

Greece experience with RES integration

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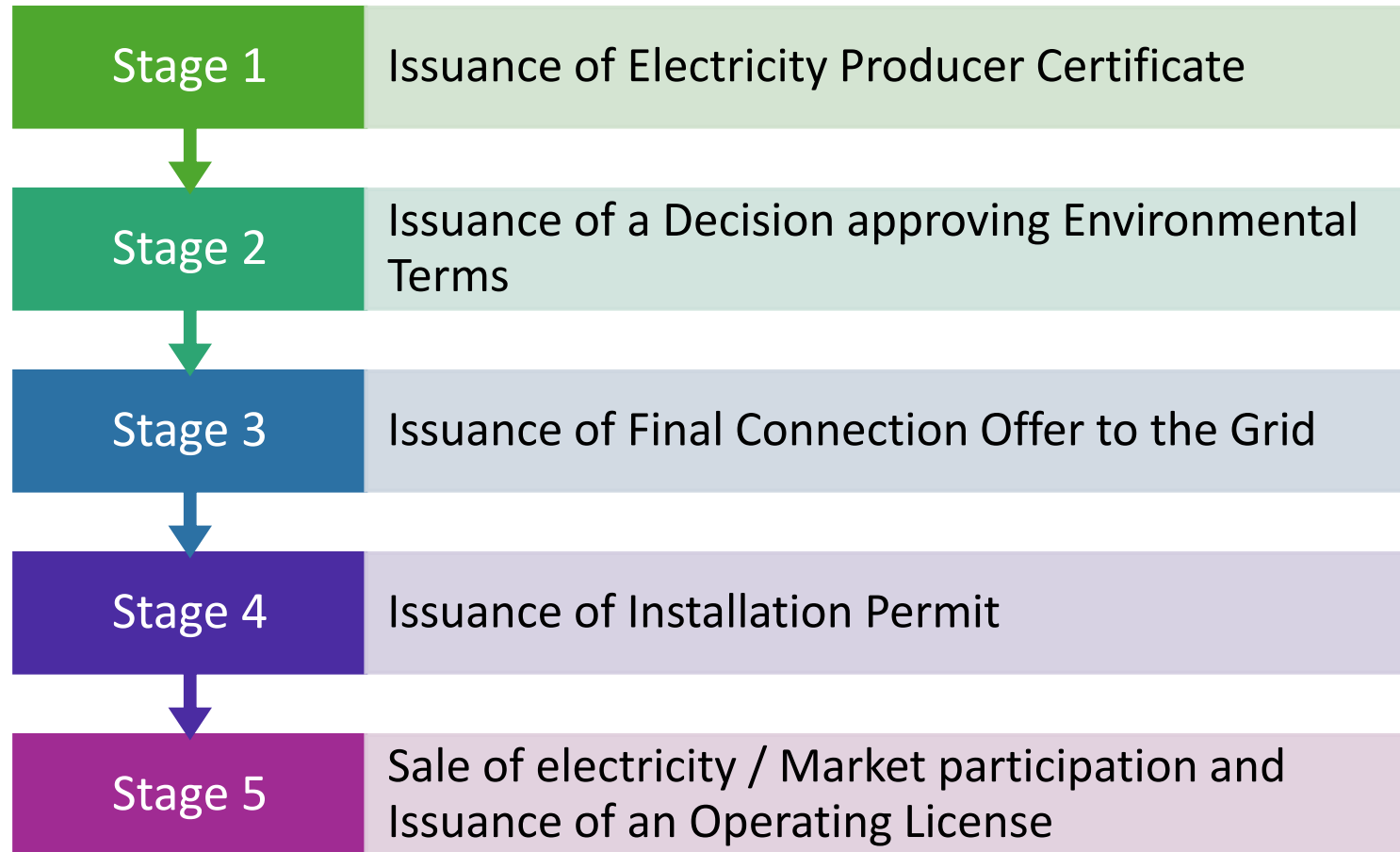
*Director RES and Storage Department
Regulatory Authority for Energy, Waste and Water*

Istanbul, 06.11.2024

Contents

- RES licensing
- Status of RES projects
- RES economic schemes
- Energy Storage Systems (ESS) licensing
- Energy Storage Systems Auctions

Main Stages of RES Project Development



Main Framework for Licensing Acceleration

- **Law 4685/2020:** Simplifies RES licensing – Phase A (Electricity Producer Certificate)
- **Law 4951/2022:** Simplifies RES licensing – Phase B (Grid Connection, Installation and Operating License)

Simplification of RES licensing procedures

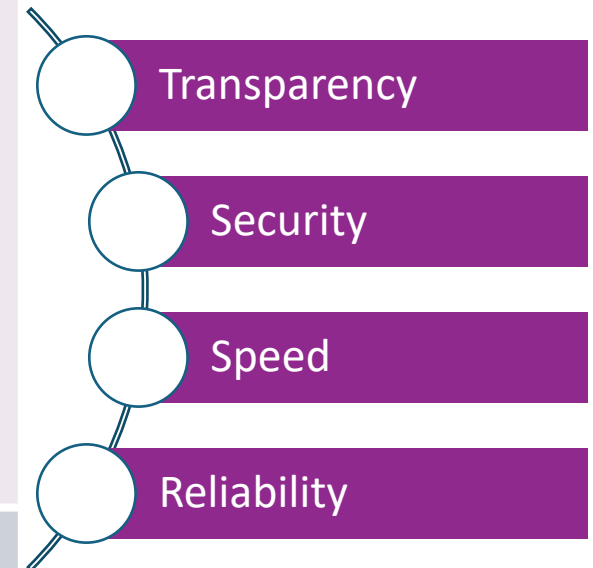
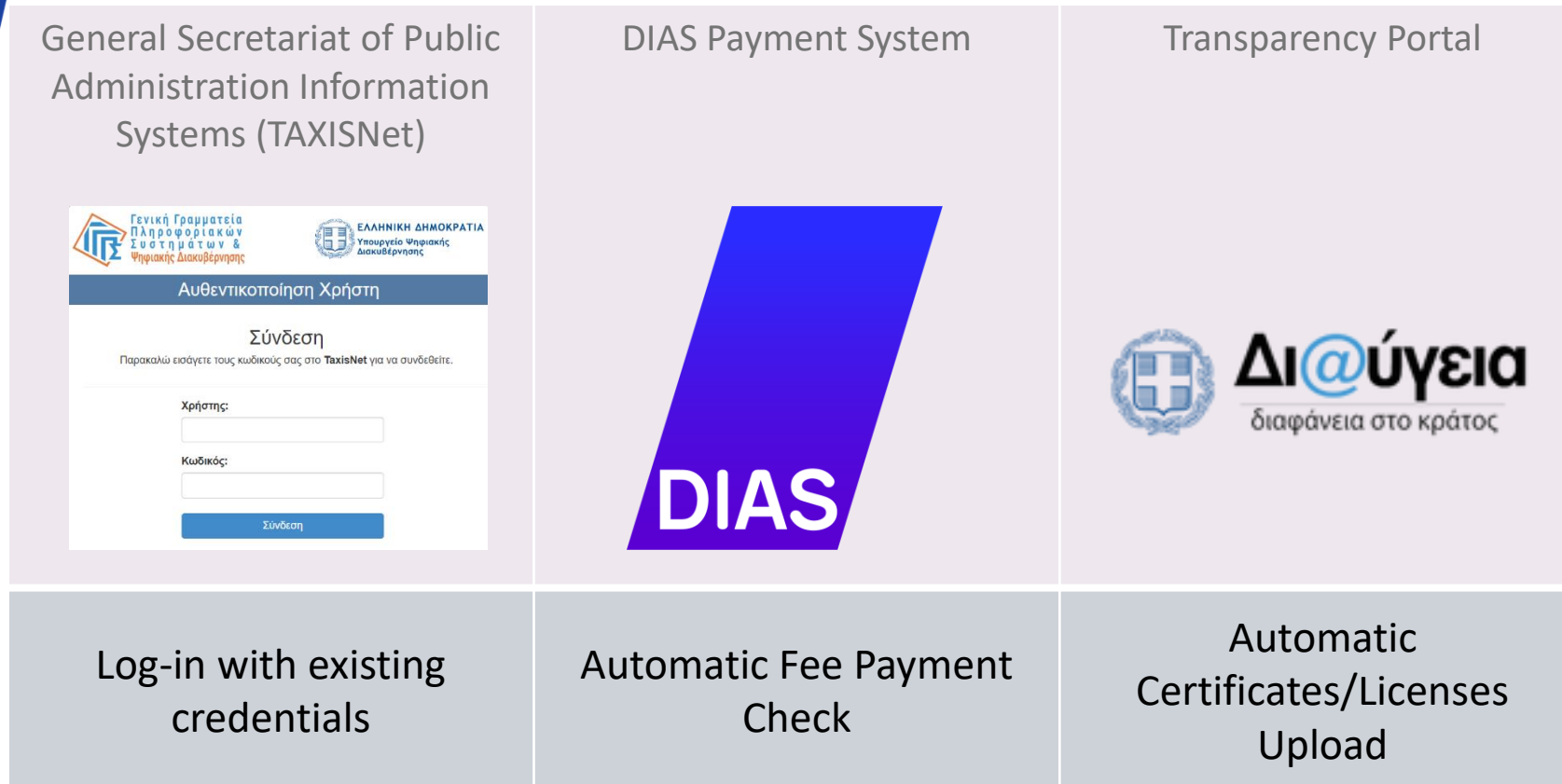


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graph TD; A[Simplification of RES licensing procedures] --> B[Acceleration of RES development and penetration]
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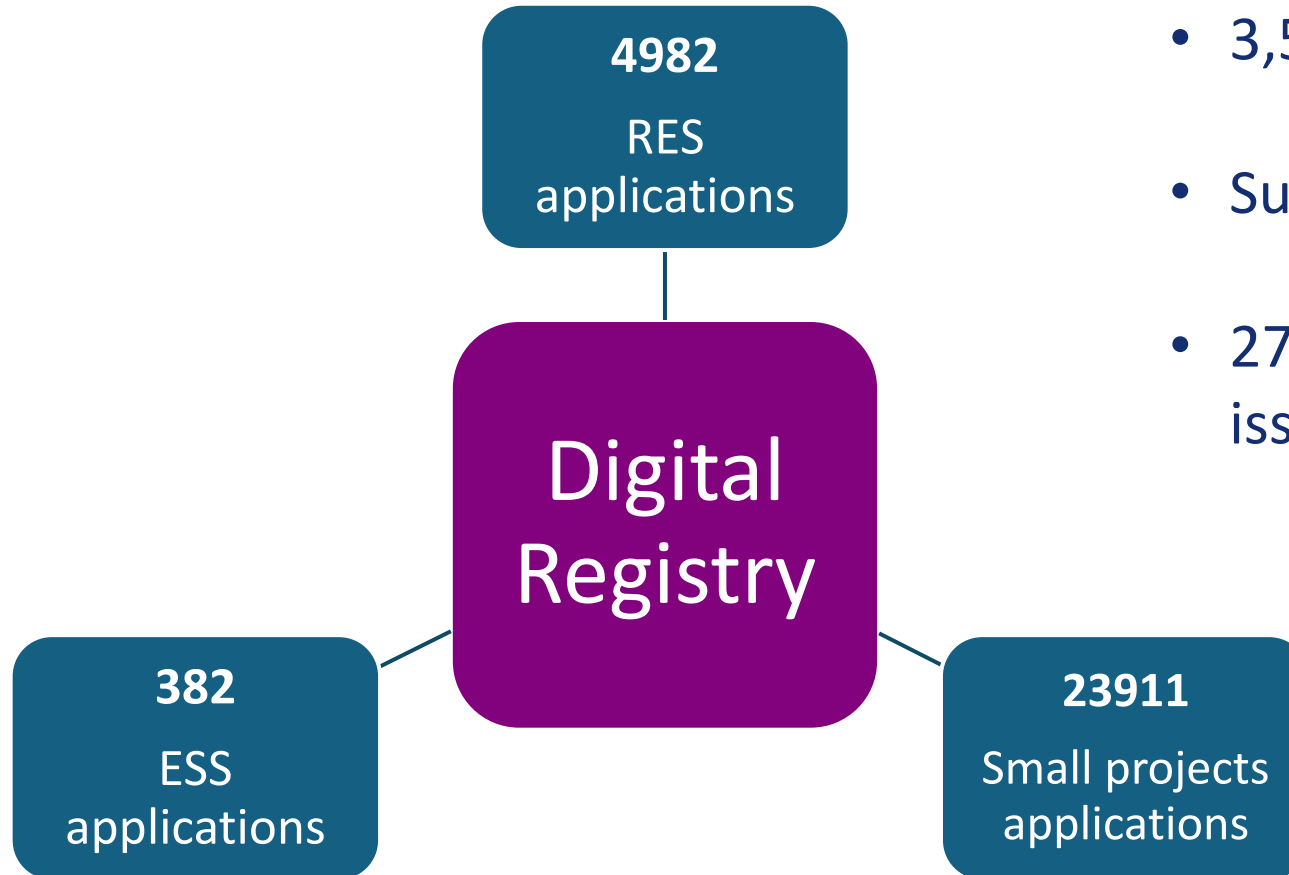
Acceleration of RES development and penetration

Digital Registry for RES and Storage

Interaction with Existing Information Systems



Digital Registry for RES and Storage



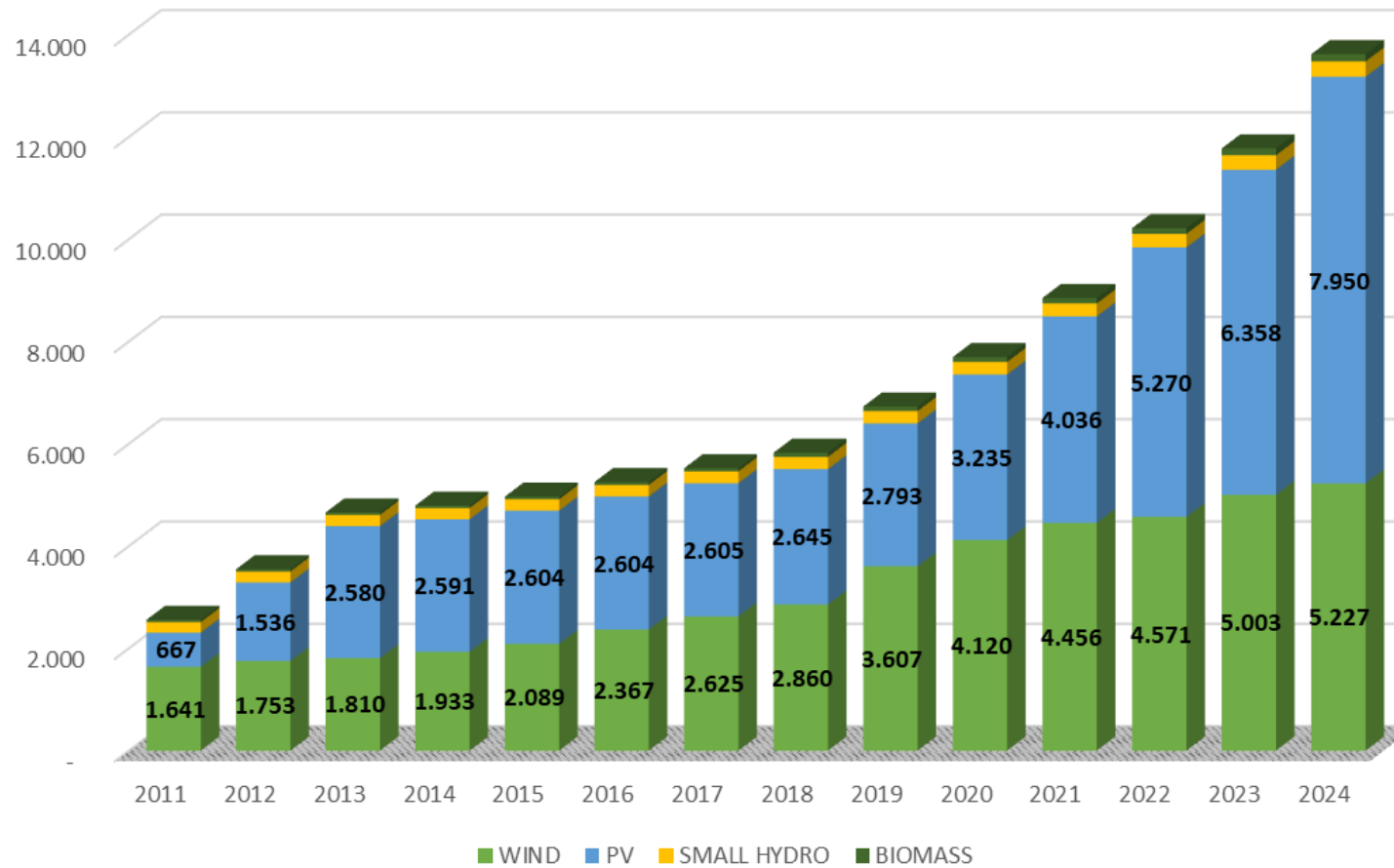
- 3,5 years of Operation
- Submission of 29275 applications
- 27127 Administrative Acts have been issued

RES – Producer Certificate

PRODUCTION LICENSE		
TECHNOLOGY	NUMBER	POWER (MW)
WIND	1865	31986,0
OFFSHORE WIND	1	216,0
PHOTOVOLTAIC	2239	50066,6
SOLAR THERMAL	3	201,9
SMALL HYDRRO	687	1012,1
BIOMASS	57	208,5
HYBRID	170	596,2
TOTAL	5022	84287,3

Evolution of installed and in operation RES projects

IN OPERATION RES PROJECTS 2011-2024 (AUG. 2024)



The installed capacity of RES projects in Feb. 2024 was 13.6 GW

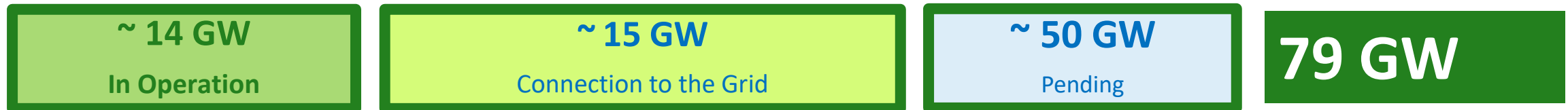
- PV: 7.95 GW
- Wind: 5.23 GW
- Small Hydro: 0.30 GW
- Biomass: 0.14 GW

Status of RES Projects

Electricity Producer Certificate

85 (RES) GW +
20 (RES+ESS) GW

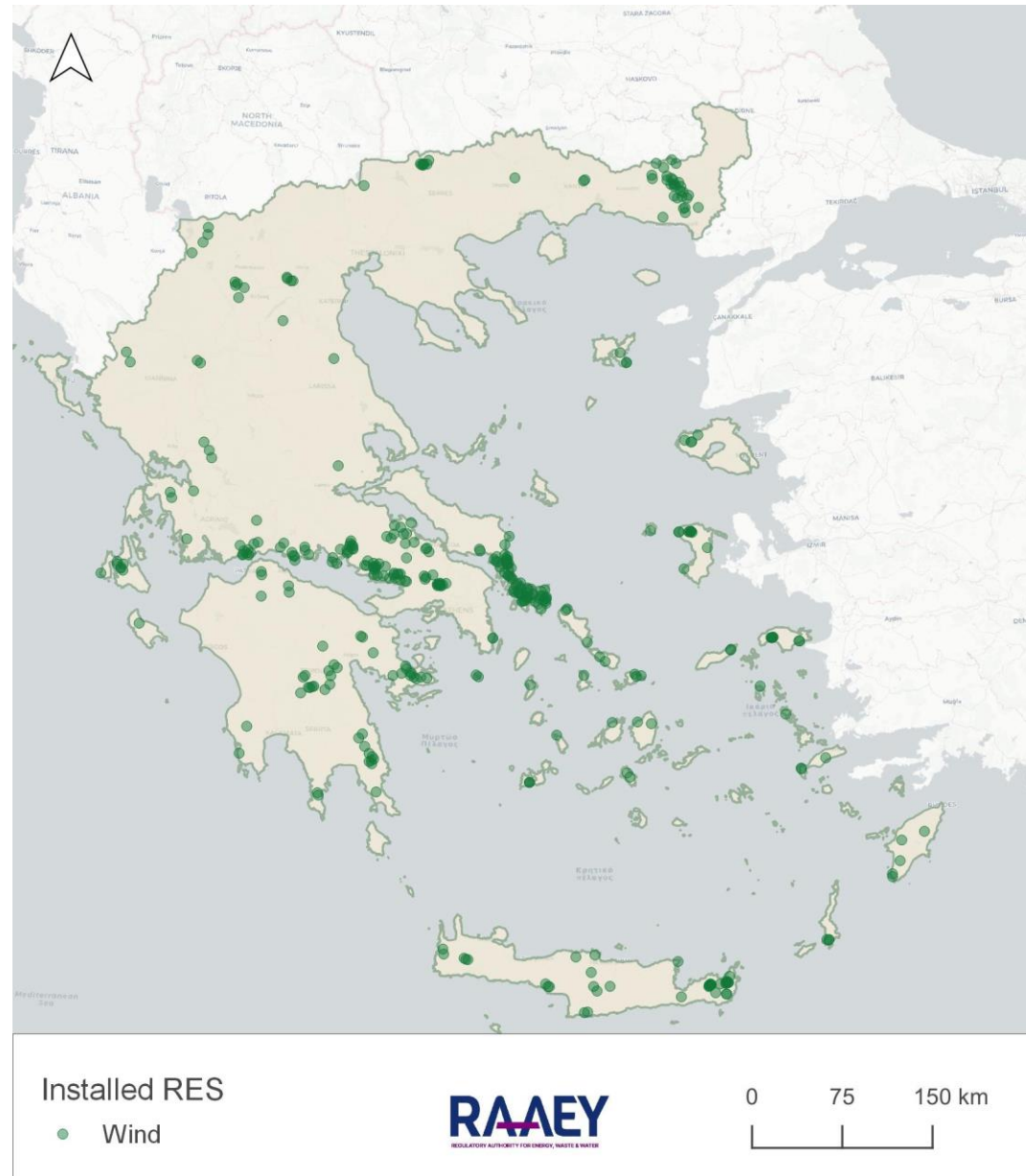
Electric Grid – Connection to the Grid



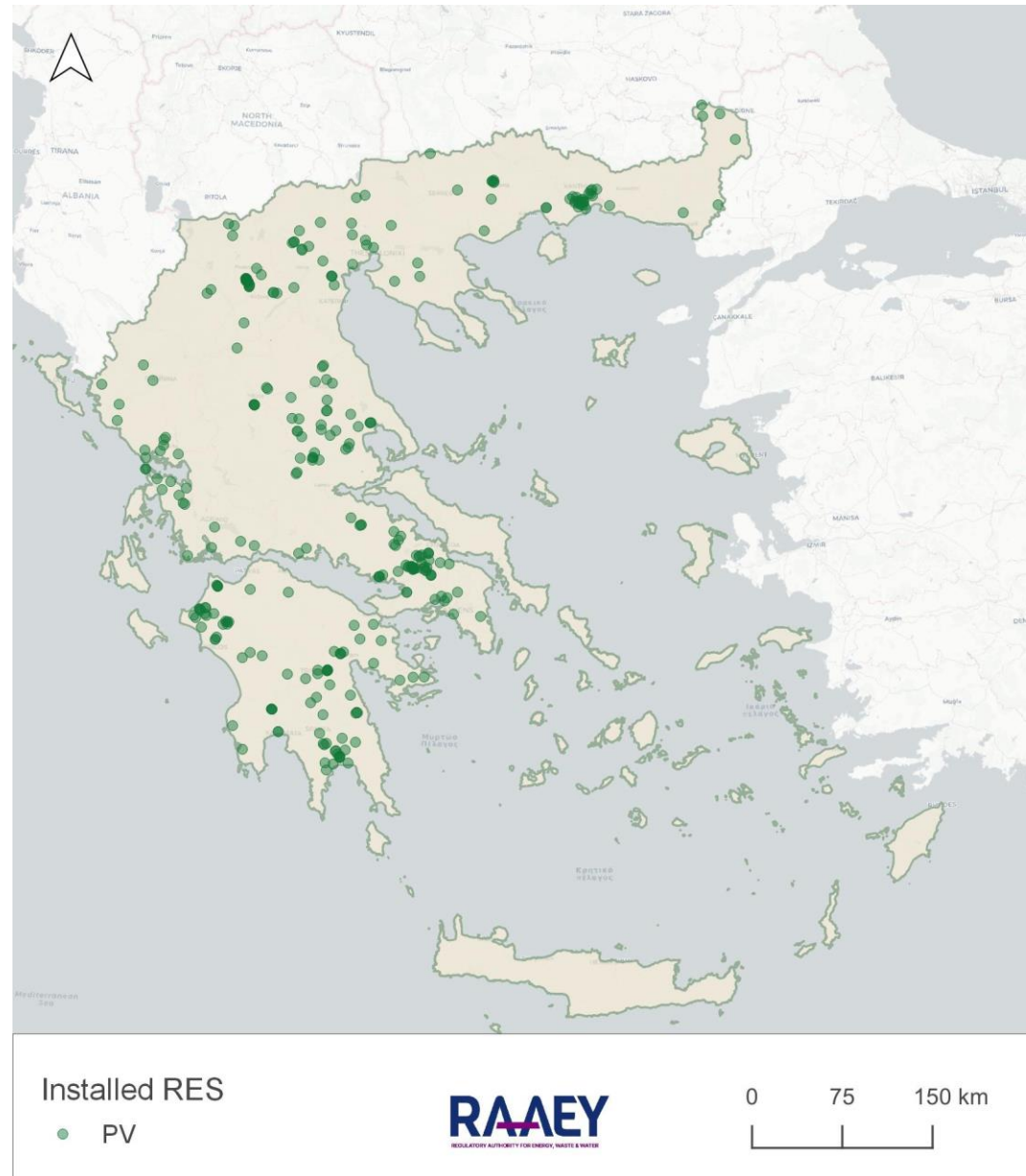
Capacity of the Grid



Installed RES projects - Wind



Installed RES projects - PV



Economic Schemes for development of RES in Greece

**New
RES**

**up to
2030**

**28
GW**

Participation in RES Auctions (Technology Neutral)

Participation in the Market

Private PPA between RES Producer & Consumer or Supplier

FiT - Currently small units take prices directly by law and minister's decision (PV < 500kW, Wind < 6MW - up to 2 projects each producer)

Implemented RES Auctions 2016-2021

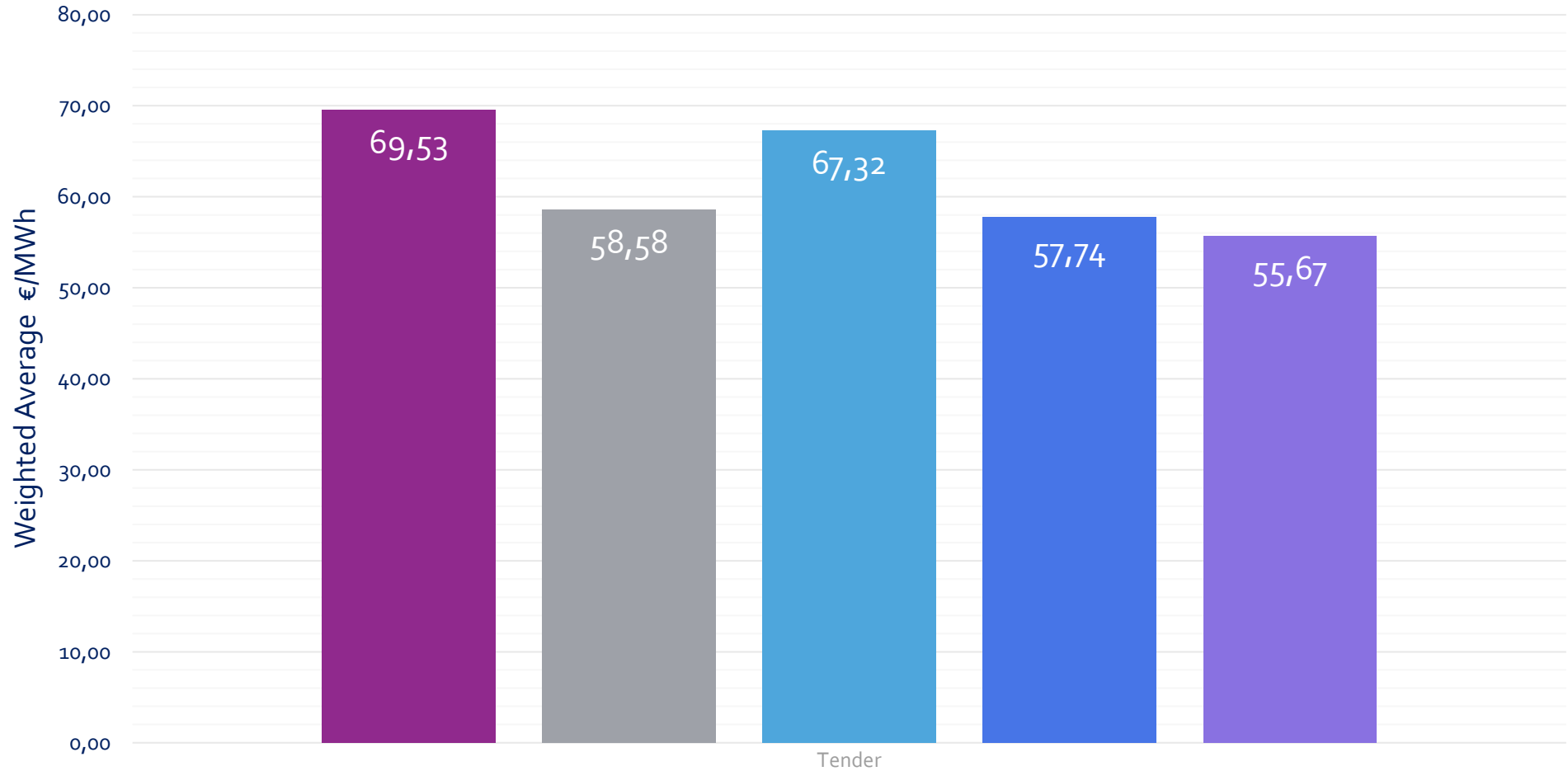
No. of Auctions	Type of Auction	Date	Granted PV Projects (MW)	Granted Wind Projects (MW)
2	1st Pilot Auction (TS)	December 2016		40 MW
3	Technology Specific	July 2018	106,40	170,93
3	Technology Specific	December 2018	61,94	159,65
1	Technology Neutral (Big)	April 2019	371,18	66,60
2	Technology Specific	July 2019	142,88	179,55
2	Technology Specific	December 2019	105,09	224
1	Technology Neutral (Big)	April 2020	349,94	153
2	Technology Specific	July 2020	142	472
1	Technology Neutral (Small)	May 2021	350	0

PV: 1.629,34 MW

Wind: 1.426,73 MW

Implemented RES Auctions 2016-2021

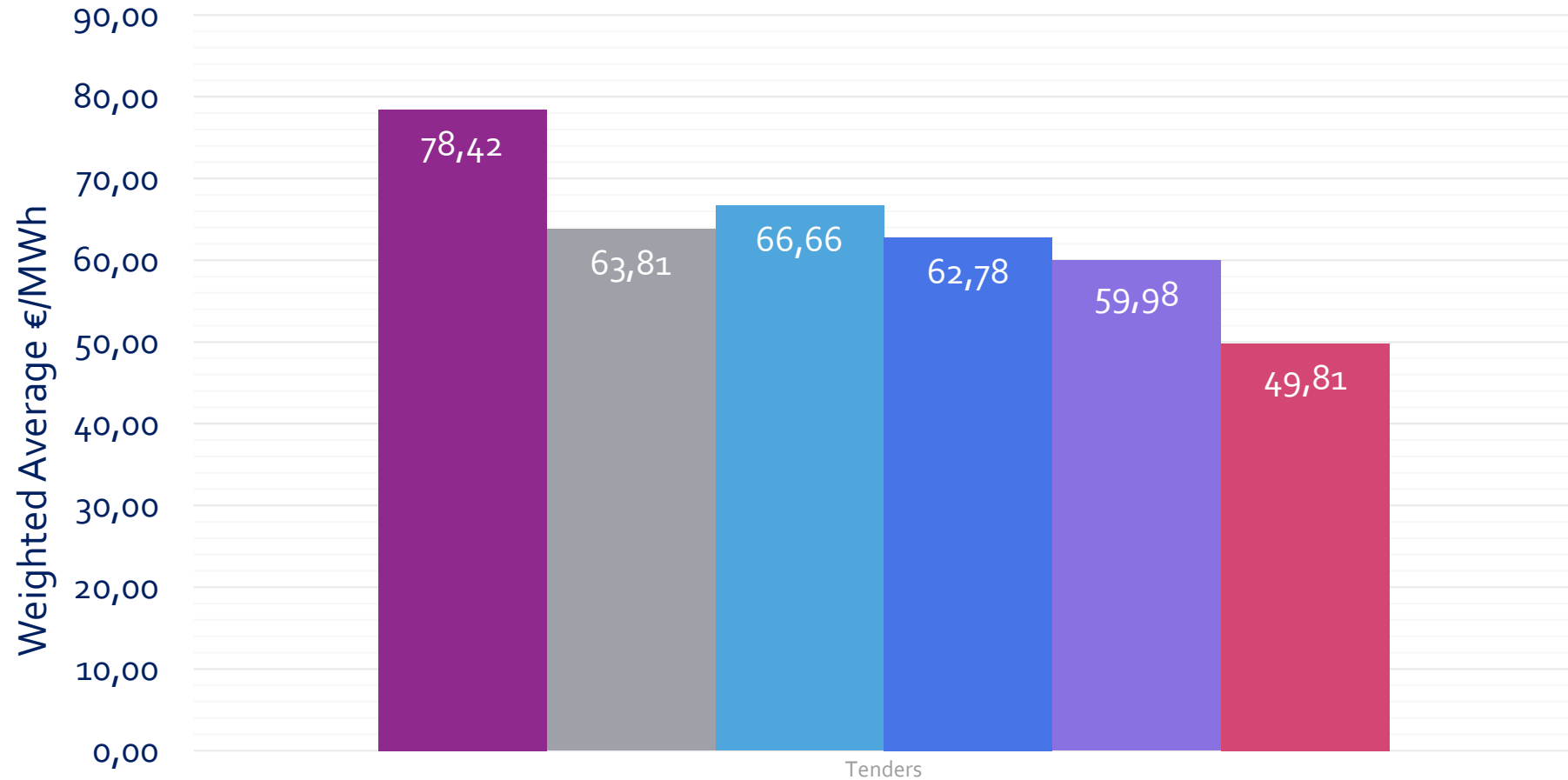
Weighted average for Wind stations per Tender



- 2018 - Tender [3/2018] – Category III (Wind Stations - 3MW < PWIND ≤ 50MW)
- 2018 - Tender [6/2018] – Category III (Wind Stations - 3MW < PWIND ≤ 50MW)
- 2019 - Tender [3/2019] – Category II (Wind Stations - PWIND ≤ 50 MW)
- 2019 - Tender [5/2019] – Category II (Wind Stations - PWIND ≤ 50 MW)
- 2020 - Tender [3/2020] – Category II (Wind Stations - PWIND ≤ 50 MW)

Implemented RES Auctions 2016-2021

Weighted average for PV stations per Tender



- 2018 - Tender [1/2018] – Category I (PV Stations - PPV ≤ 1 MW)
- 2018 - Tender [2/2018] – Category II (PV Stations - 1MW < PPV ≤ 20MW)
- 2018 - Tender [4/2018] – Category I (PV Stations - PPV ≤ 1 MW)
- 2019 - Tender [2/2019] – Category I (PV Stations - PPV ≤ 20 MW)
- 2019 - Tender [4/2019] – Category I (PV Stations - PPV ≤ 20 MW)
- 2020 - Tender [2/2020] – Category I (PV Stations - PPV ≤ 20 MW)

Energy Storage Systems Licensing

Law 4951/2022

Incorporation of 2019/944/EU Directive: Licensing framework for stand-alone electricity storage systems

Definition of the licensing procedure for:

- documents to be submitted,
- evaluation of applications,
- license modification procedure,
- license duration
- milestones and
- fees

Application for granting of Storage License are submitted in the Digital Registry

Licensed Energy Storage Systems / RES+ESS

*ESS Technology	Max Absorption Power (MW)	Max Injection Power (MW)	Installed Capacity (MWh)	Guaranteed Capacity (MWh)	Count
Battery	48165.3	46954.5	133368.3	114907.0	957
Pumped hydro	4789.0	5104.2	51199.4	48796.0	34
Sum	52954.3	52058.7	184567.7	163703.0	991

Technology	RES Power (MW)	ESS Max Injection Power (MW)	ESS Guaranteed Capacity (MWh)	Count
**11A	13658.8		23722.8	280
PV	12743.3		21715.3	254
Wind	915.5		2007.5	26
***11B	4670.6	6502.4	15521.4	181
PV	4193.3	5875.1	13607.6	156
Wind	451.0	556.8	1678.8	22
Wind + PV	26.3	70.5	235.0	3
Sum	18329.4	6502.4	39244.2	461

*ESS: Stand-alone Energy Storage System

**11A: Co-located ESS with RES without the ability to absorb electrical energy from the grid

***11B: Co-located ESS with RES with the ability to absorb electrical energy from the grid

Storage Licenses Status & Auctions

ESS Licensing Status	ESS Max (Injection) Power (MW)	ESS Installed Capacity (MWh)	ESS Guaranteed Capacity (MWh)	Count
License	33625.8	132943.2	118606.5	591
Environmental Approval	17830.6	50168.3	43891.2	383
Grid Connection Offer	602.3	1456.3	1205.3	17
Sum	52058.7	184567.7	163703.0	991

AUCTION	AUCTION D POWER (MW)	CEILING PRICE (€/MW/έτος)	INVESTMENT SUPPORT	TENDERS	POWER (MW)	CAPACITY (MWh)	LOWEST PRICE (€/MW/έτος)	HIGHEST PRICE (€/MW/έτος)	WEIGHTED PRICE (€/MW/έτος)	SUCCEEDED	POWER (MW)	CAPACITY (MWh)
A AUCTION	400	115.000	200.000	93	3.299,0	6.653,0	33.948	64.112	49.748,2	12	411,79	824,14
B AUCTION	288.11	115.000	100.000	55	1.668,9	3.348,7	44.100	49.917	47.680,0	11	299,78	599,81

A third auction, with a 4-hour duration of guaranteed capacity, is scheduled to be announced in the near future

Thank you for your attention!!!

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