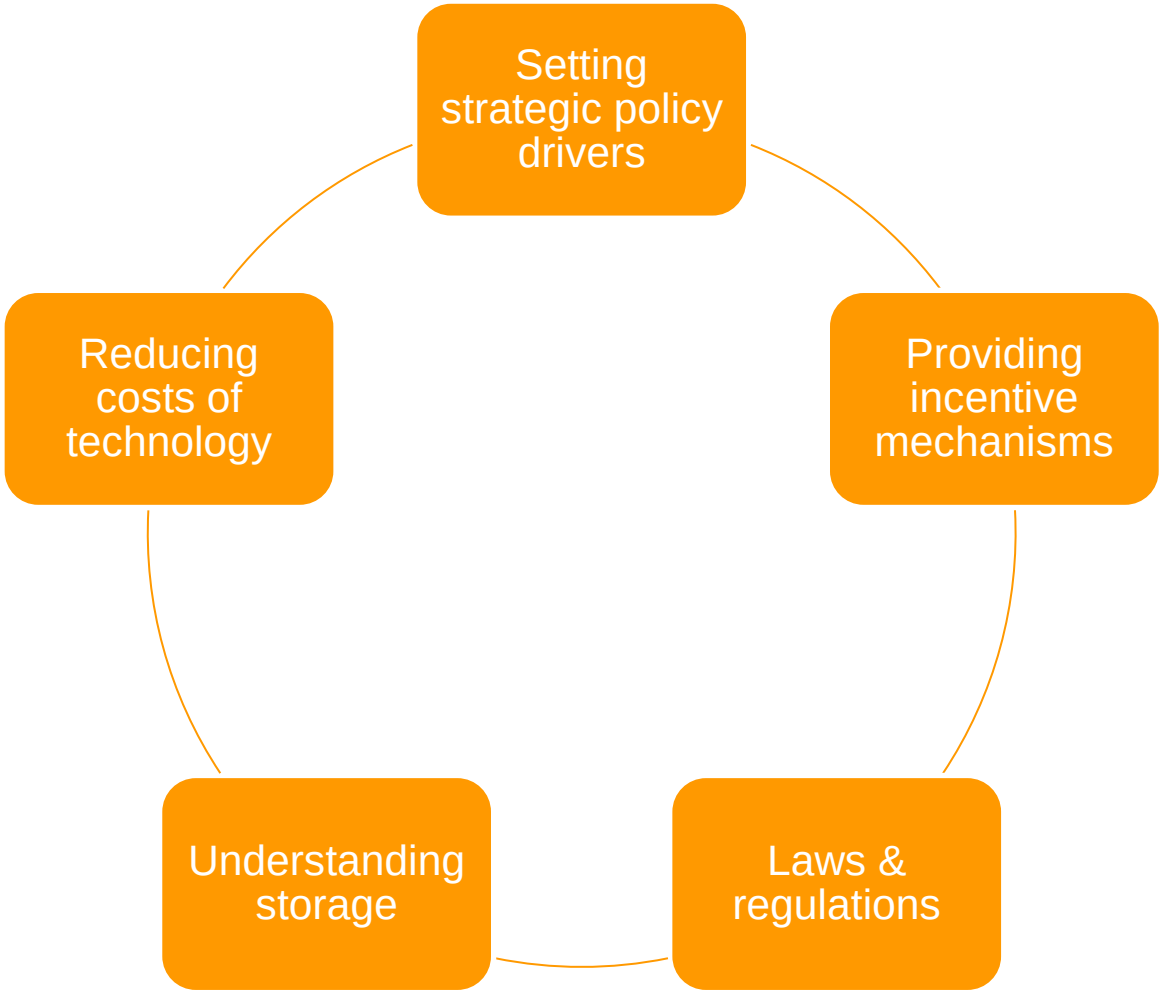
CHALLENGES REMAIN FOR CCS



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CONCLUSIONS

- Energy demand and emissions have doubled in past 40 years
- Energy demand and emissions continue to grow
- The world's time window to achieve a 450ppm scenario is closing, requiring rapid policy action
- CCS has the potential to significantly reduce emissions from various sectors, not only power
- Without ambitious goals, a supportive policy framework and solutions to various challenges, CCS will not be deployed in large scale