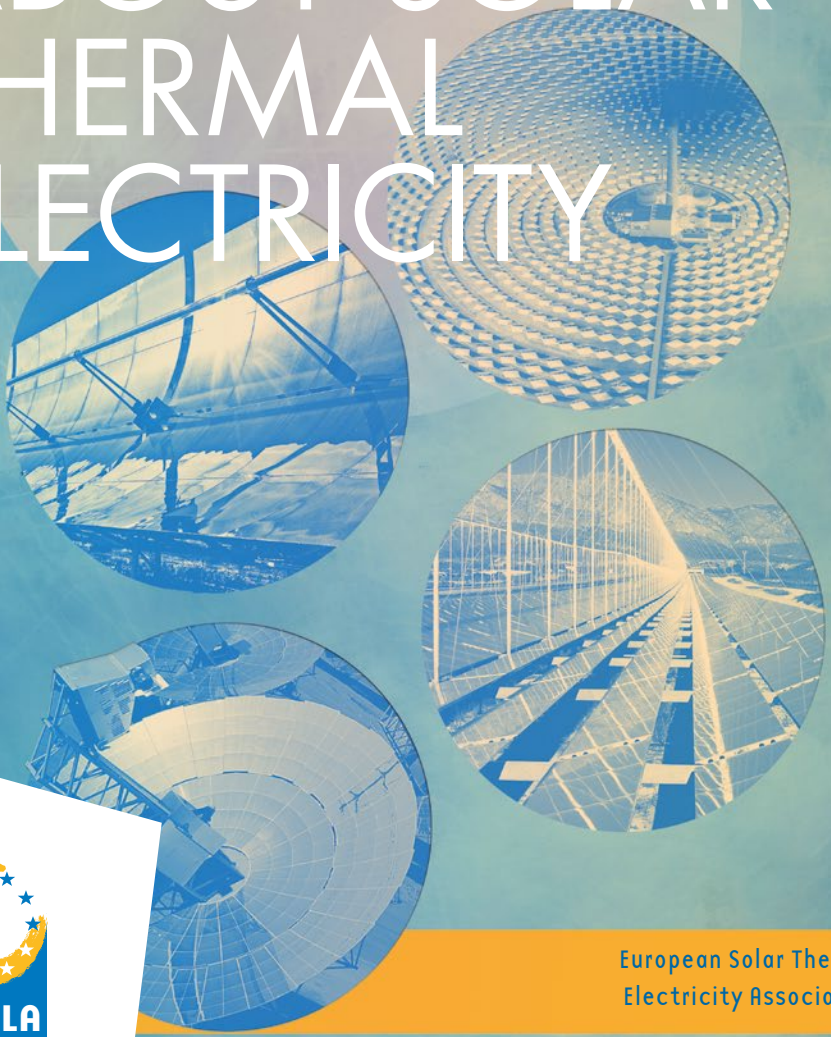
DEBUNKING MYTHS ABOUT SOLAR THERMAL ELECTRICITY



ESTELA

European Solar Thermal Electricity Association

April 2015

MYTH 1

"Solar energy" is just about photovoltaic (PV) technology

Fact is that...

"Solar Energy" is NOT just about PV technology. There are also several other technologies using this free and abundant power of the sun to produce both heat and electricity. Solar Thermal Electricity (STE), also known as Concentrating/Concentrated Solar Power (CSP), is a technology that produces heat by using mirrors or lenses to concentrate sunlight onto a heat receiver, which brings the solar energy to a heat transfer fluid. This heat can be used to generate electricity with a steam turbine or as process heat for industrial application.

Unlike PV that any household can install on its rooftop, STE power plants generate electricity mostly at utility-scale They are connected to the high voltage grid for transport and further delivery to end-users. By storing the thermal energy and/or using hybridization, STE is able to firmly deliver electricity on demand without additional cost – even after sunset. STE is grid-friendly not only due to thermal energy storage, but also due to the use of conventional turbine technology to generate electricity.

This is the most distinct feature of STE plants compared to other renewable energies that will allow for integration into the high voltage grids of even more RES sources without jeopardizing grid stability. This specific feature of dispatchability of the STE energy raises the overall value of the energy produced.

MYTH 2

STE is too expensive and it will always be so

Fact is that...

A remarkable cost reduction – around 50% – has been achieved by STE since 2007 with only approximatively 4.5 GW installed worldwide. Compared with the current situation of Wind (350 GW) and PV (130 GW), one can easily figure out the real potential for cost reduction in the next years of STE plants.

Although STE plants are more capital-intensive than traditional fossil-fuel plants, their operating costs – once connected to the grid, are low, essentially because sunshine is free.

However, as of today, the cost of electricity produced by STE plants is lower than the one generated by currently announced new nuclear power plants (notwithstanding the fact that the final costs of nuclear power plants remains vague due to dismantling costs, measures for increased security, etc).

In other words, STE technologies are much more economically feasible compared to fossil-fuel plants over their respective effective operational lifetime (See Myth 9).

Prices for electricity produced by today's STE plants fill the range from 12 to 16 c€/kWh depending on the irradiation level and most importantly on the financing conditions. They will continuously decrease over the coming years due to announced cutting-edge technology developments. The result will be that cost optimisation (also in manufacturing components), economies of scale after deployment of larger plants (i.e. 100-250 MW) are expected to further reduce the cost below 10 c€/kWh before 2020.

This means that solar thermal electricity will be competitive against coal- and gas-fired power before 2020.

MYTH 3

STE plants are like all renewable energy sources an "intermittent" (or "variable") way of generating electricity

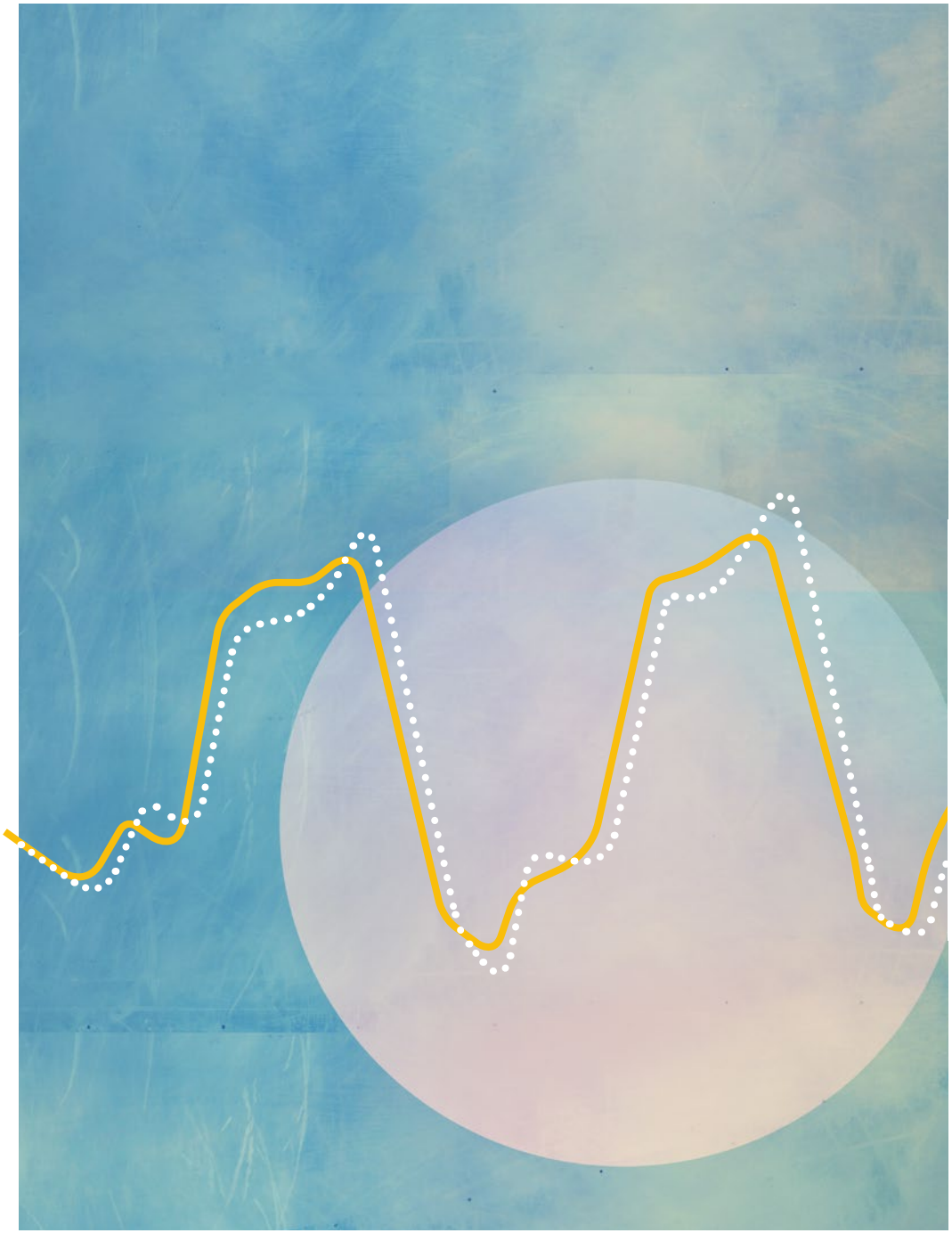
Fact is that...

STE plants are today in most cases equipped with a heat storage system. During sunny hours the collected solar energy is used not only to provide steam to the turbine but also to charge the thermal storage tank. Then, after sunset or during cloudy periods the energy can be drawn from the storage tank to deliver energy – on demand!

Normally the solar fields and the tanks are designed to cover 4 to 7 hours of operation but there is already a reference plant – Gemasolar in Spain – that can produce electricity continuously during the summer season, day and night, just like "base load" nuclear power plants.

From a system perspective, due to its built-in thermal storage capabilities, STE offers significant advantages over other renewable energy sources.

Furthermore, hybridization with biomass natural gas enhances the firmness of the delivery of solar thermal electricity to markets and grid operators.



MYTH 4

STE is not a mainstream energy source in Europe

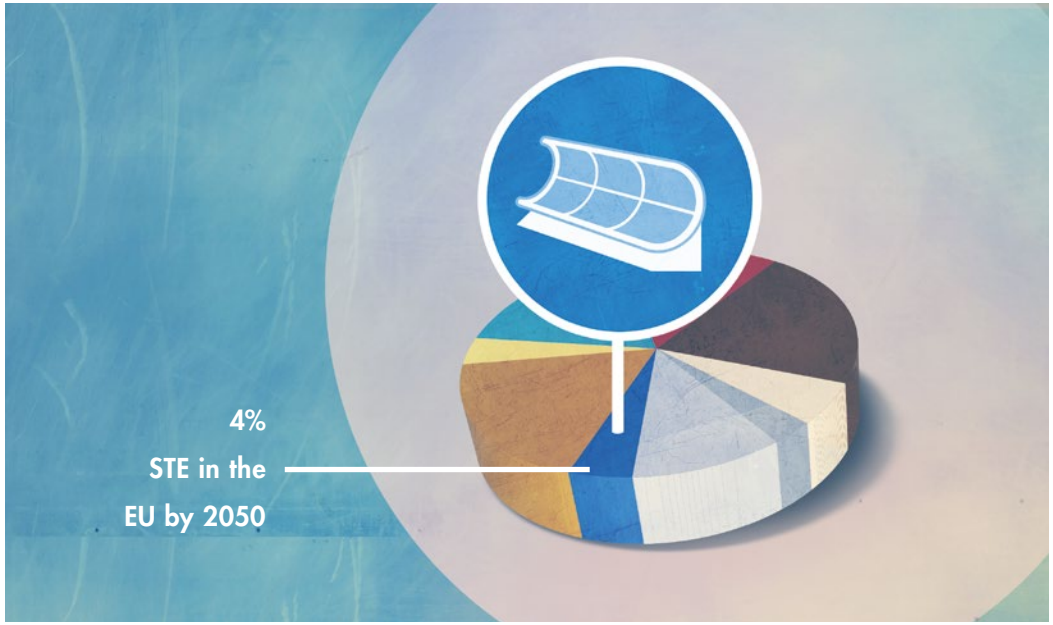
Fact is that...

With only approximatively 4.5 GW installed worldwide, STE technology is relatively new compared to other energy technologies. However, STE has a considerable potential in terms of electricity generation. A small part of the North African (MENA) territory could meet the electricity demands of Europe, the Middle East and North Africa all together. The same also applies to the potential of STE plants in Southern Europe. For instance in Spain, 50 plants with a total 2300 MW are currently connected to the grid providing more than 4 TWh/year. STE represents already a share of more than 3% of the Spanish electricity generation mix during a significant part of a year.

With the recently adopted binding targets of at least 27% of renewable energy used and of 15% interconnection capacity at EU level, renewables are no longer a niche market and will contribute 45-60% to the electricity mix in Europe by 2030. Hence, STE will play an important role in the future energy mix due to its storage and its system-friendly thermal generation unit – STE can not only easily integrate but also facilitate the integration of more intermittent renewables.

Assuming an important capital cost reduction and the contribution of energy storage, the International Energy Agency (IEA) suggests that STE could become economically competitive for intermediate and peak loads within the current decade, due to reduced STE costs and increasing prices of fossil fuels and CO_2. According to the 2014 edition of IEA's Technology Roadmap for STE, the estimated production of STE reach about 1000 TWh by 2030 and 4380 TWh by 2050, thus providing 4% of the electricity mix in Europe and 11% of global electricity mix. In other words, this will be a significant share in the energy mix.

In the future generation mix, dispatchable STE electricity from the Southern European countries combined with off-shore wind from the North See could complement seasonally each other and provide the bulk of the demand of Europe by 2050. Large hydropower along with other technologies such as on-shore wind or solar PV could also have a significant share. According to the study, adding STE to PV, solar power could provide up to 27% of global electricity by 2050 and become the leading source of electricity globally as early as 2040. All together they can achieve the goal of a practically carbon-free electrical system in the future.



MYTH 5

Support programmes for STE deployment are expensive and inefficient for the economy of the countries

Fact is that...

Investments in STE plants bring high macro-economic benefits to countries that go for it. Due to its high local economic content, therefore STE industry brings great contribution to the country GDP, during both the construction and the operation of the plants. In terms of direct job creation, the STE industry has created jobs from manufacturing and engineering to construction works throughout Europe and will continue doing so as the global STE market is set to reach up to €130 bn. per year, according to the IEA technology roadmap for STE. Based on IEA's estimates, €39-57 bn. will be invested on average every year between 2015 and 2030, creating 275,000 to 520,000 jobs worldwide. Up to 150,000 qualified jobs are at stake alone in Europe through these 15 years covering a wide spectrum of direct activities related to:

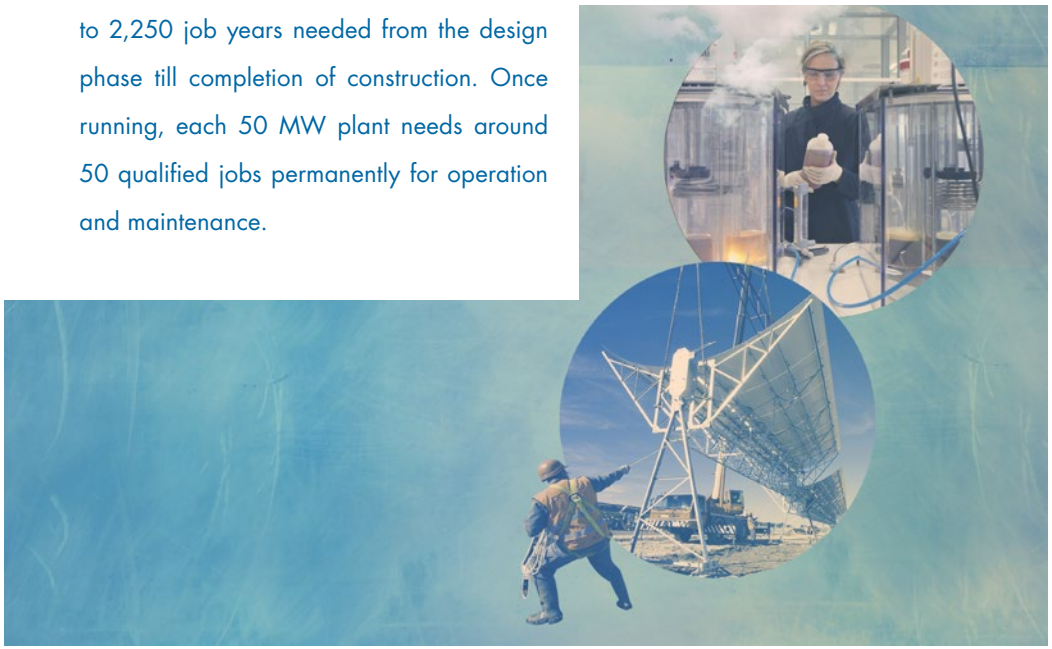
- Engineering, development and financing
- Manufacturing of components: reflectors, receivers, etc.
- Construction, civil, installation and commissioning works
- Operation and maintenance (O&M)

In addition to such direct activities, the European STE industry will in this case also create numerous indirect jobs: research, training, transport, information and communication (ICT) activities, general maintenance services, etc. The returns of all kinds of tax incomes, avoided unemployment subsidies, avoided fuel imports, avoided CO_2 emission rights – are in any contemplated timeframe along the lifetime of the plant higher than the still necessary, but decreasing premiums to fill the initial gap with the current electricity prices.

In Spain, as an example, each 50 MW plant with thermal storage installed is equivalent to 2,250 job years needed from the design phase till completion of construction. Once running, each 50 MW plant needs around 50 qualified jobs permanently for operation and maintenance.

A report from the National Renewable Energy Laboratory (NREL, U.S.) estimates that investing in 100 MW of STE generates 4,000 (direct and indirect) job years plus 94 permanent jobs and $628 million in economic output – compared to 330 job/years plus 13 permanent jobs and $47 million economic output for an identical investment in natural gas-fueled power plant.

This means that STE investment creates more than 10 times more employment (and social wealth) per MW than the same investments in fossil-fuel power generation.



MYTH 6

STE plants disrupt landscape

Fact is that...

STE power plants tend to be located at abandoned industrial sites, on rural land and in deserts to lower the impact of land use and land disturbance. But "beauty is in the eye of the beholder". For someone, a STE power plant may look like a giant art project, and we in the industry do feel it indeed so …

Others may not think the same. All this is at the end largely a matter either of opinion, interest or taste.

More objectively, parabolic trough plants are difficult to be perceived as visually disruptive on landscapes since the collectors are not high and spread over a large area.

The tower in STE tower plants can be seen from far away, a little similar to a lighthouse. When in operation the view of sun rays concentrating in the receiver is appreciated by most people.

MYTH 7

STE power plants need too much land

Fact is that...

The electricity yield of solar technologies per unit of land is in the order of magnitude of other technologies.

Moreover, STE makes great use of the desert's abundant solar resource.

A relatively modest amount of desert land would be enough to supply our planet with energy, according to a study performed in 2003, 2,400,000 TWh per year using 1% of each of the world's deserts!

MYTH 8

STE power plants need much water

Fact is that...

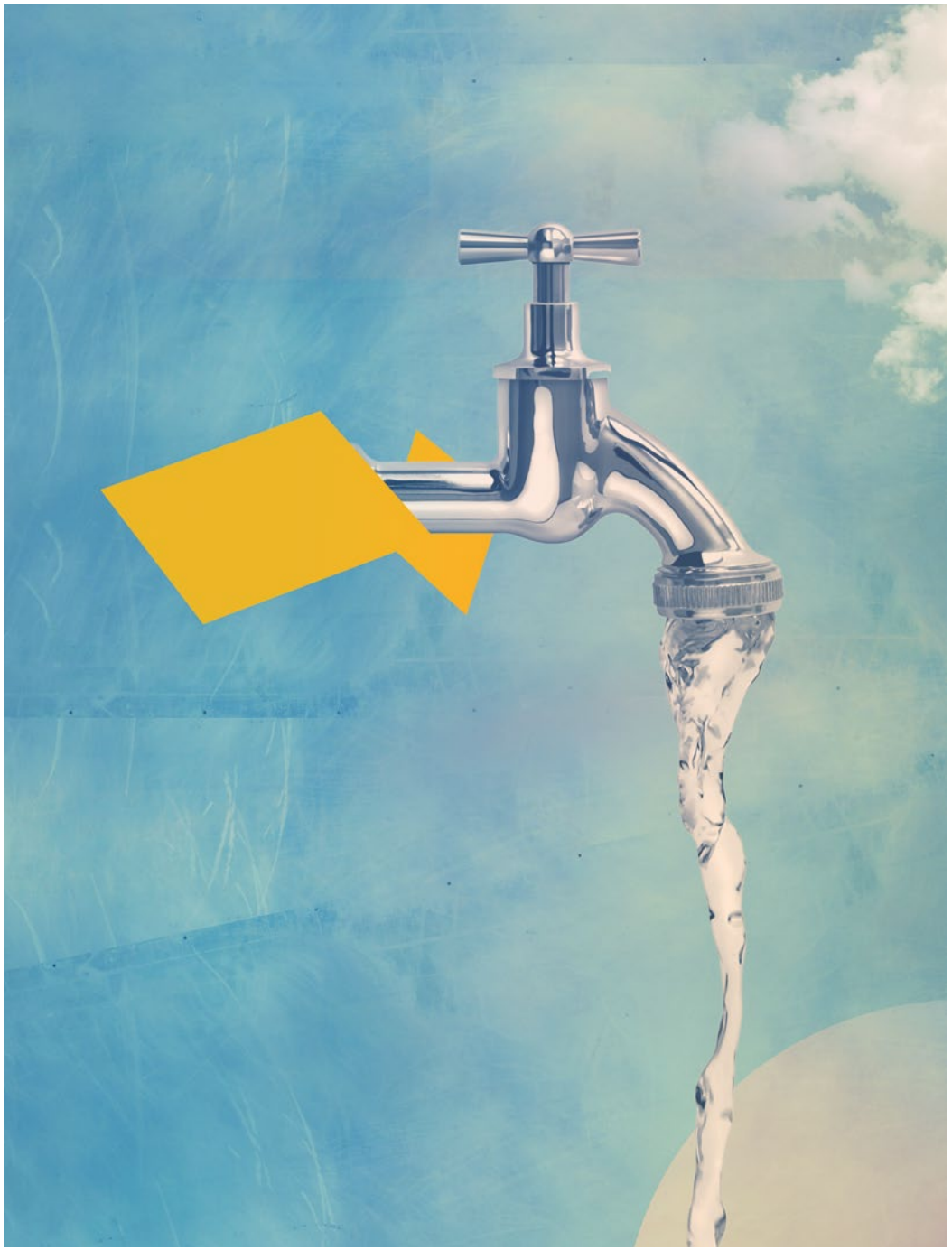
Compared with conventional fossil or nuclear technologies, this statement does not hold true.

STE plants require also less water per hectare (ha) than agricultural activities as this was assessed in the south of Spain so that transforming agricultural land into STE application would not increase but reduce the water needs of such a region.

It is true that water resources are often scarce in the Sun Belt regions where dry cooling towers can be used for cooling the condenser of the steam cycle. Solar fields can be also integrated in existing thermal power plants – coal or gas – reducing immediately gas consumption, emissions with reduced water needs.

Moreover, STE for sea water desalination is possible and makes sense on many sites (especially on islands). Solar fields can be designed besides electricity generation also to produce high-temperature heat to be used for industrial heating, production of synthetic fuels (e.g. syngas), enhanced oil recovery and refineries.

The combined production of electricity, heat and desalinated water is of particular interest in arid regions where STE can provide electricity for reverse-osmosis or heat for water desalination.



MYTH 9

STE is a not-yet mature technology and thus not reliable

Fact is that...

STE plants have proven their reliability since the 1980s as the first commercial-scale application, the Solar Energy Generating System (SEGS) with 9 separate sites continues to operate and produce 350 MW of installed capacity – enough to power nearly a quarter of a million homes at peak production. In other words, STE plants have a lifetime of more than 30 years with minimum performance losses.

2,300 MW have been installed in Spain since 2007 in 50 plants at different locations. They provide reliable electricity which match perfectly the demand curve. The maturity and reliability of the huge two-tank molten salt storage technology is since 2008 a matter of evidence with daily charging and discharging processes without any incident.

On many days during summer 2014, STE plants supplied more than 10% of the demand and many days of summer 2014 the total daily contribution was over 5% of the demand in Spain with the same reliability as any other conventional source.

Taking into account the great potential, the macroeconomic benefits and the contribution to RES integration, STE as the sole dispatchable technology deserves further support in the coming years.

MYTH 10

STE industry is falling

Fact is that...

STE industry is rather booming worldwide. Since 2010, generation of solar thermal electricity from STE plants has grown strongly worldwide.

Due to financial and economic crisis in Spain, retroactive legislative changes on renewable energy in the last 2 years have been applied and thus the growth became more slowly than expected. Despite of the sudden cut in renewable energy incentives in Spain, new markets are emerging on most world regions and countries with continents where the sun is strong and skies clear enough, including the U.S., Australia, China, India, Turkey, the Middle East, North Africa and South Africa with ambitious and far-seeing development plans for STE.

More specifically, the Middle East is ramping up its plans to install STE based projects and as a part of the Plan, Shams-I has been installed in Abu Dhabi. There are ambitious plans in Saudi Arabia and in several Arab Emirates. A further 1.5 GW in STE plants are under construction in the U.S. and contracts signed for at least another 6.2 GW.

According to International Energy Agency (IEA), the prospects for the development of STE plants are extremely high. The forecast of STE production could reach about 1000 TWh by 2030 and almost 4500 TWh by 2050 at world level, thus providing 4% of the electricity mix in Europe and 11% of global electricity mix.

MYTH 11

STE is more complex technology than PV or wind

Fact is that...

STE power plant is not that complex, although STE plants are like mechanical watches with many parts and components to be optimized.

This being said, let us note that the electrical part of STE plants uses common, simple conventional power generation parts and devices – just the solar field is specific.

Unlike solar PV panels, which require large amounts of scarce materials such as silicon, copper indium selenide, or cadmium telluride, STE plants electrical components are manufactured at large scales and thus at low-cost from durable, common materials such as steel, glass, mirrors and piping.

MYTH 12

STE plants endanger wildlife.

Fact is that...

In Europe, there is no case about endangering wildlife at all. However, recently there seems to be some misleading and exaggerated news in the U.S. about bird deaths associated with STE plants, especially the story about a new solar project in California killing up to 28,000 birds per year by reflected sunlight, which is based on a number of uncertain assumptions. In fact, the power plant reported 321 total avian fatalities between Jan and June 2014, of which 133 were related to reflected sunlight, thus falling far short of the 'estimates' in those criticises, according to NRG Energy. In reality, the impact of STE or other renewable energy resources in power generation on bird deaths has been largely overblown.

So what do these numbers mean compared to other sources of bird deaths ?

For example, every year cats kill between 1.4 and 3.7 billion birds; windows nearly 1 billion; cars some 60 million; the mining and burning of coal nearly 8 million, etc.

If killing birds had to be avoided at all costs, then windows, pet cats and roads should all be first prohibited, commented by IEA's recent study. Moreover, this may happen only to tower technology, which is less than 10% of the installed STE power in the world.

In reality, government agencies and all relevant stakeholders work closely to optimise the clean energy contributions from STE plants while minimising any environmental impact. Environmental analyses are performed before acting on the site and preventive measures are taken in case of any potential threat to the protected species.

MYTH 13

Countries may be better off starting a CSP program later (after 2020 or so...)

Fact is that...

There is an erroneous perception by some policy-makers that it would be better to wait until STE become competitive before considering deploying STE plants in their own countries.

On the contrary, as a matter of fact, a support programme for STE will provide immediate positive returns to the economy of any given country – in terms of GDP increase, employment and taxes – right from the starting up of the construction phase, while the first premiums will be paid some years later. ESTELA has performed simulations for different countries which show that the returns to the economy will be always greater than the corresponding premiums. The "golden era" has also to be taken into consideration - the golden era is the time when the support program ends and the costs of the electricity produced will be the O&M costs only – without necessity of re-powering the unit.

Besides this, the local content delivered during the construction of the plants will be increasing with the time and widening STE programs. Therefore an ambitious country can reach a point where new STE plants can be deployed without any further country support. This means that the country that started its support program earlier will be in a position for grasping further benefits by building the plants with a local content delivery close to 80% while others may start later their STE program, but with most of the supplies still coming from abroad.

Additionally such countries with an ambitious STE program will no doubt enjoy an additional "first-mover advantage" in their region and become an exporter to the neighbouring countries.

MYTH 14

STE companies – along the whole value chain – are making huge profits due to incentive measures (feed-in-tariffs or feed-in-premiums)

Fact is that...

On the contrary the companies took high risks associated to large investments either for building up manufacturing units for specific STE components or for the construction of the plants.

In Spain, the profit and loss accounts of the plants' holders show very small positive results until they had to face aggressive retroactive cuts in their income putting the owners of the plants at threat, revealing thus severe shortcomings of current national and European legislation related to investments/investors protection.

As the STE plants have high CAPEX, most of them were financed with a high leverage, so that the banks are the entities that currently make most profit from the STE deployment.

ABOUT STE

Solar Thermal Electricity (STE), also known as Concentrating Solar Power (CSP), is a technology that produces heat by concentrating solar irradiation. This heat can be used to generate electricity with a steam turbine or as process heat for industrial applications. By storing the thermal energy and/or using hybridization, STE is able to firmly deliver electricity on demand without additional cost – even after sunset. STE is grid-friendly not only due to thermal energy storage, but also due to the use of conventional turbine technology to generate electricity.

ABOUT ESTELA

ESTELA, the European Solar Thermal Electricity Association, is the voice of the European STE/CSP industry. From its office in Brussels, ESTELA provides a single point of contact to stakeholders dealing with energy policy for all matters related to STE.

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Sources

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CONCENTRATING SOLAR POWER ON THE ROAD TO 2030

Photo Acciona – Palma del Rio II

How solar thermal electricity improves energy security and creates jobs in Europe

European Solar Thermal Electricity Association

ESTELA

WHAT IS STE?

Solar Thermal Electricity (STE), also known as Concentrating Solar Power (CSP), is a technology that produces heat by concentrating solar irradiation. This heat can be used to generate electricity with a steam turbine or as process heat for industrial applications. By storing the thermal energy and/or using hybridization, STE is able to firmly deliver electricity on demand without additional cost – even after sunset. STE is grid-friendly not only due to thermal energy storage, but also due to the use of conventional turbine technology to generate electricity.

WHO IS ESTELA?

ESTELA, the European Solar Thermal Electricity Association, is the voice of the European STE/CSP industry. From its office in Brussels, ESTELA provides a single point of contact to stakeholders dealing with energy policy for all matters related to STE.

Photo ABENGOA solar – Solana

SUMMARY

STE: A unique combination of advantages

The European industry is a global leader in STE, a technology with a unique set of advantages.

Industry jobs. The STE industry has created manufacturing and engineering jobs throughout Europe, including the southern Member States hit hardest by the economic crisis. The industry will continue doing so as the global STE market is set to reach up to € 130 bn. per year, according to the IEA STE technology roadmap.

Dispatchability. STE with storage provides sustainable (CO_2-free) electricity on demand and makes a further increase of variable renewables in the electricity system possible.

Energy security. STE does not need imported fuels or technologies as backup for ensuring firm balancing services. Hence, STE enhances Europe's energy independency.

Southern Neighbourhood. STE is a key technology to meet rising demand for firm electricity supply in the EU's Southern Neighbourhood in a sustainable way. STE can help stabilize the region economically and politically.

Competitiveness. With only 4GW installed globally, STE technology is relatively new compared to other energy technologies and has a strong potential for further innovation and cost reduction. By 2020, sustainable STE electricity will be the most competitive source of dispatchable electricity in the parts of the world with good Direct Natural Irradiation (DNI).

Seizing the benefits of STE for Europe

Domestic market. To maintain Europe's global leadership for STE and develop the STE industry in particular in southern Europe, it is vital to create a domestic European market of at least 250MW per year. Innovations and cost reductions require projects in this "home market" for the next 5-10 years. This market needs to be supported with long-term financing and other incentives in order to bring innovative projects to the commercial level.

Coordination. STE support should come from a well-coordinated combination of sources: renewable energy support, strategic energy security investments, cohesion funds, as well as resources for development and cooperation.

Grid and regulation. Seizing the advantages of STE for EU energy security requires strengthening the internal electricity market through new transmission lines (especially between the Iberian Peninsula and the rest of Europe, also in Italy and Greece) and an improved regulatory framework (e.g. allowing for long-term transmission rights).

Neighbourhood development. EU support for a program to build several hundred megawatts of STE in its Southern Neighbourhood would create green jobs there, as well as in the EU itself. It would also be a significant and cost-efficient contribution to the global combat against climate change.

Photo ACS Cobra – Extresol

Photo ABENGOA Solar – PS 10-20

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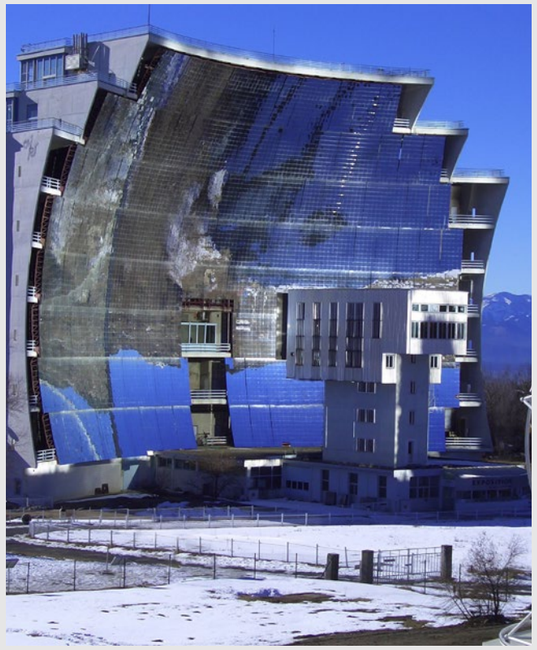

Photo SBP Sonne – EuroDish at Solar Furnace

STE ENABLES A HIGHER SHARE OF RENEWABLES

The EU's 2020 renewable energy targets put Europe on track to increase the share of renewables in its electricity mix.

This will continue with the 2030 target of at least 27%, adopted by the European Council in October 2014. The final goal is an emission-free power sector in Europe by 2050.

Since renewables are no longer a niche market and will contribute 45-60% to the electricity mix in Europe by 2030, the power sector faces new kinds of challenges. In particular, system integration of renewables was found to be a concern by European transmission system operators in their ten-year network development plan (TYNDP 2014).

Due to its storage and its system-friendly thermal generation unit, STE is not only easy to integrate but can also facilitate the integration of more intermittent renewables.

The European Council has set the goal of achieving 15% interconnection capacity and emphasized the need for the full implementation of the internal electricity market. This will make it possible for the whole European continent to profit from sustainable and manageable STE electricity.

Photo Acciona – Palma del Rio II

FACT 1

STE provides proven large-scale storage

To provide solar electricity after sunset with STE, thermal energy is stored in very large quantities. Unlike battery-based solutions, this storage does not increase the cost of electricity generation.

The three 50MW Andasol plants as well as another 14 plants in Spain, have operated with 7.5 hours (h) storage each since 2008. The largest storage system installed worldwide is part of the 280MW Solana plant in Arizona with 6h storage. The 20MW Gemasolar plant in Spain is able to provide electricity 24h a day with its 15h storage. There is no other commercially available solution to deliver such base load with renewables, except with hydro storage.

STE CONTRIBUTES TO ENERGY SECURITY

In its energy security strategy (May 2014), the EU acknowledges that significant investments in energy infrastructure and a diversification of energy sources are needed to reduce dependency on fossil fuels.

The cost of strategic energy security is not reflected in current wholesale market prices. These prices arise from the short-term balance of supply and demand and are not sufficient to trigger investments in new renewable power plants, which need a long-term business case. STE is a sustainable technology that is able to substitute fossil fuel imports and does not need back-up by other power plants in order to meet electricity demand when it occurs.

Promoting STE technology is therefore in the common interest of the EU Member States striving for energy security.

Dedicated, strategic investments in the form of reliable, long-term contracts for STE are required to help make Europe less dependent on energy imports.

FACT 2

STE creates jobs in Europe

Based on the latest IEA estimates, € 39-57bn will be invested on average every year between 2015 and 2030, creating 275,000 to 520,000 jobs worldwide.
With dedicated EU political support, allowing in particular for the installation of 15GW STE in Europe between 2015 and 2030, the European STE industry is well positioned to capture a substantial share of this market and the related jobs. Up to 150,000 qualified jobs are at stake alone in Europe through these 15 years covering a wide spectrum of direct activities related to:

- Engineering, development and financing
- Manufacturing of components: reflectors, receivers, etc.
- Construction, civil, installation and commissioning works
- Operation and maintenance (O&M)

In addition to such direct activities, the European STE industry will in this case also create numerous indirect jobs: research, training, transport, information and communication (ICT) activities, general maintenance services, etc.
As reward for such a political support by EU, the European STE industry will return to member states more money than received in taxes: revenue taxes, VAT, social charges, corporate taxes, local community's taxes, etc.

SOURCES

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Photo ACS Cobra – Andasol 2

STE IS AN OPPORTUNITY FOR ALL OF EUROPE

STE is inherently European: The entire EU will profit from STE's ability to stabilize the grid and increase energy independence. STE from the south and wind power from the north are complementary.

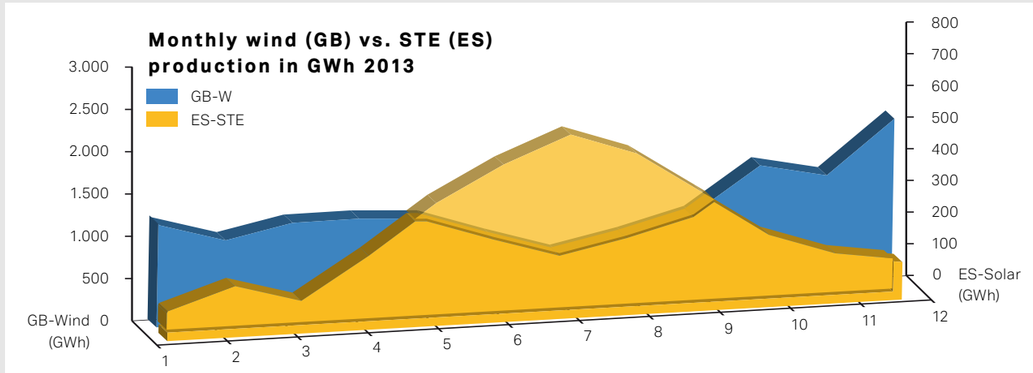
STE brings investments and jobs to the southern regions of the EU that are the focus of EU regional policy since they have been hit hardest by the financial and economic crisis.
These advantages make STE a Technology of Common Interest for the EU. Yet, the fact that STE requires effective cooperation at EU level is slowing down its development. Southern member states suitable for STE plants lack the financial strength to support the development of STE alone. Despite progress in creating the EU internal electricity market, which will allow the north to share the benefits of STE, support for the development of STE is left to individual countries in the south.
The EU-level 2030 targets and their governance mechanism are an opportunity to address the specifics of STE as a Technology of Common Interest.
In addition, the umbrella of the energy union is an opportunity for intensified coordination between the EU and Member States, as well as between the involved EU institutions, namely those dealing with energy, research, regional policy and development and cooperation.

FACT 3

STE in the South complements wind in the North

In Northern Europe, winds blow stronger during winter, while the sun shines more in summer.

Therefore, STE in the south of the EU and wind power in its north have a good seasonal fit.



EUROPEAN STE NEEDS A DOMESTIC MARKET

Thanks to the Spanish STE program, the EU is a global leader in STE technology, profiting from a broad base of diverse companies and sectors.

A domestic STE market of at least 250 MW per year is needed to maintain this leadership. Such market development is in line with the IEA estimate that Europe should install 15 GW of STE by 2030.

An EU-level approach to STE as a Technology of Common Interest is required to support reliable off-take options for STE projects. This approach should combine strategic investments in energy security with support for renewable energy, as well as cohesion and research funding. In particular, innovative commercial projects need support including access to affordable long-term financing.

In addition, STE needs a remuneration mechanism that rewards its system benefits, and long-term transmission rights (15-25 years) to make cross-border projects bankable.

Concrete EU initiatives are required to increase low north-south grid capacities, particularly projects from the Iberian Peninsula, southern Italy and Greece, e.g. using submarine cables.

Photo ABENGOA Solar – PS20

STE IN MENA MATTERS ALSO FOR EUROPE

Solar resources in MENA are among the world's best. The IEA estimates that Africa and the Middle East would need 84 GW of STE by 2030.

Demand doubles every 10 years throughout the MENA region. The result is a constant struggle to cover peak demand, which often occurs after sunset. STE with storage is a recognized, sustainable answer to address this challenge. As a secure electricity supply, STE also provides a prerequisite for economic development and growth, which are essential for political stability in the MENA countries.

Ultimately, increasing the standard of living and stability in the EU's Southern Neighbourhood is crucial for European cooperation policy and security.

With the upcoming Paris climate conference, the EU also has a responsibility to live up to its leading role in global climate policy. Supporting renewables in the MENA countries is an opportunity to do so.

A market for STE in the neighbouring MENA region would be an opportunity for the European industry to create green jobs there and at home in Europe.

Photo Shams Power Company – Shams 1

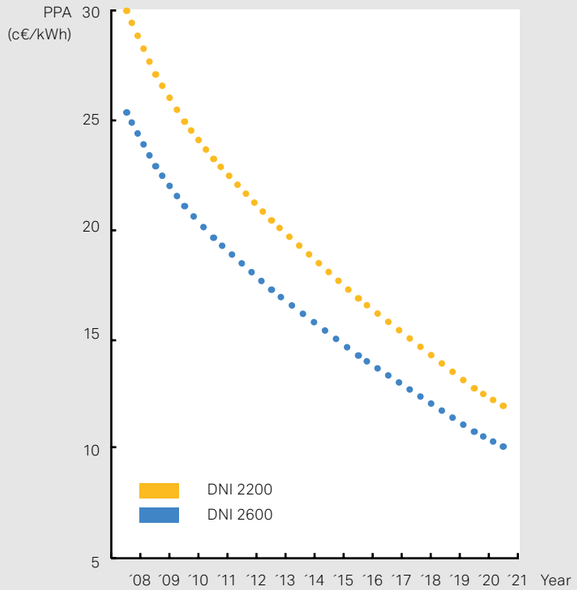
Photo ACS Cobra – Andasol 1-2

FACT 4

STE is affordable

As for all renewables, STE cost of electricity depends on the quality of the resource, i.e. irradiation in the case of STE, and the cost of capital. The lines in the graph show cost developments depending on these factors and based on the STE industry's innovation roadmap. Values for a 25-year PPA for a 150MW, 4h storage STE plant, under usual commercial terms for the loans without any public financial aids and no escalation. By the end of 2014, prices for plants in Morocco went slightly below 12 c€/kWh due to subsidies on the granted loans.

COST REDUCTION ESTIMATIONS FOR STE POWER PLANTS UNDER STANDARD CONDITIONS



EFFECTIVE SUPPORT FOR STE IN THE EU'S SOUTHERN NEIGHBOURHOOD

First gas-STE hybrid plants exist in Egypt and Algeria, as well as Morocco. In Morocco, a 500 MW STE complex (Noor) is also currently under construction.

Photo NOOR I, Courtesy of TSK

Europe has supported these projects with development finance and technical cooperation. This experience provides a good basis for further cooperation with the EU's Southern Neighbourhood.

With a coordinated effort, the EU can support the creation of a self-sustaining STE market in its Southern Neighbourhood. A market of several hundred MW new STE per year for a period of 5-10 years is required to reach this ambitious but realistic objective.

Beyond development finance, priority instruments to incentivize a STE market in the Southern Neighbourhood include guarantees to mitigate off-taker risks and financial support for electricity payments, e.g. from climate funds.

To establish a stable STE market in MENA that also creates jobs in Europe, EU development cooperation needs to be coordinated with industrial and climate policy.

This coordination is particularly needed since the European STE industry is facing an aggressive industrial policy by other countries supporting their STE industries in MENA.

#1 STE enhances EU energy security and grid integration of renewables.

#2 The EU's STE industry creates jobs in Europe.

#3 To maintain its global leadership position, the European STE industry needs a domestic market.

#4 The EU will get the most out of STE via an intensified coordination of its energy, research, regional and development policies.

#5 A sizeable market for STE in the MENA countries benefits both the local and the EU economies.

#6 The EU must coordinate its development, climate and industrial policies regarding its Southern Neighbours.

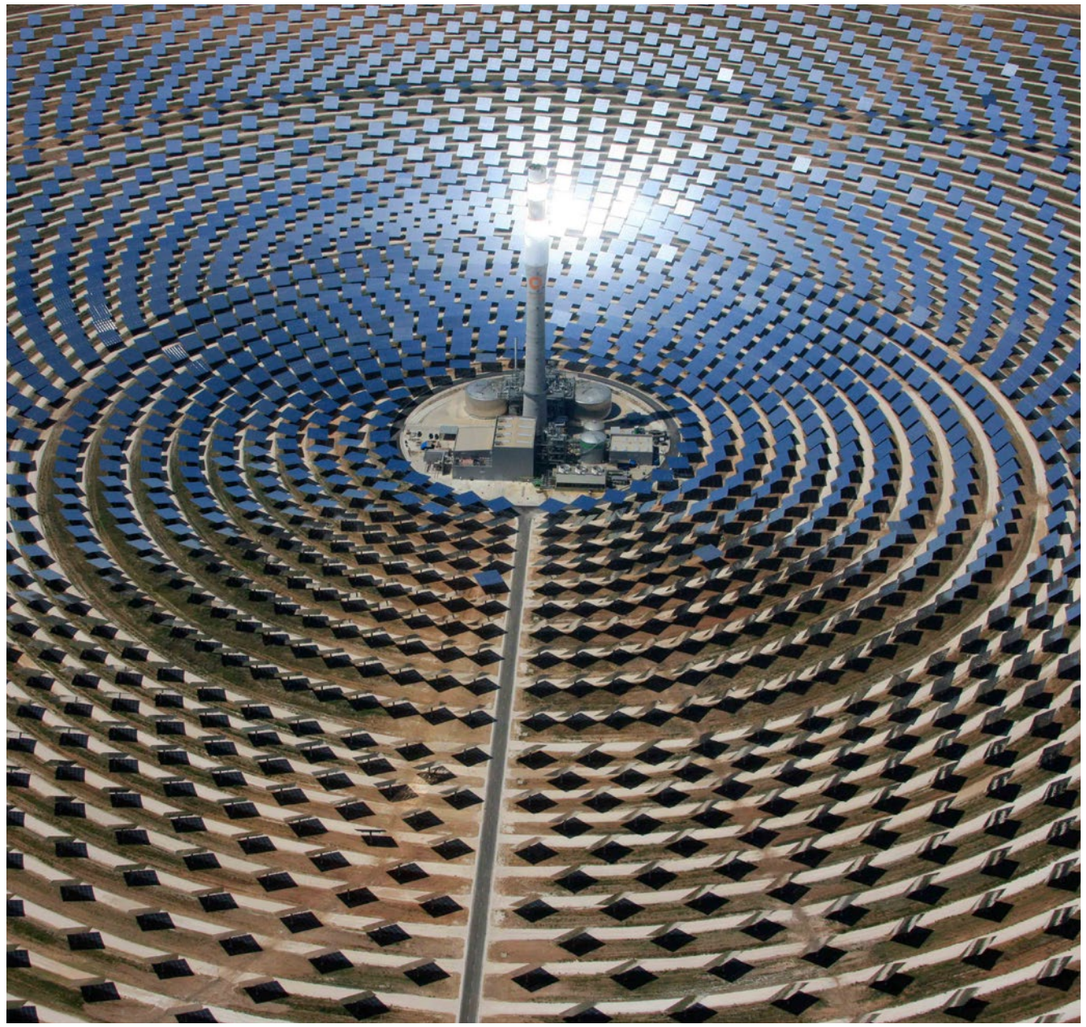


Photo SENER/Torresol – Gemasolar

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