

Encouraging the Adoption and Development of Clean Technology in Qatar

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Strictly Private and Confidential

Agenda

- Current Situation: Qatar and the Region
- Clean Technology and Applications
- Focus on Solar Energy
- Way Forward

Current situation: Qatar and the Region

WATER & ELECTRICITY DEMAND IN QATAR

	2009	2013	Growth
Electricity demand	3,990 MW	7,791 MW	129%
Water consumption	204 million g/d	380 million g/d	83%
Population	1.6 million	2.4 million	50%

- Qatari economy continues to grow strongly with forecast real GDP growth of 10% for 2010
- Power demand is forecast to near double in the next 5 years to support both strong economic growth and increasing population demands
- Fresh water sources in Qatar are near zero and water requirements are served through desalination facilities further compounding energy demands

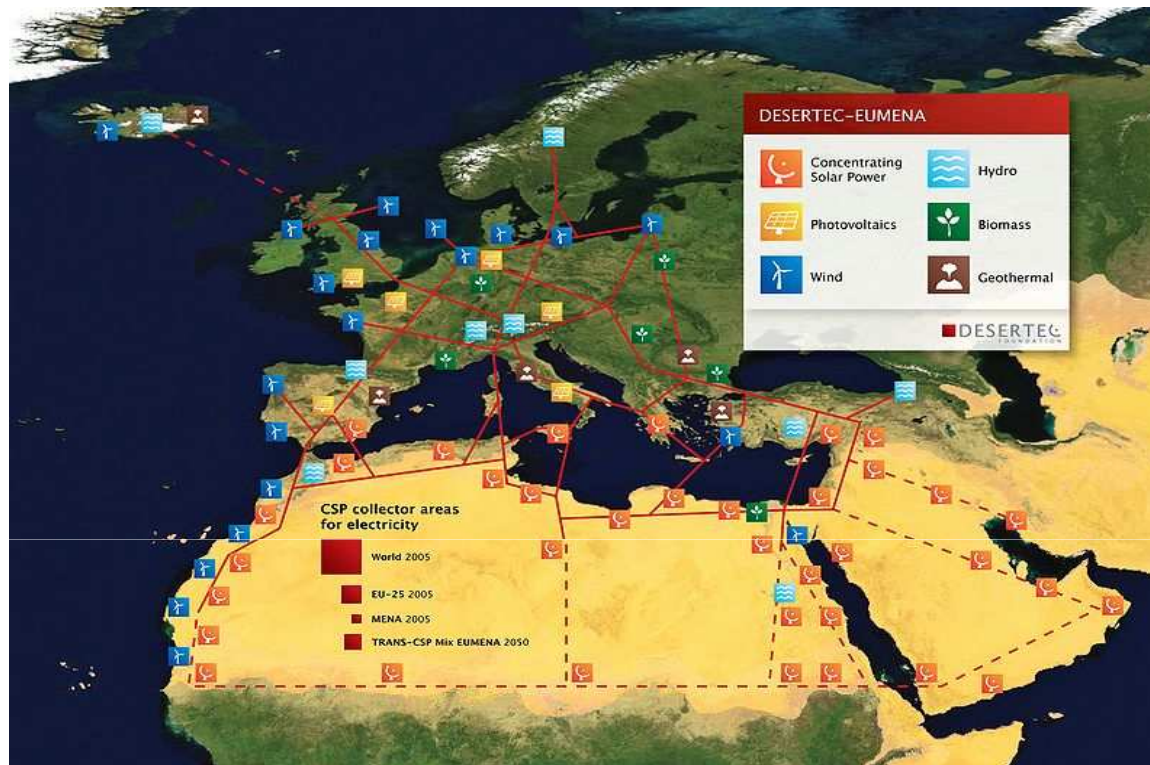
Population and economic growth will drive a continued increase in power requirements and energy efficiency in the short term

REGIONAL INITIATIVES

- Saudi Arabia
 - King Abdullah University of Science & Technology
 - Various dedicated research centers, including Solar and Alternative Energy Science and Engineering Research Center.
 - 2MW rooftop installation in progress
 - Large scale solar desalination plants study and rollout
 - Several off-grid PV projects around the country
- Abu Dhabi
 - The Masdar Initiative: Masdar City, Masdar Institute of Technology, Masdar PV, Shams 1 Project (100 MW CSP project) and Masdar Clean Tech Fund
 - Headquarter of International Renewable Energy Agency (IRENA), with over 130 country members
 - First large-scale PV power plant of the region (10MW)
- Oman
 - Tender for a major solar power plant (up to 250 MW)

GCC countries are facing a power shortage and are developing Renewable Energy capabilities to meet their clean power needs

DESERTEC FOUNDATION PROJECT



- Large scale concentrated solar power plants, photovoltaic power plants and wind farms distributed across the Sahara in North Africa delivering electricity power to Europe through a super-grid of high voltage direct current cables
- US\$550 billion investment by 2050
- 1% of the area of global deserts would be sufficient to produce the entire primary energy consumption of humankind as electric power

GCC ELECTRICITY INTERCONNECTION GRID

- Regional electricity grid under construction with phase I of interconnection between Qatar, Bahrain, Saudi Arabia and Kuwait completed and full completion and operation scheduled for May 2010
- Jointly funded by the 6 Gulf States and designed to provide basis for trading of electricity across the GCC
- Also supports liberalisation of regional electricity sector allowing for private development including renewable projects which could be set up in the most appropriate locations with power then distributed and sold across the region

GGCIA Grid March 2009



GCC electricity market continues to liberalise and will afford significant opportunity for investment including renewable energy

ENERGY EFFICIENCY & RENEWABLES IN QATAR

- Despite a relatively positive contribution in the LNG and GTL sectors, Qatar is considered to be a major emitter of carbon emissions with practically no presence in the Renewable Energy sector historically
 - Top 60 in the world in total emissions
 - Top 3 emissions per capita globally

- Supported by the Qatar National Vision 2030 (Fourth pillar “Environmental Development”):
“Preserving and protecting the environment, including air, land, water and biological diversity, through: Effective and sophisticated environmental institutions that build and strengthen public awareness about environmental protection, and encourage the use of environmentally sound technologies.”

- Supported by His Highness the Emir Sheikh Hamad bin Khalifa Al Thani ‘s recent address to the 64th session of the General Assembly of the United Nations (September 2009):
“The State of Qatar is aware of the enormous potential that lies in the sources of clean and renewable energy, particularly the solar energy that is abundantly available in our climate.”

- Supporting the cause of Energy Efficiency and Renewable Energy in Qatar would assist in establishing a plan to:
 - Reduce impact on climate by producing clean and sustainable energy
 - Utilise Qatar’s natural resources more efficiently
 - Contribute positively to building sustainable communities

QATAR INITIATIVES

Major projects underway:

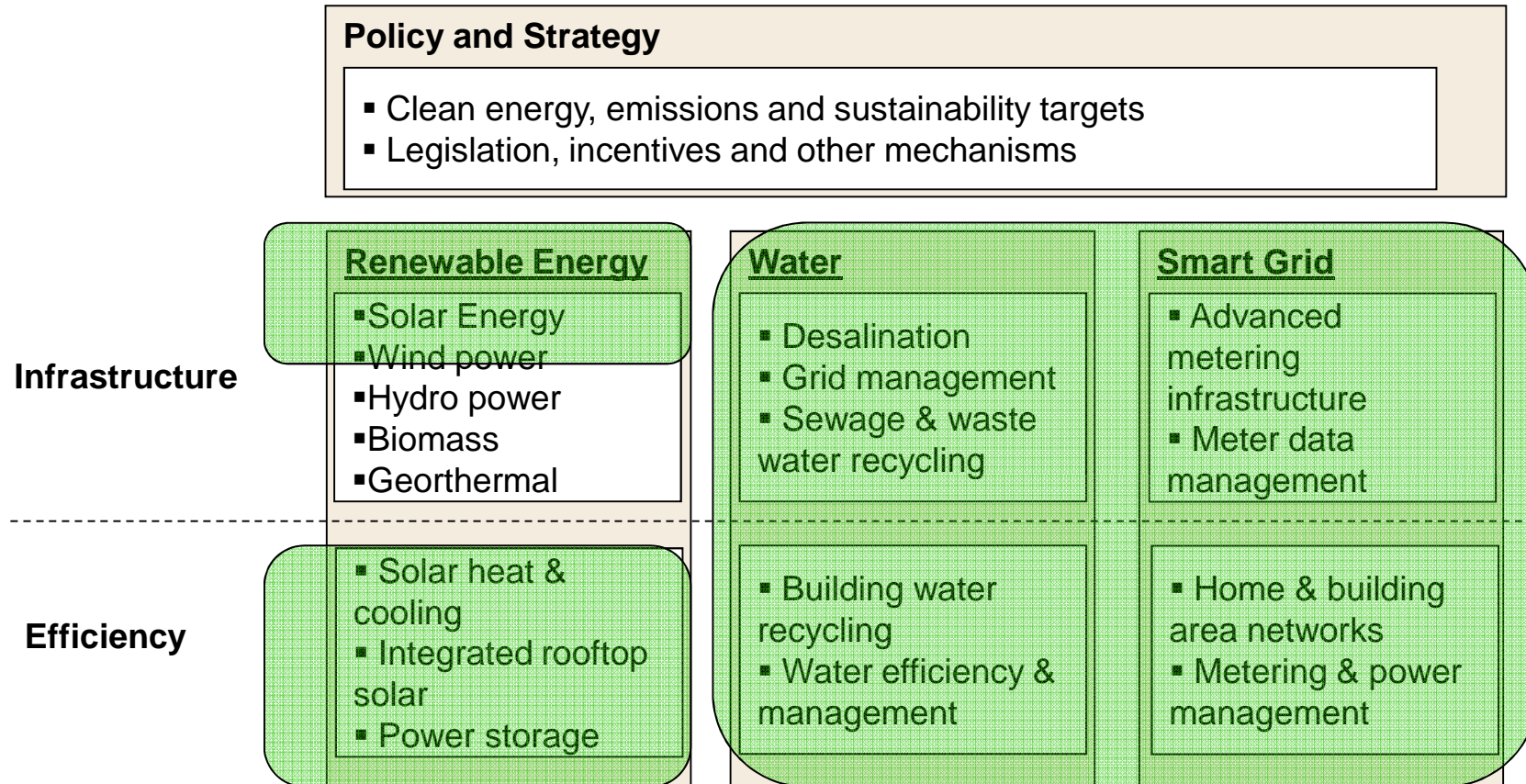
- Qatar National Vision 2030
- Qatar National Food Security Programme
- Barwa's Qatar Sustainability Assessment System
- DOHA LAND - Musheireb Heart of Doha
- Qatar National Convention Centre
- Energy City Qatar
- Feasibility study for solar desalination by Kahramaa
- QWE by Texas A&M University at Qatar
- QF-SolarWorld poly-silicon plant in Ras Laffan Industrial City
- QSTP Solar Testing Facility



Key Initiatives are taking place that are laying the foundation for the use of clean technology in Qatar

Clean Technology & Applications

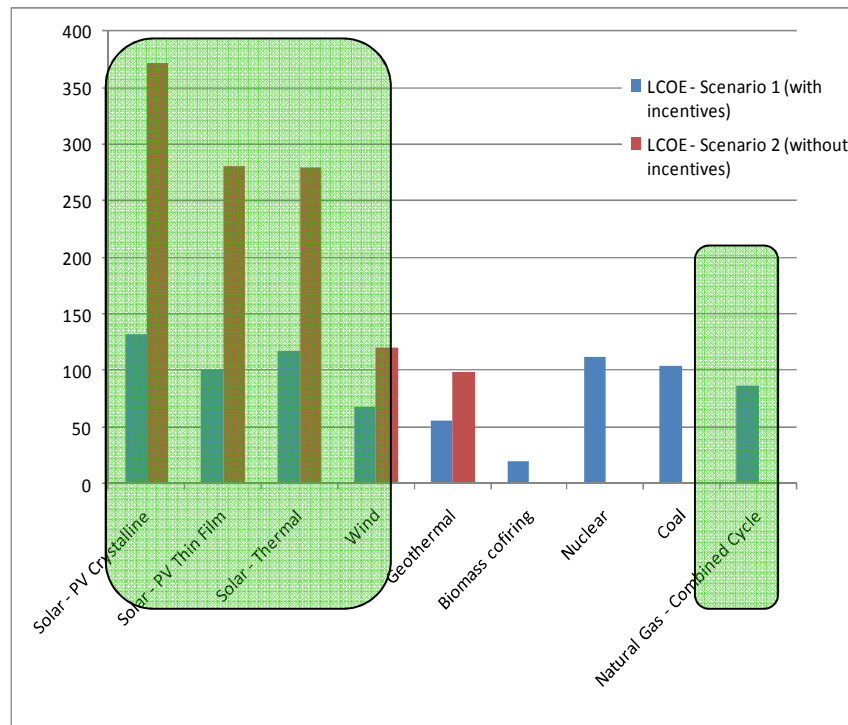
CLEAN TECHNOLOGY OVERVIEW



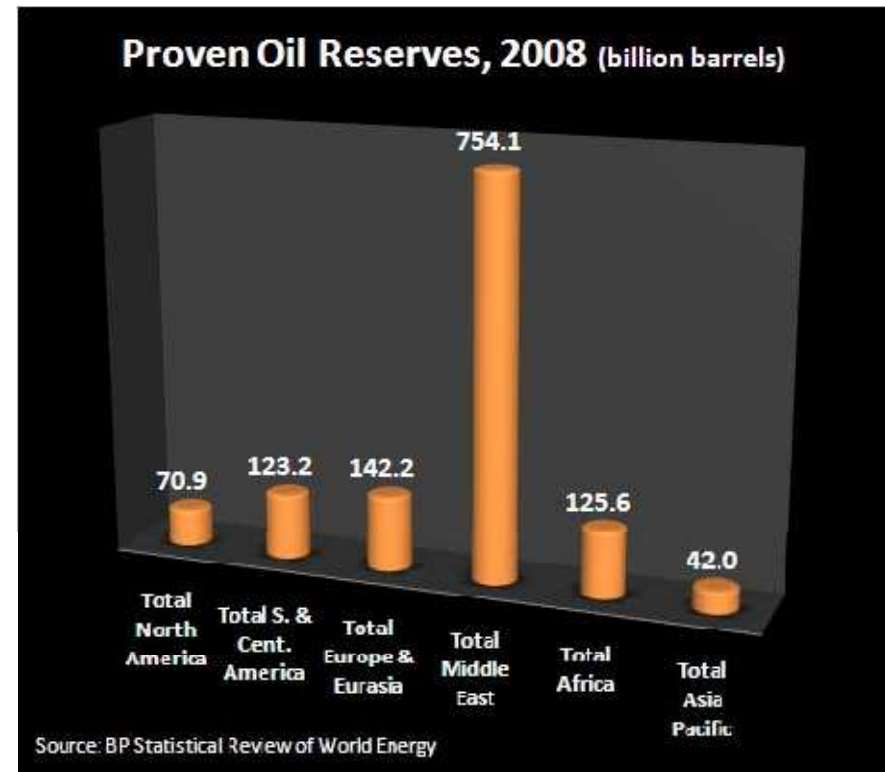
“Green Technologies” are a combination of energy efficiency and renewable energy technologies supported by the appropriate policies and strategies

WHY RENEWABLE ENERGY?

- The cost of electricity produced by non fossil fuel is significantly greater than that produced by burning fossil fuels

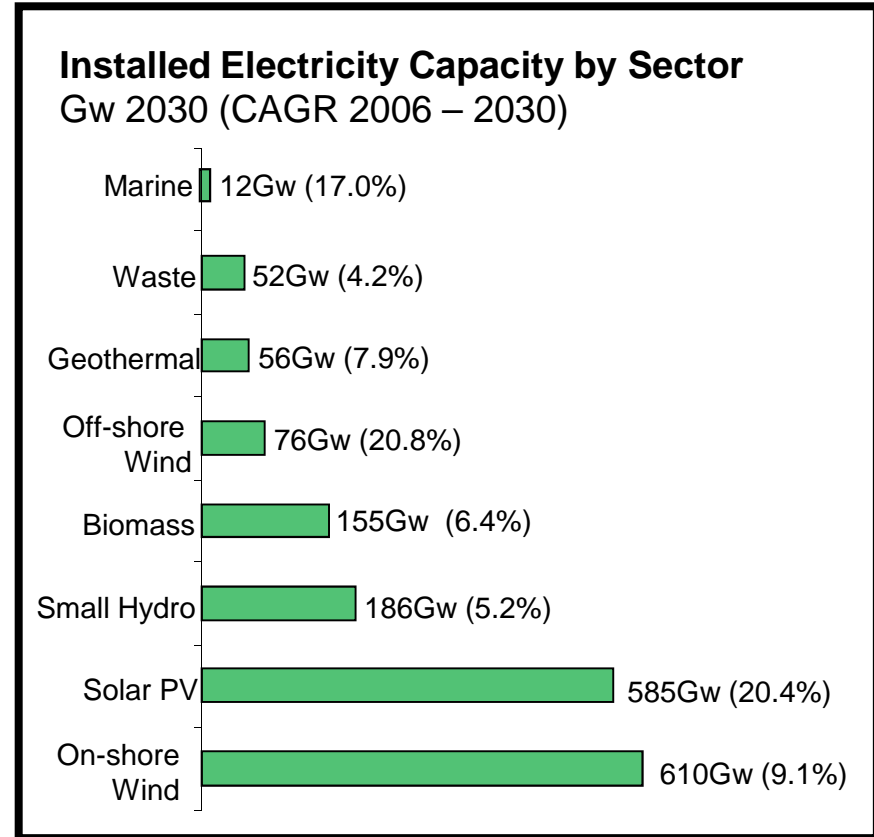
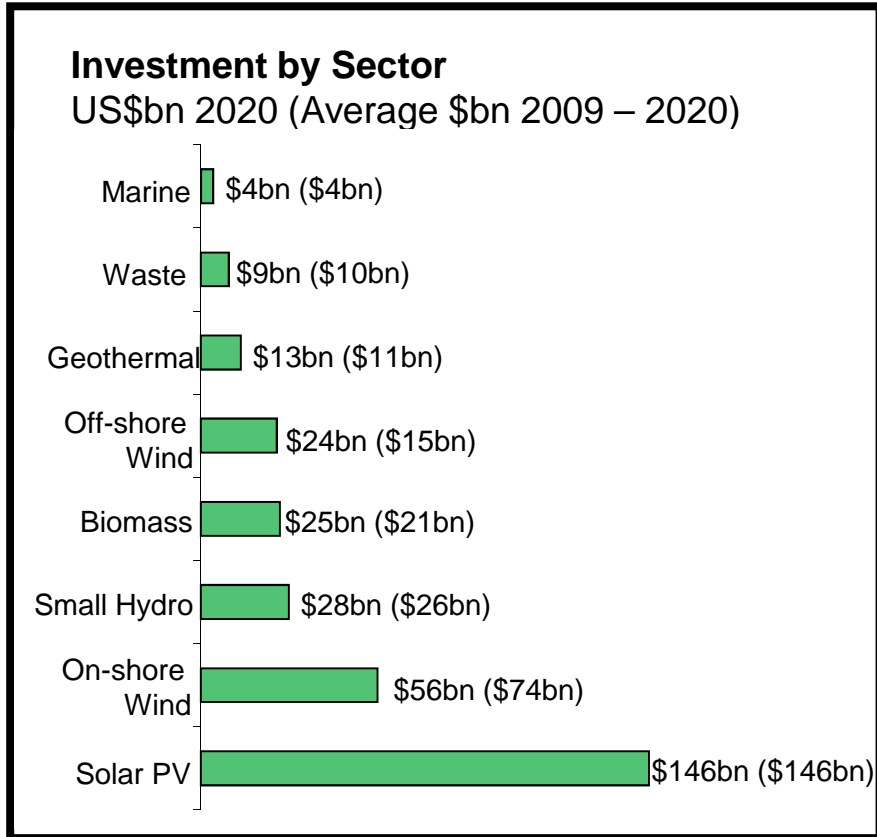


Source: Levelised Cost of Energy Analysis v2.0, Lazard 2008



- The Middle East has an abundance of Oil Reserves

GLOBAL RENEWABLE ENERGY GROWTH



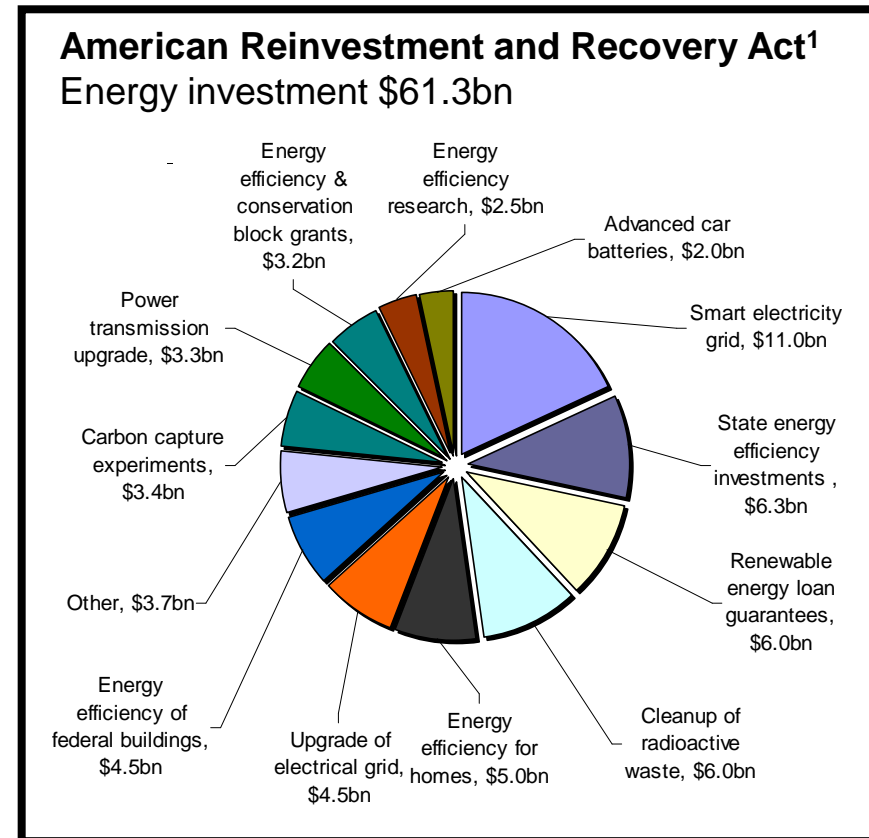
Major investment in Renewable Energy will most likely lead to significant cost reduction, with Solar PV forecast to be the highest growth renewable sector

¹Source: New Energy Finance; 'Global Futures Interim Report 2009'
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GLOBAL ECONOMIC STIMULUS POLICIES

- Renewable energy a key part of G20 economic stimulus packages
- Increasing push for co-ordinated global "Green New Deal" that would aim to restore growth to the worlds economy while dealing with climate change
- The \$787bn US economic stimulus plan includes program for up to \$60bn+ towards green energy initiatives
- Similar packages in Europe and Asia also stress the importance of green measures

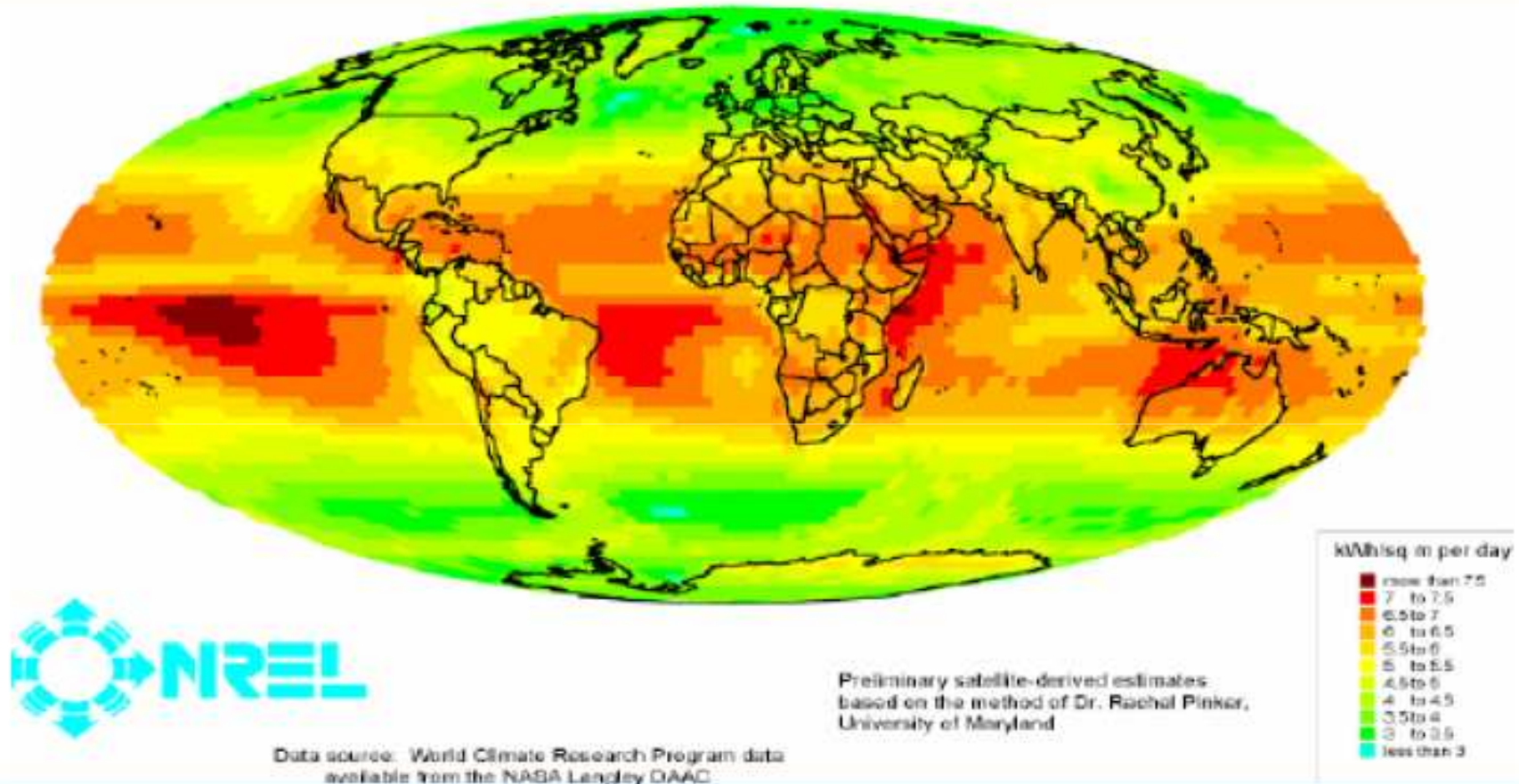


Energy Efficiency and Renewable energy are key beneficiaries of the global economic stimulus packages which will stimulate R&D.



Focus on Solar Energy

SOLAR ENERGY POTENTIAL



Southern Europe, Asia and the Middle East have a comparative advantage in Solar.
From all of the Renewable Energy sources, Solar has the most potential in Qatar.

ATTRACTIVENESS OF SOLAR

1. Good match for energy usage profile

- High sunlight climates see peak energy requirement in middle of the day matching solar energy production

2. Quick installation, low complexity, low OPEX

- Construction of 20MW plant < 6 months
- Stable & reliable with 25-30 year life
- Limited to no moving parts with very limited maintenance

3. Highly scalable

- Plants scalable from 1MW to 100MW
- Key constraint land availability

4. Limited supporting infrastructure required

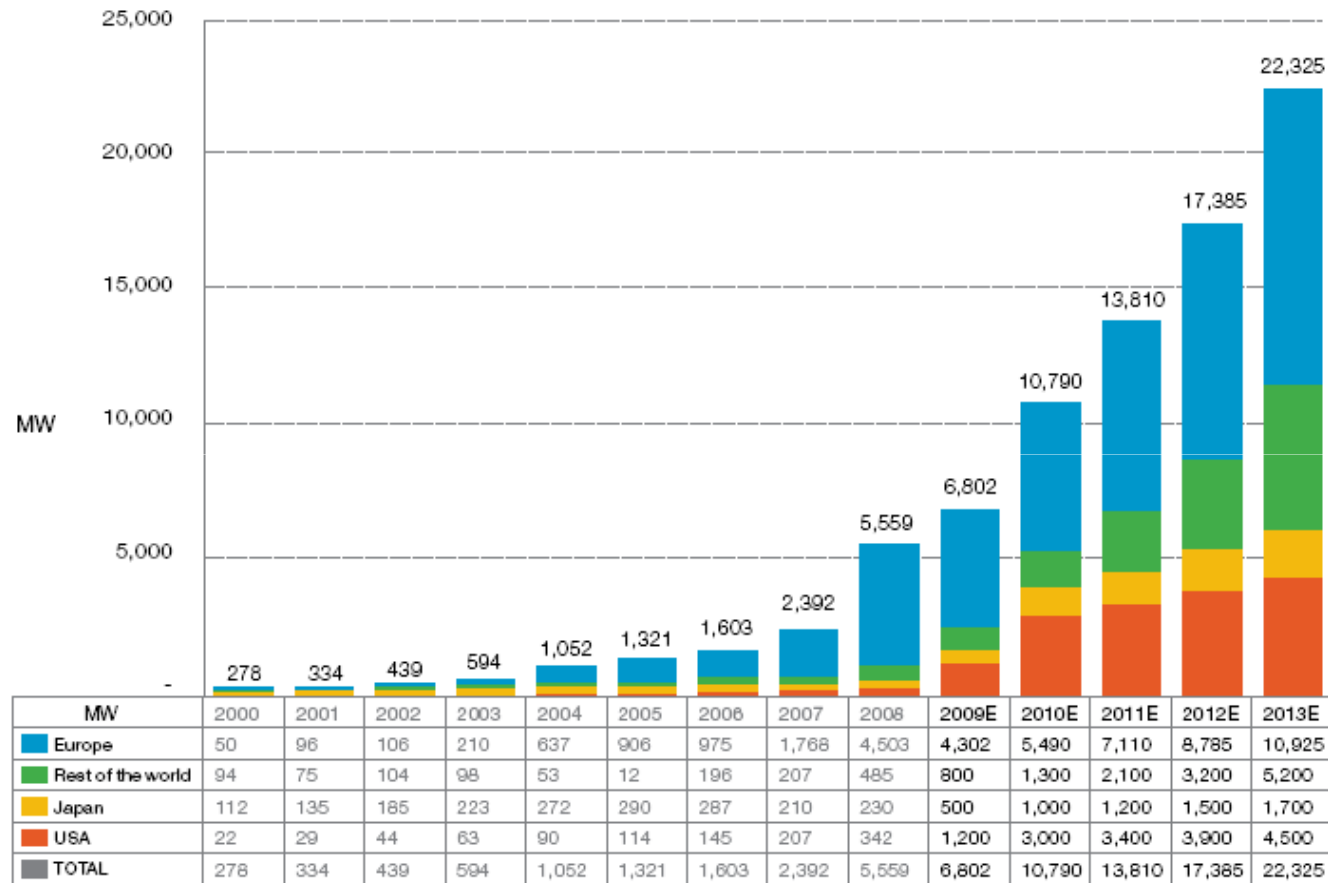
- No fuel re-supply and limited maintenance requirements
- Highly attractive in underdeveloped areas
- Straight forward connection to grids

5. Predictable production

- Energy production only dependent on solar irradiation
- Data is available for any location
- Annual variance < 5%

FORECAST GROWTH IN PV SOLAR

Global annual PV market Outlook per Region (Policy-Driven scenario)



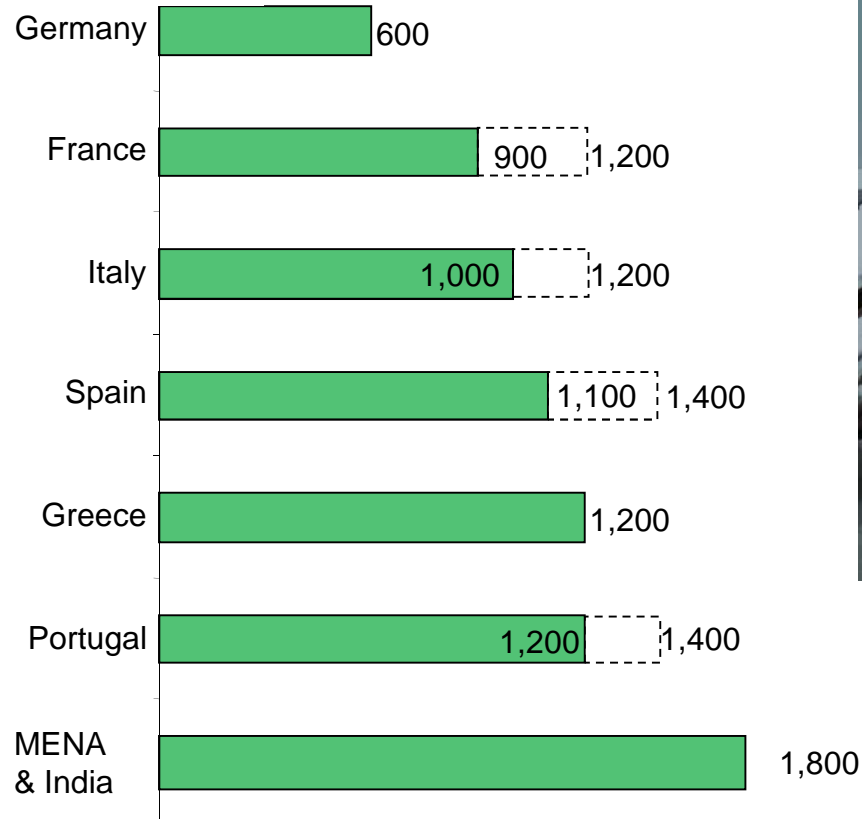
Forecast growth in the global photovoltaic solar market is 400% over the next 5 years



COMPARATIVE SOLAR TARIFF REQUIREMENTS

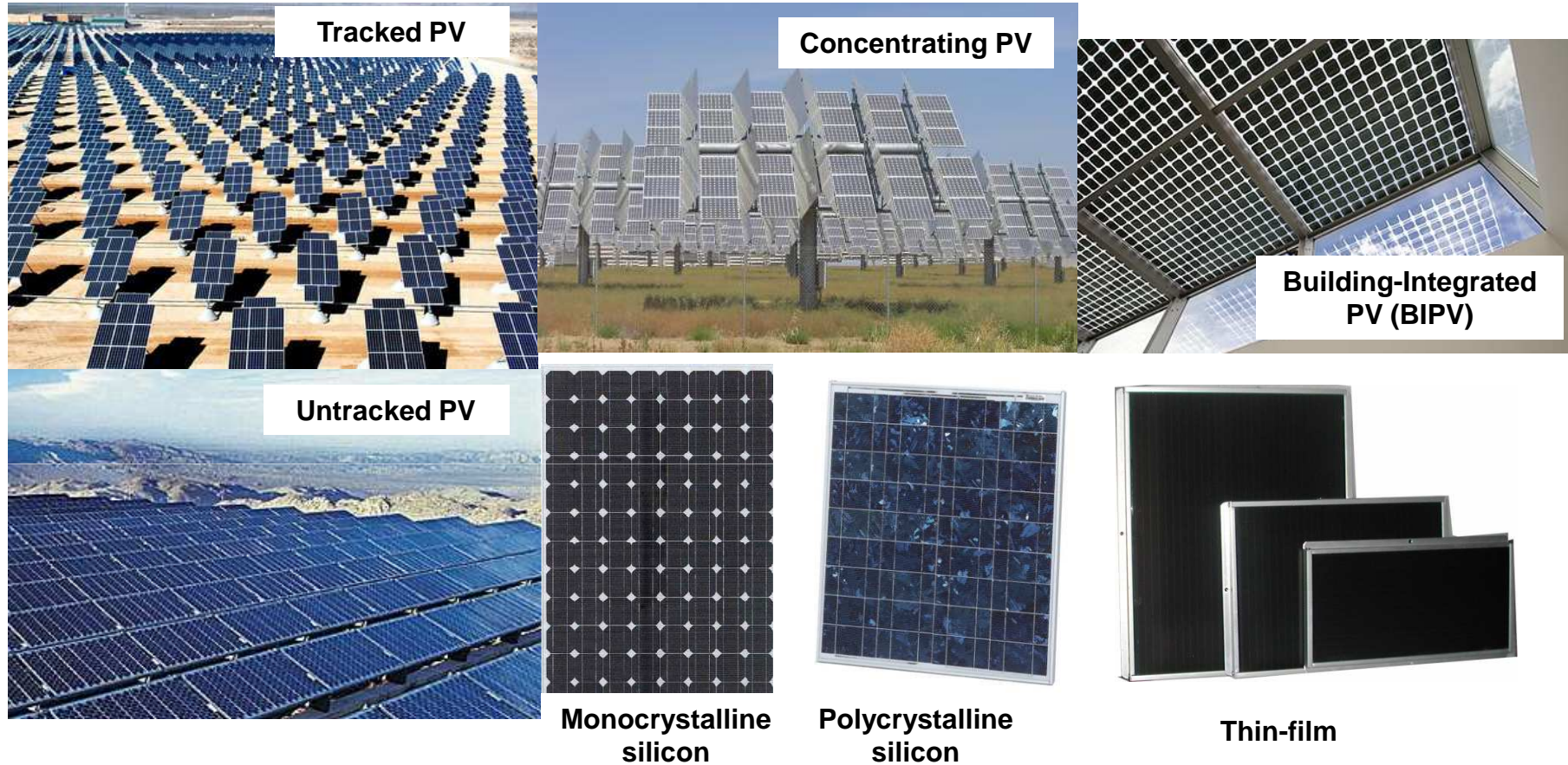
Sunlight hours

p.a.



Solar tariffs are a function of annual sunlight hours.
MENA has significantly more sunlight per year than solar energy producing countries such as Germany, Spain and Italy.

SOLAR TECHNOLOGIES - PHOTOVOLTAICS



PV is the largest solar energy technology today, with the majority of its applications being small to medium scale power generation, off grid uses and roof top installations. The performance of PV in GCC climatic conditions is a key area of focus.

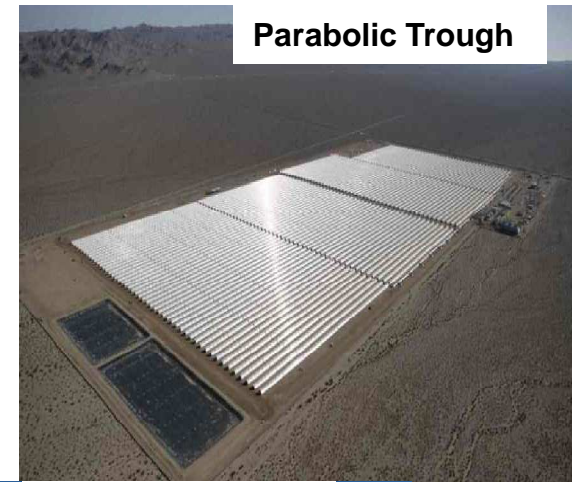
SOLAR TECHNOLOGIES – CSP (Concentrated Solar Power)



Solar Chimney



Linear Fresnel



Parabolic Trough



Solar Tower



Solar Dishes

CSP technologies can be deployed for large-scale production of electricity, as well as for various other useful applications like solar seawater desalination and solar cooling.

Way Forward

POLICIES TO ENCOURAGE USE OF RENEWABLE ENERGY

	Description
Feed-in tariffs	<ul style="list-style-type: none"> ▪Electricity distributors / suppliers obligated to buy renewable energy electricity at a premium which is guaranteed for a certain time period
Market based mechanism (quota, green certificates, ...)	<ul style="list-style-type: none"> ▪The supply of renewable energy is achieved by obliging generators to deliver consumers a portion of their power from renewable energy,
Tax incentives or other subsidies	<ul style="list-style-type: none"> ▪renewable energy is fiscally incentivised in order to reduce the cost gap between other conventional power sources

Feed-in tariff schemes have proven to be a successful framework to deliver long term certainty for investors. However, Qatar and the region will have to develop tailored policies to fit its unique characteristics.

QSTP-GREENGULF SOLAR TEST FACILITY

- Announced 18th March 2009 under the patronage of Her Highness Sheikha Mozah Bint Nasser Al-Missned to be establish in QSTP
- Part of an integrated Qatari strategy to become a leader in the development of solar as an alternative electricity source
- Facility will act as a gateway to developing strong and lasting relationships with leading global solar energy companies
- Crucial to providing data to support business case for large scale solar production facilities in the region



Crucial for collecting basic data to support the energy efficiency and renewable energy initiatives in Qatar and the region

TEST FACILITY'S GOALS AND OBJECTIVES

- The facility will provide an opportunity for
 - QSTP, GreenGulf and other partners to develop partnerships and generate unique IP to support roll-out of large scale solar facilities
 - Partners to demonstrate and quantify the behavior of their technology in the Qatari environment (i.e. dust, humidity, high heat)
 - Education City university students to study and learn about solar technologies
 - Provide unique testing ground for strategic local partners who would benefit from solar technologies

- While the focus of the Test Facility will be on Solar Power Generation, the facility will also focus on the following:
 - Solar Cooling & Solar Heating
 - LED Lighting
 - Smart Grid Delivery
 - Home Energy Monitoring systems
 - Off-grid solutions (i.e. Street lamps)
 - Other Building Integrated Solar Thermal and PV technologies

Testing and evaluation of these technologies in Qatar's environment is significant for the development of a long-term solar energy programme in Qatar.

Summary

KEY POINTS

- Awareness of the benefits of Energy Efficiency and Renewable Energy has increased dramatically in recent years throughout the Region
- Key Initiatives already underway to lay foundation for the development of appropriate policies and technologies
- Energy Efficiency and Solar Energy have the opportunity to play a key positive role in Qatar despite an abundance of power in the short term and significant long term gas reserves

GREENGULF OVERVIEW

Background

- Renewable energy development and advisory business
- Founded in Doha in 2008, presence in Jeddah and London
- Strong partnership culture
- Committed to the development of solar and renewable energy to address climate change
- Opened a branch office in Qatar Science and Technology Park (QSTP) in late 2009

Business Profile

- Core expertise includes finance, regulatory policy, legal and tax
- Areas of Focus
 1. Developing Renewable Energy Projects
 2. Policy , Technology and Advisory Services
 3. Renewable Energy Asset Management Fund
- Strong partnerships and business relationships with key players across the renewable energy value chain
- Extensive experience in developing green field projects with high levels of regulation and issues of national importance

An experienced team with strong relationships across the region

Thank You

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