Energy, water, and waste in travel and accommodations

Megatrends are provoking

URBANIZATION

+2.5B

people in cities by 2050

Source: United Nations, DESA

DIGITIZATION

30B

connected things by 2020

Source: Cisco

INDUSTRIALIZATION

+50%

Energy consumption by 2050

Source: IEA

More ELECTRIC

2X faster growth of electricity demand compared to energy demand by 2040

Source : IEA WEO 2014

More DIGITIZED

10X more incremental connected devices than connected people by 2020

Source : Cisco, Internet World Statistics

More DECARBONIZED

82% of the economic potential of energy efficiency in buildings and more than half in industry, remains untapped

Source : World Energy Outlook 2012, Internal Analysis

More DECENTRALIZED

70% of new capacity additions will be in Renewables by 2040

Source : BNEF

IS IT REALY A COMPETITION BETWEEN TECH & HUMAN ?

CULTURAL HERITAGE

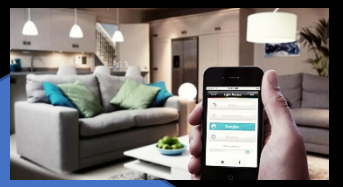
OPTIMUM TECHNOLOGIES IMPLEMENTATION IN FUTURE HOTELS

WINDOWS

INSULATION

PLUG-IN AUTO

AUTOMATION



HEAT PUMP

SHADING

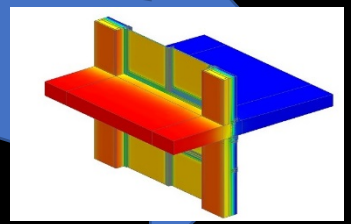
VENTILATION VIA ENERGY RECOVERY

ENERGY STORAGE

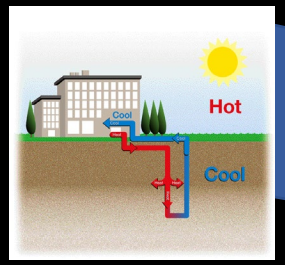
SOLAR SYSTEMS

AIR TIGHTNESS

THERMAL BRIDGES

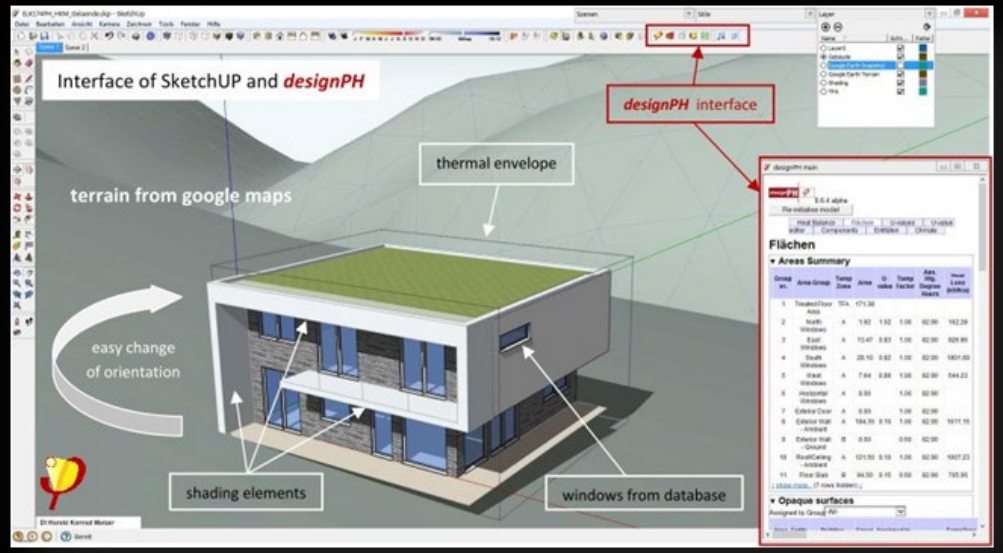


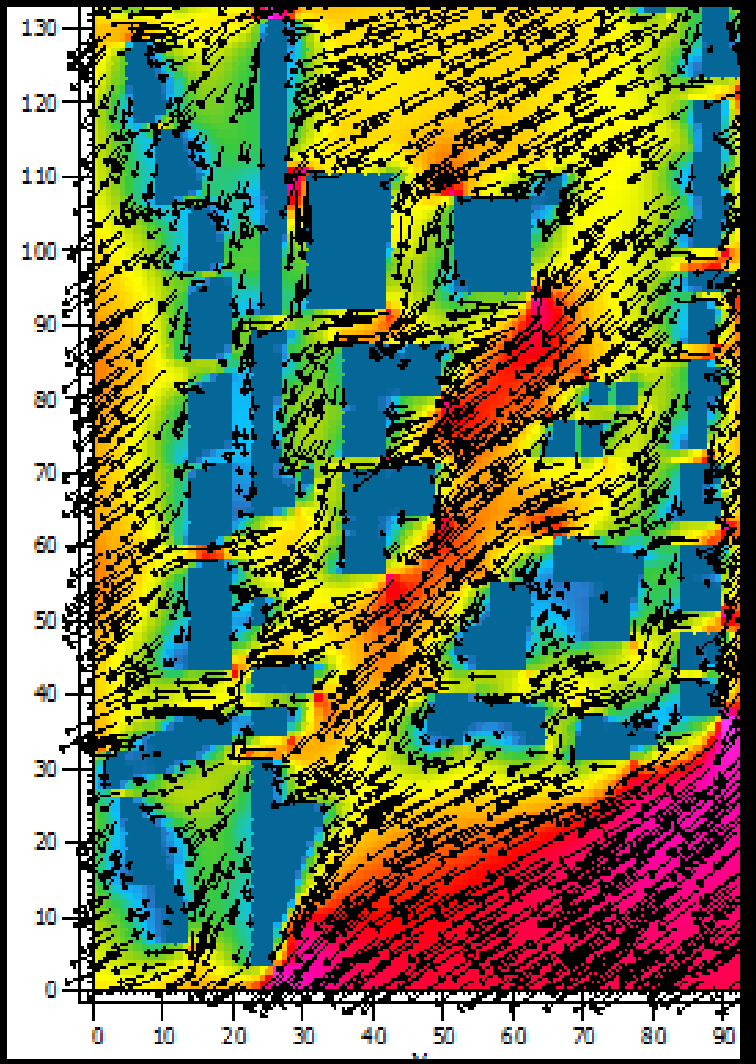
GEOTHERMY

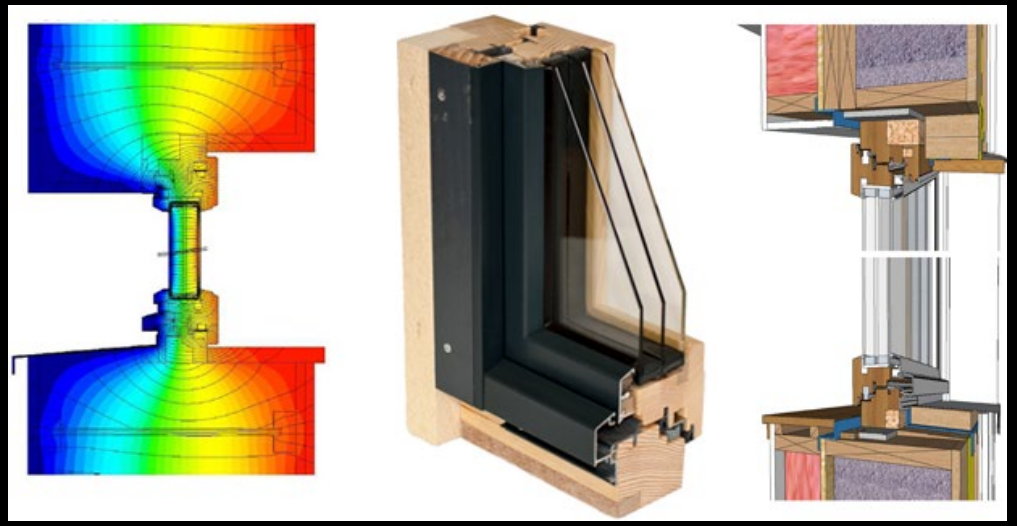


PV - BIPV

SUSTAINABABLE BUILDINGS, SIMULATIONS & RENEWABLES INTEGRATION

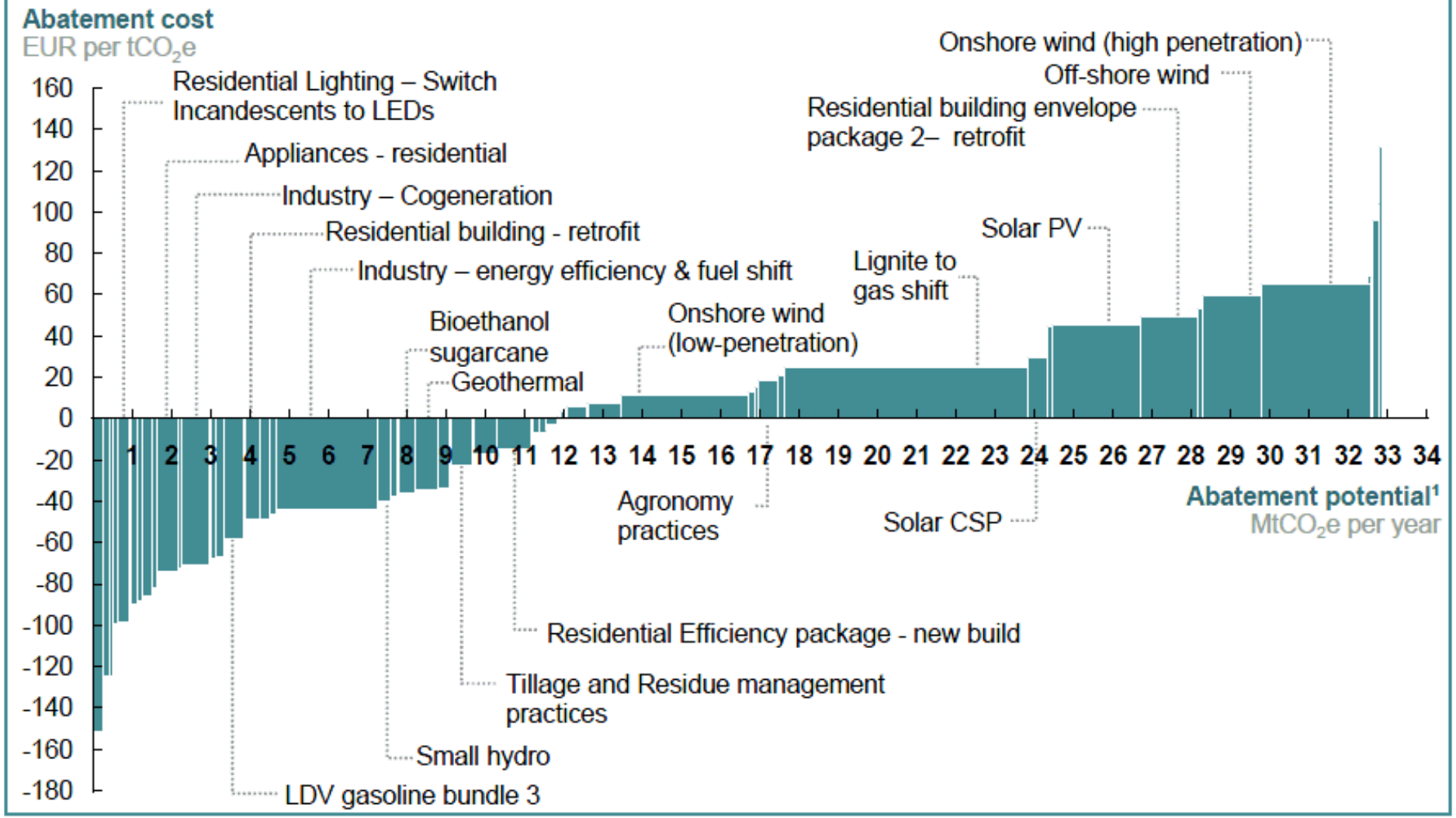






The Greek GHG Abatement Cost Curve includes a number of actions with negative and positive cost – in 2020, abatement of ~33 $MtCO_2e$ is possible

Greece GHG abatement cost curve, 2020



1 Versus reference case in same year, i.e. 2020

SOURCE: Greek GHG Abatement Cost Curve 2010

ARE THE AVAILIABLE TECHNOLOGIES MATURE ENOUGH ?

WHO IS REALY DECIDING ON TECHNOLOGY IMPLEMENTATION ?

WHAT IS REALY THE CRITICAL POINT ON DECISION ?

? THINK RESPONSIBLY ? MORE THAN RETURN OF $ INVESTMENT

MOST OF THE TIMES

THE CHANGE OF THE

WAY OF THINKING IS

ENOUGH !!!!!!!

Paulo Duarte

Director of Operations at Memmo Unforgettable Hotels

Duarte Conde Silva

Plant Manager at Graciólica Lda

Motti Essakow

Co Founder & Chief Imagineer of Rythms by Design and Rythms House

A MEMBER OF DESIGN HOTELS™

GSTC global conference

Terceira Island

December 6, 2019

memmo UNFORGETTABLE HOTELS

energy, water and waste

our approach

memmo

UNFORGETTABLE HOTELS

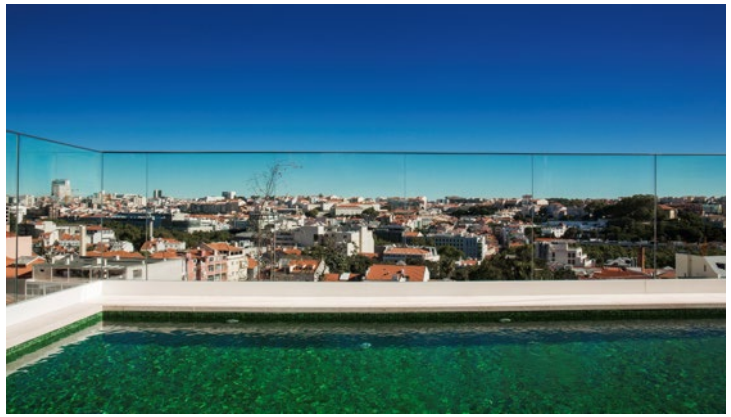
our hotels

memmo BALEEIRA
HOTEL ★★★★
SAGRES PORTUGAL

memmo ALFAMA
LISBOA PORTUGAL
HOTEL ★★★★

memmo PRÍNCIPE REAL
HOTEL

memmo ★★★★★ HOTELS



four strategic pillars

Commitment & Communication

Procedures

Technology

Measurement

main goals

1. Performance improvements by reducing energy and water consumpsions.
2. Reducing CO2 emissions.
3. Brand positioning.
4. Third party certification with regular external auditing.

commitment & communication

- **Shareholders** (definition of goals & investment decisions with impact on energy and water consuption).
- **The Team** (regular meetings, suggestion boxes for departamental teams, sharing & celebrating results).
- **Suppliers** (regular communication in order to reduce single use packaging).
- **Guests** (policy communication, towels reuse, suggestion boxes for guests).

procedures

- Preventive maintenance procedures.
- Keeping optimal equipment performance.
- Permanent analysis of possible deviations (water leaks and excessive energy consumption).
- Simple action plans for the teams & short reminders troughout the hotel (lights off, smart use of potable water, waste recycling).

technology

- Facilitiy management software with automatic alerts.
- Water flow reducer equipments in all rooms maintaining the comfort of the showers.
- Smart equipments (reuse of the heat produced by the air conditioning system to water heating – pools & rooms, room energy activated with a unique room key and movement sensors).
- Massive use of LED.

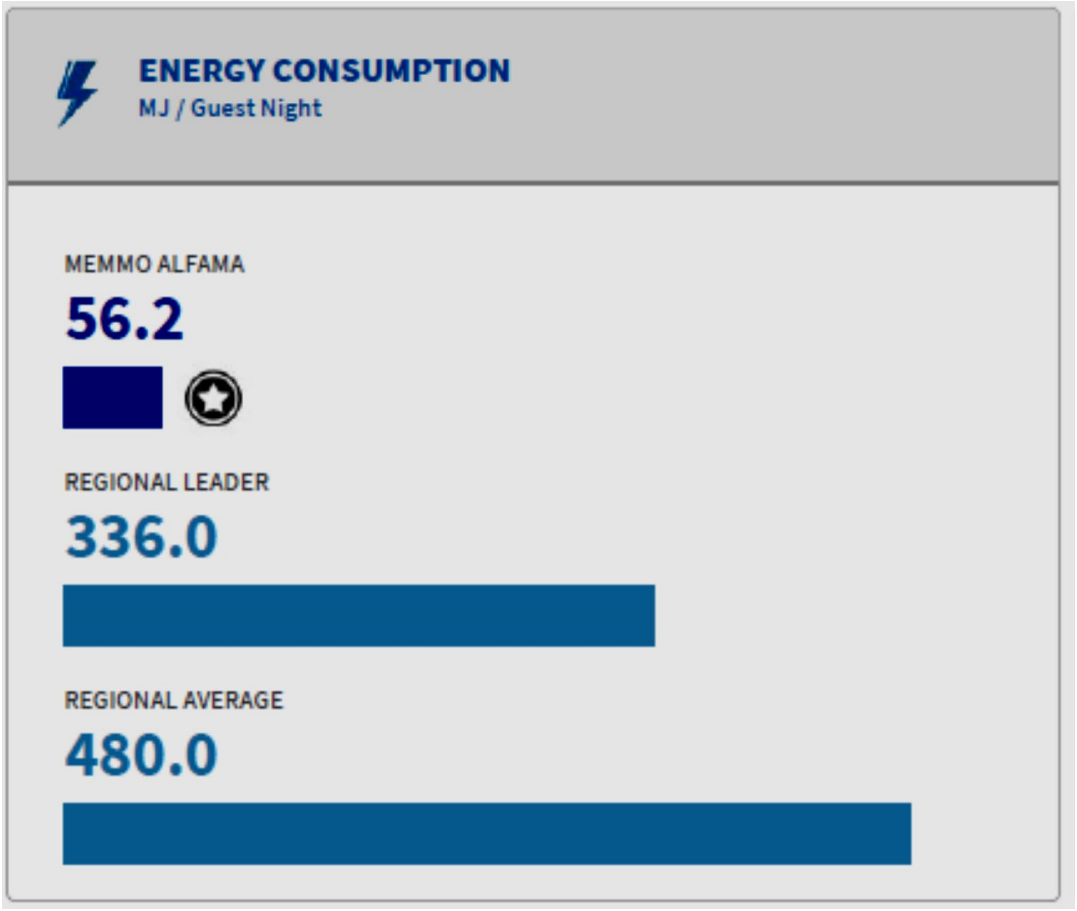
measurement

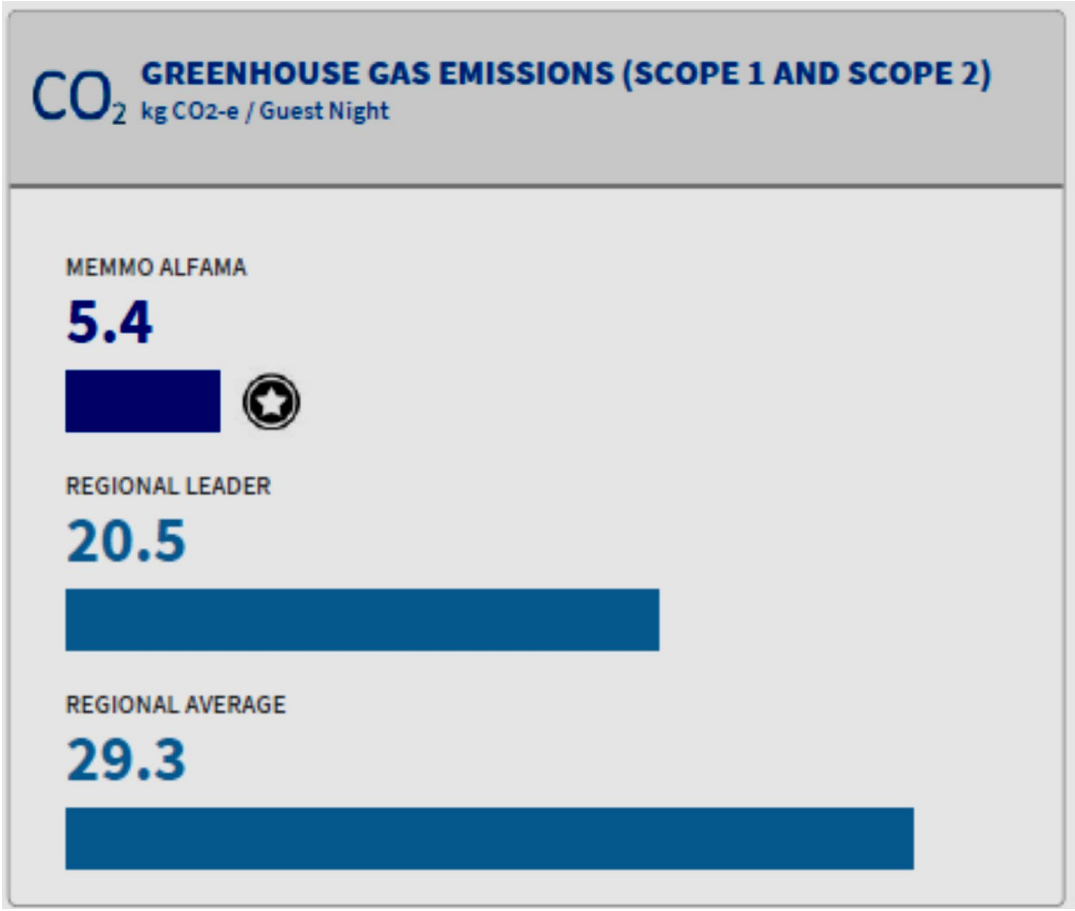
- Earth check partnership and platform.
- Tracking of fundamental KPI's:
  - Energy consumption per guest night
  - CO_2 Greenhouse gas emissions per guest night
  - Potable water consumption per guest night
  - Waste send to landfill per guest night
- Comparability with industry's benchmarks.

relevant results (2105-2018)

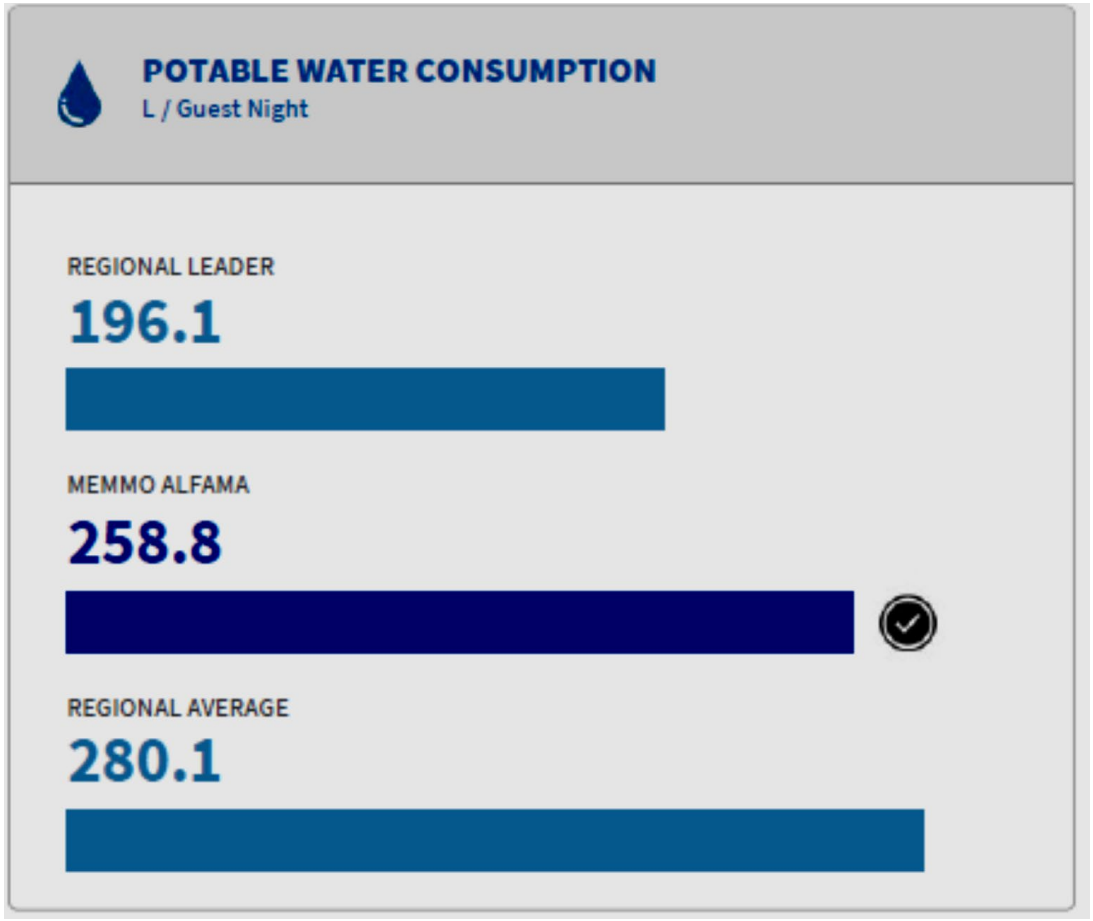
- 26% reduction of energy consumption per guest night from 20 kw/h to 15,6 kw/h (37 apartments of 4 yearly consumption).
- 31% reduction of CO2 greenhouse gas emissions from7,8Kg to 5,4 kg per guest night (22 cars yearly emissions).
- 25% reduction of chemicals plastic waste from the housekeeping departamento.
- 30% reduction of paper waste.

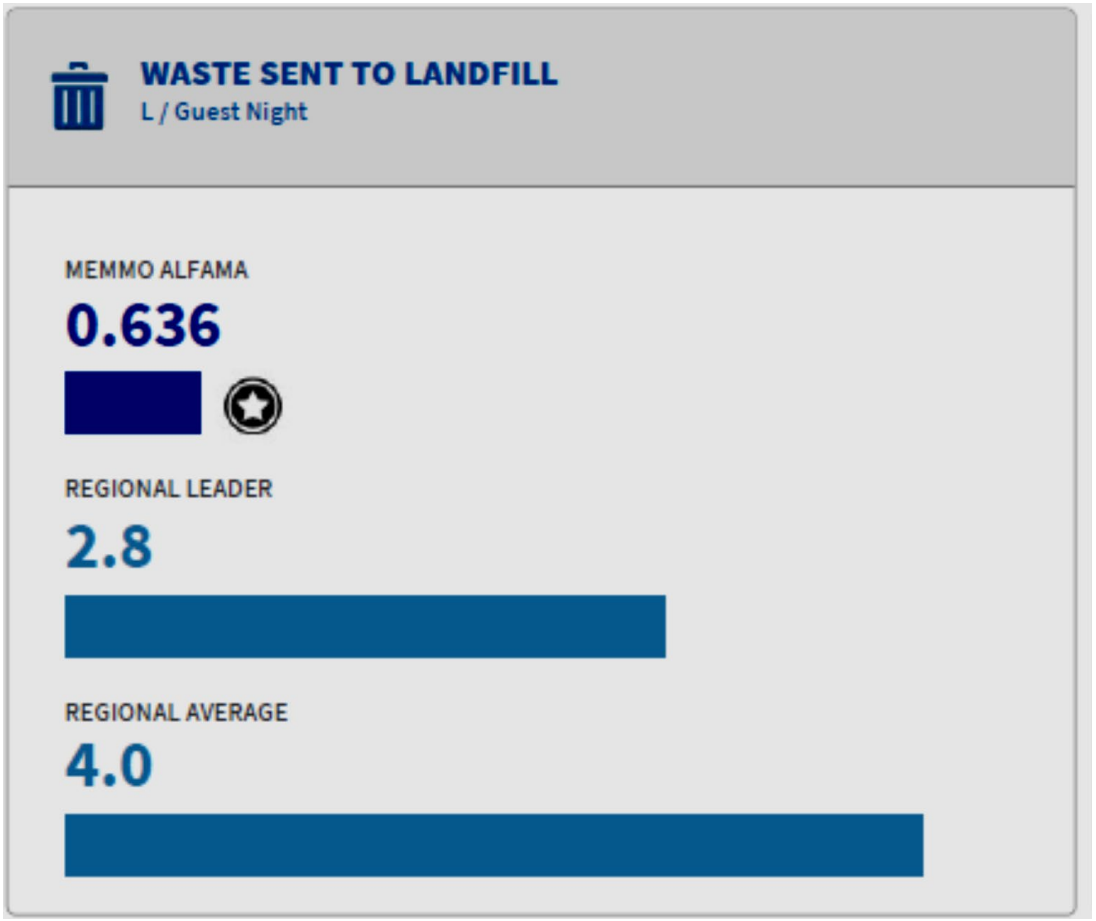
comparison with competitors





comparison with competitors





thank you!

memmo

UNFORGETTABLE HOTELS

Paulo Duarte

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Graciólica Renewable Hybrid Power Plant

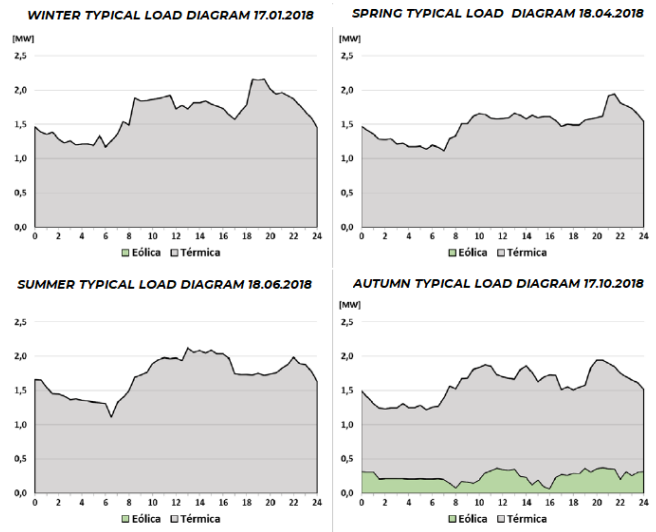
Global Sustainable Tourism 2019 Global Conference,
Terceira island, Azores Dec 4th – 7th, 2019

Graciólica

Agenda

1. Graciosa Electrical Power System;
2. Graciosa Island Micro-grid;
3. Graciólica Project and major timelines;
4. A special Project;
5. Micro-grid and Power Quality improvements overview;
6. Renewable Penetration results;
7. Renewable Energy delivered & CO2 Emission Savings;

1. Graciosa Electrical Power System



Diesel Power Plant

- 6 engines: 2x 750kVA; 1x 762kVA; 1x 1100 kVA 2x 1287 kVA;
- Total **4,6 MW** of rated power

Wind Farm

- 5 x 0,9 MW E-44 Wind turbines
- Total of **4,5 MW** rated power

Graciosa Distribution Network

- 15 kV voltage level
- Island peak load of 2,2 MW and 1,2 MW of valley load
- Net Energy Production of 13,44 GWh in 2018;

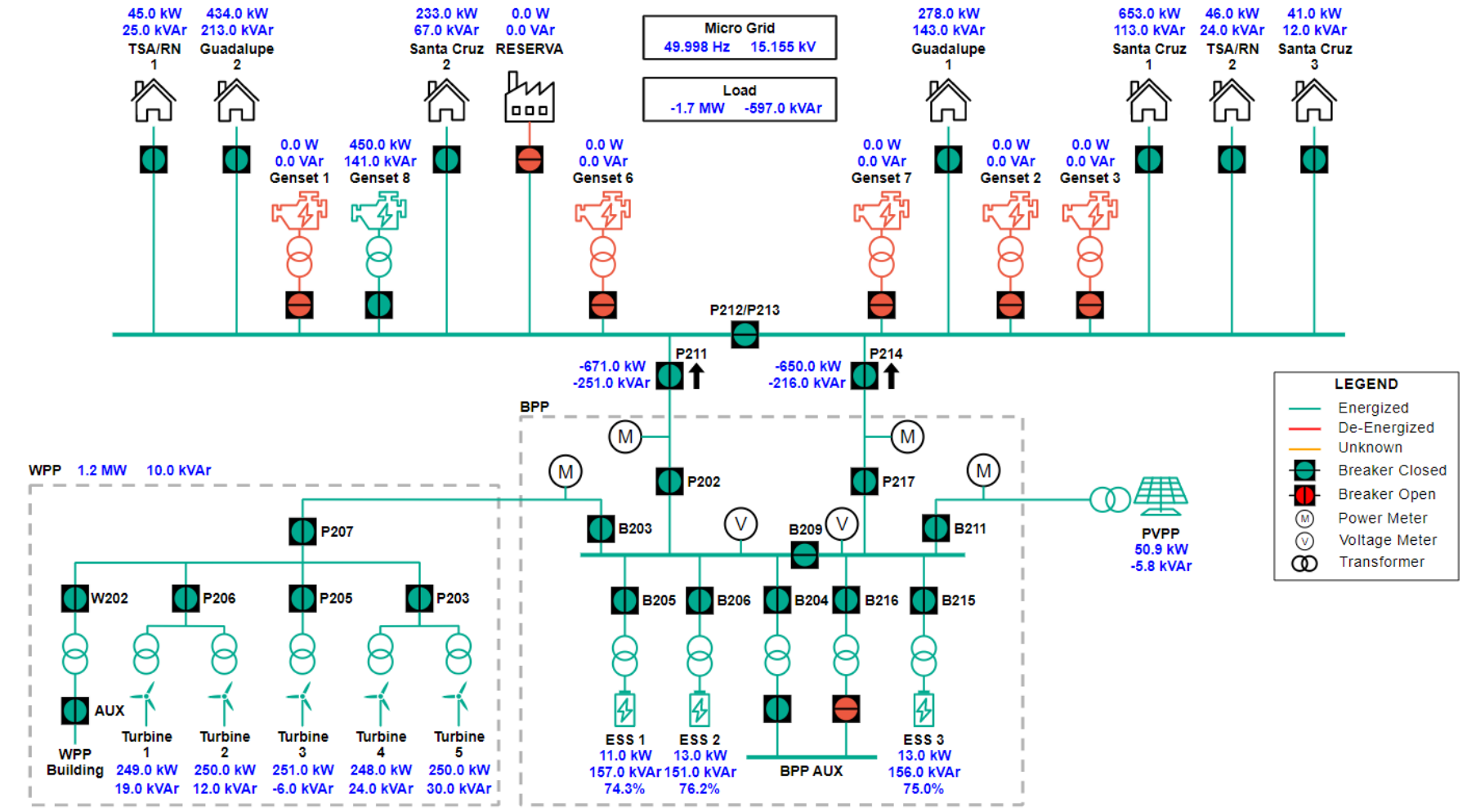
Battery Power Plant

- **7,5 MW** of rated power;
- **2,6 MWh** of usable capacity
- 45600 LTO battery cells
- Nominal capacity of 30 Ah per cell;
- 3 independent Energy storage System (ESS) units;

Solar Farm

- 4000 solar panels;
- 40 SMA Sunnypower inverters, 25 kW of rated power each one;
- Total of **1 MW** of rated power;

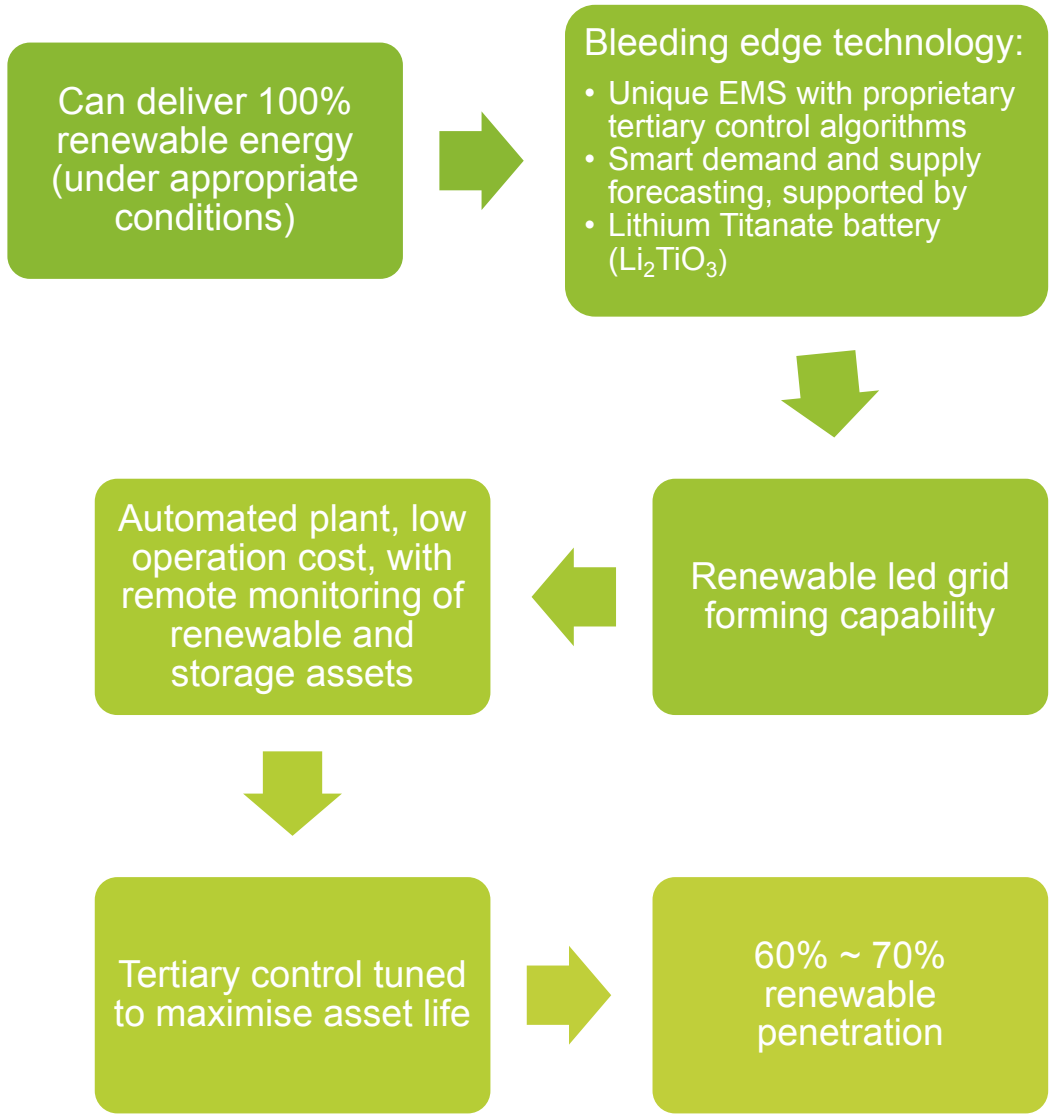
2. Graciosa Island Micro-grid



3.Introduction to Graciólica and project major timelines

- SPV formed to build a hybrid power plant on Graciosa
- Project conceived c. 2005
- PPA signed 2013
- HowardScott invested c. €12m in 2015
- Physical assets largely complete 2016
- HowardScott took responsibility from original developer Dec 2017 and invested additional €7m to finish the project
- Development of new EMS solution and installation of new physical assets on site in 2018
- Realization of the endurance tests in the end of 2018 and final completion in July 2019
- Commercial operation day (COD) started on August 21st ,2019

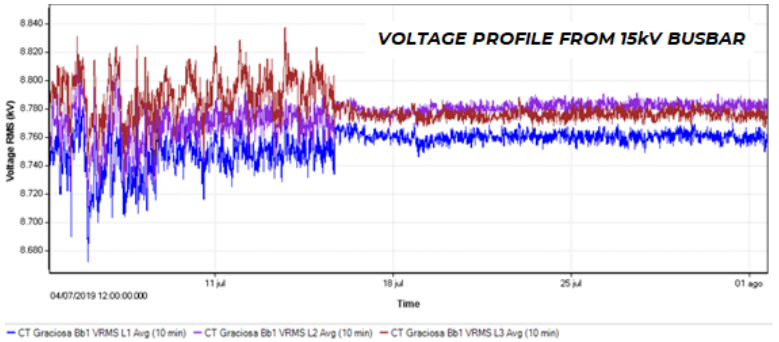
4.A special project

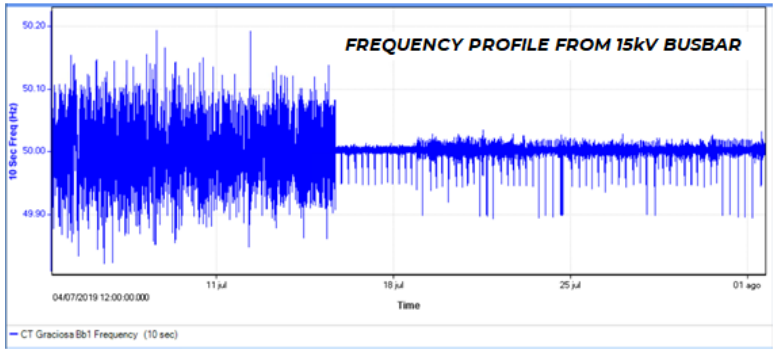


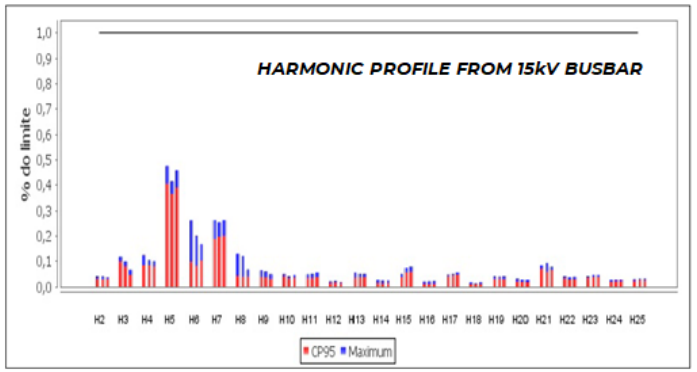
In harmony with the Açores' desire to be an environmental thought leader

5. Micro-grid and Power Quality improvements Overview

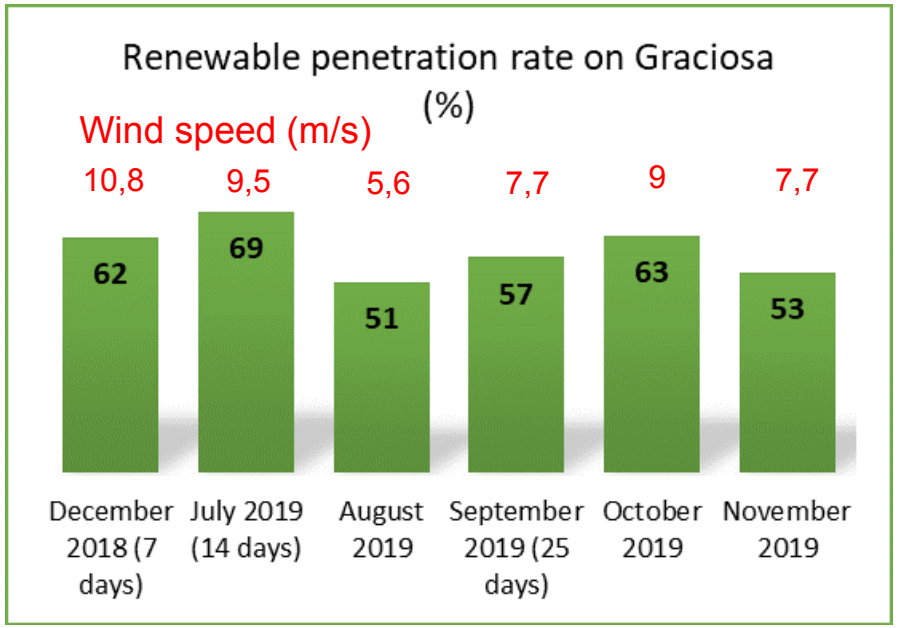
- **IMPROVEMENT OF QUALITY OF SUPPLY** (e.g. voltage profile and frequency profile);
- **IMPROVEMENT OF CONTINUITY OF SUPPLY** (So far three load shedding's have been avoided due to the running diesel engines to trip offline);
- **RELIABLE AND ROBUST SYSTEM RESPONSE FOLLOWING SHORT-CIRCUITS EVENTS** (Short-circuits in the island load feeders cleared in ~300 ms following restoration of voltage and frequency to their nom inal values;
- **VERY HIGH RENEWABLES PENETRATION RATES OBTAINED IN ISOLATED POWER ELETRICAL SYSTE MS;**







6. Renewable Penetration results



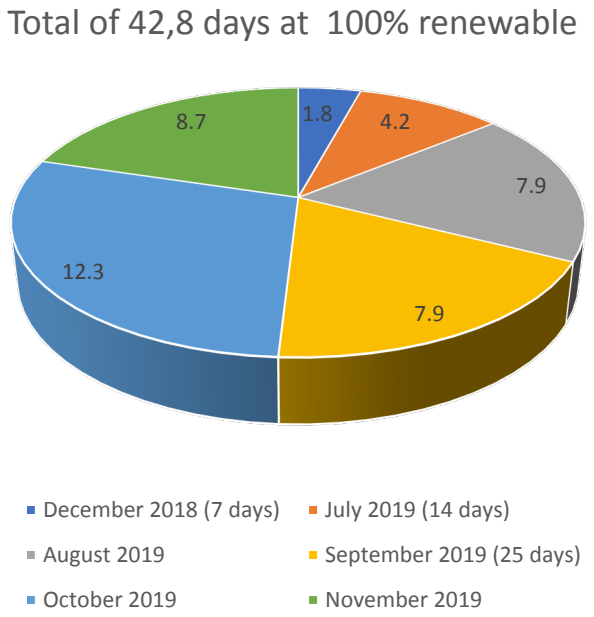
RP Average of 59,1 %

- **Longest consecutive period at 100% renewable in 2019:**
  October 11th 21:03 → October 14th 05:37

56 hours and 34 minutes

- **GHPP total of days connected to the grid: 138**
- **Total of days at 100% renewable: 42,8**

Graciosa island has been 100% fed by renewables 31% of the time in which the GHPP has been connected to the island grid



7. Renewable Energy delivered & CO2 Emissions savings

- Total of Renewable Energy delivered on grid: 2,92 GWh: 89% coming from the wind farm and 11% coming from the Solar Farm.

- Reduction of 451.024 liters of diesel consumption at the Diesel Power Plant that represent the avoidance of 1188 TONS of CO2 emissions during the months of August, September and October 2019;

- Over 20 years the project is expected to save at least 95065 TONS of CO2 emissions;

Thank you for your attention

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