Αξιοποιώντας τις ευκαιρίες των ΑΠΕ: Η περίπτωση της Ελλάδας

RES opportunities explored: The Greek Case

Δρ. Π.Κ. Χαβιαρόπουλος, Δ/ση ΑΠΕ, ΚΑΠΕ
Dr P.K. Chaviaropoulos, Head RES Division, CRES
In 2010 Greece presented its National Action Plan for Renewable Energy Sources (time frame 2010-2020)

It is an ambitious plan aiming to reform the county’s energy sector so that 20% of the primary energy use is coming from RES by 2020 (penetration level: 40% electricity, 20% heat and 10% transport)

In the electricity sector, major RES players are going to be Wind and PV (7.5 and 2.2 GW target values for 2020) and, evidently the existing large hydro.

This does not exclude additional contributions from other RES e.g. biomass, geothermal energy and concentrated solar power.
The overall investments needed in the energy sector are estimated to 22.2 billion euro for the 2010-2020 timeframe.

From these, 16.5 billion will go to new RES capacity, nearly 7 billion to wind, 5.5 billion to PV, 1.6 billion to pump storage for supporting the variable RES production, 1.1 billion to solar heating and cooling, 0.5 billion to biomass and biogas projects.

On fossil fuels, Greece will spend 2.1 billion euro for new «clean coal» (lignite in our case) power plants while 3.3 billion will be invested in natural gas facilities.

Details of the total budget needed for 2010-2020 are shown on the table.

An additional budget of 5 billion euro will be needed for grid reinforcement and interconnections.
Accompanied by a huge (5+ billion euro) grid reinforcement and interconnection program (islands)
Exploiting new RES-Electricity options, like offshore wind
## The desired renewable mix (2014/2020)
### Ministerial Decree, October 2010

<table>
<thead>
<tr>
<th>Technology</th>
<th>Actual</th>
<th>Targets</th>
<th>Actual</th>
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<tbody>
<tr>
<td></td>
<td>End 2009</td>
<td>2014</td>
<td>2020</td>
</tr>
<tr>
<td>Hydro</td>
<td>3201</td>
<td>3700</td>
<td>4650</td>
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<tr>
<td>Small (0-15MW)</td>
<td>183</td>
<td>300</td>
<td>350</td>
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<tr>
<td>Large (&gt;15MW)</td>
<td>3018</td>
<td>3400</td>
<td>4300</td>
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<tr>
<td>Photovoltaics</td>
<td>53</td>
<td>1500</td>
<td>2200</td>
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<td>Roofs (10 kW)</td>
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<td>excl</td>
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<tr>
<td>Farmers</td>
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<td>750</td>
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<tr>
<td>Rest</td>
<td>53</td>
<td>1000</td>
<td>1450</td>
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<tr>
<td>CSP</td>
<td>0</td>
<td>120</td>
<td>250</td>
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<tr>
<td><strong>Wind (including offshore)</strong></td>
<td>1167</td>
<td>4000</td>
<td>7500</td>
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<tr>
<td>Biomass</td>
<td>43</td>
<td>200</td>
<td>350</td>
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</table>
Employment

1.5 bEuro investments in 2013
4.5 bEuro investments the last 5 years
20,000 direct and 30,000 indirect employment
38,000 households and 13,500 SMSs beneficiaries
The 2050 low GHE vision, scenarios and roadmaps for Greece
Technology Roadmap, SET-Plan

- Wind
- Solar Photovoltaics
- Concentrated Solar Power
- Geothermal Power
- Hydrogen Cars
- Wave
- Geothermal Heating
- Cogeneration
- Solar Heating & Cooling
- Energy Efficiency in Transport
- Energy Efficiency in Industry (without CHP in industry)
- Energy Efficiency in Buildings
- Hydropower
- Fission

Demand side technologies
Supply side technologies
Transport

Time Horizon
Challenge for Implementation
Towards Sustainable Energy System Today
2050+
“Green Island – Ai Stratis” is an R&D Project, where mature technologies of Renewable Energy Sources (RES) in combination with energy storage technologies will be implemented in a non-interconnected power systems.

The following interventions are foreseen in the island:

1) Power Generation from RES (RES penetration> 85%)
2) Introduction of Electric and H2 vehicles in the Transport Sector
3) Hydrogen-based Autonomous Stationary Applications
4) Covering heating and cooling loads in buildings using renewable energy technologies (geothermal and solar thermal systems) and
5) Energy saving in buildings having as a main objective the reduction on fossil fuels dependence and the introduction of environmentally friendly technologies.
Summary

• Greece is rich in RES, in particular Wind and Solar (but also hydro, geothermal and biomass)

• RES exploitation addresses positively all major energy policy drivers (European and national), security of supply, competitiveness and combating climate change

• During the last couple of years of economic crisis in Greece RES deployment was one of the very few sectors where investments were made and employment was created

• There have been side effects, though, due to the difficulties in controlling the penetration rate of PVs in the electrical system. This was not only a Greek problem and it should not be used as a show stopper for future RES deployment

• In the forthcoming years we should keep supporting RES for all the benefits they provide but putting more effort in getting costs down in the benefit of the energy consumers

• To do this both the financing costs and technology costs should be reduced

• Greece has not exploited yet all the opportunities associated to RES deployment, especially those related to technology development, innovation and smart specialization

• There exist in the country strong RTDI groups with excellence in RES technologies (among them CRES) which are ready to deliver along these lines, as they already did in the past