

Decarbonization of coal fired power plants using high temperature thermal storage technologies from solar power plants - from CoalAge to StorAge

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Wissen für Morgen





Photographer: Krisztian Bocsi

Climate Changed

Germany's Coal Plants May Be Converted to Giant Batteries

By [Brian Parkin](#) and [William Wilkes](#)

10 de abril de 2019 9:01 GMT-4

The storage units “could be converted from the mid-2020s to innovative, long-term power plants storing surplus wind and solar power,” the Economy and Energy Ministry said in its 32-page report on coal phaseout planning. No particular storage technology has been selected for the switch yet, according to the April 4 report.



German Coal Commission published Jan 28, 2019
its report to step out from coal by 2038

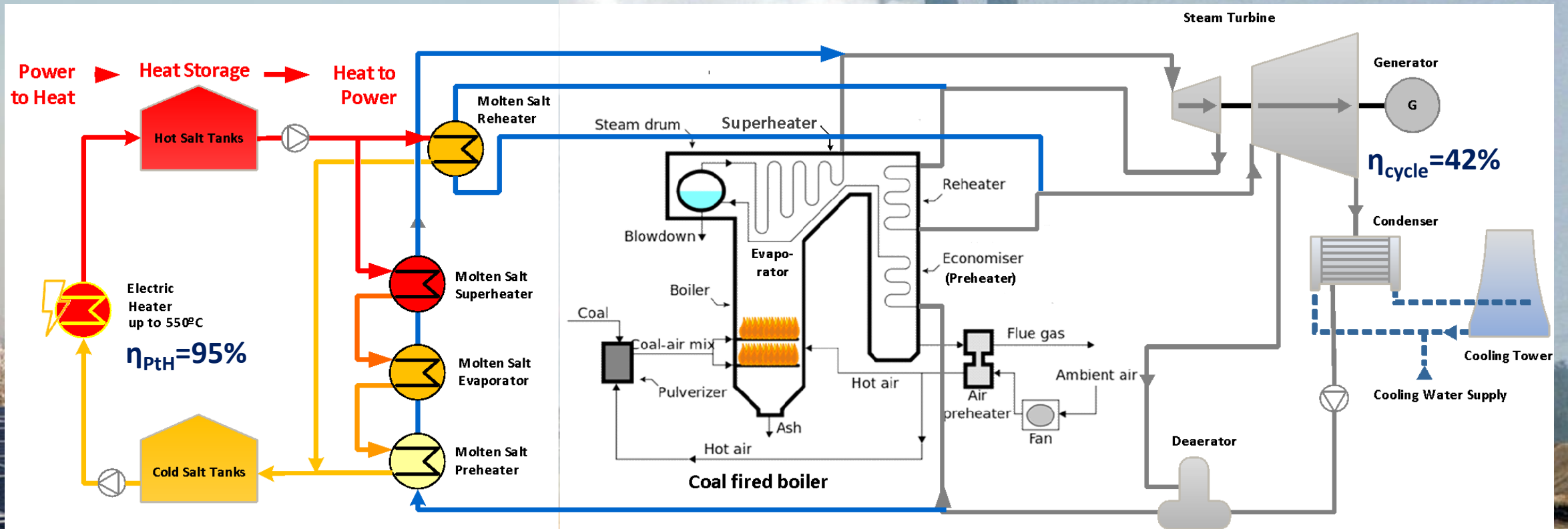
Today 46GW coal plants

- 2022 to be shut down 7GW
- 2030 to be shut down additional 16GW (23GW accumulated)
- 2038 to be shut down remaining 23GW



Addition of the molten salt storage island to the existing Rankine Cycle

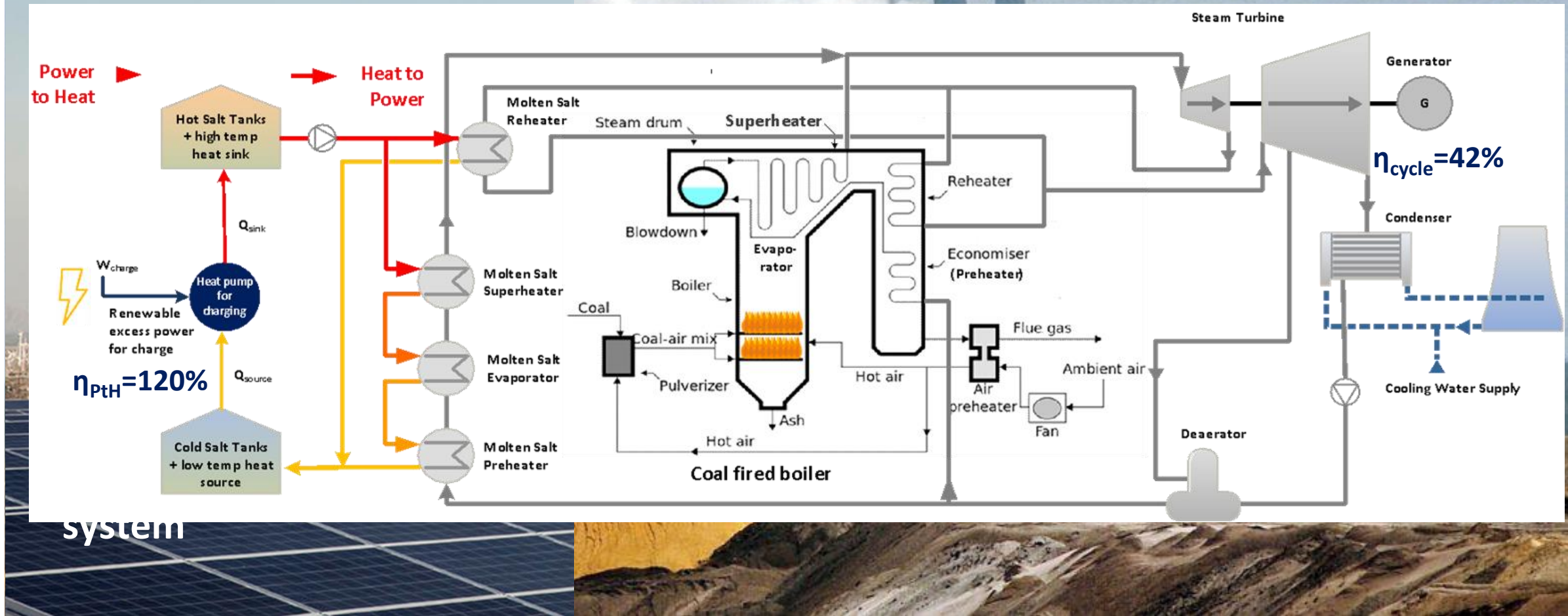
Phase 1: Pilot integration of molten salt storage in existing coal plant – proof of concept $\eta_{\text{roundtrip}} = 40\%$



system

Substitution of resistance heater with heat pump to improve charging efficiency

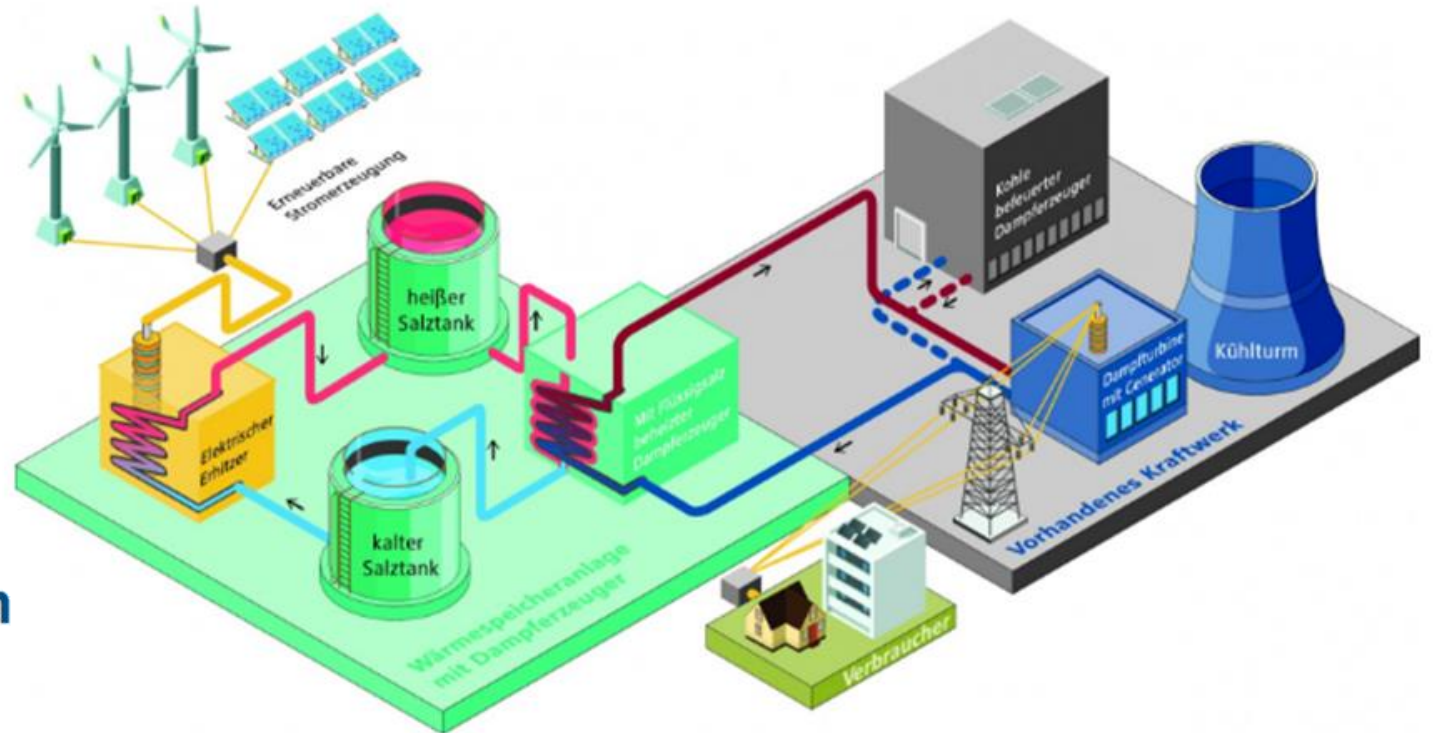
Phase 2: Substitute resistance heater by heat pump for charging – proof of concept $\eta_{\text{roundtrip}} = 50\%$



Store2Power Pilot Project Germany

[← Zurück zur Übersicht](#)

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Köln/Essen, 15 März 2019

RWE Power AG

Wegweisendes Pilotprojekt: Im Rheinischen Revier entsteht ein Wärmespeicherkraftwerk

- Gemeinsame Planung von RWE Power, DLR und FH Aachen
- Flüssigsalz-Anlage integriert erneuerbare und konventionelle Energieträger und schafft Perspektive für Kraftwerksstandorte
- Land NRW fördert Planung mit 2,9 Millionen Euro

Advantages of molten salt thermal storage over batteries and pumped hydro



- Low cost – its components are mass used as fertilizer
- Inert – low corrosion with carbon steel
- Non Toxic / non penetrating in ground soil – its freezing at contact
- Durable – good for 35 years charge discharge cycles
- Capable of achieving high temperatures at ambient pressure
- Can be used as heat transfer fluid and easily exchange heat with other working fluids (water/steam, HTF)
- High mass specific energy density – magnitudes higher than water in pumped hydro and in comparable range of batteries
- Abundant availability
- Reusable



Perspectives for other countries

REGULATION & POLICY

PacifiCorp Proposes Replacing Wyoming Coal Plants With Renewables and Storage

For the first time, the Berkshire Hathaway-owned utility has outlined a plan that could save customers money by retiring coal plants early. But it faces a challenge in Wyoming's new coal protection law.

JEFF ST. JOHN | APRIL 30, 2019



Lithium and thermal storage salts come from same source - the Salar de Atacama



Lithium Mining in the Atacama



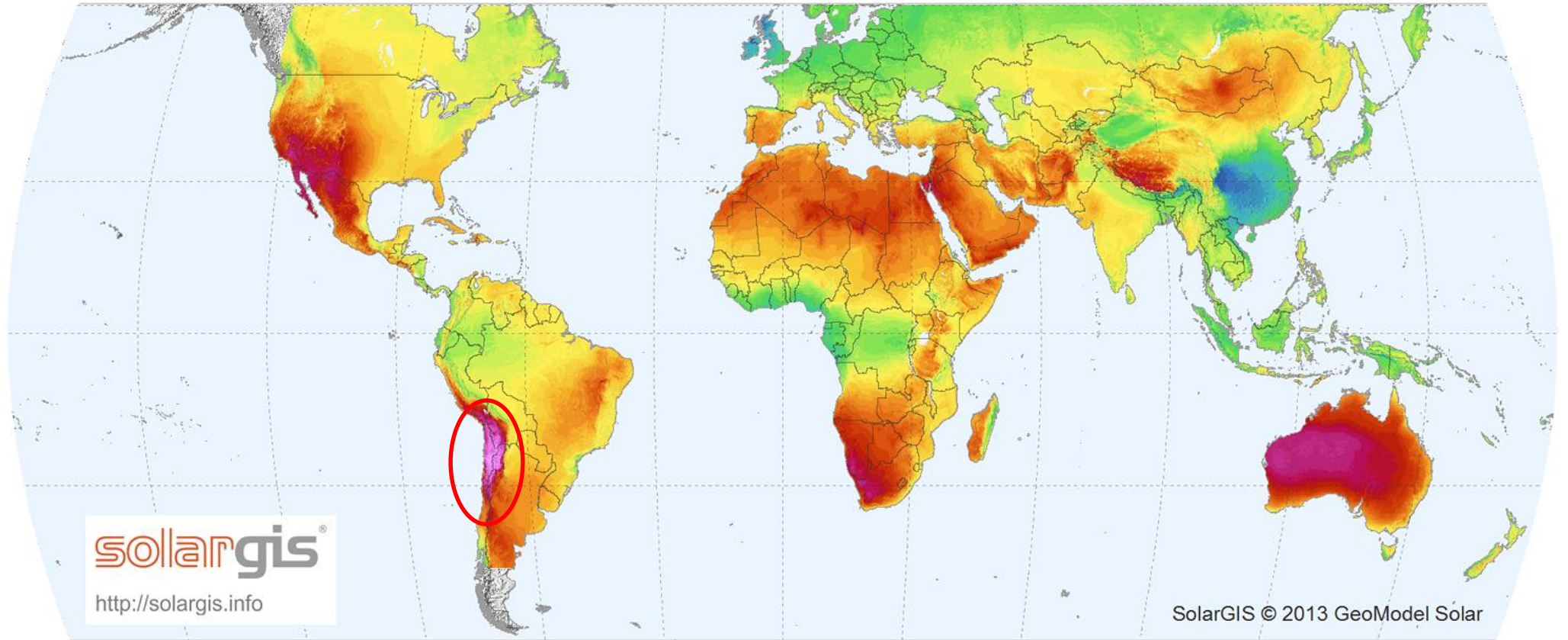
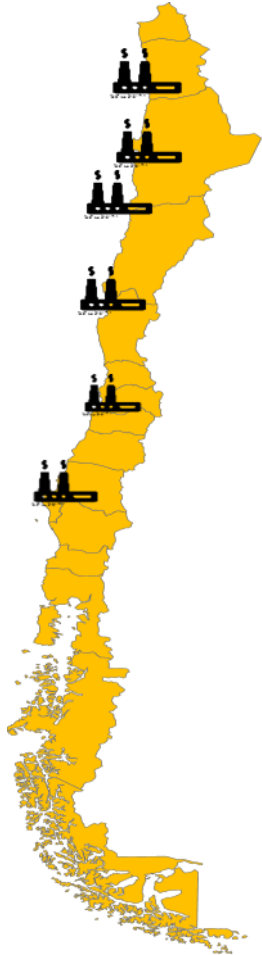
Solar Salt Mining (NaNO_3 and KNO_3) in the Atacama



Chile has world best direct normal and global horizontal irradiation

WORLD MAP OF DIRECT NORMAL IRRADIATION

GeoModel
SOLAR



solarGIS
<http://solargis.info>

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