Renewable Energy Development in the Gulf Cooperation Council: A Revival

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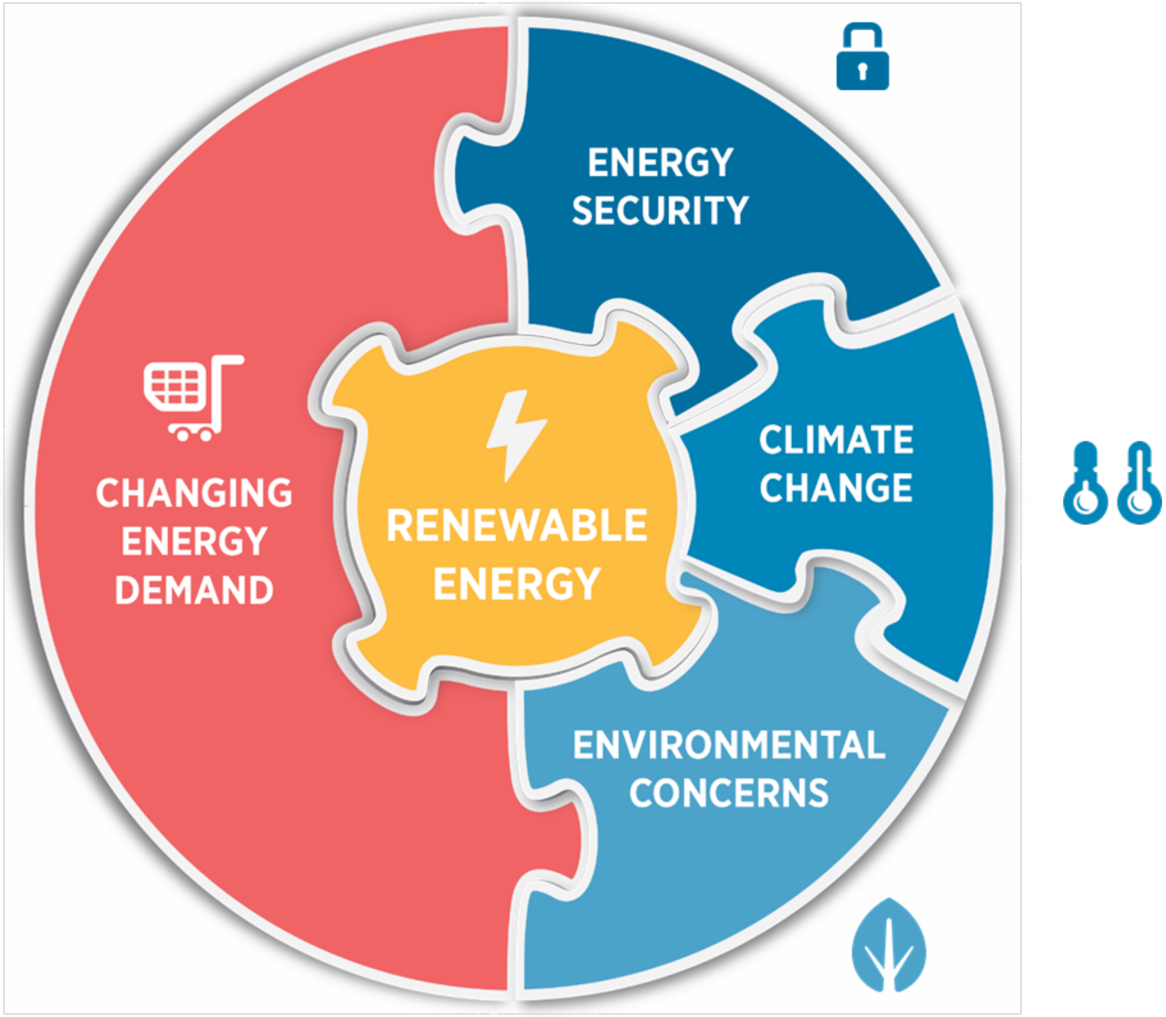
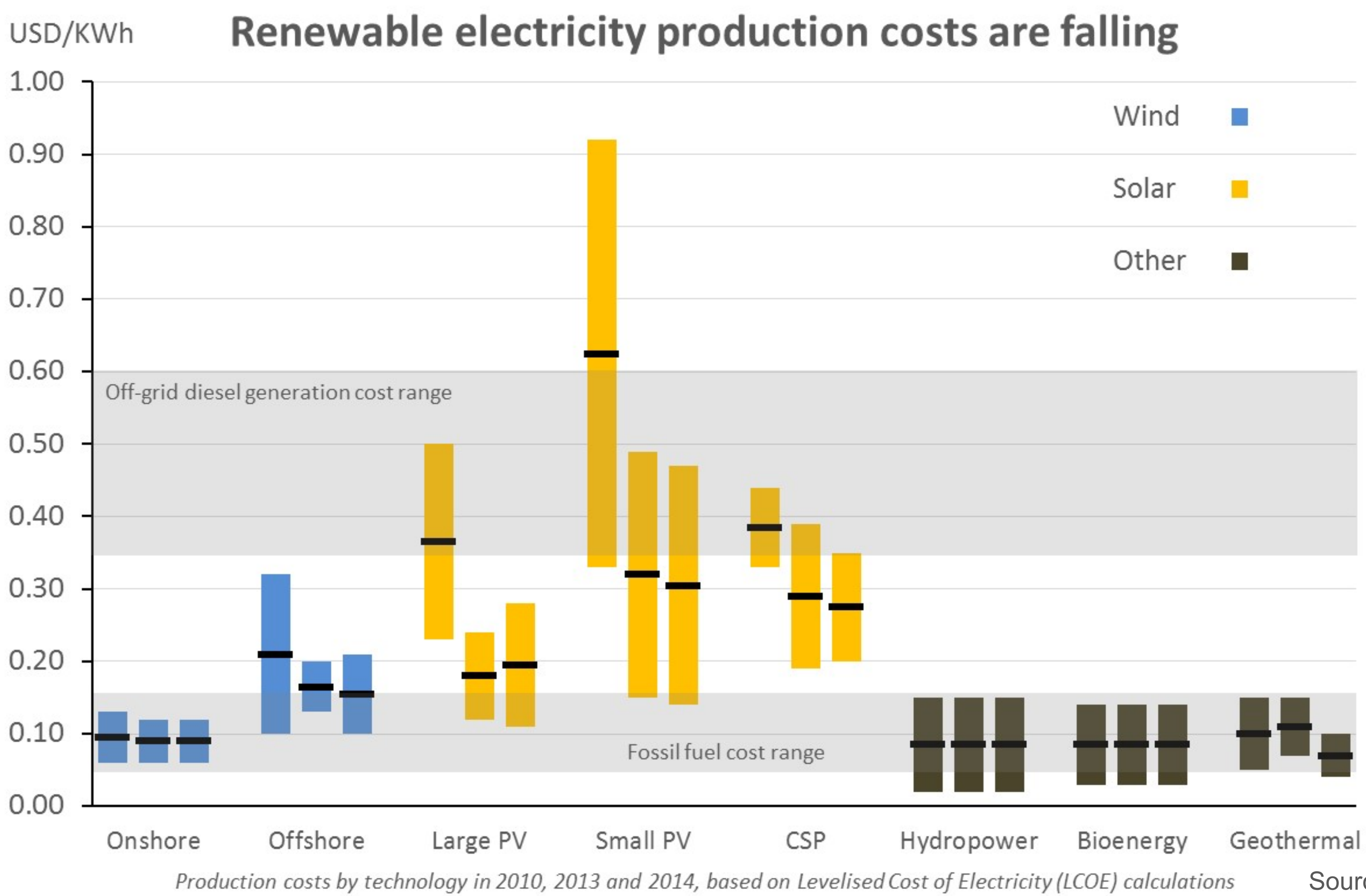
IRENA
International Renewable Energy Agency

The global energy sector is transforming

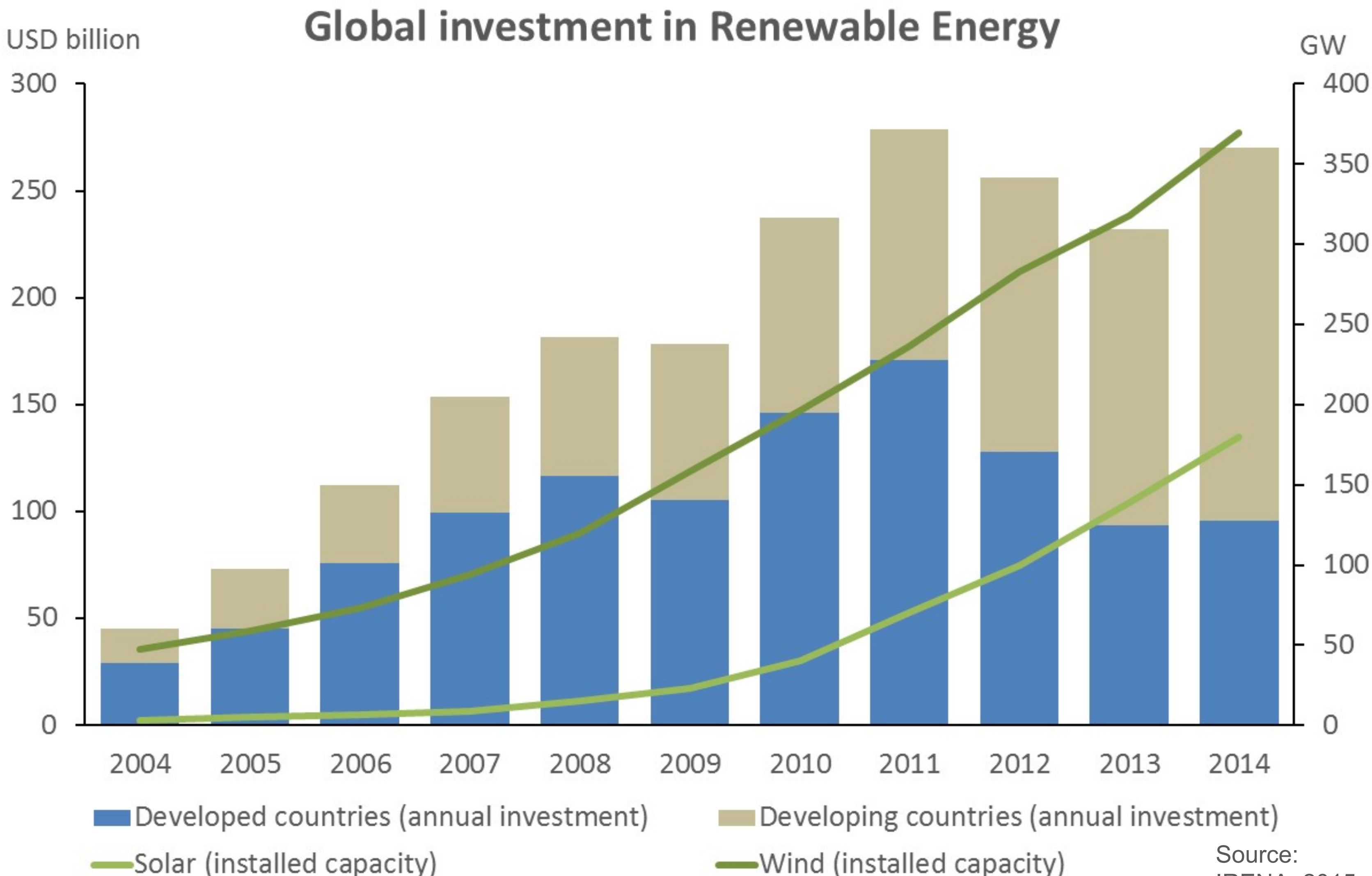


Electricity generation costs are falling



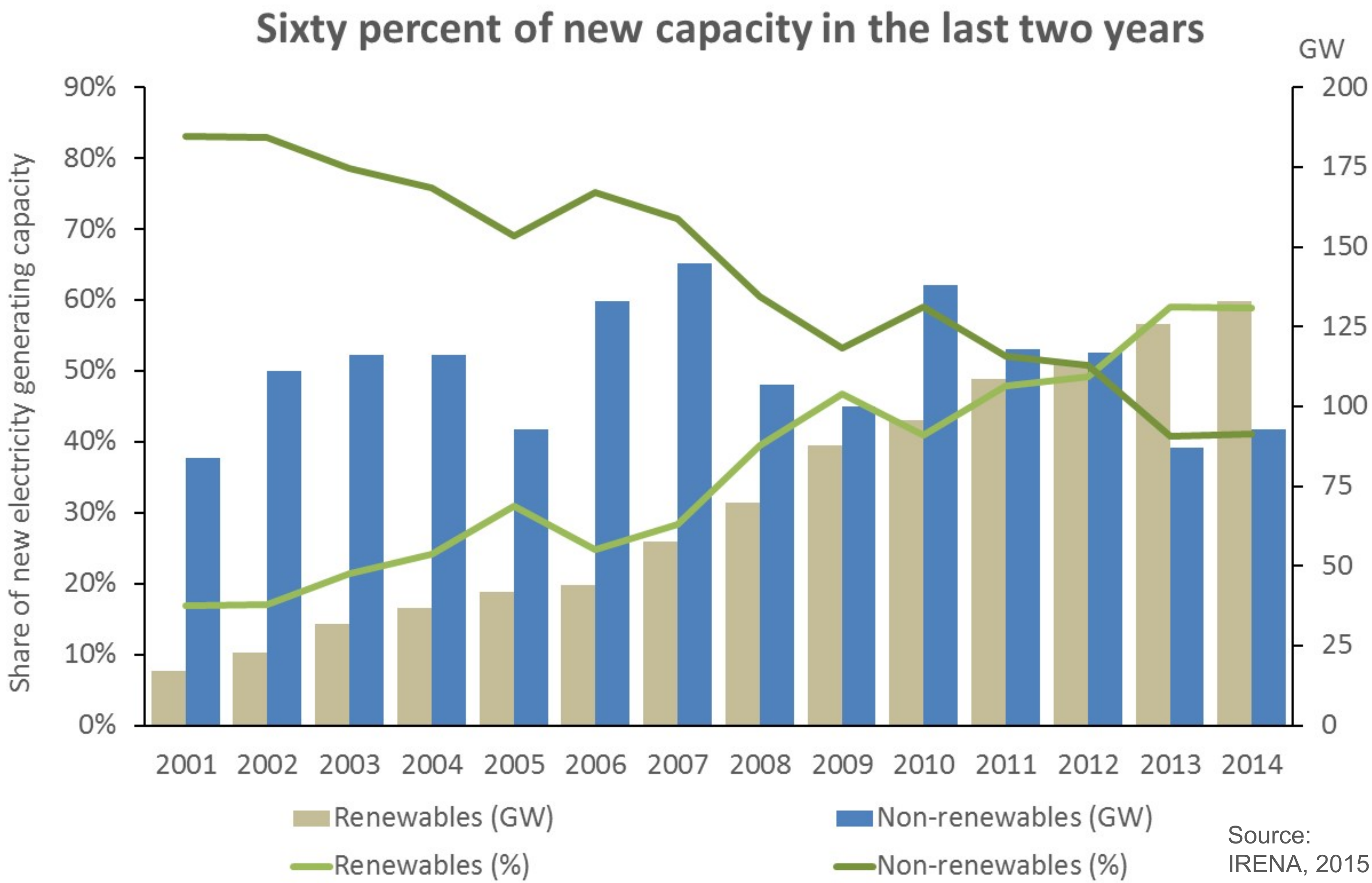
Source: IRENA, 2015

Investments in renewables



Source: IRENA, 2015

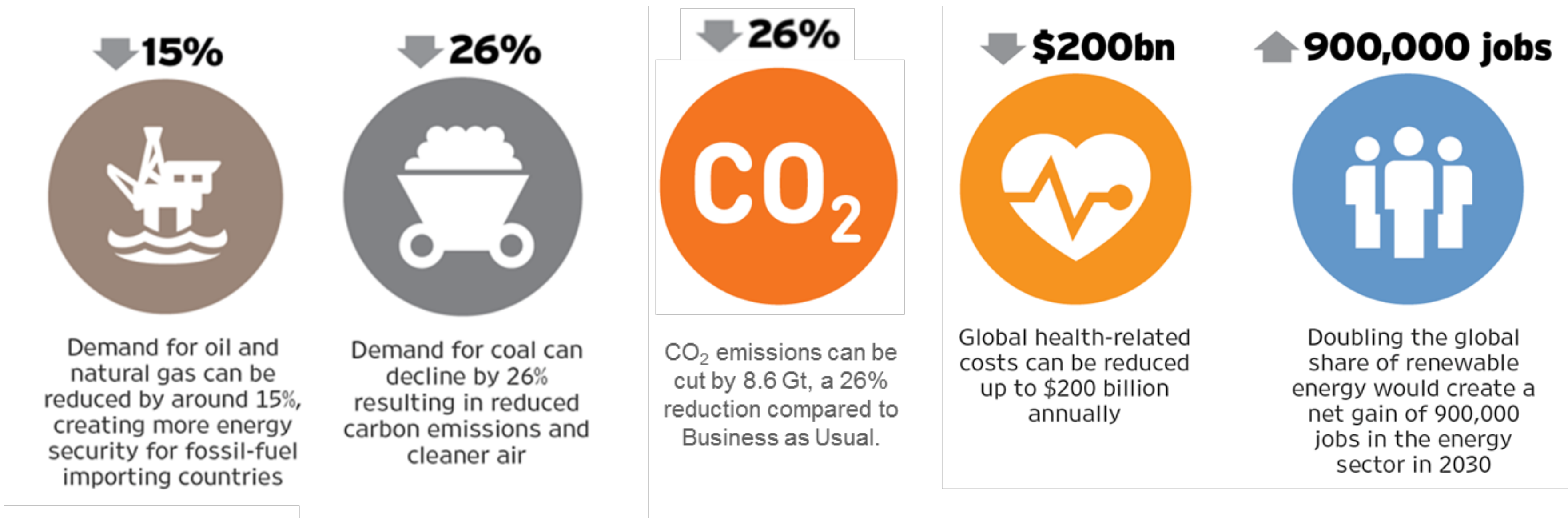
Rapid capacity expansion



Source: IRENA, 2015

Benefits of the transition to renewable energy at the global scale

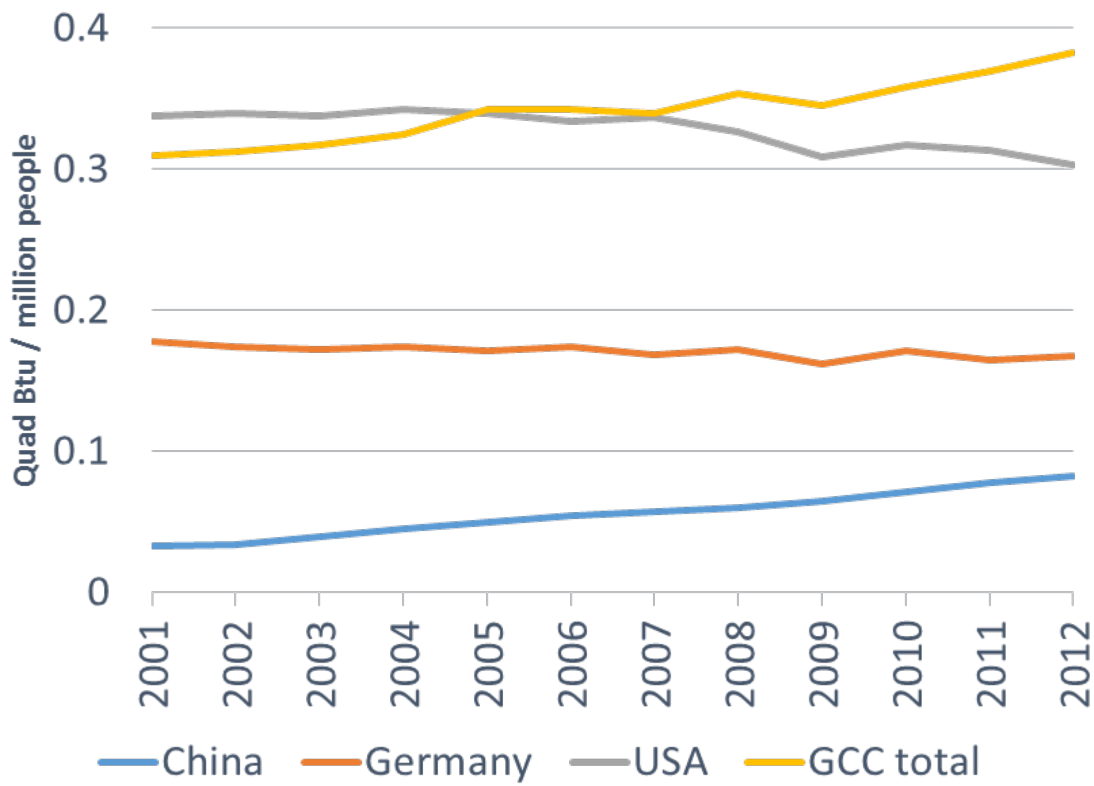
IRENA's REmap 2030 analysis emphasises that doubling the share of renewable energy in the global energy mix is achievable and can lead to remarkable socioeconomic benefits



Growing demand in GCC

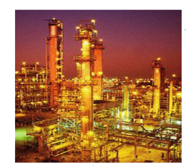
Energy and power

The GCC per capita energy consumption is increasing rapidly, 22% in the last decade



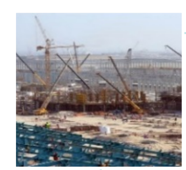
Rising Populations

Harsh climate (Cooling and Desalination)



Industrialization (steel, aluminum & petrochemical)

Energy-intensive hydrocarbon industry serving world demand



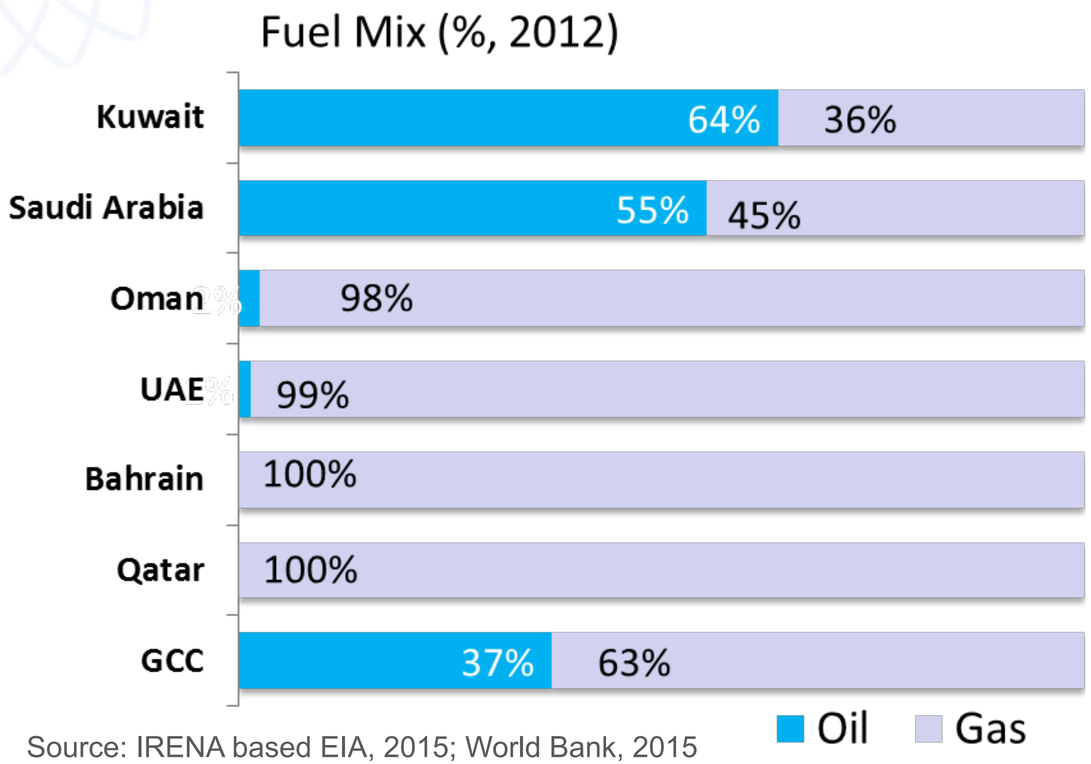
Young and fast growing infrastructure

Power demand has doubled in last decade while the per capita demand has increased by 30%

Source: IRENA based on EIA, 2014 and World Bank, 2014

Heavy reliance on fossil fuels

Power Sector



Source: IRENA based EIA, 2015; World Bank, 2015

	Total (TWh)	Per capita (MWh/person)
Kuwait	57	15.3
Saudi Arabia	240	8.2
Oman	20	6.1
UAE	98	10.1
Bahrain	13	8.9
Qatar	28	14.9
GCC	520	9.2
USA		13.5
EU		5.8

By 2020, the GCC electricity consumption is expected to reach **856 TWh** requiring an additional 100 GW capacity

Rationale for diversification

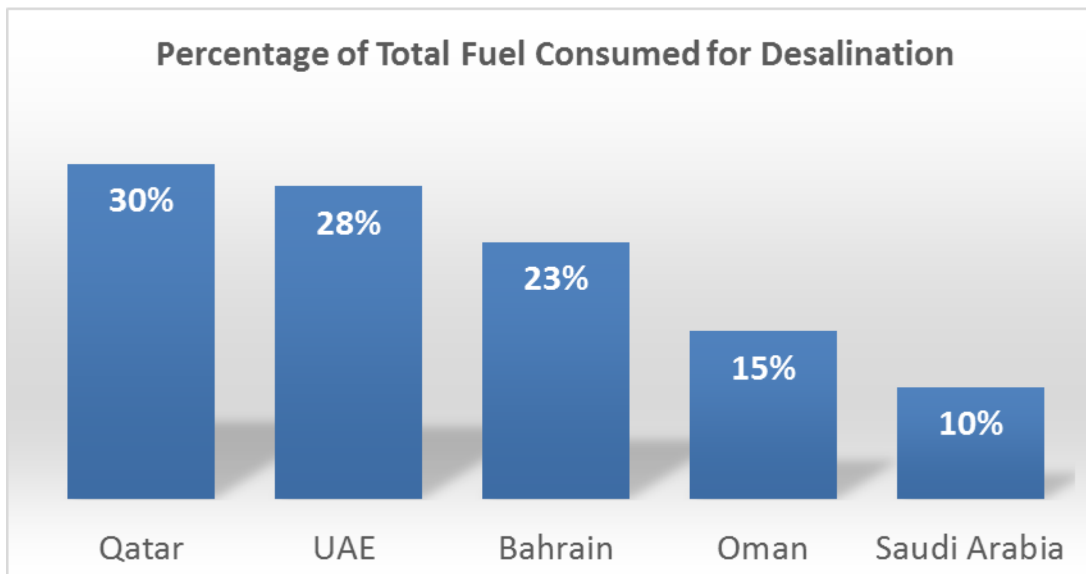
- Resource constraints – Gas and Oil
- Forgone earnings from fossil fuels exports
- Pressure on government budgets
- Interlinkages between resources
- High per capita carbon footprints

Subsidy costs in GCC countries

9% – 28%

of government revenue

	tCO_2 per Capita
GCC	19
United States	17
European Union	7
China	5
World	4



Source: IRENA based on Lahn, Stevens and Preston, 2013

Plans for RE and EE in GCC

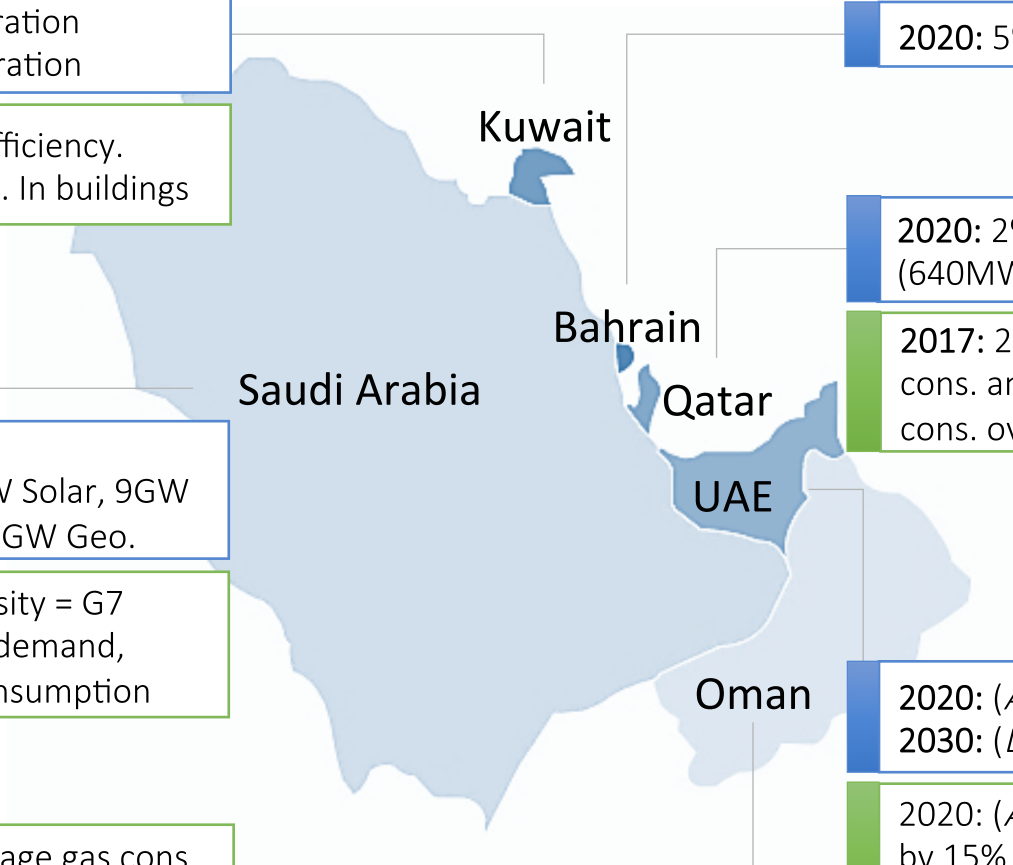
2020: 5% of generation
2030: 15% of generation

5%↑ generation efficiency.
10%↓ energy cons. In buildings

2022: 24GW
2032: 54GW. 41GW Solar, 9GW Wind, 3GW W2E, 1GW Geo.

2020: Energy intensity = G7
2021: 14%↓ peak demand,
8%↓ electricity consumption

2015: 5%↓ in average gas cons. per kWh of generation



2020: 5%

2020: 2% of generation by solar (640MW)

2017: 20%↓ in per capita electricity cons. and 35%↓ in per capita water cons. over 2011

2020: (*Abu Dhabi*)7% of capacity
2030: (*Dubai*) 15% of generation

2020: (*Abu Dhabi*) electricity demand by 15% of the 2010 level
2030: (*Dubai*) ↓ power cons. by 30%

Source: IRENA, 2015

Seeds of enthusiasm for renewables

Kuwait

- MEW/KISR–Shagaya Wind turbine 10MW bidders selected
- MEW/KISR–Shagaya Solar Thermal 50 MW bidders selected
- MEW/KISR-Shagaya PV 10 MW bidders selected
- Al-Abdaliyah ISCC project 60 MW planned
- KOC – Umm Gudair PV 10 MW permitted

Qatar

- KAHRAMAA–Solar Energy Power Plant 230 MW Announned
- Mesaieed waste to energy plant 40MW Completed
- Al Duhail Solar PV Park 10 MW Announced

Bahrain

- Waste to Energy Plant 25MW Planned
- BAPCO Bahrain PV Plant 5 MW Commissioned
- Petro Solar-Manama Solar PV Park 5 MW Completed

Saudi Arabia

- PV Plant Makkah 100 MW Bid Invited
- KAUST rooftop PV panels 2MW Completed
- KAPSARC PV Phase 1 - 3.5 MW Completed
- KAPSARC PV Phase 2 - 1.8 MW Completed
- Princess Nora University solar water heating 17MW Completed
- ARAMCO, 300 MW capacity off-grid Planned
- Saudi Aramco North Park PV Project 10.5 MW Completed
- SEC – Duba ISCC Power plant phase 1 CSP 50 MW Planned
- Waad Al-Shamal ISCC Project 50 MW Announced
- Al-Aflaj Solar PV Park 50 MW Announced
- KACST Al Khafji PV desal Plant 10 MW Planned

Source: IRENA, 2015

Oman

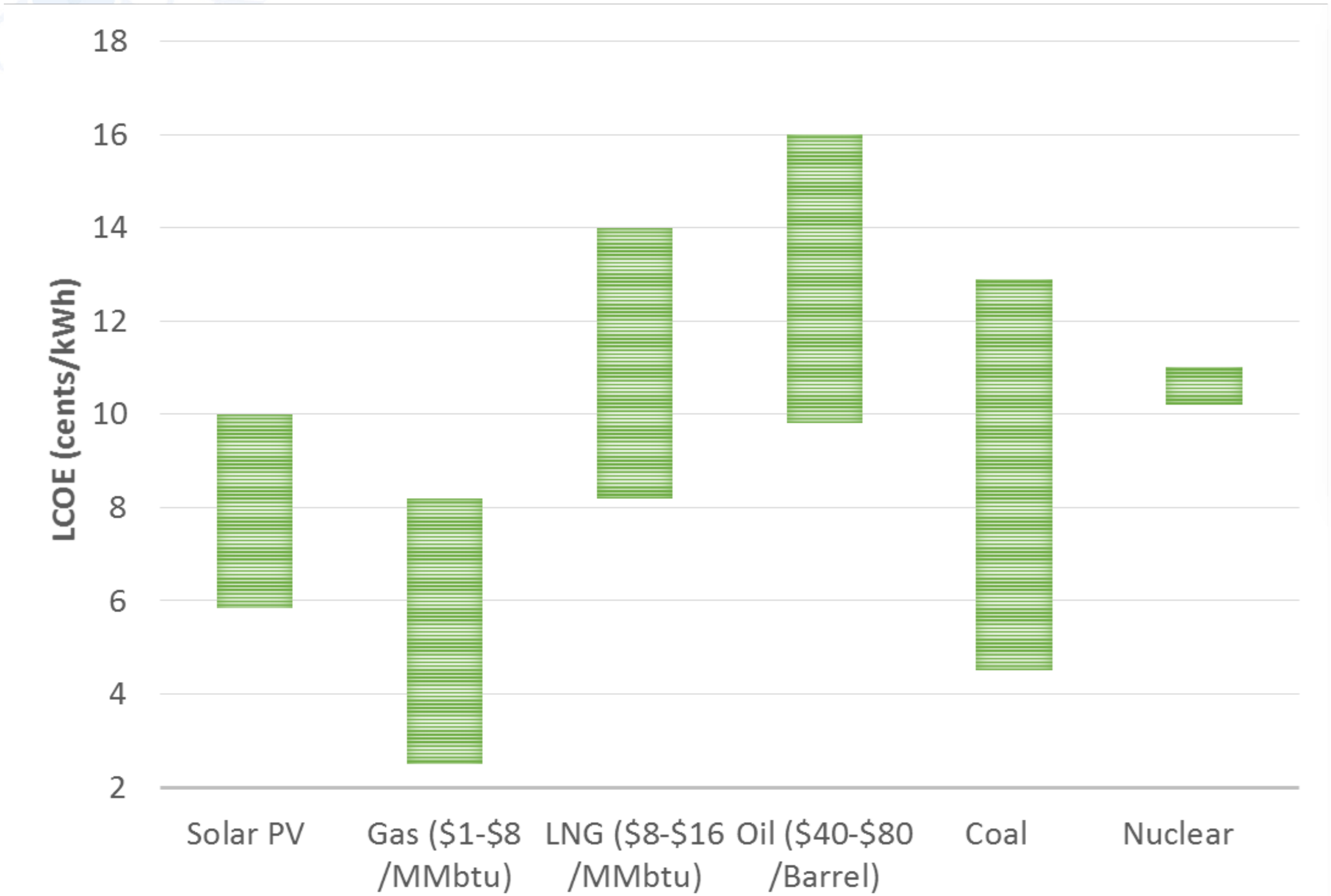
- Solar thermal EOR plant 1 GW Planned
- Solar thermal EOR plant (7MW) Completed
- Dhofar Wind farm 50 MW Planned
- Harweel Wind Farm (50 MW) Planned

United Arab Emirates

- Sir Bani Yas Wind Energy plant 30 MW Planned
- Solar power plant, Utico, RAK 40MW Planned
- Waste to Energy, TAQA 100MW Bids invited
- Masdar City solar PV park ADFEC 10MW Completed
- Shams 1 CSP plant 100MW Completed
- Mohammed bin Rashid Al Maktoum 1 - 13 MW Completed;
- Mohammed bin Rashid Al Maktoum 2 - 200 MW Financial Closure
- Mohammed bin Rashid Al Maktoum 3 - 800 MW Announced
- Waste to energy, Bee'ah 83 MW Announced
- Noor 1 Solar PV plant 350MW Planned

Rising competitiveness

Large scale



Sources: Includes information from Channell et al. (2015), MANAAR (2014), Scribbler (2015), (Utilities ME 2015) and others.

Development of value chain in GCC

Medium and Large Scale

SEGMENTS OF THE VALUE CHAIN	RENEWABLE ENERGY PROJECTS ACROSS MENA			
	DEWA 13 MW	DEWA 200 MW	SHAMS I 100 MW	OURZAZATTE I
Developer and/or EPC	First Solar	ACWA POWER, TSK	Masdar A MUBADALA COMPANY, TOTAL, TEYMA, ABENGOA SOLAR	ACWA POWER, ARIES, SENER, acciona, TSK
Financer	ديوا dewa	First Gulf Bank, samba سامبا, NCB الأهلي	NBAD, kfw IPEX-BANK, SMBC, BNP PARIBAS, SOCIETE GENERALE, MUFG	afd AGENCE FRANÇAISE DE DÉVELOPPEMENT, kfw IPEX-BANK, WORLD BANK GROUP, European Investment Bank The EU bank
Utility	ديوا dewa	ديوا dewa	Masdar A MUBADALA COMPANY, ADWEC شركة أبوظبي للماء والكهرباء Abu Dhabi Water & Electricity Company	masen Moroccan Agency for Solar Energy
Equipment Providers	First Solar, ABB	First Solar	ABENGOA SOLAR, SCHOTT solar, FLABEG	SENER, FLABEG

Development of value chain in GCC

Small Scale

Developers working with DEWA's Shams Dubai

Key Enablers

- Commercial opportunities for diesel replacement
- Government programmes *e.g.* Shams Dubai

Key issues

- Difficulties in attracting finance
- Limited public know-how and advertising costs
- Lack of local manufacturing and/or distributors – limited availability of parts

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Development of renewable energy of value

Local manufacturing

Poly Silicon

QStec qatar solar technologies

REC Silicon

IDEA Polysilicon

Inverters

AEC

new energy.

Mounting Structures

TigerPROFILES The Roof & Cladding Company

AL JAZIRA Metal Industries Co L.L.C.

Modules

SOLON

Almaden®

DUSOL Industries LLC

قطر للطاقة الشمسية QATAR SOLAR ENERGY

Key enablers of local manufacturing

- Favorable taxes regime
- Strategic location
- Infrastructure (roads, ports, etc.)
- Lower electricity costs
- Expectations from GCC market

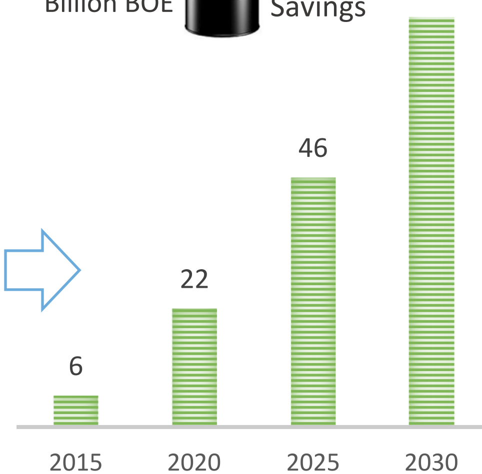
Conclusion

Renewable energy development brings multiple benefits

International Renewable Energy Agency

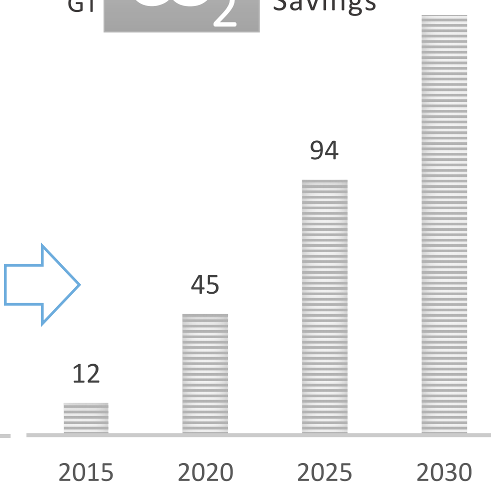
	Target	*Year*
Bahrain	5%	2020
Kuwait	15%	2030
Oman	10%	2020
Qatar	2%	2020
KSA	54GW	2032
Abu Dhabi	7%	2020
Dubai	6GW	2030

3.4 Billion BOE Cumulative Fuel Savings

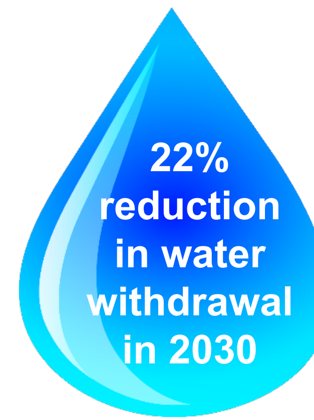


ANNUAL FUEL SAVING (MTOE)

1.3 GT CO_2 Cumulative Emission Savings



ANNUAL EMISSION SAVING ($MTCO_2$)



170,000 Jobs Every Year (on average)

90-125 Billion $ Discounted* Fuel Savings

7 Billion $ Monetized and Discounted* CO_2 Savings

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Thank you!