



Politecnico
di Torino



MED & Italian Energy Report 2021

Presentation of the 3rd Annual Report

1st December, 2021 | Brussels and online

MASSIMO DEANDREIS, General Manager SRM



A triptych of studies

The **2021 edition of the ENEMED – MED & Italian Energy Report** aims at completing a triptych of studies devoted to the assessment and understanding of the **current energy situation and of the future perspectives in the Mediterranean area**, in the framework of the ongoing energy transition towards decarbonisation:

 from **NATURAL GAS** (ENEMED 2019), which embodies the present energy dialogue based on fossil fuels

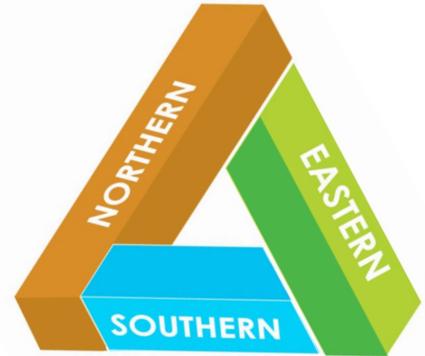
 to **ELECTRICITY (RES)** (ENEMED 2020), which represents the key commodity for an effective transition to a new renewables-based dialogue

 to **HYDROGEN** (ENEMED 2021), which could support the decarbonisation of the final energy uses and, consequently, the achievement of the tight goals of climate neutrality.

A triptych of triangles: how to boost the energy transition

■ An effective and holistic assessment of the implications of the transition towards sustainability in the Mediterranean Region cannot disregard the interaction among a triplet of triangles:

- **The triangle of energy attributes**
- **The commodity triangle**
- **The geographical triangle**



The **interplay among the three triangles is crucial** for defining the possible trajectories of the energy transition in **the whole Euro-Mediterranean region** and for **a new energy and economic dialogue among its shores.**

Outline

Multi-dimensional dynamics of the Euro-Mediterranean Area

Energy transition in the Mediterranean Area

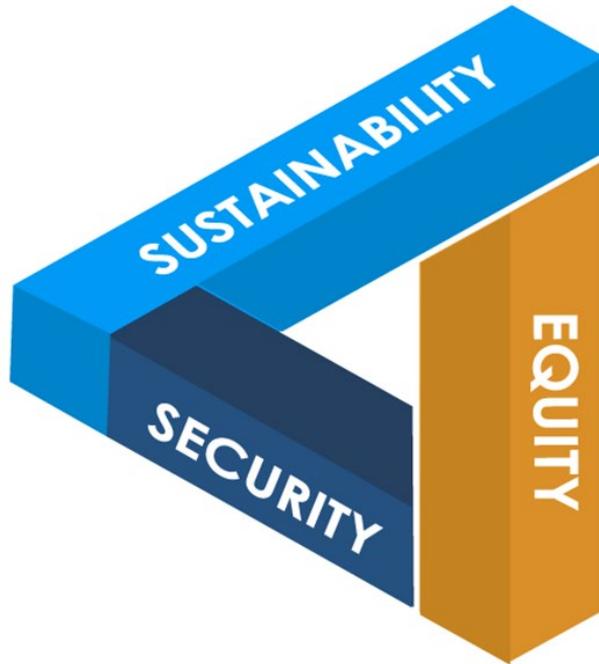
Italy as a bridge between Europe and the MED

Final recap and conclusions

The basic dimensions of a balanced energy system

(The triangle of energy attributes)

- A triangle of energy attributes, i.e. security, sustainability, and equity should characterize the configuration of the future energy systems.

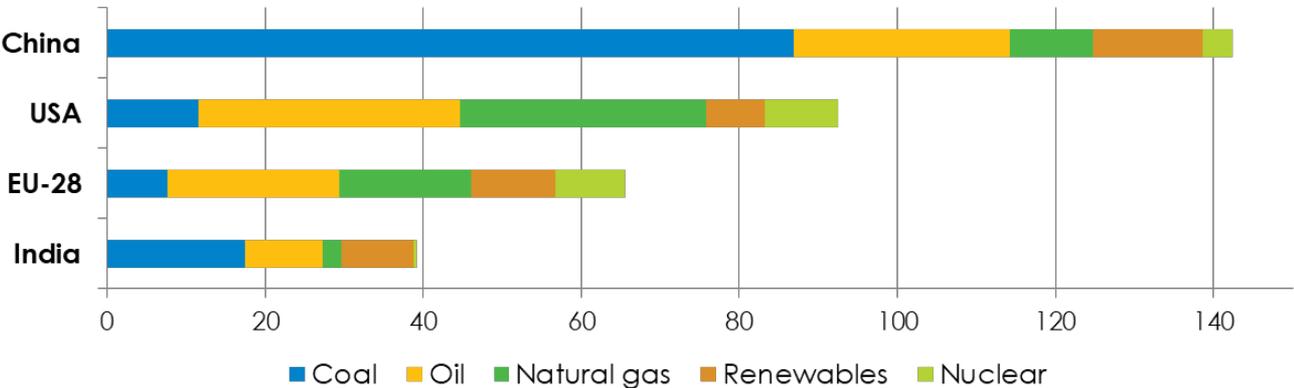


- It's important to **simultaneously consider the different attributes and their interdependencies**, their quantitative assessment and the tracking of their evolution over time through specific metrics and indicators.
- The strategic **political options to adopt need to find the right compromise** and balance each other out.

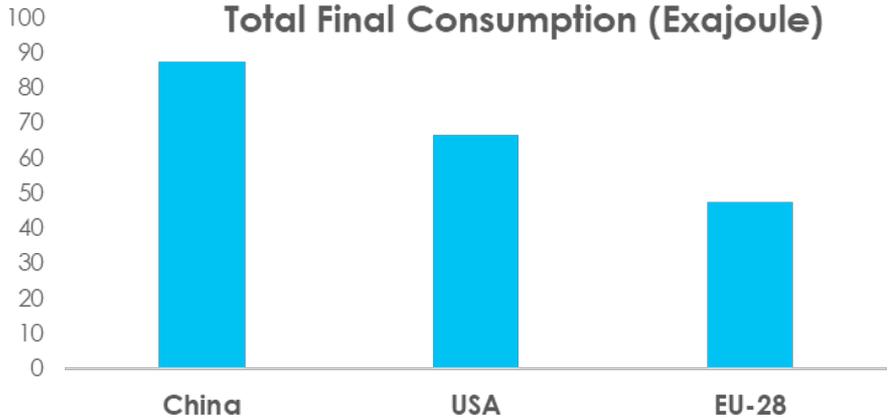
Over 1 billion people (14% of the world's population) **still have no access to electricity**

Sustainability : an international comparison

Total Energy Supply (Exajoule)



Top three energy areas Total Final Consumption (Exajoule)



GDP China 14.8 Trillion \$
GDP USA 20.9 Trillion \$
GDP EU-28 15.3 Trillion \$

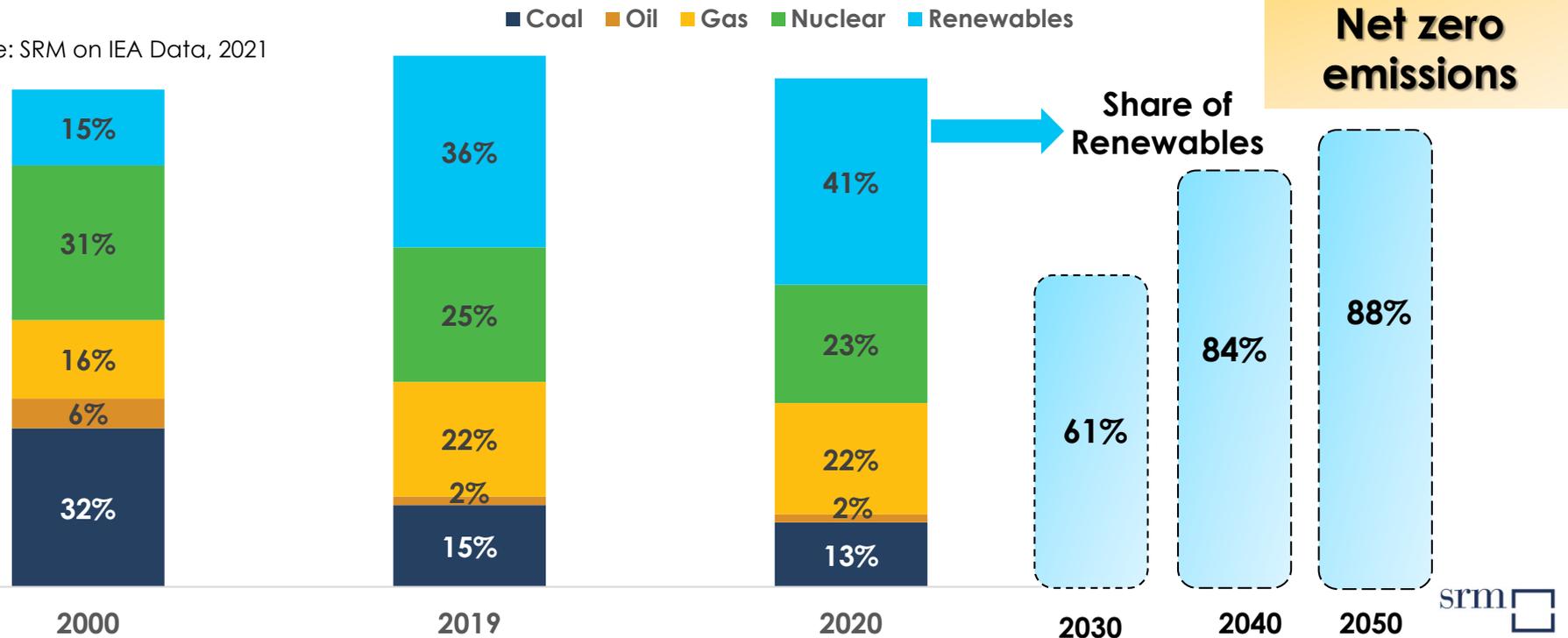
Source: SRM on IEA Data, 2021



The EU is taking greater steps towards sustainability

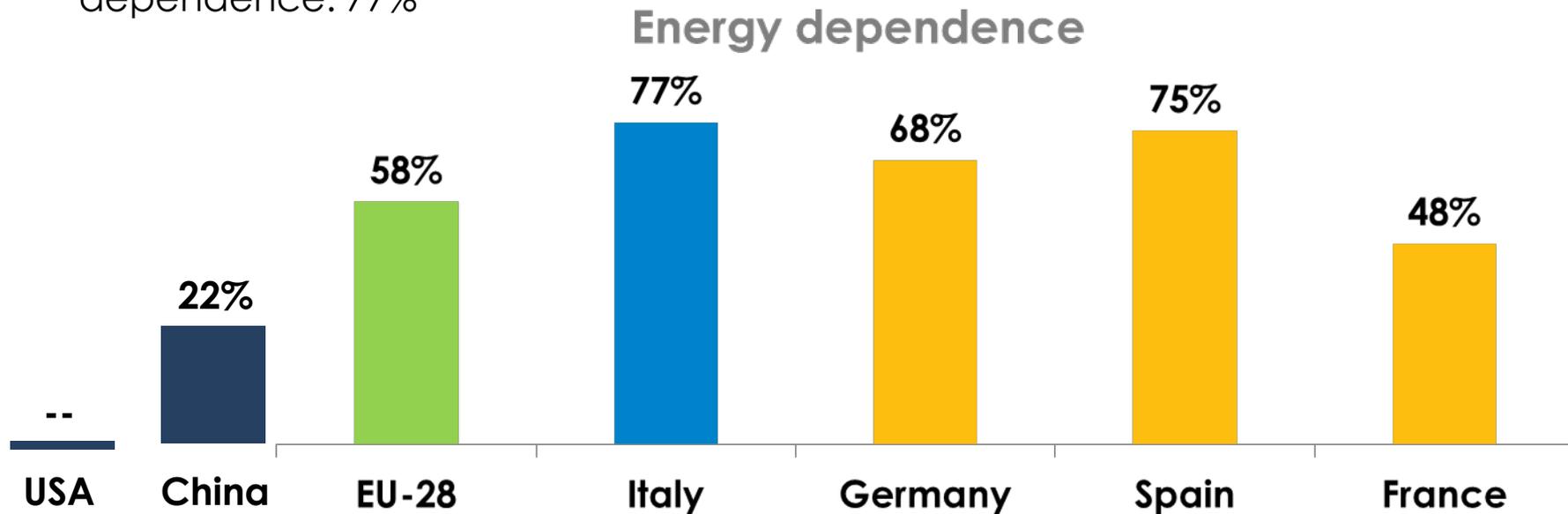
- **The EU electricity generation mix has changed...** radically with the pandemic.
- Over the last 20 years, the use of **oil and coal has declined**, while **natural gas has increased**.
- Renewables are on the rise. Explode during the pandemic.

Source: SRM on IEA Data, 2021



Energy dependence from foreign sources in the EU and other key areas

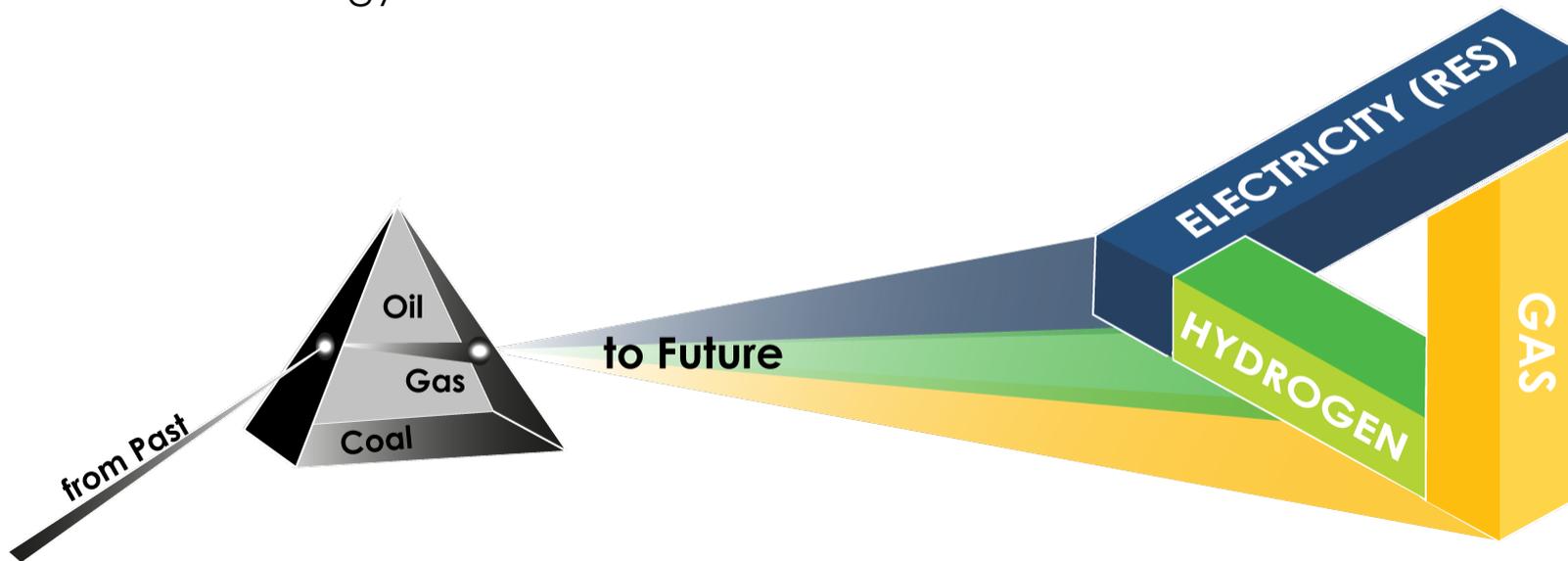
- Dependence from foreign countries is also high in nations such as France, where nuclear power is used.
- Among the major European countries, Italy shows the highest level of energy dependence: 77%



The right interaction to accelerate the energy transition

(The commodity triangle)

- A crucial aspect is represented by the choice of the commodity mix for fulfilling the demand of energy services.



Energy efficiency and the **costs** associated with each commodity affect both **equity** and **sustainability**

The interplay among commodities becomes fundamental

GAS

Natural Gas can be a sort of buffer to move toward energy transition. By 2030 it could be the second source of the global energy mix, before coal.

ELECTRICITY (RES)

It is **unlikely** that the **EU** will be able to achieve its **decarbonisation objectives solely** with the increase of **indigenous renewable capacity**. Import of additional renewable capacity is required.

HYDROGEN

The use of **green hydrogen** is the real **challenge of the future**. Currently, only a small percentage is produced through electrolysis powered by electricity from renewable sources.

Critical
issues to
overcome

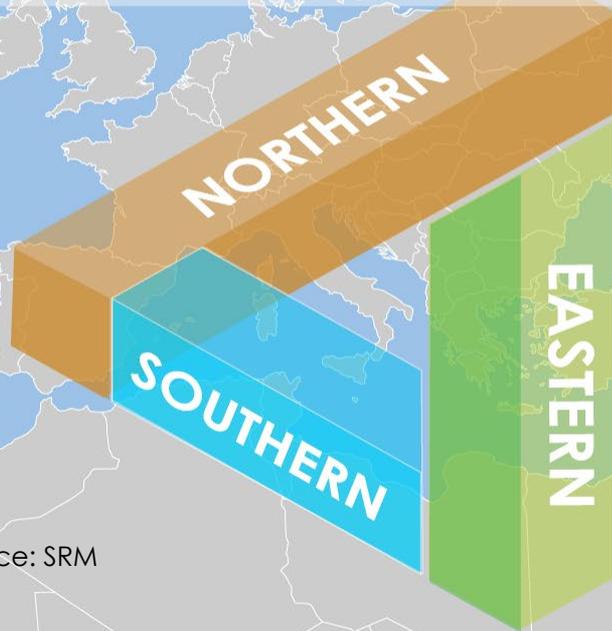
- The production of green hydrogen** is currently still **quite expensive**. Water electrolysis is a highly energy-intensive process.
- Investments in** dedicated transport and distribution **infrastructures** present **significant risks** in the absence of guaranteed supply and demand.
- There is **no clear regulatory framework**.

A great technological challenge is being played out on hydrogen

The cooperation in the Med Area as a springboard to a new energy partnership

(The geographical triangle)

- The geographical triangle is related to **the three macro-zones into which the Mediterranean region can be divided (Northern, Eastern and Southern)**, showing differences in terms of socio-economic and energy features



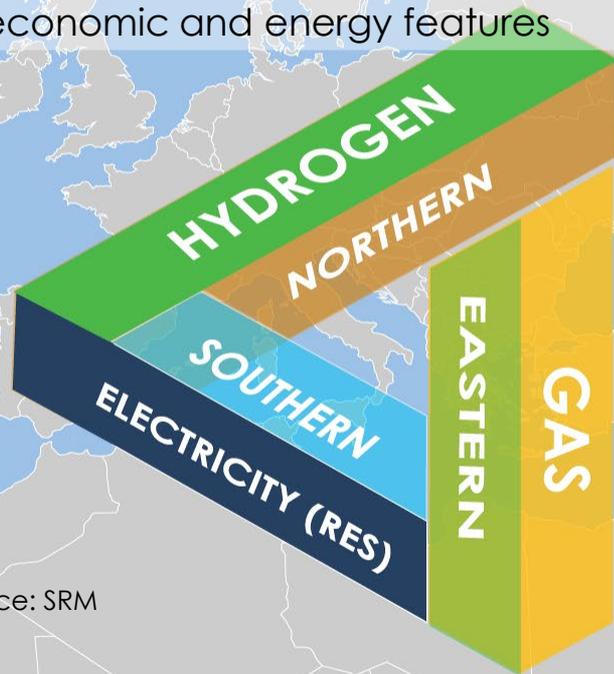
Source: SRM

- **Northern** - high level of development, a high energy consumption and dependency.
- **Southern** - a relevant availability of fossil reserves and high renewable potential, but still relatively low level of development and social welfare.
- **Eastern** - intermediate socio-economic situation with respect to the other two areas, an availability of fossil reserves concentrated in some countries and good renewable potential.

The cooperation in the Med Area as a springboard to a new energy partnership

(The geographical triangle)

- The geographical triangle is related to **the three macro-zones into which the Mediterranean region can be divided (Northern, Eastern and Southern)**, showing differences in terms of socio-economic and energy features



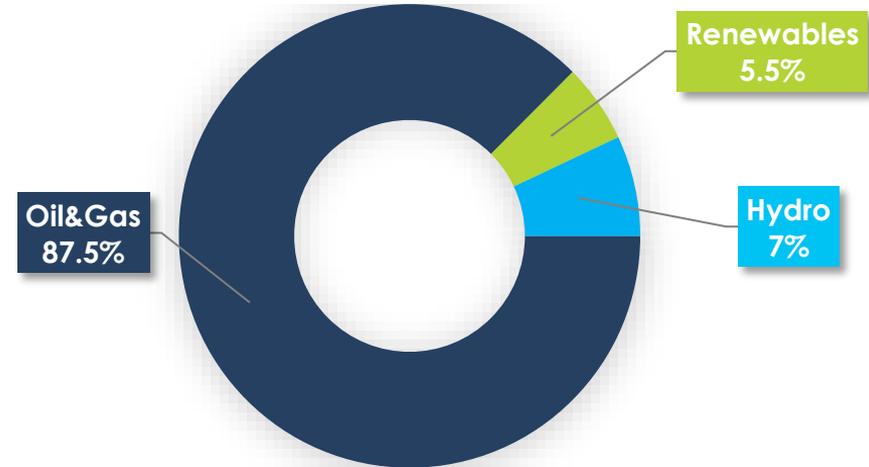
Source: SRM

- **Northern** - high level of development, a high energy consumption and dependency.
- **Southern** - a relevant availability of fossil reserves and high renewable potential, but still relatively low level of development and social welfare.
- **Eastern** - intermediate socio-economic situation with respect to the other two areas, an availability of fossil reserves concentrated in some countries and good renewable potential.

The South Med countries are heavily dependent on fossil fuels

- Countries in the Area rely almost entirely on fossil fuels to meet their energy need
- Fossil fuels have a similarly significant weight also in the electricity mix. Renewables account for a 'mere' 6%.

Electric Mix in the South Med Area



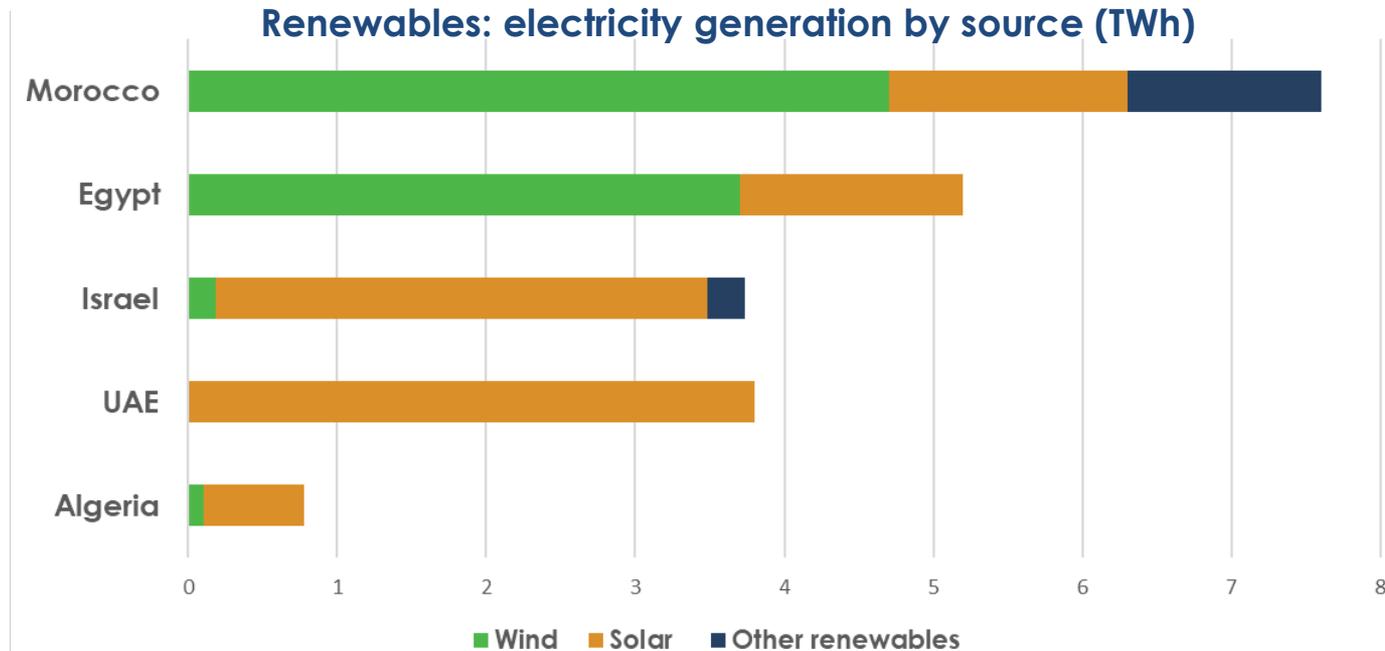
Source: IEA, 2021

The energy dialogue among the shores is hinged on fossil fuels, with a flow from South (producing and exporting countries, mainly located in North Africa) to North (consuming and importing countries).

The huge renewables potential of African countries and the need for a global energy transition could change this paradigm. A new energy partnership based on renewables is required

The role of renewables is on the rise

- Renewables as **a new energy partnership opportunity**.
- Several countries are focusing on solar and wind energy as a means of meeting the growing demand for electricity.
- Opportunity in the greater **interconnection between the three shores**.



Source: SRM on IEA, 2021

Hydrogen is a huge opportunity

- **European countries** already included **hydrogen** in the **Green Deal** strategy. Moreover, in 2020, the Eu Commission published the **European Hydrogen Strategy** and the Energy System Integration strategy (including hydrogen among its pillars). On the opposite, **Middle East** and **North African** regions sometimes still **lack organic strategies** on hydrogen penetration, even if some countries (Jordan, Qatar, Saudi Arabia, and Tunisia) have identified hydrogen as a commodity that can help in achieving their sustainability targets.
- The European **Hydrogen Strategy** plans to install at least 6 GW of **electrolysers** within 2024 and **40 GW** in **2030**.
- The **hydrogen value chain** can be a **significant business perspective for the Mediterranean region**, thanks to the high RES potential, with positive economic impacts.
- A mid-term (up to **2040**) **scenario analysis** has been performed, showing that, if a **high penetration** of **hydrogen (25% of the final energy uses)** is foreseen, a **cooperative approach** among the three shores allows for fulfilling the same hydrogen demand with an **overall installed capacity 36 GW lower** than the one requested if an approach oriented to the self-sufficiency is adopted by each shore, thanks to a **better exploitation** of the available **resources** of the whole region.

The “hydrogen opportunity” strictly requires the adoption of a cooperative approach among countries

- The well-established industrial sector related to the exploitation of renewable resources and the hydrogen production **in the Northern shore** (and, in particular, in the European Union) **could support the installation of production sites in Eastern and Southern countries** and promote a **knowledge transfer process** helpful in improving the socio-economic conditions of these areas.
- New storage options like Power-to-Gas can be exploited. **Power-to-Gas** (PtG) technology can play an important role in **managing the excess of electricity from RES**, using it to produce **hydrogen through electrolysis** and, in turn, combining hydrogen with CO₂ in a **methanation process to generate synthetic natural gas** (SNG).
- Moreover, PtG represents the technology **linking** the most important energy infrastructures, i.e., **gas pipelines and electricity grid**, and it **allows** to actually implement **a cross-vector integration between electricity, hydrogen and gas**, significantly helpful in the framework of the energy transition.

Investments in new interconnections and synergies between green electricity, gas and hydrogen may be the key to the future

Ports as key actors of the energy transition

- As energy hubs they facilitate the energy transition process of shipping.

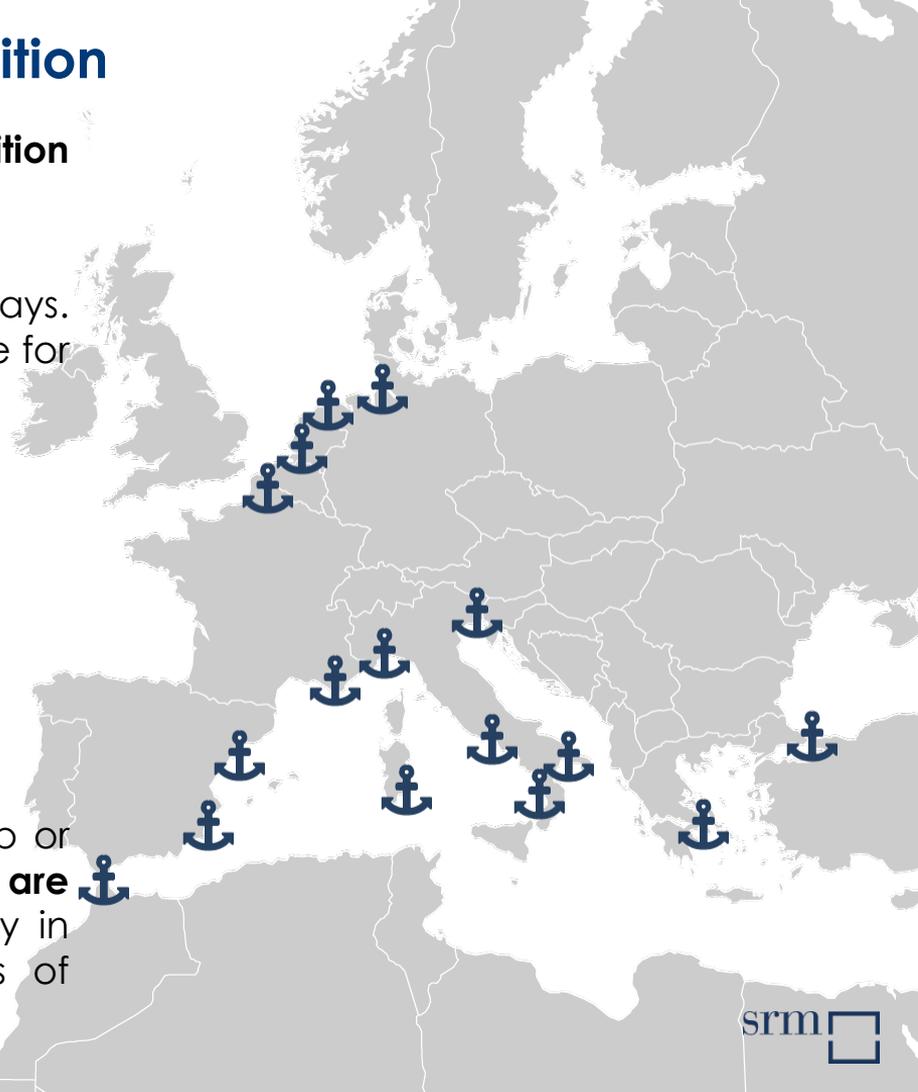
- They play a strategic role as energy gateways. Refineries or access points to transport infrastructure for hydrocarbons are usually located near ports.

- They are the arrival points of Oil and Gas pipelines.

- They are close to the energy-intensive industries.

- They are suitable for hosting the "Hydrogen Valley".

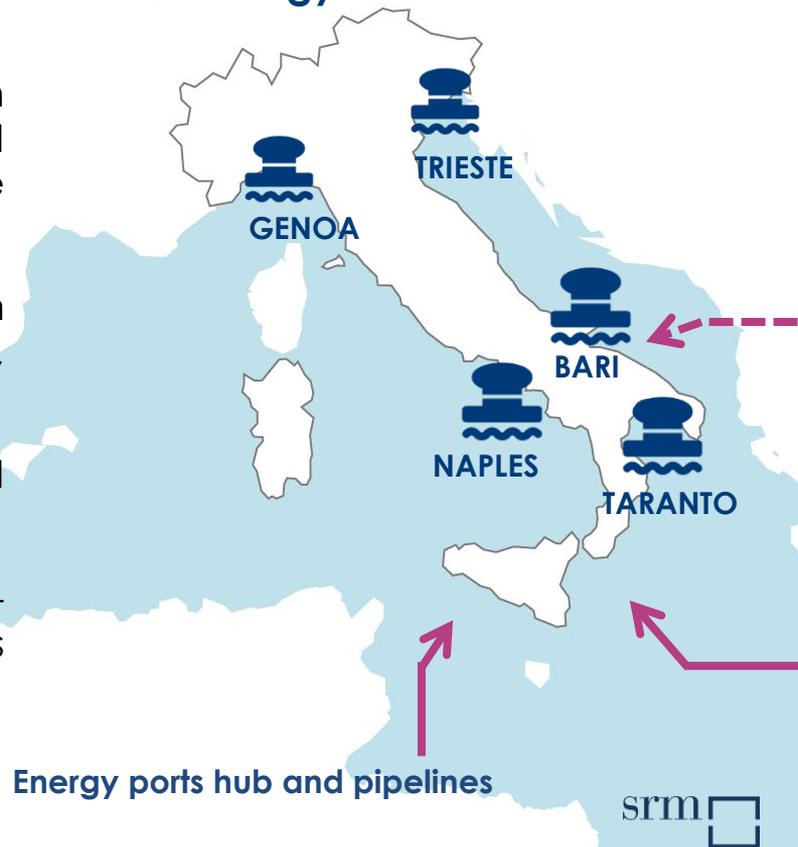
- Several European megaports (Rotterdam, Antwerp or Hamburg) are champions of sustainability and are focusing on hydrogen. There is also a fair activity in Italy: Civitavecchia and Leghorn are examples of dynamism.



Italy as a bridge at the intersection of the 3 shores of the Mediterranean

Shipping remains a crucial economic asset for the energy sector

- **Italy imports crude oil from eastern countries** (Azerbaijan first, then Iraq, Russia, Saudi Arabia and Kazakhstan); and it **exports refined products to western countries** (Spain the first, and then the US, and France).
- **Italy's maritime oil import-export amounts to € 28.2 bn** (imports hold a more significant share equal to € 21.1 bn, while exports amount to € 7.1 bn).
- **Oil and Gas pipelines** link Italy with South and East Med countries.
- **Grid interconnections** with EU countries are a key to low-carbon future: a challenge to exploit the renewables produced in the MENA countries.



Conclusions: some key remarks

Green New Deal and EU energy transition goals will be fully achieved only if North African Countries are supported in developing renewables and if we invest in grid interconnection.

To become a global leader in energy transition, Europe should invest more in technological innovation of electrical and storage machinery, batteries, energy sistem network. We must not forget to invest for exploring new technologies like **hydrogen**.

The Mediterranean region is a liquid frontier between North Africa and Europe which represents a significant place of energy demand. **From that point of view Italy has a strategic role to link Europe and North Africa,** even through the creation of a **connection HUB for the transport and distribution of hydrogen.**

Hydrogen will revolutionize various sectors, primarily **transport**. Several initiatives concern the maritime sector: port infrastructures and ships. **The ports are suitable locations for "Hydrogen Valley".**

Several European megaports (Rotterdam, Antwerp or Hamburg) are champions of sustainability and **are focusing on hydrogen**. There is also a fair activity in Italy: Civitavecchia and Leghorn are examples of dynamism.

Thank you for your attention

sr-m.it

