SUSTAINABLE ENERGY WEEK
An initiative of the European Commission

Innovative technologies and regulatory schemes accelerating islands' decarbonisation
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Outstanding projects of the European Outermost Regions

OR Energy Network

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OR ENERGY NETWORK

JOINT STRATEGIC ACTION FOR THE EUROPEAN UNION:

***European O**utermost**R**egions (ORs):*

LEADERSHIP IN THE DEVELOPMENT OF SUSTAINABLE ENERGY MODELS

(Renewable) Energy Context of OR & Challenges (I)

- **Excellent renewable energy resources**; not being used to their full extent for technical, economic and legislative barriers. Legislative barriers are mostly at national level

- **Very heterogeneous situation among the ORs**, with **renewable penetrations** in the electricity grid ranging from 1.5% (St Martin) to 64% (Guyane). Most ORs have set targets of 50% renewable electricity by 2020, and the French ORs aim to get to 100% by 2030. To reach these challenging limits, the current frameworks for implementation of renewable energies in all the ORs need to be improved. *One of the reasons of these big differences in RES penetration is the existence of non- variable renewables (hydro + geothermal) in some ORs*

- **Technical barriers for implementation of renewable energy penetration** require demonstrating the feasibility of solutions involving, e.g., energy storage capabilities, smart grid technology, micro-generation and electric mobility. Public support for demonstration projects that could significantly increase the penetration of renewable energy in the electricity grid, e.g., in smaller islands first, would be an important step.

- **Various ORs plan to implement additional innovative projects to increase renewable energy penetration** in their electricity grid in the near future. In some cases, ORs plan to reach the target of 100% renewable electricity and, in others, they plan to also include transport (100% electrical vehicles charged by renewable energy)

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(Renewable) Energy Context of OR & Challenges (II)

- **National legislation should not impose obstacles** to the implementation of innovative solutions, along the "innovation principle" that has been adopted by the EU in 2015.
- **Transportation costs added to smaller markets result in higher costs for the deployment of renewable energy solutions than in mainland Europe**. ORs estimate a 20-30% cost increase relative to typical "European" prices.
- **"Feed-in tariffs" for renewable energy in the OR are mostly based on the "pool price"** in the respective mainland, markets to which the OR are not linked and cannot access. As the national electricity "pool price" is much lower than the real cost of electricity production in the OR, local feed-in tariffs for renewable should be higher, based on the real local cost of producing conventional electricity, to offset the increased local investment costs in renewables. Producing renewable energy locally, in this scenario, would be more profitable than burning fuel for the "national pool" and, at the same time, penetration of renewable energy in the OR would receive an important impulse. Although this is an issue best dealt with at national level, EU legislation (e.g., regulations, Directives) or EU guidelines could help set a more favourable policy in this respect, e.g. by allowing derogations until specific targets are met.
- **Transport represents more than half** of the primary energy needs in the OR. The target of reducing electricity production in Directive 2012/27/EU may conflict with the strategy of fossil free islands, as the base strategy is to replace fossil fuels by renewable electricity. For OR and other regions (namely, islands) pursuing ambitious targets towards electric mobility, it would be more appropriate to consider the overall target for reducing primary energy and CO_2 emissions rather than for electricity alone.

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(Renewable) Energy Context of OR & Challenges (III)

- **The GDP in most OR is below the national average**. Citizens of the OR are thus even more focused on solutions with low initial cost than residents in mainland Europe. Incentives schemes and information campaigns, namely highlighting the rate of return for investments and production efficiency, need to consider these special circumstances.

- **OR would like to have funding and regulatory procedures streamlined**.

- **Energy efficiency and buildings regulations** in some of the OR may need to be improved to match the local climate and social/economic conditions. OR with tropical climates would be among those with the best potential for improvement (Guadeloupe and Martinique already have their own building climate-adapted regulations and Reunion did so for residential buildings only). The definitions of Nearly Zero-Energy Buildings (NZEB) should also be adapted to local conditions in each OR, as the relevant EU Directive (the EPBD) allows and recommends. Adoption of a unique country-wide definition may result in solutions that may be far from cost-optimal.

- Local utilities (electricity and/or gas distributors) in the OR could/should play a larger role towards energy efficiency in the OR, through well designed Energy Efficiency obligation schemes (as defined and required by the Energy Efficiency Directive – EED), targeting the specific social and economic needs of the OR population (industry as well as residential and non-residential buildings).

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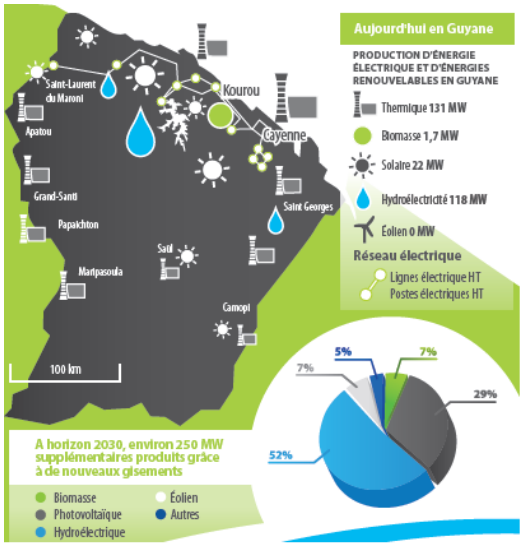
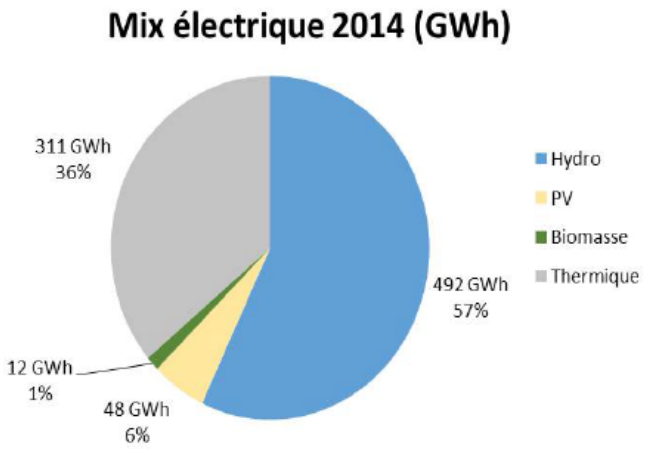
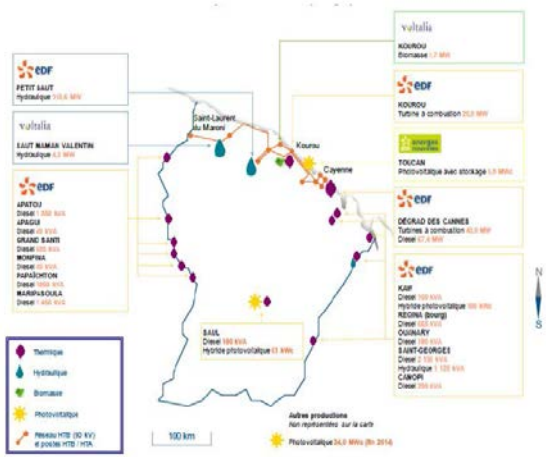
Guyane







Puissance installée en MW	Etat 2014	Objectifs 2016-2018	Objectifs 2019-2023	Total PPE à 2023	Total Territoire 2023	Objectifs 2024-2030	Total Territoire 2030
Grande hydraulique	114	0	0	**0**	114	0	114
Petite hydraulique	4,5	+4,5	+12	**+16,5**	21	+13,5	34,5
Biomasse	1,7	+15	+25	**+40**	41,7	+20	61,7
PV avec stockage	5	+15	+10	**+25**	30	+15	45
PV sans stockage yc autoconso	34	+8	+8	**+16**	50	+10	60
Eolien avec stockage	0	+10	+10	**+20**	20	+10	30
Déchets	0	0	+8	**+8**	8	+5	13
TOTAL	**159,2 dont 39 MWc**	**+52,5 dont 23 MWc**	**+73 dont 18 MWc**	**+125,5 dont 41 MWc**	**284,7 dont 80 MWc**	**+73,5 dont 25 MWc**	**358,2 dont105 MWc**

Objectifs de développement des EnR dans la PPE de Guyane

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Guyane

ABIOIDIS

Power generation plant from biomass in an "isolated" territory

Municipality of Saint Georges to become the first municipality of Guyana, independent in terms of energy:

- Sommersault of Maripa hydroelectric power station (will be entirely rehabilitated by 2019 (1 MW))
- ABIODIS biomass plant (3 MW).

+ Two other activities:

- Logging (SEFEG): to supply the wood energy biomass plant;
- First sawmill (SAS SCIERIE OYAPOCK) in the area: to exploit the Régina massif, which the NFB wishes to explore.

The plant contributes not only to securing the electricity supply for the inhabitants of the municipality, but also to consider economic development in the area, particularly by installing companies in the new Business Economic Zone.

The Abiodis project has been supported for several years by the public authorities (both decentralized services of the State and local authorities). It has been financially supported by 2007-2013 programming of European funds and is now benefiting from a decision to allocate ERDF funds of € 2 million.

In addition to the creation of jobs and the supply of energy due to its participation in the Multiannual Energy Program of Guyana, it also aims to meet a growing energy need in an area not interconnected to the Guyana coastline network.

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Saint Martin

Geothermal Interconnection Panel

All of the Caribbean islands suffer from the same dependence on fossil fuels to produce their electricity. The geothermal resources available in the zone could allow a lower carbon electricity production that is insensitive to climatic variations and at a much lower cost than the existing one.
However, this resource remains closely linked to the geology and volcanism of these territories: it is not always available where demand exists.
The range of base production powers that geothermal energy can achieve, unlike the other exploitable renewable resources in the area, provide economic justification for the creation of electricity interconnections between the northern islands and the Lesser Antilles.

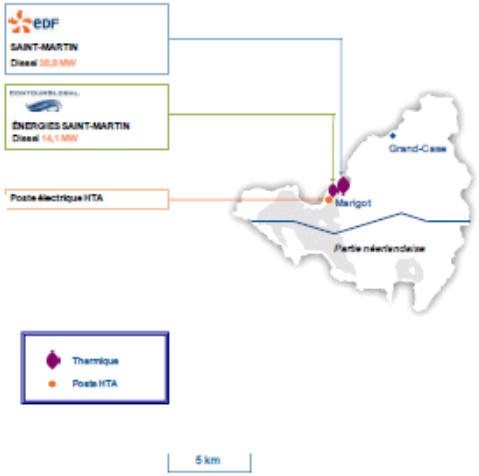
Given the geographical constraints, such an infrastructure appears realistic in the first approach.

The creation of an interconnected electricity network based on a production mainly of geothermal origin, will also allow a better integration of intermittent renewable energies, in particular photovoltaic and wind power strongly linked to climatic hazards.

More generally, it will provide each of the interconnected networks with greater resilience to changes in electricity demand and generation.

Finally, the development of geothermal energy will allow a reduction and harmonization of electricity production and distribution costs. This securing of the energy supply is an essential vector for the economic development of the area.

Schéma du système électrique de Saint-Martin



Energie livrée au réseau	2005	2006	2007	2008	2009	2010	2011	2012
Energie nette (GWh)	169	173	180	178	188	197	188	196
Croissance (%)	5,9 %	2,3 %	4,0 %	-1,0 %	5,6 %	4,7 %	-4,6 %	4,2 %

Puissance de pointe	2005	2006	2007	2008	2009	2010	2011	2012
Puissance (MW)	28,7	28,9	28,8	28,5	29,9	33,0	31,3	32,2
Croissance (%)	2,0 %	0,7 %	-0,3 %	-1,0 %	4,9 %	10,3 %	-5,2 %	2,9 %

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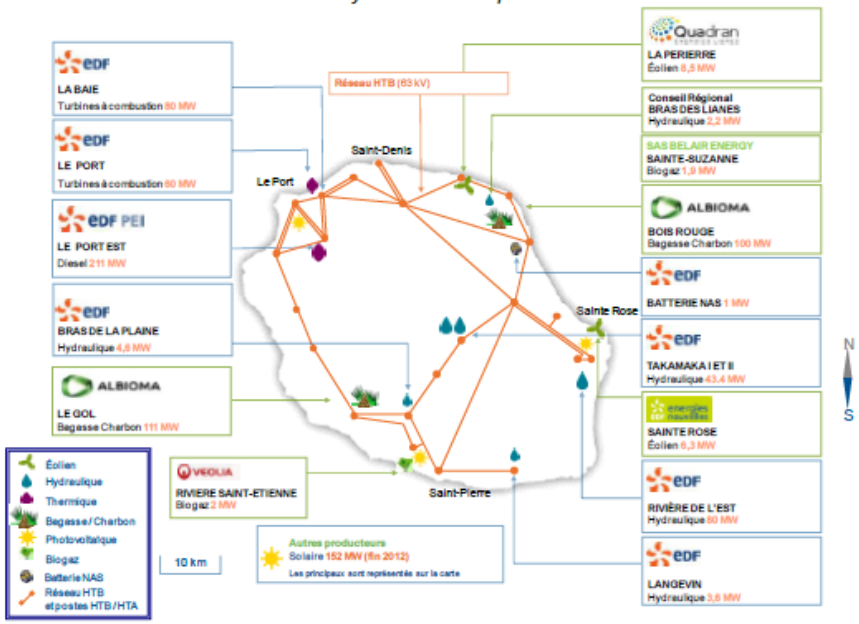
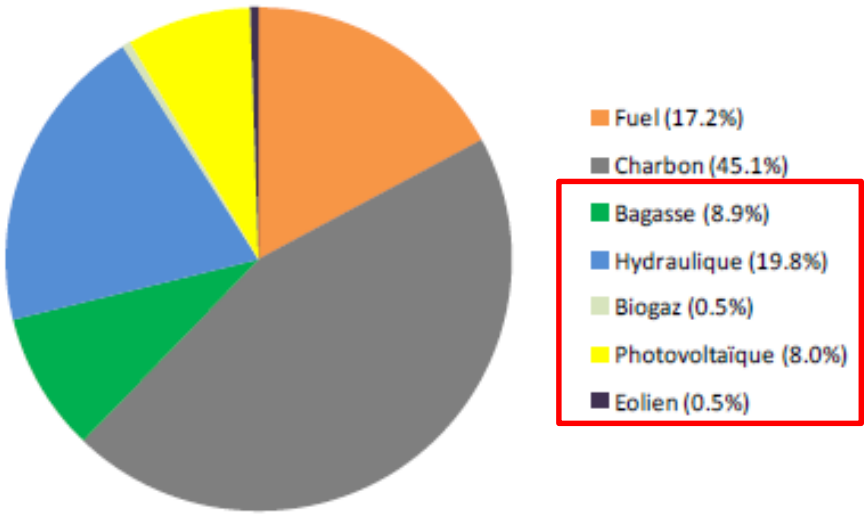
Réunion

Schéma du système électrique réunionnais





Objectifs de développement des énergies renouvelables
=> 509 GWH en 2018 et 729 GWh en 2020

	2018		2020		2023	
	Puissance installée (1), en MW	Production annuelle (2), en GWh /an	Puissance installée (1), en MW	Production annuelle (2), en GWh /an	Puissance installée (1), en MW	Production annuelle (2), en GWh /an
Photovoltaïque stocké	20	**27**	32	**43**	50	**68**
Photovoltaïque non stocké	20	**27**	32	**43**	50	**68**
Photovoltaïque 3-9 kWc	5	**7**	8	**11**	13	**18**
Bagasse et autres	-	**375**	-	**538**	-	**750**
Méthanisation	3	**20**	4	**31**	6	**48**
Gazéification	1	**7**	2	**12**	4	**28**
ORC	5	**35**	6	**35**	10	**68**
Énergies marines	-	**-**	-	**-**	5	**25**
Géothermie	-	**-**	-	**-**	5	**40**
Hydraulique	1	**2**	1	**2**	40	**158**
Éolien terrestre	8	**9**	13	**14**	25	**28**
Valo. Énerg. déchets	-	**-**	-	**-**	16	**130**
Total	**62**	**509**	**96**	**729**	**223**	**1427**

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Réunion

Societal Challenges

The purpose of this project is to harness the different best practices, which are implemented in small communities like ORs or islands as far as the societal challenges are concerned. We must consolidate the idea that population is one of the major stakeholder in the energy transition process aiming to pursue of the EU targets.

This topic fits well with the EU sustainable energy policy. We know that in order to tackle the climate change, we have to stimulate all the stakeholders. The population and societal challenges cannot be excluded. Moreover, The EU sustainable energy policy must focus on climate justice issue. This is more important in ORs and islands where the stratification of the population imply the risk to let a large part of the population in a kind of energy poverty trap. So, policies implemented must care about these societal issues and the abilities of these regions to boost the inclusive dimension.

Some key issues of the event could be as follows:

- **Managing energy efficiency at the household's level** (communication and information, diagnostic)
- **Challenging the energy insecurity that poor households should face with in isolated area and islands**: what kind of tools or policies to achieve these goals. (Example for La Reunion Slime, Ecosol, Cheque energy)
- **The participation of civil organizations to build smart governance of the transition**

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Mayotte

Electric Cars with Solar Charging

		2007	2010	2015	2020	2030
Centrale Electrique Petite Terre	Puissance	40 MW	40 MW	30 MW	30 MW	5 MW
	Travaux	remplacement 4 moteurs		déclassement de 4 moteurs		déclassement de 4 moteurs
Centrale Electrique Longoni	Puissance		40 MW	48 MW	80 MW	80 MW
	Travaux	construction 5 turbines		passage à 6 turbines	passage à 10 turbines	
GE Secours MDZ	Puissance	11 MW	11 MW	11 MW	11 MW	11 MW
	Travaux					
Photovoltaïque	Puissance	2 MW	10 MW	15 MW	15 MW	15 MW
	Travaux		développement du parc	construction champ solaire		
Biogaz	Puissance				1 MW	1 MW
	Travaux				construction usine	
	Total	53 MW	101 MW	104 MW	137 MW	112 MW

Tableau 4 : Puissances disponibles à l'horizon 2030 et travaux associés [réf. (1)]

- Introduction for the first time of an electric car device for professional use with a 100% solar charging device.
- Objective is to limit air pollution and limit the use of fossil fuels while reducing transport costs.
- The department authority of Mayotte is the authority organizing non-urban transport on their territory. Through this project the Department Council wants to exercise this competence by initiating a first experiment, starting point with the study on the movements of the agents and the project of interurban transport, of a more global strategy to rethink the displacements to the scale. of the territory of Mayotte.
- 5 vehicles will be deployed for this project.

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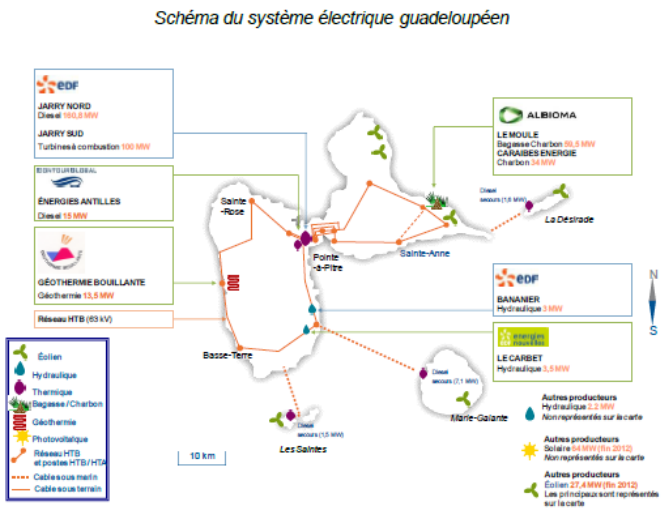
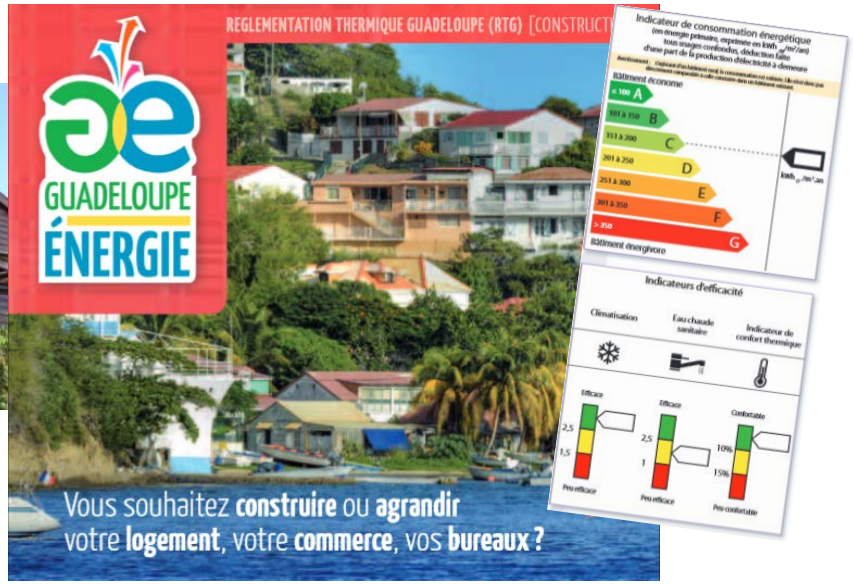
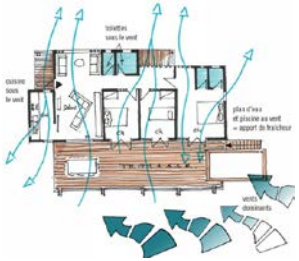
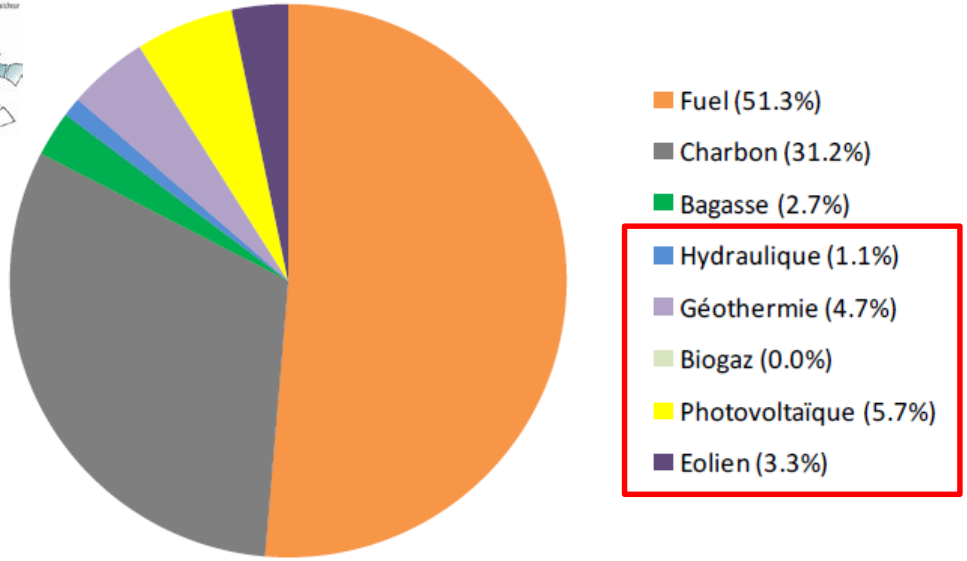
Guadeloupe









REGION GUADELOUPE

Guadeloupe Energie

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Guadeloupe

Guadeloupe's Thermal Regulation

In 2008 the regional energy Plan of Guadeloupe showed that **buildings accounted for more than 85% of total electricity consumption.** There was no regulation to adapt buildings to the tropical climate and lifestyle of islands like Guadeloupe. The regional Council of Guadeloupe has established a Thermal Regulation for Guadeloupe (RTG). This work has been conducted in partnership with the Scientific and Technical Center for Building (CSTB), responsible body at national level for the development of thermal regulations.

This regulation, in force since May 2011, set a range of standards to improve energy efficiency in buildings by considering local specificities, while meeting the requirements of the European framework in this area. It is organized around four main axes:

- Construction: RTG Construction includes a set of technical rules to be applied to new buildings and new parts of buildings, air-conditioned and non-air-conditioned, for residential use, offices, or shops. It aims to improve the thermal comfort of buildings while limiting the use of air conditioning.
- The DPEG (Guadeloupe Energy Performance Diagnostics): Building certification process, this is a document that describes the energy performance of buildings using a color code and an energy label, that which must be given to the future tenant or owner of a property. This system, which meets a European obligation, had not been transposed in the outermost French regions.
- Equipment: This component targets the most energy-intensive equipment in the Guadeloupe territory. It requires the installation of solar water heaters in new housing and new buildings of the tertiary sector, prohibits the importation and sale of air conditioners of energy category lower than class A and reinforces the obligation of inspection for air conditioning systems
- Feasibility study: The proposed measure concerns buildings of 1000 m² and over, whether for new construction projects or renovations. For these constructions, a feasibility study must evaluate the technical and economic indicators of various possible variants for defined energy positions of the building.

Finally, it should be noted that the international benchmark shows that **there are very few thermal regulations adapted to the tropical environment. There is none in the Caribbean.** RTG is therefore of interest to the countries of the zone and even to the entire tropical belt. Guadeloupe is positioning itself as a demonstration territory in this field. RTG has also been transferred to the Martinique community. An INTERREG project integrating this topic is being prepared in partnership with the OECS (Organization of Eastern Caribbean States).

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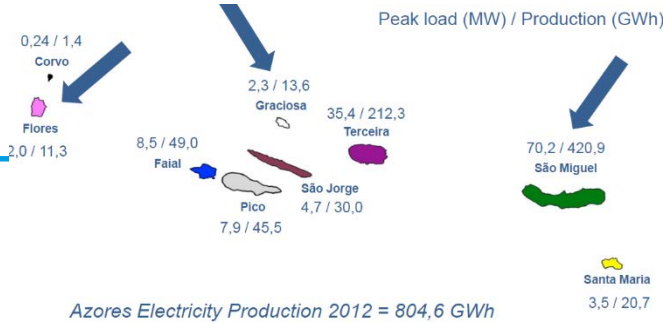
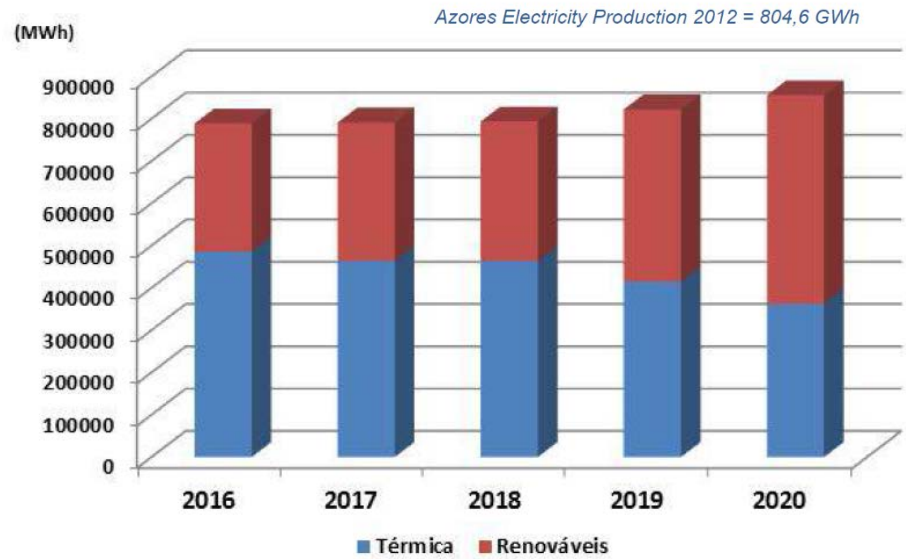
Açores



Quadro – Potência instalada em 2016

Ilhas	Térmica		Geotérmica	Eólica	Hidríca	Total	
	Fuelóleo	Gasóleo				Ilha	%
Santa Maria		6907		1500		8407	3,0
S. Miguel	98064		23000	9000	5066	135130	47,8
Terceira	61116			12600	1432	75148	26,6
Graciosa		4670				4670	1,7
S. Jorge		8228		1800		10028	3,6
Pico	16503			2400		18903	6,7
Faial	19107			4350	320	23777	8,4
Flores		3710		600	1562	5872	2,1
Corvo		536				536	0,2
Açores	194790	24051	23000	32250	8380	282471	100,0
%	69,0	8,5	8,1	11,4	3,0	100,0	

(kW)



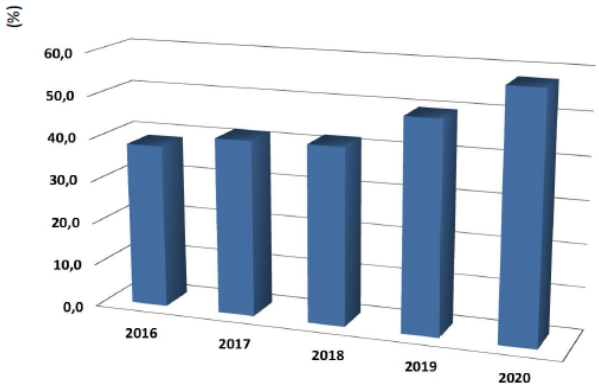


Gráfico – Taxa penetração de renováveis

Quadro – Produção prevista por origem no período de 2016- 2020

Tipo	Produção (MWh)				
	2016	2017	2018	2019	2020
Térmica	486268	464085	463310	415011	362420
Renováveis	302255	326749	329983	406889	492892
Total	788523	790834	793293	821900	855312
% Renováveis	38,3	41,3	41,6	49,5	57,6

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Açores

Geothermal power + Azorean decarbonisation roadmap

- The first electric power installation was built in the Azores in 1899
- Since then, the archipelago of Azores has counted on a strong share of renewables with installations of geothermal, hydro, wind, sun and wave power.
- Making the best out of its location on the mid-Atlantic ridge, geothermal power represents today about 45% of the total electricity generation and that value is expected to strongly increase.
- New challenges, however, abound: how to make use of the geothermal wasted heat or how to implement it in the smaller islands are some of the questions that need to be dealt with on the long-term roadmap towards decarbonisation.

Pico Vermelho Geothermal Power Plant

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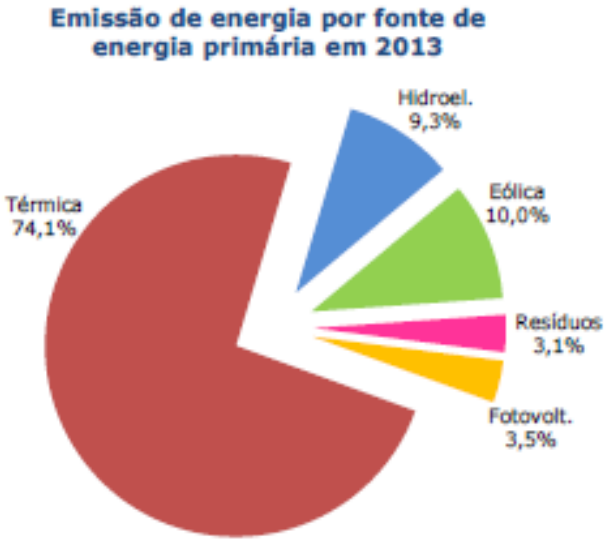
Madeira

Madeira:



Porto Santo:

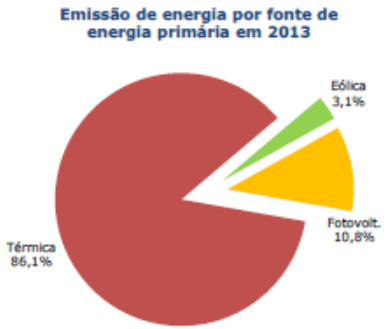


Table 9: Targets for 2020

	Objectives	Targets
1.	Improve energy supply guarantee.	Increase by 20% the number of days of autonomy of primary energy storage in comparison to 2005.
2.	Reduce energy dependence from abroad.	Increase to 20% the use of renewable energy resources in primary energy demand.
		Increase to 50% the use of renewable energy resources in electricity production.
3.	Reduce energy intensity in Gross Domestic Product.	Reduce by 20% the energy intensity in Gross Domestic Product (primary energy/Gross Domestic Product) compared to 2005.
4.	Reduce carbon dioxide emissions.	Reduce CO_2 by 20% compared to 2005.

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Energy storage infrastructure to increase the share of renewable energy sources

- In small isolated electric systems of an outermost island like Madeira, the reception of intermittent renewable energy sources (RES) is limited by the demand in off-peak hours.

- In Madeira, during the night, the demand is low and there is excess of RES rejected, which makes not feasible to increase RES power because the level of rejection will increase.

- With the energy storage infrastructure that EEM is building in Calheta, Madeira Island, it will be possible to pump water during the night with excess of RES and use that energy during the day and peak hours.
- This infrastructure allows to increase the capacity of the electric system to accept higher share of RES and also make the electric system less dependent on fossil fuels and more resilient to external factors, which is crucial in outermost regions.

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Thank you for your attention

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Gobierno de Canarias
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Presidencia de las Regiones Ultraperiféricas
2017 - 2018
Gobierno de Canarias