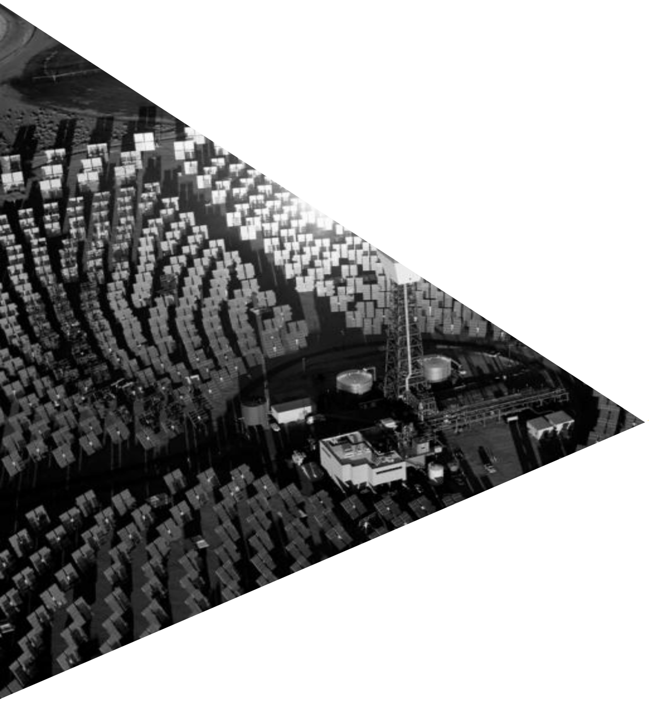
CSP local manufacturing potential in the MENA region



Mediterranean Week of Economic Leaders
Barcelona
November 23rd 2011

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CSP technology

CSP Technology

Parabolic Trough

64 MW_{el} power plant *Nevada Solar One*

Linear Fresnel

1.4 MW_{el} plant *PE1* in Murcia, Spain (Novatec, 2010)

Solar Tower

PS10, 11 MWel in Seville, Spain

Dish Stirling

prototype plants of 10 kW_{el} Almería, Spain;

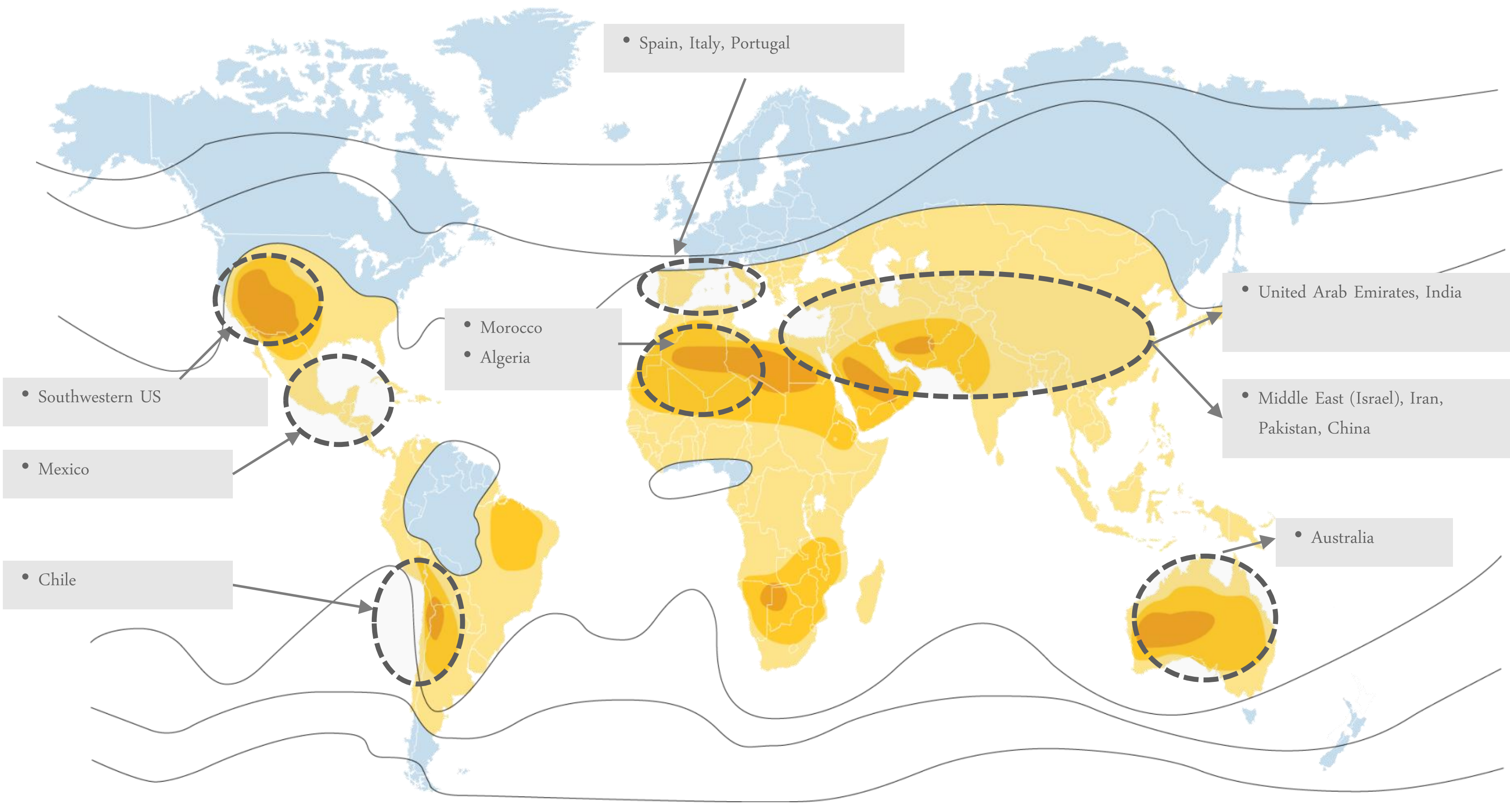
CSP Market Shares and Development
Parabolic Trough today over 90% market share

In MW	Operational	Construction	Planning phase
Tower	44	17	1603
Parabolic	778	1400	8144
Fresnel	9	30	134
Dish & Stirling	2	1	2247

Source: Sun & Wind Energy 2010

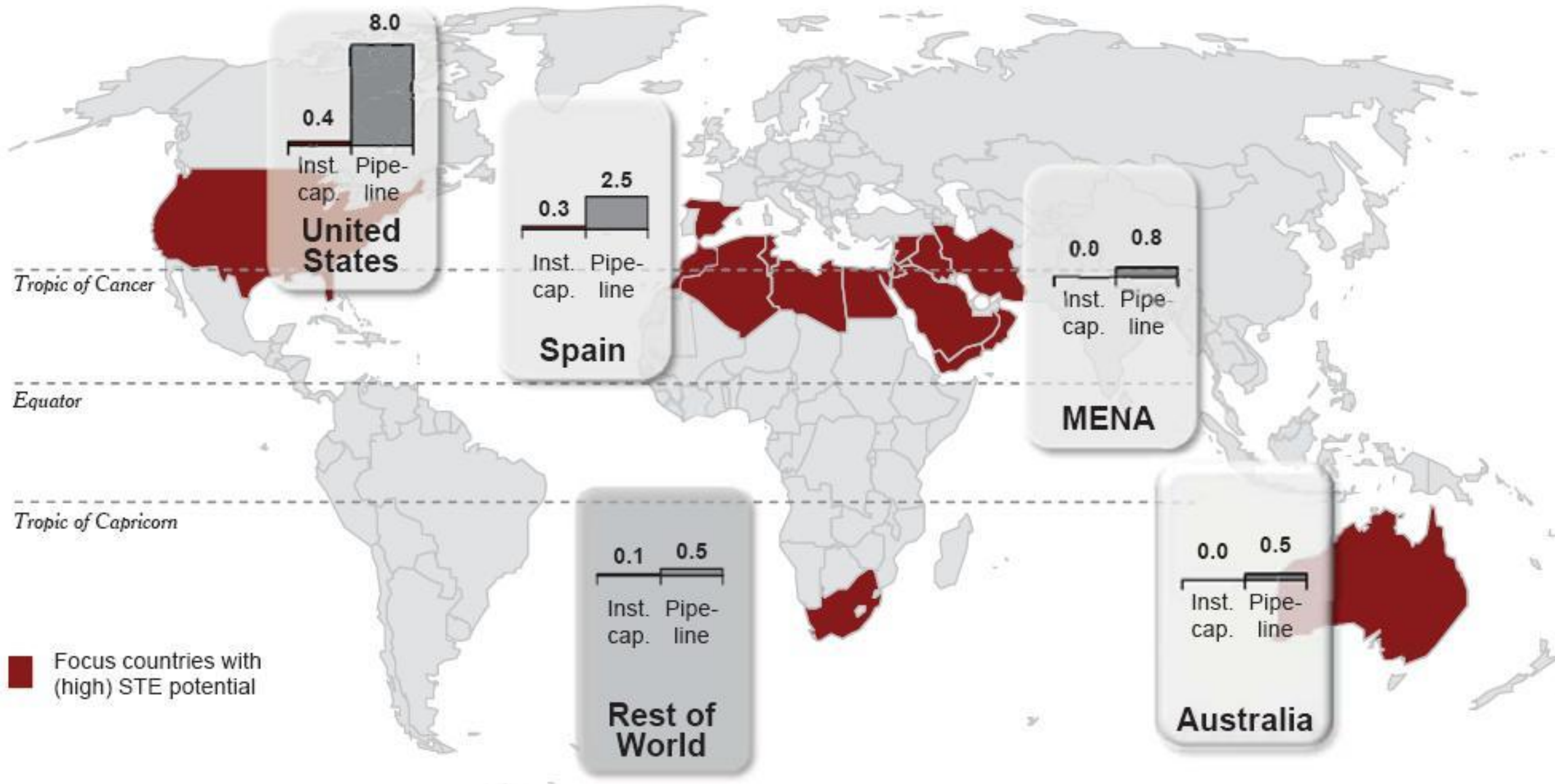
CSP development in the MENA region

Solar irradiation is a key driver



Current CSP development - global

Expected developments by 2015



ESTELA: Solar Thermal Electricity 2025, Report June 2010

Several projects are under construction in MENA…

Shams 1

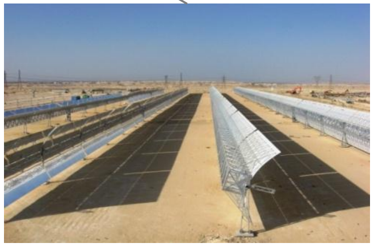
Abu Dhabi

Ain Beni Matar

Morocco

Hassi R'mel

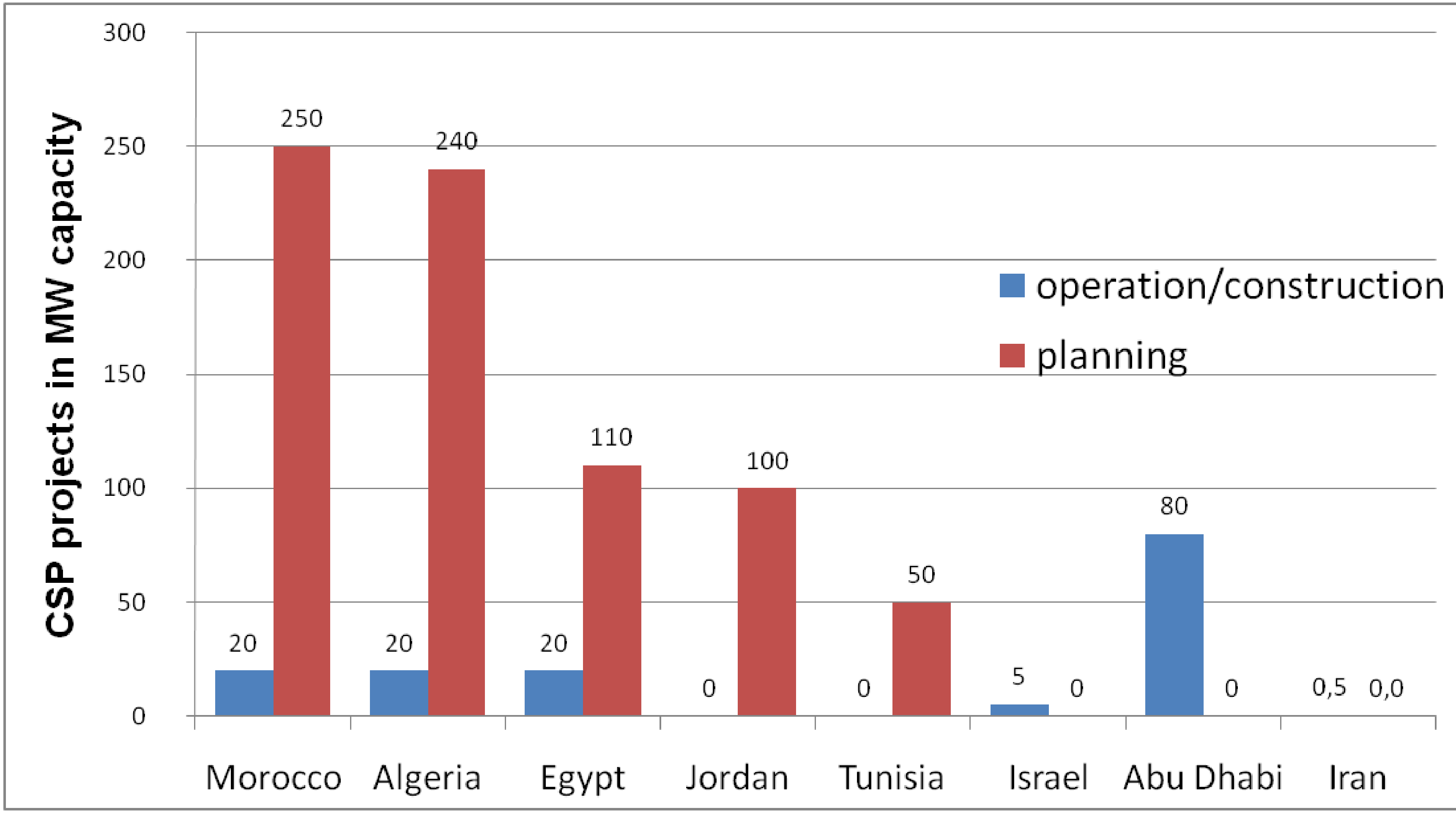
Algeria



Kuraymat

Egypt

…or in the planning / tendering phases



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Various degrees of local involvement

- 3 current CSP projects (ISCCS power plants) show various degrees of local involvement :
  - Local / international EPC contractors : limited local know-how for project development
  - Strong share of components and equipments imported (no import taxes, doubt on local ability to supply in quantity and timely)
  - Few highly skilled workers

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Challenges for CSP development in MENA

- CSP projects in MENA need strong Government support to materialize

- Despite ambitious renewable energy programs, developping CSP is a challenge for budget-constrained Governments

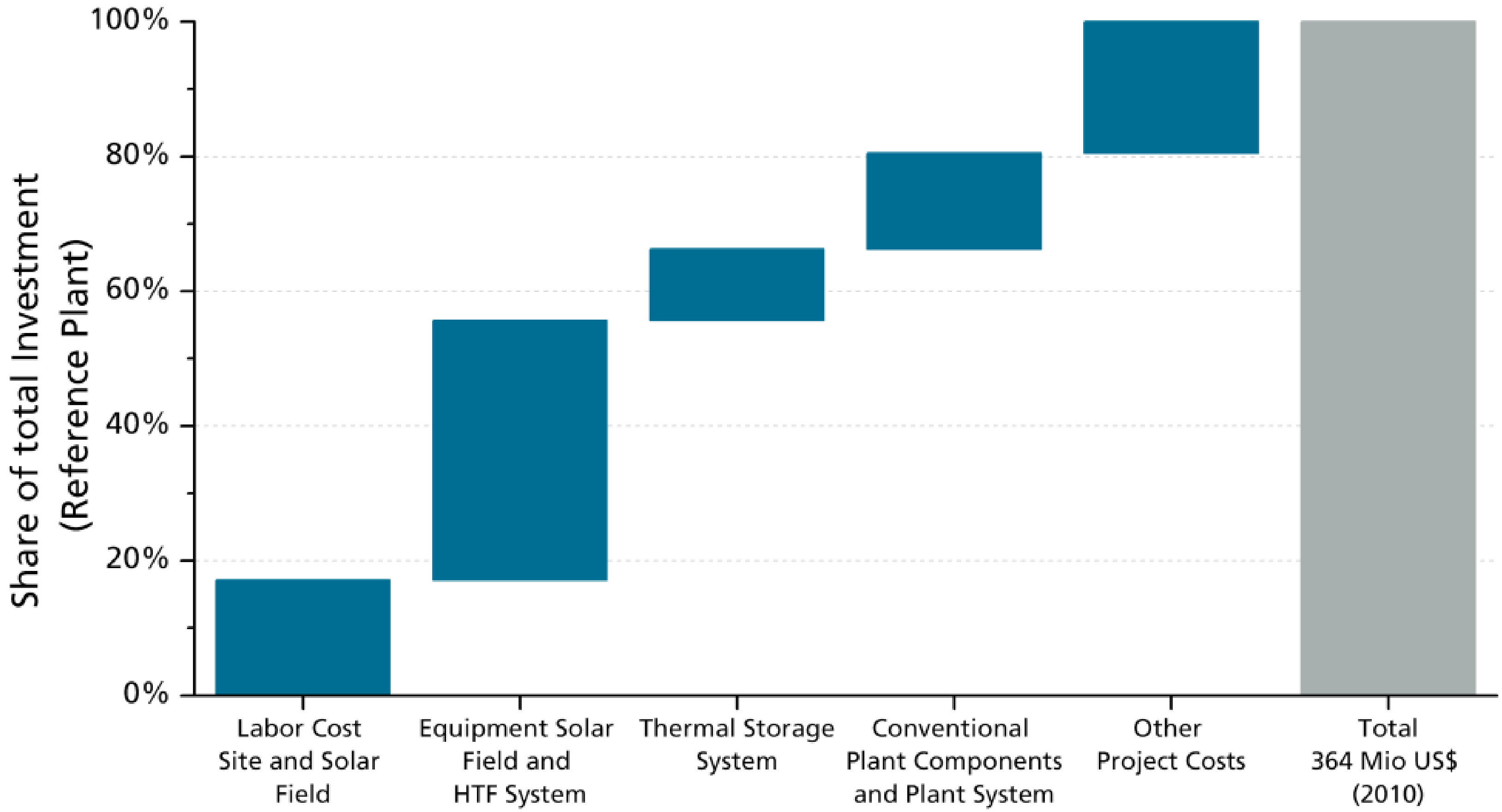
- Renewable energy projects are perceived as having the potential to generate new service or industrial activities

→ Increasing local content requirements for new projects


Can CSP deliver both affordable clean
energy and local job creation?

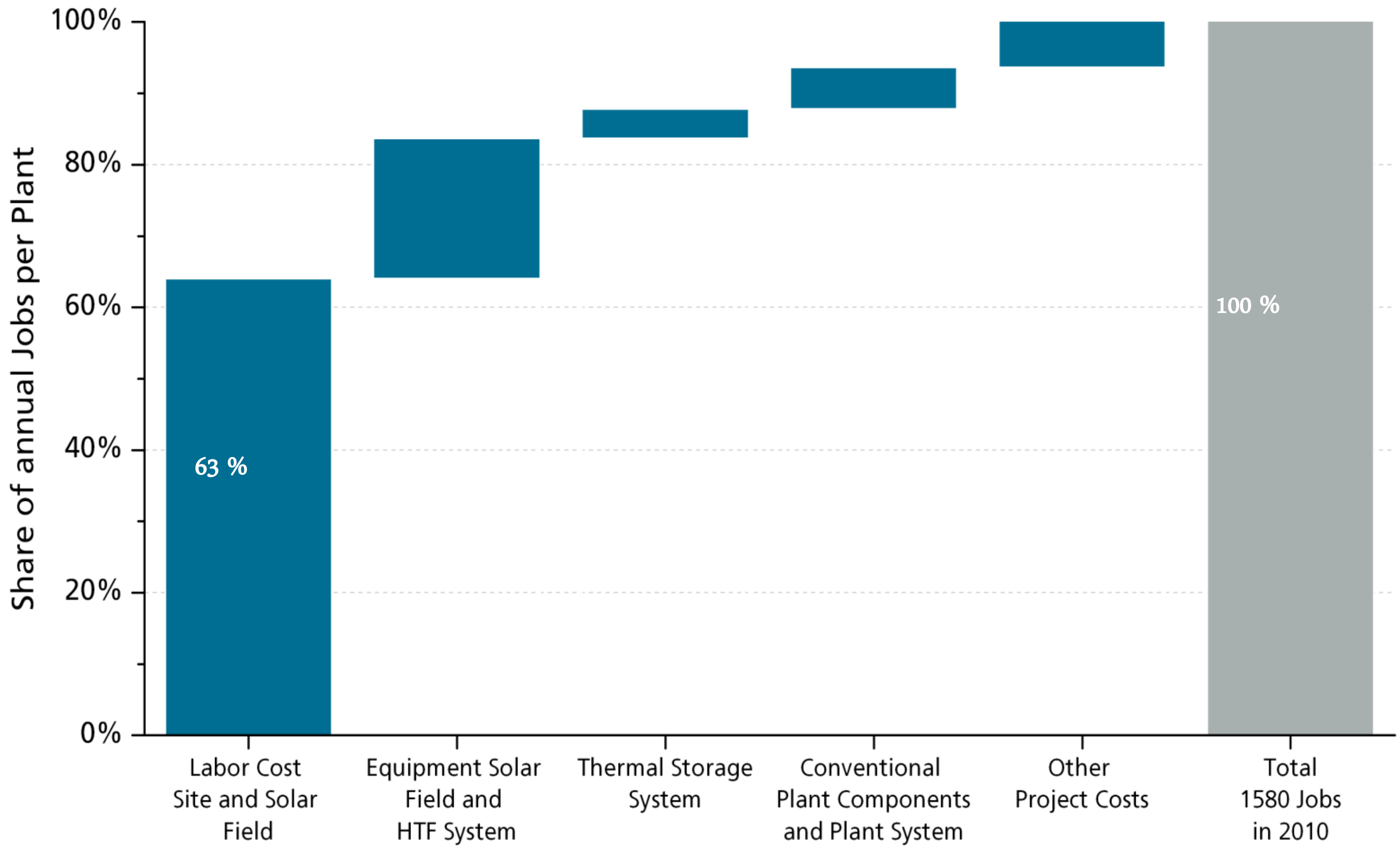
Cost breakdown of CSP plant

Reference : parabolic trough 50 MW, 7,5 hrs storage



Job creation potential

Over 1500 job creation in reference plant – mostly during construction



MENA competitive advantage

Perception of a predictable and stable market development is key

- Market size not predictable
- Fiscal, institutional and legislative framework
- Lack of financial markets for innovative projects
- Infrastructure
- Insufficient training of workforce and availability of skilled workers
- Lack of awareness of opportunities in the CSP sector
- Competition from other markets

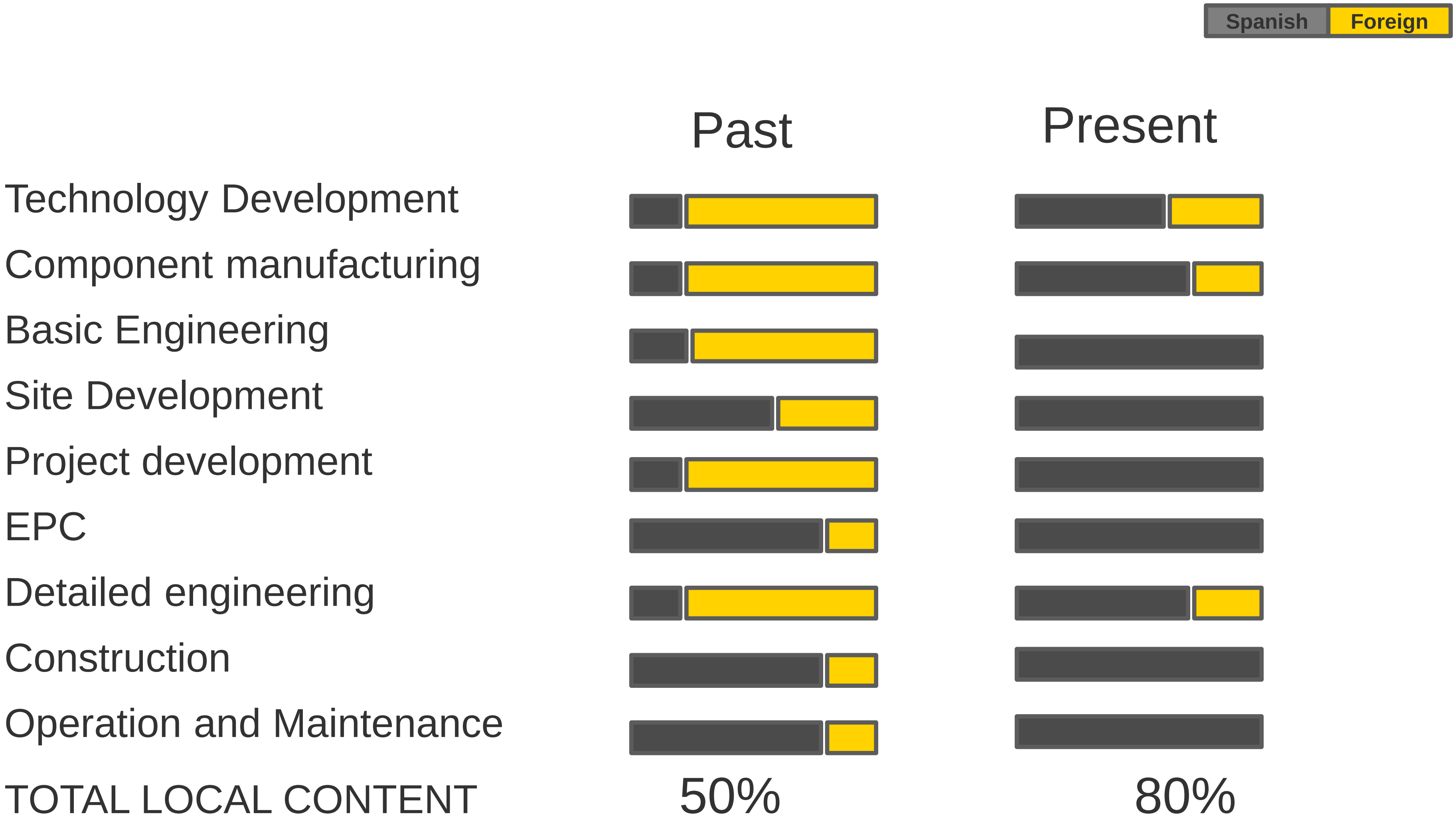
MENA competitive advantage

Cables, tracking systems and monitoring systems will be supplied locally in the short term

- Low labor cost
- Little gap to bridge for steel structures and electric and electronic industries
- Experience of three CSP/ISCCS plants
- Political will to develop a local industry
- Potential market deployment and support from national initiatives (Moroccan Solar Plan, Tunisian Solar Plan and strong solar initiatives in Egypt, Jordan and other countries)

The Spanish example

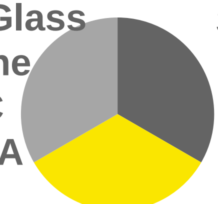
Evolutions since the first plants connected in 2008



Source : PROTERMO SOLAR

Local industrial development potential : mirrors
Potential new entrants in the value chain

	2010	2020
MENA market (capacity, nb of plants, size in billion $)	70 MW, 3 ISCC, ~ $0.5	~1 GW, 10-20 plants, ~$8
	Flabeg Rioglass solar	Potential new entrants Sphinx Glass Dr Greiche EGC SIALA Flabeg Rioglass solar Saint-Gobain Guardian Ind. Pilkington Saint-Gobain Ind. PPG Guardian
Market size *(M$)*	*25*	*400 - 450*



« Pure » local production (local players)

Local production (implantation of international players)

International players

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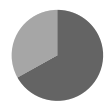
Local industrial development potential : mounting structures

	2010	2020
MENA market (capacity, nb of plants, size in billion $)	70 MW, 3 ISCC, ~ $0.5	~1 GW, 10-20 plants, ~$8

Mounting structures

2010

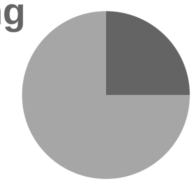
NSF Engineering



Abengoa Solar

2020

NSF Engineering
Ynna Holding
DLM
AOI



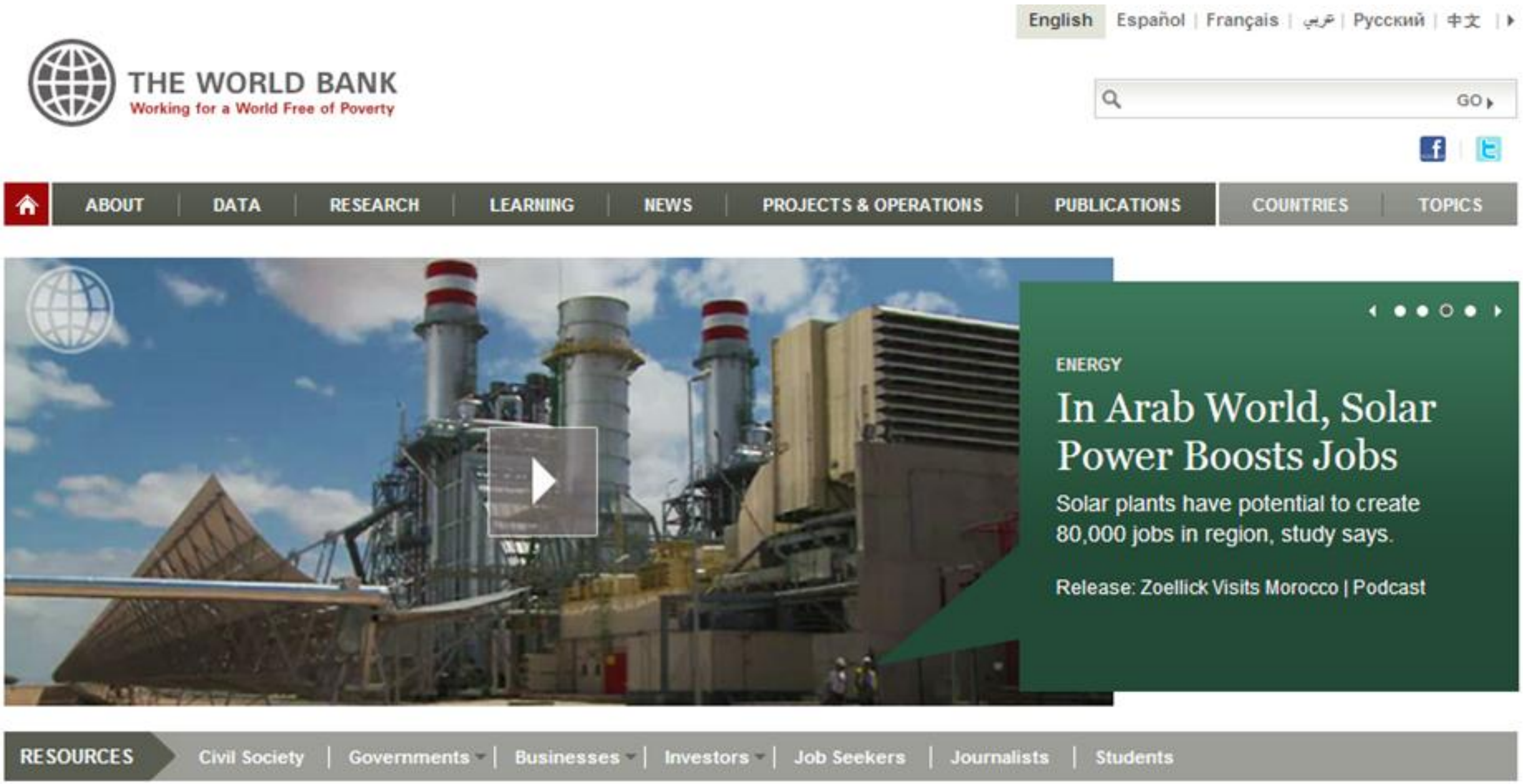
Very limited nb of intl. companies

	2010	2020
Market size *(M$)*	*~ 50*	*800-1000*

« Pure » local production (local players)
Local production (implantation of international players)
International players

Market size is key to create local industry in MENA
Market thresholds for investments in manufacturing facilities

CSP Components	Annual output of a typical factory (MW/year)
Receiver	200 – 400 MW
Mirrors	200 – 400 MW
Steel structure	50 – 200 MW
HTF	Very high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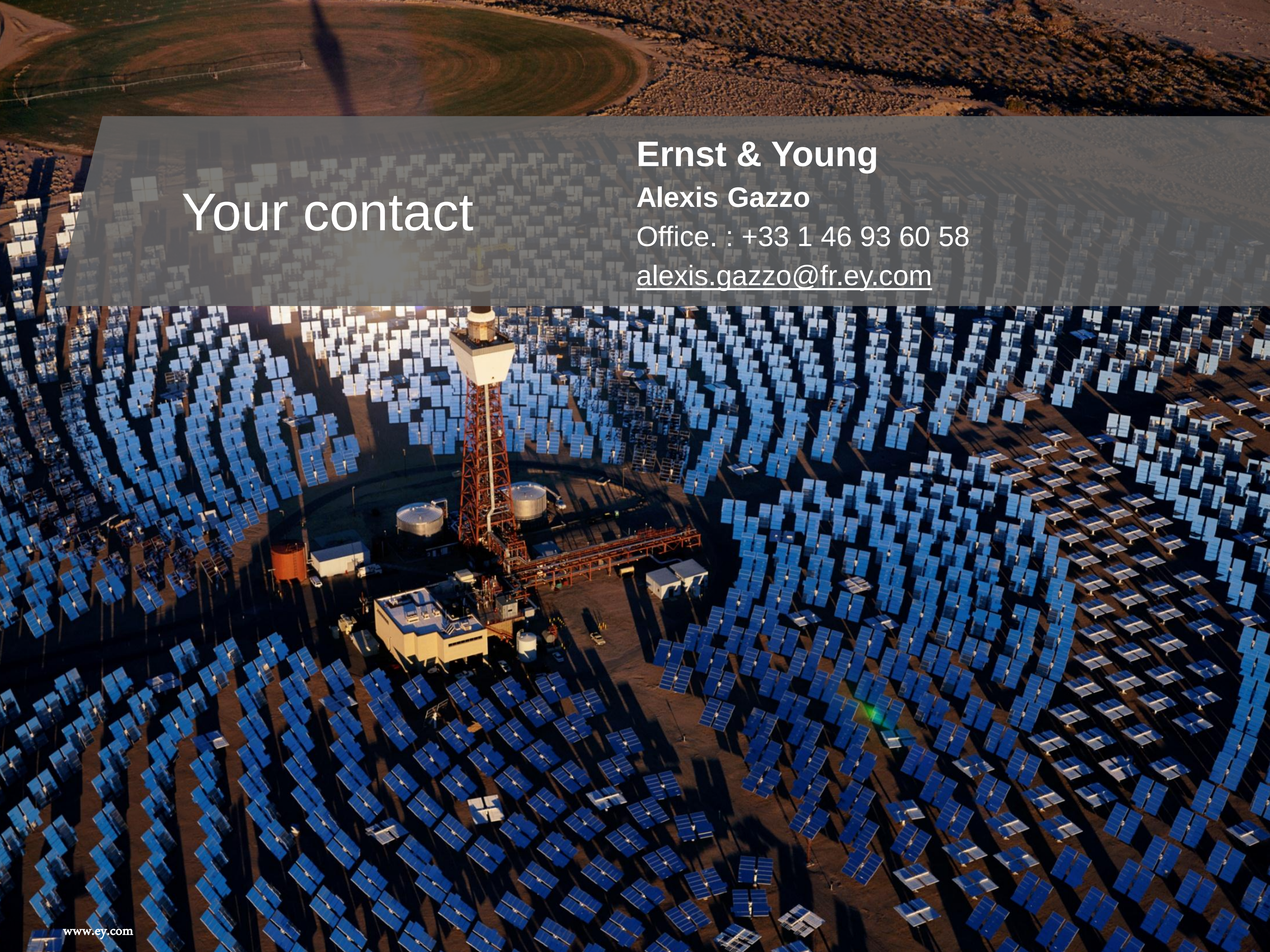

Your contact

Ernst & Young

Alexis Gazzo

Office. : +33 1 46 93 60 58

alexis.gazzo@fr.ey.com