



FINANCING CCS IN DEVELOPING COUNTRIES



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World Bank Support for CCS

- World Bank CCS Trust Fund (CCS TF) was established in December 2009
- Main objectives are
 - To support strengthening capacity and knowledge building
 - To create opportunities for developing countries to explore CCS potential
 - To facilitate inclusion of CCS options into developing country low-carbon growth strategies and policies
- *Toward a Sustainable Energy Future for All: Directions for the World Bank Group's Energy Sector* report (2013) highlights CCS as a critical technology for CO₂ mitigation in the energy sector



World Bank Support for CCS

- Contributions to the CCS TF to date total USD 70 million from
 - UK government USD 38 million (*+USD 13 million*)
 - Norway government USD 17 million
 - Global CCS Institute USD 2 million (*in the process of withdrawing*)



World Bank Support for CCS

- Phase I of the World Bank CCS TF

- Completed in 2015
- Allocated funds: USD 8 million
- Desk-top CCUS studies in nine countries

- Phase II of the World Bank CCS TF

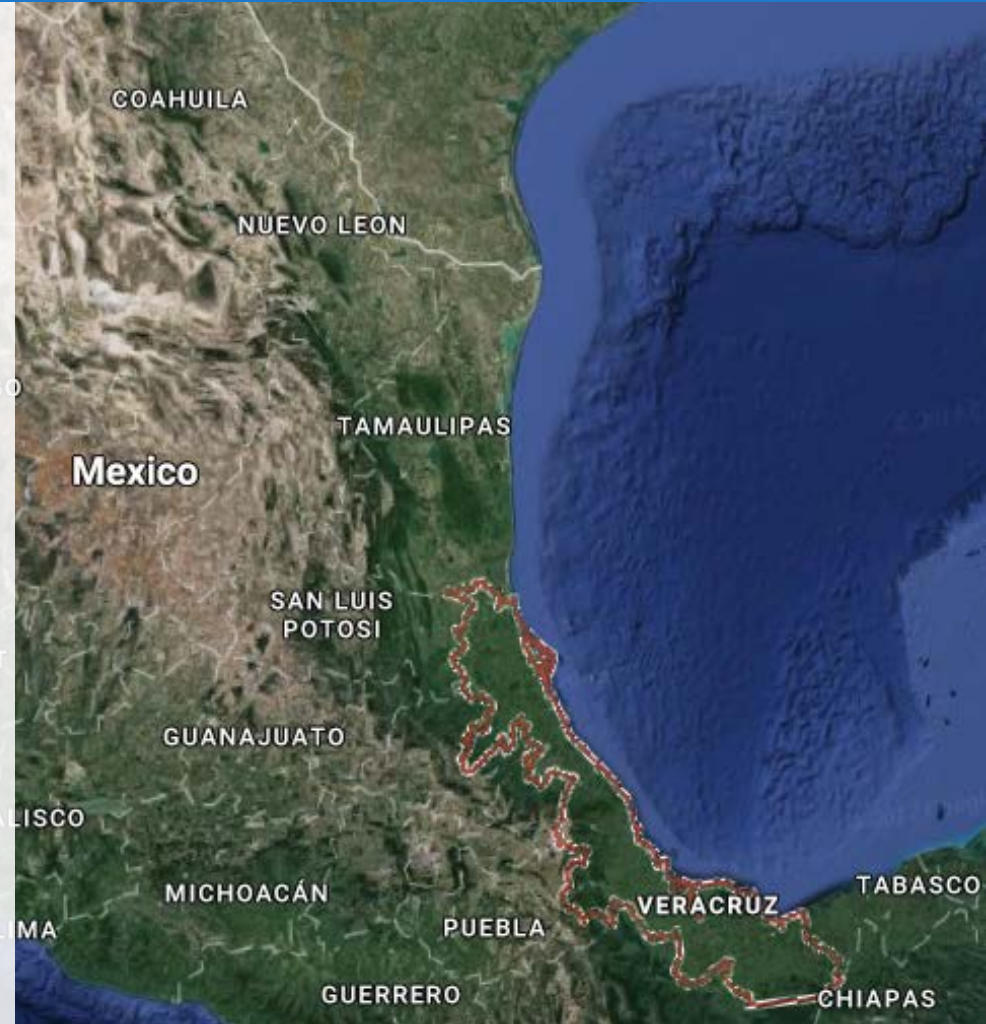
- Commenced in 2014
- Allocated funds: USD 49 million (*+USD 13 million*)
- Four CCUS pilot projects in Mexico and South Africa

Country/region	Allocation (USD)
Botswana	1.4m
South Africa	1.35m
China	1.8m
Mexico	1.3m
Indonesia	0.85m
Kosovo	0.4m
Egypt	0.3m
Jordan	0.15m
Maghreb	0.4m
TOTAL	7.9m



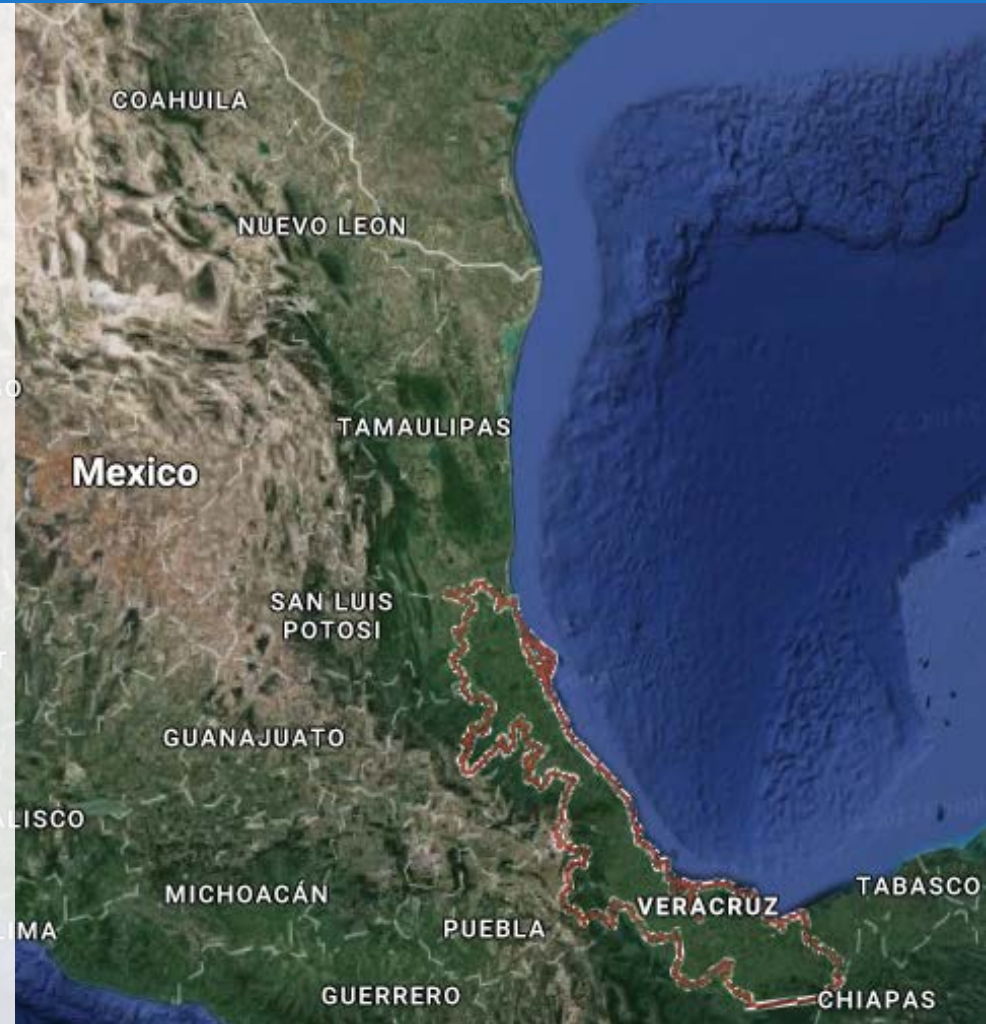
Phase I World Bank Support for CCUS in Mexico

- Budget
 - USD 1.3 million
- Comprised of five studies
 - A prefeasibility study for a capture pilot plant at a natural gas-fired power station
 - Assess the monitoring and regulatory requirements for converting EOR sites into permanent CO₂ storage sites
 - Undertake a study to establish a legal and regulatory framework for CCUS
 - Develop a public engagement strategy
 - Support capacity building where opportunities arise
- Completed in 2015



Phase II World Bank Support for CCUS in Mexico

- Led by SENER
- Supported by
 - PEMEX
 - CFE
 - Mexican Centre for CCUS
- Total budget
 - Mexican Hydrocarbon Fund: ~USD 24.5 million
 - WB CCS TF: USD 16.5 million
- Two projects
 - CO₂ Capture Pilot Project
 - CO₂ EOR & Storage Project



Mexican CO₂ Capture Pilot Project



- To be hosted by CFE in Poza Rica, Veracruz State
- Comprises
 - Post-combustion capture on a Natural Gas Combined Cycle power plant
 - ~2.4MWe (~20tCO₂ per day)
 - Generic, flexible design to allow testing of a range of advanced amine technologies
- Budget
 - USD 29.1 million
- Current status
 - Pre-feasibility complete
 - FEED to be undertaken 2018



Mexican CO₂ EOR & Storage Pilot Project

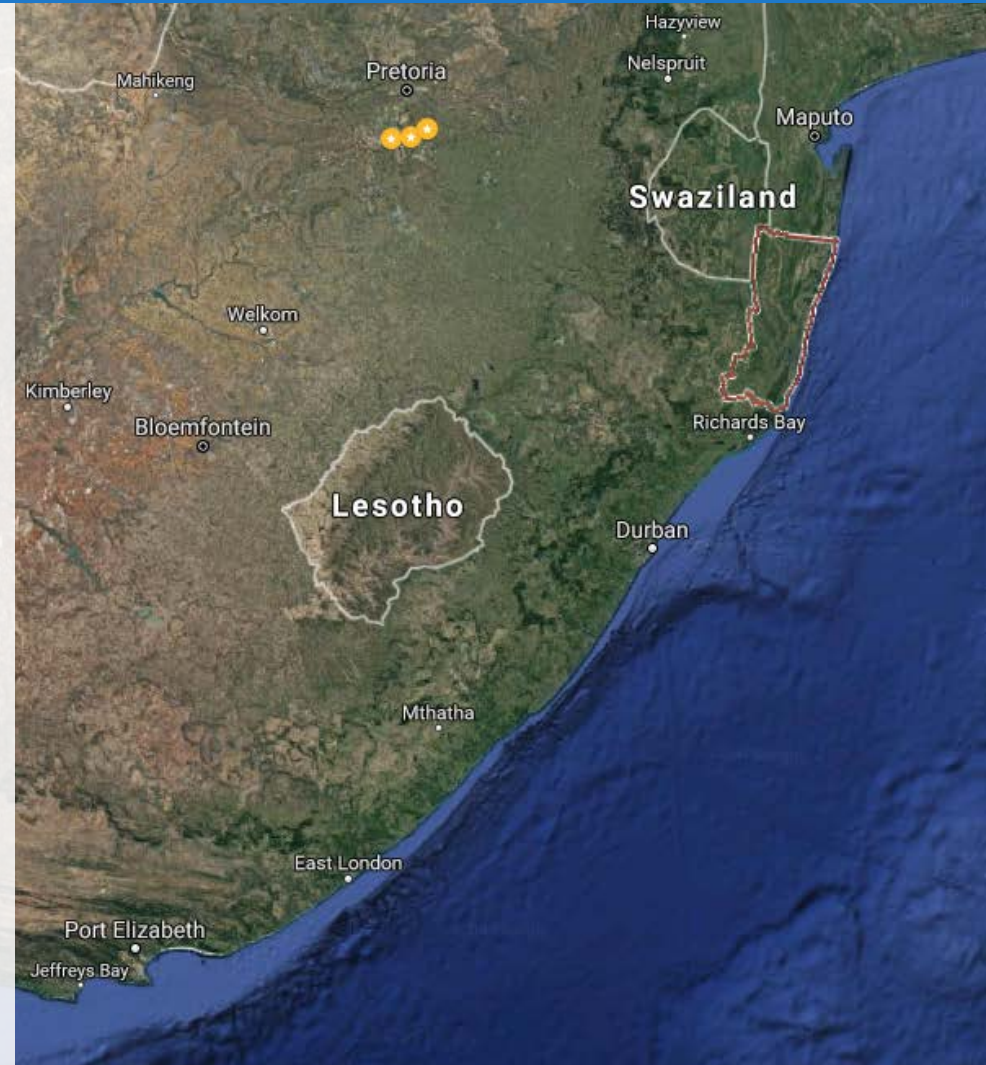


- To be hosted by PEMEX at the Brillante Oil Facility, Veracruz State
- Comprises
 - A one-week CO₂ “huff-and-puff” test (~100tCO₂ per day); and, if successful
 - A two-month CO₂ injection test (~100tCO₂ per day)
- Budget
 - USD 11.9 million
- Current status
 - “huff-and-puff” to be undertaken 2018/19



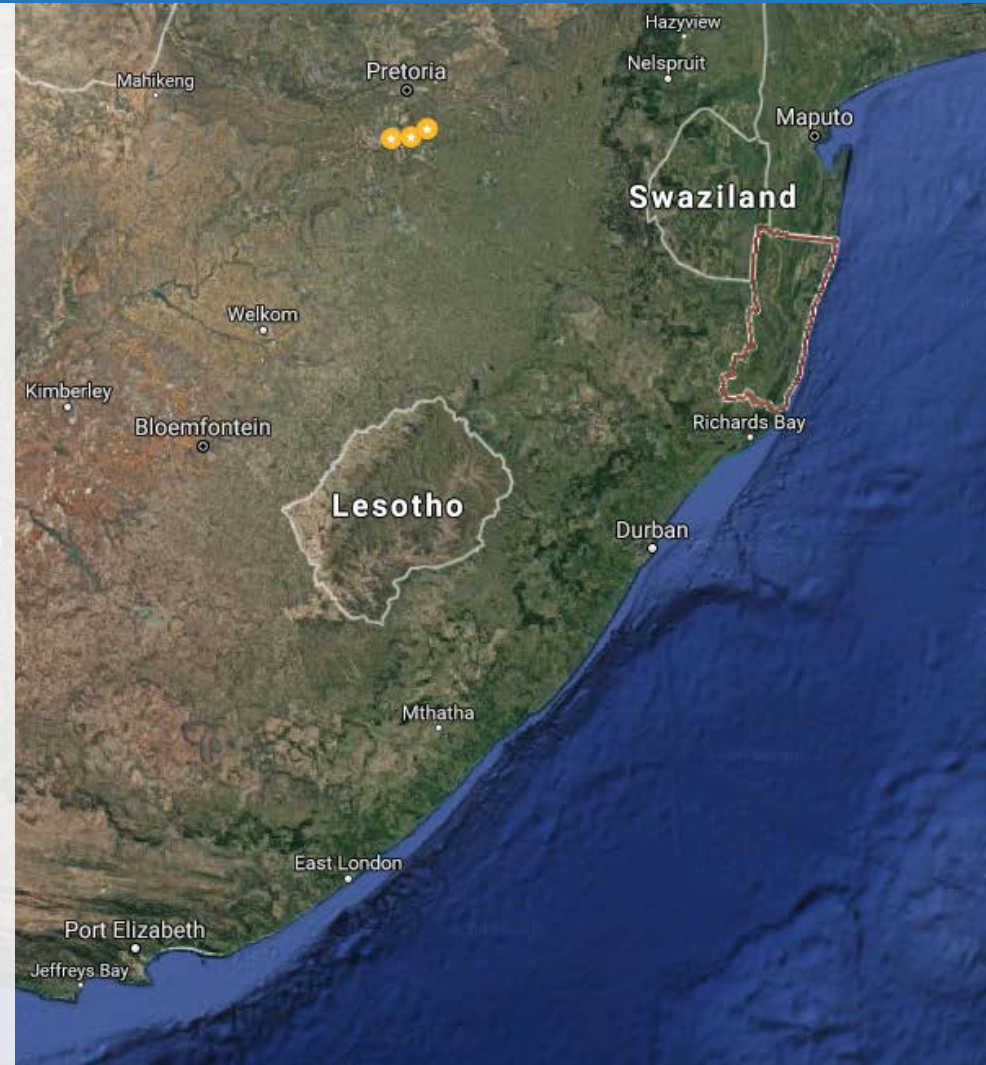
Phase I World Bank Support for CCS in South Africa

- **Budget**
 - USD 1.35 million
- **Comprised of five studies**
 - Regulatory review to enable the implementation of the Pilot CO₂ Storage Project
 - Techno-economic assessment for deployment of CCS Technology in South Africa
 - Capacity Building for CCS in South Africa
 - National and Local Public Engagement Plan for the Pilot CO₂ Storage Project
- **Completed in 2015**



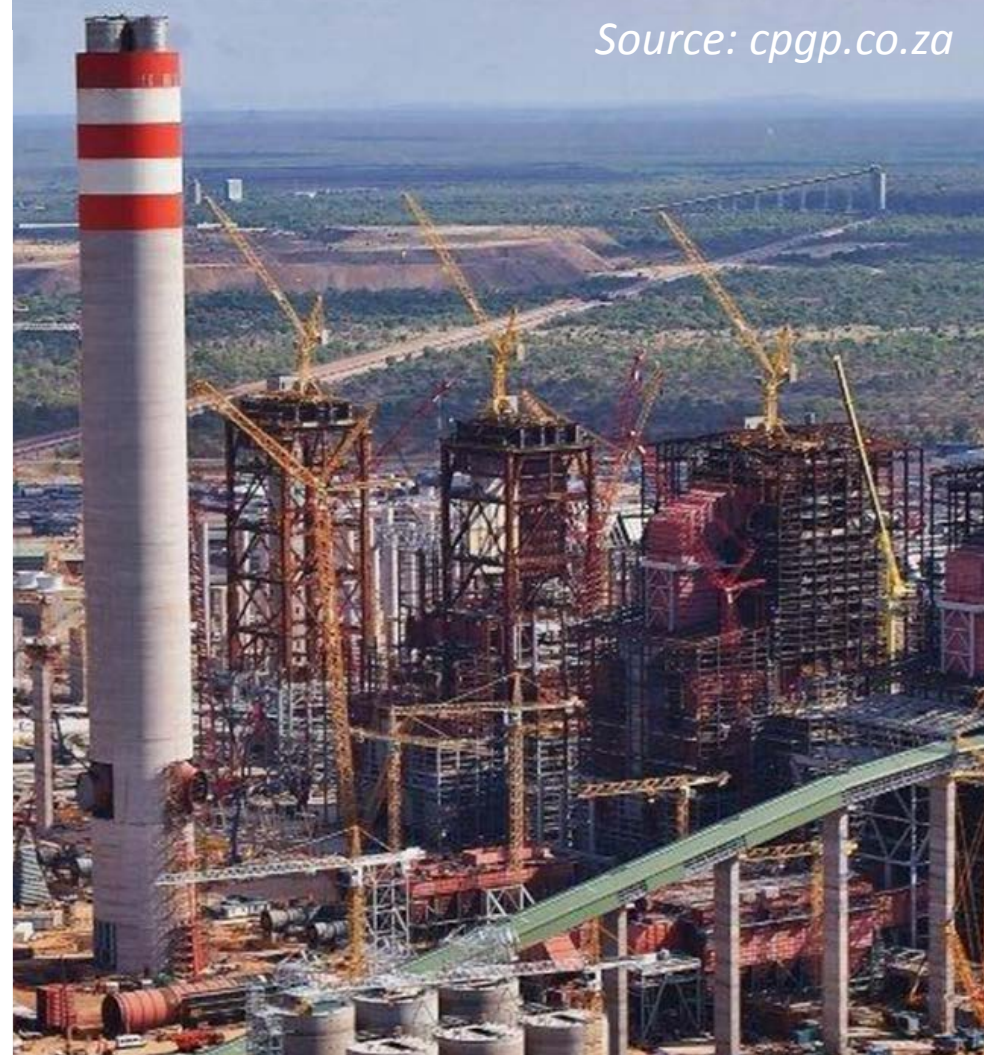
Phase II World Bank Support for CCS in South Africa

- Led by SANEDI
- Supported by
 - Department of Energy
 - Council for Geosciences
 - Petroleum Agency of South Africa
 - Eskom
- Total budget
 - Department of Energy: USD 15 million
 - WB CCS TF: USD 27.4 million
- Two projects
 - CO₂ Capture Pilot Project
 - Pilot CO₂ Storage Project



South African CO₂ Capture Pilot Project

- To be hosted by Eskom at the Kusile power plant in Mpumalanga Province
- Comprises
 - Post-combustion capture on a coal-fired power plant
- Budget
 - Total budget TBD
 - USD 2 million allocated for pre-feasibility and FEED
- Current status
 - Pre-feasibility to be undertaken in 2018



South African Pilot CO₂ Storage Project

- To be located in the Zululand Basin in the KwaZulu-Natal province
- Supported by Battelle Memorial Institute
- Comprises
 - 10,000 - 50,000 metric tons of CO₂
 - Saline aquifer storage
 - Commercially sourced industrial CO₂
 - Truck CO₂ transport
- Budget
 - USD 36.5 million
- Current status
 - Procurement underway for basin exploration seismic survey
 - Exploration wells to be drilled 2018/19



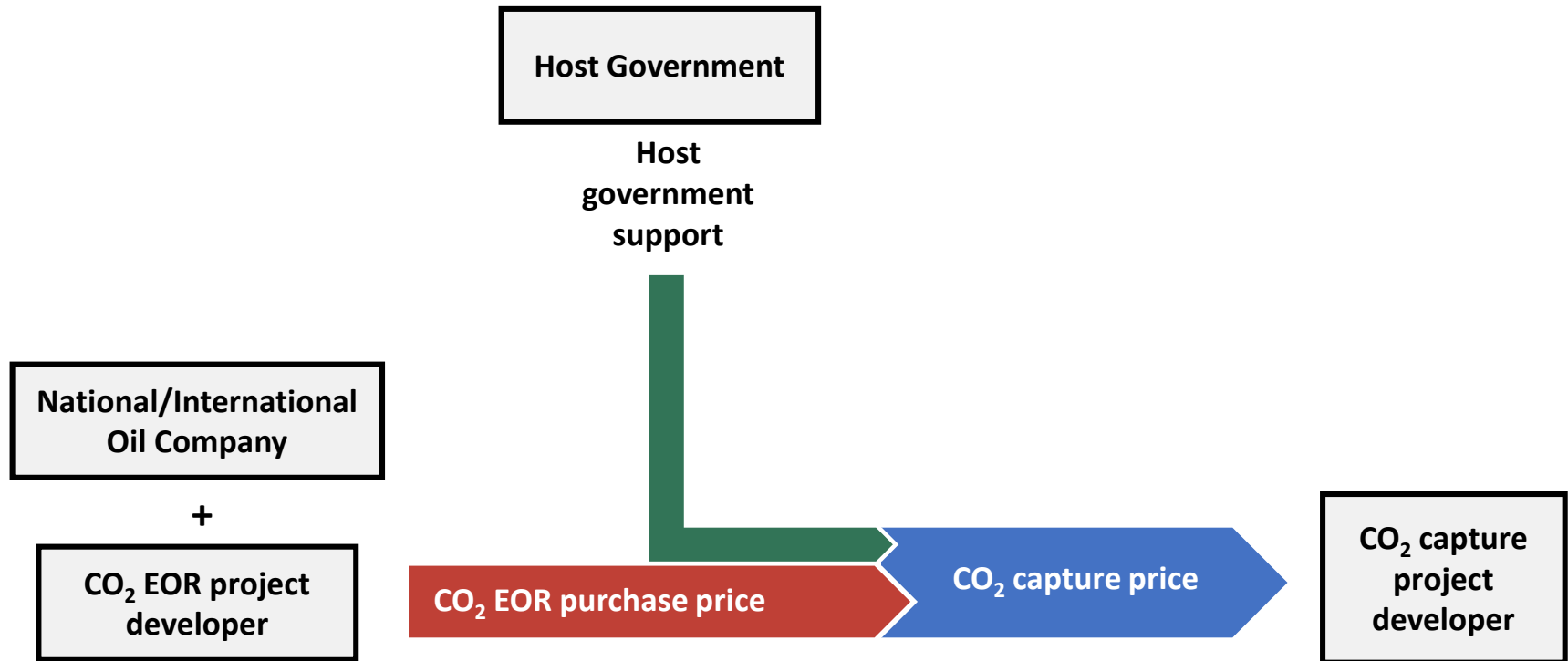
Financing CCUS in Developing Countries



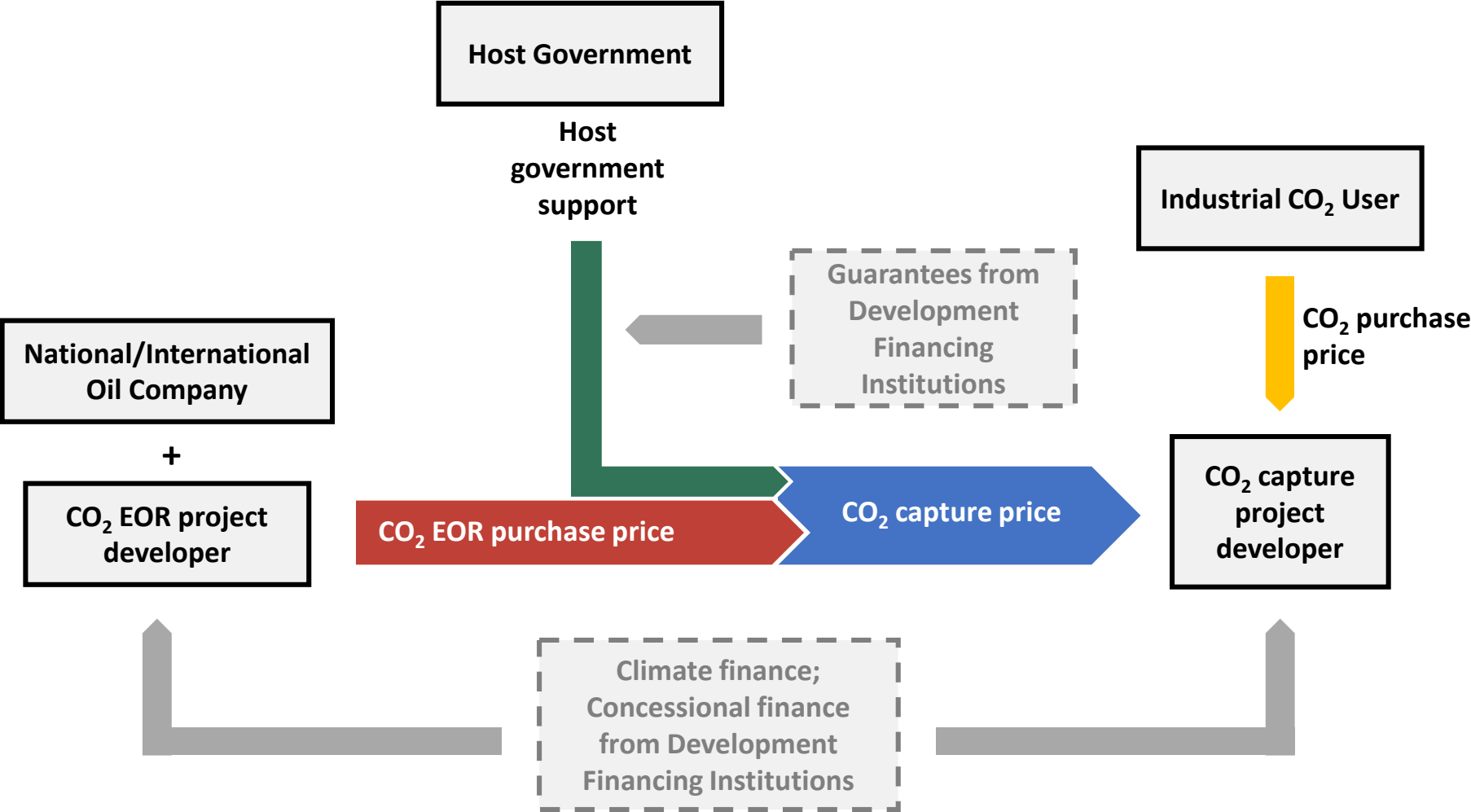
- Focus on early-opportunity projects
 - Host government support
 - High-concentration CO₂ sources
 - Industrial CO₂ uses
 - EOR opportunities
- In combination with support opportunities
 - Climate finance
 - Concessional finance
 - Payment guarantees
 - Private sector participation



Financing CCUS in Developing Countries



Financing CCUS in Developing Countries



Potential CCUS Support Mechanism



- Consideration underway into financing commercial CCUS in developing countries
- Novel GHG Mitigation Technology Program
 - Assist the Governments meet GHG emissions targets
 - Promote novel GHG mitigation technologies
 - Develop innovative public-private business models



Decarbonizing Natural Gas study

- Will analyze the role of natural gas in deep, global CO₂ mitigation
- Analysis will look at the role of
 - Fuel switching from coal/oil to natural gas;
 - CCS in the natural gas production industry;
 - CCS in industry where natural gas is the feedstock; and
 - CCS on natural gas-fired power generation.
- The analysis will be based around case-studies, both in developed and developing countries
- Being scoped in partnership with the ADB and IEA
- To be undertaken in 2018





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