

1st Greek – Turkish Energy Forum: Energy developments in Greece

Assoc. Professor, Athanasios Dagoumas
President, Regulatory Authority for Energy, Waste and Water

Athens, 25.04.2024

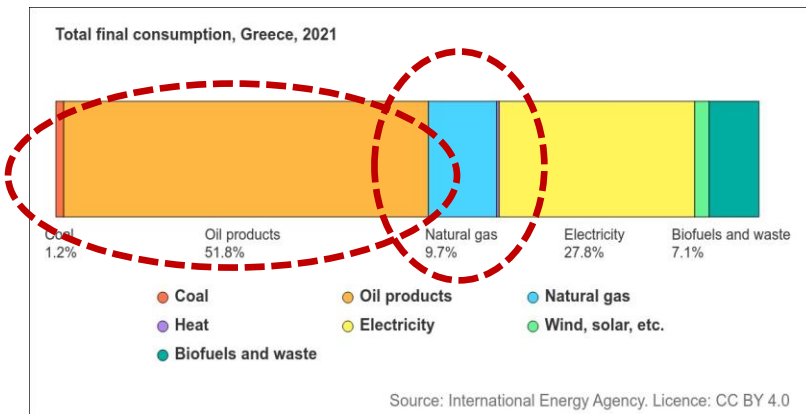
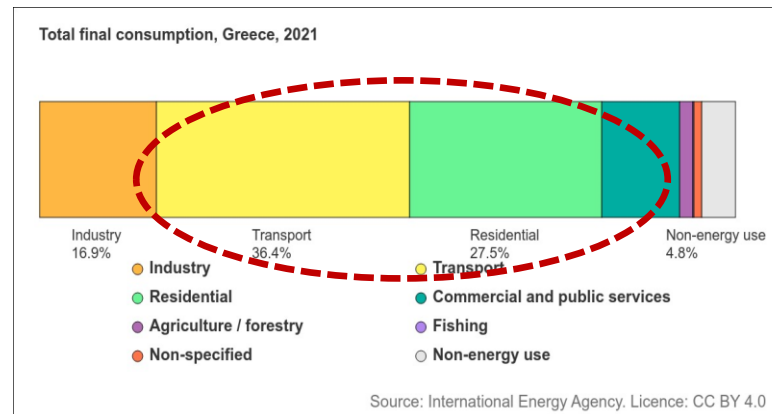
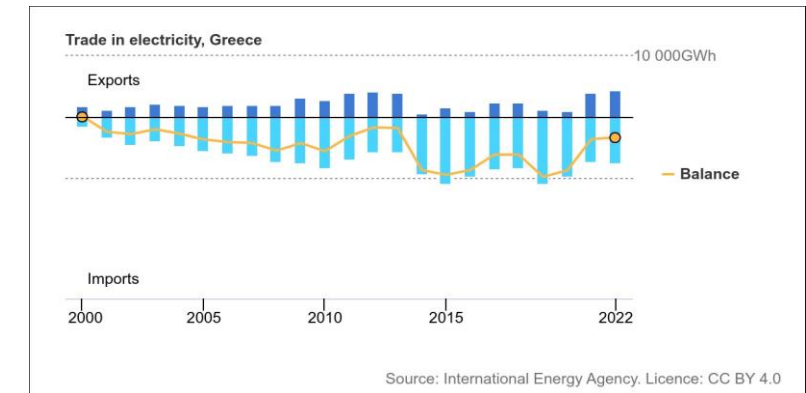
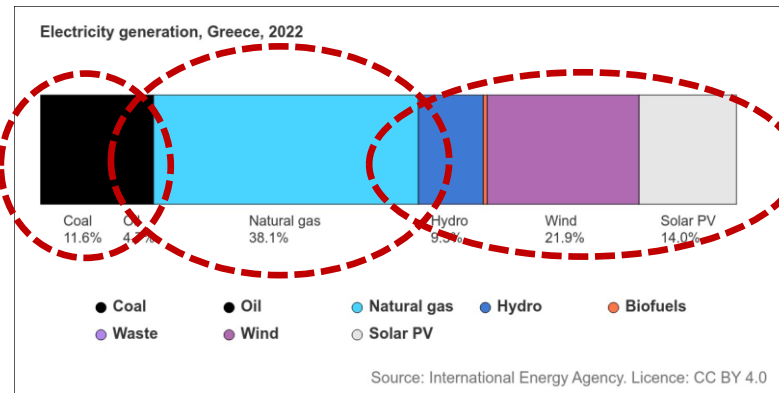
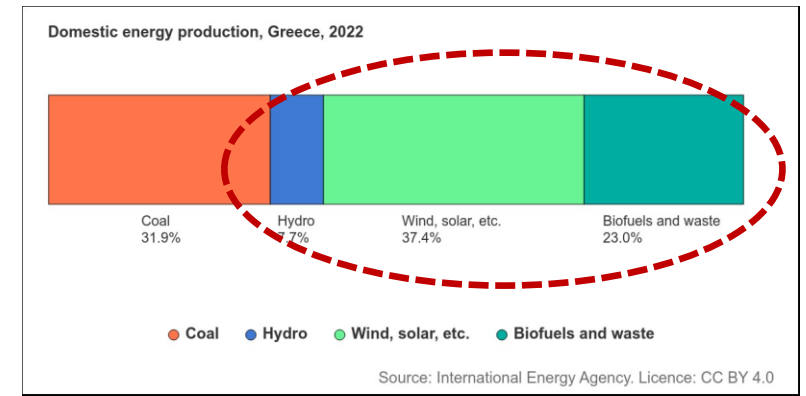
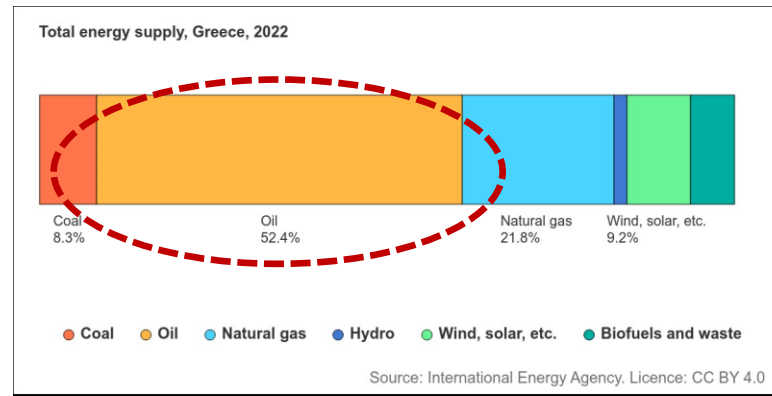
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- 1. Energy Facts and Energy Policy**
- 2. Energy Markets developments**
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- 4. Consumer's Place to support consumers during green transition**

Conclusions

Energy Facts in Greece (2022, source: IEA)

- **High share of oil**
 - Transport&heating/exports from refineries
- **Phase out of lignite**
 - in electroproduction
- **Rapid increase of RES**
 - mainly solar, wind
- **Considerable role of gas (uncertain within European green transition)**



Draft NCEP submitted to EU (2023), under finalization

NECP (Apr 2023)			2021	NECP 2019						
			(estimate)	for the 2030	2025	2030	2035	2040	2045	2050
GHG,LULUCF (change since 1990)	(change since 1990)		— 26 %	— 40 %	— 41 %	— 54 %	— 68 %	— 82 %	— 89 %	— 93 %
GHG with LULUCF (change since 1990)	(change since 1990)				— 44 %	— 57 %	— 72 %	— 87 %	— 95 %	— 99 %
RES indicator as% of gross final consumption of energy	as% of gross final consumption of energy		22 %	35 %	31 %	44 %	65 %	83 %	97 %	105 %
Energy efficiency				0 %	— 4 %	— 5 %	— 14 %	— 18 %	— 22 %	— 27 %
Final consumption of land (million billion)	of land (million billion)		15.2	16.5	16.6	15.4	13.7	12.7	12.0	11.5
RES-Electroproduction (% gross electricity consumption)	(% gross electricity consumption)		36 %	61 %	58 %	79 %	94 %	96 %	96 %	97 %
RES-heating/cooling			31 %	43 %	36 %	46 %	63 %	80 %	99 %	100 %
RES-transport			4 %	19 %	13 %	29 %	98 %	209 %	381 %	584 %
RFNBO (% fuel transport)	(% fuel transport)		0 %	0 %	0 %	1.00 %	11 %	23 %	31 %	50 %
Advanced biofuels (% transport fuels)	(% transport fuels)		0 %	1.50 %	0 %	2.40 %	10 %	17 %	26 %	32 %
Conventional biofuels (% transport fuels) – upper limit	(% transport fuels) – upper limit		1.70 %	1.70 %	1.70 %	1.70 %	1.70 %	1.70 %	1.70 %	1.70 %
ESR (% GHG change in non-ETS sectors)	(% GHG change in non-ETS sectors)		— 32 %	— 40 %	— 36 %	— 46 %	— 61 %	— 76 %	— 84 %	— 87 %

Million tonnes of oil equivalent (E.toe4)

Table 2 Overview of objectives of the revised NECP 2021-2050

Energy Policy in Greece

The latest draft National Climate Energy Plan (NCEP) identifies the following main priorities:

- **Energy efficiency**
 - high domestic value
- **Green electricity**
 - RES and flexible assets (storage - pumping hydro/batteries-, demand response)
- **Electrification of sectors (mainly transport and buildings)**
 - Electric vehicles, ports/cold ironing create electric demand
- **Gas as transition fuel, Renewables gases, H2 and new technologies**
 - Biomethane, Green hydrogen, CCS, Critical infrastructure for energy security....

In alliance to EU Green Deal, enhancing regional energy security and green transition

Energy Policy in Greece

- **Energy efficiency**
 - Supported by numerous funding programs from the State
 - Energy price awareness, real estate market, suppliers becoming ESCOs create gradually a market place for energy efficiency
- **Green electricity**
 - RES and storage are supported by operating (and investment) state aid schemes towards their market uptake (PPAs...)
 - Electricity network development plans
- **Electrification of transport**
 - Chargers (AC&DC) are gradually expanding, State allocated funding for EVs & ports' electrification
- **Renewables gases and new technologies**
 - Biomethane, Green hydrogen, CCS projects implementing, included in IPCEI/Innovation fund

The role of the Regulator in supporting national Energy Policy in Greece

- **Energy efficiency**
 - Innovative IT tools: <https://www.electricitycostcalculator.gr/en>, <https://www.buildingenergysaving.gr/>
 - One Stop Shop for Building Energy Efficiency Market (BEEM) under development
- **Green electricity**
 - Facilitate RES and storage licensing (<https://licensing.rae.gr/>, <https://geo.rae.gr/>), enhance investments and competition
 - Approval electricity network developments (fines on delays), Digitalization of Network
 - Protect consumers for the green transition through fines, market monitoring/transparency and Consumer tools
 - <https://www.rae.gr/en/digital-services-for-energy-markets/>
 - <https://my.rae.gr/>, <https://www.rae.gr/energiakos-diamesolavitis/>, <https://invoices.rae.gr/>, <https://www.energycost.gr/>
- **Electrification of transport**
 - Approve network development plans, Network charges based on Capacity
 - Tools for consumers: <https://chargingcost.gr/> to be issued soon
- **Renewables gases, H2 and new technologies**
 - Approve network development plans, Regulatory updates

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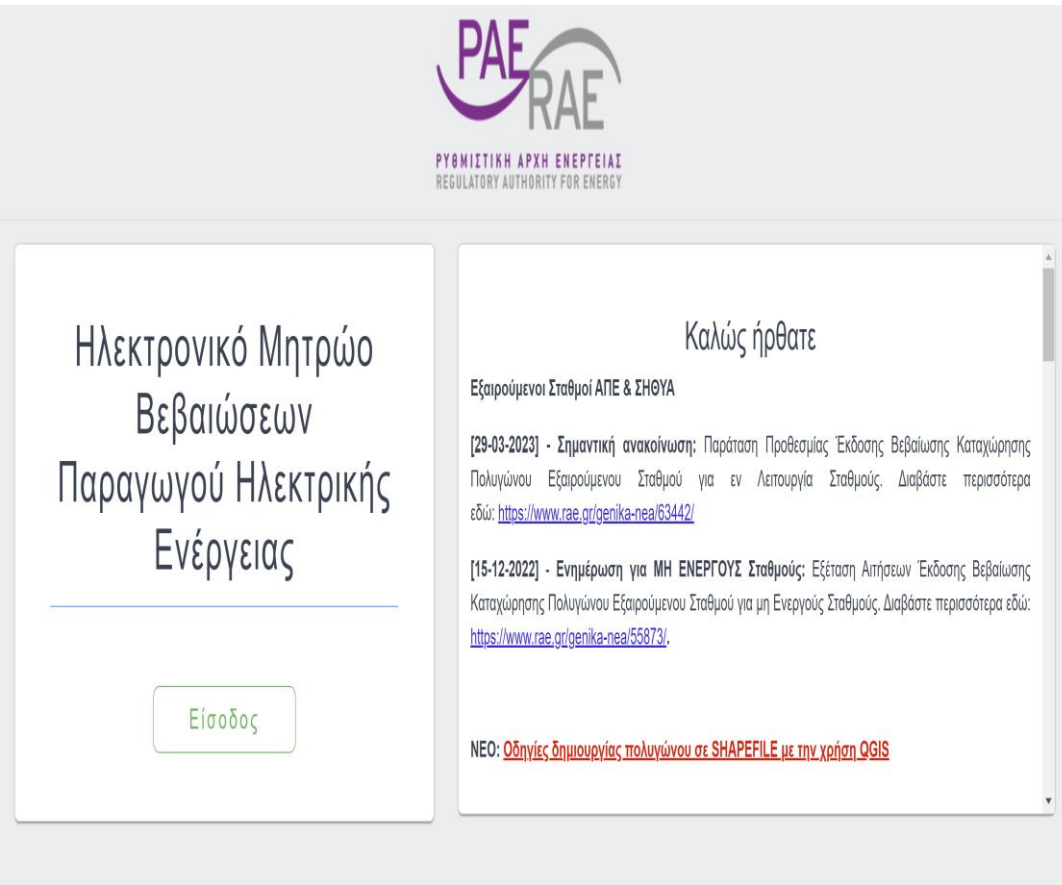
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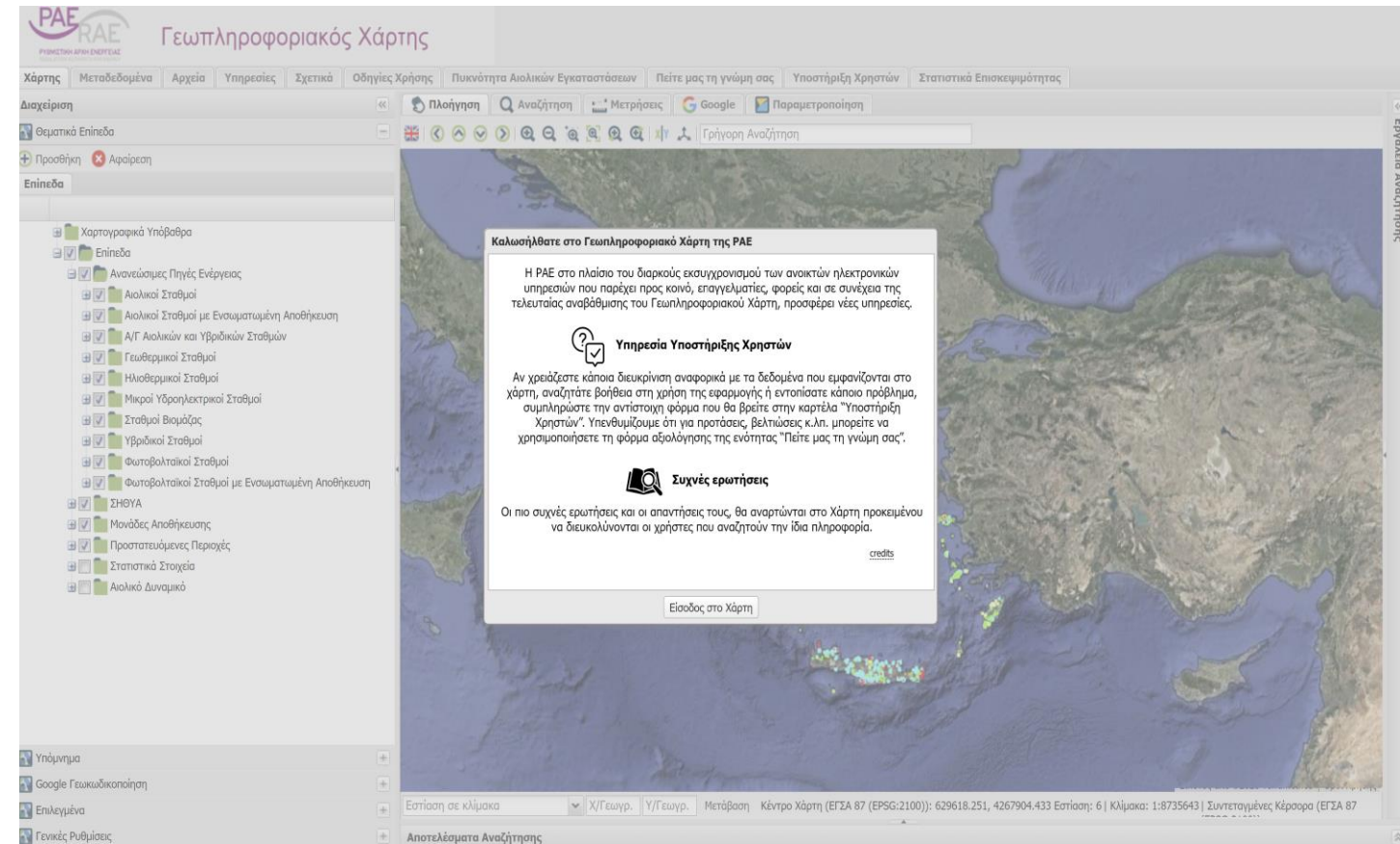
Facilitating RES/storage licensing enhance competition

RES/Storage Licensing – <https://licensing.rae.gr/>

Geospatial Map – <https://geo.rae.gr/>



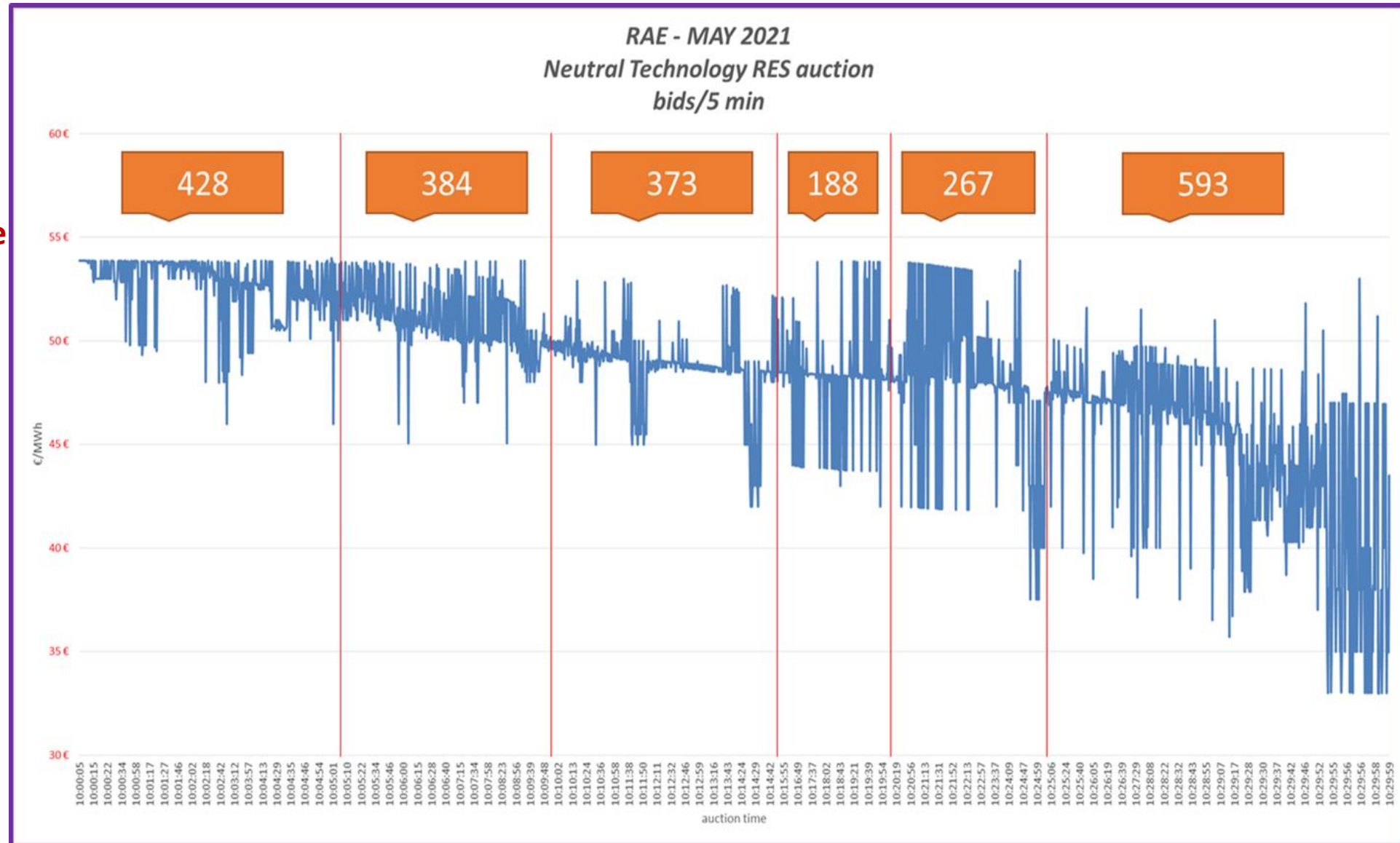
The screenshot shows the RAE (ΡΑΕ) website. The header includes the RAE logo and the text 'ΡΥΘΜΙΣΤΙΚΗ ΑΡΧΗ ΕΝΕΡΓΕΙΑΣ' and 'REGULATORY AUTHORITY FOR ENERGY'. The main content area is titled 'Ηλεκτρονικό Μητρώο Βεβαιώσεων Παραγωγού Ηλεκτρικής Ενέργειας'. Below the title, there is a green button labeled 'Είσοδος'. To the right, there is a section titled 'Καλώς ήρθατε' (Welcome) with a sub-header 'Εξαιρούμενοι Σταθμοί ΑΠΕ & ΣΗΘΥΑ'. It contains two announcements: one dated [29-03-2023] regarding the submission of applications for the exclusion of certain power plants, and another dated [15-12-2022] regarding the submission of applications for the exclusion of certain power plants. Both announcements include links to the RAE website for more information. At the bottom, there is a note about the creation of a shapefile for the exclusion of power plants using QGIS.



The screenshot shows the RAE Geospatial Map interface. The header includes the RAE logo and the text 'Γεωπληροφοριακός Χάρτης'. The main content area is a map of Greece with various energy production facilities marked. A sidebar on the left lists the types of facilities, including 'Ανανεώσιμες Πηγές Ενέργειας' (Renewable Energy Sources), 'Αιολικοί Σταθμοί' (Wind Farms), 'Α/Γ Αιολικών και Υβριδικών Σταθμών' (Hybrid Wind and Storage Stations), 'Γεωθερμικοί Σταθμοί' (Geothermal Stations), 'Ηλιοθερμικοί Σταθμοί' (Solar Thermal Stations), 'Μικροί Υδροηλεκτρικοί Σταθμοί' (Small Hydroelectric Stations), 'Σταθμοί Βιομάζας' (Biomass Stations), 'Υβριδικοί Σταθμοί' (Hybrid Stations), 'Φωτοβολταϊκοί Σταθμοί' (Photovoltaic Stations), 'Φωτοβολταϊκοί Σταθμοί με Ενσωματωμένη Αποθήκευση' (Photovoltaic Stations with Integrated Storage), 'ΣΗΘΥΑ' (Pumped Storage), 'Μονάδες Αποθήκευσης' (Storage Units), 'Προστατευόμενες Περιοχές' (Protected Areas), 'Στατιστικά Στοιχεία' (Statistical Data), and 'Αιολικό Δυναμικό' (Wind Potential). A pop-up window titled 'Καλωσήλατε στο Γεωπληροφοριακό Χάρτη της ΡΑΕ' (Welcome to the RAE Geospatial Map) is displayed over the map. It contains information about the RAE's role in facilitating the licensing process and provides a link to the 'Υποστήριξη Χρηστών' (User Support) section. The map interface includes various navigation and search tools, such as a search bar, a map scale, and a legend.

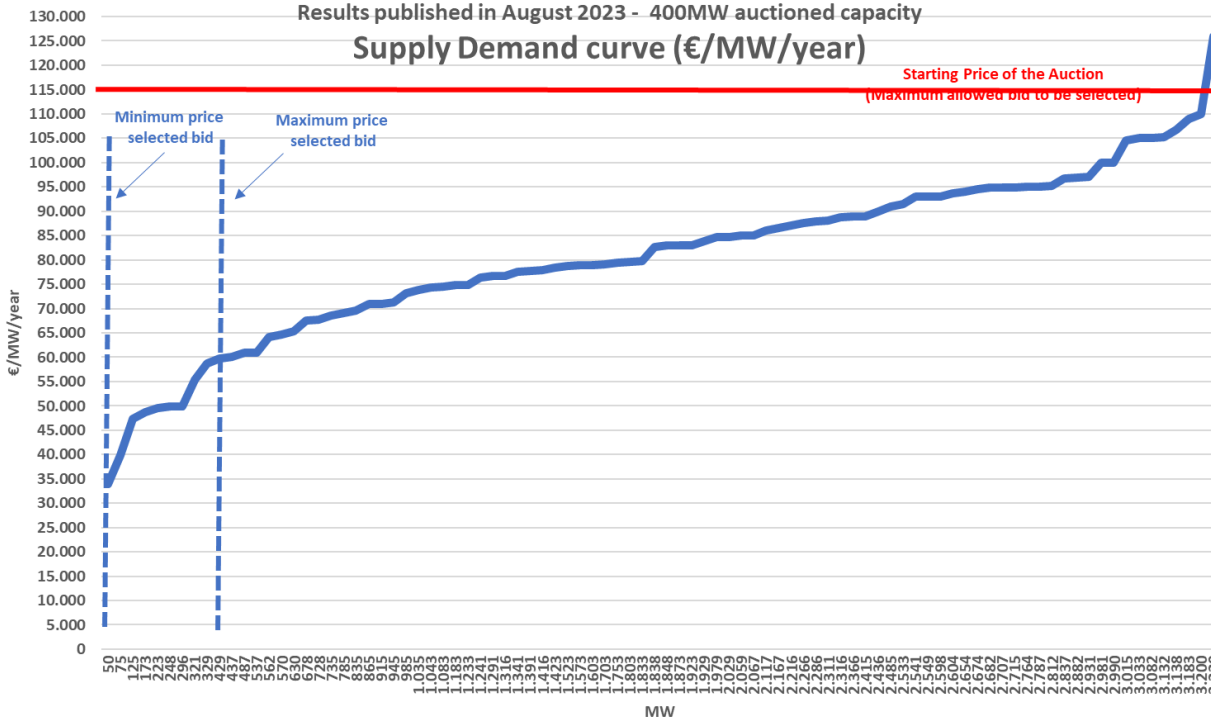
Licensing has been facilitated within RAEEY through innovative IT platforms, enhancing transparency
Licenses issued: About 100 GW of RES, 45 GW of storage, 10 GW of hybrid (RES+storage)

Auctions for financial operating aid for RES electroproduction assets

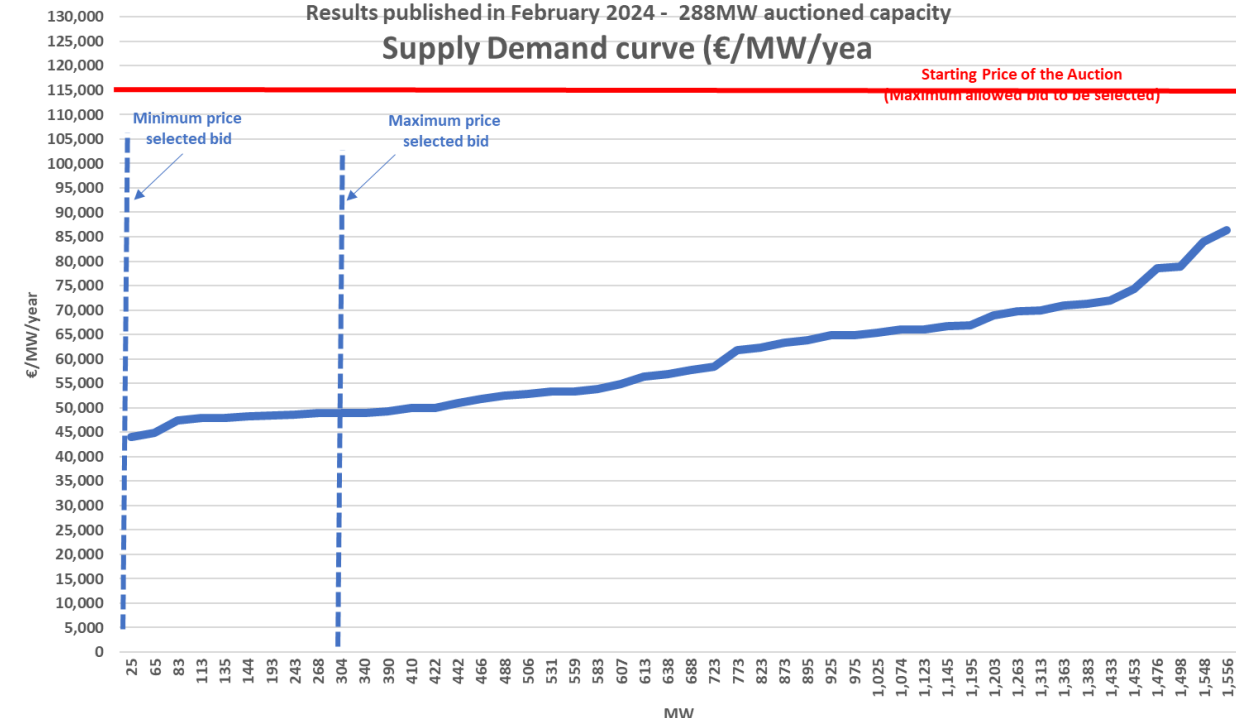


Auctions for financial operating aid for electricity storage

1st Competitive Procedure for financial operating support of electricity storage in Greece -
Auction organized by Regulatory Authority for Energy, Waste and Water
Results published in August 2023 - 400MW auctioned capacity
Supply Demand curve (€/MW/year)



2nd Competitive Procedure for financial operating support of electricity storage in Greece -
Auction organized by Regulatory Authority for Energy, Waste and Water
Results published in February 2024 - 288MW auctioned capacity
Supply Demand curve (€/MW/yea)



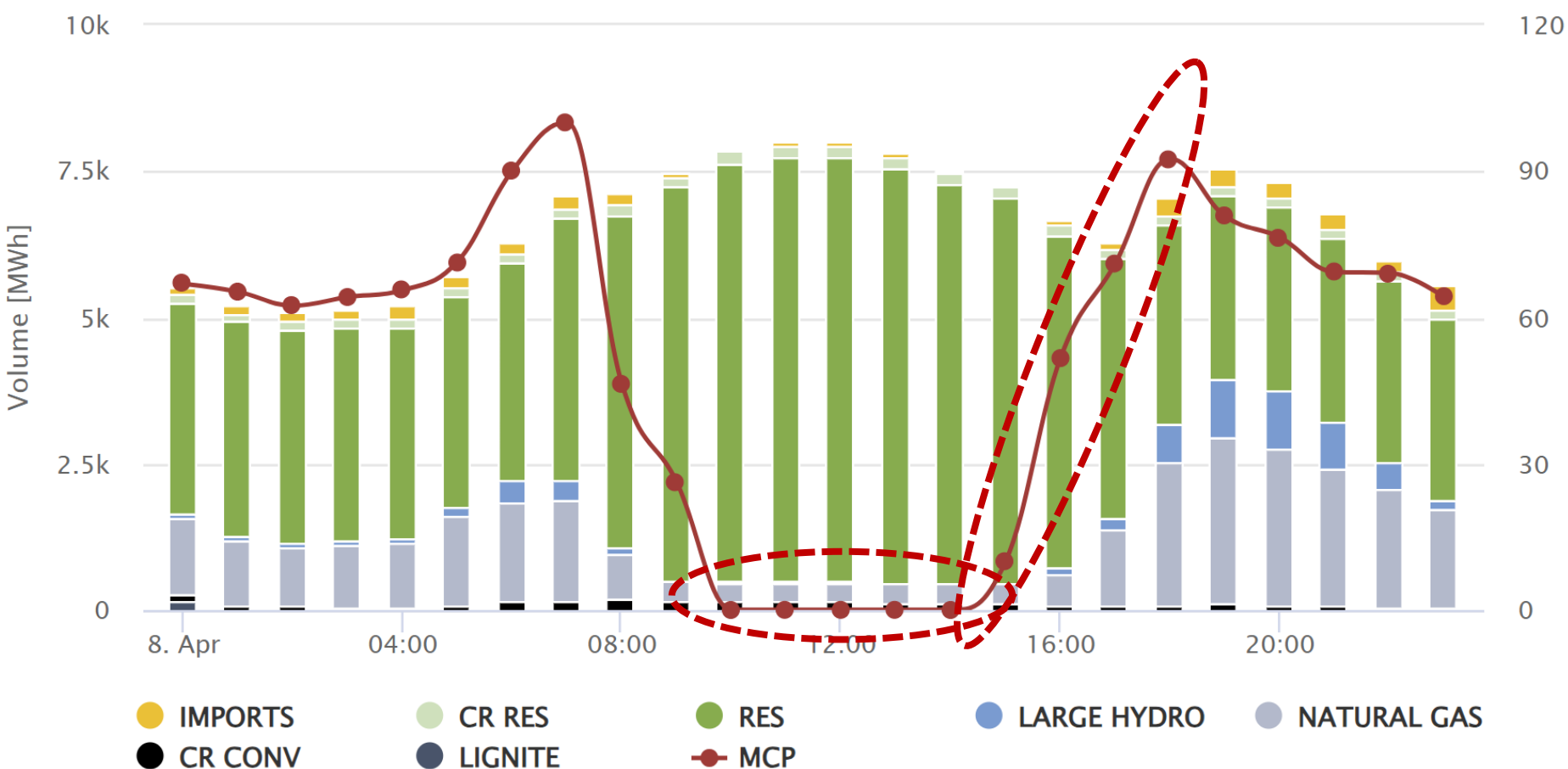
Facilitation of licensing, enhances competition

- in auctions for operating aid for RES and Storage assets

Typical Hourly Energy Mix – in Day-Ahead Market

<https://www.rae.gr/energeiako-meigma/>

GR DAM Hourly Energy Mix - SELL - 08-04-2024



- **zero prices reduce energy cost** for retailers and consumers,
 - however, they create **uncertainty in RES** projects
 - (that could be offset through combining with flexible assets (storage), long-term contracts – CfD and PPAs)
- **price differentials create clear signal for storage/demand response** investments

Greek Wholesale Electricity Markets Monitoring

Aggregate Supply-Demand Curves

<https://www.rae.gr/soreftikes-kampiles-prosforas-zitisis>



Select Date

Δευτέρα, 8 Απριλίου 2024

Select Hour

15



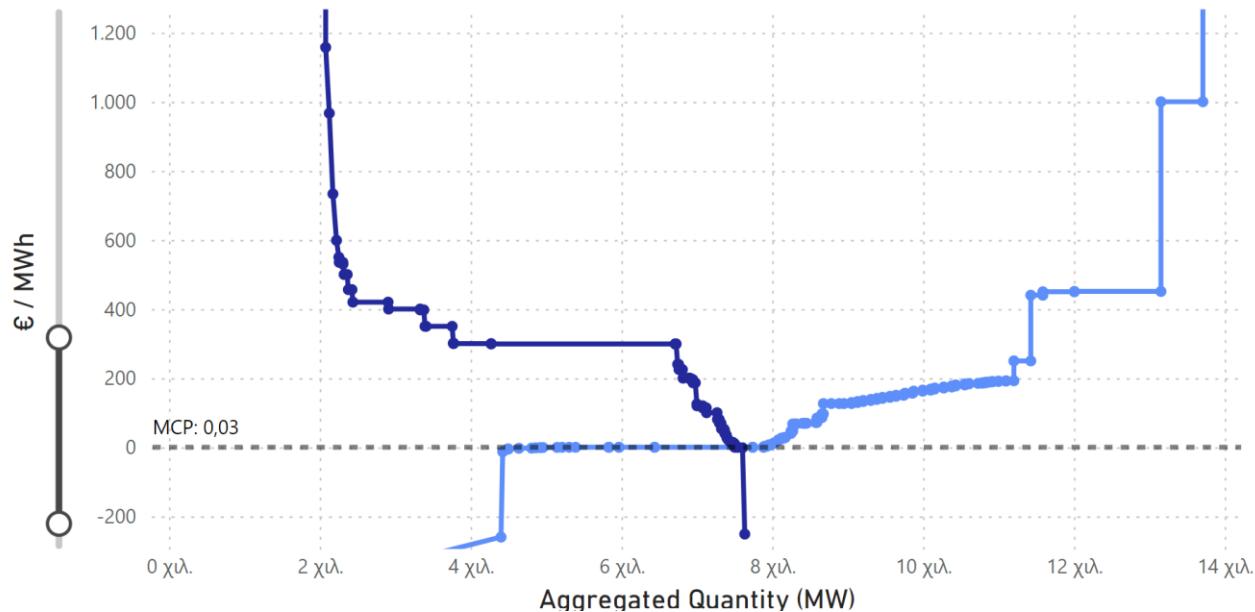
Select Date

Δευτέρα, 8 Απριλίου 2024

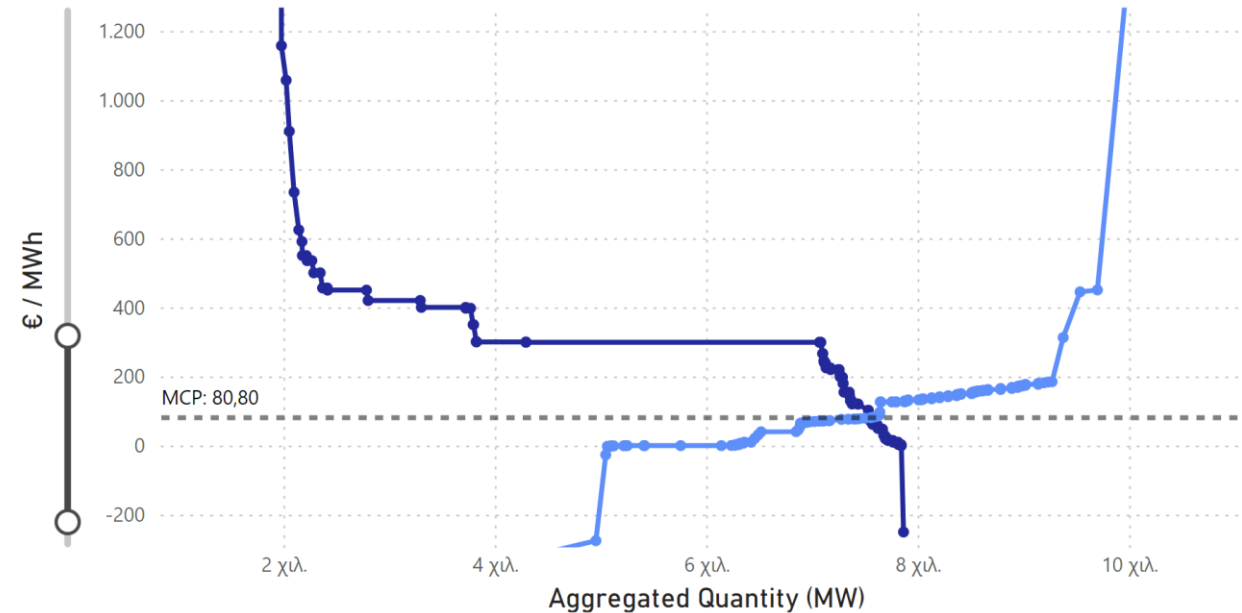
Select Hour

20

Offer Side ● Demand ● Supply



Offer Side ● Demand ● Supply



Facilitation of licensing, enhances investments and competition

- in wholesale markets

European Wholesale Electricity Markets Monitoring

<https://www.rae.gr/en/market-monitoring/european-wholesale-markets/day-ahead-electricity-price-map/>

Average Day-Ahead Market prices – 24-04-2024



Day-Ahead Market Prices (€/MWh)					
Country	DAM Price	(%)		Month-To-Date	Year-To-Date
Italy (IT)	100,23	-4,8%	↓	84,58	90,43
Malta (MT)	100,87	-3,5%	↓	83,68	89,46
Ireland (IE)	100,58	-0,8%	↓	82,48	88,90
Estonia (EE)	106,80	3,6%	↑	58,32	83,70
Poland (PL)	107,30	5,1%	↑	82,44	81,87
Lithuania (LT)	106,80	3,6%	↑	58,14	81,02
Latvia (LV)	106,80	3,6%	↑	58,14	80,95
Ukraine (UA)	112,68	19,3%	↑	70,40	74,42
Greece (GR)	83,18	-15,6%	↓	59,97	74,35
Switzerland (CH)	85,35	-9,8%	↓	60,42	72,84
United Kingdom (GB)	83,67	-2,4%	↓	57,68	71,59
Hungary (HU)	97,98	-2,0%	↓	60,84	70,84
Serbia (RS)	95,31	-1,5%	↓	62,52	70,72
Romania (RO)	97,65	-4,3%	↓	59,16	70,67
Slovakia (SK)	99,01	-1,3%	↓	61,75	70,63
Czech Republic (CZ)	97,53	-2,8%	↓	62,33	70,37
Bulgaria (BG)	83,23	-18,1%	↓	53,94	70,13
Croatia (HR)	95,44	-3,6%	↓	58,67	69,32
Slovenia (SI)	94,96	-3,7%	↓	58,47	68,81
Austria (AT)	94,22	-4,5%	↓	57,44	67,64
Finland (FI)	98,62	42,1%	↑	44,67	66,97

- Greece engaged in
 - Gradual Market coupling among SEE and CEE
 - Gradual Market decoupling from Italian market

The map shows, for the current day, the average daily price (€/MWh) of the wholesale Day-Ahead Market for each European country.

service provided to the Hellenic Regulatory Authority for Energy (RAE)

Powered by DIEM; sources: ENTSOe, GME;

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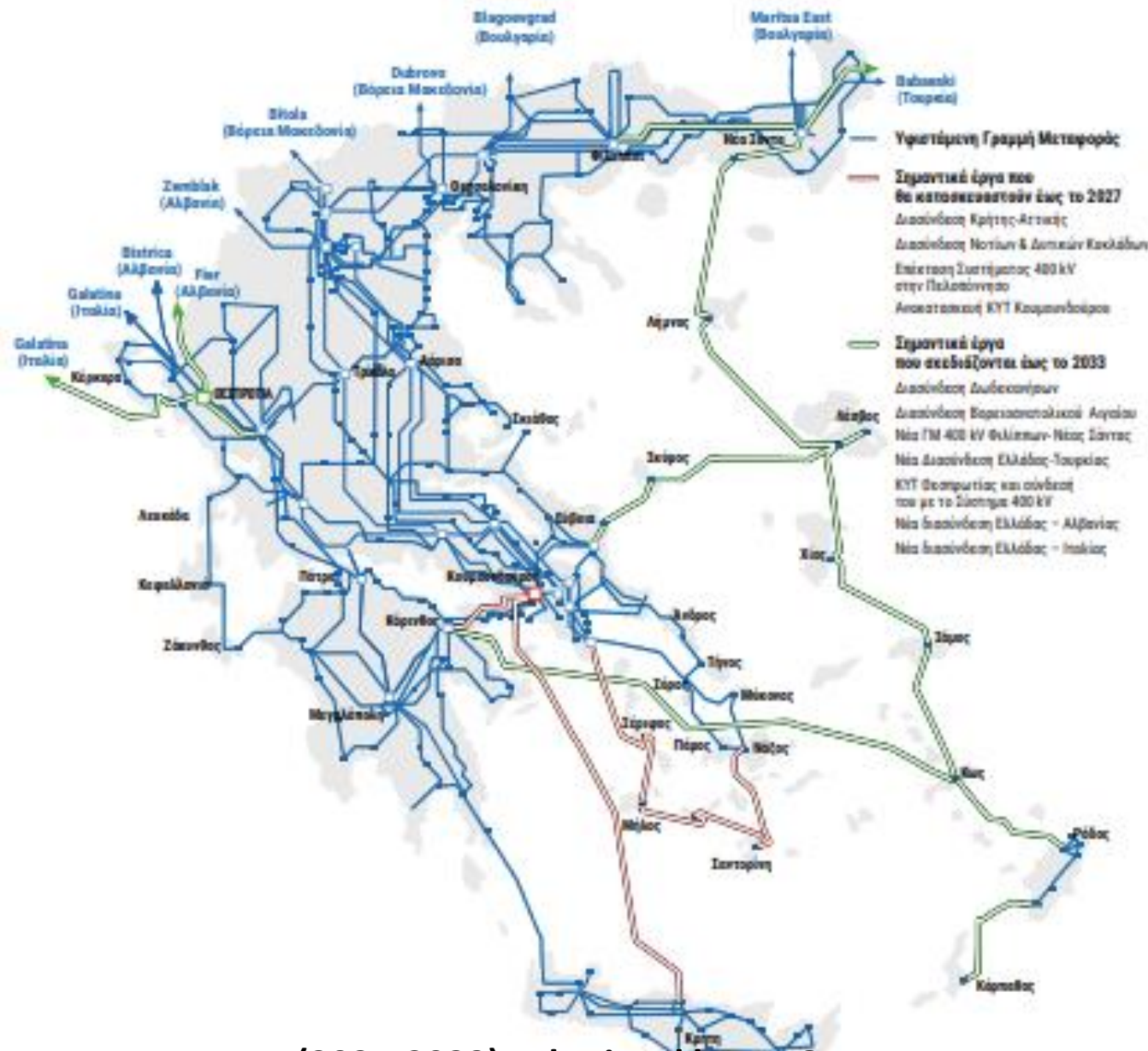
Conclusions

Approval of Ten -Year Network Development Plan in Electricity Transmission System

TYNDP (2022-2031) approved by RAEWW

- **2023 for Crete (DC) - 2025**
- **2024 for 4th Phase for Cyclades Interconnection (AC) - 2025**
- **2028 for Dodecanese (DC)**
- **2029 for North Aegean (AC)**
- **2023 Extension of 400 kV system in Peloponnese**

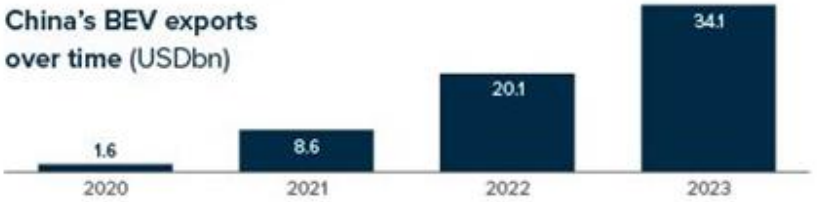
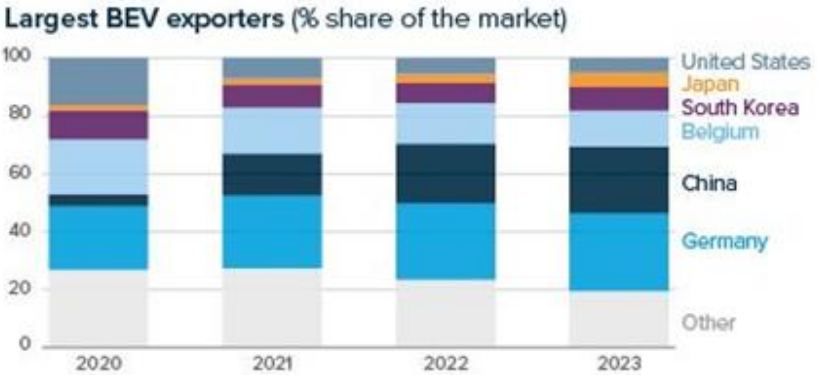
Delay in implementation of interconnections might lead to fine by Regulator (as in case of West route in Peloponnese)



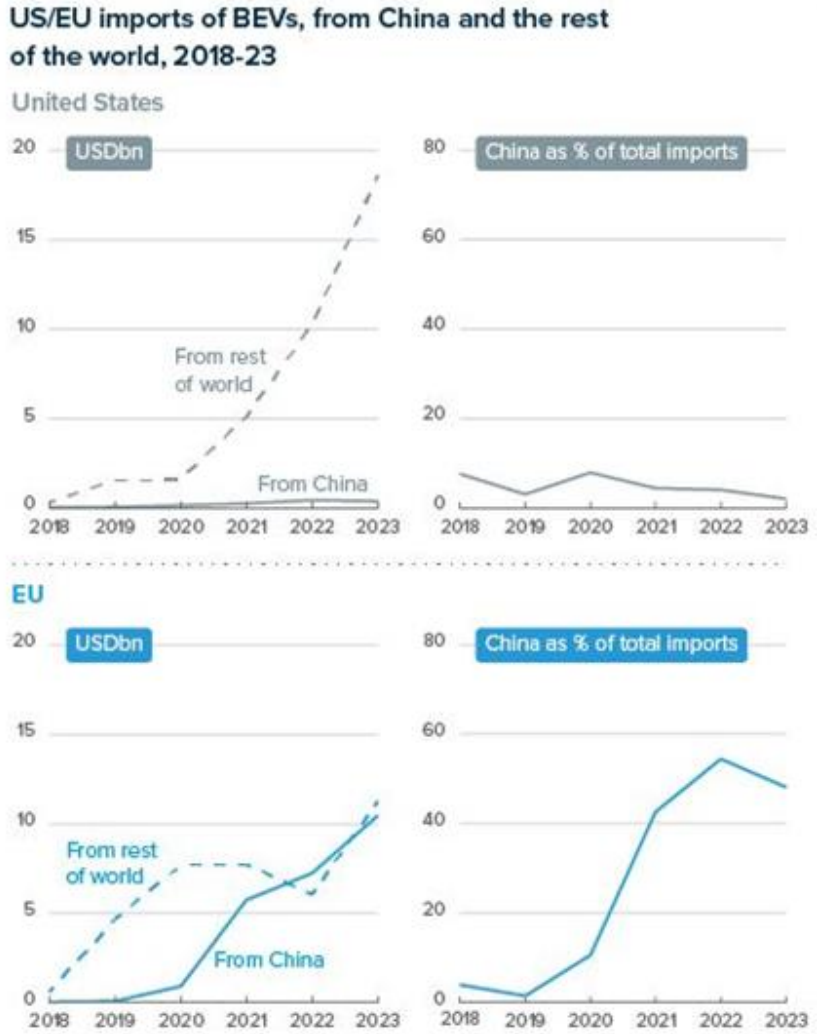
TYNDP (2024-2033) submitted by IPTO to RAAEY

Electrification of transport (new electric demand), enhanced by developments in electric vehicles, storage and fast DC chargers

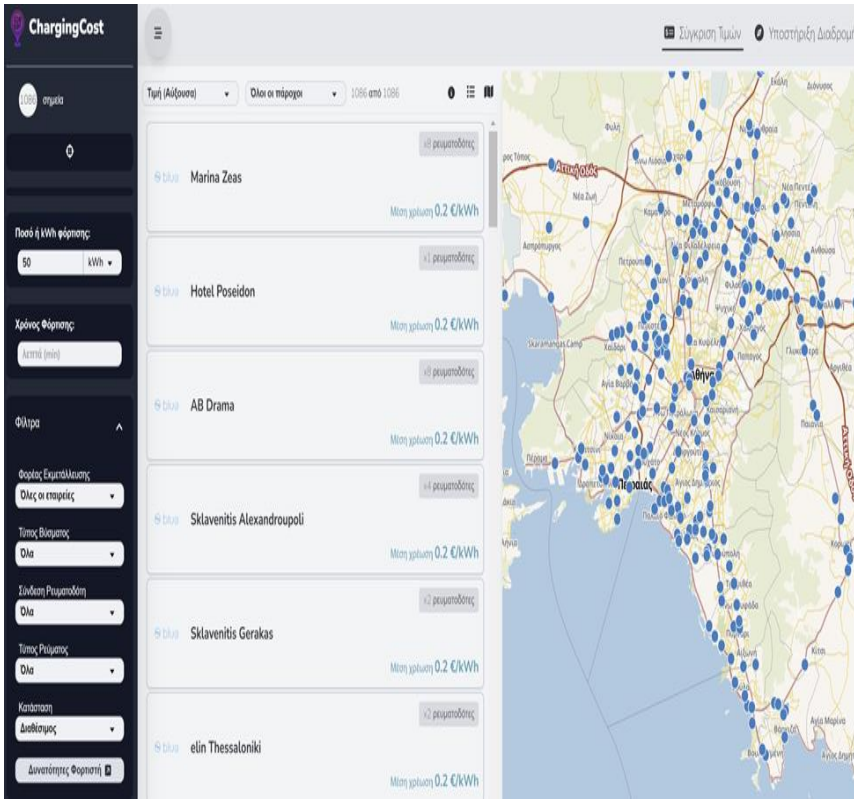
China's share of the battery electric vehicle (BEV) market is rising, especially in Europe



High US tariffs on Chinese-made BEVs have kept them out so far, but this policy poses high risks for Europe



Electric Vehicles' Prices Comparison Tool (in operation May 2024)



Ten - Year Network Development Plan in Electricity Transmission System

International Interconnections proposed by IPTO:

- *Second Interconnection Greece-Bulgaria (2023) – in operation*
- *Second Interconnection Greece-Turkey (2029)*
- *Interconnection Greece-Cyprus-Israel (2027) – under development*
- *Second Interconnection Greece-Albania (2030)*
- *Upgrade of Interconnection Greece-North Macedonia (2030)*
- *Interconnection Greece-Egypt*
- *Second Interconnection Greece-Italy*
- *Green Aegean*



Σχήμα 5.1 Σχηματικό Διάγραμμα των Διασυνδεδεμένων Συστημάτων της ΝΑ Ευρώπης

Network Development Plans in Regional Gas Transmission Systems



Source: IENE

International Interconnections in South-East Europe

TAP – 10bcm annually to Greece, Italy and Bulgaria (through IGB)

IGB – 3bcm annually to Bulgaria (in operation 1.10.2022) – 5bcm

IGNM: North Macedonia – 1.5 bcm annually to North Macedonia, (Kosovo, Montenegro, Serbia) (under construction)

Transbalkan – reverse flow of firm capacity bundled products (from Greece to Bulgaria/Romania/Moldova/Ukraine)

EastMed – 12-15bcm annual from Israel/Egypt/Cyprus/Lebanon to Greece/Italy

Vertical Gas Corridor (Hydrogen)

Infrastructure in Greece

High interest for investments in FLNG/FSU/UGS

- **Revythoussa FSU** (transitional measure in energy crisis)

- **Alexandroupolis Terminal** (April 2024)

- **Korinthos Terminal** (binding Market Test completed)

- **Volos Terminal** (non-binding Market Test completed)

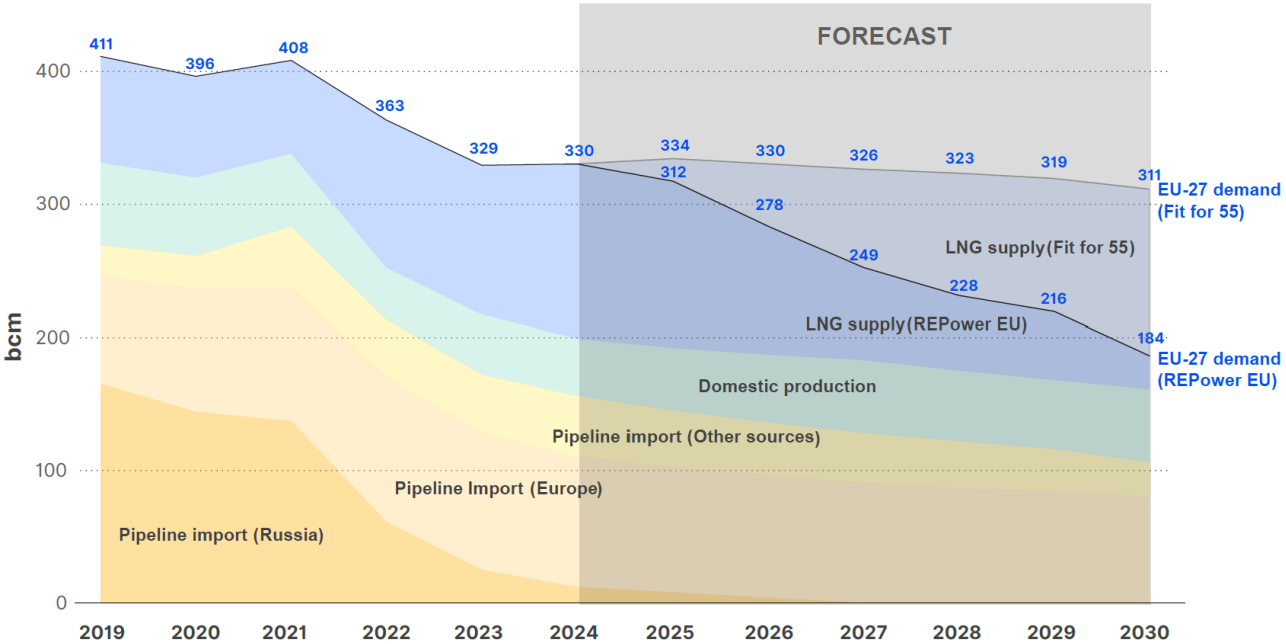
- **Salonika Terminal** (License approved by RAEWW)

- **Thraki Terminal** (License approved by RAEWW)

- **Kavala Underground Storage** (tender by the Hellenic Republic Asset Development Fund S.A.)

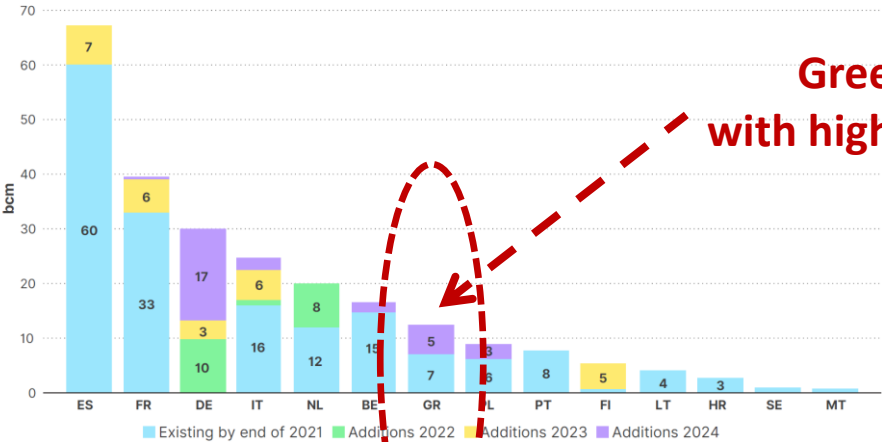
Evolution of gas supply in Europe (source: ACER)

Figure ii: EU gas supply and demand outlook and assessed LNG supply needs relative to Fit For 55 and REPowerEU scenarios by 2030 (bcm)



Source: ACER based on data from ICIS, Platts, and REPowerEU.
 Note: The demand evolution from 2024 to 2030 reflects a linear decrease in alignment with the target set for 2030. The potential gas demand reduction described in REPowerEU associated with 20 Mt of green hydrogen introduced by 2030 is not factored in the assessed scenario.

Figure 15: Overview of existing EU LNG capacity per Member State and yearly additions by 2024 (bcm)



Source: ACER based on data from GIIGNL 2023 annual report and ICIS LNG Edge.
 Note: Capacity additions in 2023 for Spain correspond to El Musel LNG terminal. The terminal was already built but was mothballed and had not started commercial operations.

LNG import infrastructure in Europe increased while “REPower EU” contradicts “Fit for 55” LNG demand evolution

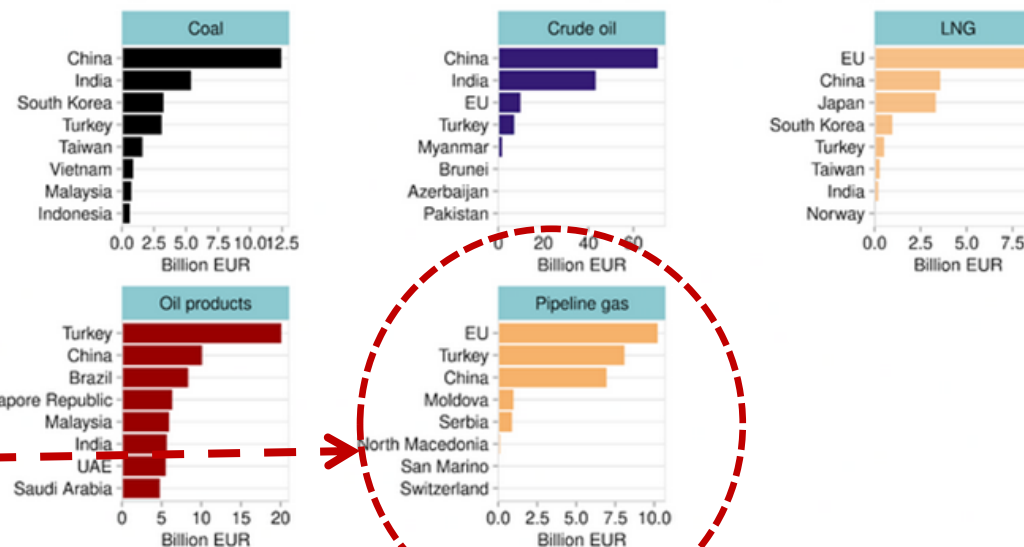
Russia's exports after EU bans

Increased trading role of Turkey for pipeline gas (affecting LNG trade)

Who is buying Russia's fossil fuels?

Who bought Russia's fossil fuels after EU bans?

Shipments arriving since EU oil bans until end of March 2024 | Top 8 countries per fuel type



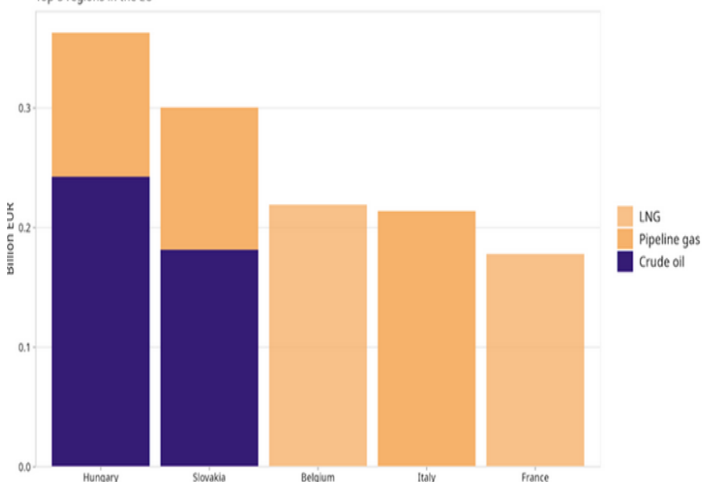
Source: CREA analysis based on Kpler, Marine Traffic, ENTSOG and customs data.

CREA



Who bought Russia's fossil fuels in March 2024

Top-5 regions in the EU

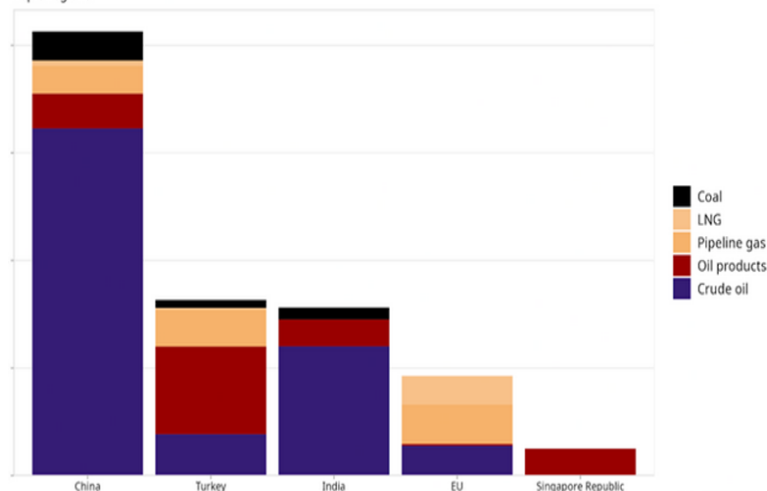


Source: CREA analysis based on Kpler, Marine Traffic, ENTSOG and customs data.

CREA

Who bought Russia's fossil fuels in March 2024

Top-5 regions



Source: CREA analysis based on Kpler, Marine Traffic, ENTSOG and customs data.

CREA

NATURAL GAS DATA: FIRST QUARTER 2024

3M / 2024

KEY NATURAL GAS DATA

DOMESTIC CONSUMPTION	EXPORTS	TOTAL DEMAND
16,22 tmc (+28.71%)	0,29 tmc (+14.31%)	16,51 tmc (+14.02%)

NATURAL GAS ENTRY POINTS



TOTAL IMPORTS: 16,55 tmc

CUSTOMER CATEGORIES

ELECTRICITY PRODUCERS	DISTRIBUTION NETWORKS	INDUSTRIES & CHS
9,00 tmc (+19.38%)	4,72 tmc (+14.47%)	2,50 tmc (+27.84%)
0,78 tmc	0,41 tmc	0,22 tmc
TOTAL: 16,22 tmc (+28.71%)	1,41 tmc	

LNG VESSELS

USA	RUSSIA	ALGERIA
4,54 tmc (+14,07%)	1,91 tmc (+11,90%)	0,48 tmc (+17,12%)
TOTAL: 6,93 tmc	-27,13% variation	

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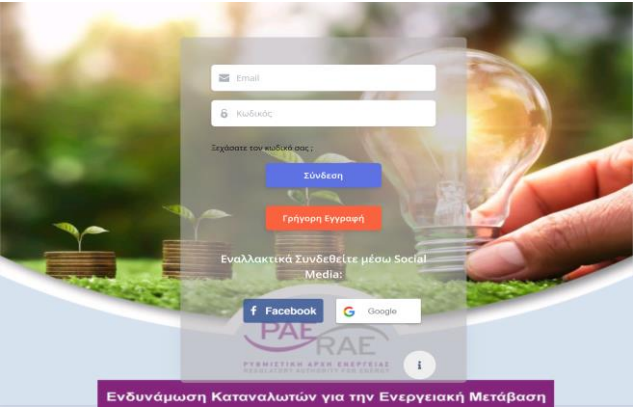
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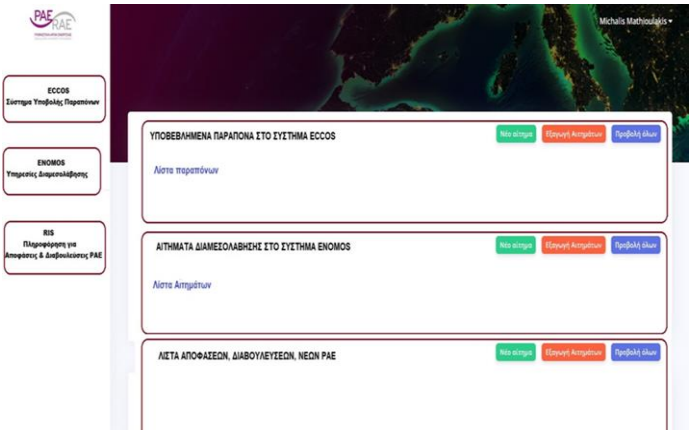
Transforming Regulator nature (R2C),
creating Consumer's Place

to Protect Consumers (during Green transition)
and Enhance Transparency

Complaints tool – my.rae.gr
(to Energy Providers and Network Operators)
(in operation)



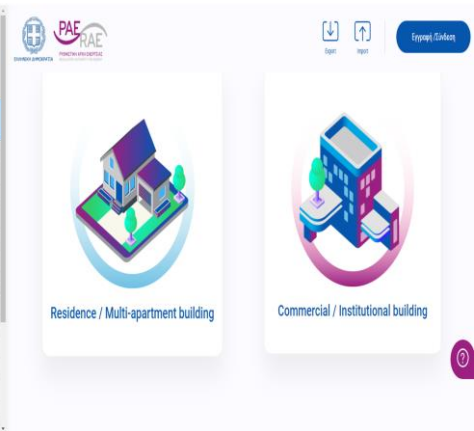
Energy Ombudsman –
Online Arbitration system
(in operation)



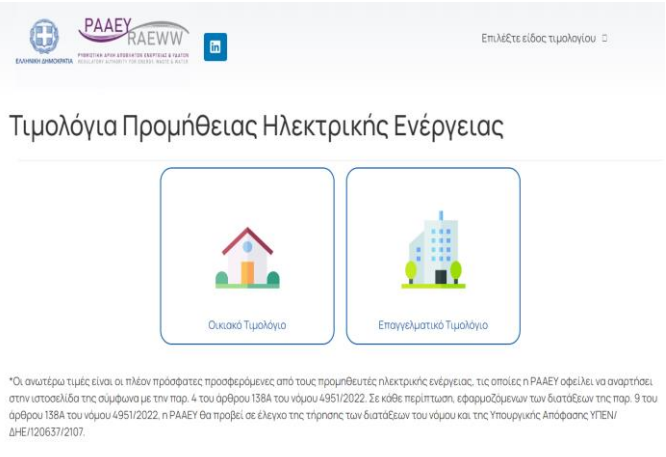
Electricity Cost Calculator
<https://www.electricitycostcalculator.gr/>
(in operation)



Energy Savings Guide Tool
<https://www.buildingenergysaving.gr/>
(in operation)



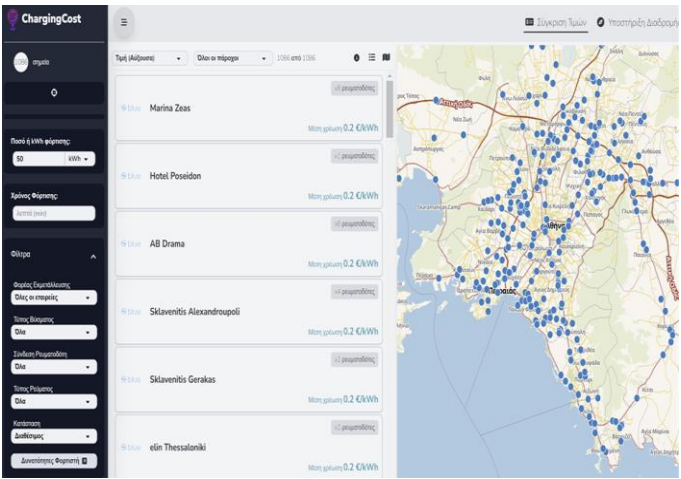
Available Electricity Supply Contracts
– invoices.rae.gr
(in operation)



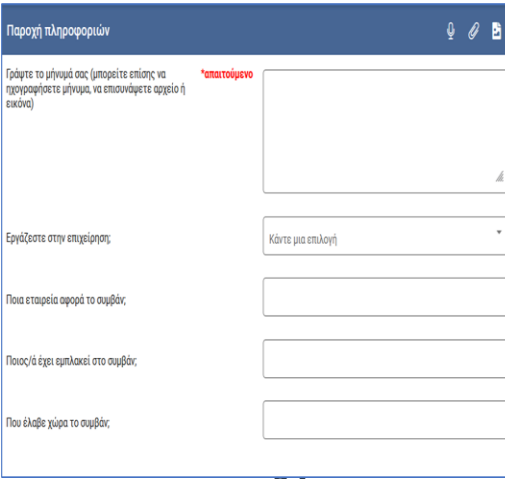
Household Energy Prices Comparison Tool
– energycost.gr
(in operation)



Electric Vehicles’ Prices
Comparison Tool
(in operation May 2024)



Anonymous Complaints system
- energy-whistleblowing.gr
(in operation in 2024)



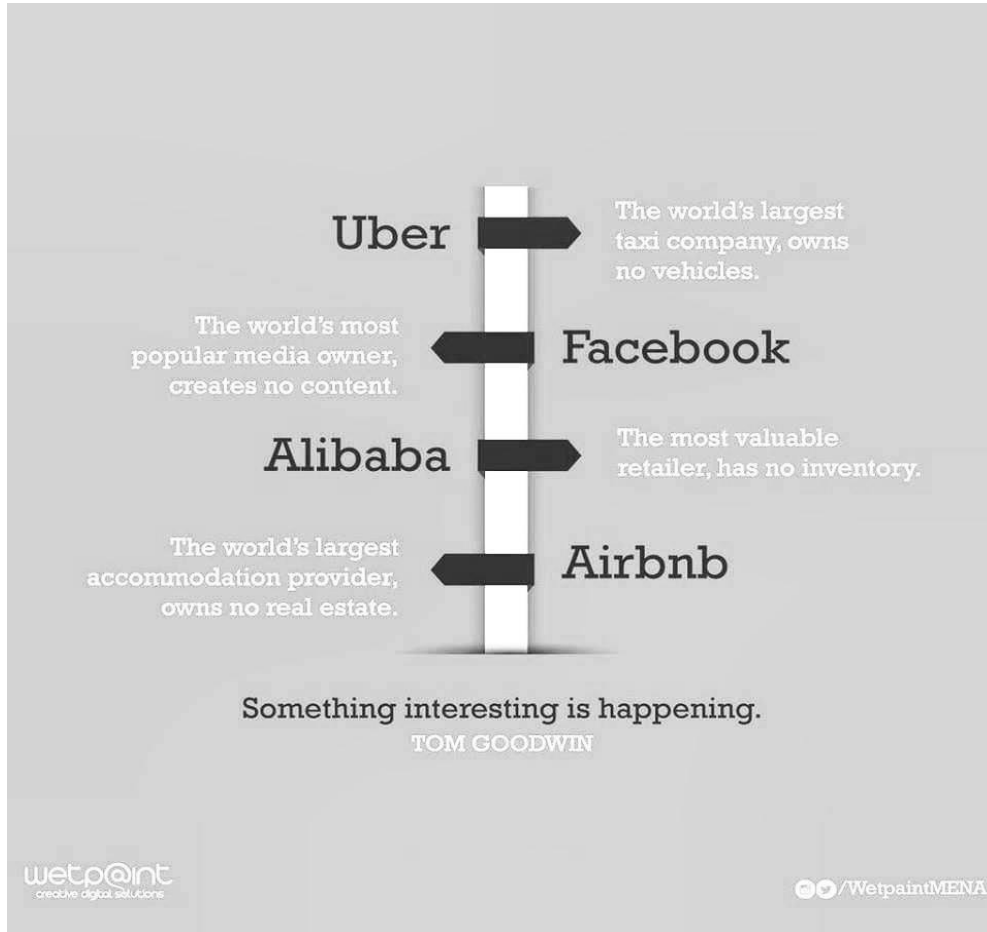
We Create a Consumers' Place

We transform Regulator's nature from B2B (R2B) to R2C

in a similar way that innovative companies

**Engage Assets' owners to create
Market Place**

**We Engage Citizens to create
Consumers Place**



Through a number of innovative tools:

MyRAE

Energy Ombudsman

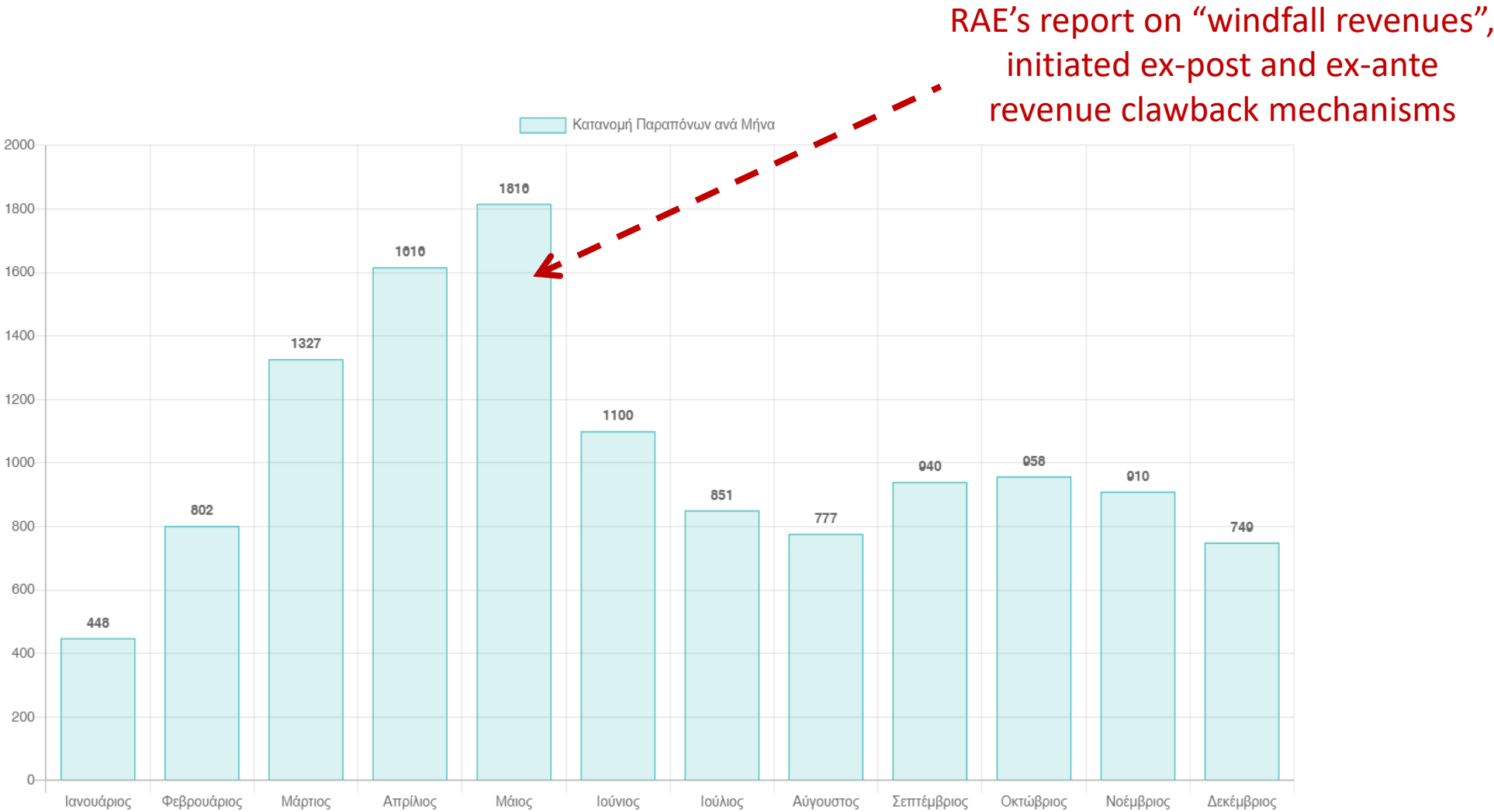
Energy-Whistleblowing

Energy Cost and Charging Cost comparison tools

**Tools enhancing Transparency and Understanding
Retail Billing database**

Energy Cost calculator and Building Energy Savings tools

Monthly Complaints in MyRAE over 2022



Facilitate decision making for enhancing Social Cohesion and Protecting Consumers

Summary

NCEP key priorities: Energy efficiency, Green Electricity, Electrification of Transport and other sectors, Renewables Gases and new Technologies

• **Energy Market developments**

- Competition in Wholesale and Retail markets
- Robust monitoring and transparency
- Price signals for Storage/Demand Response

Energy markets
are competitive
and provide price
signals

• **Network/Infrastructure developments**

- Facilitation of network developments/Interconnections/Digitalization
- Electrification of new sectors create new demand, eliminate curtailments from RES
- Identify the role of gas/H2/renewable gases in energy transition (energy security)
- Challenges: Network Costs/ KPIs in TSOs/DSOs performance


Considerable
developments of
Networks/
Infrastructure

• **Digitalizing procedures for Energy Consumers and Markets**

- Enhance Competition, Transform nature of Regulator (from R2B to R2C)
- Create Consumers' Place to Protect Consumers and Enhance Transparency

Protect
Consumers
for green
transition

Participation of RAAEY in Regional and European institutions

ACER 

European Union Agency for the Cooperation
of Energy Regulators

CEER

Council of European
Energy Regulators



ENERGY REGULATORS
REGIONAL ASSOCIATION



MEDREG

Thank you for your attention!

