



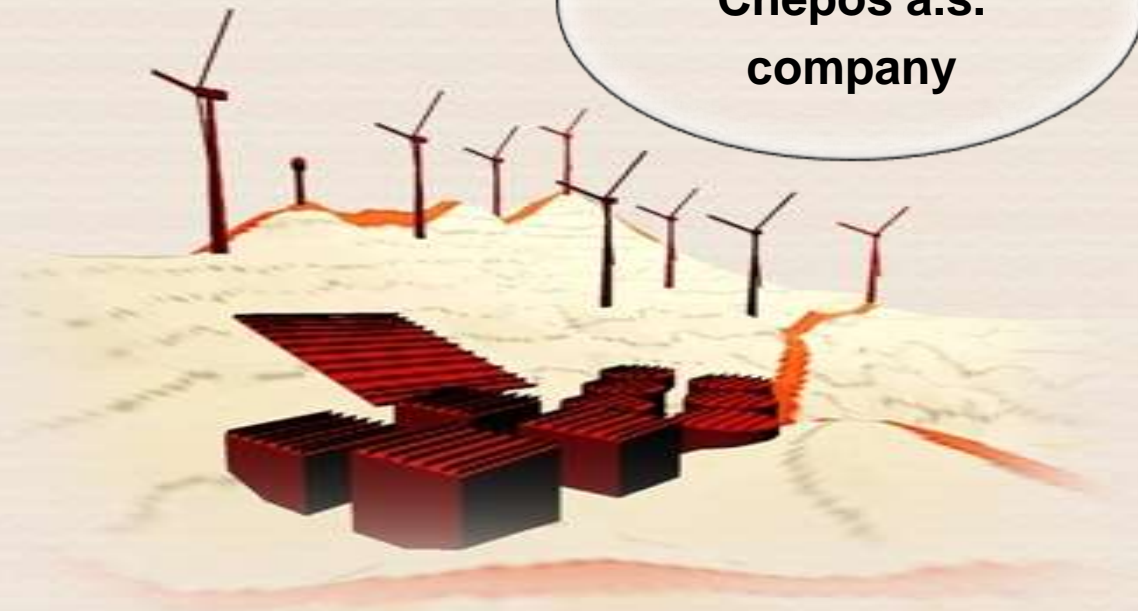
G **CHEPOS**

®



Building of the Technological Center for water desalination, drinking water produce and electricity delivery

**Project of
Chepos a.s.
company**





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Cape Verde Islands - location





Republic of Cape Verde

- 1975 – Independence
- 1990 – Declaration of pluralism
- 2006 – Parliamentary elections
 - Won by the ruling party
 - African Party for the independence of Cape Verde (PAICV)
 - Its main objective is coming closer to the European standards
- Official language – Portuguese
- Common language – Creole



- Capital – Praia
 - Located at the Island of Santiago – 100,000 inhabitants
- Total area – 4,033 square kilometres
- Population – 520,000
- Estimated density of population
 - 133 inhabitants per square kilometre



Summary of the project

- Acquisition of lands with the area of 199.6 hectares
 - 12 km north-east from Praia
 - 100 metres from the sea
- Winning the tender for the delivery of technologies
 - Desalination plant for the production of drinking and service water
 - Water / air heating and cooling
 - Treatment of sewage
 - Power supply
 - Other possible technological variants (biogas, wastes incineration, etc.)



Property – chart

- Installed technologies
- Hotel complex
- Contours



Local significance road


Boundary of the plot – building of the technological centre (about 1/3)


Boundary of the plot – building of apartments (about 2/3)


Property purchased by the company Chepos a.s. – 199.6 Ha





Property – division and 3D illustration


 Installed technologies

 Hotel complex

 Contours

Local significance road 

Boundary of the plot – building of the technological centre (approx. 1/3) 

Boundary of the plot – building of apartments (approx. 2/3) 





● ■ 🌪 Installed technologies

●●●●●●●●●● Hotel complex

Contours

Local significance road

Boundary of the plot – building of the technological centre (about 1/3)

Boundary of the plot – building of apartments (about 2/3)





Project study

- For the implementation of the project, the following studies will be necessary
 - Opportunity study
 - Pre-feasibility study
 - Feasibility study

- Basic implementation studies
 - Geological study
 - Hydro geological studies
 - Water management studies
 - Meteorological study
 - » Weather conditions study
 - » Solar radiation study
 - Studies focused on power supply
 - Logistics study
 - Town planning and architectonic studies
 - Other studies arisen from the basic studies



- Technological study

- From the basic studies, interconnected technological needs can be determined
- Study focused on water production – reverse osmosis and connected technologies
- Power engineering
 - » Micrositting study – wind farm study (location and installed output)
 - » Standby systems
 - » Power distribution system
- Studies for water supply
 - » Water heating, cooling
 - » Water distribution system
 - » Sewage treatment plant
- Logistics for the deliveries of technological units
- Other studies related to the detailed specification of the delivery



Financing

- Total estimated investment: CZK 1,500 million
- Project will be financed by an export credit
 - Creditor - Export Bank
- Insurance for the project will be provided by EGAP
 - EXPORT GUARANTEE AND INSURANCE CORPORATION (EGAP)
- the Policy will cover the following risks:
 - Political risks
 - Credit risks
 - Natural disasters
- Ratio Financing Investor vs. Bank 30/70
 - 30% equity and 70% guarantee LaCaixa
- The State guarantees the obligation to purchase power and water for the prices defined by law.



- Administration and project preparation
 - Project study
 - Project documentation
 - Basic implementation studies
 - Technological study

- Construction and installation of technologies
 - Buried services
 - Installation of technological units (water, power)
 - Hotel complex construction

- Putting into operation, tests of functionality
 - Individual technologies
 - The system as a whole



Ecology and environment

- Implementation of the project is based on the use of environment-friendly technologies
 - Alternative, renewable power sources
 - Optimum use of local natural conditions
 - Water heating and cooling – solar energy
 - Power supply – wind energy
 - Use of other energy sources (recycling, biogas...)



Conditions of water supply

- Determination of required supply and water temperatures
 - Hotel complex
 - Public network
 - Cold service water (expected temperature 12°C)
 - Hot service water (expected temperature 56°C)
- Technological prerequisites
 - Water desalination (reverse osmosis)
 - Water heating, cooling and storage
 - Water distribution within the hotel complex and public network



Expected water consumption

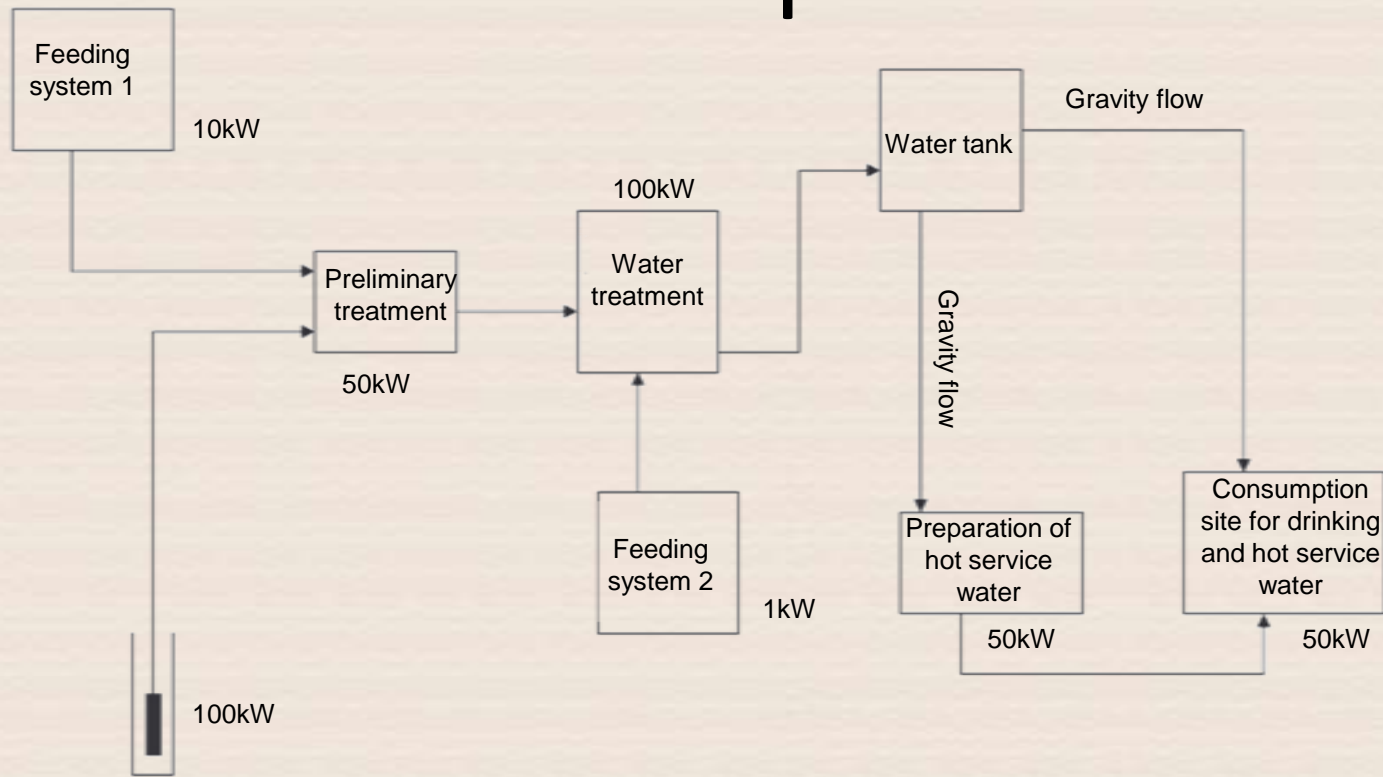
- Water desalination using reverse osmosis system, preparatory and subsequent treatment of water is necessary.
- Water supply – for better quality of water and lower load for RO units, pumping water from 6 wells located in the maximum distance from shore has been recommended.
- **variant 1:** 2,650 m³/day
- **variant 2:** 2.000 m³/day
- **variant 3:** 1,000 m³/day
 - including 3/5 m³ of volume for hot service water, showers or toilets and other services, and 2/5 m³ drinking water for drinking, cooking, dish washing and related activities.



Reverse osmosis unit



Technological scheme based on power consumption



Pumping of raw water
(6 wells with 22 m³/hour
each – one standby)



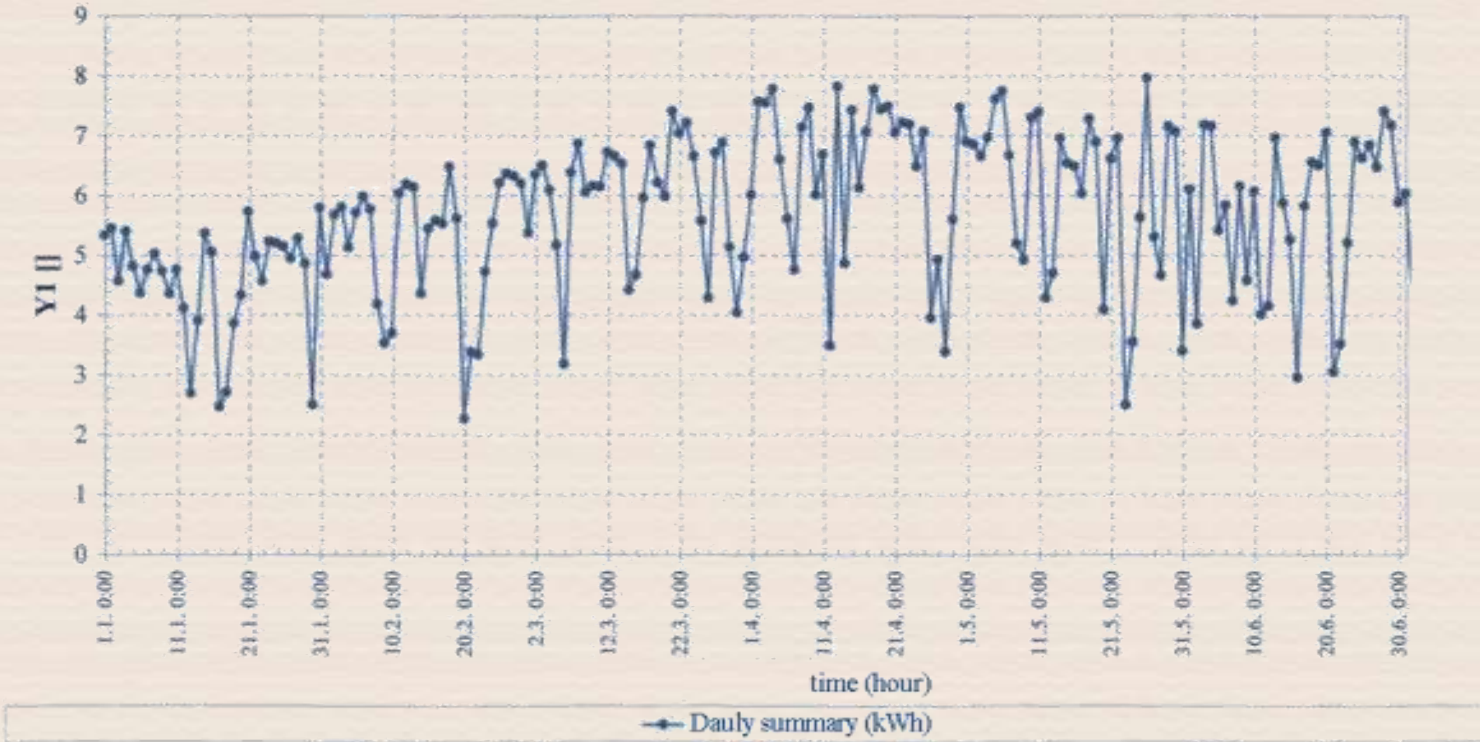
Water / air heating and cooling

- Heating
 - Thermal solar system (solar collectors)
- Cooling
 - Heat absorption from solar system for cooling
 - Water cooling
 - Central air conditioning
 - In case of interest for a development project



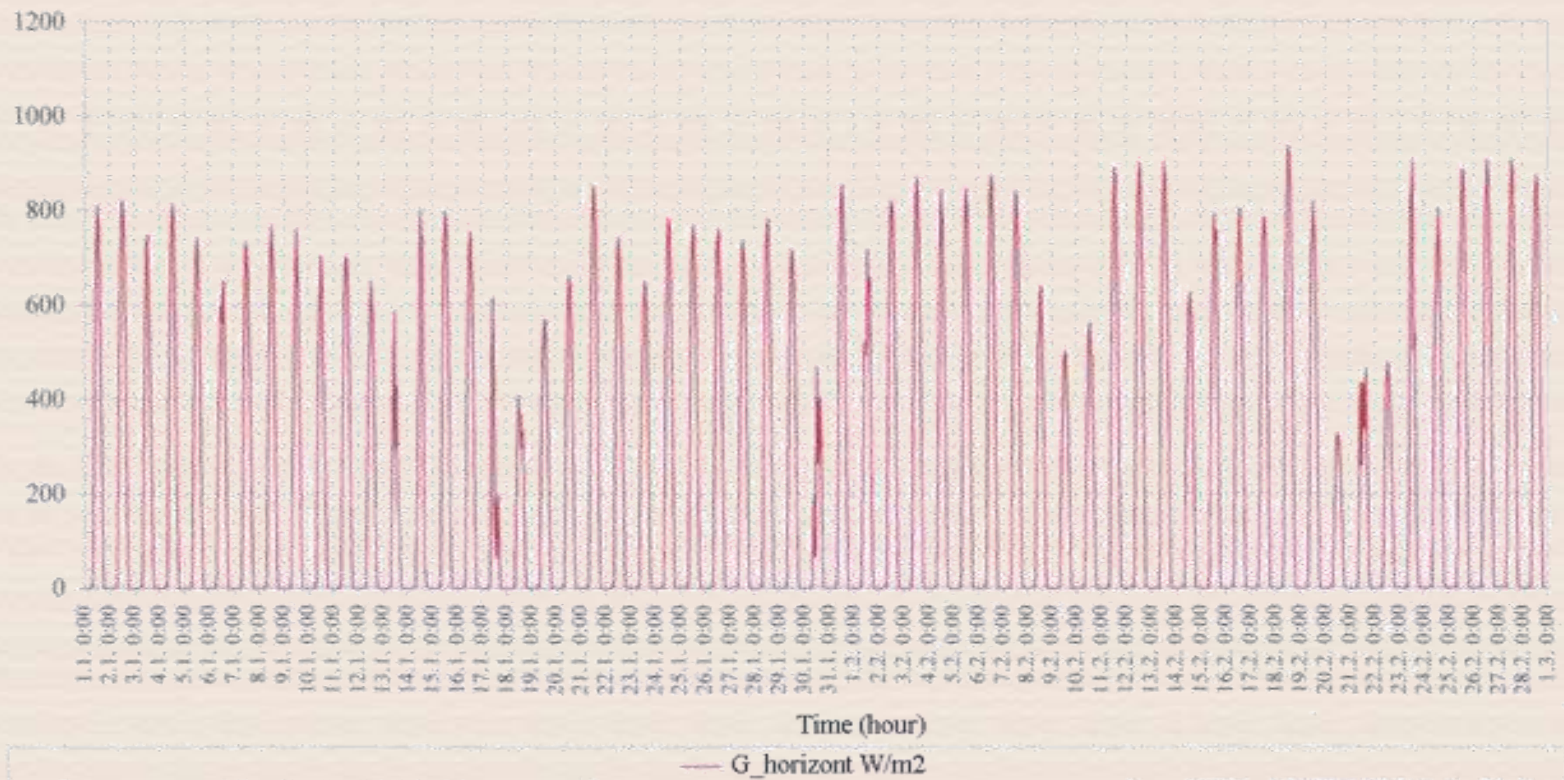


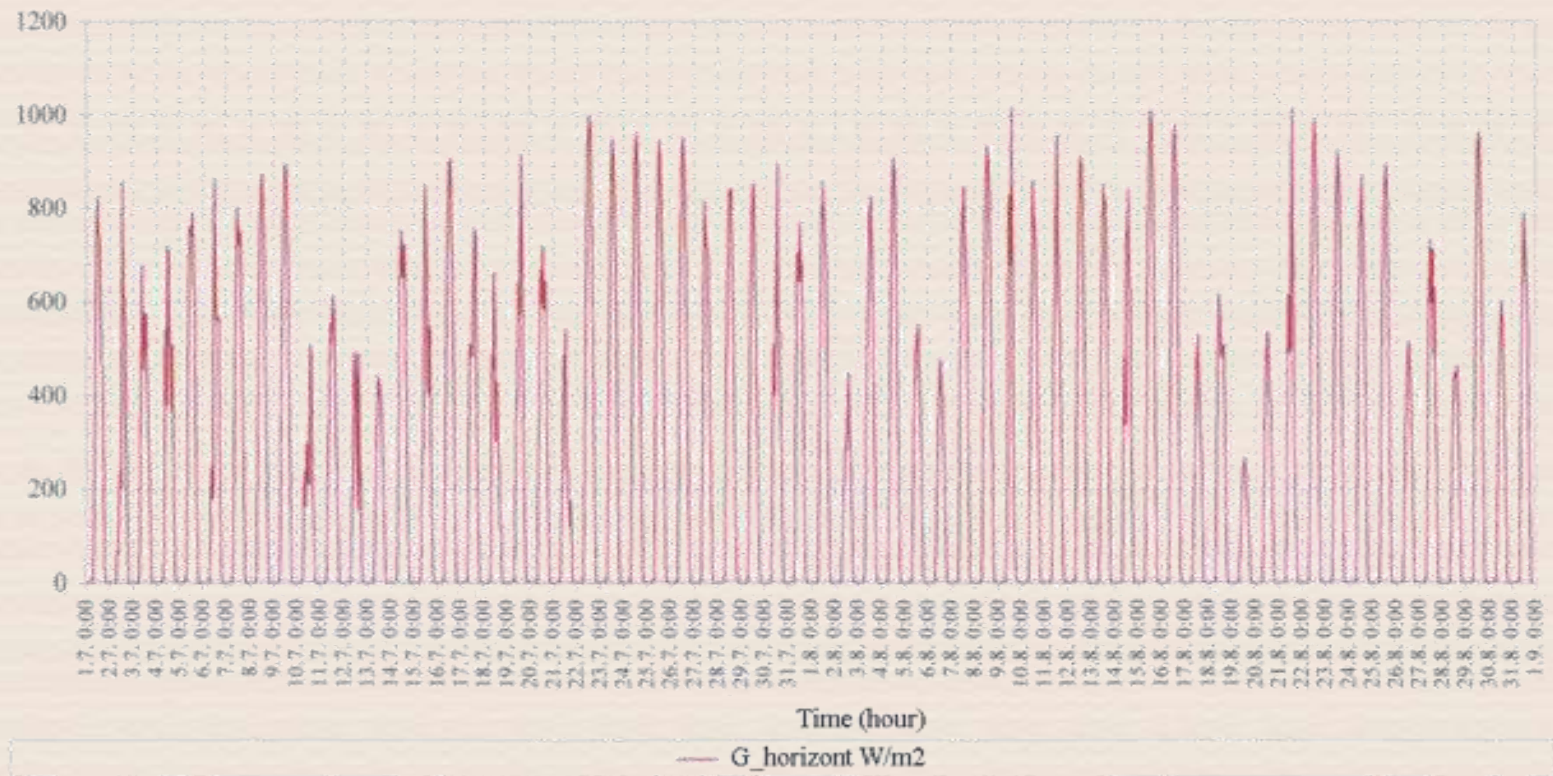
Daily totals of solar radiation





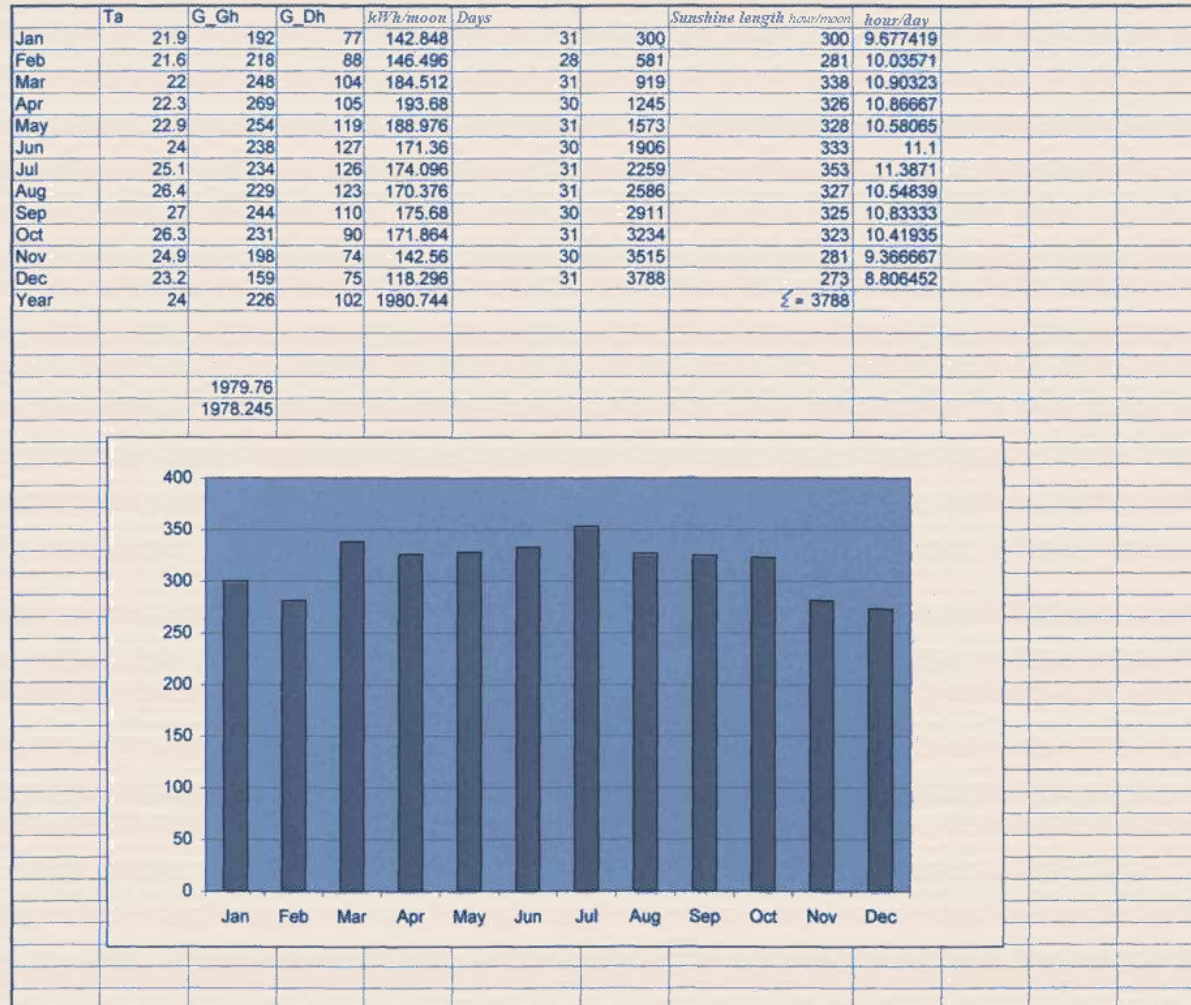
Intensity of solar radiation





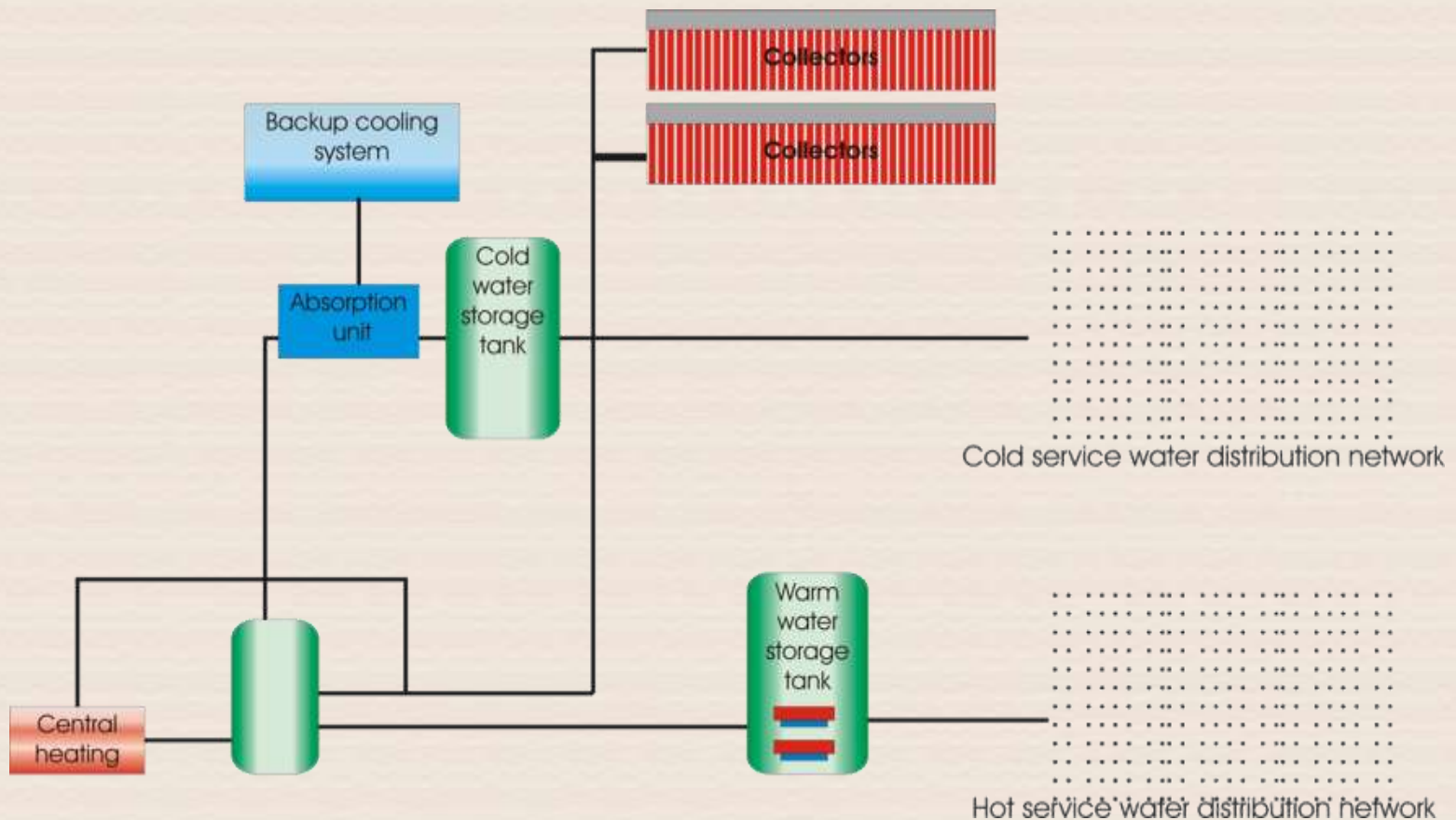


Solar radiation and sunshine duration





Example of the use of a thermal system





Electric power supply

- Determination of required power supply (regular and peak)
 - Hotel complex
 - Public network
 - Technological centre
- Conditions for the connection to the public network
 - Technical requirements for the connection to the network
 - Voltage of the public network system
 - Possible locality of connection
 - Provision of central dispatching of the distribution network and possible use of the existing one
 - Other conditions for power distribution network building
- Specification of technologies and their adjustment according to the requirements



Estimated power consumption in peaks

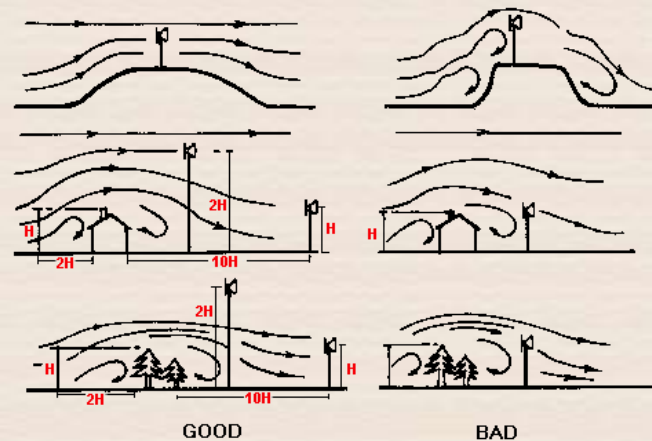
- Maximum estimated power consumption – 24MW
 - Hotel complex 7 MW
 - Public lighting (streetlamps), restaurant and relax centre 15MW
 - Desalination unit 600 kW
 - Thermal system 900 kW
 - Other technologies 500 kW

The estimate will be adjusted based on third-parties demand for power.



Electric power production

- Sources of power
 - Main source of power
 - Windmill generating station (WGS)
 - Micrositing – Study of optimum positioning of the individual power plant units within the given area based on specific wind conditions.



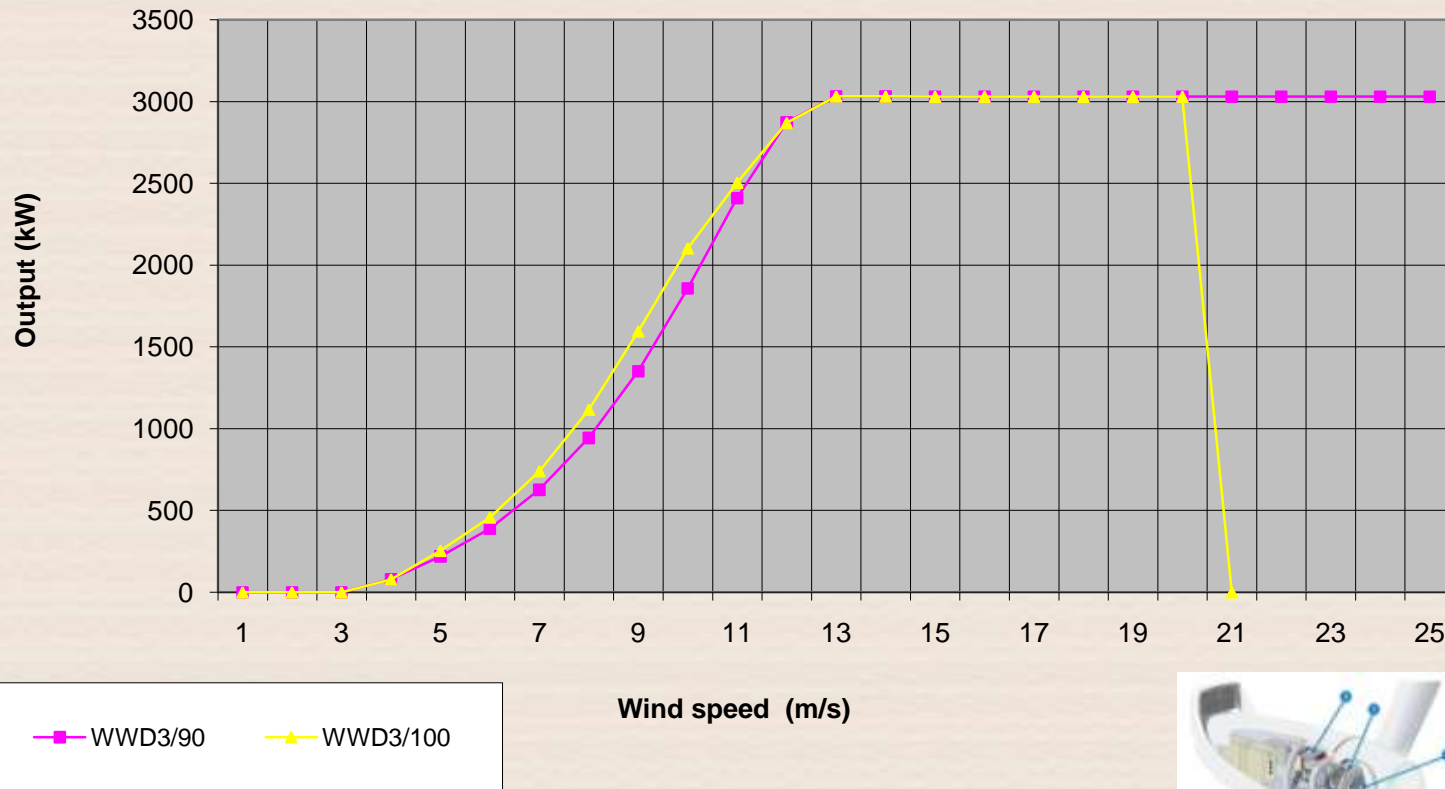


Output characteristics WGS

m/s	WWD3/90	WWD3/100	m/s	WWD3/90	WWD3/100
0	0	0	13	3032	3032
1	0	0	14	3032	3032
2	0	0	15	3030	3030
3	0	0	16	3030	3030
4	80	79	17	3030	3030
5	220	254	18	3030	3030
6	389	458	19	3030	3030
7	627	740	20	3030	3030
8	944	1117	21	3030	0
9	1351	1595	22	3030	0
10	1858	2103	23	3030	0
11	2410	2505	24	3030	0
12	2873	2870	25	3030	0

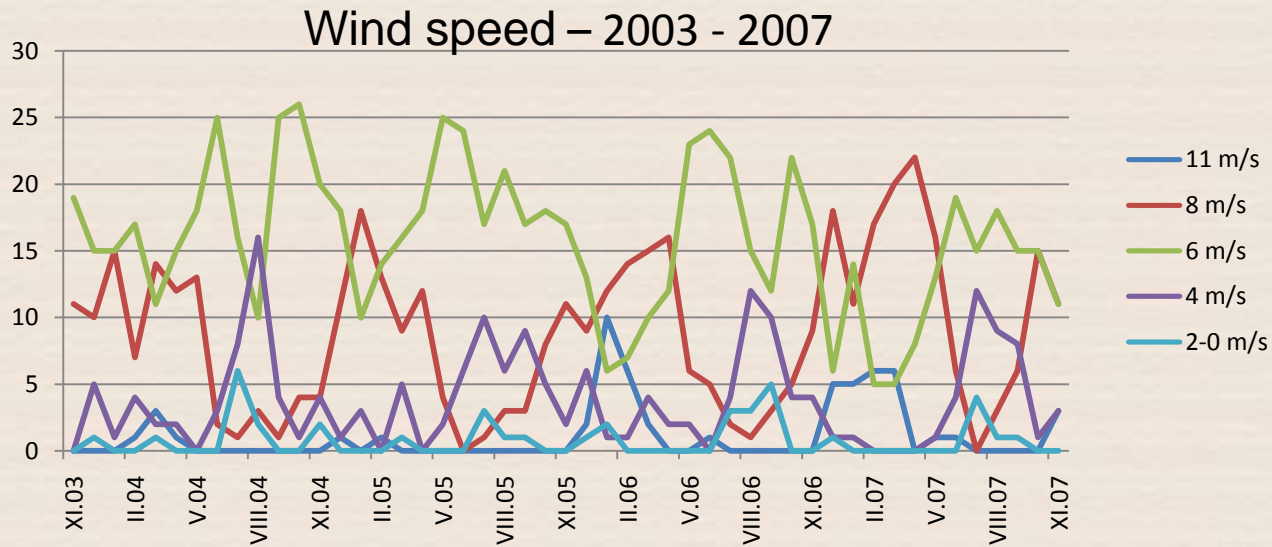


Output curve WWD3/90/100





Wind speeds – Cape Verde



Percentual wind speeds in the period 2003 - 2007

1489	55	432	774	189	39
100.00%	3.69%	29.01%	51.98%	12.69%	2.62%

Wind speed - Bft (Beaufort)		6	5	4	3	2-0
Wind speed - m/s		11	8	6	4	2-0
Wind speed - km/h		40	29	22	14	7-0



Standby power supply

- Standby power supply – options
 - VRB Energy Storage System (VRBESS)
 - Standby extent - MWh (e.g. 2MW for 8 hours)
 - System reaction 90ms
 - Biogas station
 - Oil-powered generator



VRBESS application



VRBESS



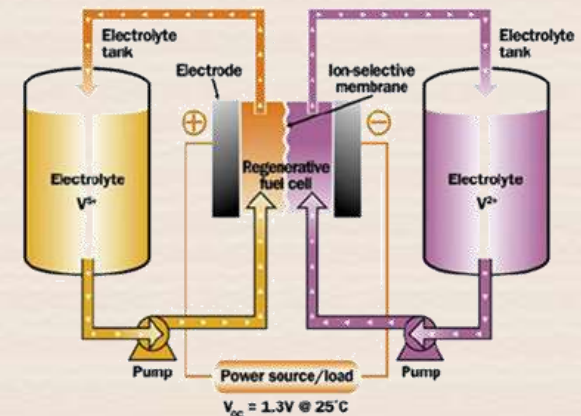
Power storage

Vanadium-Radox Battery

- High effectiveness – 75%
- Very low self-discharge effect
- Possibility of adjustment and addition of volume and output
- Very low maintenance costs – 0.027–0.132 CZK/kWh
- Reaction time - 5ms

Hours	4	6	8	10
kW				
50	15	20	25	35
100	30	40	45	70
200	55	80	110	140
500	140	200	270	340
1.000	270	400	540	660
2.500*	700	800	1.000	1.100
10.000*	1.200	1.200	1.800	2.000

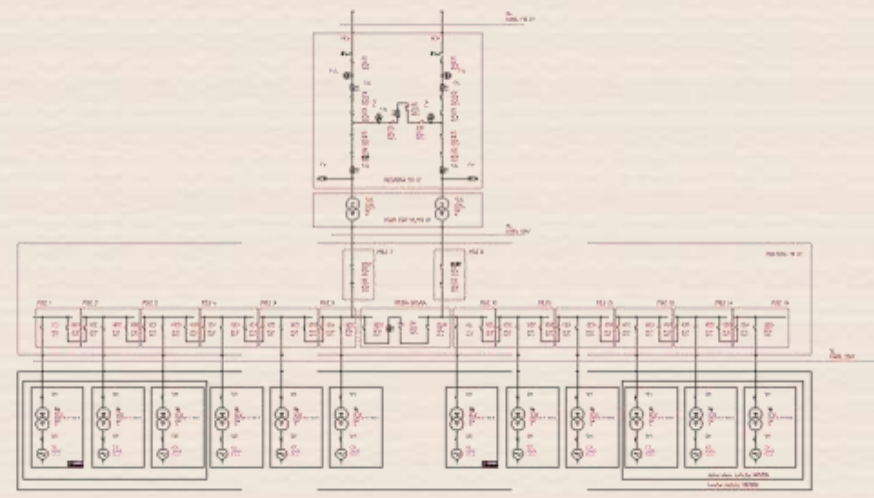
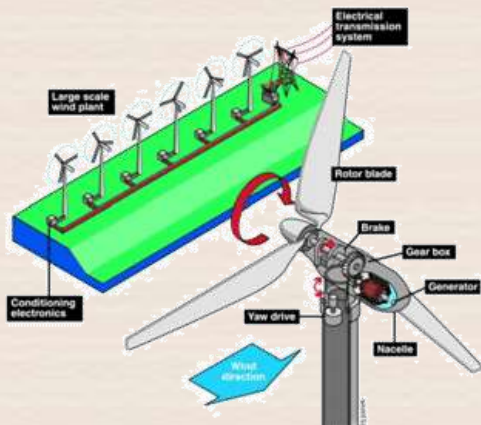
System building dimension (m2)





Power engineering Put in network system







- Building of power network for
 - hotel complex
 - connection to the public network

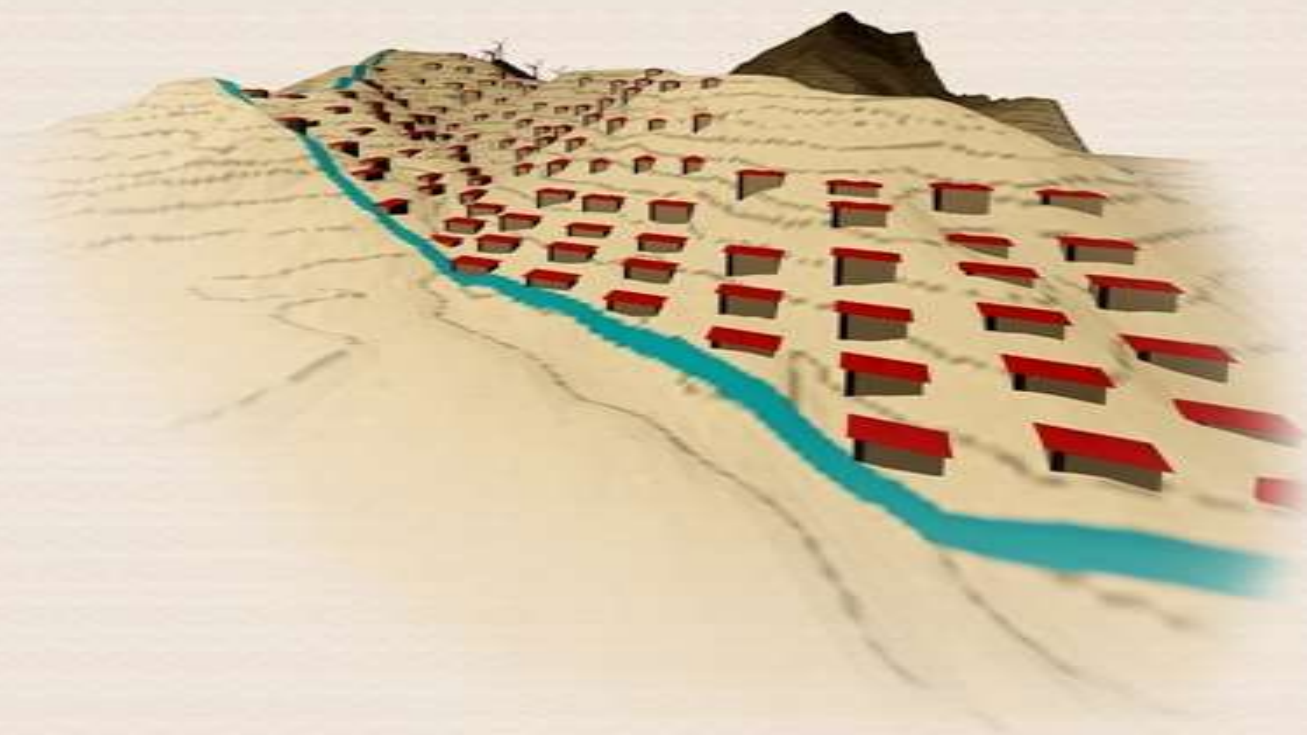




Apartment complex

Building of 2,500 luxury apartments with respect to local architecture and using up-to-date technology

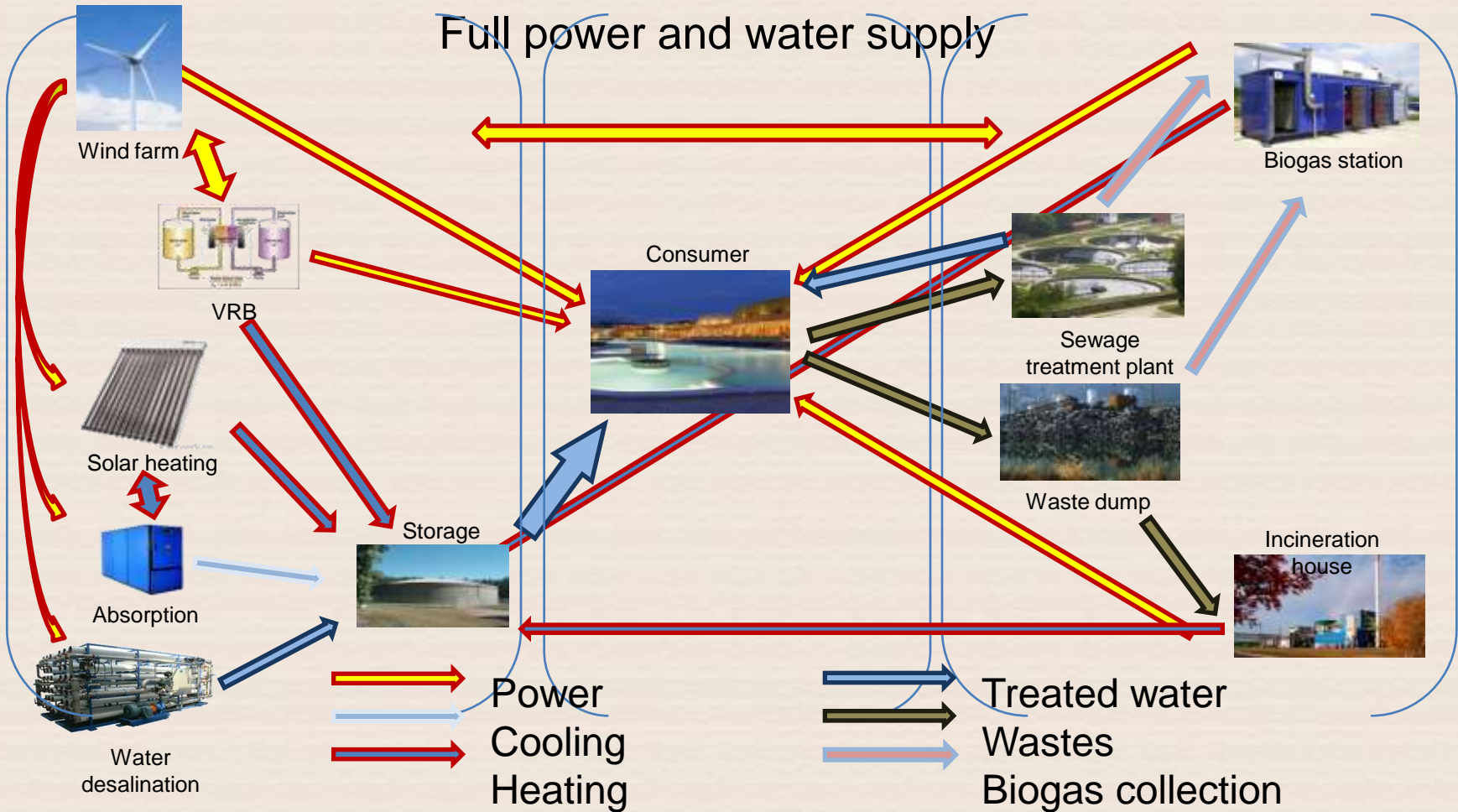
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- Boundary of the plot – building of the technological centre (about 1/3) 
- Boundary of the plot – building of apartments (about 2/3) 
- Installed technologies 
- Hotel complex 
- Contours 





Energy circulation system

Full power and water supply





Other possible deliveries of technological units

- Sewage treatment plant
 - (use of treated water for agricultural land, parks and other green areas irrigation, the biological wastes from the treatment plant can be used for biogas station and also for agriculture and lawn and planting)
- Biogas station
 - (power and heat production from gas obtained from sewage treatment and wastes storage)
- Municipal wastes incineration plant
 - (power and heat production from municipal wastes incineration)



Thanks for your attention

www.cheposas.cz

Chepos a.s.

tř. kpt. Jaroše 31

Brno-střed, 602 00

Czech Republic

