G·R·E·C - German Renewable Energy Consortium

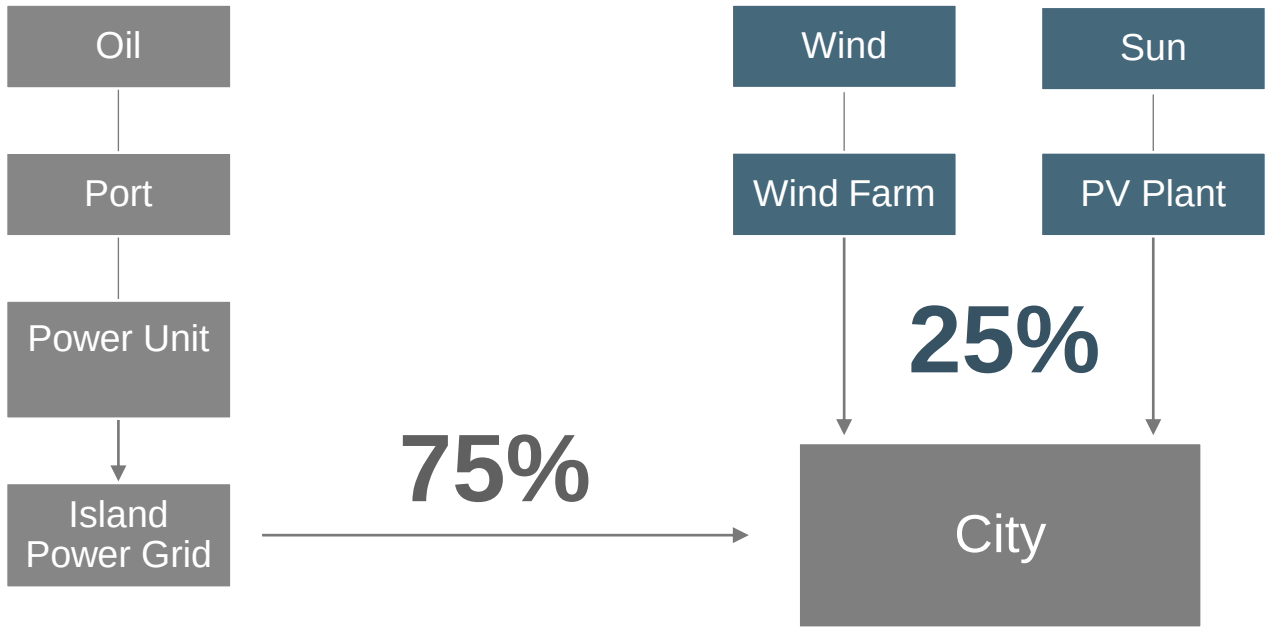
Smart & Green Energy Solutions
Cape Verde

Supported by

Oldenburg
J. Britto, 2021-09-22

Sao Vicente - Status Quo
Energy Production Pathways

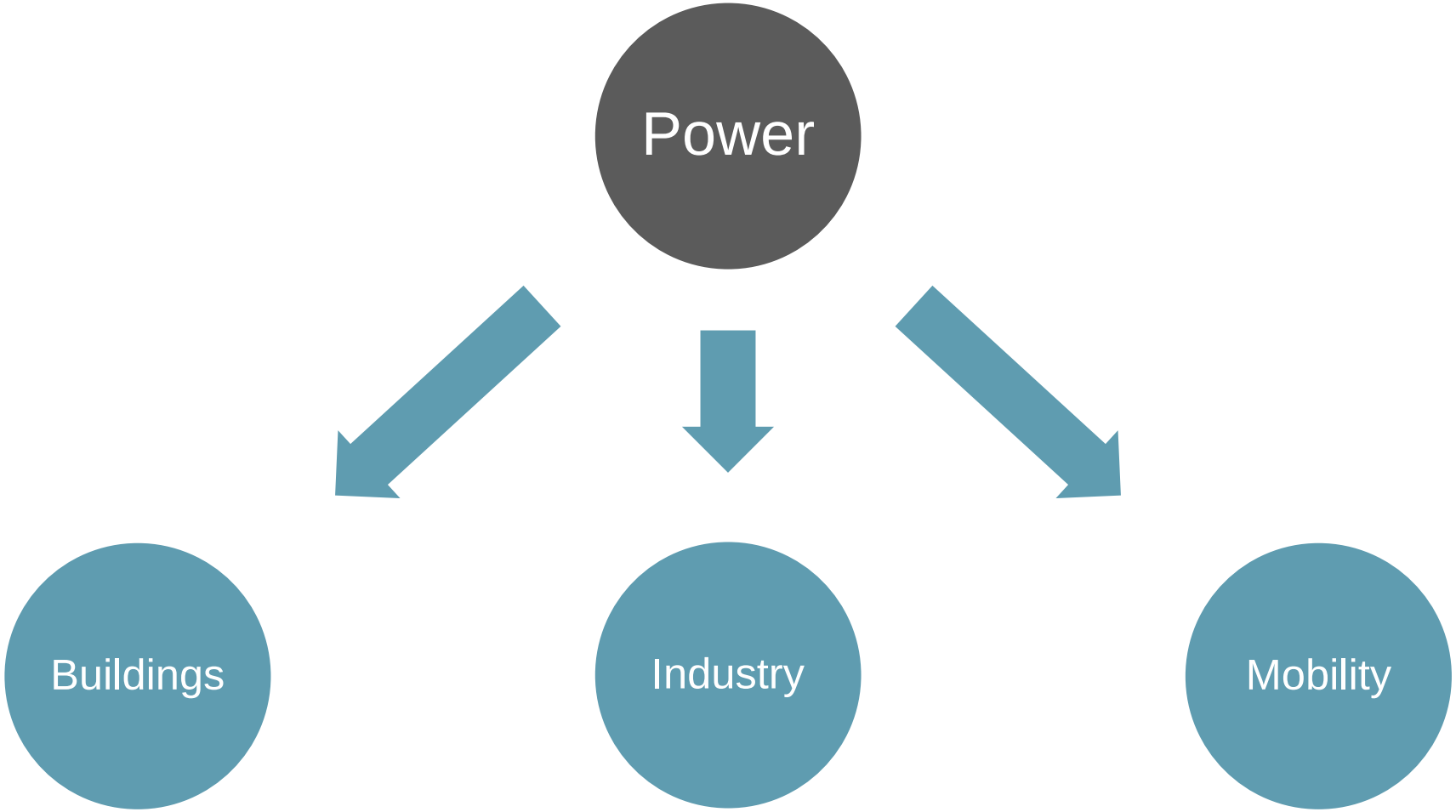
ENERGY PRODUCTION



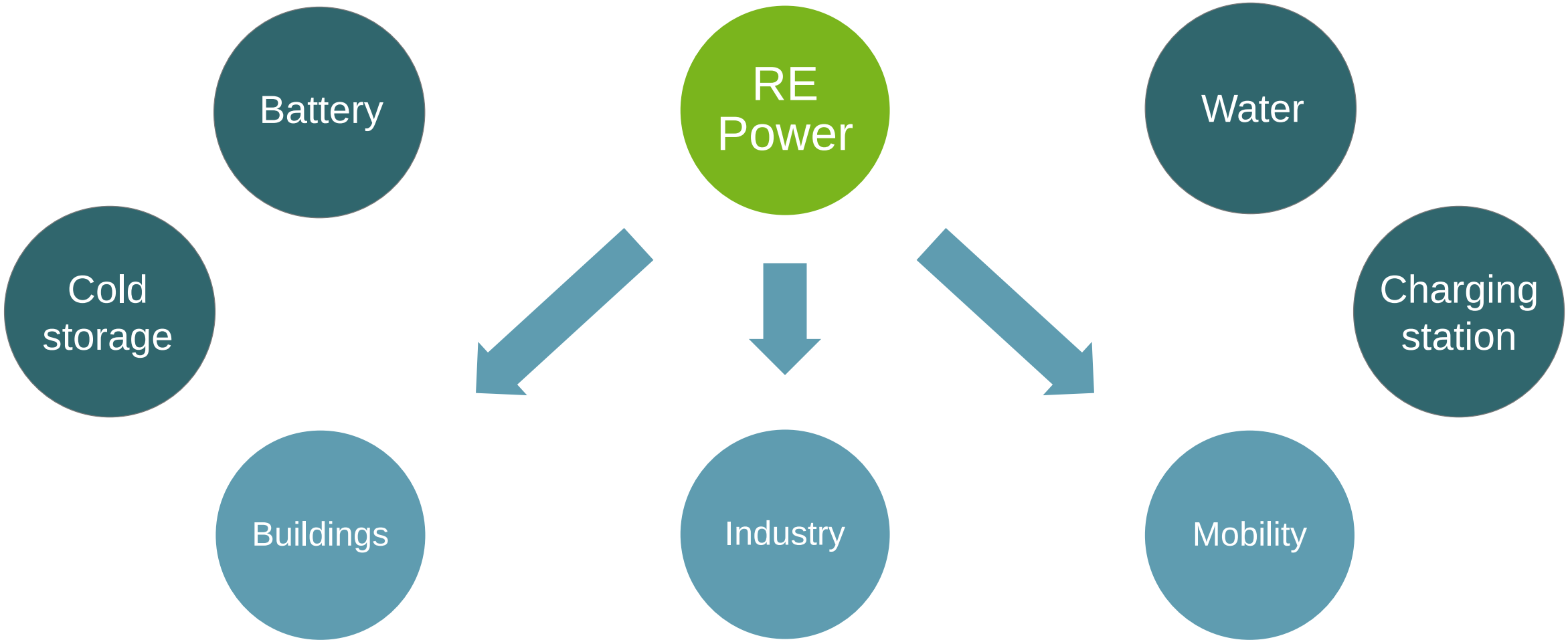
System characteristics

- Import dependency
- High energy cost
- Price fluctuation
- Environmental pollution
- Unreliable power supply

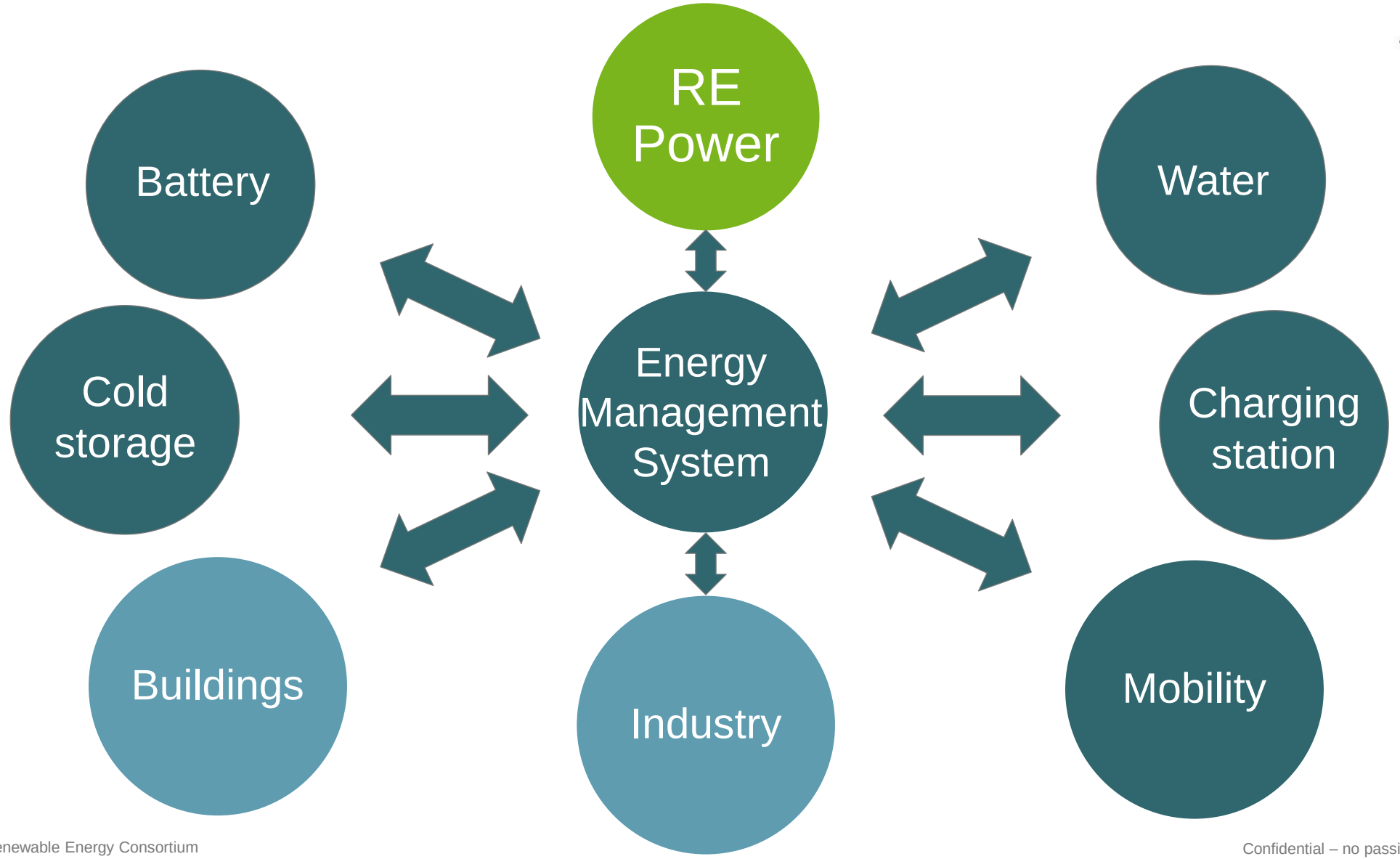
Outdated energy system – One way energy supply



Sector coupling – Smart integrated energy supply



Sector coupling – Smart integrated energy supply



Who we are

G·R·E·C

Formed by companies with extensive experience in each of their fields of expertise and under the leadership of a company with successfully executed projects in Cape Verde.

- **Lead partner**
- **RE production**
- **Energy Management System**

Projekt Firmengruppe

- **Battery storage systems**
- **Grid stabilization systems**

FREQCON sustainable solutions

- **E-Mobility analysis**
- **Smart charging concept**

FEV

- **Solar cooling**
- **Ice storage systems**

SOLAR COOLING TECHNOLOGIES

- **Water desalination**
- **Waste water treatment**

Chriwa® Wasseraufbereitungstechnik GmbH

Renewable energy supply and Energy Management System

Sectors

- Renewable Energy
- Wind and Solar Power
- Energy Management System
- Hydrogen

Services

- Designing, engineering, procurement, construction, financing and operation of renewable energy projects
- Development of photovoltaic projects on roof and open land
- Development of wind parks on- and offshore

Projects

- Experience in the development of photovoltaic systems in the island of Sao Vicente
- Several projects in scope in the island of Sao Vicente and the island of Sal
- Well established local network

Key Facts

- More than 30 years of international experience
- Subsidiaries and projects in Europe, Africa and America
- Pioneer in the development of photovoltaic and wind energy projects

Energy storage through batteries and Grid Stabilization System

Sectors

- Power Converting
- Battery Storage Systems
- Grid Stabilization Systems

Services

- Development and manufacturing of power converters and control systems
- Interfaces for PV-integration and EV-charging
- Grid stabilization solutions based on dynamic, ultra-fast frequency and voltage support

Projects

- Experience with MW-scale battery storage since 2012
- Solutions for weak grid and island grid projects

Key Facts

- Founded 2005, staff of 85
- Family-owned leading engineering and manufacturing company

SOLAR COOLING TECHNOLOGIES

Solar cooling and ice storage systems

GREC
German Renewable Energy Consortium

Sectors

- Solar Cooling
- Ice Storage Systems

Services

- Development and delivery of solar cooling systems
- Centralized solutions for commercial applications
- Decentralized solutions for apartments
- Minimal operational costs for refrigeration

Projects

- Backed by strong industry partners
- Extensive experience of harsh conditions in Africa
- Active network with universities and research institutes

Key Facts

- Founded in 2015 in Germany as a spin-off from the Norwegian Noreps Fund development program Vision 2020
- One of the first companies in that field world-wide

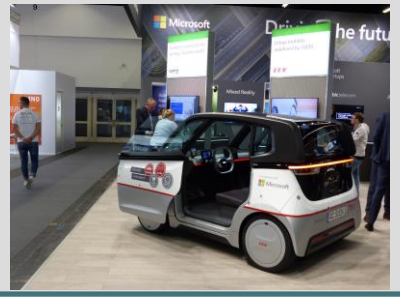
E-Mobility analysis and charging concepts

Sectors

- Electric and Smart Mobility
- Thermal and Energy Management
- Carbon-neutral traditional powertrains
- Mobility concepts

Services

- System energy requirement analysis
- Embedded Software Development
- Hardware-in-the-Loop



Projects

- 10+ stationary energy storage systems
- Energy Management Systems for Stationary Battery and Energy Systems
- Mobile Charging Unit Development

Key Facts

- Founded 1978 by Prof. F. Pischinger as Spin-Off from RWTH Aachen University
- Staff of 6,300 in 42 sites on 5 continents
- Family-owned, independent, leading engineering company

Wastewater treatment and desalination

One-Stop Shop

- Water treatment,
- Wastewater treatment
- Reuse and recycling of water

Scope of Supply

- Project development
- Design
- Construction
- Own Factory
- Pre-assembly
- Installing & Starting up operation worldwide
- After-Sales Service
- Maintenance
- Supervision or "Turnkey" projects

Sectors

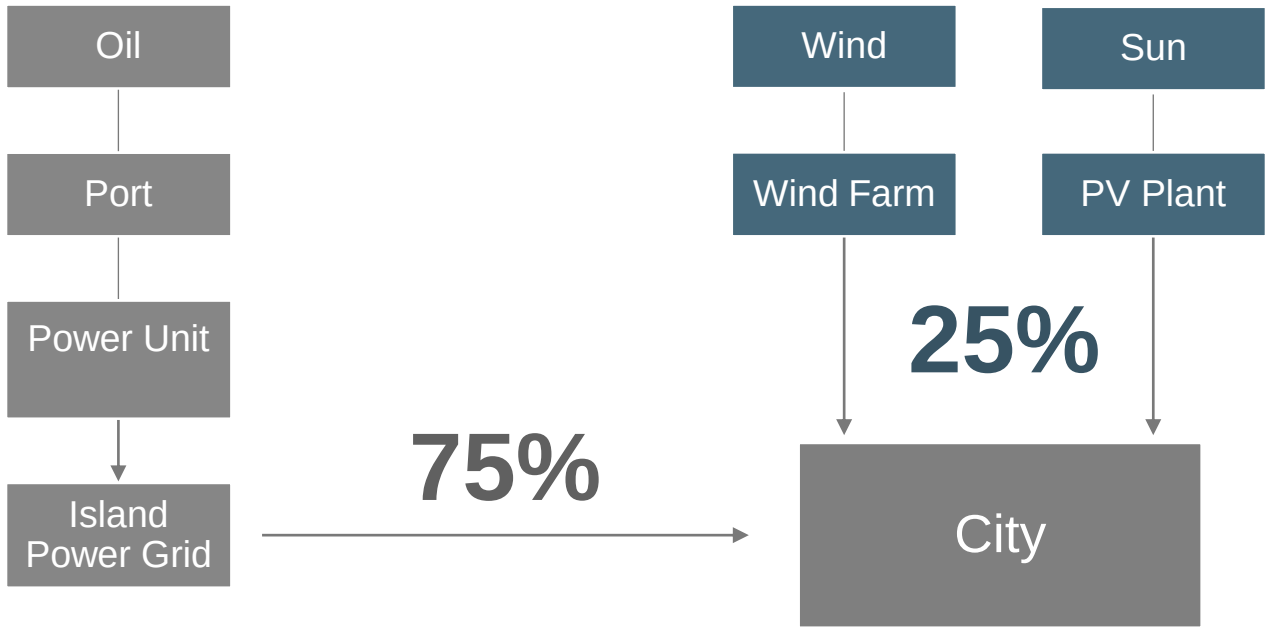
- Beverage Industry/ Brewing Industry
- Food Industry
- Process Water
- Municipal Waterworks
- Seawater & brackish water desalination
- Demineralisation for industrial process
- Treatment of polluted groundwater and soil rehabilitation
- Surface water treatment
- Treatment of extremely contaminated water, like with arsenic, radioactive material, fluor
- Swimming Pool Technology

Key Facts

- Since 1973 CHRIWA® supplies water - wastewater treatment and biogas plants for the industry and municipalities in more than 110 countries worldwide.
- Family-owned, independent
- Made in Germany.

Sao Vicente - Status Quo
Energy Production Pathways

ENERGY PRODUCTION



System characteristics

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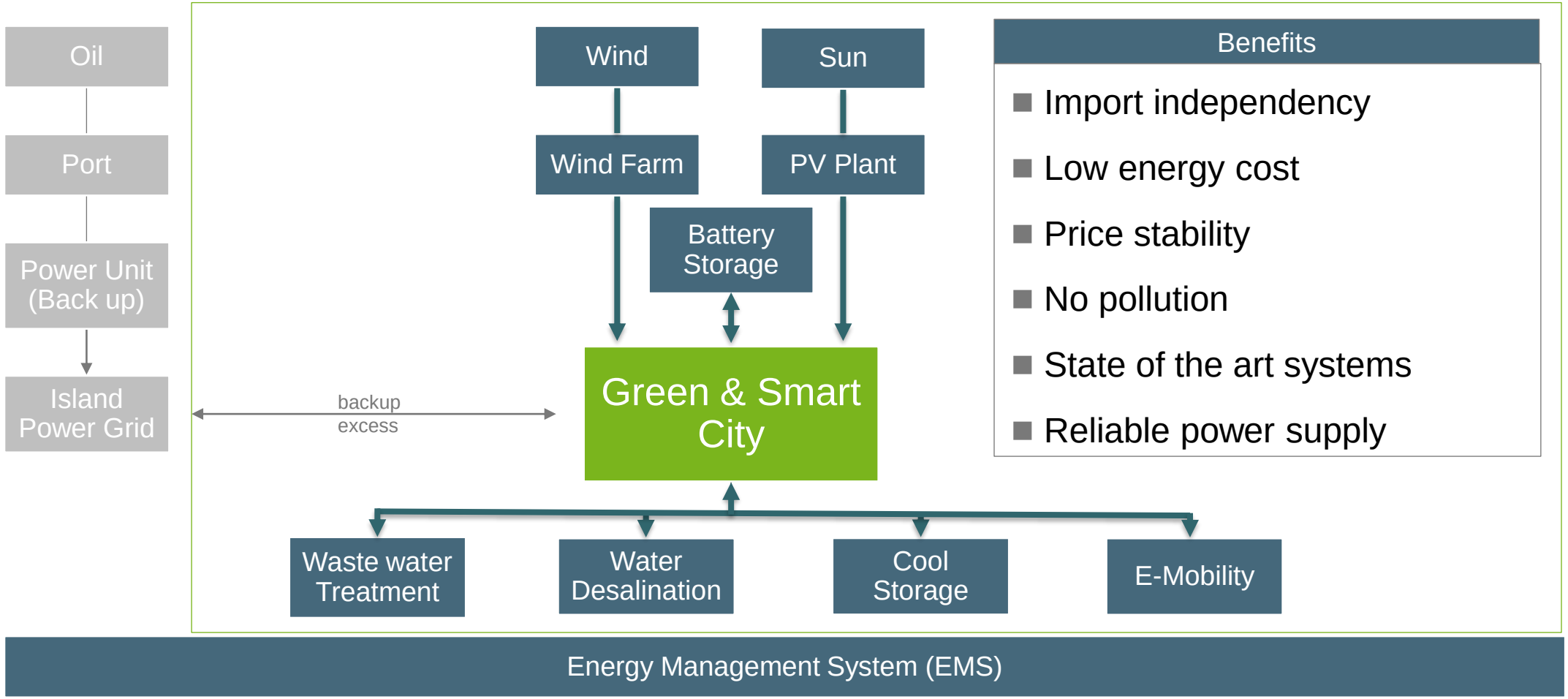
- Environmental pollution
- Unreliable power supply

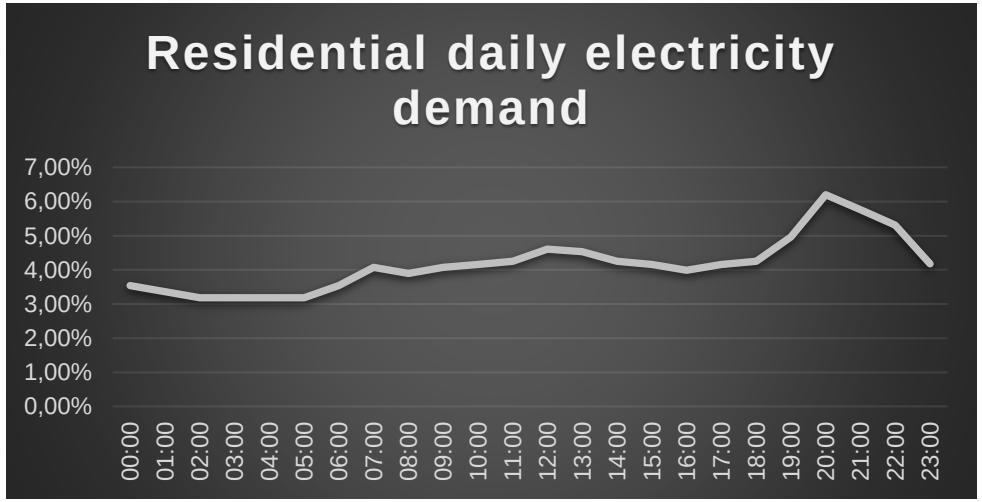
Sao Vicente + Riviera Mindelo
Enabling 100% renewable energy implementation

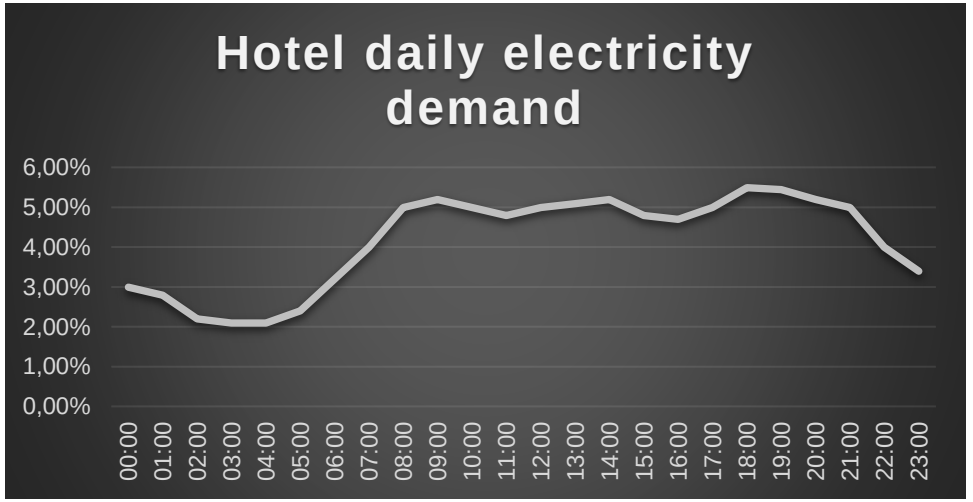
ENERGY PRODUCTION, STORAGE AND CONVERSION

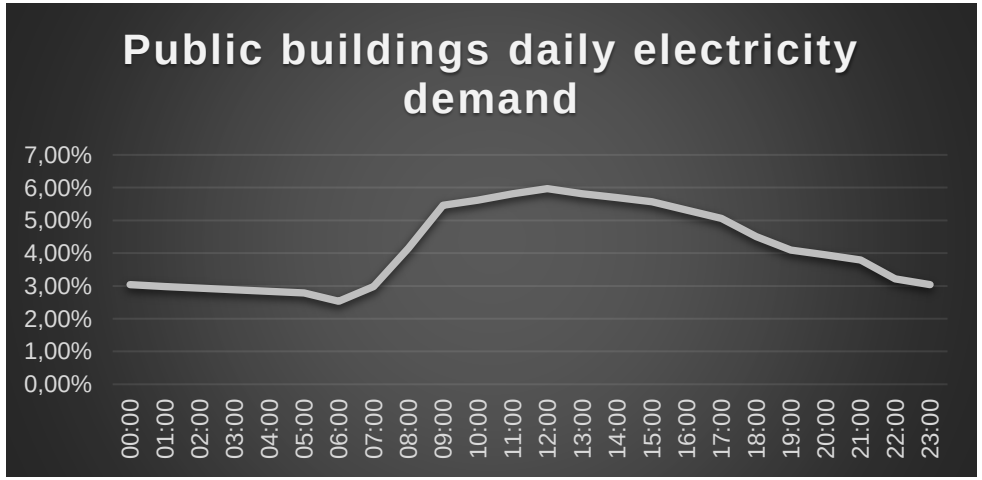


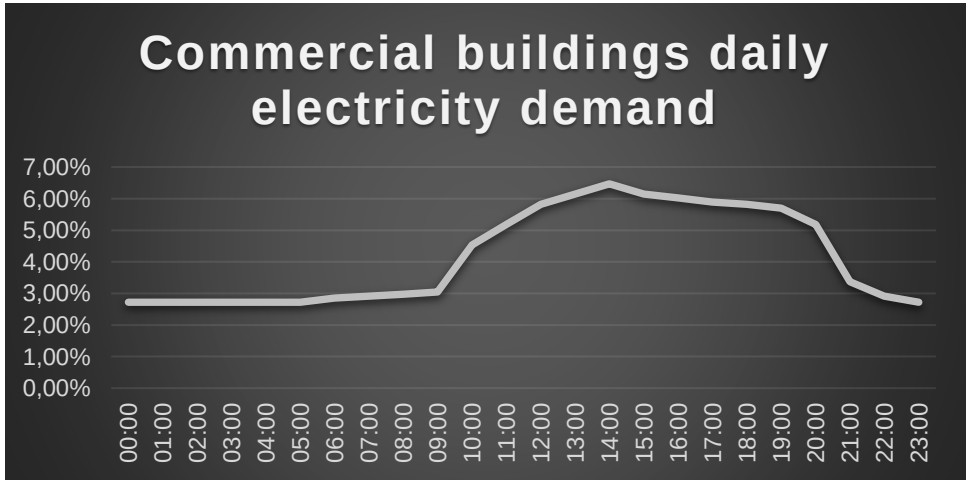
Sao Vicente + Riviera Mindelo
Assessment of demand

ENERGY CONSUMPTION LOAD PROFILE – BASED ON ANALYSIS ESTIMATED BY THE AHK PORTUGAL



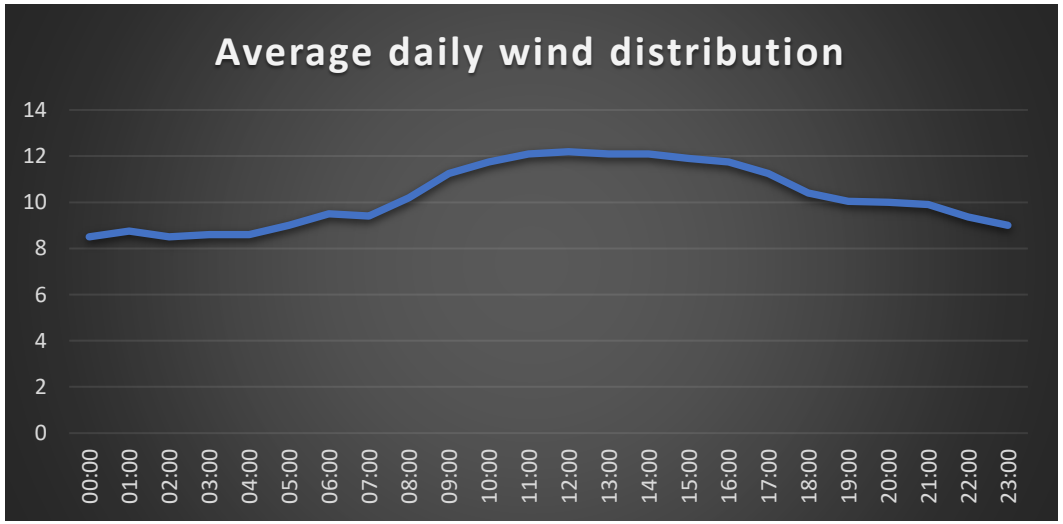


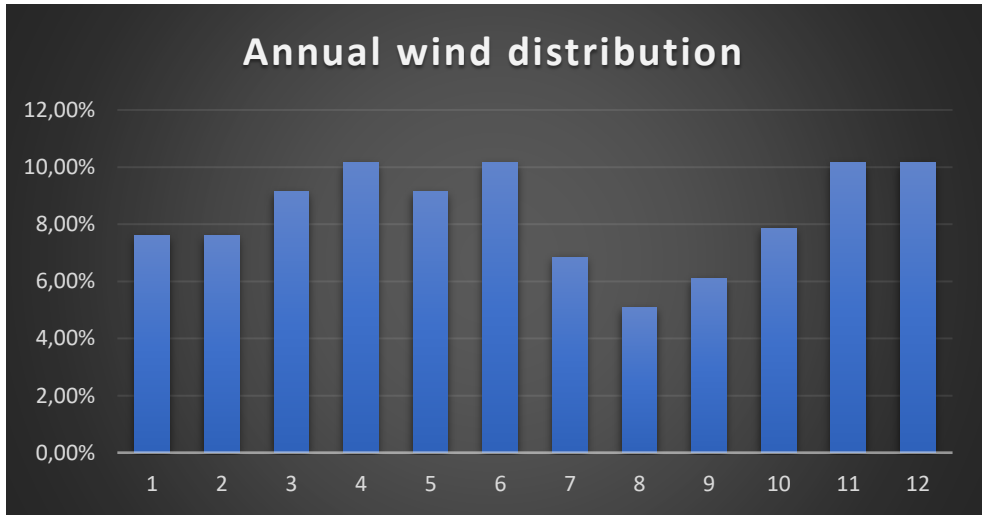




Sao Vicente + Riviera Mindelo
Energy production, storage and conversion

WIND ENERGY SUPPLY

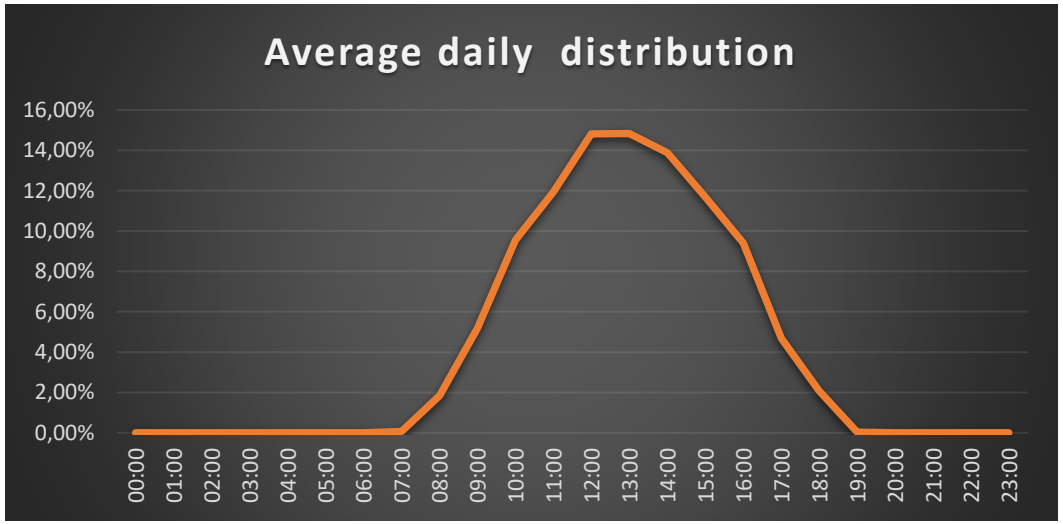


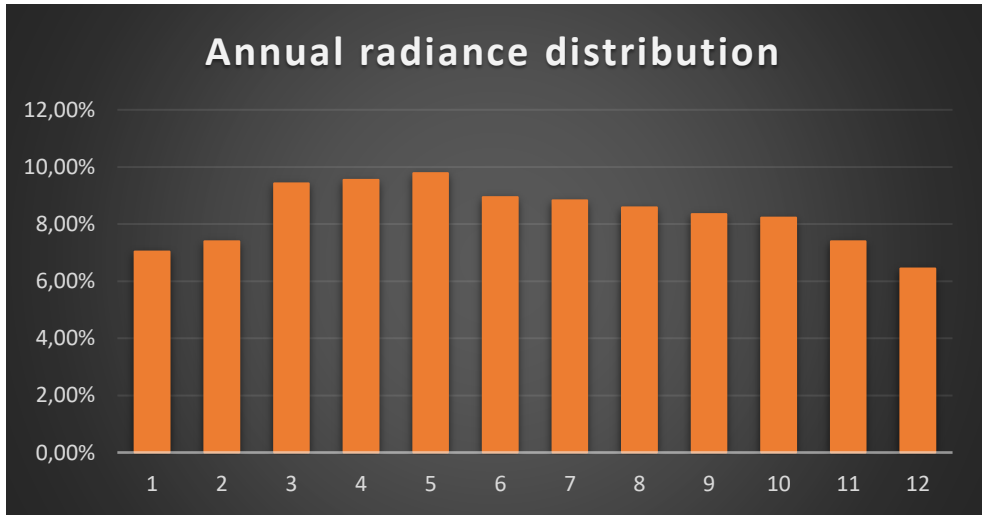


Energy source	Installed power	Annual energy production
Wind energy	11 MW	91.000 MWh/y

Sao Vicente + Riviera Mindelo
Energy production, storage and conversion

PHOTOVOLTAIC ENERGY SUPPLY

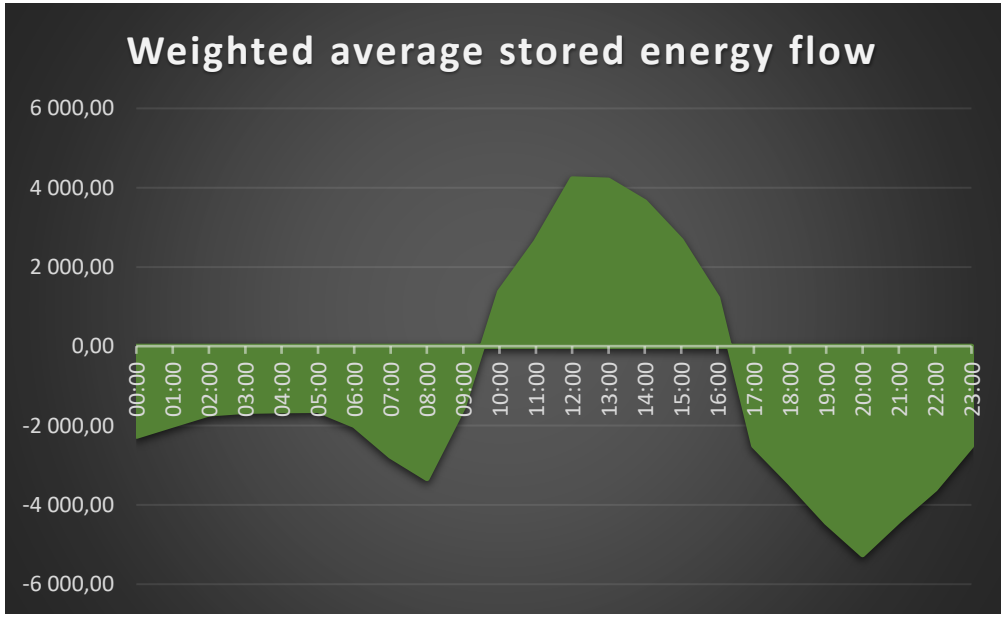




Energy source	Installed power	Annual energy production
Photovoltaic energy	28 MWp	100.000 MWh/y

Sao Vicente + Riviera Mindelo
Energy production, storage and conversion

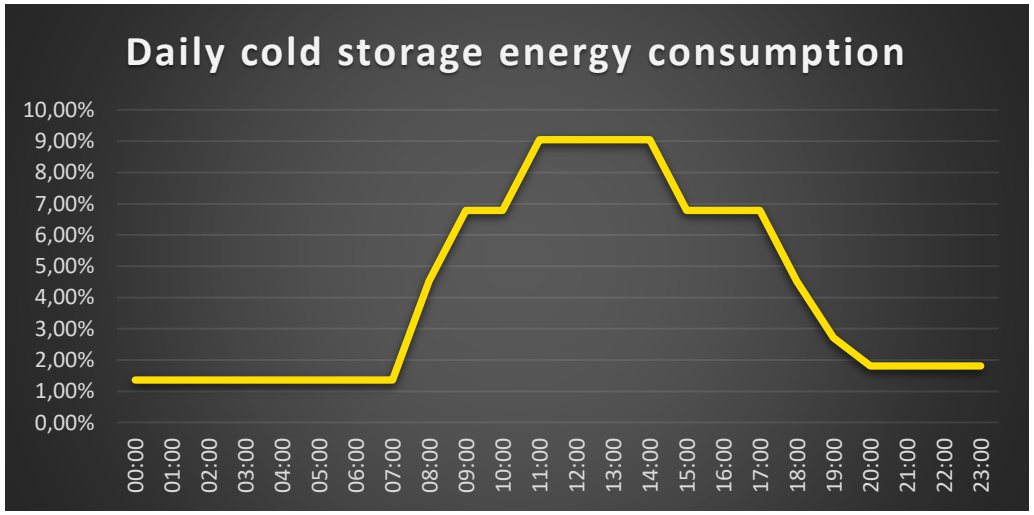
ENERGY STORAGE THROUGH BATTERIES

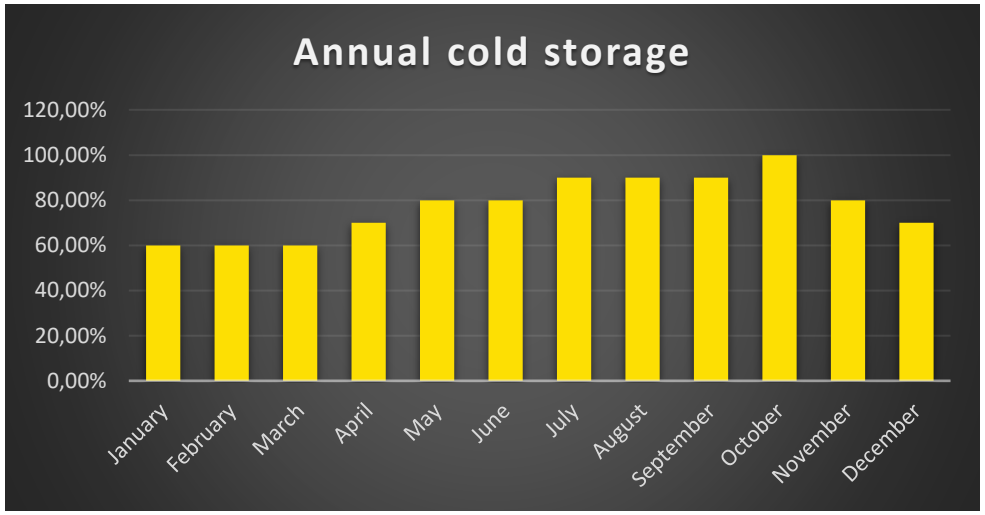


Energy storage	Installed power	Energy storage capacity
Battery system	9 MW	36 MWh

Sao Vicente + Riviera Mindelo
Energy production, storage and conversion

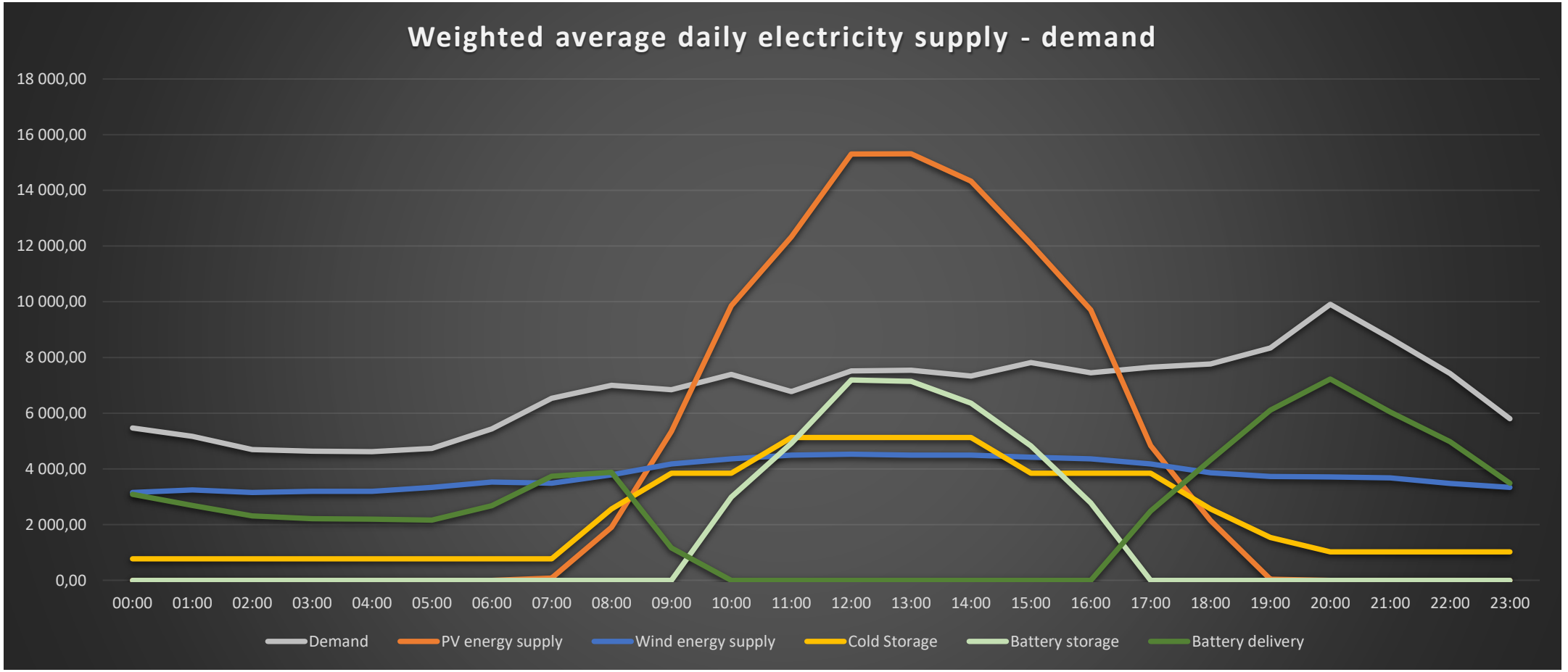
COLD STORAGE





Energy storage	Installed power	Energy storage capacity
Cold storage	-	56 MWh

Sao Vicente + Riviera Mindelo
Energy generation and demand equilibrium



Green & Smart City
G·R·E·C our offer

Integrated all-in-one system	Scalable solutions	One contract & one contact	Zero investment costs
Smart integration of multiple technologies	From small projects to utility scale	Ensuring smooth implementation	Project financing can be provided

Green & Smart City
G·R·E·C your benefits

Import independency

Boost local economy and social coherence

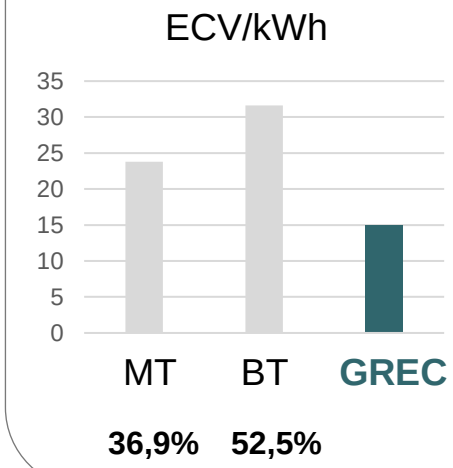
Long term price stability

Secure investment environment

Climate neutral

Embarking future proof technologies

Significant cost savings



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