CATO Meets the Projects

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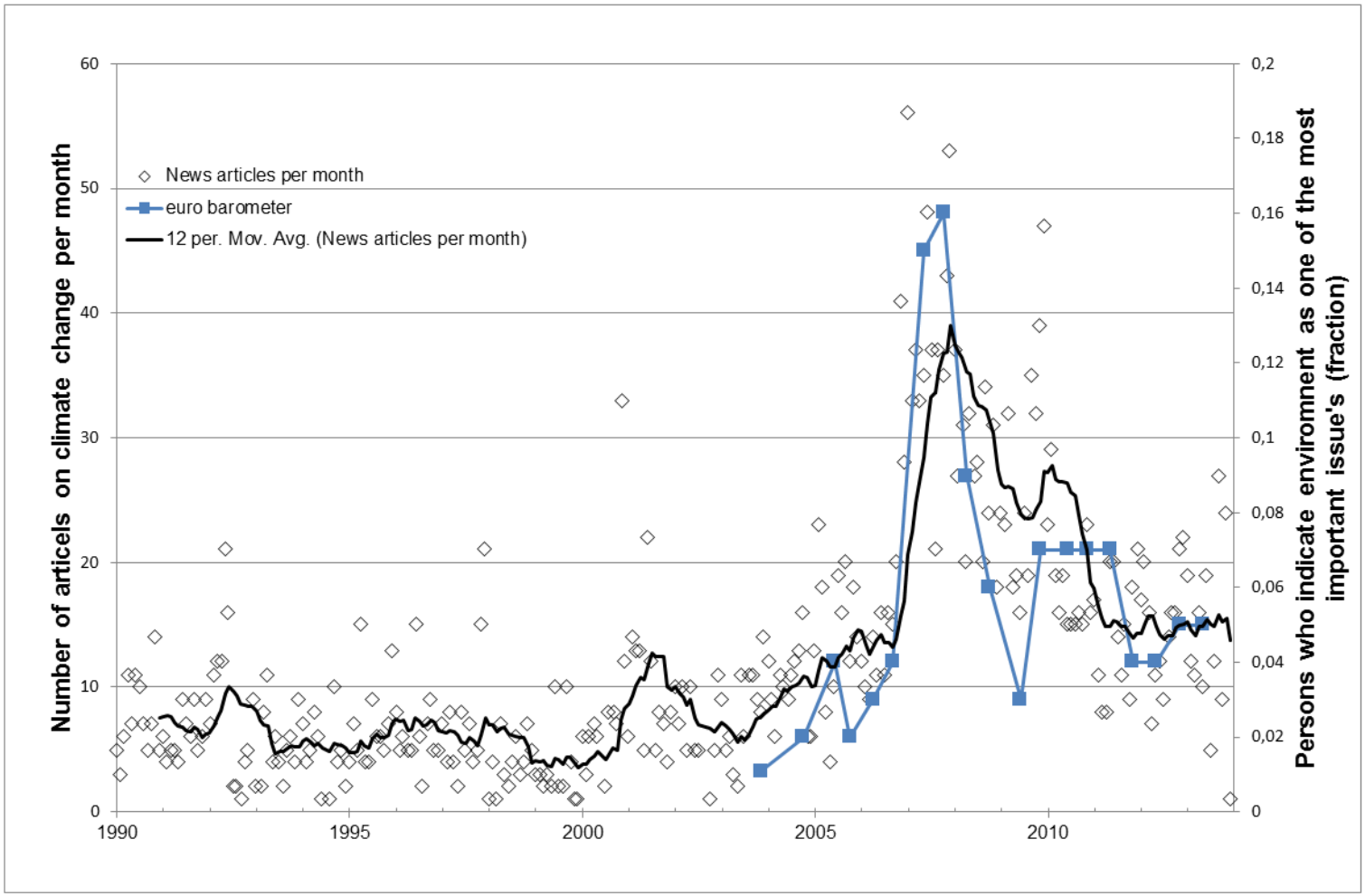
jan.hopman@tno.nl

What is CATO?

- 2004-2009: CATO1
- 2019-2015: CATO2
- 2015-now: CATO/TKI-CCUS
- ???: CATO3

Goals of today

- Meet the CCUS Projects
- Meet each other



Source: Utrecht University


Nations Unies
Conférence sur les Changements Climatiques 2015
COP21/CMP11
Paris France
SECRETAIRE EXECUTIVE CCNUCC
PRESIDENT
SECRETAIRE

Holding the increase in the global average temperature to well below **2 °C above pre-industrial levels**…

... and pursuing efforts to limit the temperature increase to **1.5 °C above pre-industrial levels**

... to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century ...

- Paris Agreement, UN 2015

CO_2 Budgeting

Budget for 2 °C target:	2900 Gt CO_2
CO_2 emissions up until 2016:	- 2138 Gt CO_2
Remaining emissions:	= 762 Gt CO_2
CO_2 emissions in 2016:	/ 40 Gt CO_2
Years left (@2016 emissions):	= ~19 years

By 2036, the 2°C target will be surpassed

(By 2021, the 1.5°C target will be surpassed)

Source: Carbon Brief 2017

Why CCS?

not yet

Industry sector (e.g. Cement, Fertilizer, Steel):

- No (easy) other options for de-carbonization

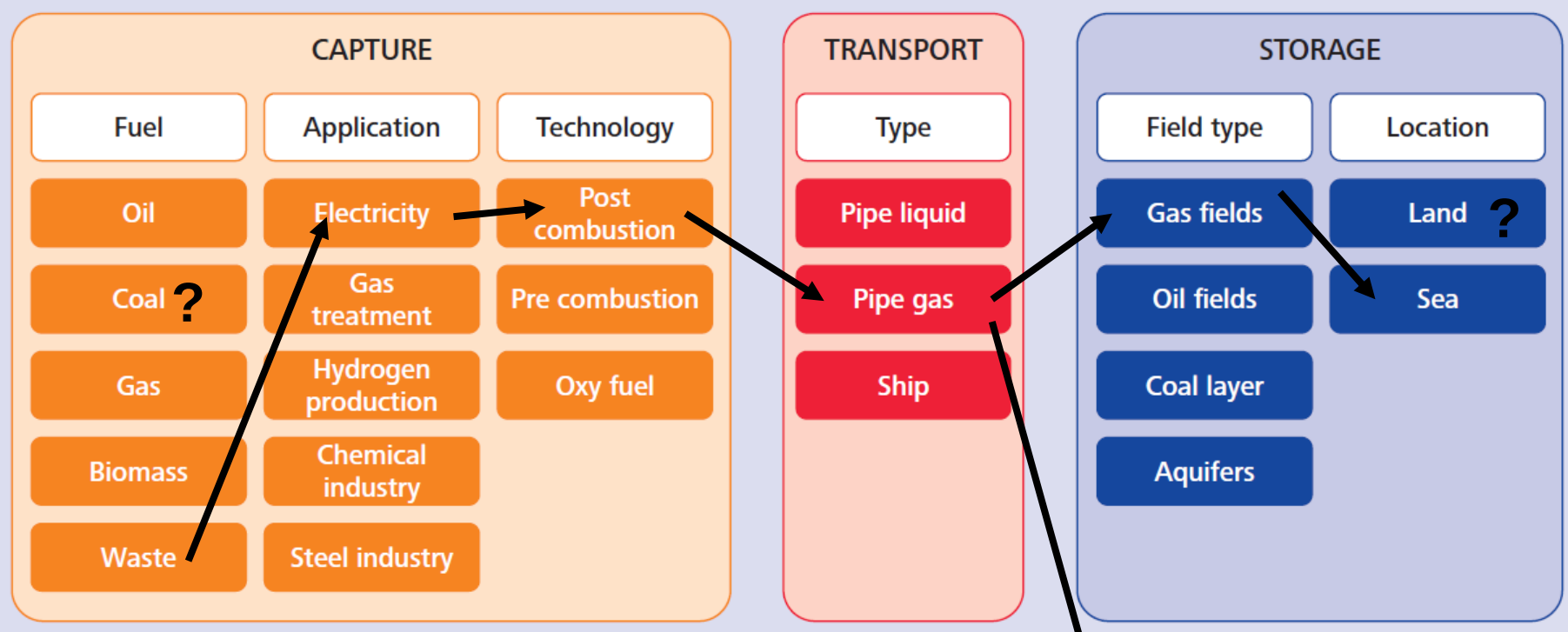
Energy sector:

1. Energy saving
2. Renewable Energy
3. During the energy transition, fossil fuels will be used at large scale (renewable energy deployment is not fast enough)
   - CCS can enable CO2 emission reduction:
     - Fast
     - Large scale
     - Affordable
   - CCS already proven at large scale

Negative emissions:

- BECCS
- Air Capture?

There is not one CCUS



Source: Utrecht University

CCS + CCU = CCUS

	CCU	CCS
CO_2	Resource	Waste
Cost driver	Capture	Capture
Deployment in NL	Tomorrow	~5 years
Emission reduction	kton	Mton

Don’t think “OR”, but think “AND”:

- Use as much CO2 as you can
- And store the final 95? percent

CCS in the world

Source: GCCSI: The global status of CCS 2016

CCUS activities

- CSLF
- GCCSI
- IEA-GHGT
- Mission Innovation
- …

- CATO
- **TKI-CCUS**
  - Toeslag projects
  - Regular call
- **CCUS initiatives**
- **EC-projects**
- …

- **ERANET-ACT**
- CCU-Phoenix
- CO2-Geonet
- **ECCSEL**
- EERA-CCS
- **H2020 (+FP9)**
- SET-plan
- ZEP
- …

Agenda (CATO iii)

- Implementation session:
  - CCS initiatives
- Innovation session:
  - ERANET-ACT projects
  - TKI-Toeslag projects
- Interactive session:
  - Panel discussion

Implementation session *This session provides an insight into current and planned CCUS deployment activities in the Netherla*		
10:15	Current CCUS developments in the Netherlands	Gerdi Breembroek, Advisor CCS and Geothermal Energy, RVO
	The development of the new CCUS roadmap for the Netherlands	Margriet Kuijper, Consultant, MKC Tynaarlo
	The Road Project: Lessons learned	Andy Read, Project Director, ROAD 2020
	CCUS activities in Rotterdam	Tim Bertels, Partner, DAREL
	Nuon Magnum Super Battery and hydrogen developments	Geert Laagland, Head of Engineering, Vattenfall AB.
	The CO_2 Smart Grid	Petrus Postma, Founding partner, BLOC
	Supercritical Water Reforming	Gerard Essing, SCW Systems
	Overview of ECCSEL – European Research Infrastructure for CCS	Jan Hopman, ECCSEL National Node
12:15	Lunch	

Innovation session *This session provides an insight into current CCUS R&D projects in the Netherlands*		
13:15	Overview of ERA NET Accelerating CCS Technologies	Gerdi Breembroek, Advisor CCS and Geothermal Energy, RVO
	ERA NET - ACT Elevator Pitches	Chaired by Tom Mikunda, Energy policy consultant, TNO
	Developments in the SEWGS CO2 capture technology	Jaap Vente, Innovation Manager, ECN
	TKI-CCUS overview	Earl Goetheer, Principal Scientist, TNO
	CO_2 capture at waste incineration plants	Simon Frans de Vries, Project manager, AVR
	CCU through mineralisation	Pol Knops, CTO, Green Minerals B.V.
	CO_2 reduction in the iron production process	Jan van der Stel, Knowledge group manager Ironmaking, TATA Steel
15:30	Coffee and refreshments	