Financing Renewable energy Sources in Greece.

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Thessaloniki, 12 September 2018

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Introduction
Current situation

National targets (2014 & 2020)

Technology	Installed capacity target in MW	
	2014	2020
Wind	4000	7500
SHPP (P<15MW)	300	350
PV	1500	2200
CSP	120	250
Biomass	200	350

Current Licensing Status (RAE, July 2018)

DEVELOPMENT OF R.E.S. PROJECTS WITH PRODUCTION LICENSE PER TECHNOLOGY(1) (2)

TECHNOLOGY		With operation license		With installation license		With A.E.P.O.		With installation license before the stage of A.E.P.O.		Total Production licenses
			% of total production licenses (4)		% of total production licenses (4)		% of total production licenses (4)		% of total production licenses (4)	
Wind	Number of Projects	242	22,4%	129	11,9%	230	21,3%	480	44,4%	1081
	Power (MW)	2543,6	11,2%	1985,4	8,7%	4645,3	20,5%	13524,1	59,6%	22698,4
Photovoltaics(3)	Number of Projects	253	42,9%	21	3,6%	174	29,5%	142	24,1%	590
	Power (MW)	691,8	23,3%	295,0	9,9%	946,1	31,9%	1033,2	34,8%	2966,1
Small Hydro	Number of Projects	115	52,0%	32	7,7%	46	11,1%	221	53,4%	414
	Power (MW)	233,1	45,7%	57,0	6,2%	115,1	12,6%	510,0	55,7%	915,1
Biomass - Biogas	Number of Projects	7	12,5%	10	17,9%	12	21,4%	27	48,2%	56
	Power (MW)	46,2	27,7%	35,1	21,1%	23,8	14,3%	61,6	37,0%	166,8
Biomass - Combustion	Number of Projects	0	0,0%	3	7,3%	14	34,1%	24	58,5%	41
	Power (MW)	0,0	0,0%	15,0	6,4%	77,4	33,3%	140,1	60,3%	232,6
Total	Number of Projects	7	7,2%	13	13,4%	26	26,8%	51	52,6%	97
	Power (MW)	46,2	11,6%	50,1	12,5%	101,3	25,4%	201,8	50,5%	399,3
Geothermal	Number of Projects	0	0,0%	0	0,0%	1	100,0%	0	0,0%	1
	Power (MW)	0,0	0,0%	0,0	0,0%	8,0	100,0%	0,0	0,0%	8,0
Hybrid	Number of Projects	0	0,0%	2	10,0%	4	20,0%	14	70,0%	20
	Power (MW)	0,0	0,0%	3,7	0,9%	63,8	15,1%	355,4	84,1%	422,8
Solar Thermal Power	Number of Projects	0	0,0%	0	0,0%	58	70,7%	24	29,3%	82
	Power (MW)	0,0	0,0%	0,0	0,0%	251,9	57,0%	190,3	43,0%	442,2
Total RES	**Number of Projects**	**617**	27,0%	**197**	8,6%	**539**	23,6%	**932**	40,8%	**2285**
	Power (MW)	**3514,7**	**12,6%**	**2391,2**	**8,6%**	**6131,4**	22,0%	**15814,7**	100,0%	**27851,9**

(1) As it must be from the monitoring carried out by RAE within it's remit

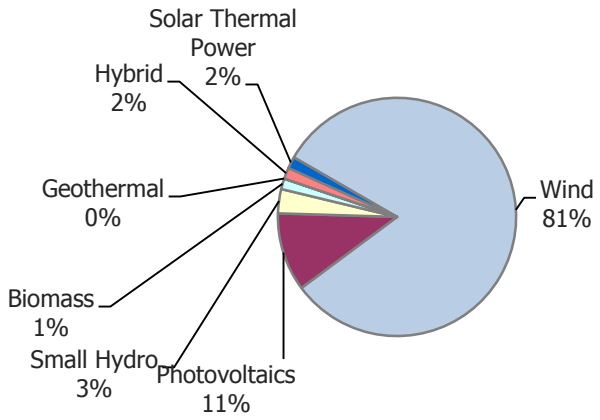
(2) There are not included 430 projects with a total installed capacity of 2381,46 MW which did not pay the annual production license fee for the year 2015 and their license has expired according to the provisions of Law 4152/2013 (55 wind power of 940,87 MW, 339 photovoltaic power of 1342,1 MW, 35 small hydro power of 89 MW and 1 biomass project of 9.5 MW)

(3) There are not included projects with a capacity of less than 1 MW for which no production license is required according to the provisions of Law 3851/2010

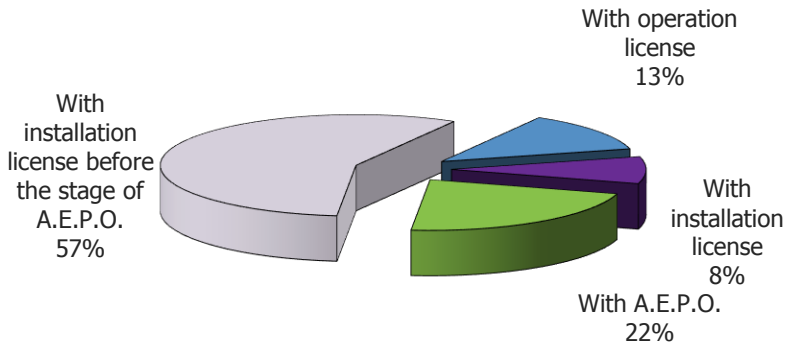
(4) Percentages for all projects with Production License

Current Licensing Status

POWER OF R.E.S. PROJECTS WITH PRODUCTION LICENSE PER TECHNOLOGY



POWER OF R.E.S. PROJECTS WITH PRODUCTION LICENSE PER STAGE OF DEVELOPMENT



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The Role of the Regulator

2. Role of the Regulator in renewables area & licensing

- RAE's responsibility is concentrated primarily on the electricity sector
- Three Stages' licensing Procedure (not in smaller projects that are exempted from Production License, PL)

RAE's Licensing Responsibility

RAE's Monitoring Responsibility

Production License → Installation License → Operation License

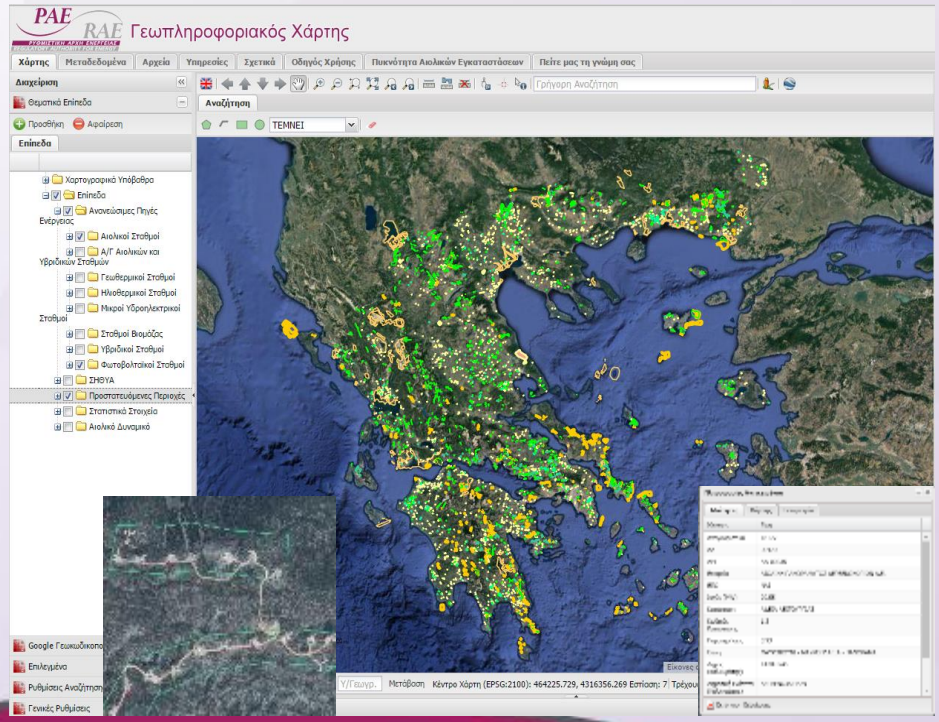
- Issued by RAE
- Approval of Preliminary Scope of Work Analysis
- 25 years duration
- Monitoring, renewal, amendment / modification, transfer are controlled by RAE

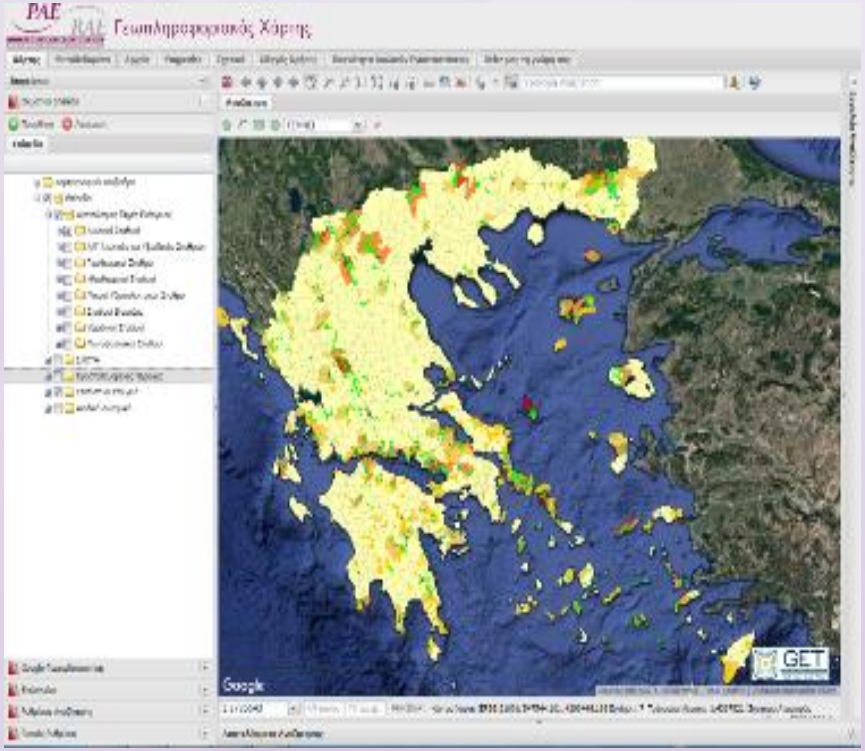
- Issued by Ministry of Energy or Regional Authority
- Green light to commence installation works
- Once issued for 2 years with 2 times extension of total 3.5 years
- Prerequisites: Environmental Terms Approval (E.P.O) & Grid Connection Terms

- Issued by the same Body as the Installation License
- Project becomes operational
- Duration 20 or 25 years
- Prerequisites: Grid Connection Contract & P.P.A

2. Role of the Regulator in renewables area & licensing

- RAE holds a registry with all the PL issued, amended and revoked published in its webpage and updated constantly.
- For the representation of the RES projects and their most up - to - date significant elements (capacity, wind turbines, SPV, location, licensing stage etc.) a very helpful Geo - informatics map is being used (www.rae.gr/geo/)





RES Licensing Current Status (Aug. 2018)

- Total number of applications for PL for all kind of RES technology:704
- Total capacity under approval with PL: 10.917 MW

Applications for RES production licenses								
Technology								
		WIND				Small		Biomass-
	PV	<3MW	>3MW	Peloponnese	Off-shore	Hydro	Hybrid	Biofuel
Number	109	179	119	69	26	28	166	8
Capacity (MW)	1122,52	492	2156,44	1586,7	4629	56,45	850,76	22,81

- Decision RAE 96/2007 determines all the connected and the non-interconnected islands as areas with congested grid and therefore is not allowed the submission of application for production licenses for wind and PV projects (solar thermal and hybrid are excluded)
- Decision RAE 699/2012 determines the geographic area of Peloponnese as area with congested grid and for this reason is not allowed the submission of application for production licenses for all RES technologies.
- Completion by the end of 2018 of the evaluation procedure for all the pending applications for RES projects in Peloponnese

- Opinion RAE 7/2018 to Ministry for the Hybrid pricing in order to restart and complete the evaluation of the pending applications for Hybrid projects
- The majority of the applications for Hybrid projects that have been submitted during the last three years uses batteries as storage mean and PV instead of the pumped storage (hydro-wind) that used to in the previous years

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Risk in RES sector

Risk Energy Projects Risk Matrix

- The risks of renewable energy projects can be broken down in several categories
- The following table summarizes the most common risks categories associated with renewable energy projects

Risk categories for RES

Risk Category	Stake	Specific Risk Events
Project Investors	Commitment, competence, and creditworthiness of investors	Credit risk, large level of investment, long tenor of return, additional equity required at later stages, commitment of the investors, misalignment of investors' goals
Construction Risk	Timing, cost, and performance of the construction project of PV solar plant	Cost overruns, completion delays, abandonment and non-completion, meeting project's specifications, project's quality, availability of land and approvals Force-majeure: sponsor changes order, natural disaster, political risk
Operational Risk	Costs, availability, environmental impact, changes in legal regulations and tariffs, policies, etc.	Unsatisfactory performance of the plant, equipment damages
Market Risk	Volume, price, demand for the output (electricity), supply and demand for the input (availability and amount of solar irradiation, weather and climate conditions in the case of solar)	Demand for power, electricity prices and tariffs Quality of solar irradiation, quality of supporting infrastructure
Transport Risk	Logistics costs can increase in the case of blockages, strike and other events; also has impact on construction and operations	Blockages, strikes, natural disasters, costs increases
Environmental Risks	Risk of incurring fees, fines or license withdrawal due to natural disasters and/or violation of environmental laws	Disposal of fixed assets Disposal of spent fuel
Financial and Cryptocurrency Risk	Changes in the interest rates or exchange rates may affect payments and financing of the solar plants construction	Interest Rate Swings and subsequent violation of terms Exchange Rate Swing
Country and Political Risk	Arises from operations in a foreign country environment, and includes transfer risk, sovereign risk, political risk (wars and revolutions), exchange rates changes, inflation and other hazardous events arising from the behavior of local political actors	War and Civil Strife Confiscation, Expropriation and Nationalization (CEN) Increase in taxes levied on the project Import / Export duties Change in regulation Foreign exchange rate changes due to devaluation, convertibility or transfer restrictions
Credit Risk	Counterparties' default risk or default on specific payments	

Risk Mitigation and Control Mechanisms

Risk Category	Control / Mitigation Mechanism	Risk Allocation
Project Investors	Credit Assessment Competence and knowledge of the industry Credit Assessment of Sponsors Understanding between the investors' differences	Sponsors / Lenders
Construction Risk	Fixed price engineering Procurement and Construction contracts (EPC) Completion guarantees and progress reports Equity in advance Penalty Payments: up to cap of 20% for any delay on daily basis (except *Force Majeure*) Delivery date in advance of off-take agreement Performance Tests Use proven technology from well-known vendors **Against Force-Majeure:** Insurance **Against Land Ownership Risks:** Agree to completion criteria between construction and operating companies. Exclusivity Agreement Environmental indemnities Long lease that coincides with useful life of plant.	Equipment Suppliers, Insurance Companies, Landowners
Operational Risk	Performance Warranty Operating & Maintenance Agreement Manufacturer performance warranties	Plant Operators, Equipment Suppliers and sponsor
Market Risk	Off-take agreement (PPA) for the whole lifetime of the plant. Although this reduces the market risk, a PPA introduces credit risk with regards to the purchaser. Hedge the risk (up to 5 - 8 years only)	Power off-taker (utility) Hedge provider Sponsor
Transport Risk	Consideration transport alternatives Agree on pricing terms	Sponsor
Environmental Risks	Long-term contracts Include expenditure for disposal in business plan	Sponsor
Financial and Cryptocurrency Risk	Interest Rate and Currency Hedges	Bank
Country and Political Risk	Political risk insurance through state sponsored agencies (range: 0.2% pa to 2% pa): Won't cover all events and based on book values. Keep part of the technology secret Debt finance preferred, as dividends are more likely to be blocked than interest payments. Use of local debt Use joint venture with local investors. Joint financing with international lenders.	Export Credit Agency Development Banks Insurance Companies Investments in local markets
Credit Risk	Appropriate credit risk management	All parties

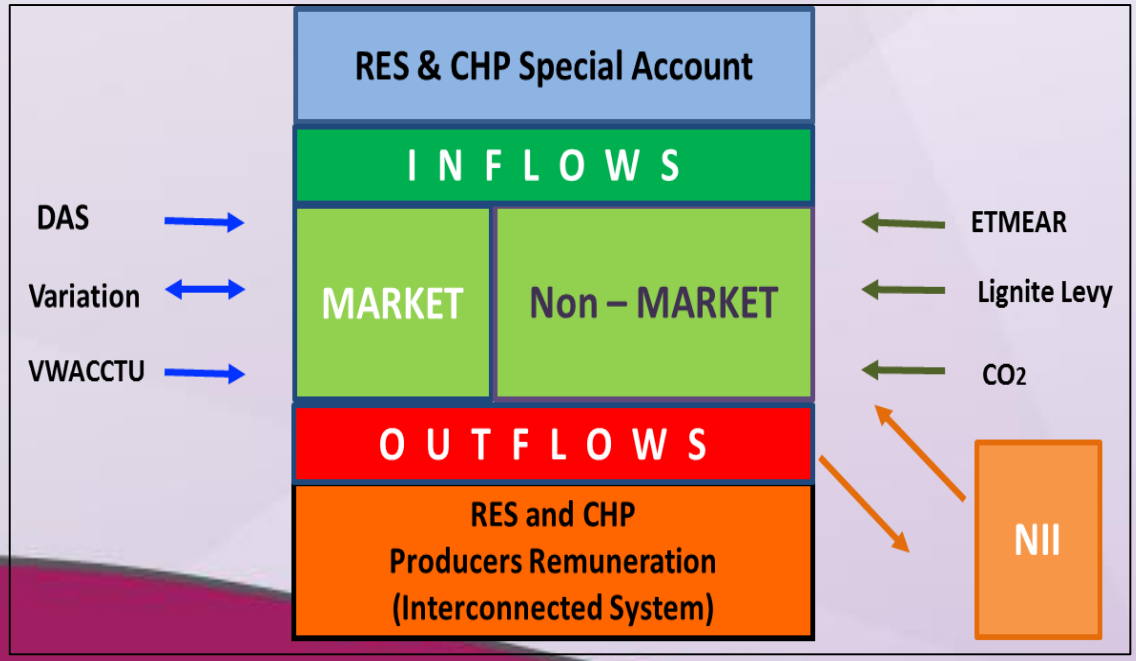
Key perceived risk elements in Greek RES Sector

1. Country Risk – Economic Stability
2. Retroactive policy (need for stable long –term RES strategy & governmental tax policy) → Auction Process (RAE's Decision 321/2018, Official Gazette B' 1466/27.04.2018)
3. Number of authorizations needed (more than 20 authorities are involved) – no concrete timetable
4. Grid Issues
   - In many cases insufficient grid capacity represents a major problem for RES projects
   - RES projects are often located in areas with a weak grid infrastructure (mainland and non-interconnected islands)
   - RAE's Decisions 96/2007 & 699/2012 for grid congestion areas (connected and the non-interconnected islands, Peloponnese)
5. RES & CHP Special Account

RES & CHP Special Account Surplus/Deficit

- Since the beginning of 2016 a new RES support scheme is established, based on an operating aid granted in the form of a sliding Feed in Premium over the compensation that RES and High Efficiency CHP producers receive from their participation in the electricity market and therefore changes were also introduced in the structure of the Special Account (law 4414/2016).

Figure 1. Qualitative schematic representation of RES Special Account's Components



RES & CHP Special Account Surplus/Deficit

	Month/Year	Total (mil. €)
Realised	Jan. 2015	-136,15
	Dec. 2015	-84,25
	Jan. 2016	-41,89
	Dec. 2016	-241,68
	Jan. 2017	-141,15
	Dec. 2017	42,49
	Jan. 2018	67,16
Forecasted	Dec. 2018	227,6
	Jan. 2019	126,62
	Dec. 2019	280,89

Source: ΔΑΠΕΕΠ ΑΕ

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Challenges for the Banking Sector

Challenges for financing RES

- **Distinct challenges for banks funding RES:**

1. **Liquidity**: funding that can be immediately drawn upon
   - Bank Guarantee participation Letter (1% cost of RES project)
   - Bank Guarantee Letter of project good execution (4% cost of RES project)
   - Letter of Intent
2. **Cost of debt** for wind onshore in the range of 6%-8%, while the cost of debt range for PV is much wider (6%-12%), which seems to be due to the different size of the projects (residential, small and large) and the different investor profiles (*Ecofys, 2017).*
3. **Debt/Equity ratio** (evaluation of investor's financial and economic creditworthiness & financial status, *Ecofys, 2017*)
   - 60/40 for PV
   - 60%-70%/30%-40% for wind
4. **Bank L.O.I** submitted to RAE range between 70%-100% of project's total cost

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Actions

Actions

- On process: Redefinition/Reassessment of the current production license evaluation criteria (Official Gazette B’ 2373/2011) as a result of the new RES support scheme and new legislation framework for RES auctions,
- New auctions
- Stable and proactive legal environment: Proposals to the Ministry of Environment and Energy to simplify the licensing procedures and set new rules for RES issues (e.g hybrid technology, wind technology projects of < 3 MW, etc)
- RAE’s decision to HEDNO for Grid congestion limits

Thank you for your attention

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