

Energozapas

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National

Technølogy Initiative





Actuality for the Persian Gulf countries



Country	Average energy consumption power*, GW	Optimum storage power, GW	Optimum storage capacity, GWh
Bahrain	3,25	0,98	3,90
Saudi Arabia	38,62	11,59	46,34
UAE	14,54	4,36	17,45
Qatar	4,74	1,42	5,68
Kuwait	7,75	2,33	9,30

*as reported by IEA, 2015

Technology comparison



TECHNOLOGY*	CAPEX, \$/kWh	LCOS for 20 years, \$/MWh	
Lifted Weight Storage (LWS)	230-300	136-194	
Pumped Hydro Storage (PHS)	238-350	152-198	
Electrochemical storage with CAPEX expected by 2020-2025	140-200	170-210	
Compressed air CAPEX = 110 \$/kWh in presence of a ready-to -use cavern	110-430	190-250	
Solid fuel elements	190-500	250-400	
Flywheels	400-10 000	250-5 390	
Supercapacitors	9 000-41 000	350-19 070	

*as reported by World Energy Council и LAZARD

Idea



Lifted Weight Storage:

a solution that is analogous to pumped hydro but uses polymer- cladded local soil instead of water



No requirements for the terrain

Requires a landscape elevation and a water reservoir

Other gravity storage projects



Heindl Energy (Germany)



Requires a landscape elevation and a solid granite begging

ARES (USA)





Requires a landscape elevation

Technological challenges

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- Belts able to last more than 70 mln cycles.
- Inexpensive bearing structure able to withstand seismic and wind loads.
- Reversible energy conversion with the cycle efficiency of at least 80%.
- Automated construction system.
- Electromechanical parts with the life cycle of 50 years.
- Automated condition monitoring and process management.

Additionally to the above-listed challenges, the CAPEX of the storage of, for example, 100 MW in power and 400 MWh in capacity should not exceed 300 \$/kWh

Our team



	Belts	Bearing structure	Power electronics	Manipulators	Mechanical parts	APCS
Management and concept development	Energozapas	Energozapas	Energozapas	Energozapas	Energozapas	Energozapas
Modeling	Energozapas	MT-Engineering	Oldham	Energozapas	Energozapas	Energozapas
Design	Brugg Cables	MT-Engineering	FMT	Energozapas, SVAP	Energozapas	Energozapas
Production	Brugg Cables	Aton	FMT	Energozapas	NZ-tsg	Wago, Siemens
Implementation	Energozapas	Aton	Energozapas	Energozapas	Energozapas	Energozapas

Our team is in possession of all the necessary expertise





Eiffel Tower consumption ~7,8 GWh/year height 300 m

Industrial pilot LWS

power 3,6 MW capacity 420 kWh height 80 m

Prototype LWS

power 10 kW capacity 0,8 kWh height 20 m





9-storey building

iii-90 series

consumption



Our road map







Our goals

Implementation of the project will result in ENERGOZAPAS takes a significant part of the world's energy storage market.

We expect to take at least 10 % of the world's market to reach \$4,85 bln by 2035

Financial backing





Today's investments into the project have exceeded \$20 mln that is more than enough to put an LWS Pilot into operation

We are looking for partners :



- to design and build an industrial LWS in one of the Persian Gulf countries;
- to set up a joint engineering company able to deliver turn-key industrial LWS solutions;
- to develop the 10% of the world's market of industrial energy storage.

Thank you!