



**RESOR**  
Interreg Europe



European Union  
European Regional  
Development Fund

**RESOR**

Supporting energy efficiency and renewable energy  
in European islands and remote regions

**Salvador Suárez**

Gran Canaria meeting

27<sup>th</sup> February 2019

Las Palmas de Gran Canaria

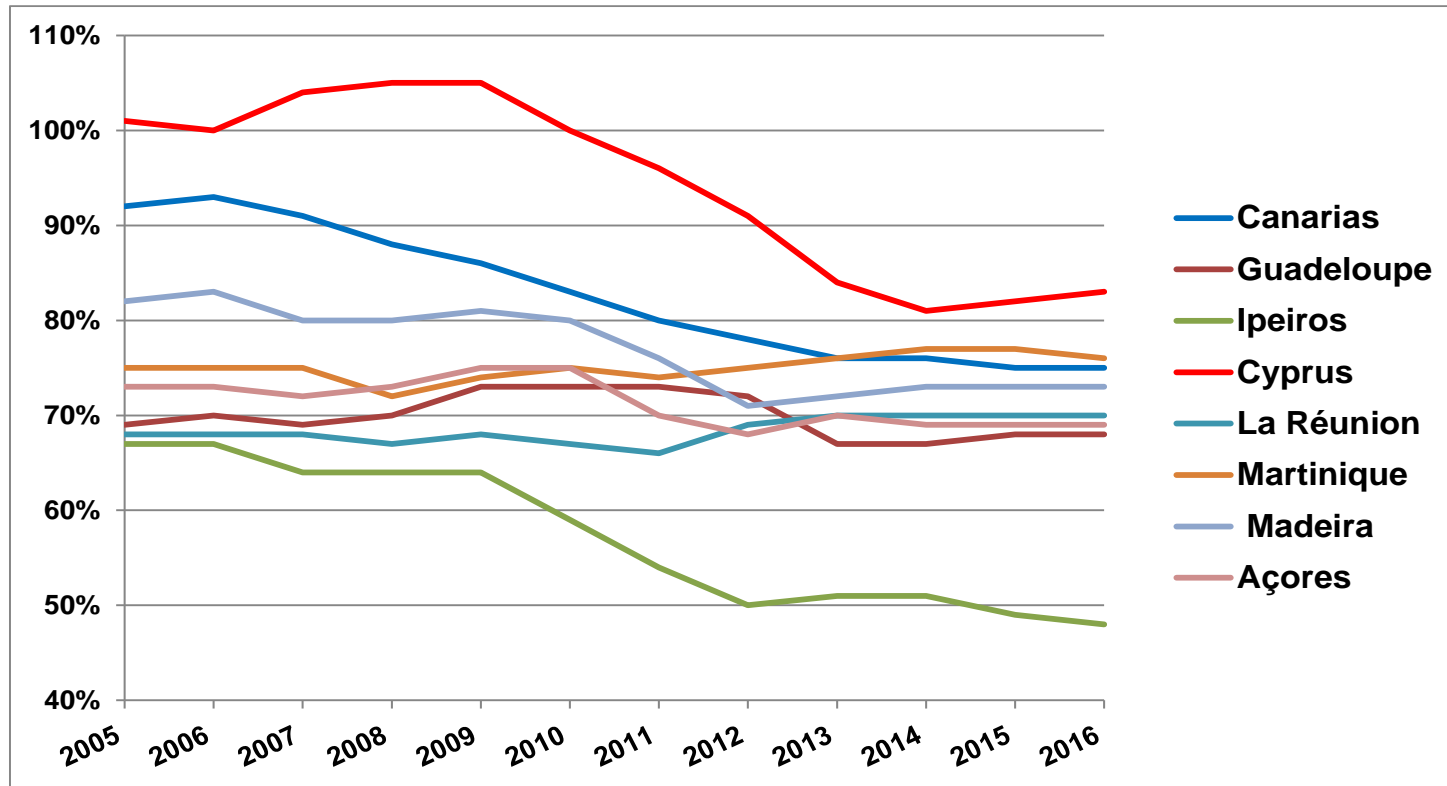
# PARTICIPATING REGIONS

	POPULATION	AREA	DENSITY	UNEMPLOY	GDP	GDP/ CAPITA	% EU AVERAGE
	2018		2018	2017	2017	2017	2016
Canarias	2.177.048	7.445,00 km <sup>2</sup>	292,42	23,5%	44.502,72 M€	22.700 €	75%
Cypros	864.236	9.251,00 km <sup>2</sup>	93,42	11%	19.570,92 M€	25.400 €	83%
La Réunion	862.308	2.503,70 km <sup>2</sup>	344,41	23%	19.709,54 M€	20.900 €	70%
Guadeloupe	422.290	1.328,60 km <sup>2</sup>	317,85	22%	10.194,76 M€	21.900 €	68%
Martinique	368.640	1.128,00 km <sup>2</sup>	326,81	18%	9.252,38 M€	22.700 €	76%
Ipeiros	334.337	9.164,00 km <sup>2</sup>	36,48	25%	4.001,38 M€	14.400 €	48%
Madeira	254.368	802,00 km <sup>2</sup>	317,17	10%	4.607,71 M€	22.000 €	73%
Açores	243.862	2.322,00 km <sup>2</sup>	105,02	9%	4.128,06 M€	20.500 €	69%

- Diversity in terms of population and population density; climate; economic activity.
- They share the current high energy dependence on imported fossil fuels and high potential for RES

# PARTICIPATING REGIONS

## GDP per capita, as % of EU average



Source: EUROSTAT

- Diversity in terms of population and population density; climate; economic activity.
- They share the current high energy dependence on imported fossil fuels and high potential for RES

# EUROPEAN COMMISSION GOALS

Two 'packages' of legislation for climate and energy: first it was agreed in 2009 and covered the period up to 2020; the second, relates to the period 2020-2030. They both **contain binding targets for emissions reductions, use of RES and energy efficiency.**

## Target 2020

2020 climate & energy package.

- **20%** cut in greenhouse gas **emissions** (from 1990 levels)
- **20%** of EU energy from **RES** (Renewable Energy Directive)
- **20%** improvement in **energy efficiency** (Energy Efficiency Directive)

Renewable Energy Directive: set a binding target of 20% final energy consumption from renewable sources by 2020.

## New target for 2030

On 14 June 2018 the Commission, the Parliament and the Council reached a political agreement for new regulatory framework with target for the 2030 of:

- **Energy efficiency 32.5%** with an upwards revision clause by 2023.
- **Renewable energy agreed 32%** target for the EU for 2030.
- An ambitious binding EU target which should lead to **reductions of at least 40% GHG** from 1990s levels.

# Clean Energy for EU Islands initiative

The “Clean Energy for EU Islands initiative”, launched in May 2017 in Malta, as part of the 'Clean Energy for All Europeans' package.

Overall objective is **accelerate European islands' energy transition**, helping them reduce their dependence on energy imports through the exploitation of their high RES potential.

The Initiative paves the way for the **establishment of a stable, long-term framework, enabling the financing of innovative projects on islands** through the leveraging of EU and private funds and also the provision of technical support.

Current island energy systems are expensive, polluting, inefficient and dependent on external supply. **Clean Energy for EU Islands initiative aims at:**

- Scaling-up **RES, energy efficiency, energy storage and clean transport**
- Energy self-sufficiency. Better **energy security**, less reliant on imports
- **Reduced energy costs** for cheaper and cleaner energy supply
- Sustainable economic growth by the **creation of new jobs and business opportunities in the field of RES and energy efficiency**

# ENERGY FRAMEWORK - CANARY ISLANDS

- Total **energy dependence** from outside resources
- Generation of **electric energy from fossil fuels** (oil)
- **Fragmentation of the territory** and existence of small, non-interconnected **independent small island electrical systems, with weak grids**
- High rise of the electric demand
- No significant **seasonal changes**, but **large daily differences** between the low valley and evening peak-demand hours
- **Great potential of RES**, which can't be fully exploited

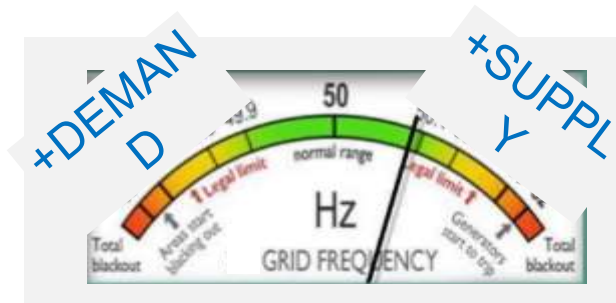
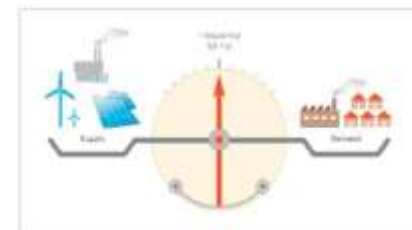


# TECHNICAL BARRIERS TO RES

Small non-inteconnected island electric systems are more sensitive to RES variations, a critical issue affecting **grid stability of small and weak island electrical system in scenarios of high RES penetration.**

## Grid stability: balancing the electrical island systems

- The islands **power systems have to be at equilibrium at every moment**, which requires that power generation be regulated to guarantee that it always equals instantaneous electricity demand
- Since the variable generation curve profiles of RES doesn't match the electrical demand curve of the island, **curtailment of RES generation is needed** to avoid excess electricity
- Power regulation of RES translates into curtailment and less operating hours of wind systems, which **negatively impact the initially foreseen return on investment** of these investment projects



# MAXIMIZING RES PENETRATION:

The need for enacting policies to support renewable energy is often attributed to a variety of barriers that prevent investments from occurring.



## Barriers to renewable energy penetration in Islands electric power systems

Electric System

Land Planning

Economic-Administrative issues

### Strategy for maximizing RES penetration

Forecasting wind and solar

Grid stability analysis

Energy storage

Demand Management

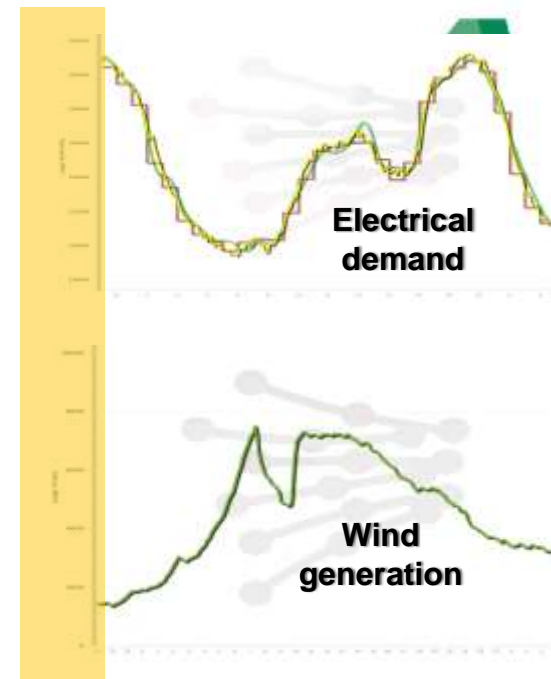
Distributed generation

Security and reliability

Market - Risk analysis

Scheduling

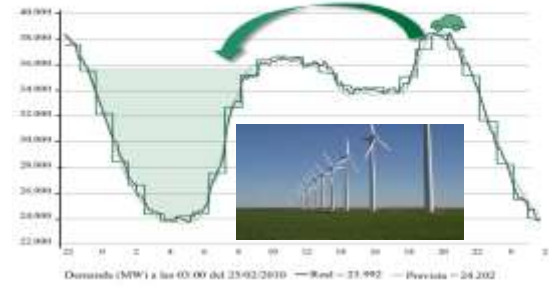
Planning





# DEMAND MANAGEMENT

Carry-out studies on loads whose operation could be managed (time-shifted from peak hours to off-peak) to contribute to peak-shaving of the island electricity demand curve.



## ELECTRIC MOBILITY

30% of oil consumed in the internal market goes to the road transport sector.

Electric vehicle are manageable loads with potential to become an instrument to promote greater RES penetration



20% of electricity goes to to water desalination and water distribution.

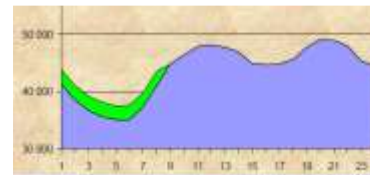
## OTHER MANAGEABLE LOADS

Sea-water	430,000 m <sup>3</sup> /d	167 plants
Brackish-water	150,000 m <sup>3</sup> /d	146 plants

- The residential sector represents 30 % of electricity demand in the islands



- Heating water in the residential sector represents 30-40 % of electricity demand.



# Energy recovery from waste

Energy recovery is a key element in the fight to reduce waste volumes that accumulate in the landfills of the archipelago.



**Biodigestors:** convert organic fraction of waste into usable products: Biogas (methane 40-75%) and fertilizer

**Biomethane:** biogas with 50% CH<sub>4</sub> has a LHV about 5 kWh / Nm<sup>3</sup>. To improve the heating value of biogas we must eliminate CO<sub>2</sub>.



## Energy efficiency

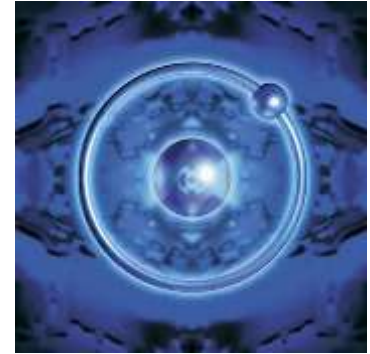
- Reduction of energy intensity: decrease the amount of (primary) energy needed to produce one unit of GDP
- Environmental Impact of CO<sub>2</sub> emissions
- Increase efficiency in industry, tourist and residential sectors
- Reduce energy consumption in Public buildings



# ENERGY STORAGE

Energy storage are essential to maximize RES penetration in weak electrical networks.

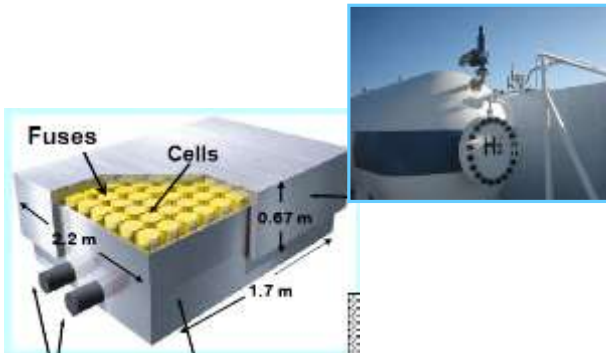
- Solutions to store surplus RES in peak hours to feed into the grid in peak demand.
- Energy carriers for the use of RES in transport.



- Wind-Pumped-Hydro
- Compressed air
- Flywheels

- Batteries
- Ultracapacitors

- Hidrógeno
- Thermo-chemical cycles



# CANARY ISLANDS (2016)

	G. CANARIA	TENERIFE	LANZAROTE	FUERTEV	PALMA	GOMERA	HIERRO	TOTAL
Interconnected to continent grid?	No	No	No	No	No	No	No	
Interconnected to other islands?	No	No	YES	YES	No	No	No	
Capacity of interconnection	0,00 MW	0,00 MW	60,00 MW	60,00 MW	0,00 MW	0,00 MW	0,00 MW	
ENERGY STORAGE								
Storage capacity (Power)	0,00 MW	0,00 MW	0,00 MW	0,00 MW	0,00 MW	0,00 MW	11,32 MW	11,32 MW
Storage capacity (Energy)	0,00 MWh	0 MWh	0 MWh	0 MWh	0 MWh	0 MWh	429 MWh	429 MWh
FOSSIL FUEL CONSUMPTION	695.711 t	728.152 t	177.142 t	157.058 t	52.700 t	16.100 t	6.034 t	1.832.897 t
<b>INSTALLED POWER-FOSSIL</b>	<b>999,18 MW</b>	<b>1.046,50 MW</b>	<b>232,30 MW</b>	<b>187,00 MW</b>	<b>105,30 MW</b>	<b>21,20 MW</b>	<b>14,90 MW</b>	<b>2.606,38 MW</b>
RES POWER								
Wind	88,10 MW	36,70 MW	13,40 MW	13,10 MW	7,00 MW	0,40 MW	11,50 MW	170,20 MW
PV	40,00 MW	115,00 MW	7,80 MW	13,10 MW	4,60 MW	0,04 MW	0,03 MW	180,57 MW
Hydro	0,00 MW	1,20 MW	-	-	0,80 MW	-	-	2,00 MW
Biogas (landfill)	0,00 MW	1,60 MW	2,10 MW	-	-	-	-	3,70 MW
<b>Total RES</b>	<b>128,10 MW</b>	<b>154,50 MW</b>	<b>23,30 MW</b>	<b>26,20 MW</b>	<b>12,40 MW</b>	<b>0,44 MW</b>	<b>11,53 MW</b>	<b>356,47 MW</b>
<b>Total installed power</b>	<b>1.127,28 MW</b>	<b>1.201,00 MW</b>	<b>255,60 MW</b>	<b>213,20 MW</b>	<b>117,70 MW</b>	<b>21,64 MW</b>	<b>26,43 MW</b>	<b>2.962,85 MW</b>
<b>FOSSIL GENERATION</b>	<b>3.294 GWh</b>	<b>3.356 GWh</b>	<b>860 GWh</b>	<b>663 GWh</b>	<b>245 GWh</b>	<b>73 GWh</b>	<b>27 GWh</b>	<b>8.517 GWh</b>
RES GENERATION								
Wind	249 GWh	71 GWh	24 GWh	23 GWh	23 GWh	1 GWh	18 GWh	409 GWh
PV	57 GWh	186 GWh	7 GWh	16 GWh	6 GWh	0,02 GWh	0,05 GWh	273 GWh
Hydro	0	3 GWh	0	0	0	0	0	3 GWh
Biogas (landfill)	0	8 GWh	0,5 GWh	0	0	0	0	9 GWh
<b>Total RES</b>	<b>306 GWh</b>	<b>269 GWh</b>	<b>32 GWh</b>	<b>39 GWh</b>	<b>30 GWh</b>	<b>1GWh</b>	<b>182 GWh</b>	<b>695 GWh</b>
Total electricity generation	3.600 GWh	3.625 GWh	892 GWh	702 GWh	274 GWh	74 GWh	46 GWh	9.213 GWh
THERMAL EFFICIENCY								
Average efficiency fossil	41,14%	40,79%	42,73%	39,31%	40,96%	39,00%	39,00%	40,71%
<b>RES penetration (energy)</b>	<b>8,51%</b>	<b>7,43%</b>	<b>3,57%</b>	<b>5,57%</b>	<b>10,79%</b>	<b>1,23%</b>	<b>39,80%</b>	<b>7,55%</b>

- **Institution:** Deputy Ministry of Industry, Energy and Trade – VIEC
- **Description/competence:** Promote the energetic development. Promote the development and coordination of plans to improve the quality of electricity supply and electrification programs aimed at guaranteeing supply in areas lacking electricity service or reducing the social or environmental impact of electrical infrastructures. Promote the implementation of the set of measures proposed by the Canary Islands Energy Plan.

## PROGRAMMES/POLICIES SUPORTING ENERGY EFFICIENCY AND RES

### 1- Subsidies for the improvement of energy efficiency and the use of RES in public infrastructures, including public buildings, co-financed with FEDER

<b>Description</b>	Promote improvement of energy efficiency and the reduction of CO2 emissions in buildings and public infrastructures and services, and the use of renewable energies. Energy audits. Equipment in the public lighting of the municipalities that promote energy saving. Energy efficiency criteria in desalination, purification, potabilization and water distribution. Saving and efficiency and RES in building and municipal infrastructures.
<b>Budget</b>	<b>(2018) 3,900,000 €</b>

### 2- Subsidies for the improvement of energy efficiency and the use of renewable energies in companies and residential buildings

<b>Description</b>	Energy efficiency and the use of renewable energies in the business sector and the residential sector.
<b>Budget</b>	<b>(2018) 791,250 €</b>

## BEST PRACTICES

### 1- Policy for the promotion of energy efficiency in public buildings

<b>Description</b>	Carry-out a global and integrated action involving the improvement of energy efficiency and the provision of energy services in several administrative buildings of the Government of the Canary Islands. The winning companies commit themselves to carry out works to improve and renew the energy consuming installations and to execute investments in energy savings and renewable energies related to air conditioning, lighting, photovoltaic installations.
<b>Budget</b>	<b>27.458.549 €</b>

# Wind-Pumped-Hydro power station – 5<sup>th</sup> FP

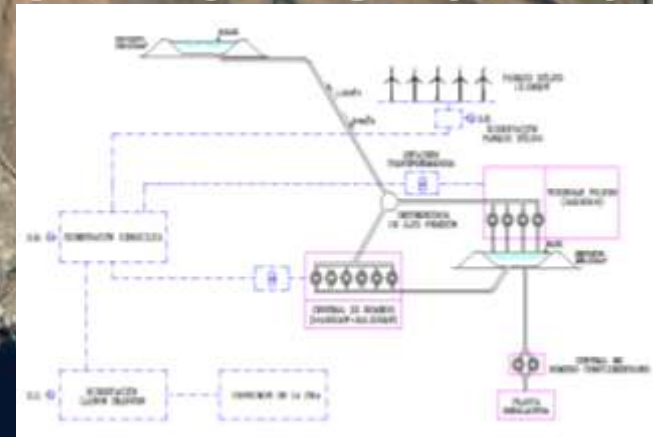
EUROPEAN COMMISSION, DG TREN Contract N°: NNE5-2001-00950

"Implementation of 100% RES Project for El Hierro Island -Canary Islands

Project Coordinator: ITC



## El Hierro island



# EL HIERRO WIND-PUMPED-HYDRO SYSTEM



Area	278 km <sup>2</sup>
Max. Height	1.501 m.
Population (2014)	10,587 inhab.
Electricity Plant (Diesel) nominal power (2016)	14.9 MW
Peak demand (2016)	8.1 MW

Wind Farm (5 ENERCO E-70)	11,5 MW
Hydroelectric Substation	11,32 MW
Pumping Station	6 MW
Upper Reservoir	384.000 m <sup>3</sup>
Lower Reservoir	158.000 m <sup>3</sup>
Height of upper reservoir	700 m
New Diesel systems	0
RES penetration (2018)	56.5 %



# MADEIRA

	MADEIRA	PORTO SANTO	TOTAL
Is the island interconnected to continental grids?	No	No	
Is the island interconnected to other islands?	No	No	
Capacity of the submarine cable	0,00 MW	0,00 MW	
<b>ENERGY STORAGE</b>			
Storage capacity (Power)	24,00 MW	0,00 MW	24,00 MW
Storage capacity (Energy)	44,00 MWh	0,00 MWh	44,00 MWh
<b>FOSSIL FUEL CONSUMPTION (metric ton)</b>	<b>121.516 t</b>	<b>8.091 t</b>	<b>129.607 t</b>
<b>INSTALLED POWER-FOSSIL</b>	<b>211,04 MW</b>	<b>17,28 MW</b>	<b>228,32 MW</b>
<b>RES POWER</b>			
Wind	45,11 MW	1,11 MW	46,22 MW
PV	19,13 MW	2,34 MW	21,47 MW
Hydro	47,17 MW	0,00 MW	47,17 MW
Waste	8,00 MW	0,00 MW	8,00 MW
<b>Total RES</b>	<b>111,41 MW</b>	<b>3,45 MW</b>	<b>114,86 MW</b>
<b>Total installed power</b>	<b>322,45 MW</b>	<b>20,73 MW</b>	<b>343,18 MW</b>
<b>FOSSIL ELECTRICITY GENERATION</b>	<b>657 MWh</b>	<b>30 MWh</b>	<b>688 MWh</b>
<b>RES GENERATION</b>			
Wind	83,11 MWh	1,33 MWh	84 MWh
PV	29,78 MWh	3,75 MWh	34 MWh
Hydro	73,38 MWh	0,00 MWh	73 MWh
Waste	47,61 MWh	0,00 MWh	48 MWh
<b>Total RES</b>	<b>234 MWh</b>	<b>5 MWh</b>	<b>239 MWh</b>
<b>Total gross electricity generation</b>	<b>891 MWh</b>	<b>35 MWh</b>	<b>927 MWh</b>
<b>THERMAL EFFICIENCY</b>	<b>45,11%</b>	<b>36,05%</b>	<b>44,71%</b>
<b>RES penetration (energy)</b>	<b>26,24%</b>	<b>14,34%</b>	<b>25,79%</b>

# MADEIRA

- **Institution:** Agência Regional da Energia e Ambiente da Região Autónoma da Madeira - AREAM
- **Description/competence:** Energy efficiency, renewable energies and environmental protection. advisor of regional authorities for the energy sector

## PROGRAMMES/POLICIES SUPORTING ENERGY EFFICIENCY AND RES

<b>1- Programa Operacional Regional Madeira 2014-2020</b>	
<b>Description</b>	Energy efficiency and RES in companies
<b>Budget</b>	<b>4.226.349,00 €</b>
<b>2- Programa Operacional Regional Madeira 2014-2020</b>	
<b>Description</b>	Energy efficiency and RES in the public infrastructures and domestic sector
<b>Budget</b>	<b>4.280.000,00 €</b>
<b>3- Programa Operacional Regional Madeira 2014-2020</b>	
<b>Description</b>	Low carbon, sustainable multimodal urban mobility and mitigation
<b>Budget</b>	<b>8.850.000,00 €</b>

# MADEIRA

## BEST PRACTICES

1- INOVAR 2020 supported one relevant project related with energy in an hotel in Madeira.

<b>Description</b>	High performance and energy self-sufficiency of the hotel unit
<b>Budget</b>	<b>2.080.196 €</b>

2- EMPREENDER 2020 supported one relevant project related with a biomass factory in Madeira.

<b>Description</b>	Construction factory to process local biomass obtained from waste of forest maintenance. Wood chips to for boilers.
<b>Budget</b>	<b>959.703 €</b>

# AZORES-1

	SAO MIGUEL	TERCEIRA	SANTA MARIA	GRACIOSA	SAO JORGE
interconnected to continental grids?	No	No	No	No	No
interconnected to other islands?	No	No	No	No	No
Capacity of Interconnection	-	-	-	-	-
<b>ENERGY STORAGE</b>					
Storage capacity (Power)	0,00 MW	0,00 MW	0,00 MW	0,00 MW	0,00 MW
Storage capacity (Energy)	0,00 MWh	0,00 MWh	0,00 MWh	0,00 MWh	0,00 MWh
<b>FOSSIL FUEL CONSUMPTION</b>	<b>41.732 t</b>	<b>36.426 t</b>	<b>3.889 t</b>	<b>3.013 t</b>	<b>5.170 t</b>
<b>INSTALLED POWER-FOSSIL</b>	<b>98,06 MW</b>	<b>61,12 MW</b>	<b>6,91 MW</b>	<b>4,68 MW</b>	<b>8,23 MW</b>
<b>RES POWER</b>					
Wind	9,00 MW	9,00 MW	1,50 MW	0,00 MW	1,80 MW
PV	0,00 MW	0,00 MW	0,00 MW	0,00 MW	0,00 MW
Hydro	5,03 MW	1,43 MW	0,00 MW	0,00 MW	0,00 MW
Biogas (landfill)	0,00 MW	0,00 MW	0,00 MW	0,00 MW	0,00 MW
Geothermal	29,60 MW	0,00 MW	0,00 MW	0,00 MW	0,00 MW
<b>Total RES</b>	<b>43,63 MW</b>	<b>10,43 MW</b>	<b>1,50 MW</b>	<b>0,00 MW</b>	<b>1,80 MW</b>
<b>Total installed power</b>	<b>141,69 MW</b>	<b>71,55 MW</b>	<b>8,41 MW</b>	<b>4,68 MW</b>	<b>10,03 MW</b>
<b>FOSSIL ELECTRICITY GENERATION</b>	<b>200,9 GWh</b>	<b>164,5 GWh</b>	<b>18,1 GWh</b>	<b>13,7 GWh</b>	<b>24,1 GWh</b>
<b>RES GENERATION</b>					
Wind	16,9 GWh	24,3 GWh	2,6 GWh	0,0 GWh	4,0 GWh
PV	0 MWh	0 MWh	0 MWh	0 MWh	0 MWh
Hydro	21,4 GWh	0,0 GWh	0,0 GWh	0,0 GWh	0,0 GWh
Biogas (landfill)	0 MWh	0 MWh	0 MWh	0 MWh	0 MWh
Geothermal	182,0 GWh	0,0 GWh	0,0 GWh	0,0 GWh	0,0 GWh
<b>Total RES</b>	<b>220,3 GWh</b>	<b>24,3 GWh</b>	<b>2,6 GWh</b>	<b>0,0 GWh</b>	<b>4,0 GWh</b>
<b>Total gross electricity generation</b>	<b>421,2 GWh</b>	<b>188,8 GWh</b>	<b>20,7 GWh</b>	<b>13,7 GWh</b>	<b>28,2 GWh</b>
<b>THERMAL EFFICIENCY</b>	<b>42,01%</b>	<b>39,37%</b>	<b>39,30%</b>	<b>38,52%</b>	<b>39,49%</b>
<b>RES penetration (energy)</b>	<b>52,31%</b>	<b>12,87%</b>	<b>12,62%</b>	<b>0,00%</b>	<b>14,31%</b>

# AZORES-2

	PICO	FAIAL	FLORES	CORVO	TOTAL
interconnected to continental grids?	No	No	No	No	No
interconnected to other islands?	No	No	No	No	No
Capacity of Interconnection	-	-	-	-	-
<b>ENERGY STORAGE</b>					
Storage capacity (Power)	0,00 MW	0,00 MW	0,00 MW	0,00 MW	0,00 MW
Storage capacity (Energy)	0,00 MW	0,00 MW	0,00 MW	0,00 MW	0,00 MWh
<b>FOSSIL FUEL CONSUMPTION</b>	<b>8.406 t</b>	<b>9.187 t</b>	<b>1.719 t</b>	<b>387 t</b>	<b>109.929 t</b>
<b>INSTALLED POWER-FOSSIL</b>	<b>16,76 MW</b>	<b>19,11 MW</b>	<b>3,73 MW</b>	<b>0,82 MW</b>	<b>219,41 MW</b>
<b>RES POWER</b>					
Wind	2,40 MW	4,25 MW	0,60 MW	0,00 MW	28,55 MW
PV	0,00 MW	0,00 MW	0,00 MW	0,00 MW	0,00 MW
Hydro	0,00 MW	0,32 MW	1,63 MW	0,00 MW	8,41 MW
Biogas (landfill)	0,00 MW	0,00 MW	0,00 MW	0,00 MW	0,00 MW
Geothermal	0,00 MW	0,00 MW	0,00 MW	0,00 MW	29,60 MW
<b>Total RES</b>	<b>2,40 MW</b>	<b>4,57 MW</b>	<b>2,23 MW</b>	<b>0,00 MW</b>	<b>66,56 MW</b>
<b>Total installed power</b>	<b>19,16 MW</b>	<b>23,68 MW</b>	<b>5,96 MW</b>	<b>0,82 MW</b>	<b>285,97 MW</b>
<b>FOSSIL ELECTRICITY GENERATION</b>	<b>39,0 GWh</b>	<b>41,7 GWh</b>	<b>7,6 GWh</b>	<b>1,6 GWh</b>	<b>511,2 GWh</b>
<b>RES GENERATION</b>					
Wind	6,1 GWh	6,4 GWh	1,3 GWh	0,0 GWh	61,7 GWh
PV	0 MWh	0 MWh	0 MWh	0 MWh	0 MWh
Hydro	0,0 GWh	0,1 GWh	2,8 GWh	0,0 GWh	24,3 GWh
Biogas (landfill)	0 MWh	0 MWh	0 MWh	0 MWh	0 MWh
Geothermal	0,0 GWh	0,0 GWh	0,0 GWh	0,0 GWh	182,0 GWh
<b>Total RES</b>	<b>6,1 GWh</b>	<b>6,5 GWh</b>	<b>4,0 GWh</b>	<b>0,0 GWh</b>	<b>268,0 GWh</b>
<b>Total gross electricity generation</b>	<b>45,2 GWh</b>	<b>48,2 GWh</b>	<b>11,6 GWh</b>	<b>1,6 GWh</b>	<b>779,2 GWh</b>
<b>THERMAL EFFICIENCY</b>	<b>40,11%</b>	<b>39,28%</b>	<b>37,32%</b>	<b>35,00%</b>	<b>40,40%</b>
<b>RES penetration (energy)</b>	<b>13,61%</b>	<b>13,57%</b>	<b>34,75%</b>	<b>0,00%</b>	<b>34,39%</b>

# AZORES

- **Institution:** DREn-Direção Regional da Energia
- **Description/competence:** Responsible for the licensing of all energy-related installations (local electricity company, filling stations or gas networks). Manages regional programs for energy, namely energy efficiency programs, implementation of RES.

## PROGRAMMES/POLICIES SUPORTING ENERGY EFFICIENCY AND RES

<b>1-PROENERGIA - Increase the share of renewable energy generation</b>	
<b>Description</b>	Financial incentives to the acquisition and installation of small-scale renewable energy generation equipment.
<b>Budget</b>	<b>213.000 € (2017)</b>
<b>2-Incentive to the acquisition of electric boilers.</b>	
<b>Description</b>	100€ incentive together with a free timer and 5 flow reduction valves.
<b>Budget</b>	<b>Unknown</b>

# AZORES

## BEST PRACTICES

<b>1-Financing bonus under the Azores 2020 Operational Programme</b>	
<b>Description</b>	A bonus when projects present energy efficiency and/or use of RES. This has translated into a successful, optimise their energy use and production,
<b>Budget</b>	<b>Unknown.</b>

# REUNION

	REUNION
<b>ISLAND ELECTRICAL SYSTEMS</b>	
Is the island interconnected to continental grids?	No
Is the island interconnected to other islands?	No
Capacity of the submarine cable	0,00 MW
<b>ENERGY STORAGE CAPACITY</b>	
Storage capacity (Power)	1,00 MW
Storage capacity (Energy)	7,00 MWh
<b>FOSSIL FUEL CONSUMPTION (metric ton)</b>	<b>781.534 t</b>
<b>NON FOSSIL COMBUSTIBLE CONSUMPTION</b>	<b>551.375 t</b>
Bagasse (non fossil - Sugar cane residue)	551.375 t
<b>INSTALLED POWER-FOSSIL</b>	<b>501,00 MW</b>
<b>RES POWER</b>	
Wind	16,50 MW
PV	187,80 MW
Hydro	133,20 MW
Biogas (landfill)	4,40 MW
	<b>Total RES</b> 341,90 MW
	<b>Total installed power</b> 341,90 MW
<b>FOSSIL ELECTRICITY GENERATION</b>	<b>2.018.825 MWh</b>
<b>RES GENERATION</b>	
Wind	13.979 MWh
PV	256.529 MWh
Bagasse (non fossil - Sugar cane residue)	260.957 MWh
Hydro	422.338 MWh
Biogas (landfill)	13.334 MWh
	<b>Total RES</b> 967.137 MWh
	<b>Total gross electricity generation</b> 2.985.962 MWh
	<b>THERMAL EFFICIENCY</b> 34,00%
	<b>RES penetration (energy)</b> <b>32,39%</b>



# REUNION

- **Institution:** Reunion Regional Council
- **Description/competence:** Public local authority. Responsibilities include land planning, environment and energy.

## PROGRAMMES/POLICIES SUPPORTING ENERGY EFFICIENCY AND RES

<b>1-Regional Climate-Air-Energy Scheme (SRCAE)</b>	
<b>Description</b>	Reducing emissions GHG; enhancing the territory Resilience; Guaranty the quality of Air, throug eEnergy Efficiency and RES.
<b>Budget</b>	<b>None</b>
<b>2-Energy Multiannual Program (PPE)</b>	
<b>Description</b>	Security of supply and reliability of energy systems; Improvement of energy efficiency and reduction in consumption; Development of renewable energies and energy recovery; Development power grids, energy storage, energy conversion and demand-side management; Safeguarding of the competitiveness of energy prices.
<b>Budget</b>	<b>7.3 billion euros</b>

## BEST PRACTICES

<b>1- SLIME project - Local Scheme for Energy Efficiency.</b>	
<b>Description</b>	Aims to find solutions for fuel-poor households. The different steps are: locate the fuel-poor families, lead a diagnosis, find solutions and guide families toward these measures to reduce energy usage at home.
<b>Budget</b>	<b>Since 2014 : 7.6 million euros</b>
<b>2- ECOSOLIDAIRE – financing support to buy a solar heating system</b>	
<b>Description</b>	This policy aims at helping households within low income to acquire solar heating systems. Objective to reduce energy poverty ; reducing energy demand by replacing electric water heaters and gas water heaters.
<b>Budget</b>	<b>Since 2011 : 8.5 million euros</b>
<b>3- Photovoltaic check</b>	
<b>Description</b>	Granted to any individual and farmer who buys a photovoltaic plant from an agreed partner, meeting the technical and financial criteria defined in a tripartite partnership agreement. <ul style="list-style-type: none"> <li>• From : 1 - 2 kWc = 1000 € (with storage 2000 €)</li> <li>• From : 2 - 9 kWc = 3000 € (with storage 6000 €)</li> </ul>
<b>Budget</b>	<b>4.744.000 € since 2011</b>

# MARTINIQUE

	MARTINIQUE
Is the island interconnected to continental grids?	
Is the island interconnected to other islands?	
Capacity of the submarine cable	
ENERGY STORAGE	
Storage capacity (Power)	
Storage capacity (Energy)	
FOSSIL FUEL CONSUMPTION (metric ton)	
INSTALLED POWER-FOSSIL	
RES POWER	
Wind	
PV	
Hydro	
Waste	
	Total RES
	Total installed power
FOSSIL ELECTRICITY GENERATION	
RES GENERATION	
Wind	
PV	
Hydro	
Waste	
	Total RES
	Total gross electricity generation
	THERMAL EFFICIENCY
	RES penetration (energy)

# MARTINIQUE

- **Institution:** Territorial Collectivity of Martinique - CTM
- **Description/competence:** Gaining performance to succeed in the challenge of development and employment. Improving competitiveness to support economic development. The competences include economic development and land use planning and transportation.

## PROGRAMMES/POLICIES SUPPORTING ENERGY EFFICIENCY AND RES

### 1-Multi-fund ERDF-ESF program

<b>Description</b>	Energy autonomy through the use of renewable energies, in order to achieve the objectives set by the Grenelle Environment Forum for the French overseas departments (50% of renewable energy in 2020). will focus on reducing the energy consumption of buildings by renovating social and private housing, as well as public buildings.
<b>Budget</b>	<b>41,5 M€</b>

### 2-Territorial Program of Energy Management (PTME)

<b>Description</b>	Multi-year program for controlling energy demand and the development of renewable energies. 3 programs: Management of Energy Demand and Energy Efficiency (Buildings, Companies, Communities); Renewable Energies (Animation, investments, evaluation, communication, thermal, electrical, networks, traineeships...); Territorial projects of sustainable development (regional device of observation, development, mobility...)
<b>Budget</b>	<b>47.180.000 €</b>

## BEST PRACTICES

<b>1-Development of the solar water heater</b>	
<b>Description</b>	Actions reinforcing traineeships. Subsidies for the installation of equipment. • Achieve an installation rate of 5000 Individual Solar Water Heaters (CESI) per year by 2020.
<b>Budget</b>	<b>31.919.550 €</b>
<b>2-Energy Renovation of municipal Buildings</b>	
<b>Description</b>	100% supported by PMTE partners. It is to propose to the municipalities energy efficiency work agreements on two municipal buildings (project management with air conditioning, lighting, waterproofing, water solar, solar protection ...).
<b>Budget</b>	<b>1.370. 000 €</b>

# MARTINIQUE

## OTEC (Ocean Thermal Energy Conversion)

The sea also being so warm at its surface and much colder closer to the bottom has quantities of trapped energy that are not negligible. OTEC (Ocean Thermal Energy showcased by the NEMO (New Energy for Martinique and Overseas) project to generate 12 net MW by 2020.

## GEOHERMAL

Considerable geothermal potential under the "Montagne Pelée",. Studies have highlighted promising potential are the hot springs areas on the island located near Diamant Rock and on the West flank of the Montagne Pelée, although this area north of Pitons du Carbet has pristine wildlife and rainforest.

## The Grand Rivière wind project

A 14 MW wind farm with 7 wind turbines of 2MW and an annual energy output of around 40GWh. Will be equipped with the battery energy storage system. BESS. Li-ion energy storage facility to buffer the wind energy variations.). A 5MW / 5MWh of battery energy storage at a utility-scale wind farm, aimed at stabilising and maximising the flow of energy onto the grid.

# GUADALUPE

	GADELOUPE
<b>ISLAND ELECTRICAL SYSTEMS</b>	
Is the island interconnected to continental grids?	No
Is the island interconnected to other islands?	No
Capacity of the submarine cable	
<b>ENERGY STORAGE CAPACITY</b>	
Storage capacity (Power)	0,00 MW
Storage capacity (Energy)	0,00 MWh
<b>FOSSIL FUEL CONSUMPTION (metric ton)</b>	<b>185.998 t</b>
<b>INSTALLED POWER-FOSSIL</b>	<b>465,10 MW</b>
<b>RES POWER</b>	
Wind	26,30 MW
PV	70,20 MW
Hydro	10,60 MW
Geothermal	14,70 MW
Biogas (landfill, distillery)	3,10 MW
	<b>Total RES</b> 124,90 MW
	<b>Total installed power</b> 124,90 MW
<b>FOSSIL ELECTRICITY GENERATION</b>	<b>1.396.697 MWh</b>
<b>RES GENERATION</b>	
Wind	51.008 MWh
PV	92.462 MWh
Geothermal	112.197 MWh
Hydro	37.955 MWh
Biogas (landfill, distillery)	2.767 MWh
Biomass (bagass)	63.490 MWh
	<b>Total RES</b> 359.879 MWh
	<b>Total gross electricity generation</b> 1.756.576 MWh
	Average efficiency fossil 19,58%
	<b>RES penetration (energy)</b> 20,49%

# GUADALUPE

- **Institution:** Regional Council of Guadeloupe
- **Description/competence:** Competency includes economic development, training, transports, land use planning and environment. Fosters actions aimed at sustainably developing promoting intermodal and complementary transports solutions

## PROGRAMMES/POLICIES SUPPORTING ENERGY EFFICIENCY AND RES

<b>1-European Regional Development Fund - ERDF</b>	
<b>Description</b>	Key priority areas of ERDF known as 'thematic concentration', include low-carbon economy. The measures include increase the share of RES in the mix; promote energy efficiency and RES in companies, public buildings and housing.
<b>Budget</b>	<b>49 M€</b>
<b>2-State-Region Plan Contract (CPER)</b>	
<b>Description</b>	CPER includes multimodal mobility; ecological and energy transition
<b>Budget</b>	<b>590 M€</b>
<b>3-Energy Savings Certificates (ECE)</b>	
<b>Description</b>	ECE system is based on promotion energy efficiency among energy consumers: households, local authorities or professionals.
<b>Budget</b>	<b>2 billions euros</b>



## BEST PRACTICES

### 1- Regulation - Training

<b>Description</b>	The Building RTG aims to improve energy efficiency of new buildings. The RTG promotes the use of efficient and low energy consumption equipment, prioritizing the high electric consumption items (AC and hot water). The energy performance diagnosis. Performance diagnosis is carried out when property is under construction. It assesses the property's energy consumption and gives energy efficiency recommendations.
<b>Budget</b>	<b>400.000 €</b>

### 2- Subsidy

<b>Description</b>	Public lighting is the first electricity consumption item for local authorities. Renovation of public lighting.
<b>Budget</b>	<b>75 M€</b>

# GUADALUPE

## BIOMASS PLANT

Conversion a coal-fired power plant to a biomass plant. This will increase the renewable energy mix by over 15% to an estimated 35% from 20.5% in 2017.

Albioma, an independent renewable energy producer operates the plant. The power plant has an installed capacity of 34 MW and generates enough electricity annually to meet 15% of the island's power consumption.

Currently, the plant generates some 260 GWh of power per year, which represents around 15% of the island's total consumption. The planned conversion will reduce the plant's annual atmospheric emissions by more than 265,000 tonnes equivalent carbon dioxide (CO<sub>2</sub>).

	EPIRUS
% of imported electricity	7,00%
% of electricity locally generated (in the region)	93,00%
<b>ENERGY STORAGE CAPACITY</b>	
Storage capacity (Power)	784,12 MW
Storage capacity (Energy)	4.501.225,00 MWh
<b>FOSSIL FUEL CONSUMPTION IN THE REGION (metric ton)</b>	<b>0 t</b>
<b>INSTALLED POWER IN TH REGION-FOSSIL</b>	<b>0,00 MW</b>
<b>RES POWER</b>	
Wind	113,86 MW
PV	108,00 MW
Hydro	560,00 MW
Biogas (landfill)	2,26 MW
<b>Total RES</b>	<b>784,12 MW</b>
<b>Total installed power</b>	<b>784,12 MW</b>
<b>FOSSIL ELECTRICITY GENERATION</b>	
	0 MWh
<b>RES GENERATION IN THE REGION</b>	
Wind	299.220 MWh
PV	34.405 MWh
Hydro	4.165.000 MWh
Biogas (landfill)	2.600 MWh
<b>Total RES</b>	<b>4.501.225 MWh</b>
<b>Total gross electricity generation</b>	<b>4.501.225 MWh</b>
Average efficiency fossil	No
<b>RES penetration (energy)</b>	<b>100,00%</b>

- **Institution:** Region of Epirus
- **Description/competence:** Exercises regional his competencies in planning and coordination of regional policy; environmental protection.

## PROGRAMMES/POLICIES SUPORTING ENERGY EFFICIENCY AND RES

<b>1- Operational Programme of Epirus 2014-2020</b>	
<b>Description</b>	Supporting energy efficiency and use of RES among public buildings and social housing
<b>Budget</b>	<b>12.000.000 €</b>
<b>2- ELENA project</b>	
<b>Description</b>	Design and implementation of a sustainable lake transportation system; new LED lighting Municipalities of Arta, Preveza and Igoumenitsa; new rural regional road lighting network; RES and Energy Efficiency in Public Building
<b>Budget</b>	<b>727.600 €</b>

## BEST PRACTICES

### 1- Installation of RES and EE systems at the building and the surrounding space of the Epirus Regional Authority.

<b>Description</b>	The design, implementation and evaluation of two mature small-scale energy investments (in Ioannina & Gjirokastra) . Development of advanced tools for RES and energy efficiency . Guidance for mature RES and energy efficiency investments and transfer of knowledge.
<b>Budget</b>	<b>600.000 €</b>

### 2- PPP- Public-Private Partnership, implementing the National waste management Planning (ESDA)

<b>Description</b>	Regional Waste management Planning. Maximizes recycling , produces green energy. maximum waste treatment capacity of 105 000tn/year, served 370.000 inhabitants, 18 municipalities
<b>Budget</b>	<b>52,4 M€</b>

# CYPRUS

	CYPRUS
<b>ISLAND ELECTRICAL SYSTEMS</b>	
Is the island interconnected to continental grids?	N/A
Is the island interconnected to other islands?	N/A
Capacity of the submarine cable	N/A
<b>ENERGY STORAGE CAPACITY</b>	
Storage capacity (Power)	N/A
Storage capacity (Energy)	N/A
<b>FOSSIL FUEL CONSUMPTION (metric ton)</b>	<b>1.032.644 t</b>
<b>INSTALLED POWER-FOSSIL</b>	<b>1.477,50 MW</b>
<b>RES POWER</b>	
Wind	157,50 MW
PV	112,10 MW
Hydro	
Biogas (landfill)	9,70 MW
<b>Total RES</b>	<b>279,30 MW</b>
<b>Total installed power</b>	<b>1.756,80 MW</b>
<b>FOSSIL ELECTRICITY GENERATION</b>	
	4.455.189 MWh
<b>RES GENERATION</b>	
Wind	211.006 MWh
PV	167.792 MWh
Hydro	
Biogas (landfill)	36.496 MWh
<b>Total RES</b>	<b>415.294 MWh</b>
<b>Total gross electricity generation</b>	<b>4.870.483 MWh</b>
Steam Turbines	33,89%
Diesel engine	41,58%
Gas turbine (Brayton)	24,33%
Combined cycle	45,00%
<b>THERMAL EFFICIENCY</b>	<b>36,3%</b>
<b>RES penetration (energy)</b>	<b>8,53%</b>

# CYPRUS

- **Institution:** Cyprus Energy Agency - CEA
- **Description/competence:** Carries out activities related to the promotion of renewable energy, energy saving, and sustainable transport and urban mobility. Cover a wide range of topics, such as: Sustainable Energy and Climate Action Plans for Local Authorities; Production of biofuels from microalgae; promotion of RES; Increase of Energy Efficiency in the residential sector; Energy performance of homes, public buildings and sport facilities.

## PROGRAMMES/POLICIES SUPPORTING ENERGY EFFICIENCY AND RES

<b>1-Plan to produce electricity from renewable energy sources for self-consumption.</b>	
<b>Description</b>	Promote the exploitation of RES in the residential and commercial sector and contributing to the achievement of national RES and energy efficiency
<b>Budget</b>	<b>NOT AVAILABLE</b>
<b>2-Save &amp; Upgrade" grant scheme</b>	
<b>Description</b>	Provide a big motivation for the energy upgrade of existing buildings; the contribution to the establishment of a database for the energy efficiency of the current building stock through the EPC's which are necessary for the claiming. Supporting schemes for the energy renovation of existing houses and existing buildings. The support scheme provided direct grants for large-scale renovation in buildings, which will upgrade their energy class on the building's energy performance certificate
<b>Budget</b>	<b>15.000.000 EUR/ per call</b>

## BEST PRACTICES

### 1- Incentives to promote RES installation in different type of buildings, by increasing the building factor

<b>Description</b>	<p>New buildings and buildings undergoing renovation, it is possible to increase the building factor by 5% for energy class A buildings, which covers at least 25% of their total energy needs from renewable energy sources.</p>
<b>Budget</b>	<p><b>NOT AVAILABLE</b></p>

### 2- Lower VAT rate for the renovation and repair of private dwellings

<b>Description</b>	<p>Incentives to promote Energy Efficiency and RES, through tax exemption. Relates to applying lower VAT rate (5%) instead of 19% for renovation and repair works carried out in existing private dwellings.</p>
<b>Budget</b>	<p><b>NOT AVAILABLE</b></p>



# TRAINING ON RES AND ENERGY EFFICIENCY

Training is a key issue in an strategy for overcoming some of the most important barriers to RES development.



Capacity building through courses at all levels, for specialized training in design, installation, operation and maintenance of RES systems, to improve the qualification and improve the productivity of technical staff.



# RESOR

Interreg Europe



European Union  
European Regional  
Development Fund

Thank you!

Questions welcome