



Planned & implemented wind energy projects in Greece in protected areas

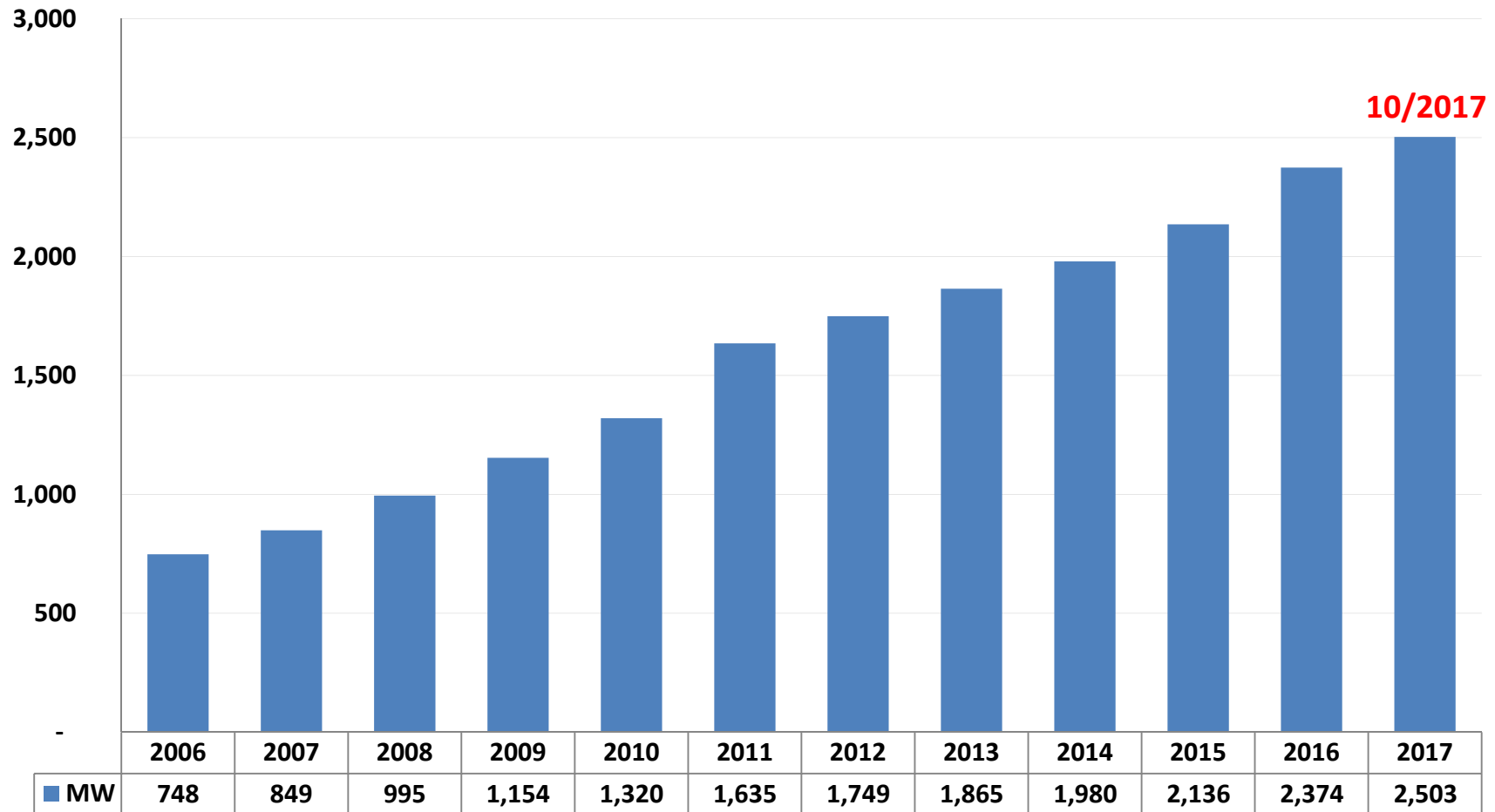
Challenges & successes

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Installed Wind Capacity



Evolution of installed wind capacity in Greece

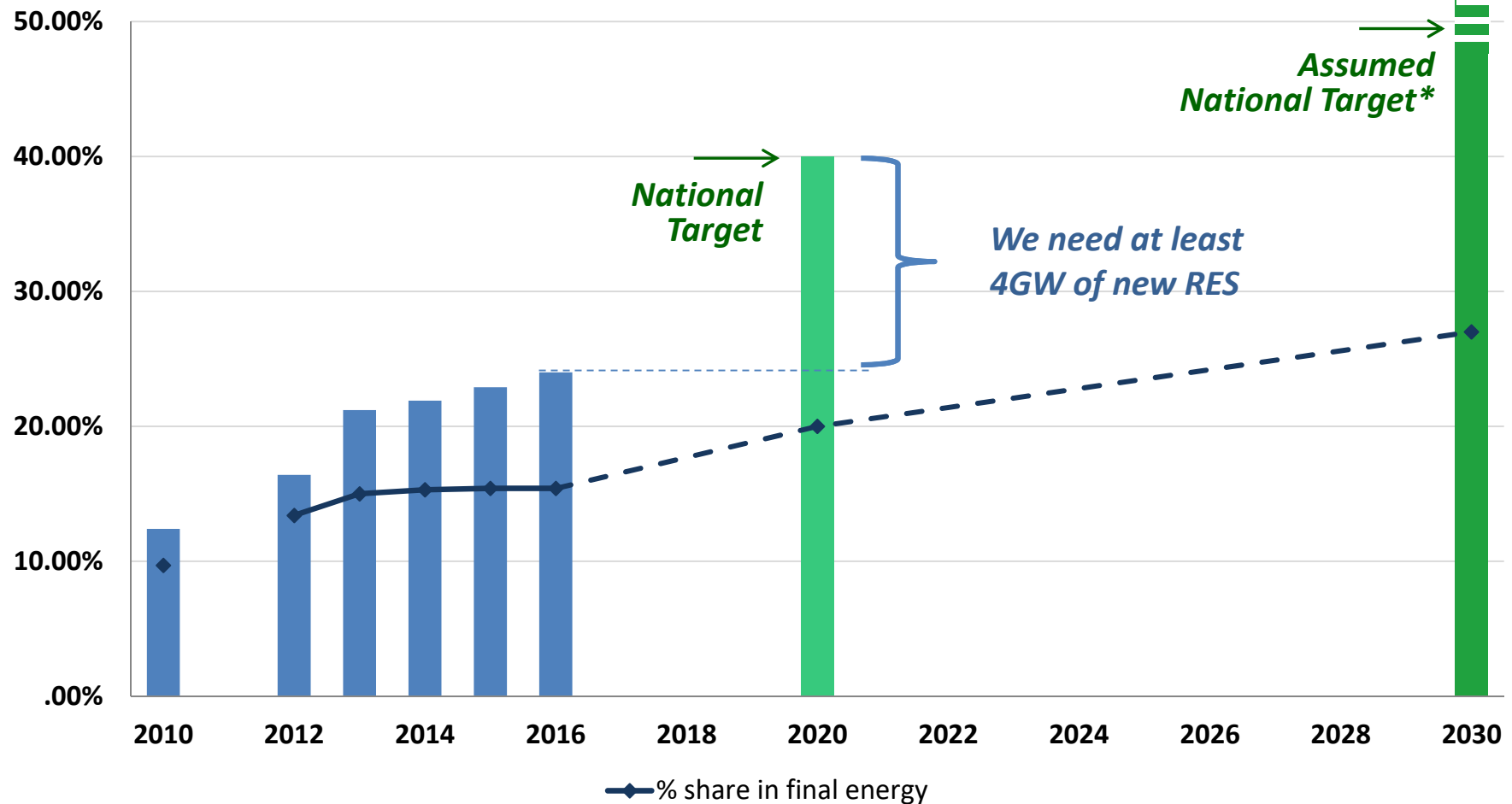


Sources: a) 2006-2016: HWEA wind statistics, b) 2017: RAE (<http://www.rae.gr/geo/>)

Share of Renewable Energy Sources

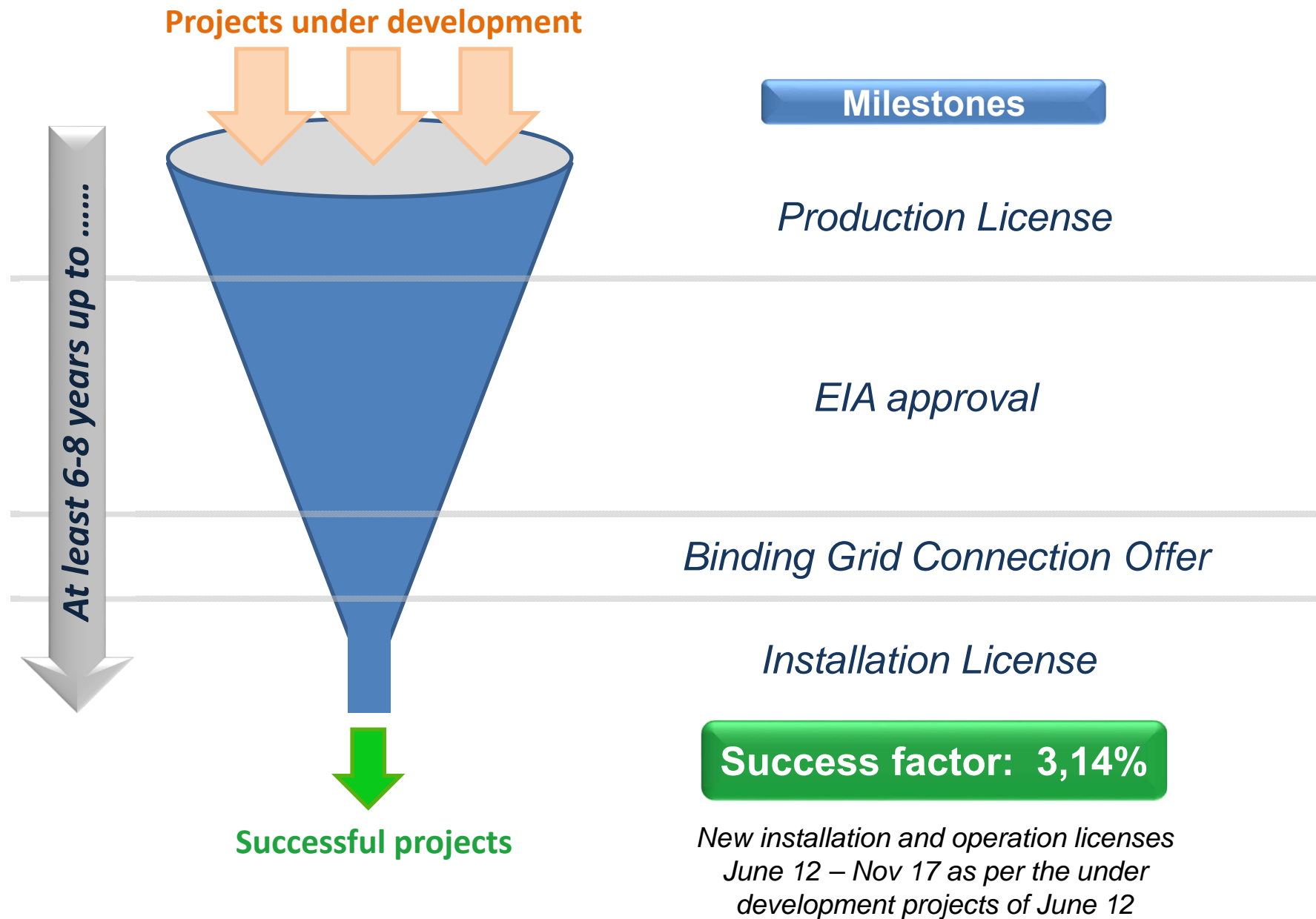


RES share in electricity



* Based on the EU target for 27% share of renewable energy in final energy consumption

Wind Energy Development in Greece



A complete legislation framework ...



2008

- Spatial Framework for RES

2010

- MD 37338/2010 for SPAs (characterization species)

2011

- Law 4014/2011 (environmental licensing)
- Law 3937/2011 for the protection of biodiversity

2012

- MD 8353/2012 for SPAs (mitigation measures)

2013

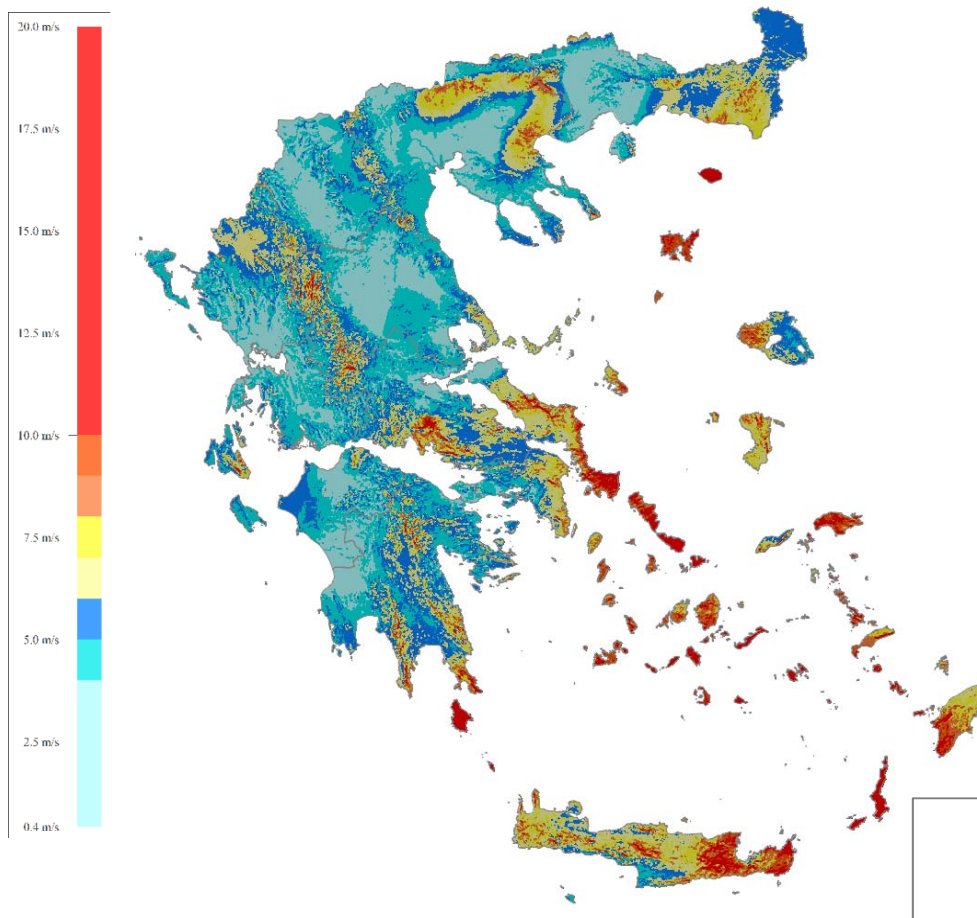
- MD 167563/2013: new procedure for environmental licensing

2014

- MD170225/2014: specifications of environmental studies
- Law 4280/2014 (new forestial Law): reforestation of equal area

... in line with EU
legislation

Spatial Framework for RES (I)

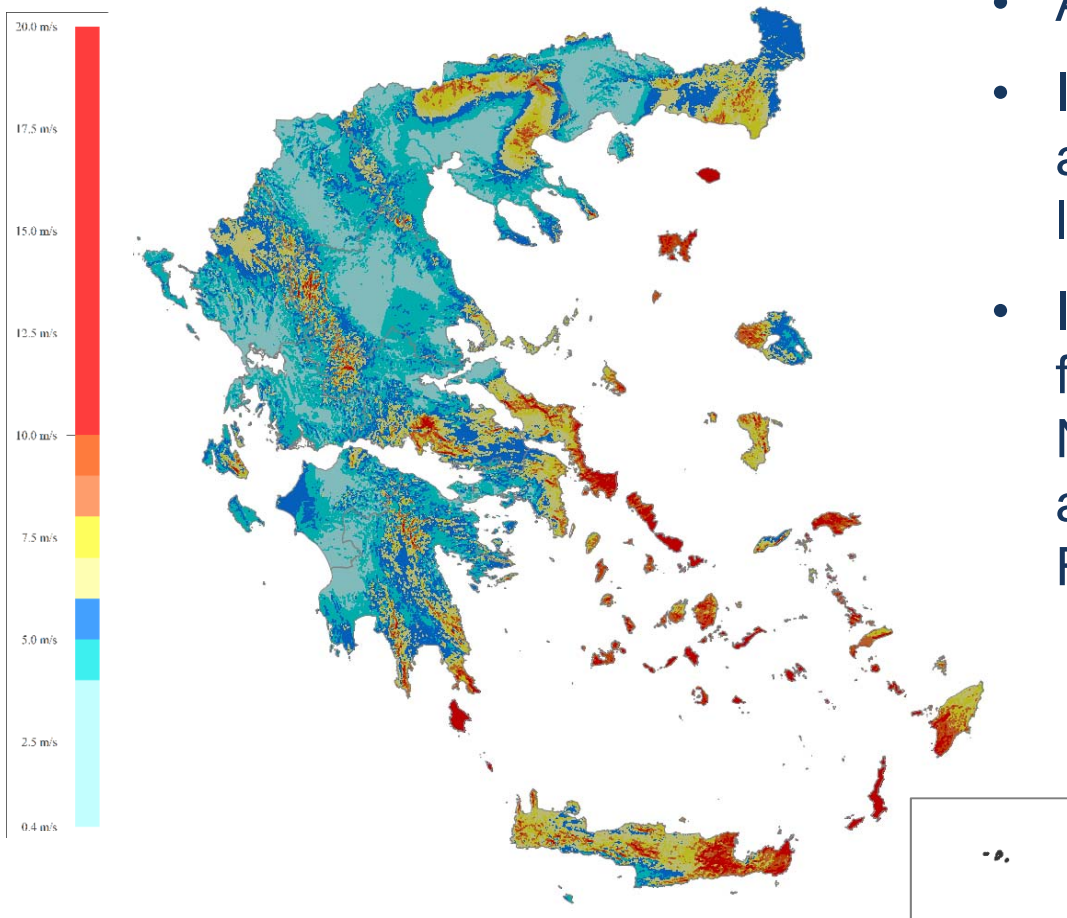


- Approved after Strategic Environmental Assessment
- Approved by the Council of State in plenary session (Dec.1422/2013)
- Legal basis for several decisions of the Council of State
- Main characteristics:
 - Strict rules and restrictions (exclusion zones, min. distances etc)
 - Transparency and equal treatment for every project

Spatial Framework for RES (II)



- A dynamic framework
- Its consequences are continually adjusted to the application of the legislation for the protective areas
- Indicatively, the legislation foresees the process for new NRs and Strict NRs, which – according to the Spatial Framework- are exclusion areas



Thorough environmental investigation



Appropriate design of wind energy projects

- application of Spatial RES criteria
 - exclusion zones
 - carrying capacity
 - min. distances from other land uses
 - visual impact assessment, etc.
- updated specs for EIA study (MD 170225/2014 with very analytical specs for all categories of environmental, ecological, bird studies)
- Special Bird Assessment for projects inside SPAs –IBAs (Special Framework for RES)
- Special Ecological Assessment for projects inside N2000 (Law 4014/2011)
- field work of at least 1 year (MD 170225/2014)
- Monitoring and reporting obligations

Exclusion zones



- ✓ **EC, Wind energy developments and Natura 2000, October 2010 – case by case approach**
- ✓ **Greek legislation: Exclusion zones (among others):**
 - Nature Reserves & Strict Nature Reserves (Biodiversity Law)
 - Core area of National Parks, aesthetic forests (Biodiversity Law)
 - Priority Habitats (Dir. 92/43/EEC)
 - Ramsar wetlands
- ✓ **New a priori exclusion zones is an extreme measure which should be taken after thorough analysis including the impact on development**

Special care for avian fauna (SPAs- IBAs)



MD 37338/2010 & 8353/2012



Special measures for 202 SPAs & 196 IBAs

- Criteria for characterization species
- Exclusion zone of 3 km from the borders of a Ramsar wetland when this zone is inside an SPA
- 21 priority species for which buffer zones from their nests are determined
- Underground cables inside SPAs
- Automated system that stops WTGs inside migratory bottlenecks
- Removal of dead animals around WTG platforms

Environmental Impact Assessment



- EIA study is the appropriate tool which secures the golden balance between the effective protection of the environment and the necessity not to block the development
- The quality of the EIA study is crucial. The high quality is secured by the existing legal framework as well as the knowledge which has been built by the sector.
- The current framework empowers the administration to secure the quality of the EIA:
 - adequate depth of analysis
 - adequate extent of the area under examination
 - adequacy of the primary data collected
 - effectiveness of the assessment of the cumulative impact

Mitigation measures toolbox



Pre-Construction

Extended field work

Ecological studies

- Habitats' mapping
- Birds' territories

GIS mapping tools

WF layout is a multi-layer problem!

Visual & noise impact tools

- Photorealism
- Iso-noise maps

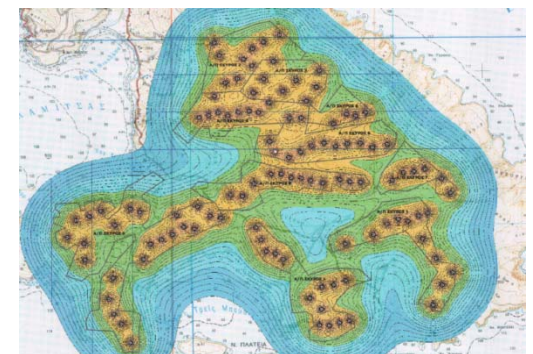
Post-Construction

Restoration & Reforestation

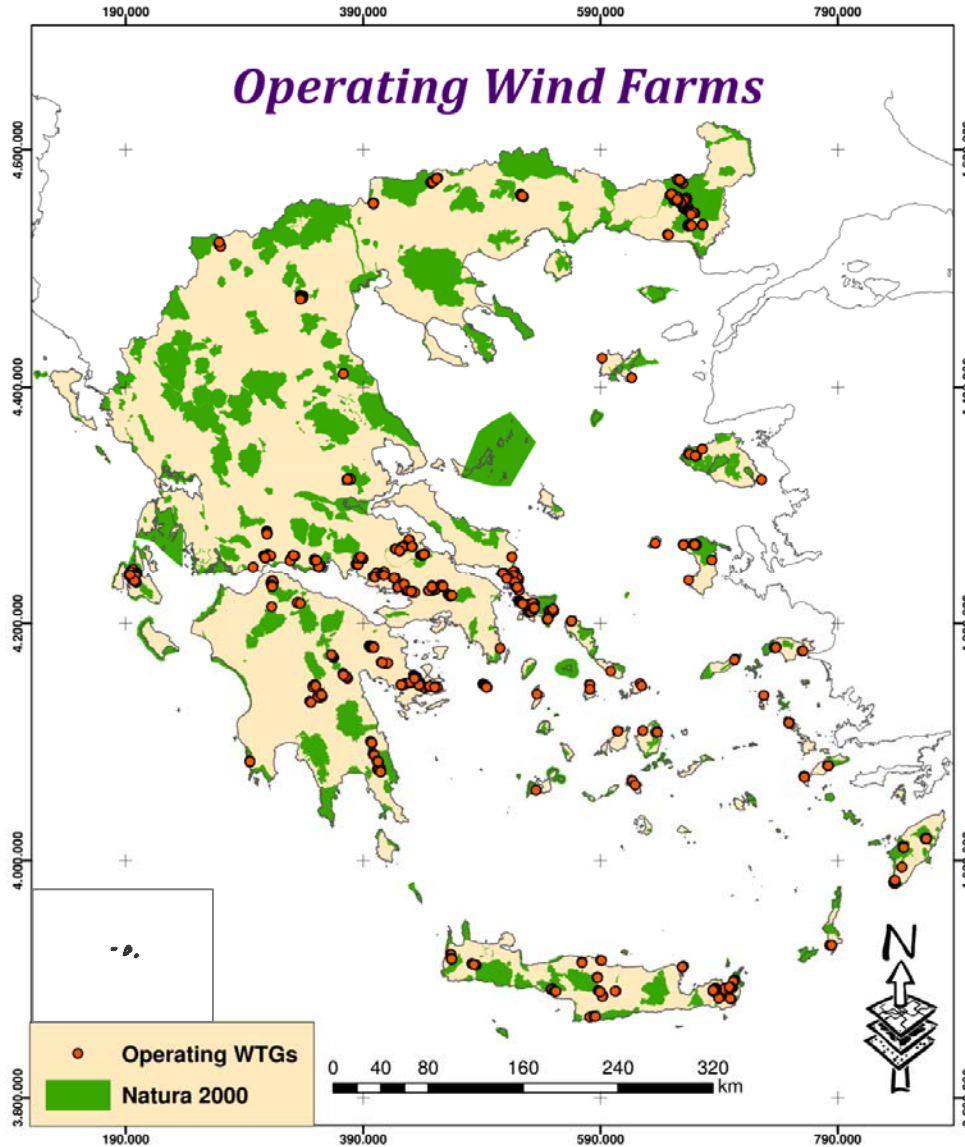
Annual monitoring

- Habitats' status
- Fauna activity
- Bird Collisions

Other preventive or remedial measures (case depended)



Wind Energy & Natura 2000 (operating projects)



Source: Regulatory Authority for Energy

**2.502,83 MW
(1.969 WTGs)**



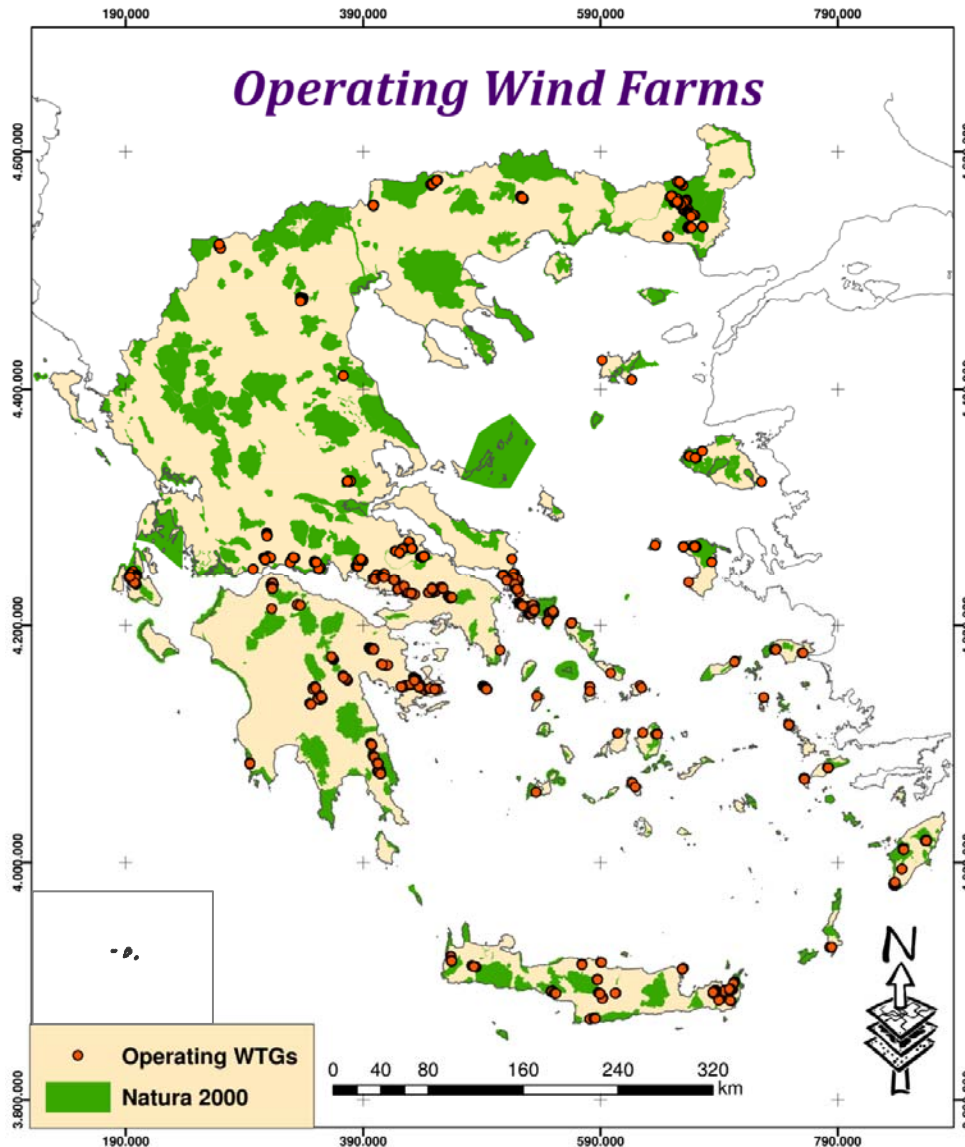
**N2000:
557,87 MW
(527 WTGs*)**



**22,3%
inside N2000
(operating)**

* avg: $P=1,06\text{MW}$, rotor $D=54,3\text{ m}$

Wind Energy & Natura 2000 (operating projects)

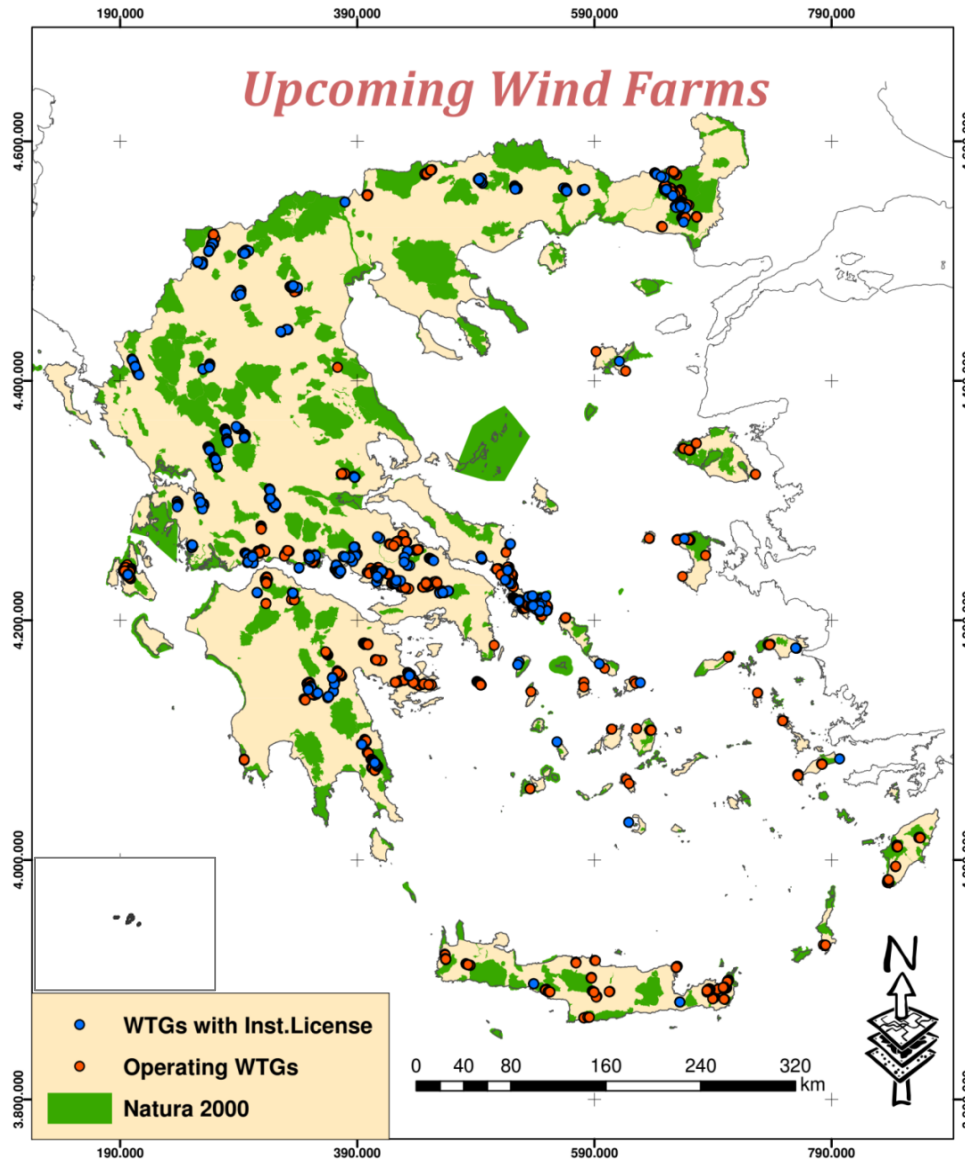


**22,3%
inside N2000
(operating)**



- A critical mass of wind parks inside N2000
- Monitoring applied
- Reporting reviewed by the competent authorities
- An important data base of actual experience

Wind Energy & Natura 2000 (upcoming projects)



Source: Regulatory Authority for Energy

2.225,89 MW
(1.069 WTGs)



N2000:
578,2 MW
(324 WTGs*)



26%
inside N2000
(upcoming)

*avg: $P=1,73\text{MW}$, rotor $D=66,5\text{ m}$

Wind Energy & Natura 2000 (total)



Area	Parameter	Operating	Installation License	Total
All country	Capacity (MW)	2.502,83	2.225,89	4.728,72
	Nr. of WTGs	1.969	1.069	3.038
Inside Natura 2000	Capacity (MW)	557,87	578,2	1.136,07
	Nr. of WTGs	527	324	851
	% of capacity inside N2000	22,3%	26,0%	24%

37,1%
of land at H>500m
covered by N2000

Source: RAE, October 2017

Final remarks – Conclusions



- The strategic role of wind energy in Greece
- A robust and EU compatible legislative framework
- RES Spatial Framework approved by the Council of State
- Adequate know-how built by the sector
- Secure the quality of the EIA studies
- N2000 areas could not be a priori no-go zones
- 37,1% of land at $H > 500\text{m}$ covered by N2000
- 22,3% of installed wind capacity inside N2000

Wind energy and wild life can co-exist

Thank you!

