



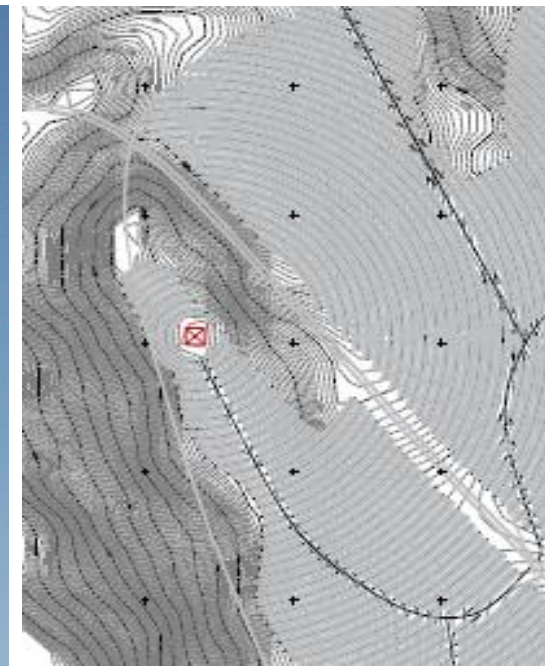
Dii

Renewable energy
bridging continents

ASSOCIATED PARTNER



Medgrid

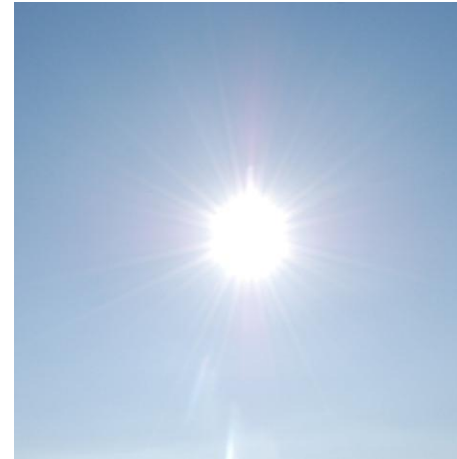
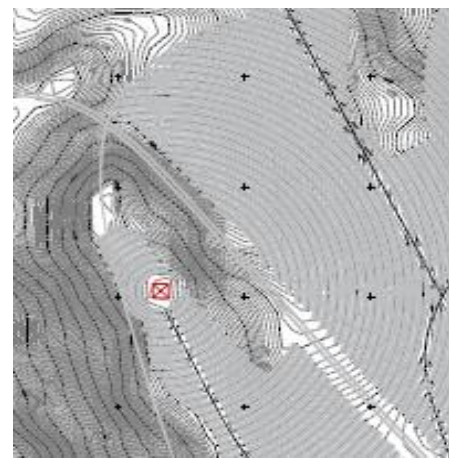


Nur Energie

TuNur Solar Export Project - Linking Tunisia with Europe

May 2011

Nur Energie Overview



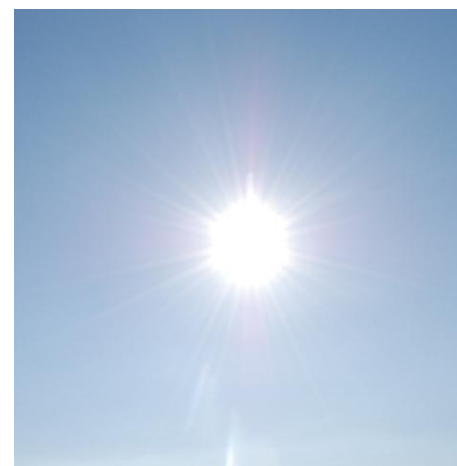
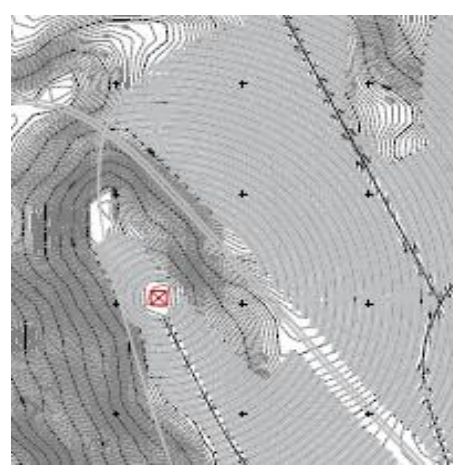
Solar Power Plant Development Activities centered around Mediterranean

- IN ITALY** MW-scale PV development
HVDC connection between Italy and Tunisia
- IN SPAIN** CSP project development agreement with German utility (subject to contract)
- IN GREECE** 38MW CSP (tower) under development, construction in 2012.
- IN NORTH AFRICA** Utility scale CSP in North Africa with integrated cable connection to Europe.
Nur Energie is Associated Partner of DESERTEC and founding shareholder of MEDGRID.



- CSP development
- PV/ CPV development
- Nur Energie Office

The “Desertec” vision – 3 projects in 1



Desertec needs to achieve production, transmission and sale of solar electricity

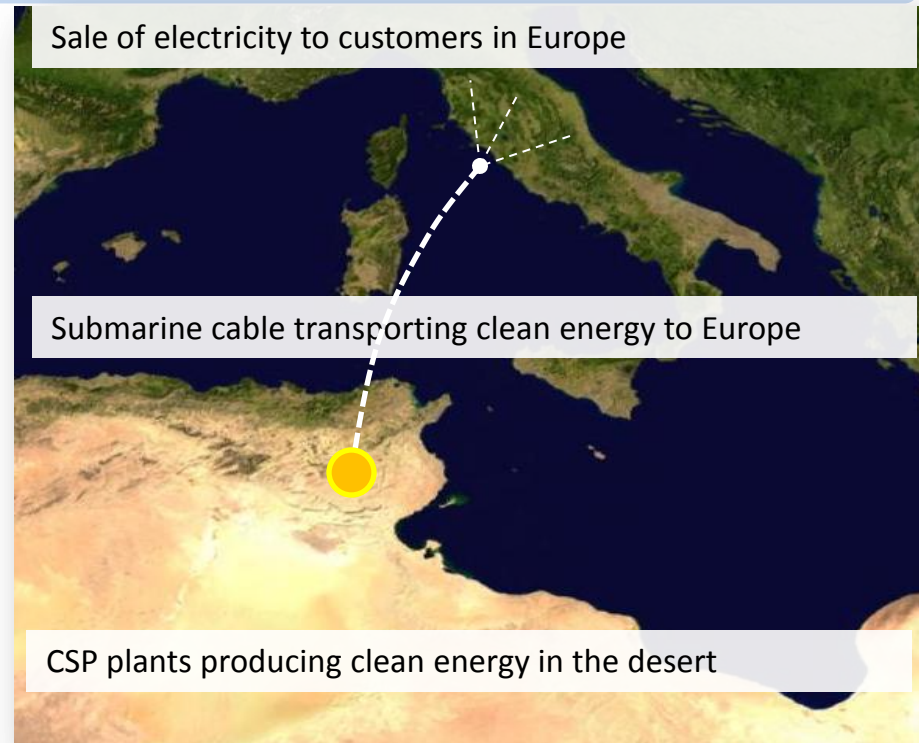
For “Desertec” projects to be successful, the following conditions have to be satisfied at the same time:

- Production of renewable electricity in the North African desert at sites with high solar radiation
- Interconnection cables between North Africa and Europe for transport of clean electricity
- Electricity customers buying imported solar electricity at a premium price (especially first projects)

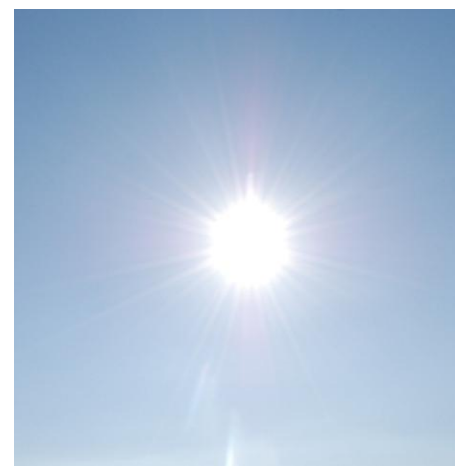
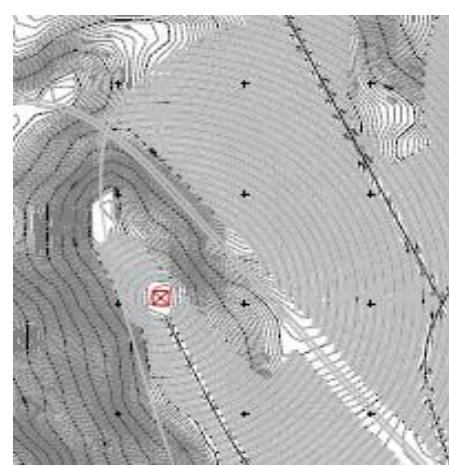
Sale of electricity to customers in Europe

Submarine cable transporting clean energy to Europe

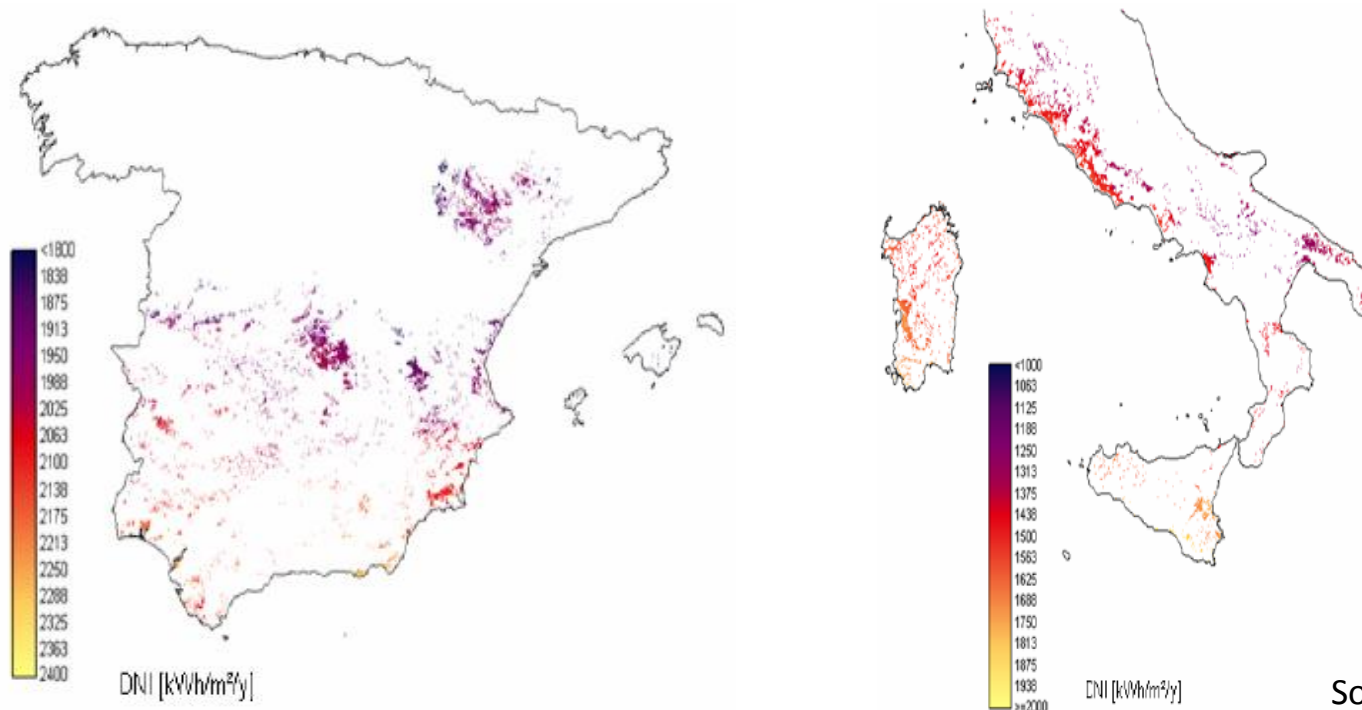
CSP plants producing clean energy in the desert



Why Desertec, why North Africa?

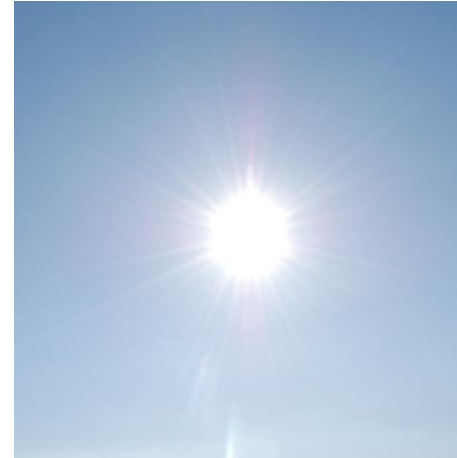


CSP Solar radiation potential in Spain and Italy

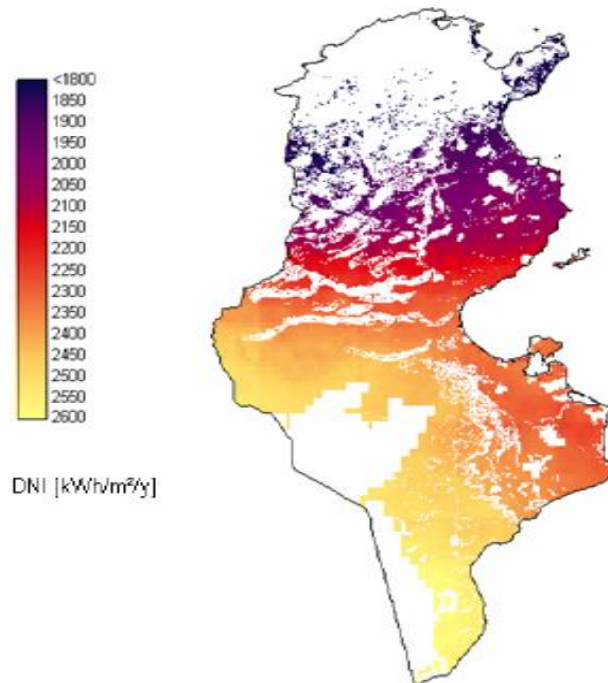


Source: DLR 2005

Why Tunisia?



CSP solar radiation potential in Tunisia



Tunisia and Morocco have up to 30% better radiation than the best sites in Europe

Potential for large-scale projects on unused land in the desert

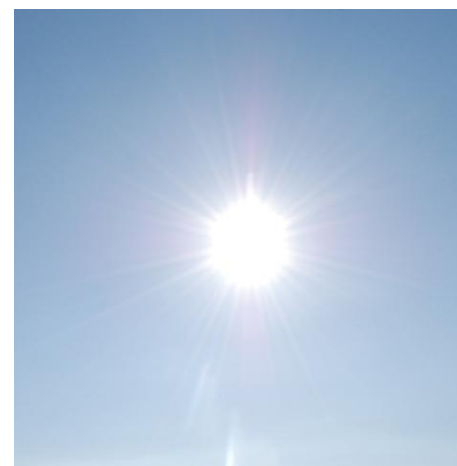
Land requirement small relative to available surface area

Transmission losses of ca. 3%/1000km

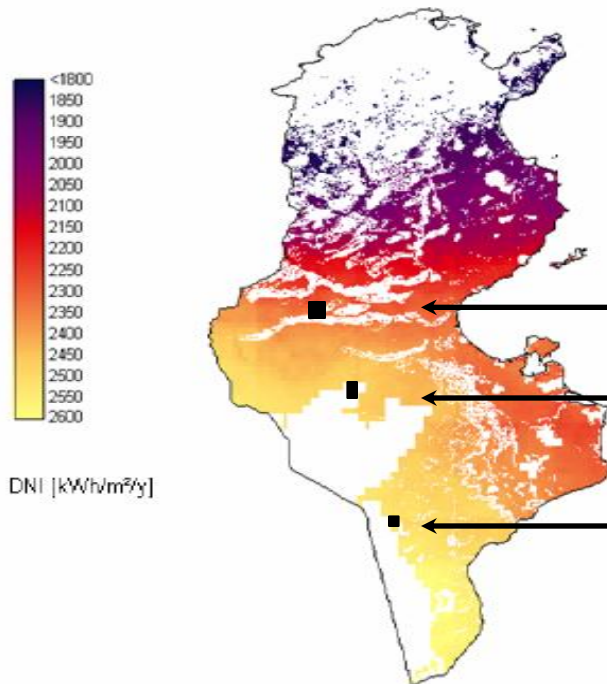
Lower generating costs more than outweigh the extra costs of transmission

Source: DLR 2005

Why Tunisia?



Land and resource availability in Tunisia



Tunisian annual electricity consumption:
~15,000 GWh (2500MW peak capacity)
Tunisian land surface area
163,610km²

Area needed to produce ~60,000GWh of solar electricity to cover 10% of German projected 2020 demand - 600km²

Area needed to produce ~18,000GWh of solar electricity and meet 100% of Tunisian forecasted demand - 180km²

Area needed for proposed 2000MW solar export project by Nur Energie (~10,000GWh of annual production) - 100km²

Nur Energie in Tunisia



Nur Energie - Active in Tunisia since 2008

Nur Energie has identified a site for a 2000 MW solar power plant and has carried out studies on environmental impact, desertification, geotechnics and water availability.

Nur Energie has worked with local and international specialist consultants such as DLR and Comete Engineering.

New Tunisian government supportive of the project and discussing an agreement in principle

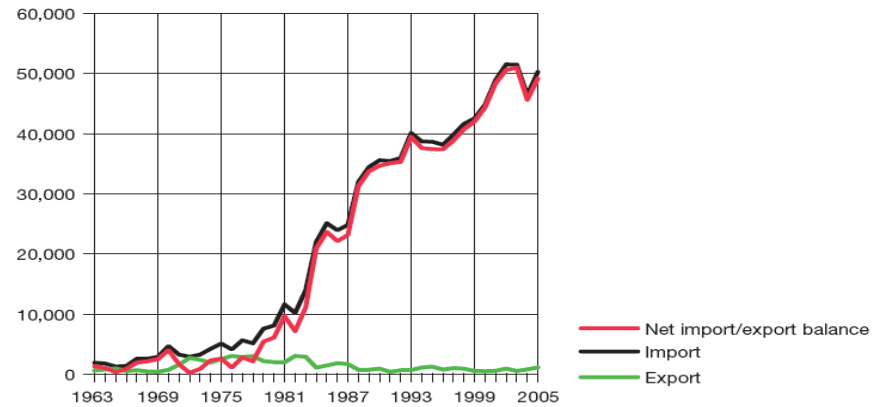
Building local Support

Water cooling for large solar thermal plants not feasible and not desirable in deserts – focus on dry cooling technologies

Focus on high levels of local content to maximize Tunisian value-add



Solar imports connecting Italy and Europe



Submarine interconnector between Tunisia and Italy



2000MW interconnection
Solution received from Terna



Sub-marine cable route
of ca. 600km



Water depths of up to
2000m



Interconnection in Italy into the high-voltage
network with potential to transport into the
rest of Europe

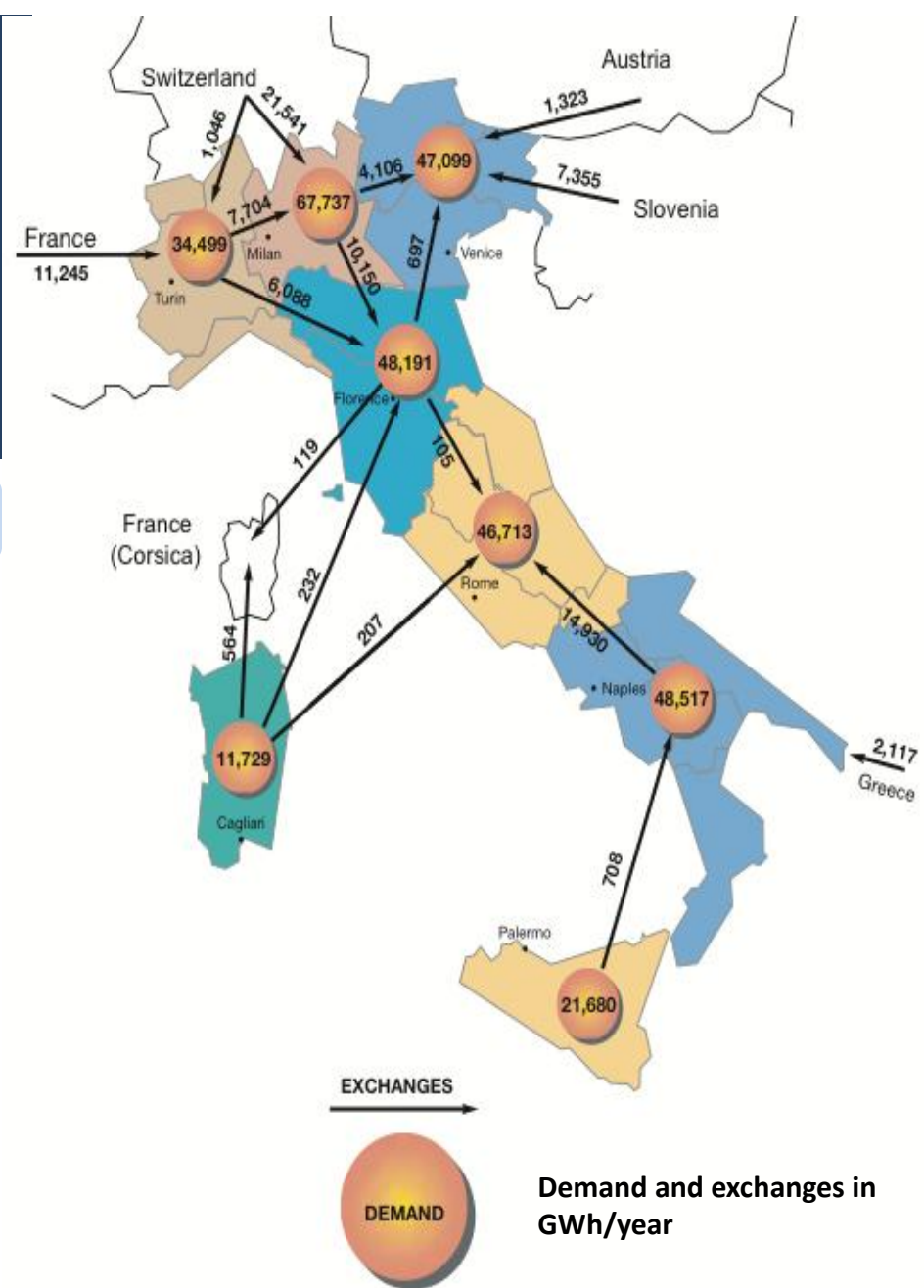
Italy has over 11GW interconnection capacity
with its Northern neighbours

Italy as an electricity hub for Europe

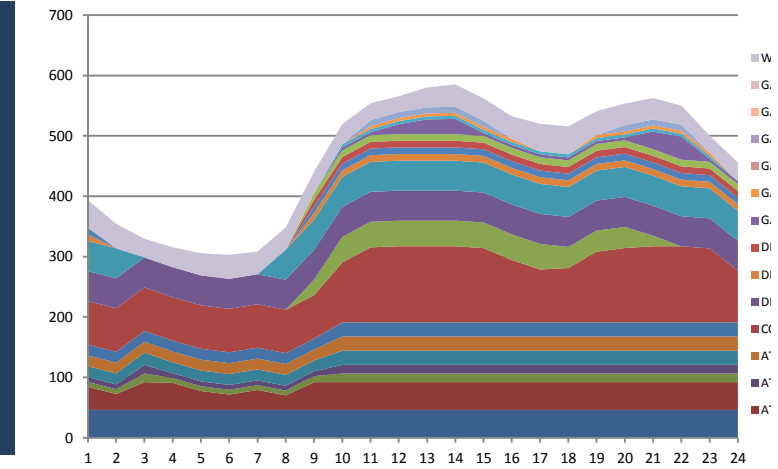
Italy is a large electricity importer

Italy is already a large net-importer of electricity

- Ca. 15% of annual electricity consumption in Italy comes from electricity imports
- Predominant current electricity flow is North - South
- Solar imports from North Africa to Europe alleviate grid bottlenecks in Italy's North
- Significant transfer capacity already confirmed in study with Italian specialist research bureau *CESI*



Benefits of solar imports – predictable renewable electricity supply



CSP power plants can deliver predictable power supply

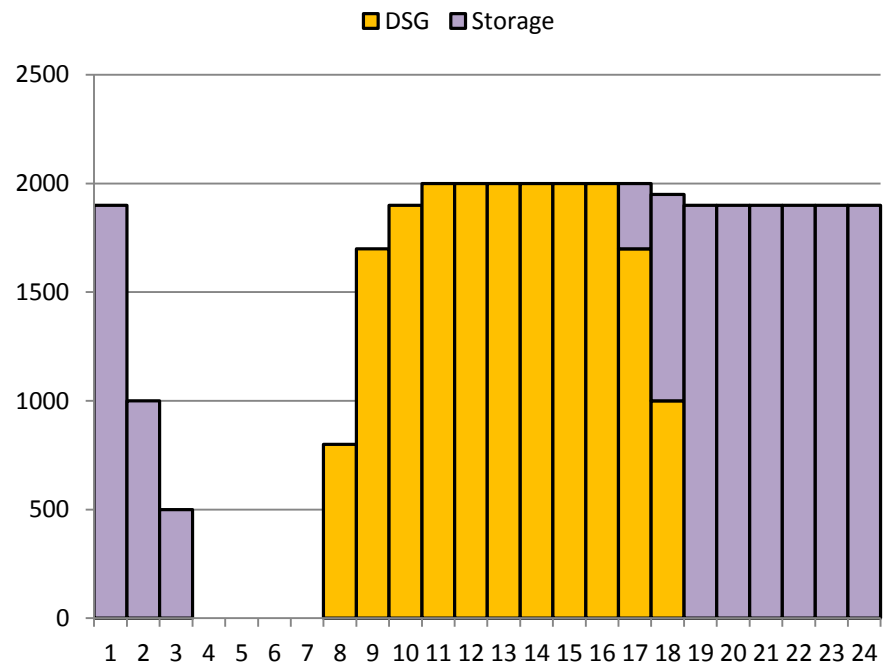
Production profile Focus on the peak periods of demand and the “green” electricity market in Europe

100% solar electricity capacity factor of up to 60% with thermal storage (i.e. 8AM-10PM)

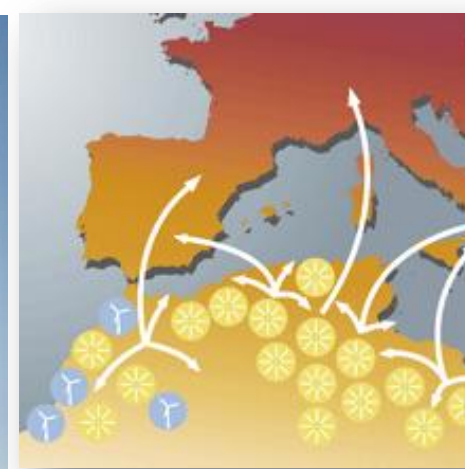
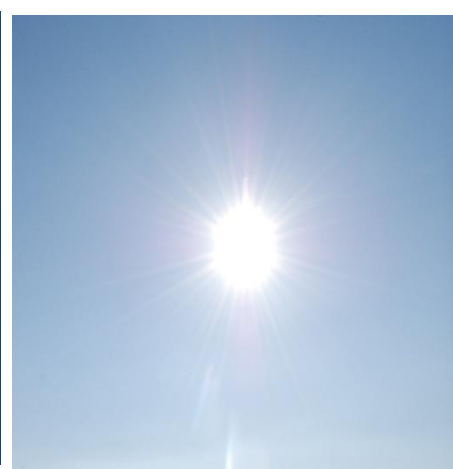
Predictable production profile over the course of the day

CSP with thermal storage delivers 100% solar energy, firm and predictable

- Delivers *Hedge* against volatile fossil fuel prices
- No *intermittency* related grid-integration issues
- Contributing to the EU Renewable Energy targets and increased consumer demand for green power



Economic and Policy Drivers for TuNur



Policy environment in the EU moving towards solar imports

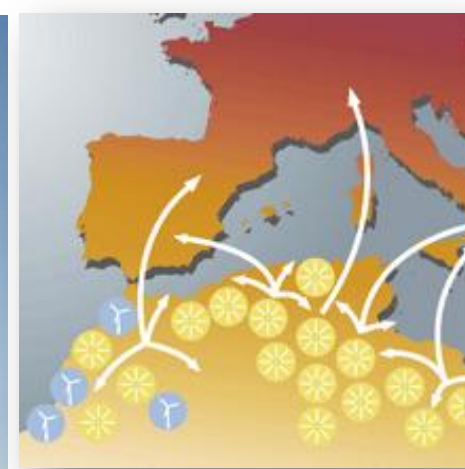
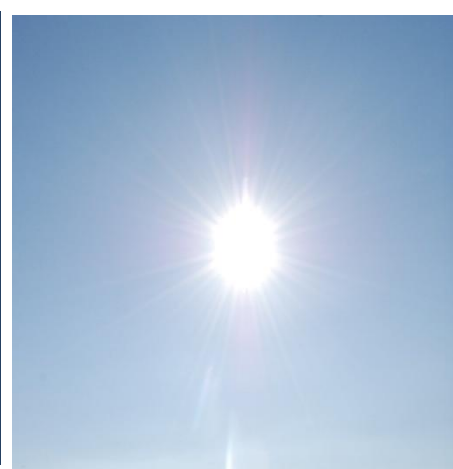
EU Renewables Directive 2009/28/EC - Article 9

- EU Directive 2009/28/EC sets mandatory target of 20% renewable energy by 2020
- Target can be met with imports and through joint projects with other EU member states
- Imports can be from non-EU member states as long as physical interconnection exists
- Italy is the first EU country that has transposed the Article 9 provisions into national law
- EU countries can join together to import renewable electricity from non-EU member states

International Support for Solar projects in North Africa

- World Bank's "Clean Technology Fund" makes loans specifically for CSP projects in North Africa
- EIB's "Facility for Euro-Mediterranean Investment and partnership" (FEMIP) targets projects in the Mediterranean region
- Union for the Mediterranean's "Mediterranean Solar Plan targets 20GW of renewable capacity by 2020
- US and EU support facilities for Egypt and Tunisia to support the transition towards democracy

Implementing Desertec



How Germany can contribute to making the first Desertec project a success

Implementing EU regulation – EU Directive 2009/28/EC and its Article 9

- Create a market for imported solar electricity in Germany, eg. through a dedicated feed-in tariff or a market premium mechanism
- Solar imports are cost competitive with offshore wind, eg a feed-in tariff for solar imports could be set at the same level

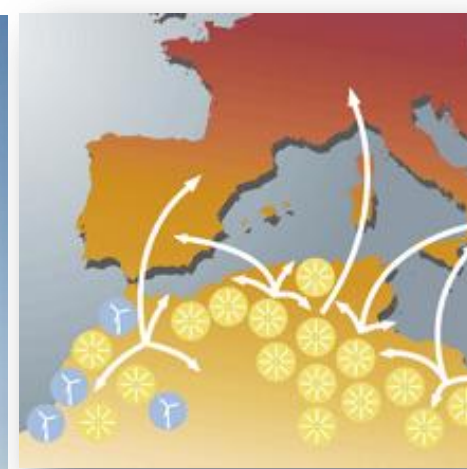
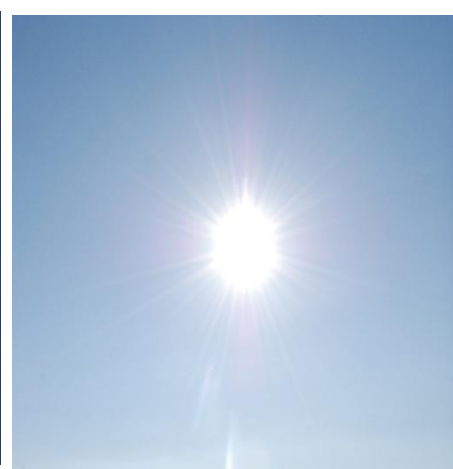
Explore opportunities for joint implementation with European partners

- Italy has already transposed Article 9 opportunities into national law
- Germany could join forces with several EU member states to share the burden of implementation

Support pan-Mediterranean and pan-European electricity grid connections

- Necessary pre-condition for bringing solar electricity to Germany
- Example from North-Stream or Nabucco gas pipelines - Special KfW lending facility, Hermes cover and grants
- Most important bottleneck for “Desertec” projects

Implementing Desertec



How Germany can contribute to making the first Desertec project a success

Support the new democracies in North Africa

- Tunisia is on a good way to implementing a positive investment environment for Desertec plants
- Investment into Desertec projects is excellent economic development opportunity
- Active support of solar projects in North Africa creates win-win situation for Germany and the local region

Opportunities for both German and local companies

- Solar know-how and implementation experience with German groups
- Ca. 40% of investment likely related to German industry input (i.e. Siemens, M+W, MAN Ferrostaal)
- Local content through Tunisian light- and medium-scale industry

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