



## Renewable Energy Investment Environment in Cyprus

### **Challenges and Opportunities**

Nicos S. Kyriakides

Partner, Head of Financial Advisory Services  
Deloitte Cyprus

---

# Table of Contents

- 1.RES Policy Framework
- 2.Existing Schemes and Projects
- 3.Financing of RES Projects in Cyprus
- 4.Limitations of RES sector in Cyprus
- 5.Future Developments
- 6.Other matters

# RES Policy Framework



The EU Heads of State and Government set a series of demanding climate and energy targets to be met by in phases by 2020, 2030 and 2050 respectively.

**Key EU targets for 2020:**  
20% reduction in EU greenhouse gas emissions compared with 1990  
20% of total energy consumption to come from renewable energy sources  
20% increase in energy efficiency



**Long-term goal**  
By 2050, the EU aims to cut its emissions substantially – by 80-95% compared to 1990 levels as part of the efforts required by developed countries as a group.

**Key EU targets for 2030**

- At least 40% cut in greenhouse gas emissions compared with 1990
- At least 27% of total energy consumption from renewable energy
- At least 27% increase in energy efficiency

# RES Policy Framework



On 12 December 2015, 177 countries have signed the Paris Agreement, aiming to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

1

Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels

3

Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development

2

Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production

The Paris Agreement has given a new impetus to the efforts to transform to a low carbon economy and to develop resilience to climate change.

It included, among others, the following provisions:

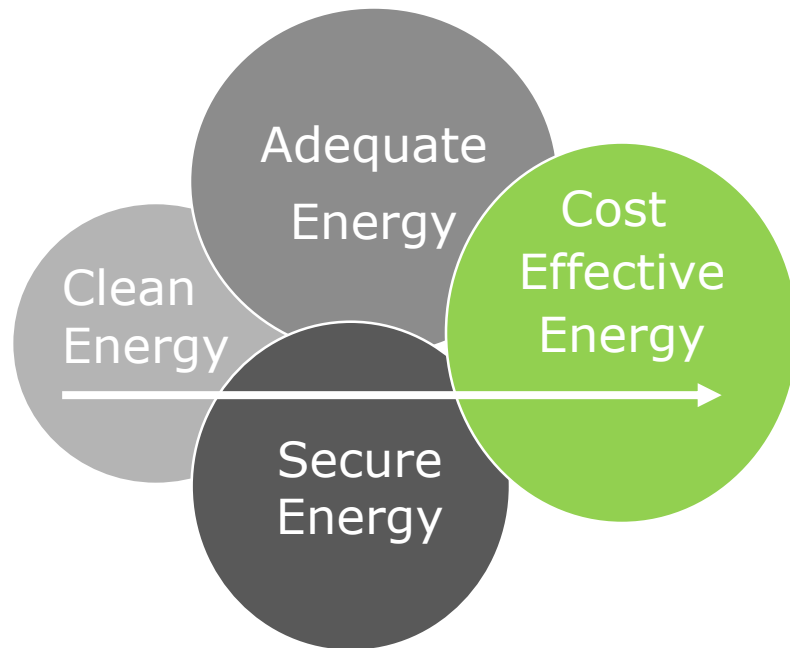
- ❑ Each Party shall prepare, communicate and maintain successive nationally determined contributions that it intends to achieve.
- ❑ Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.
- ❑ Each Party's successive nationally determined contribution will represent a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition, reflecting its common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.

Source: United Nations Conference on Climate Change



## Cyprus Energy Policy – Main Objectives

“As part of the EU 20-20-20 initiative, Cyprus is committed to achieve the following main objectives”



- ❑ Ensure security of energy supply;
- ❑ Foster Healthy Competition in the energy sector and contribution of the energy sector to the productivity and competitiveness of the national economy; and
- ❑ Environmental protection and sustainable development.



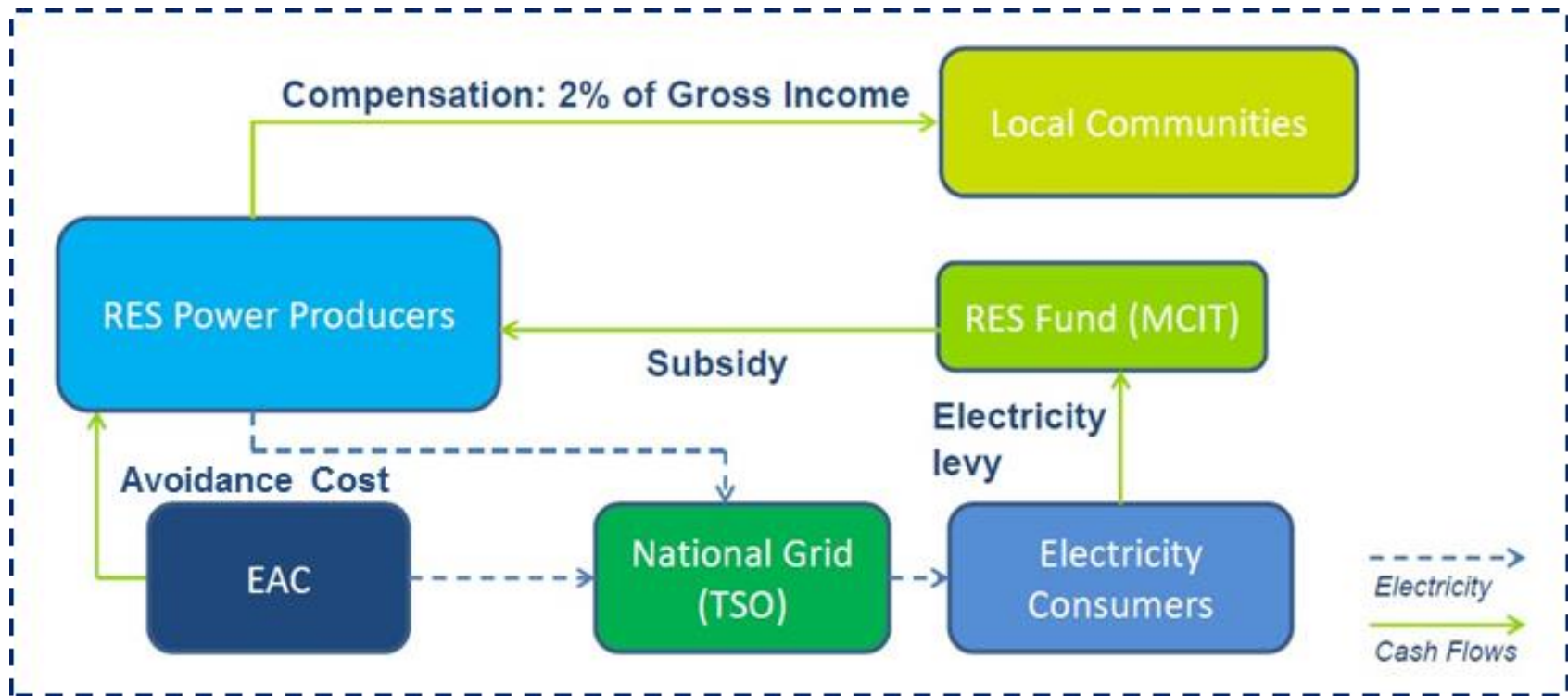
## Cyprus RES Framework – 2010 National Action Plan

- ❑ The Government of Cyprus has issued a National Action Plan in 2010 for the promotion of RES and Energy Saving;
- ❑ Due to its isolation from the trans-European electricity networks, Cyprus was allowed to have only 13% of its energy consumption coming from renewables (EU Target 20%) by 2020;
- ❑ The National Action Plan is under implementation through various support schemes, some of which are the following:
  - Support Schemes for Electricity generation from RES installations. The schemes provide stable feed-in tariffs for 20 years (Wind, PVs, Biomass, CSP).
  - Support Scheme for heating/cooling from RES.
  - Support Scheme for Energy Conservation.



## Cyprus Energy Policy: Financial Support to RES Projects

- ❑ A Special Fund has been created aiming to support RES and Energy Saving investments in Cyprus. The revenues of this fund are coming from the consumers paying a “green tax” levied on electricity bills (currently at 1,00 euro per kWh).





Existing RES Projects		
Wind Farms	Photovoltaic	Biomass / Biogas
<ul style="list-style-type: none"> <li>• Total Installed Capacity: 157,5MW</li> <li>• Annual Production for January-September 2016: 179.195,2 MWh</li> <li>• Number of Projects connected to the grid : 6</li> </ul>	<ul style="list-style-type: none"> <li>• Total Installed Capacity: 50,5MW</li> <li>• Annual Production for January-September 2016: 74.002,4 MWh</li> <li>• Number of Projects connected to the grid : 1.918</li> </ul>	<ul style="list-style-type: none"> <li>• Total Installed Capacity: 9,7MW</li> <li>• Annual Production for January- September 2016: 27.548 MWh</li> <li>• Number of Projects connected to the grid : 14</li> </ul>



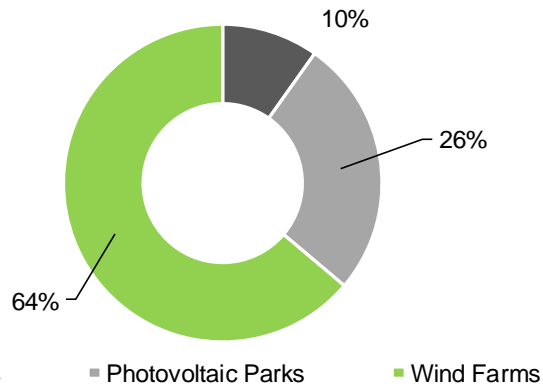


# Existing Schemes and Projects

## Existing Projects

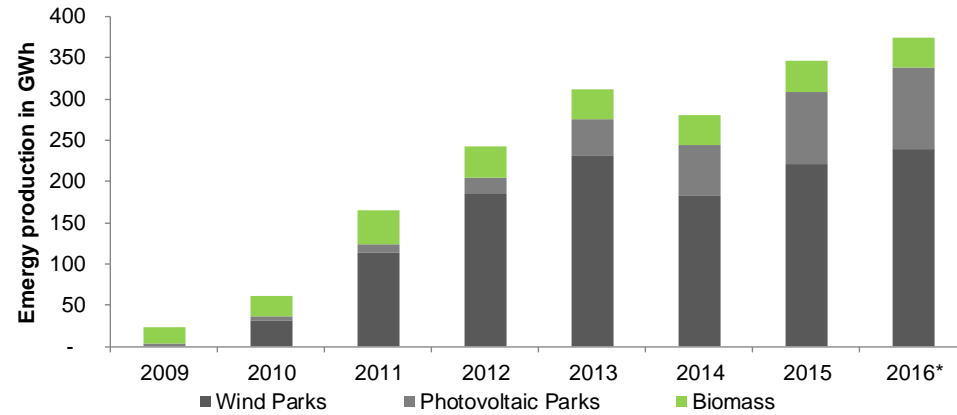


Energy Production in kWh in January-September 2016



Source: Cyprus Energy Regulatory Authority

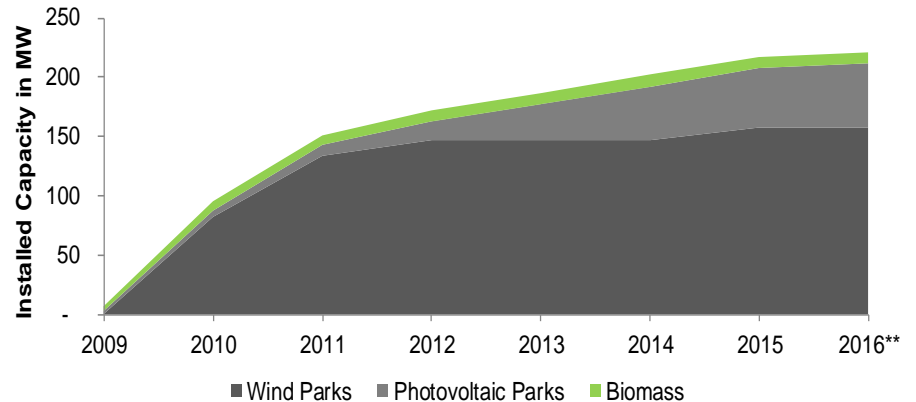
Chart: RES Projects in Cyprus – Current Energy Production



\* Please note that there are no available data for energy production for the period October to December 2016. The figures displayed above for 2016 have been annualised for presentation purposes.

Source: Cyprus Energy Regulatory Authority

Chart: RES Projects in Cyprus – Current Installed Capacity



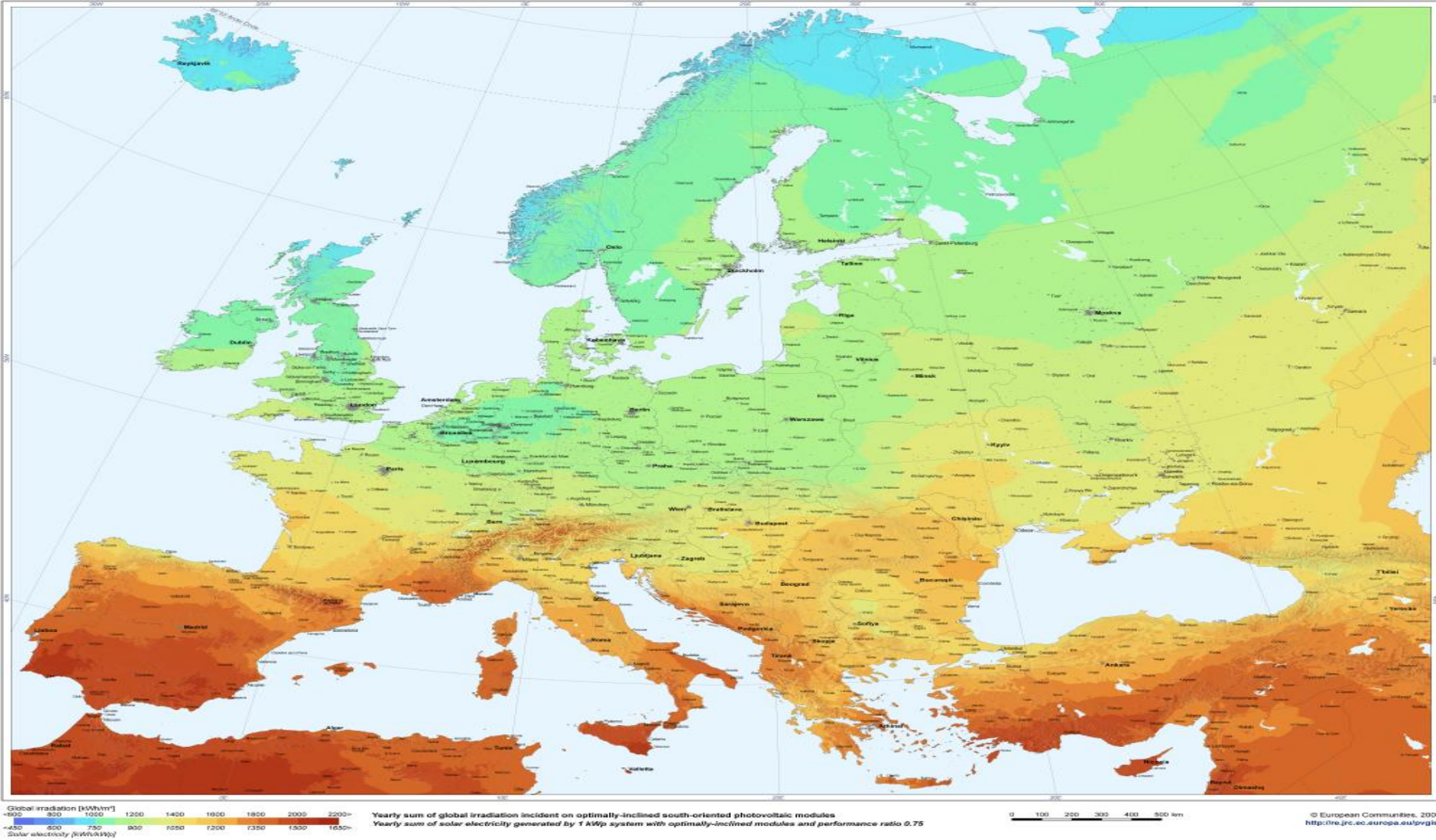
\*\* Data available until September 2016

Source: Cyprus Energy Regulatory Authority

# Existing Schemes and Projects



## “Photovoltaic Solar Electricity Potential in European Countries”



Source: European Commission

# Existing Schemes and Projects



For smaller scale installations the Cyprus Energy Regulatory Authority (CERA) introduced two schemes; for low-capacity domestic photovoltaic systems known as net metering, and for electricity self-production systems for business.

## Net metering

- ❑ This involves the installation of low-capacity domestic photovoltaic systems as well as of electricity self-production systems for businesses;
- ❑ According to the scheme, licenses will be granted for the installation of 15MW of PVs (up to 3kW per installation) per year; and
- ❑ Out of these, 1,2MW will be awarded to low-income and other vulnerable groups, partly funded by the State.



## Self-production systems

- ❑ This involves the installation of commercial and industrial PV units, the production of which will be used solely to cover the needs of the producers (e.g. factories, hotels, etc.);
- ❑ Installation capacity to be licensed in between 10kW to 500kW per person and per unit; and
- ❑ According to this Scheme, licenses will be granted for the installation of 5MW in total.



## Financing of RES Projects in Cyprus - Methods

- ❑ RES Projects may be financed through the following methods:
  - Project financing for large scale projects offered by commercial banks, the European Investment Bank and other private financing institutions (i.e. fixed income funds);
  - Owner equity, private equity funds, listing of project company shares on a regulated stock exchange;
  - Potential for the issue of bonds, which can also be listed on a regulated stock exchange;
  - European Financing Programs and Grants (i.e. NER300 or successor schemes); and
  - Through agreements with Energy Saving Companies (“ESCOs”) – Mainly for Energy Conservation.





## Energy Efficiency Contracts through ESCOs

- ❑ New technologies, including RES, may achieve up to 50% energy savings on the annual energy cost, but need financing;
- ❑ Capital Expenditure can be financed by an Energy Saving Company, in return for receiving repayments equal to the energy saving achieved during the contract period with a consumer / client (or part thereof). No additional capital expenditure arises for the client.
- ❑ Repayment of capital expenditure within 2 to 8 years;
- ❑ Advantages of Energy Efficiency Contracts:
  - The installation will be performed by a company with the required technical experience and expertise (ESCO);
  - The client can also benefit from a % of the saving during the duration of the contract, as well as be left with an energy efficient home or business at the end of the contract.



# Limitations of RES sector in Cyprus



## Grid stability / system reliability issues

- ❑ The national grid system in Cyprus has certain inherent and technical limitations which affect the penetration of RES and the reliability of the energy system:
  - Lack of interconnections to the trans-European electricity networks;
  - Lack of storage capacity for electricity produced by RES, we have no RES installations with storage capability;
  - Limitation to the amount of intermittent renewable energy that may be connected to the electricity system;
  - Low demand compared to original predictions, as many industries have reduced their production due to the financial crisis and also high energy savings from day to day consumption have been achieved;
  - The currently low cost of producing electricity from conventional means; and
  - The installation of large conventional units at Vasilikos (220MW and 130MW) together with the minimum limit for stable generation of 50% per conventional unit, are limiting RES penetration.

# Limitations of RES sector in Cyprus



## Measures for improving system reliability and enabling further penetration of RES

- ❑ Promoting the private initiative of installing an electrical interconnection between Cyprus, Greece and Israel known as the «Euroasia Interconnector» project. A study is already in process and is soon expected to be submitted to the TSO and subsequently to CERA;
- ❑ Introducing smart grids in the national network;
- ❑ Introducing energy storage in the following manner;
  - Consider the use of a large scale pumped-storage system and / or combined with the installation of modular batteries;
  - Promoting the development of RES Projects that either possess or they facilitate the storage of energy and/or projects that have continuous production on a 24-hour basis; and
  - Promoting the installation of short-term storage on large scale RES Projects, assisting the project to better predict next day's production (i.e. dispatchable production) and thus enhancing the reliability of the system overall.



# Limitations of RES sector in Cyprus



## Solutions already implemented by the TSO

- ❑ The TSO, has achieved improved absorption of the energy produced from Wind Farms in the network, by improving Day Ahead Predictions.
- ❑ The level of accuracy of predictions received initially by the TSO had caused limitations in the reliability of the network and have hindered the penetration of RES. The use of real time data submitted to projects by the TSO per 30 minute intervals, has significantly improved daily predictions and subsequently the reliability of these projects.
- ❑ In addition, the TSO has implemented automatic curtailment of wind generation, based on a fair and non judgmental allocation of the curtailed energy to each Wind Farm, which has further enhanced the reliability of the system.

# Future Developments



The Cyprus Energy Regulatory Authority (CERA) and the Ministry of Energy Commerce Industry and Tourism (MECIT) do not intend to announce new schemes for RES plants operating under national grants or other support schemes. What is expected rather is a reorganisation of the Cyprus electricity market leading to liberalization.

## Liberalization of the electricity market

- ❑ The liberalization of the electricity market is currently under consideration, in accordance with the relevant European Union Directive. The Electricity Market Regulation Law was approved by the House of Representatives in July 2003.
- ❑ This law provides for the abolition of the monopoly of the Electricity Authority of Cyprus in the production and supply of electricity and the opening up of the electricity market by granting to certain consumers the right to choose their own suppliers.
- ❑ Following a technical support study, the Net Pool model was identified to be the most appropriate trading arrangement approach for the Cyprus electricity market.
- ❑ Based on estimations of CERA, the liberalization of the electricity market is not expected to take place before the end of 2018.

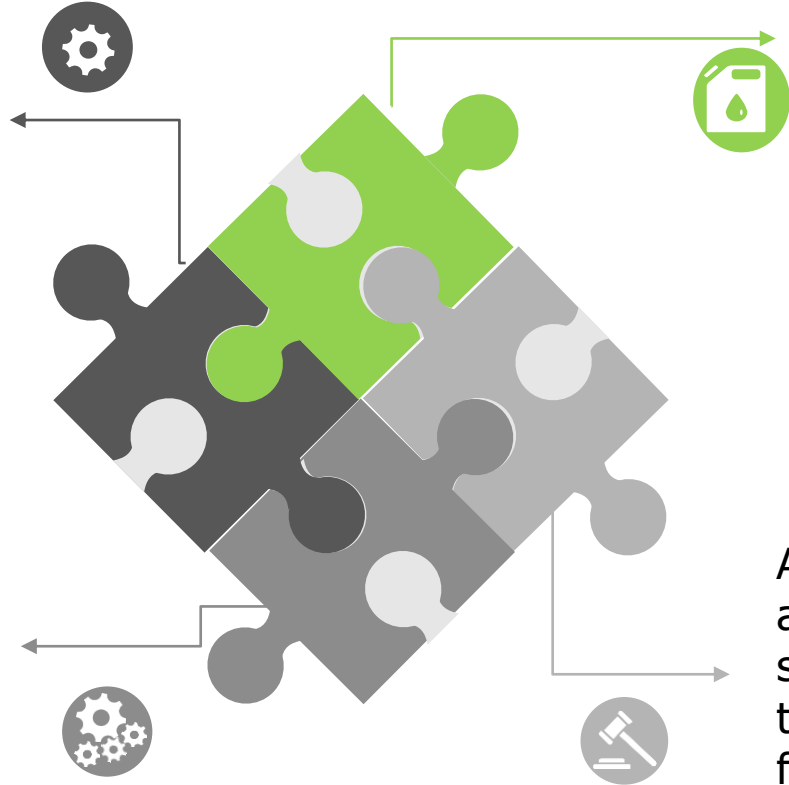
# Future Developments



## NER 300 Funding

‘**NER300**’ is a financing instrument managed jointly by the European Commission, European Investment Bank and Member States

300 million allowances in the New Entrants’ Reserve of the European Emissions Trading Scheme for subsidising installations of innovative renewable energy technology and carbon capture and storage (CCS).



The ‘**NER300**’ funding is intended to accelerate the deployment of low carbon energy across Europe and support the EU’s medium and long-term climate goals

All 27 Member States are encouraged to submit proposals so that they can benefit from the funding available and support the development of CCS and innovative renewables projects.

Source: European Commission



## Winning Projects of NER 300 Funding in Cyprus

### Helios Power Project

- Helios Power is a 50,76MW Concentrated Solar Power (CSP) Project using Sterling technology to be implemented in Cyprus.
- Being a solar power project it will relieve the Grid during those hot summer days when demand for electricity is at its peak.
- The Project shall be constructed on a plot of land on the southern side of the island (near the main airport of Cyprus).
- The Project is approved to receive around €46.5 million from NER 300 Funding Program.

### EOS Green Energy Project

- EOS Green Energy Project uses innovative Australian developed concentrated solar power technology.
- The Project will be utilizing an improved technology, that will feature a tower based, concentrated solar power system which incorporates a built-in energy storage capability allowing the production of energy on a 24-hour basis.
- The Project is approved to receive around €60.2 million from NER 300 Funding Program.

### Green+ Smart-Grid Project

- Green+ will involve the installation of a smart grid in the area of Troodos, a mountainous and densely forested area in Cyprus.
- The main objective of the project is to analyse and seek to radically address and give solutions to the issues of maintaining and balancing between reliable electricity supply and minimal environmental impact.
- The Project is approved to receive around €11.1 million from NER 300 Funding Program.



# Future Developments

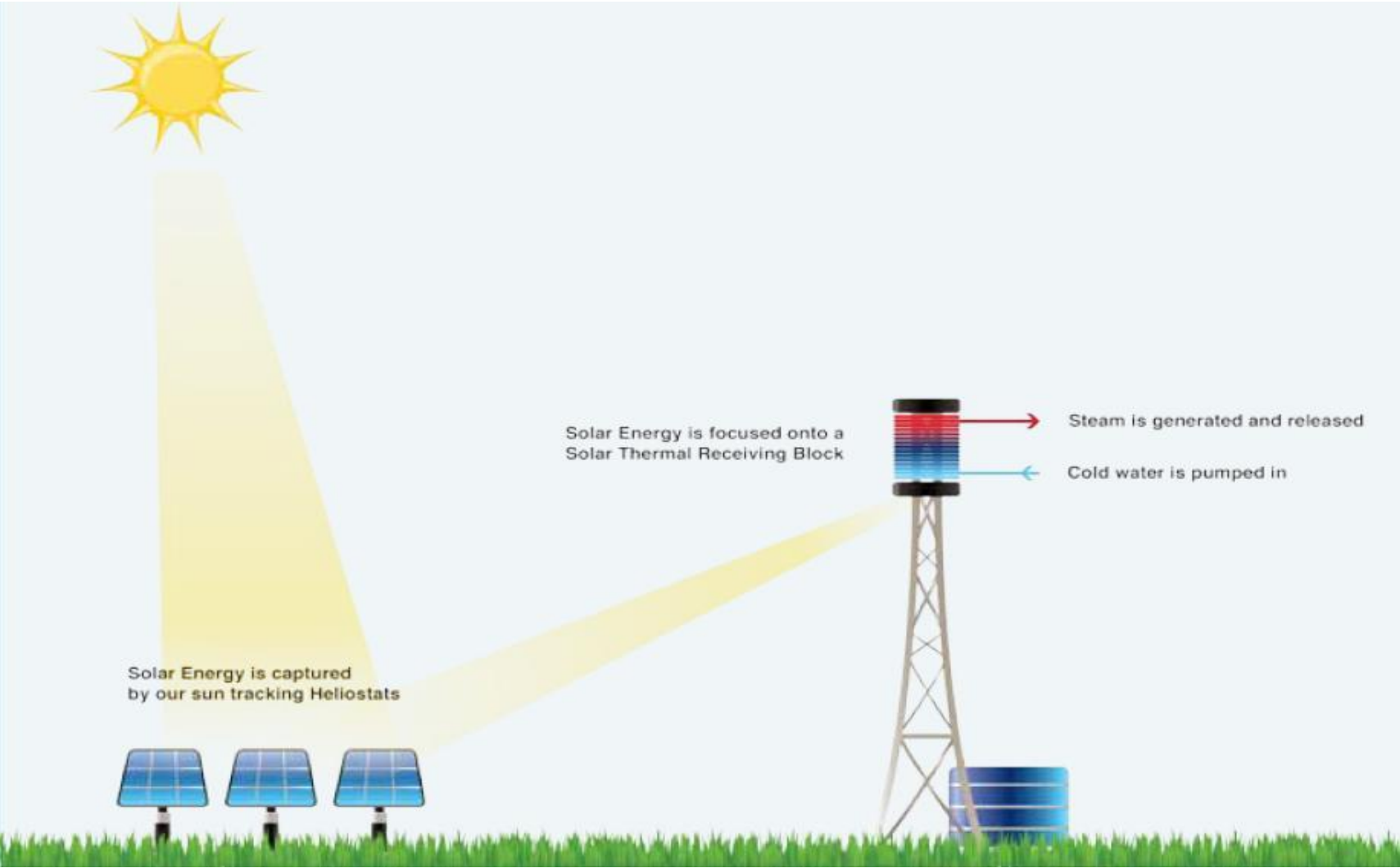


## EOS (Green Energy) Project

- ❑ The Project uses innovative Australian developed concentrated solar power technology, which involves a modular tower system, with high purity graphite heat storage towers and heliostats, utilising a superheated steam cycle;
- ❑ The Project which is planned to have 300 modules and a 50MW turbine, will be constructed near Alassa in the area of Limassol in Cyprus;
- ❑ The system is deployed in modular form which makes it easy to scale up or down;
- ❑ “Built in” storage capability through high purity graphite;
- ❑ Graphite is completely harmless, non-toxic and environmentally friendly, unlike molten salt which is hazardous material;
- ❑ Energy stored is known at the end of each day and the dispatch profile for the next 24 hours can be planned with certainty, allowing effective network management;
- ❑ Capable of producing constant output at a frequency of 10Hz.

# Future Developments

## EOS (Green Energy) Project



# Future Developments



## EOS (Green Energy) Project





## Challenges

- ❑ Will Cyprus Electricity market be connected to the European and when?
- ❑ Undoubtedly the inexhaustible and predictable source of energy, the Sun, will prevail in our territories. But we need to be able to store that energy and use it when is needed.
- ❑ What storage solutions will prove to be competitive and prevail in the market?
- ❑ Pumped storage using water dams? Using sea water on the coast? Combined with desalination plants? Batteries and what will be the duration of such solutions and the impact on polluting the environment? Or
- ❑ New and advanced Concentrated Solar Thermal power plants?
- ❑ What will be the prevailing market price when the free competitive electricity market becomes operational? Will it be attractive for more investments in RES?
- ❑ What technological change and innovation will bring to the market? Are we going to see new technologies offering competitive solutions and able to compete with electricity production from natural gas and conventional means?





## Avoidance cost formula

- ❑ The avoidance cost formula needs to be adjusted and become more transparent and dynamic, in order to reflect the actual cost of conventional production that is saved at any point in time that renewable energy is generated (i.e. peak vs non-peak);
- ❑ The amended formula should also be linked to a dynamic and automatic price adjustment mechanism (algorithm) calculating at regular intervals the appropriate amount of “green tax” to be levied on electricity bills, designed to avoid any shortfalls of the RES Fund in the future, as well as to avoid the need for approval of future changes to the “green tax” by the Parliament.

## Cyprus long term targets

- ❑ Cyprus could set targets for 2050 on its own and not wait for the European Union to determine those targets.
- ❑ Proceeds from sale of natural gas could potentially be used to fund the development of RES.

# Thank you for your attention!

For more information you may contact:

**Nicos S. Kyriakides**  
**Member of the Board of Directors**  
**Head of Financial Advisory Services**  
**Deloitte Limited**

Tel: + 357 25 868686

Fax: + 357 25 868600

Mob: + 357 99 611827

Email: [nkyriakides@deloitte.com](mailto:nkyriakides@deloitte.com)

Web: [www.deloitte.com/cy](http://www.deloitte.com/cy)

Deloitte.

Maximos Plaza, Tower 1, 3rd Floor

213, Arch. Makariou III Ave.

CY-3105 Limassol, Cyprus

P.O.Box 58466,

CY-3734 Limassol, Cyprus

**Deloitte.**