

TIMMERMANS' DREAM

An Energy Partnership between North Africa and Europe

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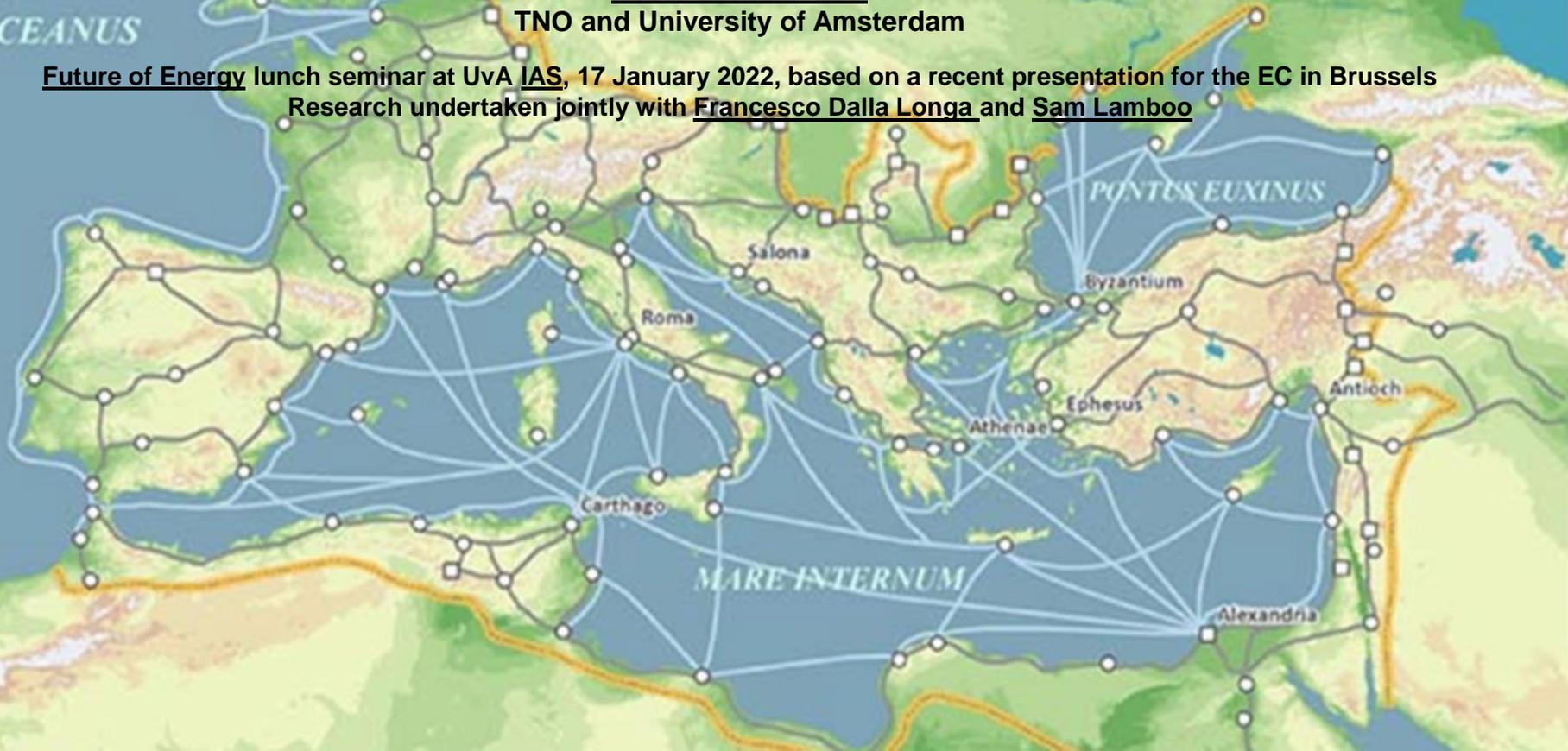
TNO and University of Amsterdam

Future of Energy lunch seminar at UvA IAS, 17 January 2022, based on a recent presentation for the EC in Brussels
Research undertaken jointly with Francesco Dalla Longa and Sam Lamboo

OCEANUS

PONTUS EUXINUS

MARE INTERNUM



TIMMERMANS' DREAM



“In my dreams, we would create a partnership with Africa, especially North Africa, and we would help install a huge capacity of solar energy in Africa and transform that energy into hydrogen. Then we would transport that hydrogen to other parts of the world and Europe,...”

This makes sense from a solar radiation – hence levelized cost – perspective.

Frans Timmermans (Executive Vice-President, European Commission, 2019)

“...if we don't incorporate a perspective for North Africa..., we will be weakened...”

Is this true from an energy system cost – or broad economic – perspective?

INTRODUCTION

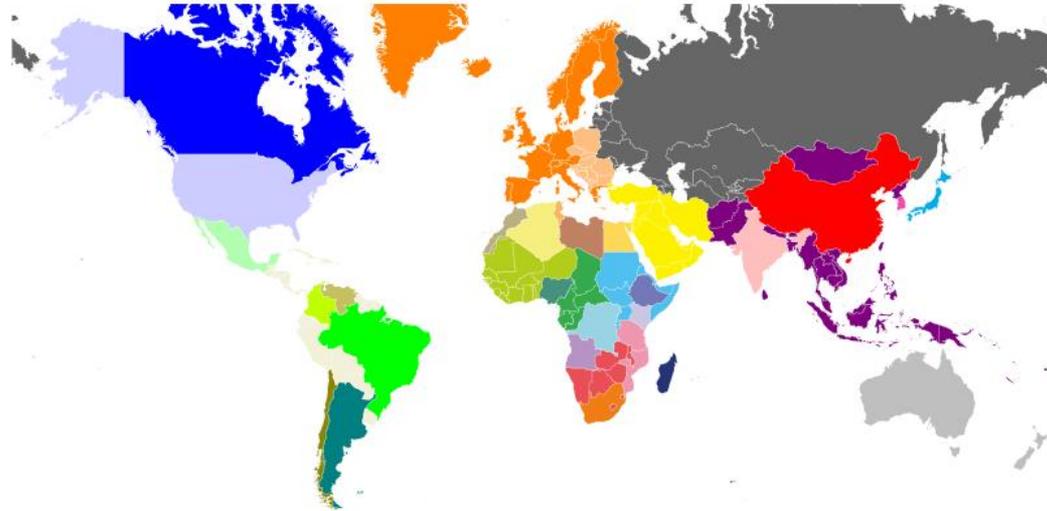
- › The main driver for the **energy transition** is, of course, **climate change**.
- › Traditionally, energy **security**, **prices**, **partnerships** and **dependencies** were the main determinants for shaping our energy system and infrastructure.
- › We have asked ourselves whether in the context of global climate mitigation, when fulfilling the goals of the Paris Agreement, *old energy partnerships and dependencies are perhaps going to be replaced by new ones.*
- › Our focus has been Europe (EU) and North Africa (NA, 5 Maghreb countries), and the role that **renewable electricity** and **renewable hydrogen** could play in an energy partnership between these two regions.

GLOBAL SCENARIOS MODEL: TIAM-ECN

TIAM-ECN: TNO's integrated assessment model (IAM) of the global energy system that allows for analyzing how to reach the 2.0 and 1.5°C targets of the Paris Agreement, particularly suitable for researching energy trade and old & new energy dependencies.

TIAM-ECN analysis:

- Model adaptations
- Scenario design
- Scenario runs
- Scenario analysis
- Policy interpretation



ENERGY TRADE SCENARIOS

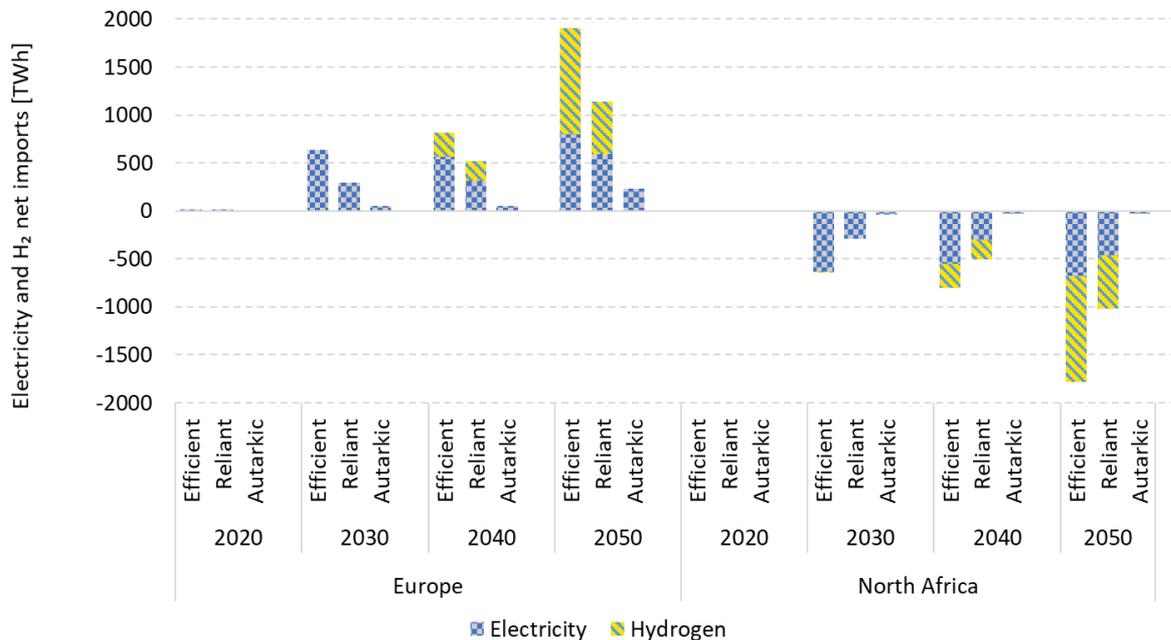
Scenario	Electricity import (2030-2050)	Hydrogen import (2030-2050)	2°C policy
Efficient	High <i>(no limit)</i>	High <i>(max 250-3750 PJ/yr)</i>	Yes
Reliant	Medium <i>(max 35-85 GW)</i>	Medium <i>(max 125-1750 PJ/yr)</i>	Yes
Autarkic	Low <i>(6 GW)</i>	None <i>(0 PJ/yr)</i>	Yes

Scenario runs with TIAM-ECN for trade between Europe and North Africa.

TIAM-ECN RESULTS

- › Mitigation pathways calculated with IAMs are extensively used by the IPCC.
- › Individual scenario runs from IAMs generate a wealth of information.
- › The art of integrated assessment modeling is to extract the relevant insights.
- › We here show some examples of our central results.

ENERGY TRADE BETWEEN EU AND NA



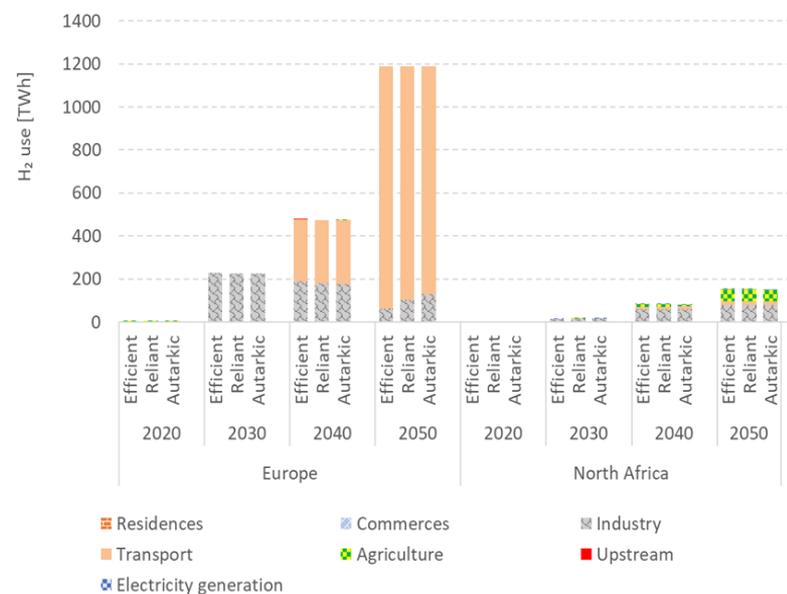
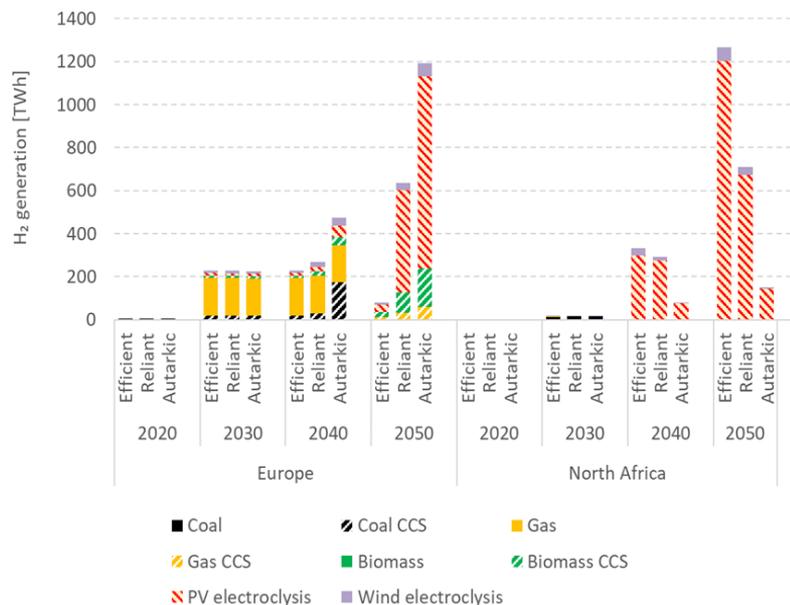
Projections with TIAM-ECN for trade of EL and H₂ between Europe and North Africa.

KEY MESSAGES

van der Zwaan, B.C.C., S. Lamboo, F. Dalla Longa, "Timmermans' dream: An electricity and hydrogen partnership between Europe and North Africa", *Energy Policy*, 159, 2021, 112613.

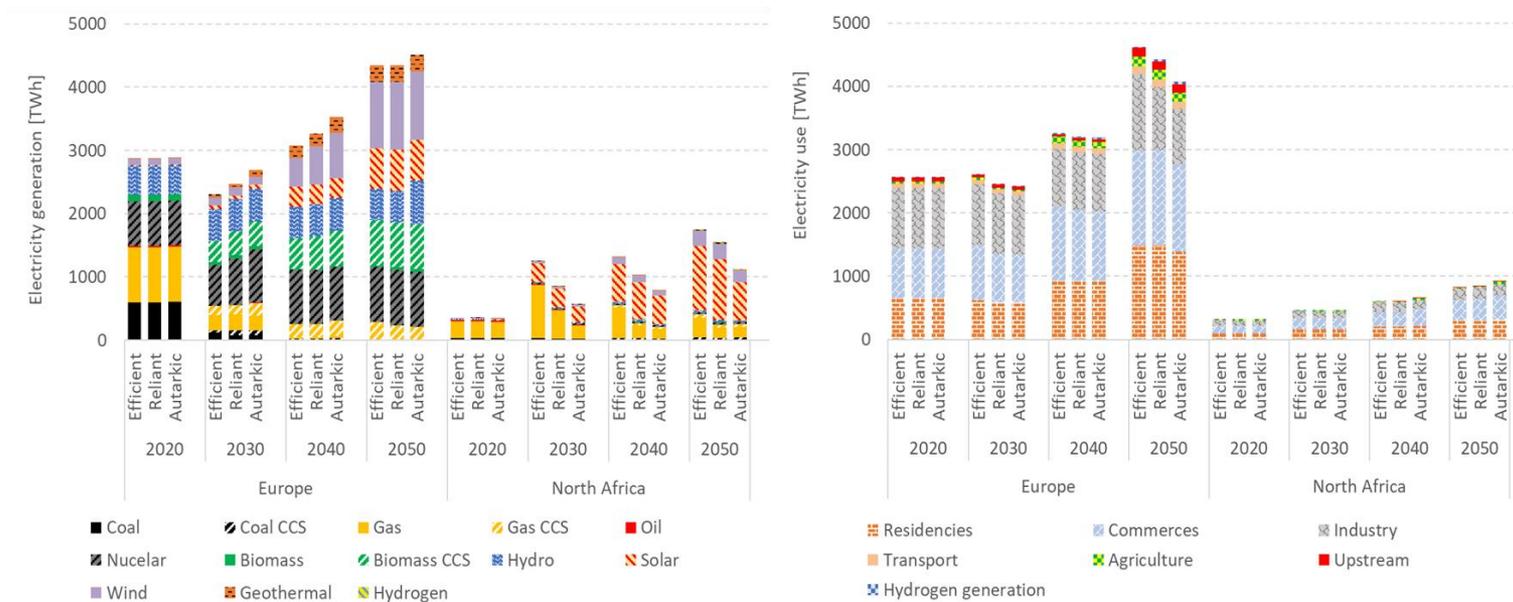
- › Timmermans' dream on an EU-NA partnership may (need to) become reality.
- › It could become optimal to establish extensive EU-NA energy trade (EL & H₂).
- › Net gains for North Africa may grow to 50 billion €/yr in 2050.
- › Europe may have to pay a net price for an EU-NA energy partnership.
- › Despite fears over costs and security, the EU could benefit from this partnership in many ways, but indirectly: stimulating economic growth in North Africa, increasing income, employment and stability in the region, and thereby perhaps even averting future large-scale (climate-induced) migration.
- › Trade reduces domestic renewable investments required for EU's Green Deal.
- › EU can reduce intricacies associated with locating renewable energy projects.

HYDROGEN SECTOR



Projections with TIAM-ECN for the hydrogen sector: generation (left) and use (right).

ELECTRICITY SECTOR



Projections with TIAM-ECN for the electricity sector: generation (left) and use (right).