

Brainstorm on mechanisms for 'Incentivising Carbon Dioxide Removal Technologies'

Potential for supply-side climate policy

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ERCST, 24 September 2019

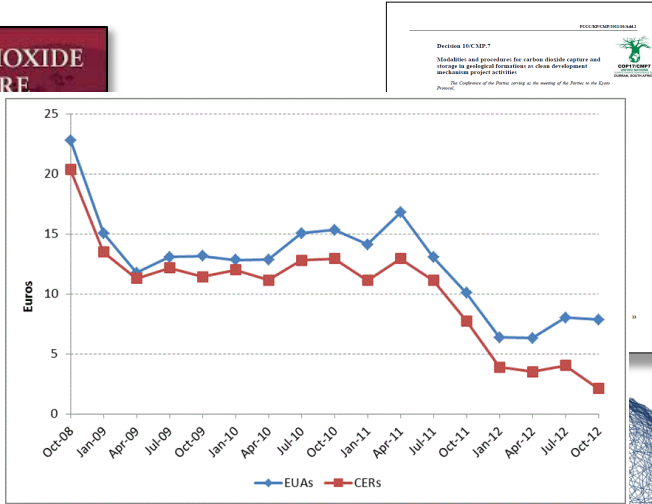
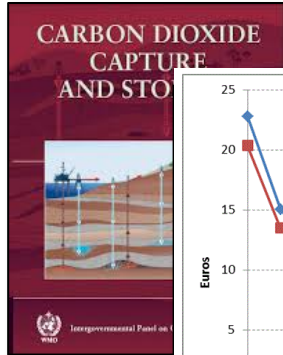
ERCST

European Roundtable on
Climate Change and
Sustainable Transition

Overview

1. Some milestones for CCUS and policy
2. Traditional approach and issues for CCUS deployment
3. Reframing the incentive and business model
4. Implementation choices

Milestones for CCUS and policy

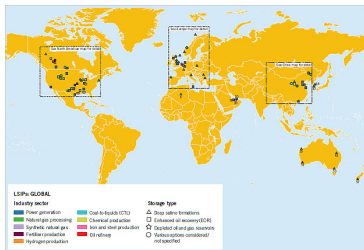


Decision 16.CM.7
 Modalities and procedures for carbon dioxide capture and storage in industrial installations or those developed thereafter project activities

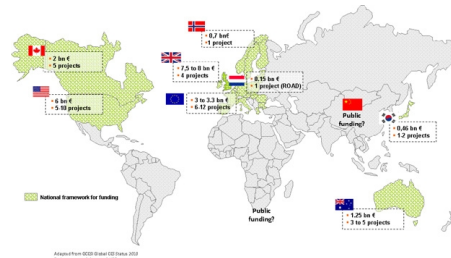
UNITED NATIONS
PARIS CLIMATE AGREEMENT
 SIGNING CEREMONY
 — 22 APRIL 2016 —



>40 projects in planning



>\$30 bn committed



18 LSIPs (10 or so since 2005)



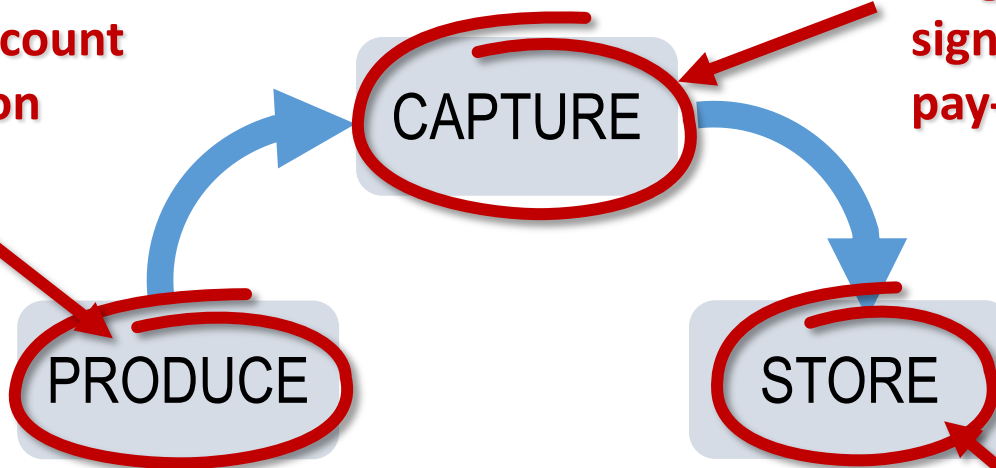
Traditional approach

Current business model

Single plant/output against which to count costs and emission reductions

Linear value-chain architecture

Single carbon price signal to incentivise and pay-off project



Project-by-project linear chain architecture is not offering a sufficient nor stable enough value proposition to systematically support deployment of sequestration technologies at scale today

Storage business model dependent on producer economics and carbon price signal

Traditional approach

Issues

- 1. CCUS is economic in some circumstances, but not widely replicable**
- 2. Climate policies do not adequately value the role of CCS as an option in avoiding dangerous climate change.**
 - Carbon pricing does not incentivize nascent, higher cost, low-carbon technologies
 - Other low-carbon technologies benefit from supplemental subsidies alongside explicit or implicit carbon prices (e.g. renewables)
- 3. Commercial market for CCUS poses challenges**
 - Demand-side climate policies place all the incentive on emitters
 - CCUS also needs price signal for “storers” or “users”

Traditional approach

Issues

“Carbon pricing by itself may not be sufficient to induce change at the pace and on the scale required for the Paris target to be met, and may need to be complemented by other well-designed policies tackling various market and government failures, as well as other imperfections”

Carbon Pricing Leadership Coalition, 2017; page 3
alongside explicit or implicit carbon prices (e.g. renewables)

“Without targeted support, it is unlikely that the current momentum in [CCS] project deployment will be maintained, with progress likely to stall by 2020. This will substantially inhibit the availability of CCS to contribute to medium and long-term climate targets.”

International Energy Agency, 2016; page 46

Reframing

Decarbonizing fossil fuels

Physical decarbonization

- Chemical engineering (e.g., reforming) to separate the hydrogen and carbon fractions
- Resulting hydrogen replaces fossil fuel energy carriers
- Carbon fraction can be geologically sequestered

In either case, a mechanism for tagging and tracking sequestration will be needed (guarantee of origin)

Virtual decarbonization

- Supplier offsets extraction through sequestration elsewhere
- Full life cycle carbon (well-to-wheel, scope 1, 2 and 3 embodied carbon (tank-to-wheel; or scope 2 emissions) = 'zero-carbon' fuel
- 'Low carbon' fossil fuel where at least a portion of the embodied carbon is offset (10%, 20%, 30%....)

Reframing Mechanism

DEMAND SIDE / CONSUMPTION-BASED

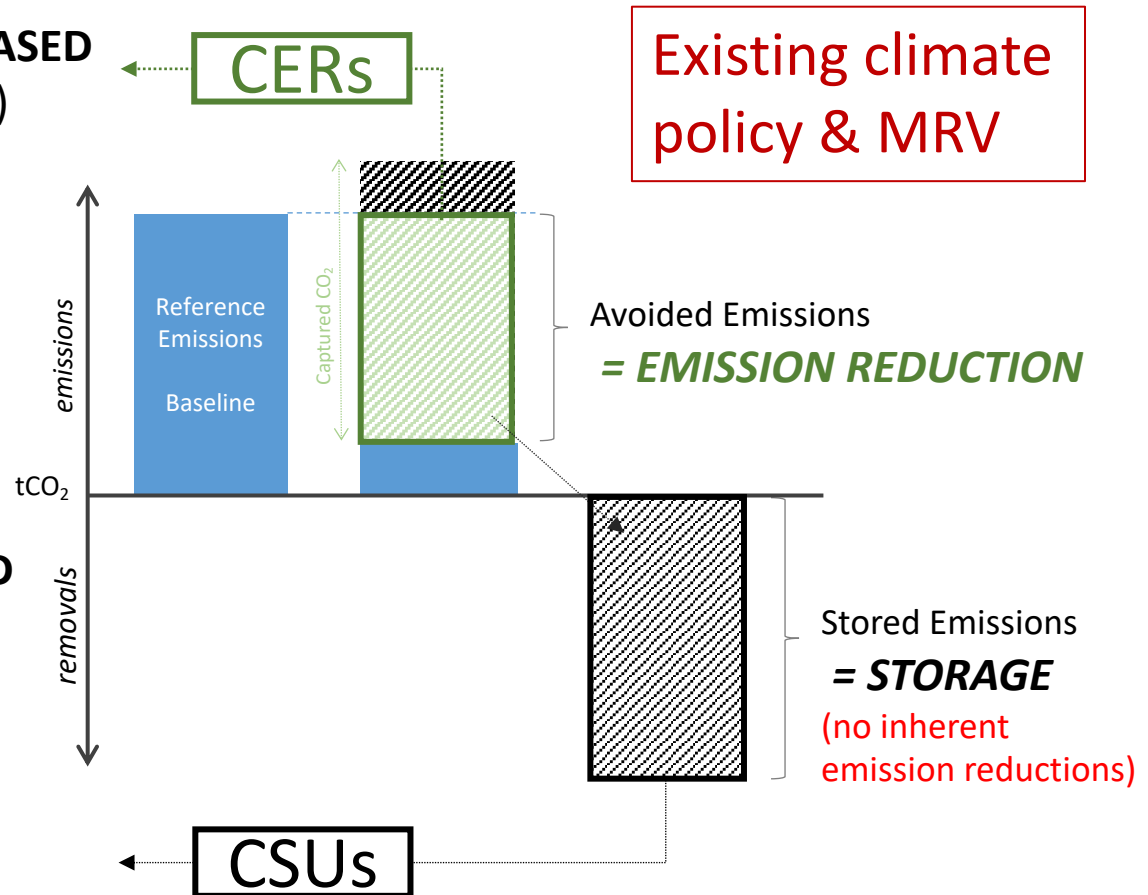
- Carbon market (ETS; ITMOs; SDM)
- Carbon Tax
- NDC ER pledge (domestic)
- NDC ER pledge (ITMO)

GOAL: Emission reductions (flow)

SUPPLY SIDE / PRODUCTION-BASED

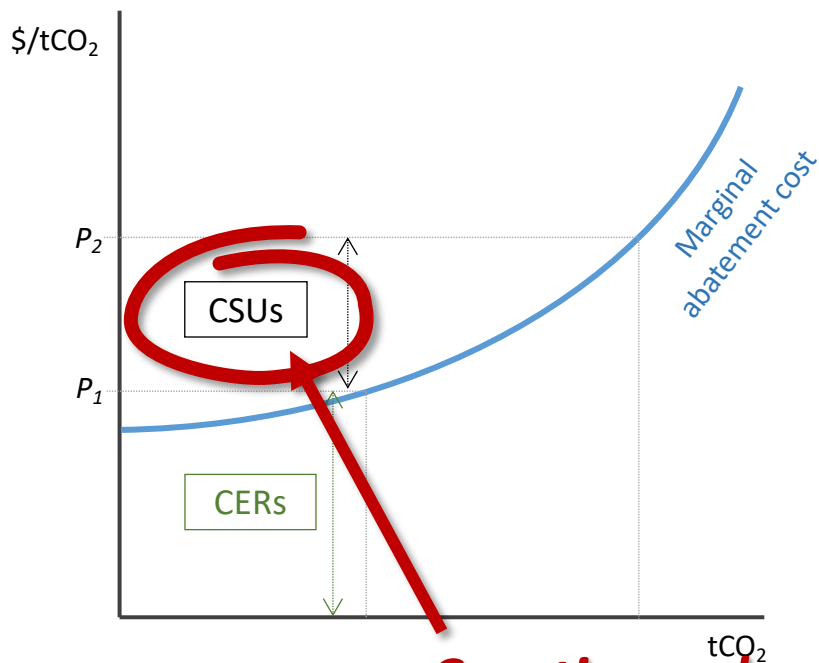
- NDC non-ER pledge (domestic)
- NDC non-ER pledge (ITMO)
- Producer/Supplier obligations

GOAL: Net-zero emissions (stock)



Reframing Advantages

Address C-market failures



Create physical C-market



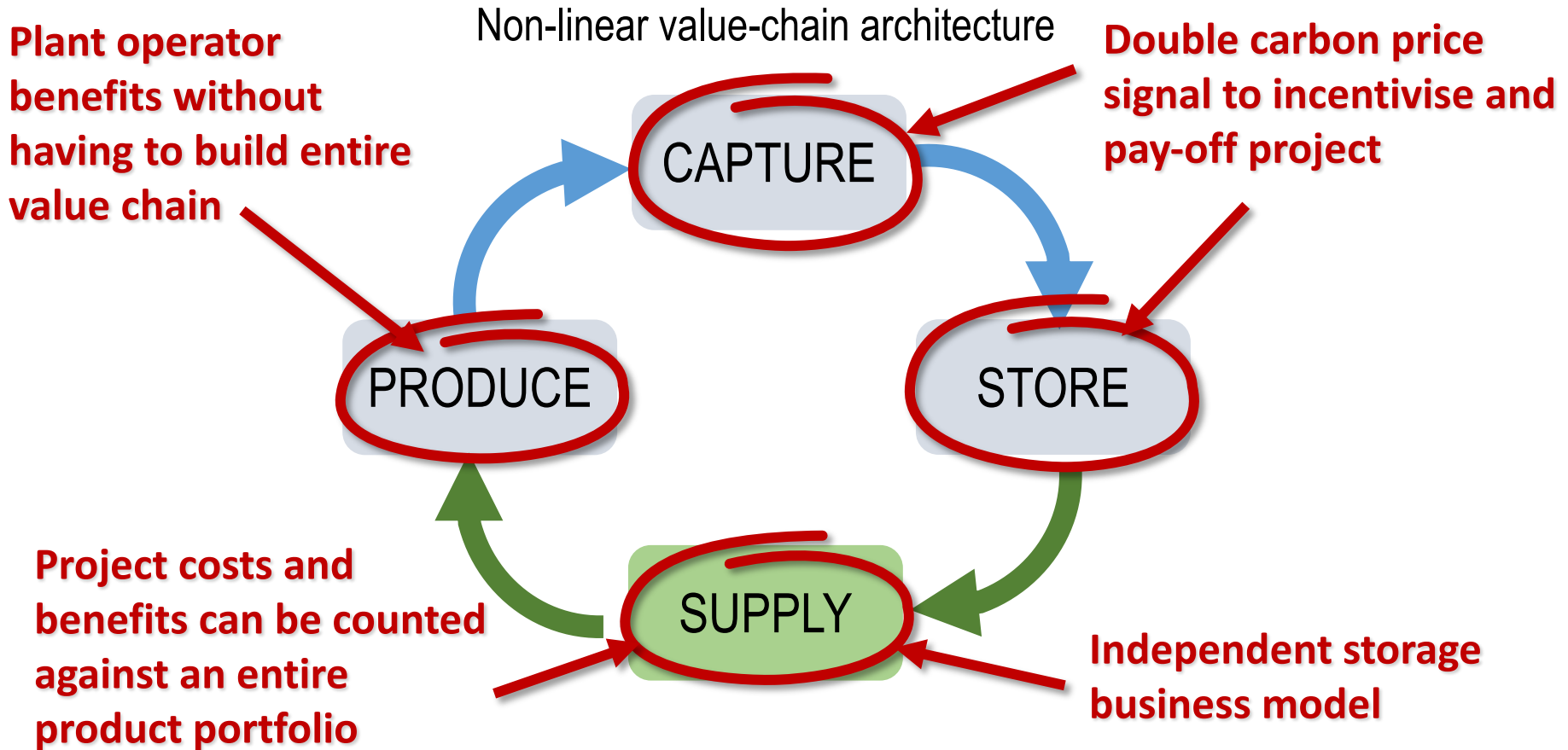
CERs

PHYSICAL CO₂ price formation (\$/tCO₂)

CSUs

Creating value for carbon sequestration

Reframing New business model



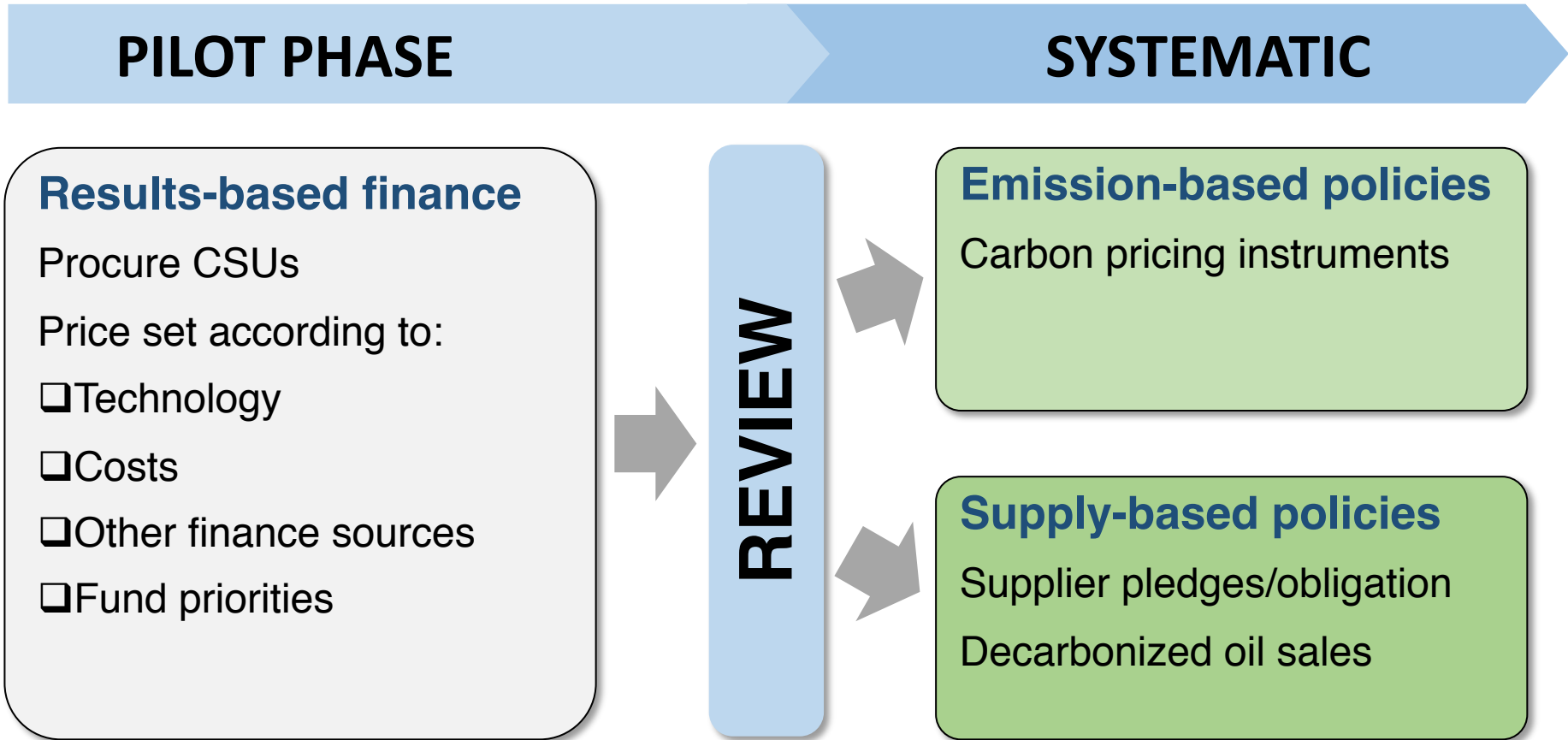
Implementation

Supply-side climate policies

Supply-side policies	Description	Example
Production (wellhead) taxes	Producers levy carbon tax which is recycled into CCUS activities CSUs act as evidence/GoO for decarbonized fuel	None today
Low carbon (portfolio) fuel standards	Importers allow decarbonized/low carbon fossil fuels in scheme CSUs act as evidence/GoO	C-LCFS allows DAC credits to be applied today
Voluntary offsetting	Suppliers pledge to offset scope 3 impacts through sequestration. CSUs act as evidence/GoO	Shell 'net carbon footprint' pledge
Mandatory offsetting	Importers require scope 3 emissions to be offset CSUs act as evidence/GoO	Swiss CO ₂ Law
Mandatory sequestration	Fossil fuel suppliers required to sequester portion/all embodied carbon in produced fuels. CSUs provide regulatory mechanism	M.Allen ('SAFE' concept)
Technology mechanism	Funds established to purchase CSUs using results-based finance. Linkages to all the above	KAPSARC (under Art. 6) WBCSD, PAG

Implementation

Adaptive policy likely to be important



“CSUs could offer a means to create value for depositing carbon into a variety of non-atmospheric carbon stocks, and complement policies focused on pricing flows of carbon to the atmosphere”

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