

A photograph of a rocky coastline. The foreground is dominated by white sand, scattered with numerous light-colored rocks of various sizes. In the background, a large, layered rock formation rises, showing distinct horizontal strata. The sky is a clear, pale blue. The overall scene is bright and sunny.

CO2Europipe  
Project results  
Brussels, September 13

## **Policy and Regulation**

**Tom Mikunda (ECN)**

# Contents

- Regulatory review
  - Transportation of CO<sub>2</sub>
  - Impurities in CO<sub>2</sub> stream
  - Emissions accounting
  - Development of CO<sub>2</sub> transport infrastructure
  - Third-party access
- Policy options for supporting transport infrastructure
  - Investment models
  - Financing and the market
  - Public support
- Recommendations

# Regulation of CO<sub>2</sub> transportation

- EU Directive on the geological storage of CO<sub>2</sub>
  - Amendment to EU Waste Framework (Article 35)
  - Transfrontier Shipment of Waste Regulation (Article 36)
  - The composition of a CO<sub>2</sub> stream (Article 12)
- The 1996 London Protocol (international)
  - Resolution LP. 3(4), addition to Article 6 on the export of CO<sub>2</sub> between contracting parties
- OSPAR convention (2006) - 7<sup>th</sup> ratification received - 2011
- 2010 MRG for CCS in the EU ETS
  - Activity specific guidelines for CO<sub>2</sub> transport
  - Fugitive and vented emissions
  - Approaches to emissions calculations

# Impurities in the CO<sub>2</sub> stream

- There is no quantitative requirements for the composition for the CO<sub>2</sub> stream – “overwhelmingly CO<sub>2</sub>“
- Different viewpoints from within industry: flexibility vs. uncertainty
- Capture: Industrial (cement, steel) stakeholders lack purity benchmark
- Transport: Less of a problem for single pipelines – potential issues of interoperability in pipeline infrastructures
- Possible synergetic effects – little known

# EU ETS Activity specific guidelines

- In June 2010, the European Commission released an amendment to the original MRGs for the EU ETS released in 2007
- ‘Activity-specific guidelines’ for the determination of emissions from the transport of CO<sub>2</sub> through pipelines to geological storage sites
- Mass-balance calculation (A)
- Calculation based methodology (B)
- Guidelines for capture, pipeline transport, storage and EOR – shipping CO<sub>2</sub> unclear

# Development of CO<sub>2</sub> transport infrastructure

- Annex 1 of EIA directive - > 800 mm and a length of > 40 km included associated booster stations - Mandatory
- In a transboundary context – the ‘Espoo procedure’ stemming from the UNECE Convention is applicable for contracting parties
- Within the directive, there is no reference made to the technical standards for the design, construction, monitoring or the maintenance of pipelines.
- European standards and guidelines
  - BS EN 14161:2003 - Petroleum and Natural Gas Industries
  - PD 8010:2004 Code of practice for pipelines
  - DNV OS-F101 - Submarine Pipeline Systems 2007
  - Recommended Practice DNV-RP-J202

# Third-party access

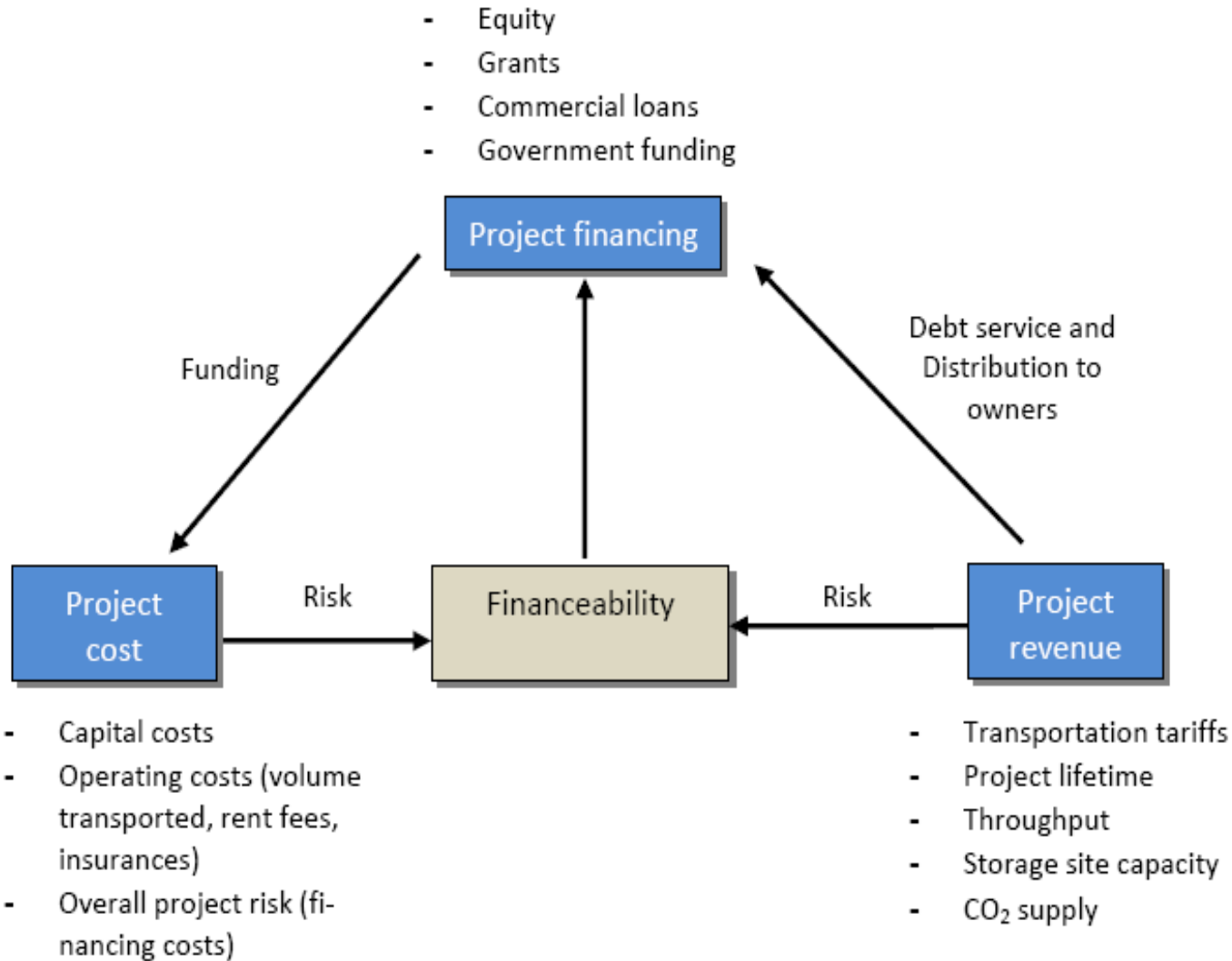
- Access to CO<sub>2</sub> transport networks as well as storage sites, could become a condition for entry into or competitive operation within the internal electricity and heat market.
- Member States should take necessary measures to ensure that potential users are able to access transport facilities, and that the granting of access will be done in a transparent and non-discriminatory
- Access to the network will follow the objectives of fair and open access.
- Article 22, stipulates that Member States must have an independent authority capable of settling disputes between operators and potential users of a network.

# Policy options for supporting transport infrastructure

- No specific policy for the development of CO<sub>2</sub> transport infrastructure
- EU ETS price to cover capture, transport and storage costs of a single project
- NER 300 funding covers individual projects cost – excluding any form of over sizing
- Oversizing pipelines and other infrastructure in anticipation of increasing volumes of CO<sub>2</sub> have potential to improve long-term economic efficiency
- How to fill the financing gap?



# Investment model of a CO<sub>2</sub> pipeline



# Market powers

- DECC 2009 - If a pipeline was built oversized or maintained with a view to taking third-party business, tariffs may be set at a level that would earn the owner a reasonable return on investment, reflecting the risks involved
- Efficiency vs. underinvestment
- However, access to equity and commercial loans for significant oversizing without guaranteed capacity utilization – very challenging
- Uncertainty of external capacity demand, in terms of volume and timing - great financial risks to the project developer
- Long-term contracts / 'Open seasons' / Market testing

# Market-led concept

## Ownership

Consortium of market actors, including emitters, oil and gas companies, transport companies and project developers

## Operator

Consortium of market actors contract a company to manage and operate, or do it themselves

## Transport Coordination

There is no central direction. The owners decide themselves the route for pipelines or to use ship transport

## Storage Coordination

There is no central direction. The owners decide themselves who they will contract for the storage, or storage firm sits within the consortium

## Capacity control and tariff setting

Negotiated access. Parties inside the consortium already have access. Consortia decide tariff for external users. Third party access possible under Article 21 2009/31/EC Directive, although not guaranteed.

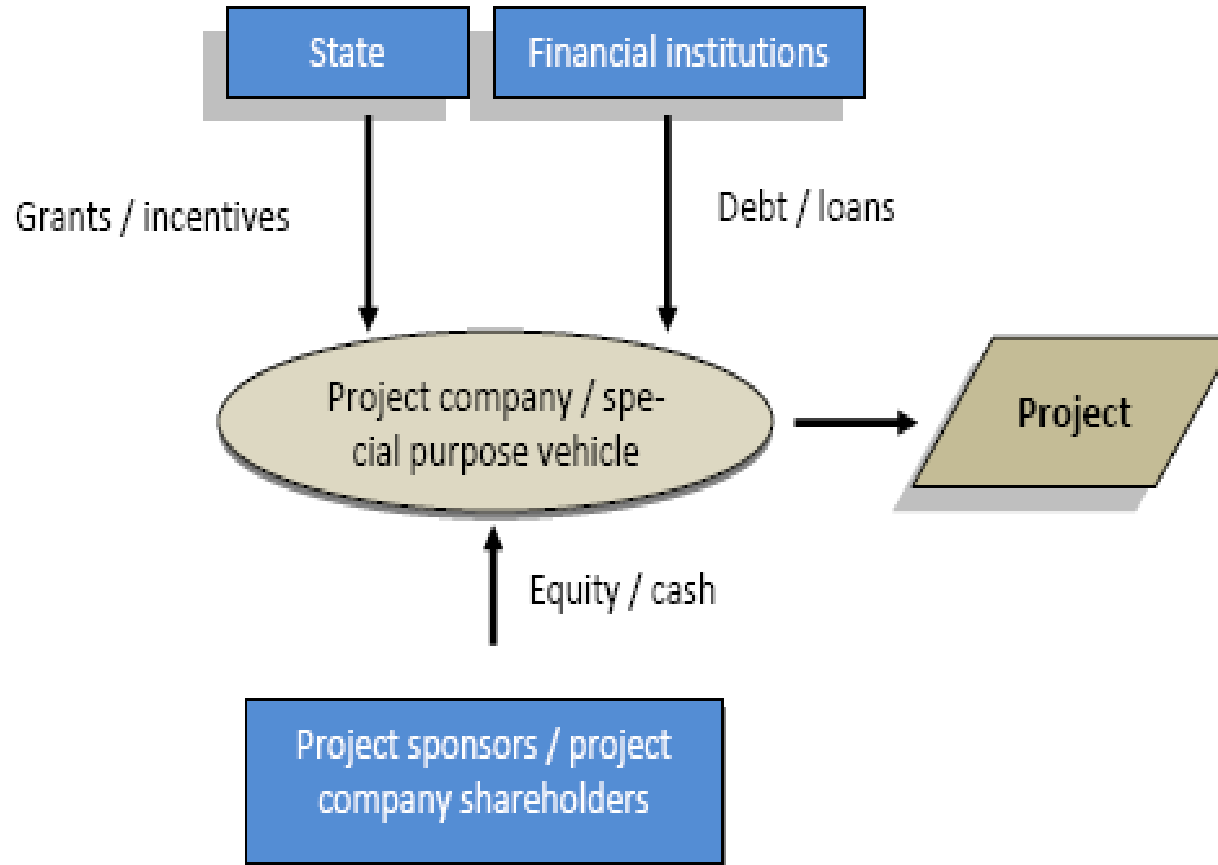
# Public involvement

- Level of involvement:
- Coordination
- Grants/subsidies
- Loans (through designated financial institutions)
- Guarantees (risk coverage to attract further investment)
- Co-investment (through PPP)
- Public funding can reduce the risk to market investors, although uncertainty on capacity demand remains

# State-led concept

Ownership	Owned by a state owned enterprise, but market parties can co-invest
Operator	State owned enterprise is given the rights to the networks, and a state owned monopoly of onshore and offshore CO <sub>2</sub> transport is created
Transport Coordination	The enterprise follows a government route plan (10/15/20+ years) with over dimensioning, based on an inventory of possible emission sources and storage locations
Storage Coordination	The state-owned enterprise tenders for CO <sub>2</sub> storage providers
Capacity control and tariff setting	Regulated capacity. Every emitter has in principle entry to the network and the storage locations. A tariff is set using non-discriminatory criteria, and a new regulatory body governs tariffs and further investment

# Public-private Partnership



# Recommendations - Regulation

- Evaluate proposed third-party access regimes on a European scale, in order to prevent regulatory misalignment with regards to cross-border pipelines. This may also be resolved on a bi- or multilateral level between the states involved.
- In order for CO<sub>2</sub> pipeline developers to take advantage of economies of scale and over-dimension pipelines, the intentions of Member State governments regarding the regulation of tariffs for third-party users need to be established.
- Eliminate barriers to growth from issues of interoperability – EU wide standards - guidelines on the level of co-contaminants
- Clarify how emissions generated through shipping CO<sub>2</sub> will be taken into account in the whole chain
- The amendment to the London Protocol must be ratified

# Recommendations – Policy

- Government intervention is required now to organize a future European CO<sub>2</sub> transport network infrastructure that will support the level of CCS deployment required to help contribute to meeting EU CO<sub>2</sub> reduction goals.
- A robust policy roadmap is fundamentally important for private industry and the public sector to reduce uncertainty and reduce the financial risk
- The development of CCS clusters has great potential for cost sharing, and the provision of access to CO<sub>2</sub> infrastructure to both energy and importantly, industrial stakeholders.
- Public-private business models for CO<sub>2</sub> infrastructure should be developed, covering contractual, risk-sharing and financing possibilities.
- NER300 Knowledge sharing essential for all aspects of CO<sub>2</sub> transport



mikunda@ecn.nl