DESERT-VISION

Millennium-Project

202GW

CO_2-free, baseload-capable electricity for Europe
world's largest energy project

Equivalent to the output of
202 medium-sized nuclear power plants

- Energy self-sufficiency for Europe
- Freshwater production of up to 253 billion m3 per year
- CO_2 savings of up to 1.2 billion tons per year
- Creation of new permanent jobs > 40,000

Content

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The European challenge

Insufficient baseload-capable power plants

Europe bears a special responsibility due to its high energy consumption to make its energy sector climate-neutral as soon as possible.

The challenge lies in the fact that wind and photovoltaic systems can only contribute minimally and are not baseload-capable.

However, reliable power supply requires baseload-capable power plants that can compensate for the highly fluctuating energy generation from wind and photovoltaic systems.

A stable grid supply is of existential importance for industrialized countries and requires the use of baseload-capable power plants.

Additional burdens

In the near future, additional major electricity consumers will be added to the existing electrical consumers:

Electric vehicles

Conversion of building heating systems from fossil fuels to electric heat pumps

Conversion of large industries, such as chemicals and steel, and others from fossil fuels to CO_2-free electricity

Digitalization:

Industry 4.0

Internet of Things (IoT)

Artificial Intelligence (AI) - the use of AI will cause an extreme increase in electricity consumption

Increasing data processing in industry and the use of server clouds will also consume enormous amounts of energy

With widespread use of AI, more and more people will be freed up and will increasingly use streaming services in their leisure time. This will further significantly increase electricity consumption.

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Resümee

Complete CO_2-free conversion of current energy consumption within one's own country is currently not possible with available technologies.

To counter the vicious cycle of CO_2-free energy shortages and simultaneously increasing energy demand in Europe, we have developed the

DESERT-VISION Millennium Project.

This is how the power plants of the future look.

DESERT-VISION multifunctional Thermo-Solar power plant.

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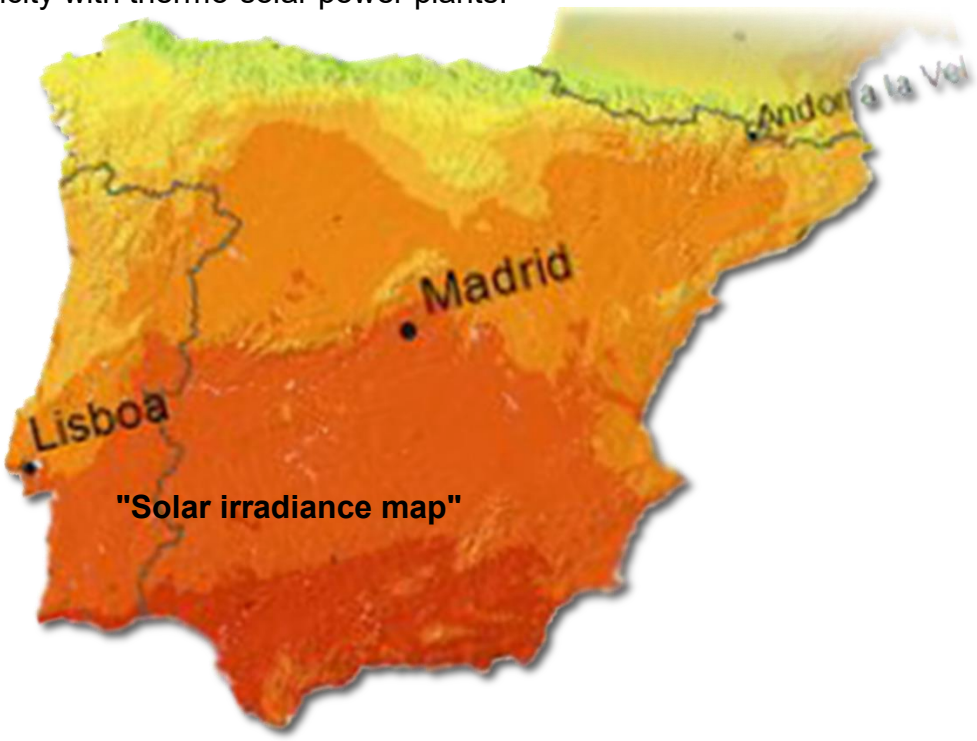
Thermo-solar electricity from the sunny southern regions of Spain.

On the southern coast of Spain, we find ideal conditions for generating vast amounts of electricity with thermo-solar power plants.



"Solar irradiance map"

Challenging conditions on Spain's southern coast

The southern coast experiences strong and consistent sunlight, making it ideal for **DESERT-VISION** multifunctional thermo-solar power plants.

However, with increasing climate warming, solar radiation continues to intensify, leading to extreme temperatures in some regions.

As the region experiences worsening drought due to increasing warming, the southern part of Spain faces extreme aridity.

This poses a threat of increased landscape devastation.

Natural water resources are depleted, forcing both agriculture and urban areas to implement radical measures.

The economy of the Spanish south heavily relies on tourism as well as fruit and vegetable cultivation.

The escalating drought and associated rising temperatures increasingly burden these industries.

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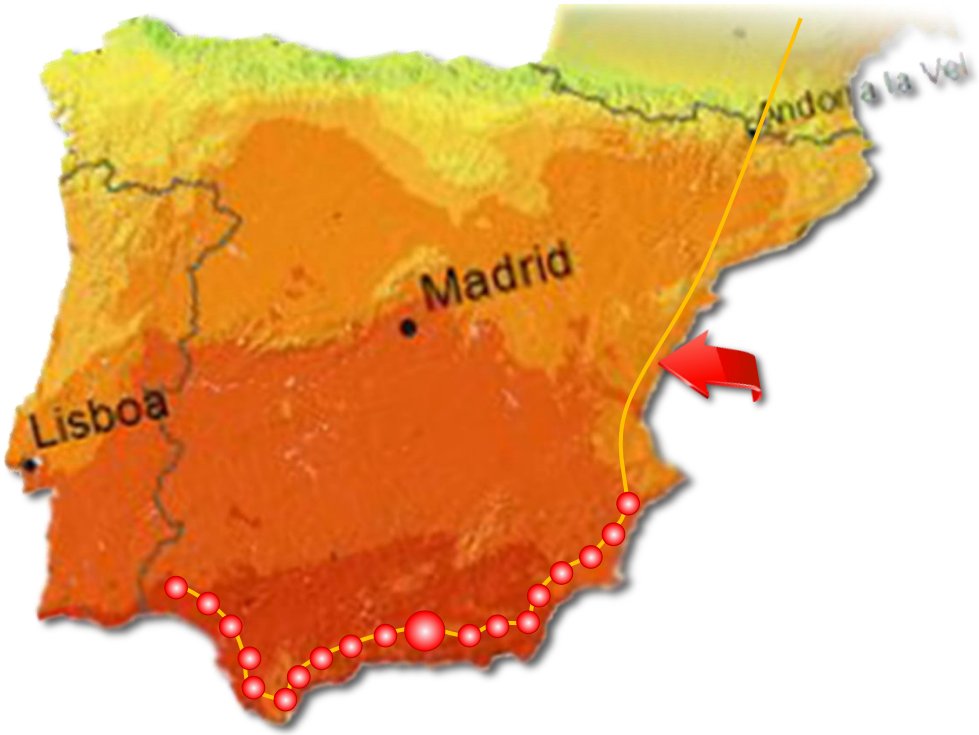
The solution - DESERT-VISION multifunctional thermo-solar power plants

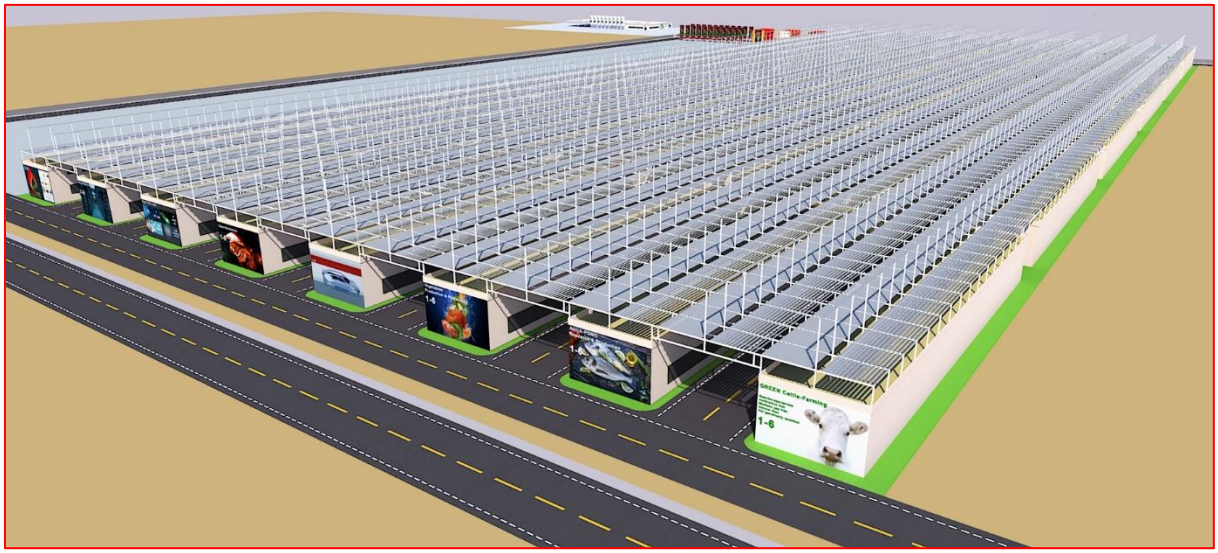


- **A 4 GW power plant has the capacity of 4 medium-sized nuclear power plants**.

High-voltage direct current (HVDC) transmission lines connect the DESERT-VISION power plants to the European power grids.

Information about HVDC transmission lines.

DESERT-VISION multifunctional thermo-solar power plants



DESERT-VISION multifunctional thermo-solar power plants differ significantly from conventional thermo-solar facilities.

DESERT-VISION multifunctional thermo-solar power plants utilize Fresnel mirror technology. This allows for a flat mirror surface and a static receiver positioned above the mirrors.

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The **DESERT-VISION** Fresnel mirror technology offers many advantages:

- Highly efficient
- Cost-effective in manufacturing and maintenance
- The flat mirror arrangement allows for fully automatic cleaning and monitoring of the mirror surface
- The flat and robust mirror construction can be mounted at any height, providing shade underneath for various applications
- The area under the solar mirrors can serve as a large greenhouse, benefiting from CO_2-free and affordable electricity.
  Entire industrial areas can also benefit from this setup.
- Under the vast, sun-protected surfaces, entire self-sufficient cities can emerge.
- **DESERT-VISION** multifunctional thermo-solar power plants are preferably cooled with seawater.
  The resulting steam is condensed back, producing large amounts of freshwater without additional energy consumption.

DESERT-VISION multifunctional thermo-solar power plants usher in a completely new era of thermo-solar power plants with the potential to mitigate the climate crisis without sacrificing economic growth.

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High-voltage direct current transmission (HVDC) line

High-voltage direct current transmission (HVDC) makes electricity generation independent of the consumer.

With HVDC technology, the electricity is stepped up to over 1,2 million volts and then rectified.

This allows for extremely large power to be transmitted over a single line.

Each line can transmit 12 GW.

Over a distance of 3000 km, the loss rate is only 10%.

Within a 3000 km distance, all European grids are interconnected.

HVDC lines do not generate electromagnetic fields because they carry direct current.

HVDC lines can be laid underground, underwater, or suspended from power pylons.

For the fast and cost-effective installation of the line, we propose utilizing the highway drainage network.

With HVDC technology, a very stable power supply with minimal losses is possible.

The HVDC transmission technology makes power generation independent of the consumers.

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The performance specifications of the Millennium-Project

Energy

- Cumulative power of all power plants: 202 GW peak power
- Baseload capability / 24/7 operation
- 8,000 operating hours per year
- **202 GW - equivalent to the power of 202 medium-sized nuclear power plants**

Seawater-Desalination

The power plants are cooled with seawater, and the remaining steam is condensed back, effectively desalinating seawater without additional energy consumption.

The annual freshwater production per GW is 40 million m^3.

The total freshwater production of the Millennium Project is approximately 8 billion m3 per year.

Additionally, the construction of additional electrically operated desalination plants is planned.

Since electricity consumption at the power plants fluctuates, surplus electricity is utilized for desalination in the desalination plants to avoid reducing the power plant's output.

Assuming a surplus electricity of about 30%, this could yield up to 245 billion m^3 of freshwater.

Altogether, up to 253 billion m^3 of freshwater could be produced annually.

This vast quantity would satisfy the freshwater demand of the entire Spanish coast in the long term.

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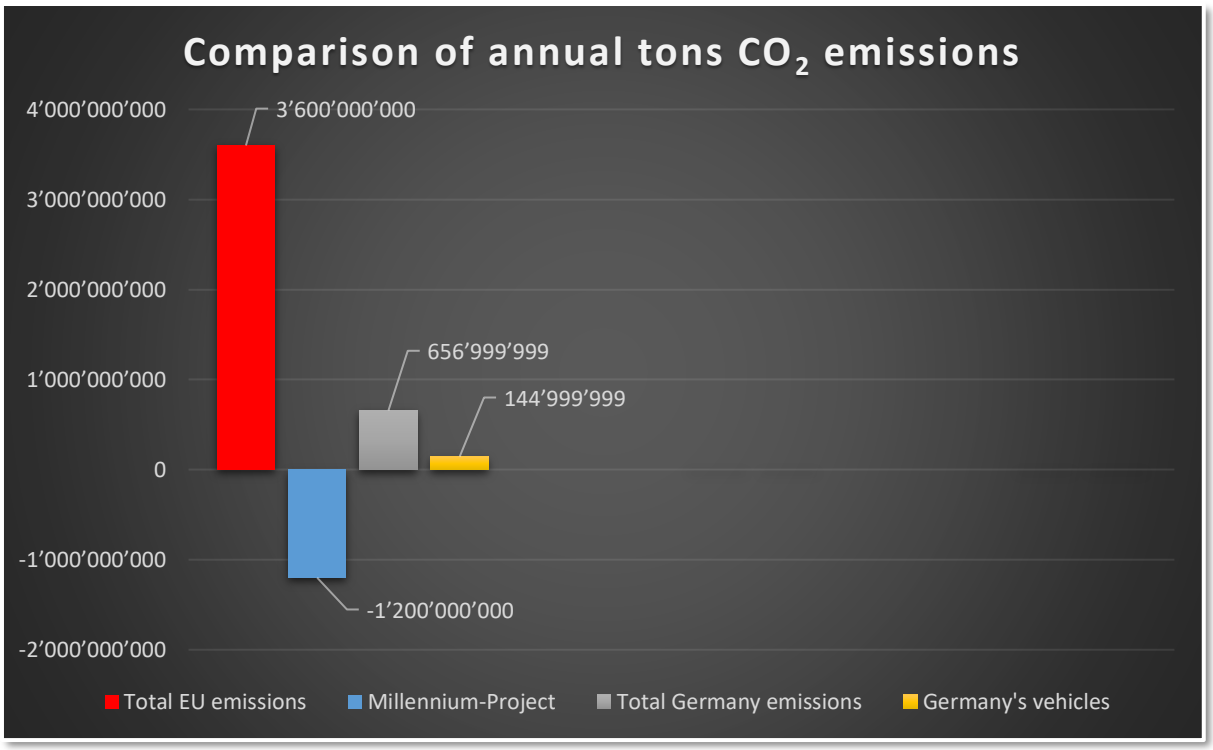
CO_2-Savings

The CO_2-savings of the Millennium Project amount to approximately 1.2 billion tons per year!



The CO_2-savings of the Millennium Project, amounting to **1.2 billion tons of CO_2**, are:

- 8 times higher than the total emissions from Germany's transportation sector
- 1.6 times higher than the total emissions from all sectors in Germany
- **Almost half of the emissions of the entire EU**

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The area under the solar mirrors

The areas under the solar mirrors are located in the cool partial shade and offer countless potential uses.

A 4 GW power plant has a usable area under the mirrors of up to 6,800 hectares.

Of the planned 46 power plants, the "Almeria Power Plant" already has 22 GW.

The area under this power plant is entirely used as a greenhouse for fruit and vegetable production.

The remaining 45 power plants together have a usable area under the solar mirrors of 306,000 hectares.

The utilization as a server farm

Our world is undergoing a transformation towards a digital realm, which is unfolding on various levels:

- IoT (Internet of Things):

  The Internet of Things (IoT) refers to the interconnection of physical devices, vehicles, household appliances, and other objects via the internet. These connected devices are equipped with sensors, software, and other technologies to collect, send, and receive data. The primary goal of IoT is to enable smart communication between devices to gather, analyze, and act upon information. Utilizing IoT can make various aspects of daily life more efficient. Examples of IoT applications include smart homes, smart cities, connected vehicles, Industry 4.0, and many other areas where the integration of information technology and physical objects creates added value.

- AI (Artificial Intelligence):

  AI is rapidly gaining significance, impacting virtually every sector. The deployment of AI is extremely energy-intensive.

  Increasing reliance on external server hosting, known as cloud services:

  These cloud services are also undergoing rapid expansion and require ever-larger energy resources.

- Mining of cryptocurrencies:

  To secure cryptocurrencies, they are stored in a blockchain and additionally calculated using an extremely energy-intensive process known as mining, which consumes vast amounts of electricity.

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New Supply-Chains

Supply chains are crucial for the global economy, ensuring smooth operations and distribution of goods.

However, the reliance on supply chains primarily based in China poses a significant vulnerability, as demonstrated during the COVID-19 crisis when disruptions occurred with devastating consequences for the economy.

This experience has led industries to realize that China may no longer be a reliable partner, prompting the need to establish new secure supply chains.

The areas under the solar mirrors offer an ideal solution, as they can easily be developed into free trade zones with abundant, inexpensive, and CO2-free electricity.

This electricity is not only affordable but also completely independent of the international energy market, as solar energy is free and abundant.

Establishing new supply chains under the solar mirrors presents a win-win situation.

It creates employment opportunities and tax revenue while providing operators with ideal conditions in Spain, a country quickly accessible and situated within the secure EU.

Energy-intensive companies

The locations of the **DESERT-VISION** power plants are excellently suited for hosting extremely energy-intensive industries such as steel production, chemical factories, cement manufacturing, and much more.

Permanently affordable, CO_2-free energy represents a key element for these industries, providing a fundamental competitive advantage globally!

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Food production and processing

The **DESERT-VISION** thermo-solar power plants provide ideal conditions for the production of fruits and vegetables - as seen in the Almeria project.

The vast amounts of freshwater produced without CO_2 emissions can not only elevate fruit and vegetable production to a new level but also benefit the entire agricultural sector.

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Benefits for the European community

Many countries in the European community are densely populated, and their geographical location does not allow them to generate their energy through local wind and solar power plants in sufficient quantities.

The thermo-solar power plants of the Millennium Project could effectively change this disadvantage.

Through highly efficient HVDC transmission lines, they could be directly connected to the Spanish power plants.

This way, they could benefit from CO_2-free electricity generation in a secure EU and NATO member country.

The European community could almost offset half of its entire CO_2 emissions with the Millennium Project.

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Benefits for Spain

Secure CO_2-free electricity supply

Spain could become the powerhouse of the entire European community.

It could supply itself and the EU with affordable CO_2-free electricity, potentially saving up to **1.2 billion tons of CO_2 per year!**

For comparison, statistics show the energy-related CO_2 emissions from transportation in Germany from 1990 to 2020.

The amount of energy-related CO_2 emissions from transportation in Germany in 2020 was 145 million tons.

Combatting drought

Spain is suffering greatly from water scarcity, exacerbated by the increasing climate crisis.

The production of up to 253 billion m3 of freshwater per year could significantly improve the dramatic situation sustainably.

Agriculture, tourism, and cities could all benefit greatly from this.

Improvement of prosperity through the establishment of new industries

The transformation of industry towards sustainability and the rapid emergence of new technologies require production sites with affordable CO_2-free energy and access to CO_2-free freshwater – all of which DESERT-VISION thermo-solar power plants offer in an ideal form.

Spain will become the new focal point for new industrial settlements in Europe with these power plants, benefiting significantly from associated advantages such as permanent employment opportunities and greatly increased tax revenues.

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Cost estimation

Naturally, cost estimation is only an approximation, as such large projects involve many uncertainties.

The calculation is based on already constructed and successfully operating Fresnel power plants.

A 1 GW **DESERT-VISION** thermo-solar power plant is estimated at €4.3 billion.

For comparison, 1 GW corresponds to the capacity of a medium-sized nuclear power plant.

As a comparison, let's consider the expansion of the Hinkley Point nuclear power plant in England.

The expansion involves adding 2 additional blocks with a **capacity of 3.26 GW**.

Currently, the construction costs are estimated at **€50.3 billion**, which equates to **€15.5 billion per GW**.

It's widely known that the construction costs of a nuclear power plant are just the tip of the iceberg, as there are additional expenses such as:

- Fuel costs
- Waste disposal
- Enormous insurance costs
- Decommissioning the power plant at the end of its operational life. The decommissioning costs more than the construction!
- Risks to the population!

Taking into account the scaling effect inherent in the vastly larger size of the Millennium project, we arrive at approximately €4 billion per GW.

The Millennium project includes a large power plant - the **"Almeria power plant"** with **22 GW - as well as several other power plants each with 4 GW**.

The construction of the Millennium project, with a total capacity of 202 GW, is estimated to cost around €808 billion.

The cost of HVDC (High Voltage Direct Current) transmission lines for distributing electricity to the EU is estimated at an additional €15 billion.

Overall, the entire Millennium project is expected to cost between €800 and €900 billion.

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Conclusion

The European Union has set the goal of becoming climate neutral by the year 2050.

This means that the EU aims to no longer cause net emissions of greenhouse gases by that time.

To achieve this goal, the EU has developed various measures and strategies, including the **"European Green Deal"** and the target to reduce greenhouse gas emissions by at least 55% by 2030 compared to the 1990 level.

The **DESERT-VISION** Millennium Project offers a feasible pathway for the EU to achieve its desired goal of carbon neutrality within the given timeframe for the first time.

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