

REN 





REN - Redes Energéticas Nacionais is one of just three European companies to manage both very-high-voltage electricity and high-pressure natural-gas grids.

OUR MISSION

To ensure the uninterrupted supply of electricity and natural gas at the lowest cost, while satisfying quality, safety and security criteria, maintaining a real time balance between supply and demand, and providing the systemic conditions for a viable energy market.

PUBLIC SERVICE CONCESSIONS IN PORTUGAL



Electricity transmission



Natural gas transmission



Natural gas distribution



Reception, storage and regasification of liquefied natural gas (LNG)



Underground natural gas storage



Wave energy



Area de Servicio	Sub-área	Pais	Estado
Area de Servicio 1	Sub-área 1	Paraguay	Activo
	Sub-área 2	Paraguay	Activo
	Sub-área 3	Paraguay	Activo
	Sub-área 4	Paraguay	Activo
	Sub-área 5	Paraguay	Activo
	Sub-área 6	Paraguay	Activo
	Sub-área 7	Paraguay	Activo
	Sub-área 8	Paraguay	Activo
	Sub-área 9	Paraguay	Activo
	Sub-área 10	Paraguay	Activo

Variable	1	2	3	4	Valor	KV
CTG	100	100	100	100	100	100
CLAS	100	100	100	100	100	100
CPIS	100	100	100	100	100	100
CPZ	100	100	100	100	100	100
CIN	100	100	100	100	100	100





Electricity

REN - Redes Energéticas Nacionais transmits electricity in Portugal and ensures the technical management of the Portuguese electricity grid under a concession agreement with the Portuguese state which runs until 2057. REN operates the National Transmission Grid (RNT), which links producers to consumption centres. It balances energy demand and supply, ensuring an uninterrupted supply of electricity at the lowest cost, providing quality of service, safety and security.

RNT delivery points enable supply to the distribution grid, which in turn feeds the majority of final consumers. Electricity companies are responsible for managing relations with final consumers, including invoicing and customer service.

REN has the specialist skills and know-how to manage and integrate renewable energy sources (RES) into the national electricity grid. This is the result of Portugal's investment in this form of energy in recent years. 2017 figures show that 40% of all Portuguese consumption now comes from RES.

In order to boost integration of the Portuguese and Spanish electricity grids, REN operates on the Iberian Electricity Market (MIBEL). It provides connection capacity for the daily and intra-daily markets, long-term capacity allocation via Financial Transmission Rights (FTRs), and operation and settlement for the ancillary services' markets, including cross-border exchange mechanisms.

- ▶ REN has over 18,500 electricity pylons
- ▶ REN has over 8,900 km of power transmission lines

INTERNATIONAL BODIES IN WHICH REN IS REPRESENTED:

- ▶ **CIGRÉ** - Association of experts dedicated to macro studies in the electricity sector
- ▶ **ENTSO-E** - The European Network of Transmission System Operators for Electricity
- ▶ **MED-TSO** - The Association of Mediterranean Transmission System Operators
- ▶ **IESOE** - Southeast Europe Electric Interconnection
- ▶ **Florence School of Regulation** - European study centre on regulatory topics
- ▶ **CORES0** - Organization bringing together the operators of the European electricity transmission system



NATIONAL ELECTRICITY TRANSMISSION GRID



SUBSTATIONS

TOTAL NUMBER
OF SUBSTATIONS **68**



BAYS

TOTAL NUMBER
OF BAYS **1,372**



CIRCUIT LENGTH

TOTAL CIRCUIT
LENGTH **8,907 km**



TRANSFORMERS

TOTAL NUMBER
OF TRANSFORMERS **203**



SWITCHING/TRANSITION STATIONS

TOTAL NUMBER OF SWITCHING/
TRANSITION STATIONS **14**



NATIONAL DISPATCH CENTRE

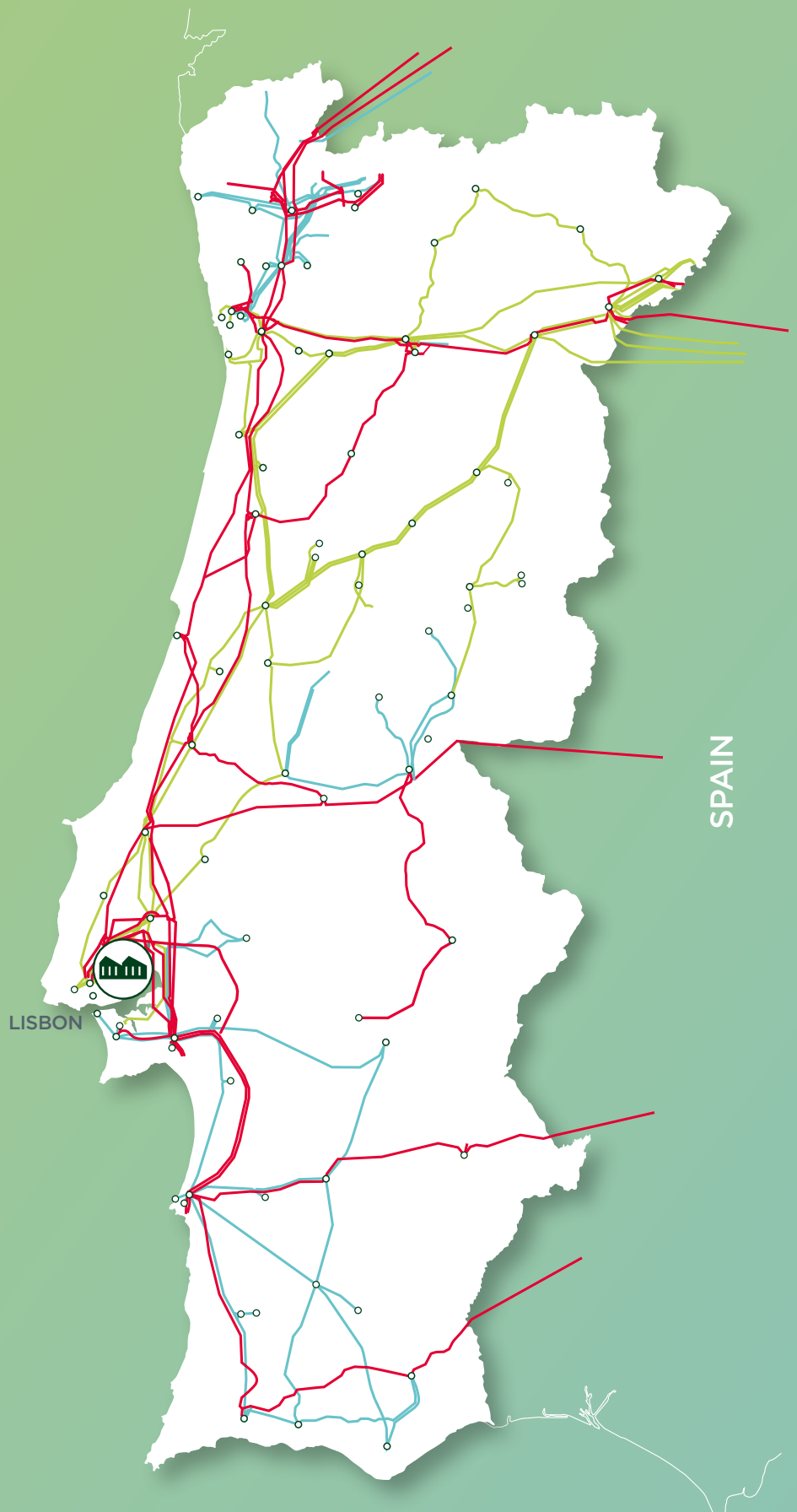
SACAVÉM

NOTE: Data concerning the end of 2017.



The location and layout of infrastructures are indicative and are not geo-referenced

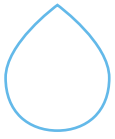
ATLANTIC OCEAN



- 400 kV LINE
- 220 kV LINE
- 150 kV LINE

NATIONAL DISPATCH CENTRE





National Transmission Network, Storage Infrastructure and LNG Terminal

- ▶ The pipeline network is 1,375 km long
- ▶ Each ship delivers about 145,000 m³ of liquefied natural gas to Sines, which is enough to supply Portugal for a week

REN Gasodutos is responsible for transmitting natural gas at high pressure and for providing overall technical management of the national natural-gas grid. It receives, stores and regasifies LNG, and stores natural gas underground. These tasks are covered by concession agreements with the Portuguese State that run until 2046.

REN Gasodutos operates the National Natural Gas Transport Network (RNTGN) that receives natural gas through its interconnection with the Spanish network or the Sines terminal and delivers it to distribution networks and high-pressure end users. It also ensures the transport of gas for injection and extraction at the Carriço Underground Storage facility.

The LNG terminal in Sines is operated by REN Atlântico and the Carriço Underground Storage facility is operated by REN Armazenagem.

INTERNATIONAL BODIES IN WHICH REN IS REPRESENTED:

- ▶ **ENTSO-G** - European association of gas transmission system operators, created by Regulation (EC) 715/2009
- ▶ **GIE** - European association of operators of gas transmission networks, gas storage systems and LNG terminals
- ▶ **GIIGNL** - International group of liquefied natural gas importers



NATIONAL TRANSMISSION NETWORK, STORAGE INFRASTRUCTURE AND LNG TERMINAL



GAS REGULATION AND METERING STATION (GRMS)

TOTAL STATIONS **85**



NATIONAL DISPATCH CENTRE

BUCELAS



CK VALVE STATION (BV)

TOTAL STATIONS **45**



INTERCONNECTION POINT

MAX. TECHNICAL CAP. INPUT **144 GWh/day**

MAX. TECHNICAL CAP. OUTPUT **80 GWh/day**

No. OF INTERCONNECTIONS **2**



JUNCTION STATION (JCT)

TOTAL STATIONS **66**



LNG TERMINAL

SINES

SHIP BERTHING TECHNICAL CAPACITY **216,000 m³ GNL**

MAX. STORAGE TECHNICAL CAPACITY **390,000 m³ GNL**

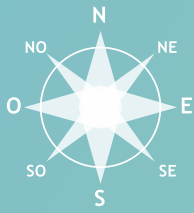
SHIP DISCHARGING TECHNICAL CAPACITY PER YEAR **82**

.... RNTGN - Design phase

NEW INTERCONNECTION TRANSPORT PIPELINE WITH THE SPANISH NETWORK*

* In project phase.

NOTE: Data concerning the end of 2017.



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ATLANTIC OCEAN



- INFRASTRUCTURE IN OPERATION
- - - RNTG - In project
- GAS REGULATION AND METERING STATION (GRMS)
- BLOCK VALVE STATION (BV)
- NATIONAL DISPATCH CENTRE
- UNDERGROUND STORAGE
- LNG TERMINAL
- INTERCONNECTION POINT





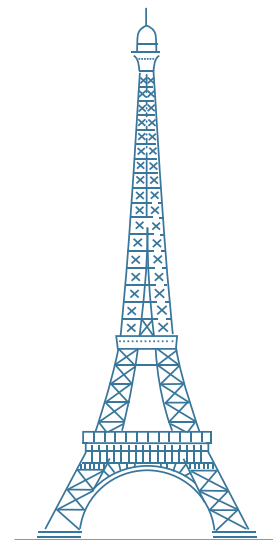
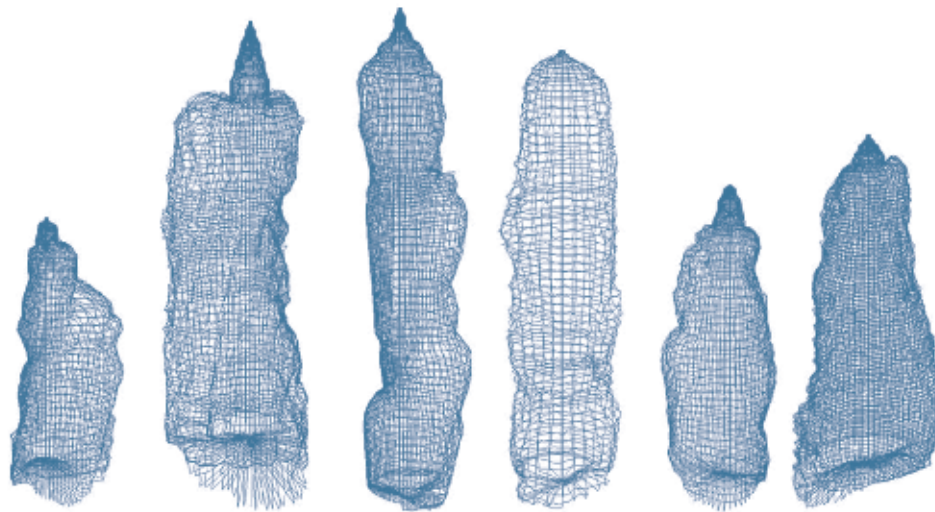
Underground Storage

- ▶ Maximum Capacity Underground Storage 3,967 GWh, or 333 Mm³(n)
- ▶ Nominal Technical Injection Capacity 23.8 GWh/day
- ▶ Nominal Technical Extraction Capacity 85.7 GWh/day

The underground storage activity comprises the reception, compression, underground storage, and depressurization and drying of the gas for later delivery to the transmission network.

Underground storage is characterized by the operations of injection, storage, extraction, processing and delivery of gas to the high-pressure network, including the construction, operation, maintenance and expansion of the related facilities and infrastructures.

The underground storage is an infrastructure located in Carricho (Municipality of Pombal), consisting of six high pressure natural gas storage caves and a common surface for the entire complex, owned and operated by REN Armazenagem.



RENC-1S	RENC-2	RENC-3	RENC-4	RENC-5	RENC-6	Eiffel Tower
1000 m	1052 m	1056 m	1049 m	1100 m	950 m	Height: 324 m
1188 m	1358 m	1366 m	1308 m	1306 m	1216 m	Base: 125 x 125 m
362 610 m ³	748 485 m ³	526 161 m ³	657 597 m ³	425 750 m ³	581 000 m ³	

DEPTH - 1000 TO 1400 M

HEIGHT - 200 TO 300 M

MAXIMUM EXTRACTION CAPACITY: 450 000 m³(n)/h

NOMINAL EXTRACTION CAPACITY: 300 000 m³(n)/h

MAXIMUM INJECTION CAPACITY: 110 000 m³(n)/h

NOMINAL INJECTION CAPACITY: 55 000 m³(n)/h





Natural Gas – Distribution

- ▶ Distribution of natural gas in the north coastal region of Portugal in 29 municipalities
- ▶ REN Portgás Distribuição holds the second largest natural gas distribution network in Portugal, with a network of 4,794 km

REN Portgás focuses its activity on the development and operation of the public natural gas distribution network in the north coastal region of Portugal.

Under a concession contract signed with the Portuguese State an valid until 2048, this is the second largest natural gas distribution network in Portugal, with around 4,794 km, in 29 municipalities of the districts of Porto, Braga and Viana do Castelo,



NATURAL GAS - DISTRIBUTION



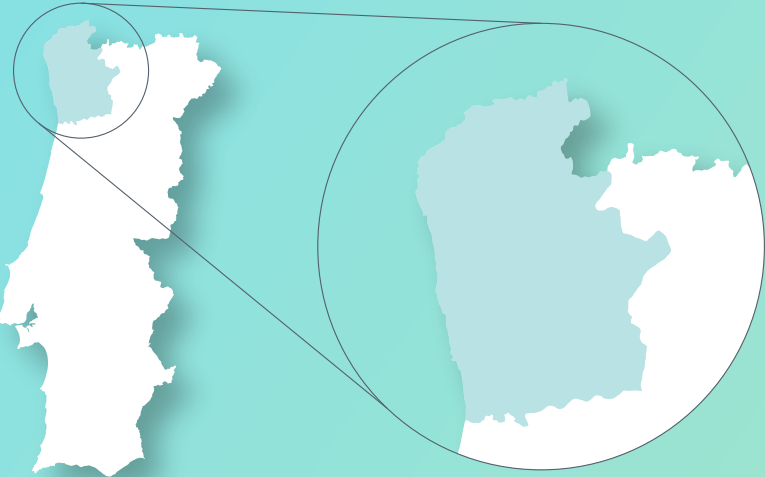
REN PORTGÁS Distribution

VOLUME OF DISTRIBUTED GAS	7,182 GWh
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SUPPLY POINTS	352,786
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EXTENSION OF PRIMARY AND SECONDARY NETWORKS	4,794 Km
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NOTE: Data concerning the end of 2017.



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RENTELECOM

RENTELECOM SA is a public telecommunications operator since 1 November 2002.

This company was created to leverage the overcapacity of the security telecommunications networks, which are crucial in supporting the transmission of electricity and natural gas. The company is based on a know-how with high added value in the area of information technologies with a focus on Security Telecommunications Networks in service of the management and operation of the Energy Networks.

RENTELECOM positions itself in the corporate market with a special focus on the utilities and telecommunications operators segments.

In addition to a distinctive expertise in solutions for utilities, RENTELECOM is a partner to the telecommunications operators and to the information technology integrators.

- ▶ REN has over 8,300 km of fibre optics connections (cables)







Consulting and Commercial Services



REN provides specialized engineering services in the fields of electricity, natural gas and telecommunications. The skills possessed by the company stem from its broad experience in the operation and management of energy transmission system and communications, as well as in the constant concern for technological training and innovation.

The services provided cover the entire transport value chain, namely strategic energy planning, network planning, construction project and monitoring, operation and maintenance, as well as the global management of the system, including the development and management of security telecommunications network.

In the field of engineering services, REN has a portfolio of domestic and reference international customers, namely electricity generation entities and other energy transmission system operators.



ESTACION DE PURIFICACION
QUILLOTA



Internationalization

With a consolidated operation at the national level, and with international recognition for its technical expertise in the operation and management of energy transmission systems, REN created the groundwork for an international expansion.

Latin America, Maghreb and Portuguese-speaking Africa, as well as a few countries in Europe, Middle East and Asia, were identified as geographical priorities, with REN, in 2017, acquiring a stake of 42.5% in Electrogas, a Chilean company that owns a major gas pipeline in the central area of Chile.

LATIN AMERICA - CHILE







MOZAMBIQUE - CAHORA BASSA

In July 2012, the Portuguese State sold its 15% stake in Hidroelétrica de Cahora Bassa (HCB), which was separated into two halves, to the public company Eletricidade de Moçambique (EdM) and the Portuguese company Redes Energéticas Nacionais (REN).

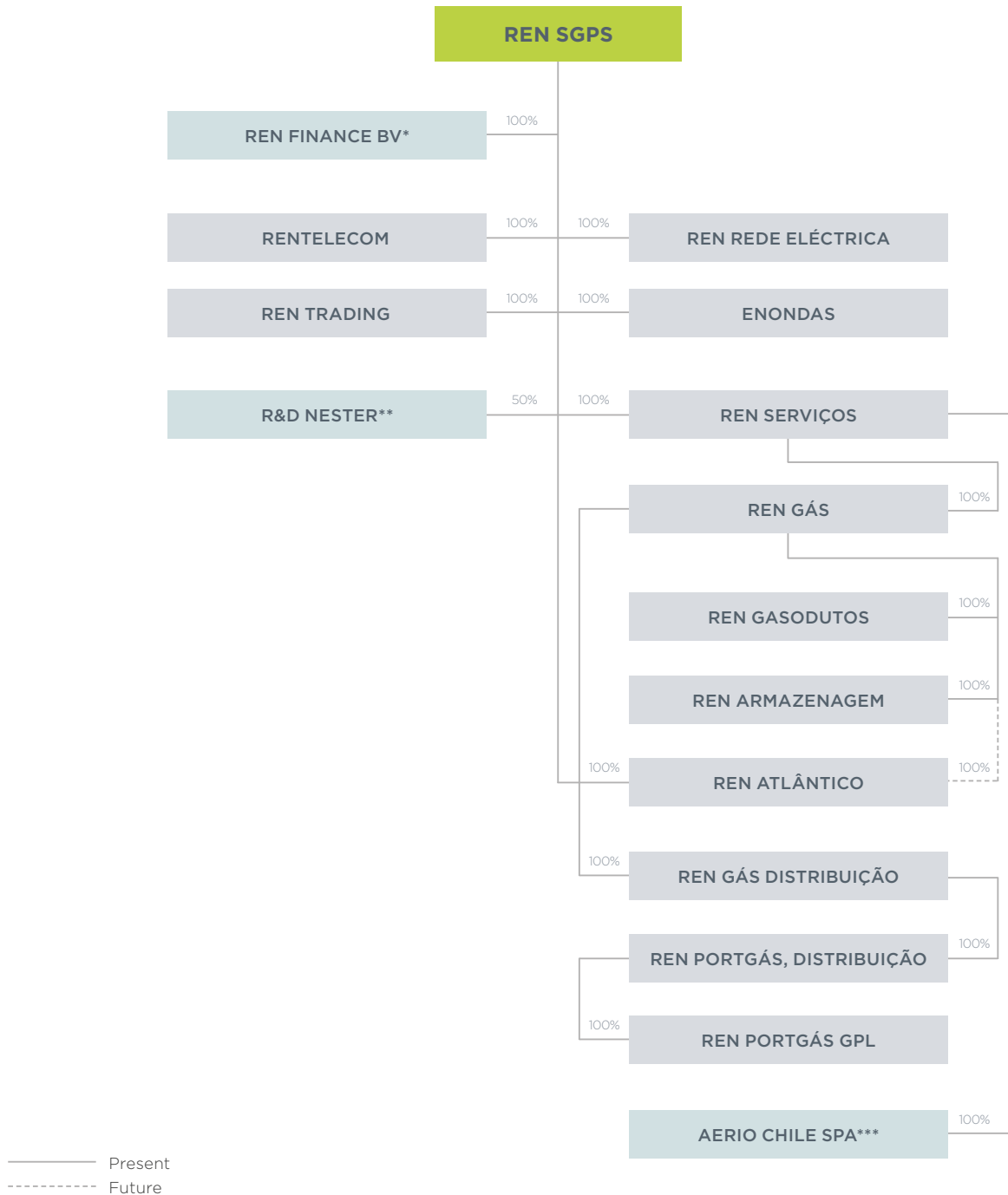
Located in the Tete province, Central-Western Mozambique, HCB was created in February 1970 and started its operation in 1977.

- ▶ REN holds 7.5% of HCB, created in 1970





REN Grup



* Company incorporated under the laws of The Netherlands

** This company is a result of a partnership between REN and State Grid regarding R&D in the energy sector

*** Company incorporated under the laws of Chile





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