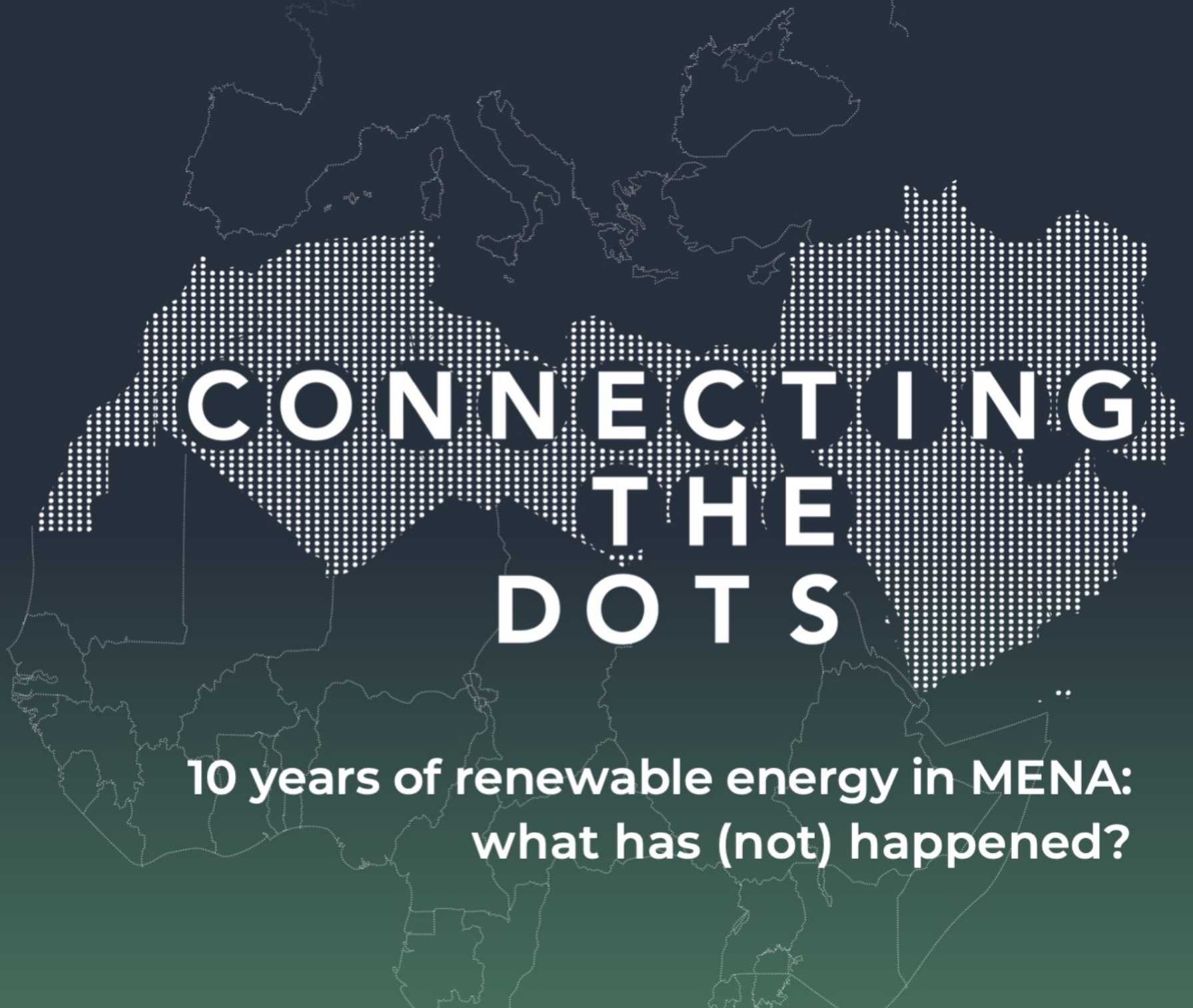
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CONNECTING THE DOTS

10 years of renewable energy in MENA: what has (not) happened?

Acknowledgments

Production: RES4Africa Foundation, Rome, Italy
Supervisor: Roberto Vigotti, RES4Africa Foundation
Lead coordinator: Luca Traini, RES4Africa Foundation

Authors: Daniele Guzzo (RES4Africa Foundation), Matthieu Ledauphin (Enel Green Power)
Hammi Ibtissem (Enel Green Power), Luca Traini (RES4Africa Foundation)
Contributors: Silvia Piana (Enel Green Power), Ilaria Urbani (RES4Africa Foundation) Rima Jreich (RES4Africa Foundation), Chiara Maero (RES4Africa Foundation), Carlo Cecchetti (RES4Africa Foundation), Iarina Ciceu (RES4Africa Foundation)

Graphic Design: Gangemi Editore

Disclaimer: The views expressed are solely those of the authors.
This publication was lunched during a RES4Africa Webinar
hold on the 26th of October and is available for download on: www.res4africa.org/library.
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For further information: info@res4africa.org
© July 2020, RES4Africa Foundation
Via Ticino, 14 – 00198, Rome
T: +39 06 85355598 -www.res4africa.org

The study was developed
in collaboration with
Enel Green Power

Introduction

RES4Africa Foundation, in collaboration with Enel Green Power, presents an overarching analysis to look at what happened in the renewable energy sector in the last 10 years in the Middle East and North Africa (MENA) region, what limited the renewable energy growth and what is expected to happen if urgent action is not taken.

The analysis focuses on the main features of the Region, its socio-economic context, its strengths and vulnerabilities, which greatly vary from one country to the other. Taking into account the wide range of differences that characterize the Region and building on facts and figures, the study presents what would be needed to achieve access to affordable, reliable, sustainable energy for all.

Why MENA?

The countries of Middle East and North Africa share many common features, despite a heterogenous history and background.
The last decade has seen a general deterioration in many economic and social indicators across the region, as well as insufficient progress in delivering consistent additional RES capacity.
MENA is differentiated in many respects (high/low income, oil import/export, geopolitical stability/instability) but despite this differentiation, it is possible to observe similarities among these seemingly very different countries… and connect the dots.

Preface

This decade will be crucial to understanding if we will be able to achieve the ambitious goals in our fight against climate change set by the international agenda, that urged a global effort to stay well below 2°C and towards 1.5°C.

The Middle East and North Africa are endowed with an enormous potential to play a central role in the global clean energy transition, grounded on renewable energies. Being home to some 6% of the global population with almost 100% coverage in terms of access to electricity, MENA represented only 1% of global RES capacity additions in the last decade, remaining extremely far from its potential. This, together with economies traditionally dependent on hydrocarbons, jeopardizes the possibilities of the Region to shift towards a greener future.

The Covid-19 outbreak has had severe impacts on the energy sector worldwide, and its consequences will have implications for years, making it even more paramount to get our fight against climate change and its devastating effects back on track. MENA countries in particular experienced severe socio-economic impacts as a consequence of the dual shock generated by the pandemics and the collapse of global oil demand.

Preface

Unleashing MENA's renewable energy potential requires simultaneous efforts in four main areas: i) improving regulatory frameworks across the region at a faster pace, ii) rapidly changing the energy mix to capitalise on the global shift towards a greener economy, iii) attract the necessary investments by reducing risk perception and iv) place younger generations at the centre of this epochal change.

To achieve this, strong political commitments have to be made today, even if changes might only be visible at a later stage. The Cooperation among countries will be pivotal to driving structural change in the regional energy market that could scale up the capacity of MENA to cope with growing energy needs.

Building on the success of last year's first edition, RES4Africa Foundation and Enel Green Power decided to dedicate the 2021 Connecting the Dots publication to analysing what has happened in the MENA Region in the last decade and how its huge unexpressed potential could be unlocked. This publication represents a platform for an open dialogue and for exploring ideas for achieving ambitious goals on the path towards a new global energy ecosystem.

It is not an easy task, but the time to act is now.



Salvatore Bernabei
President at RES4Africa Foundation
CEO of Enel Green Power
Head of Enel Global Power Generation

Abbreviations and acronyms

AFED – Arab Forum for Environment and Development
AMCE – Arab Ministerial Councils of Electricity
BNEF – Bloomberg New Energy Finance
C&I – Commercial and Industrial
FDI – Foreign Direct Investments
GCC – Gulf Cooperation Council
GDP – Gross Domestic Product
GW – Giga Watt
IEA – International Energy Agency
ILO – International Labour Organization
IPCC – Interngovernmental Panel on Climate Change
IPP – Indpendent Power Producer
IRENA – International Renewable Energy Agency
ME – Middle East
MENA – Middle East and North Africa
MWh – Megawatt per hour
NA – North Africa
OECD - Organization for Economic Co-operation and Development
PAEM – Pan Arab Electricity Market
PPA – Power Purchase Agreement
RE – Renewable Energy
RES – Renewable Energy Sources
RISE – Renewable Indicator for Sustainable Energy
QFD – Quasi Fiscal Deficit
TES – Transformative Energy Scenario
TWh – Terawatt per hour
UAE – United Arab Emirates
WB – World Bank
WGI – Worldwide Governance Indicators

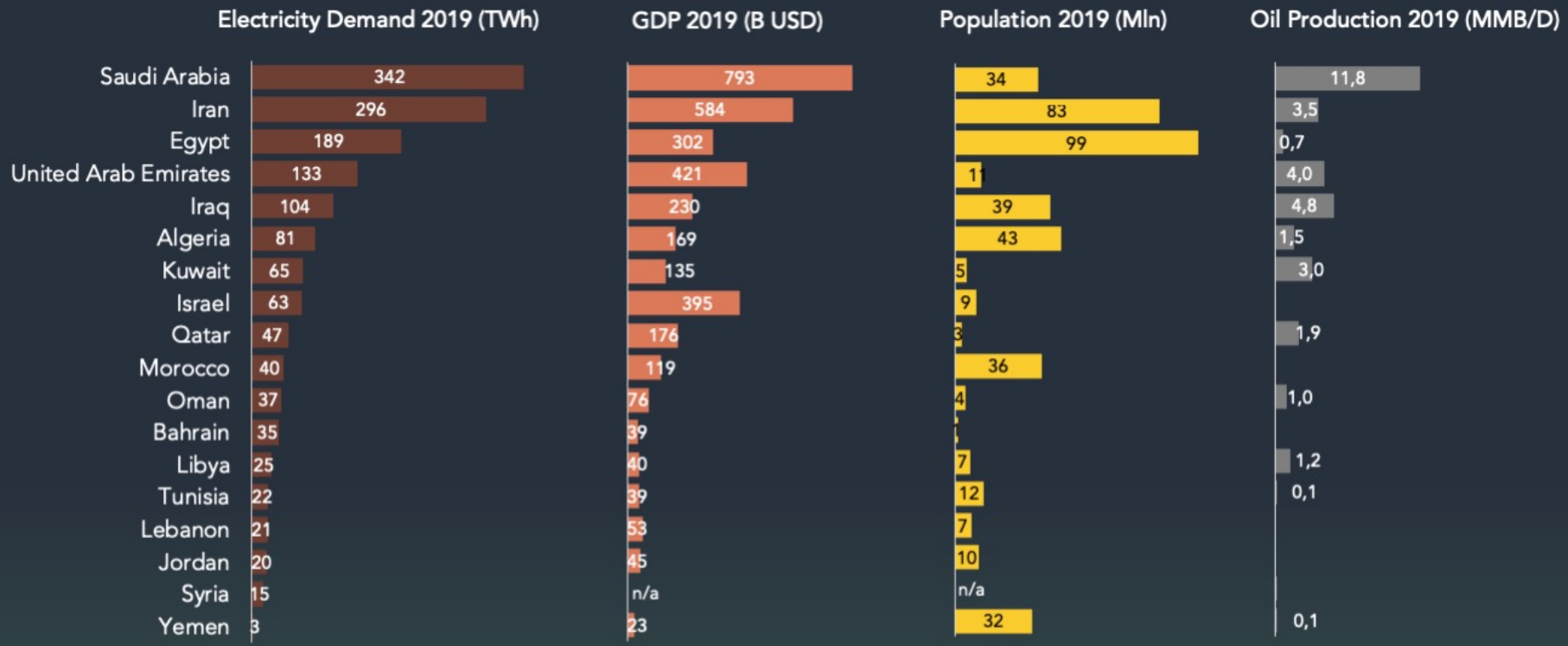
Geographic scope of work

The study includes 19 countries of the Middle East and North Africa Region: Bahrain, Iran, Iraq, Jordan, Israel, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, West Bank and Gaza, Yemen, Morocco, Algeria, Libya, Tunisia and Egypt.

Any deviation from this country grouping in the data provided is further specified within the study in the “notes” section.



Mena in numbers



Total 18 MENA's Countries	1538 TWh	3637 B$	435 Mln	33,6 MMB/D
MENA's share of the World	6%	4%	6%	35%

MENA is home to 6% of the world's population, and accounts for the same share of global power demand.
More than 50% of the region's total electricity demand comes from just three countries.
The region is home of more than a third of global oil production.

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- Much has changed in the last decade but not always for the better
- Climate change is having a tangible impact on the region
- But renewable energy potential remains largely untapped

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- The regulatory framework has improved, but most RE targets remain unachieved
- The power sector faces a wide range of challenges
- High risk perception strongly affects private investments
- MENA economies still heavily rely on fossil fuels

Chapter 3
The time to act is now

- The energy transition can only happen by addressing structural challenges
- An improved policy and regulatory framework will boost sustainable investments
- Reforms and cooperation among countries will strnghten the power sector and enhance regional trade
- Decoupling traditional energy sources from the region's growth model will contribute to economic resilience

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Much has changed in the last decade but not always for the better

Climate change is having a tangible impact on the region

But renewable energy potential remains largely untapped

1. What happened in the last 10 years

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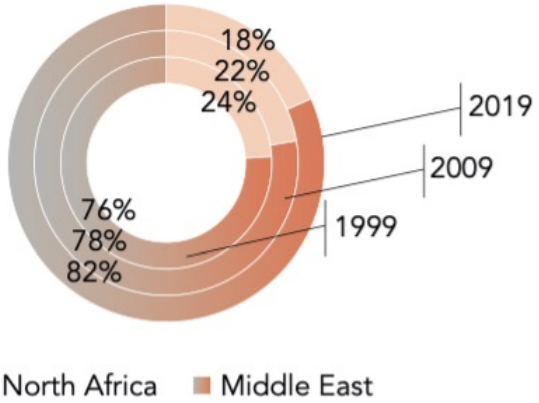
1. What happened in the last 10 years

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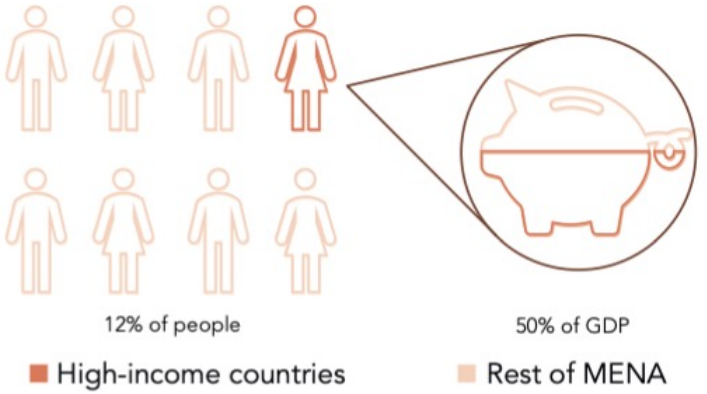
MUCH HAS CHANGED IN THE LAST DECADE BUT NOT ALWAYS FOR THE BETTER

The Middle East is growing at a faster pace than North Africa, while GDP is concentrating in a few high-income countries

GDP SHARE OVER TIME



HIGH-INCOME COUNTRIES SHARE OF MENA POPULATION AND GDP



In the last decade, GDP growth has slowed down with respect to 2000-09. The share of NA in MENA's GDP has decreased by 6 percentage points over the last 10 years.

Despite representing only 12% of the total MENA population, high-income countries retain more than 50% of the total GDP. In 2018, Saudi Arabia and the United Arab Emirates alone accounted for about 30% of the total GDP of the Region.

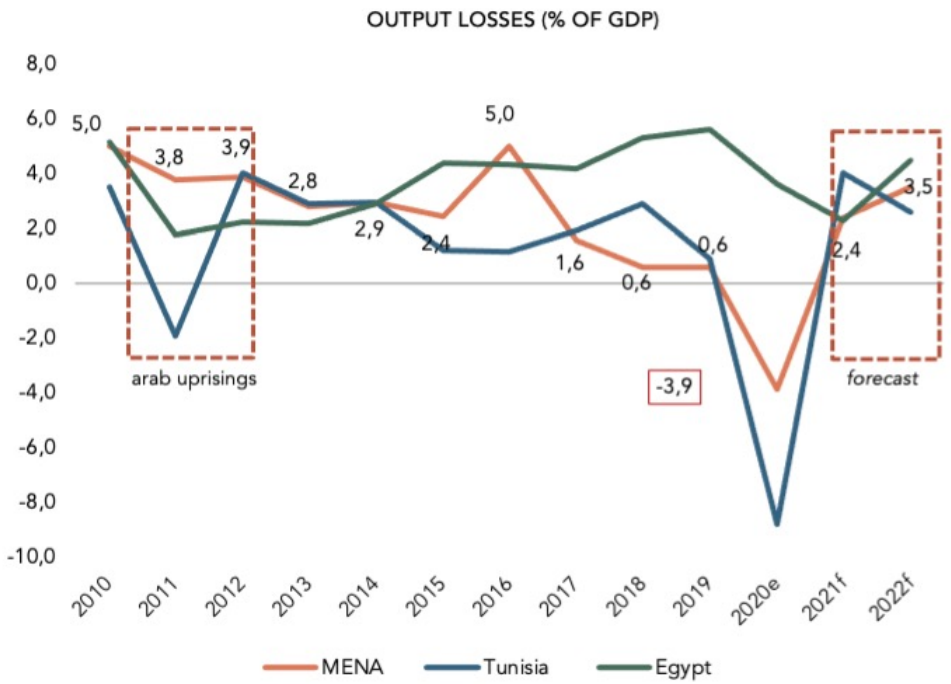
Notes: High income countries: Oman, Bahrein, Kuwait, Saudi Arabia, Qatar and United Arab Emirates

Source: World Bank, various years

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MUCH HAS CHANGED IN THE LAST DECADE BUT NOT ALWAYS FOR THE BETTER

The COVID-19 pandemic caused output losses of an estimated 3,9% in 2020



Economic activity in the Middle East and North Africa is forecast to recover to 2.4% in 2021. However, this represents a weaker performance than what was forecasted in early 2020, reflecting the repercussions of the pandemic and drop of oil prices.

The recovery is contingent on the containment of the pandemic and the rollout of vaccines in the second half of 2021, and the levelling-off of geopolitical tensions.

By 2022, after two years of expected recovery, output is still predicted to remain below the level projected prior to the pandemic, with a larger impact on oil importers than exporters. Effects of the new waves of contagions are yet to be estimated

Notes Syrian Arab Republic, Yemen and Libya are not included due to unavailable data

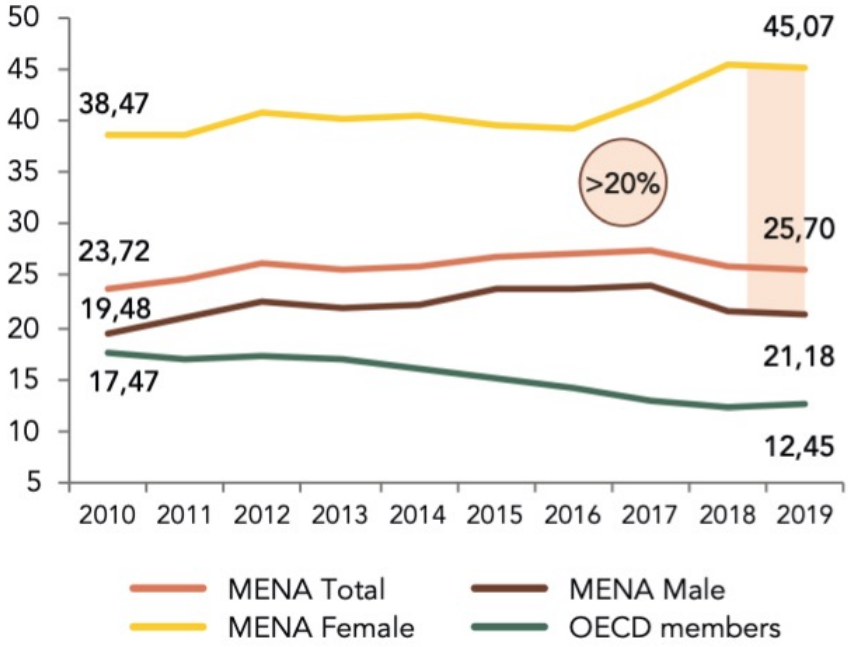
Source: **World Bank, Global Economic Prospects MENA, 2021**

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MUCH HAS CHANGED IN THE LAST DECADE BUT NOT ALWAYS FOR THE BETTER

Unemployment and gender employment gap are among the highest globally

YOUTH UNEMPLOYMENT RATE (%)



The youth unemployment rate in the MENA region has been the highest in the world for over 25 years, reaching 27% in 2017.

Data from 2019 show that unemployment is twice as prevalent among females as among males. The general picture appears even more critical when compared to the OECD countries' average.

Following 30 years of constant reduction, extreme poverty has risen again: in just three years, from 2015 to 2018, the percentage of people under the extreme poverty line has doubled, from 3.8% to 7.2%, mainly due to conflicts in Yemen and Syria.

Notes: «Youth» refers to the 15 -24 age cohort

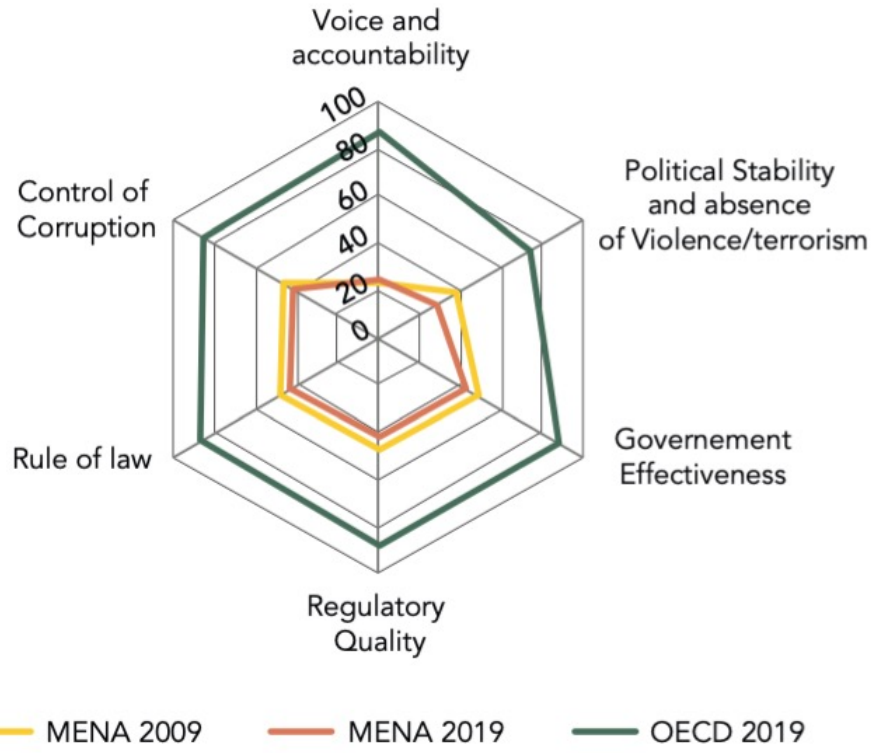
Source: ILO, Global Employment Trends for Youth, 2020

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MUCH HAS CHANGED IN THE LAST DECADE BUT NOT ALWAYS FOR THE BETTER

The quality of governance at regional and national level has decreased

WORLDWIDE GOVERNANCE INDICATORS



Governance in the region has deteriorated over the course of the last decade, and MENA lags behind the OECD in all of the World Bank's Worldwide Governance Indicators.

Most of the improvements observed have occurred in the Gulf Cooperation Council Countries. The UAE in particular has witnessed improvements, albeit minor, in most of the indicators examined.

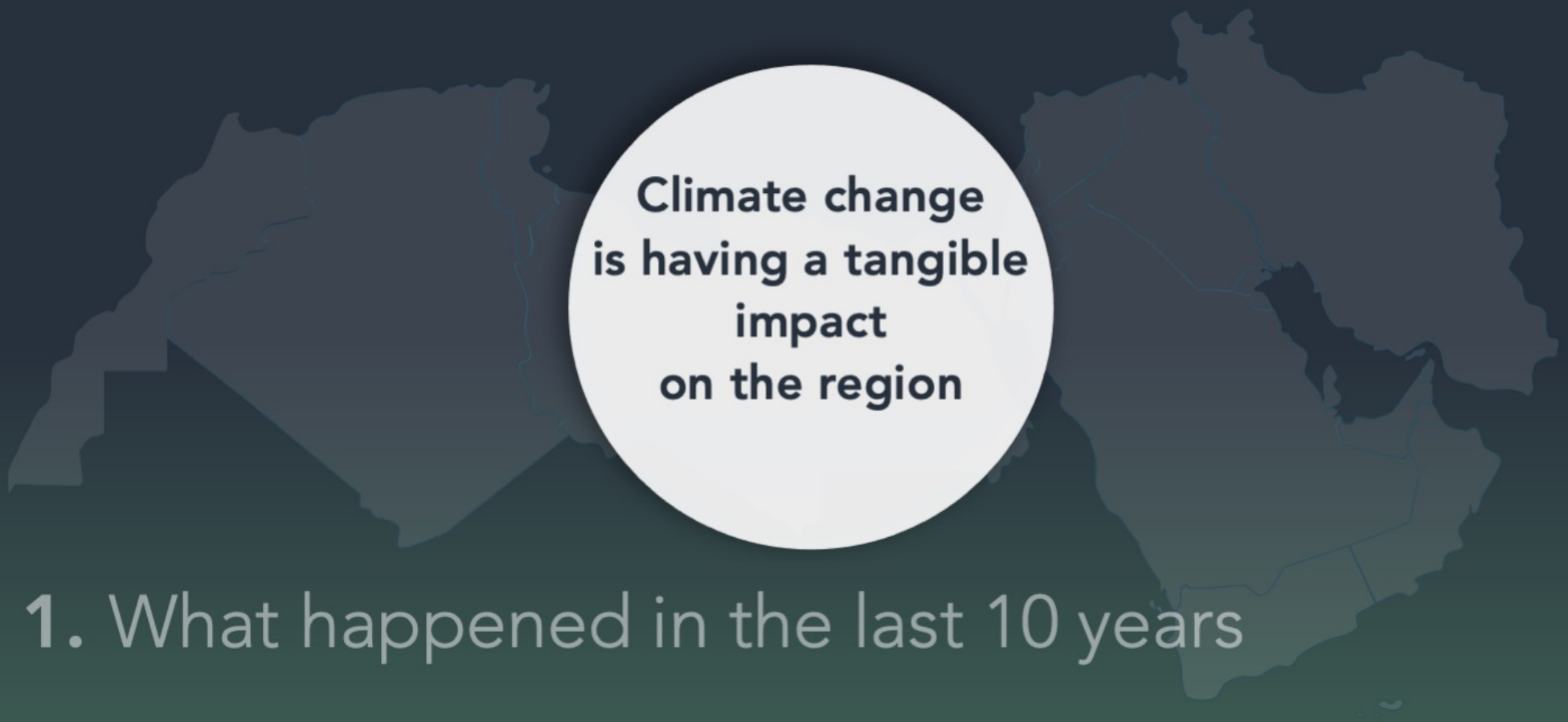
Within North Africa, Tunisia has shown tremendous improvement in the voice and accountability indicator, yet remains far from OECD levels.

Notes «Voice and Accountability»: perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media

Source: World Bank, Worldwide Governance Indicators, 2019

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Climate change is having a tangible impact on the region

1. What happened in the last 10 years

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CLIMATE CHANGE IS HAVING A TANGIBLE IMPACT ON THE REGION

MENA will be one of the most impacted area globally

Droughts and water stress

The region has almost continuously been subject to droughts, with the current dry period being the worst in 900 years.

Migration

The effect of climate change is one of the push factor for migration generating between **10% and 20% of the total migration in the region**.



Temperature rise

By the end of the century, daytime highs could reach 50°C, with 200 days of exceptional heat every year. **Cities in the region may become uninhabitable before 2100.**

Sea Level Rise

MENA region coastal areas are **among the most vulnerable places on earth to rising sea levels.**

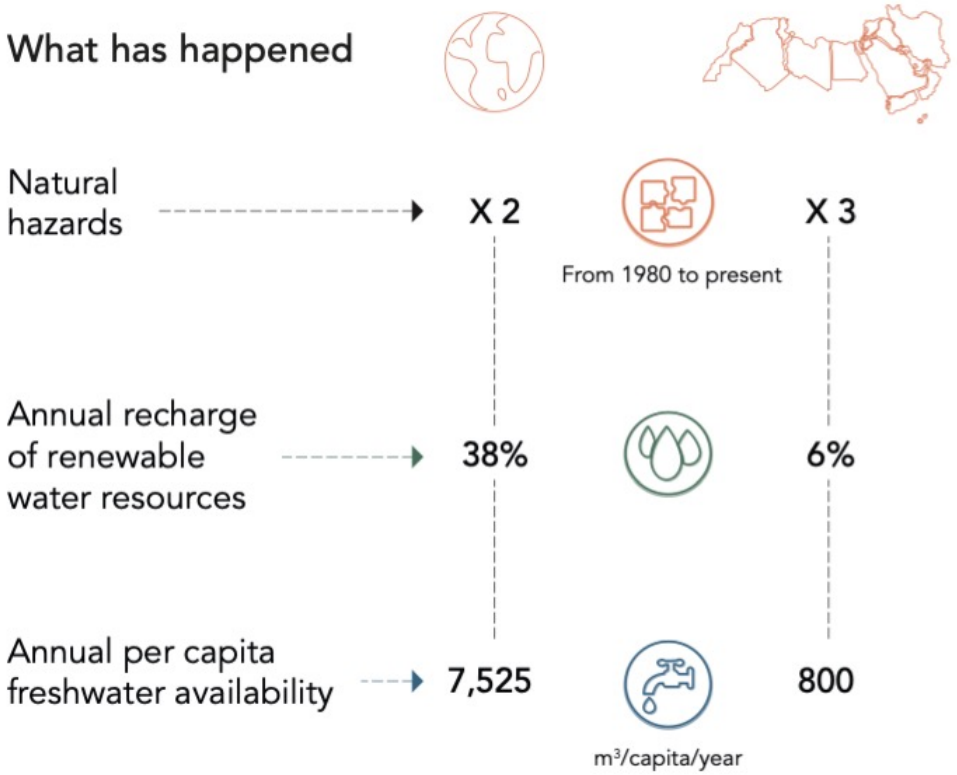
Source: World Bank, GFDRR -The making of a riskier future: How our decisions are shaping future disaster risk, 2016;World Economic Forum, How the Middle East is suffering on the front lines of climate change, 2019; Max Planck Institute/Peter Hergersberg – Hot Air in The Orient , 2016; NASA , Nasa finds drought in eastern mediterranean worst of past 900 years, 2016

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CLIMATE CHANGE IS HAVING A TANGIBLE IMPACT ON THE REGION

The region is characterized by an increase in natural hazards and the progressive reduction of natural resources



Globally, the number of natural hazards[1] has almost doubled since the 1980s, while the average number of such events in the MENA region has almost tripled over the same period.

The annual recharge rate of renewable water resources[2] amount to only 6% of its average annual precipitation; compared with a world average of 38%.

During the period 2005 to 2015, annual per capita freshwater availability in the region dropped by about 20%, from 990 to 800 m3. The world average is ten times higher at 7,525 m3/capita/year.

Notes
1. Natural hazards can be atmospheric, seismic, other geologic/hydrogeologic, volcanic, wildfire.
2. Average flow of rivers and recharge of aquifers generated from endogenous precipitation

Source: Wordl Bank, Natural Disasters in the Middle East and North Africa: A Regional Overview, 2014; AFED, Arab Environment in 10 years, 2017; Atlantic Council, Why the MENA region needs to better prepare for climate change, 2019

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CLIMATE CHANGE IS HAVING A TANGIBLE IMPACT ON THE REGION

The effects of climate change could endanger the livelihoods of millions

What could still happen



4°C scenario → +4°C

Crop yields → -30% -60%

Impact on GDP → -6%

If no mitigation measures are taken, the IPCC expects a temperature increase of 4˚C by 2100 relative to pre-industrial levels.

Crop yields could decrease by up to 30% for a 1.5–2°C increase and by almost 60% for a 3–4°C increase, particularly for crops grown in the summer period, such as legumes and maize.

The region is expected to have the greatest economic losses from climate change-related water scarcity as of **GDP may decline by as much as 6% by 2050** due to water-related impacts on agriculture, health, and incomes.

Source: IPCC, Assessment Report (AR5), 2014; World Bank/EBRD, High and Dry: Climate Change, Water, and the Economy, 2016

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CLIMATE CHANGE IS HAVING A TANGIBLE IMPACT ON THE REGION

RES can be a means to tackle climate change adaptation and mitigation

ESTABLISH A MORE RESILIENT ECONOMY



- RES are less geographically concentrated than fossil fuels.
- RES can be deployed at almost any scale and better lend themselves to decentralised forms of energy production and consumption.
- RES are a powerful vehicle of democratization: decentralized energy supply empowers citizens and local communities

LIMIT DEPENDENCE ON FOSSIL FUELS



- Fossil fuels are stocks and can therefore be stored, which is useful; but they can be used only once. RES are energy flows that do not exhaust and are harder to disrupt.
- RES have nearly zero marginal costs.
- RES could support oil importers in becoming electricity exporters and reduce dependency from exporters

CREATE GREEN JOBS OPPORTUNITIES

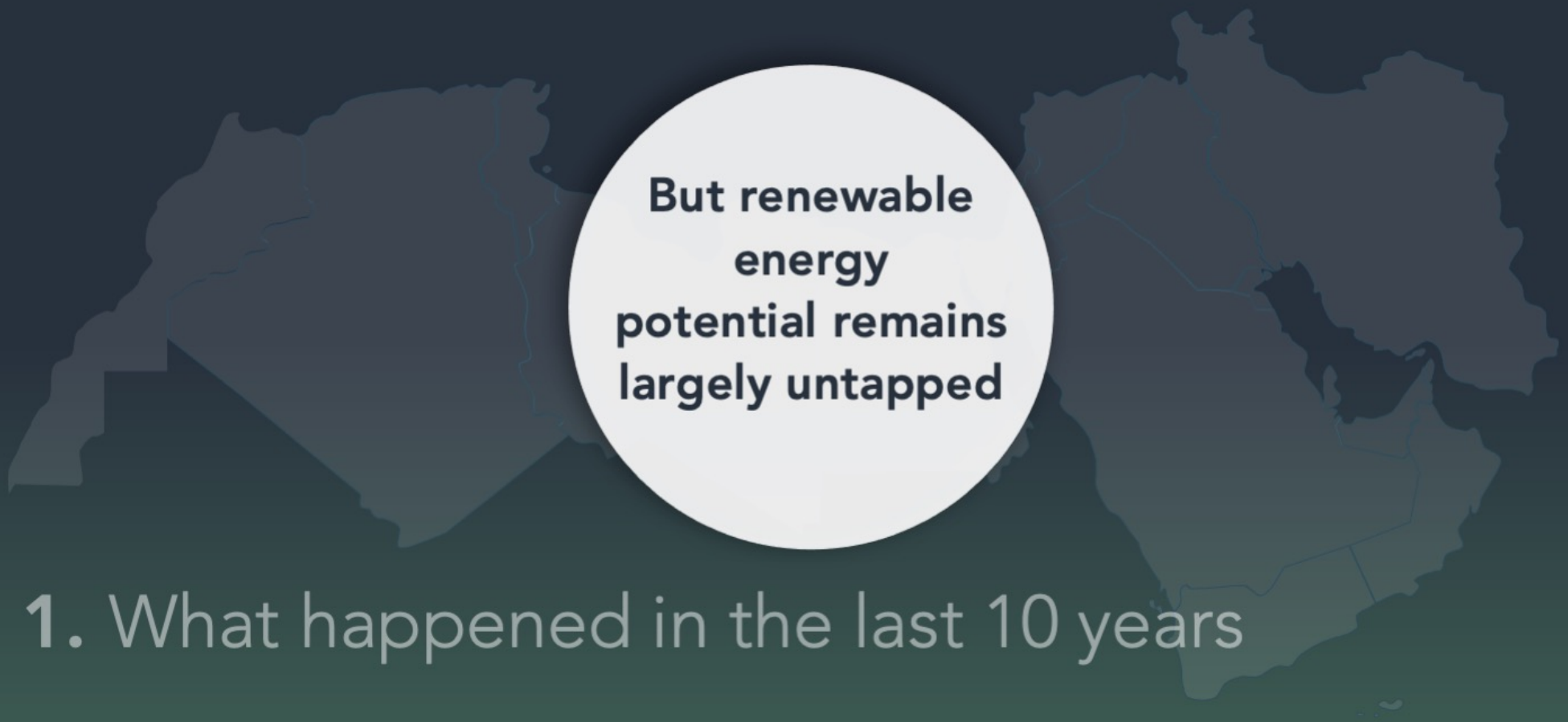


- Investments in renewables have the potential to generate three times as many jobs than the fossil fuel industry (per million dollars spent)
- These jobs cover a range of sectors, from academia and research to manufacturing, O&M etc.
- With the right support in the transition phase, it will be possible to obtain the socio-economic shift from the fossil fuel industry.

Source: IRENA; Renewable Energy and Jobs Annual Review, 2020

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1. What happened in the last 10 years

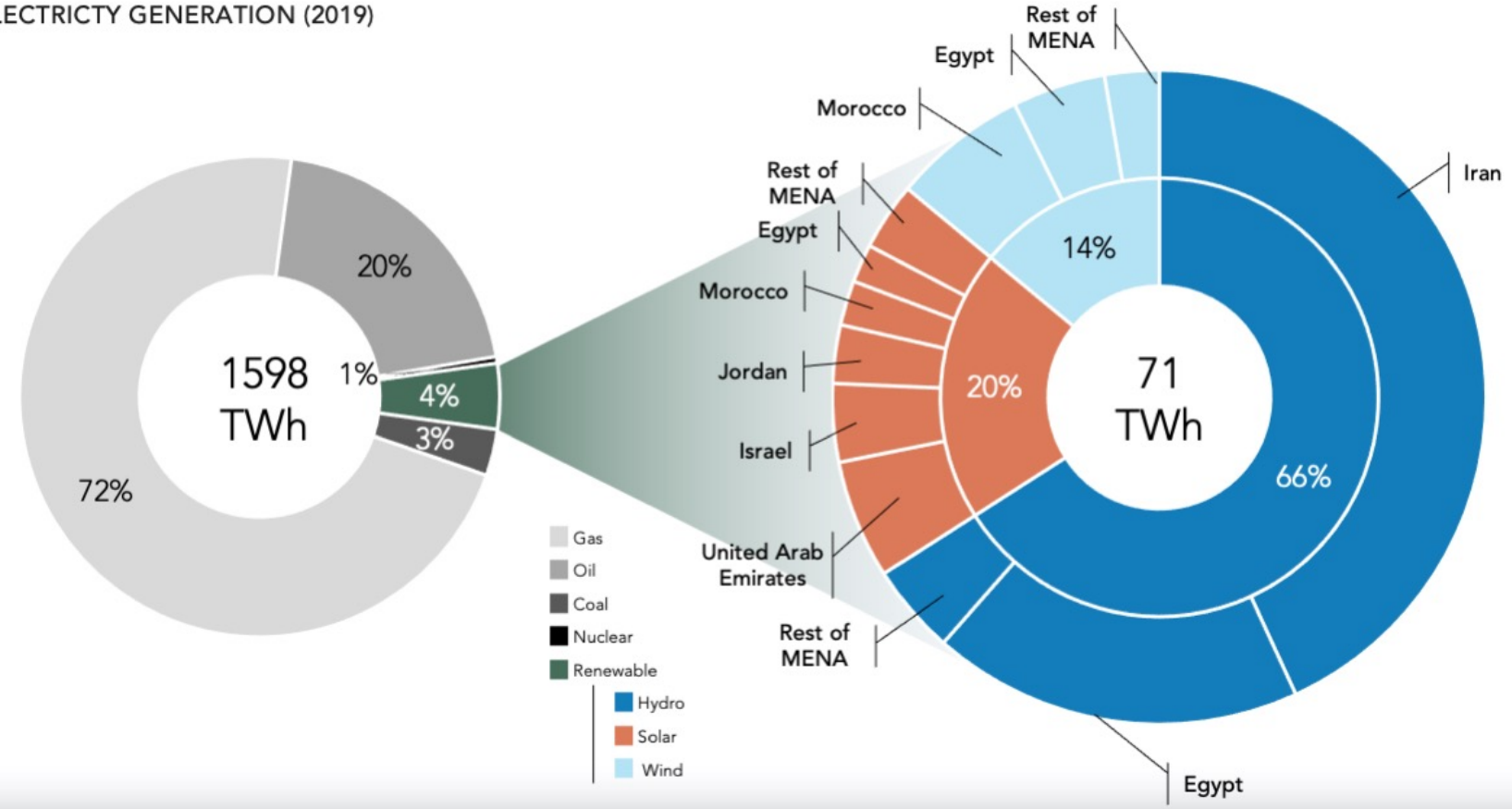
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BUT RENEWABLE ENERGY POTENTIAL REMAINS LARGELY UNTAPPED

Only 4% of power generation comes from renewables

MENA'S ELECTRICTY GENERATION (2019)



Source: Enerdata, 2019

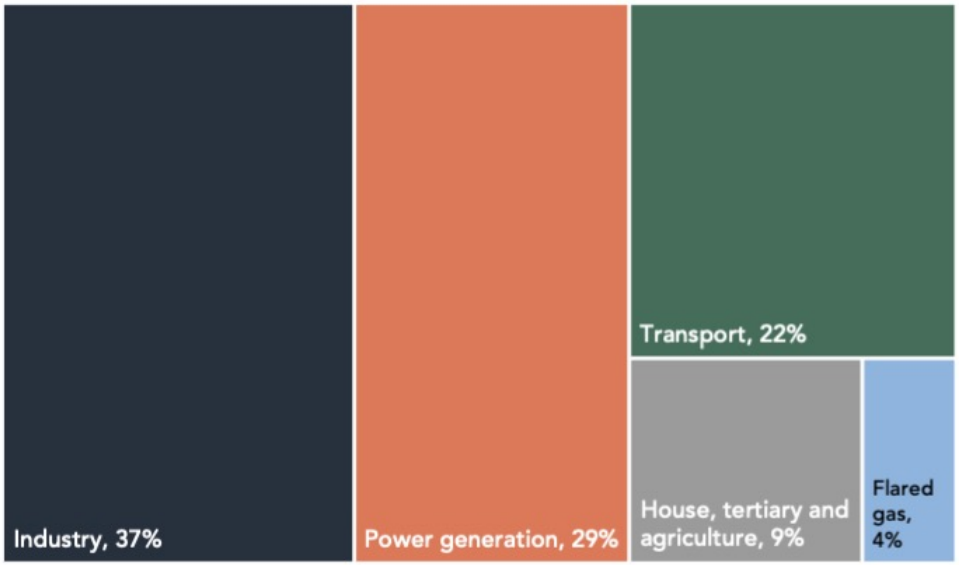
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BUT RENEWABLE ENERGY POTENTIAL REMAINS LARGELY UNTAPPED

Power generation is one of the major sources of CO2 emissions

CO2 EMISSIONS BY SECTOR IN MENA (2017)



Total MENA (18 countries – 0,4 bl ppl) : 2,66 Gt

Power generation is the second-largest source of CO2 emissions In the region, where more than 90% of the electricity comes from fossil fuels.

The per capita emissions of the oil & gas exporting countries are some of the highest in the world.

Per capita CO2 emissions are uneven across the region, ranging from 38 kt in Qatar to 0.4 kt in Yemen, compared to an OECD average of around 9.4 kt.

Most oil exporting countries per capita emission fall above the OECD average (by doubling it), with Iran, Iraq and Algeria being the exceptions.

Source: Enerdata, 2017

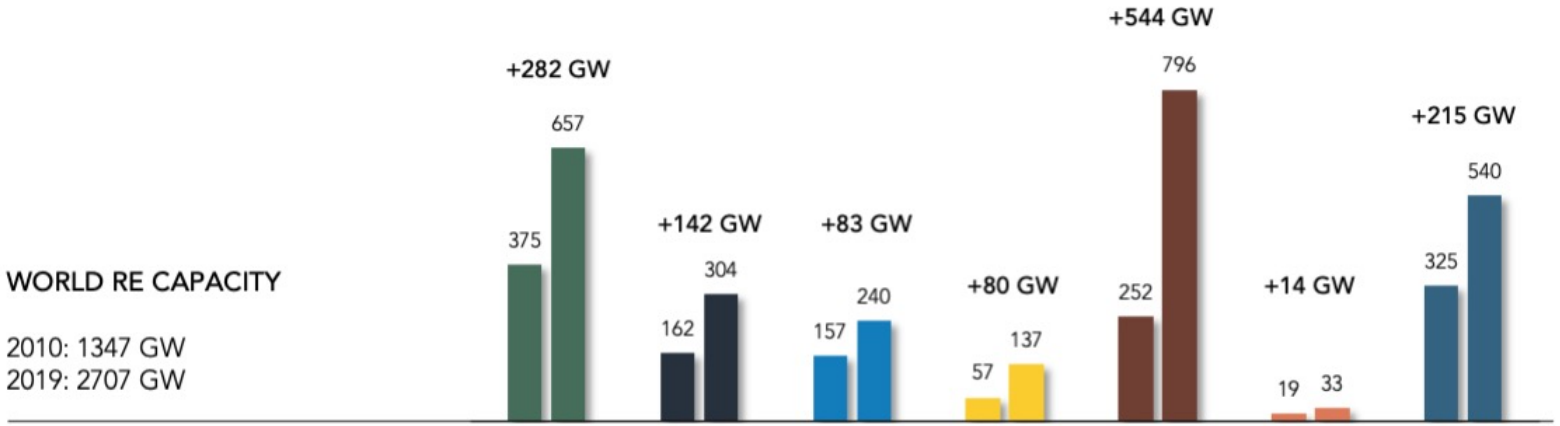
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BUT RENEWABLE ENERGY POTENTIAL REMAINS LARGELY UNTAPPED

Only 1% of global RE capacity addition over the last decade occurred in MENA

MENA's share of RE additional capacity 2010-2019 **doesn't match its share of electricity demand**



Share of RE installed capacity added 2010 - 2019	21%	10%	6%	6%	40%	1%	16%	World **+1360 GW**
Electricity demand 2019	18%	16%	5%	6%	27%	6%	21%	World **25,4 PWh**

Source: WEO 2020, Enerdata, 2010 - 2019

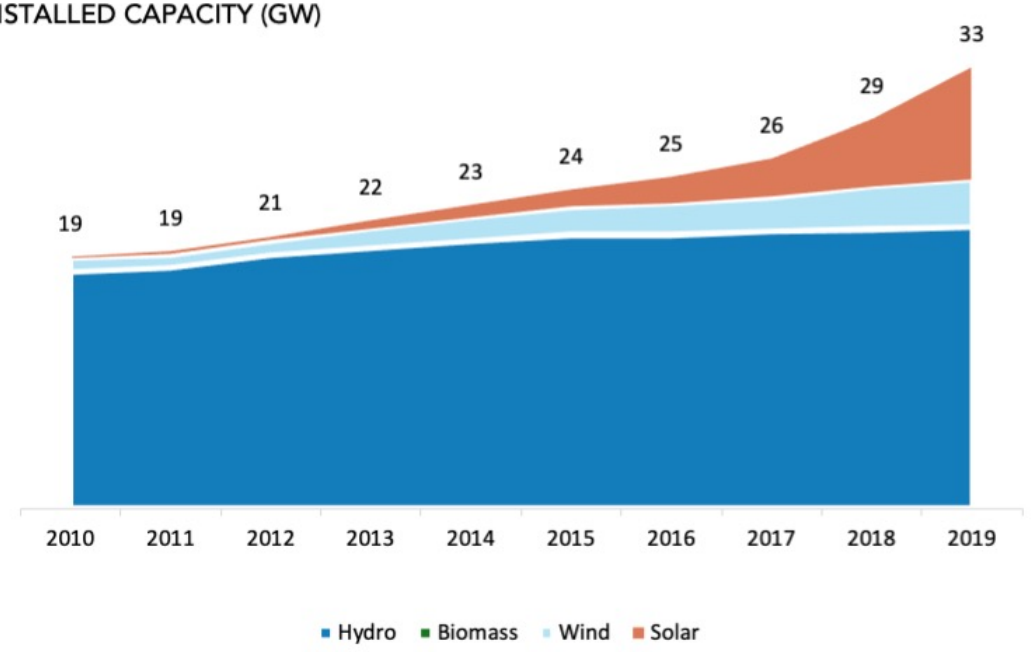
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BUT RENEWABLE ENERGY POTENTIAL REMAINS LARGELY UNTAPPED

Most RE capacity comes from large hydro, although solar and wind is growing rapidly

Wind and solar capacity represented more than 35% of RE capacity in 2019, compared to only 6% in 2010

INSTALLED CAPACITY (GW)



SHARE OF RE CAPACITY IN 2019

- Solar **25%**
- Wind **11%**
- Geo & bioenergy **0,1%**
- Large hydro **63,9%**

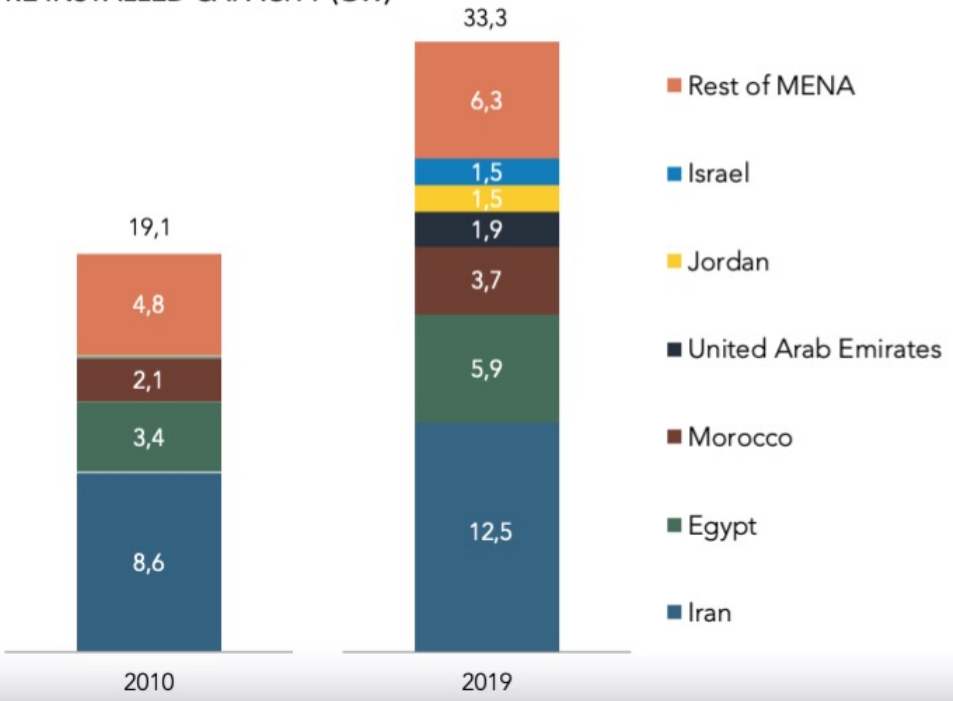
Source: Enerdata, 2010 - 2019

BUT RENEWABLE ENERGY POTENTIAL REMAINS LARGELY UNTAPPED

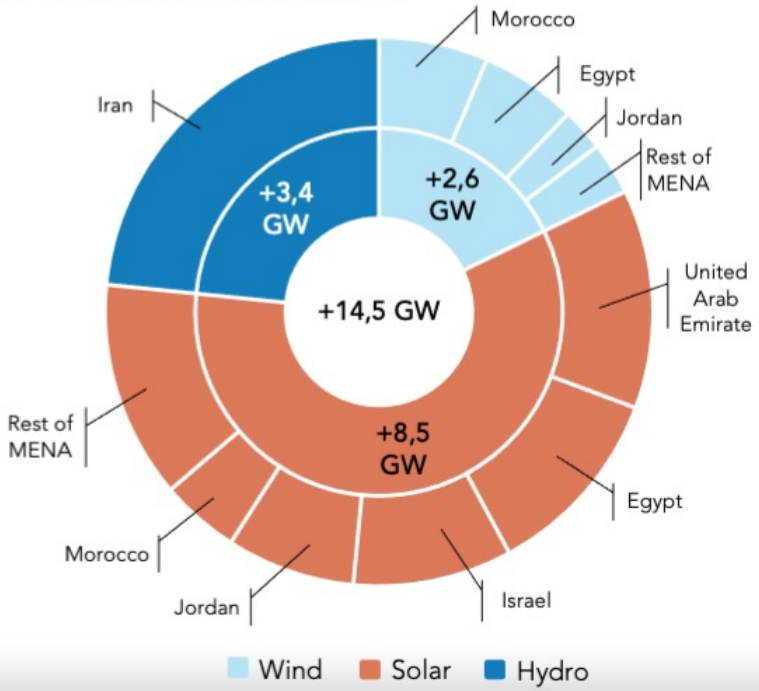
RE growth has been unbalanced and concentrated in a handful of countries

5 countries (Egypt, United Arab Emirates, Morocco, Jordan and Israel) accounted for more than 80% of the additional solar and wind capacity.

RE INSTALLED CAPACITY (GW)



2010-19 RE ADDITIONAL CAPACITY



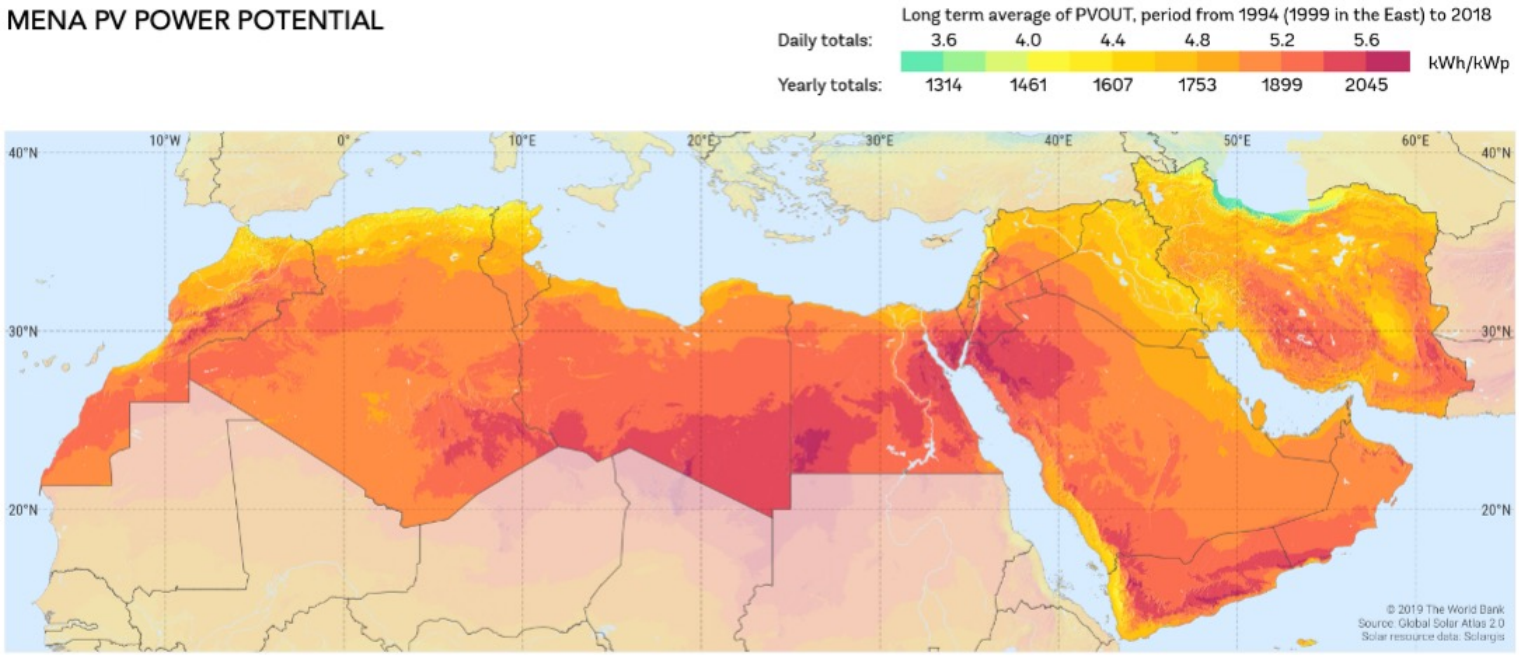
Source: Enerdata, 2010 - 2019

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BUT RENEWABLE ENERGY POTENTIAL REMAINS LARGELY UNTAPPED

Renewable energy could support the expansion of power generation and significantly cut emissions

MENA PV POWER POTENTIAL



MENAI Solar **installed capacity** in 2019
0.008534 TW

MENA **Electricity Demand** in 2019
1538 TWh

Potential Capacity
2.5 TW

Potential Production
4250 TWh

Almost **3 times** MENA's electricity demand

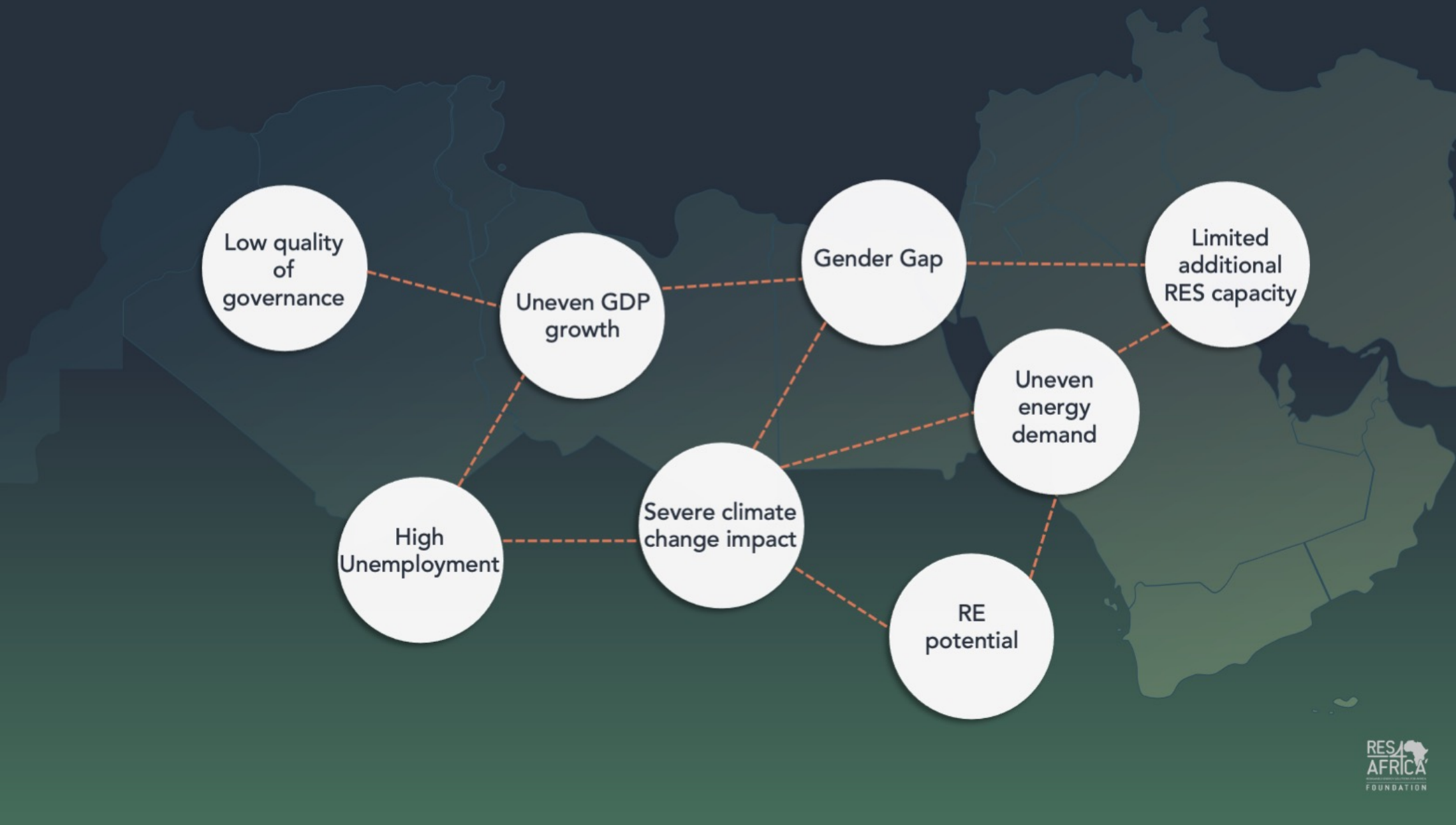
Notes The solar map provides a summary of estimated Solar PV power generation potential. It represents the average daily/yearly totals of electricity production from 1 kW-peak grid-connected solar PV plant, covering a period from 1994 to 2018 in the MENA region.

Source: World Bank, ESMAP, Solargis

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What happened in the last 10 years



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The regulatory framework has improved, but most re targets remain unachieved

The power sector faces a wide range of challenges

High-risk perception strongly affects private investments

MENA economies still highly rely on fossil fuels

2. What limited the RE growth

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2. What limited the RE growth

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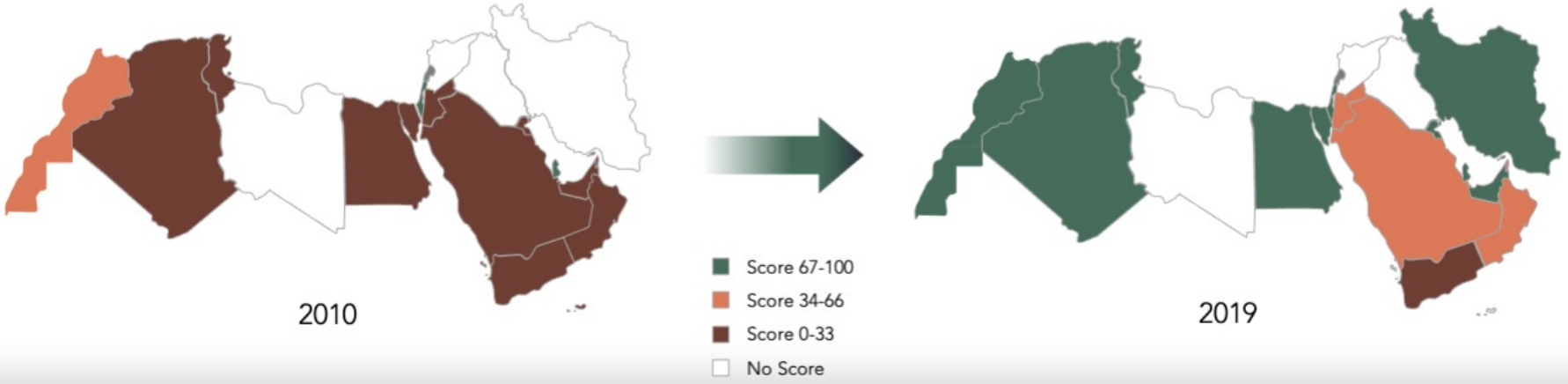
THE REGULATORY FRAMEWORK HAS IMPROVED, BUT MOST RE TARGETS REMAIN UNACHIEVED

Regulatory frameworks have developed over the last decade

RISE scores reflect a snapshot of a country's policies and regulations in the energy sector, organized by the three pillars of sustainable energy: energy access, energy efficiency, and renewable energy.

Between 2010 to 2019, the MENA region's RISE scores rose significantly, with Algeria and Egypt emerging as the countries demonstrating the most substantial improvement over the period.

RENEWABLE ENERGY RISE SCORE BY COUNTRY IN MENA (2010 VS 2019)



Source: RISE – ESMAP, 2010 - 2019

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THE REGULATORY FRAMEWORK HAS IMPROVED, BUT MOST RE TARGETS REMAIN UNACHIEVED

Commitments have been made but they are proving difficult to keep

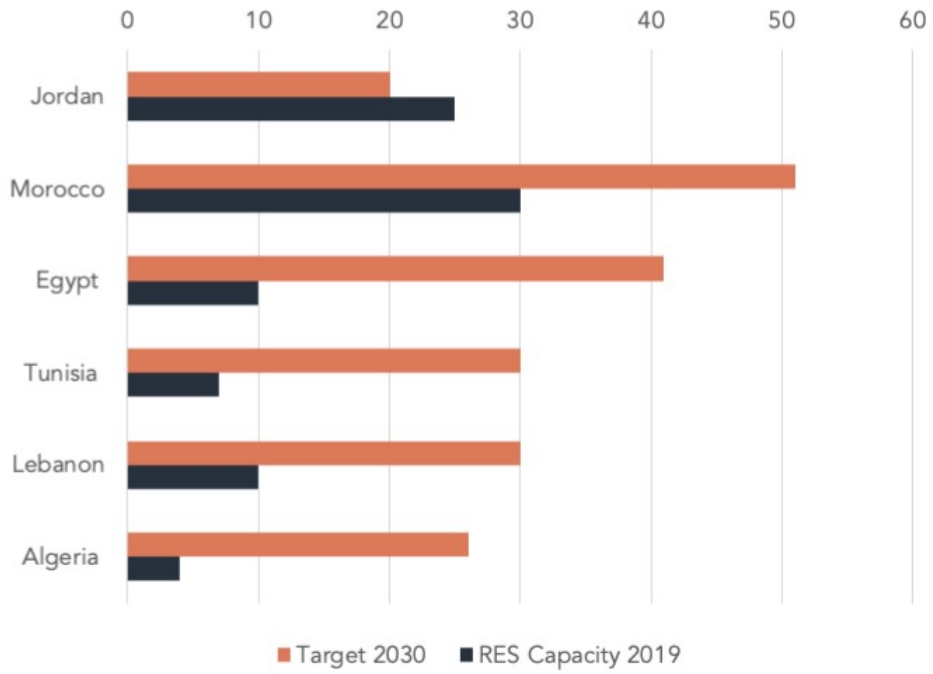
Most of the Countries (18) have adopted national renewable energy targets. But only:

- **10 Countries** have updated targets (set or reviewed after 2015)
- **10 Countries** have targets differentiated per technology
- **8 Countries** have mid-term milestones

Eye-catching targets are often trumpeted by administrations eager to show their green credentials

- Only Morocco and Egypt are on track to meet their respective targets.
- Jordan has already met its official target of 20% of RES production by 2025

PROGRESS TOWARD RE TARGETS AS OF 2019



Notes West Bank and Gaza have not set national targets

Source: Enerdata, 2019

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Most of the countries have adopted supporting policies

- Regulation and supporting schemes vary across the region as not all the countries have reached the same level of market openness for IPPs
- Tenders are the more common tool, despite a lack of structured programs such as GetFit or Scaling Solar as of yet

	Auction C&I Market (HV open and MV in the process of being opened to the market) PPA with Single Buyer Self-Generation
	Auction PPA with Single Buyer Self-Generation
	Auctions PPA with Single Buyer C&I Market Direct Assignment
	Auction PPA with Single Buyer FiT (never used) C&I Market (implemetation missing)
	Auction PPA with Single Buyer FiT Self Generation

CONNECTING THE DOTS

THE REGULATORY FRAMEWORK HAS IMPROVED, BUT MOST RE TARGETS REMAIN UNACHIEVED

Space for improvements still remains at all levels

Regulatory and Policy Risks are perceived as high by investors.
Laws and regulations currently in place are rather strong, but barriers stem from their inadequate, incomplete or delayed implementation.

Regulation

- Politics often interfere with regulatory progress
- Poor or inadequate implementation due to lack of secondary legislation
- Very slow amendment processes





Tenders

- Lack of transparency: and standardized documentation
- Slow auction processes
- Cancellation / downsizing of capacity are common (10.000 MW in the last 10 years as of 2020)
- Local content requirements often too high with unrealistic industrial projects (Algeria)

PPAs

- Lack of bankability
- Currency convertibility issues
- Sovereign Guarantees are often a problem
- In some cases (Algeria) IPPs must secure financing from a local bank, which may be reluctant to fund RES Projects.





Business Environment

- Eye-catching unrealistic targets (Algeria)
- Lack of transparency on key elements, such as tariffs, that are not published by Regulator

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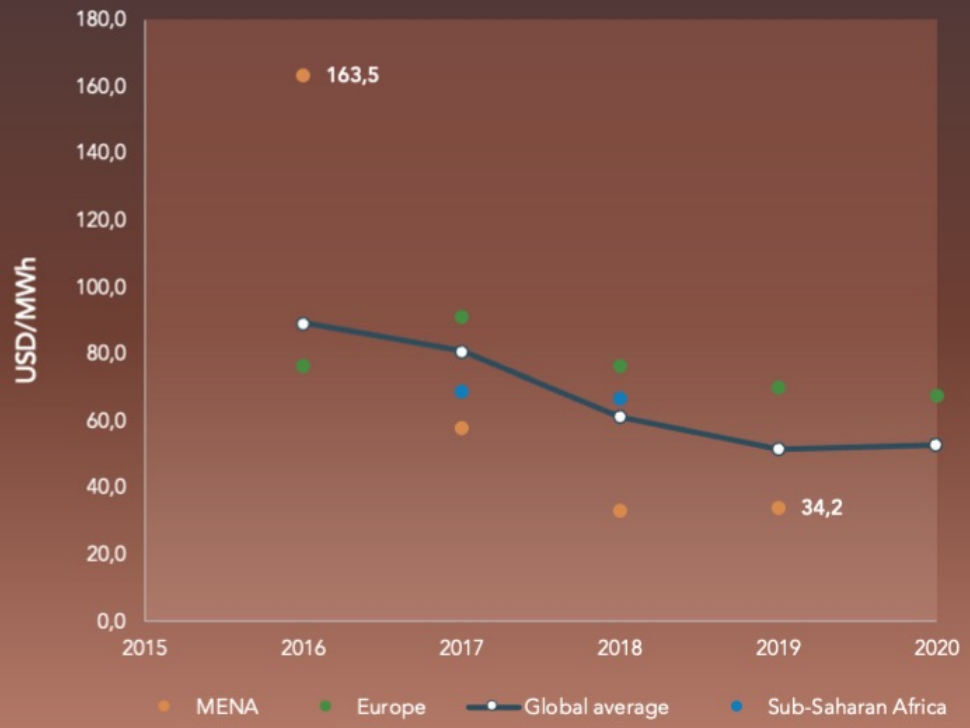
Low price solar PV auctions are one of the main drivers of the region's RE growth

Between 2017 and 2019, average auction prices in MENA were well below the global average.

An additional capacity of 20 GW is expected to be commissioned in the period 2020-2025, driven in particular by UAE, followed by Saudi Arabia, Egypt, Qatar, and Oman.

This positive trend is primarily due to the use of the competitive auction mechanism, which accounted for three-quarters of the RES capacity procured in the region in the last decade.

AVERAGE AUCTION PRICE FOR SOLAR PV, BY REGION AND COMMISSIONING DATE (2016-2020)



Notes: Tariffs discovered in auctions are not comparable to each other as they are based on different assumptions

Source: IEA, 2019

FOCUS ON

A good benchmark: Morocco has made significant progress towards meeting its ambitious RE targets

- Over the last decade, the country embarked on a liberalization process, enacting Law 13-09 on renewable energy, which allowed IPPs to sell electricity to large final customers.
- With a proposed amendment to Law 13-09, Morocco is moving towards further opening its electricity market to IPPs by allowing them to access the medium voltage grid.
- In 2021 Morocco started to amend the Self-Generation Decree, and a Public Grid Code is expected in the coming year, improving the market transparency on grid connection procedures.
- Challenges: despite the Laws and regulations currently in place, the amendment process of the 13.09 law is very slow, and the lack of secondary legislations still prevent the opening of the Medium Voltage Market to IPPs. Finally, the Energy Regulator ANRE, established in 2016, is not yet fully operational.

CONNECTING THE DOTS



The power sector faces a wide range of challenges

2. What limited the RE growth

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CONNECTING THE DOTS

THE POWER SECTOR FACES A WIDE RANGE OF CHALLENGES

Regional interconnections either exist or are planned, but inter-regional trade is limited

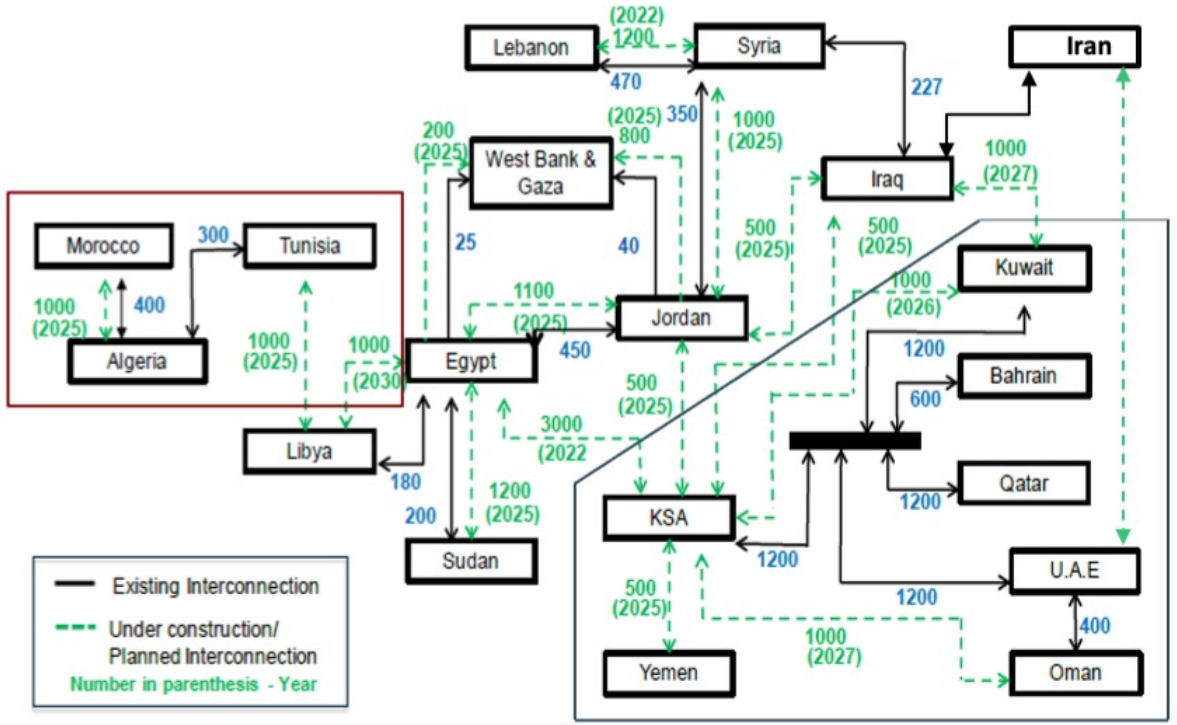
There are **3 main inter-regional connections**:

- Morocco – Tunisia – Algeria: fully connected and synchronized with the Pan-European high-voltage transmission network
- EIJLLPST: Egypt – Iraq – Jordan – Libya – Lebanon – West Bank and Gaza – Syria - Turkey
- GCC: Kuwait – Saudi Arabia – Bahrain – Qatar – UAE – Oman

Only **2% of the total annual generation is traded across borders** for various reasons such as lack of trading rules and regulations, technical issues etc. Most are one-off, irregular trades

In Europe about 9% of total annual generation is traded across borders

EXISTING AND PLANNED CROSS BORDER TRANSMISSION INTERCONNECTIONS (MW)



Notes: the study mentioned here does not include Iran.

Source: World Bank, Power System Implications of Subsidy Removal, Regional Electricity Trade, and Carbon Constraints in MENA Economies 2020; IEA, 2019

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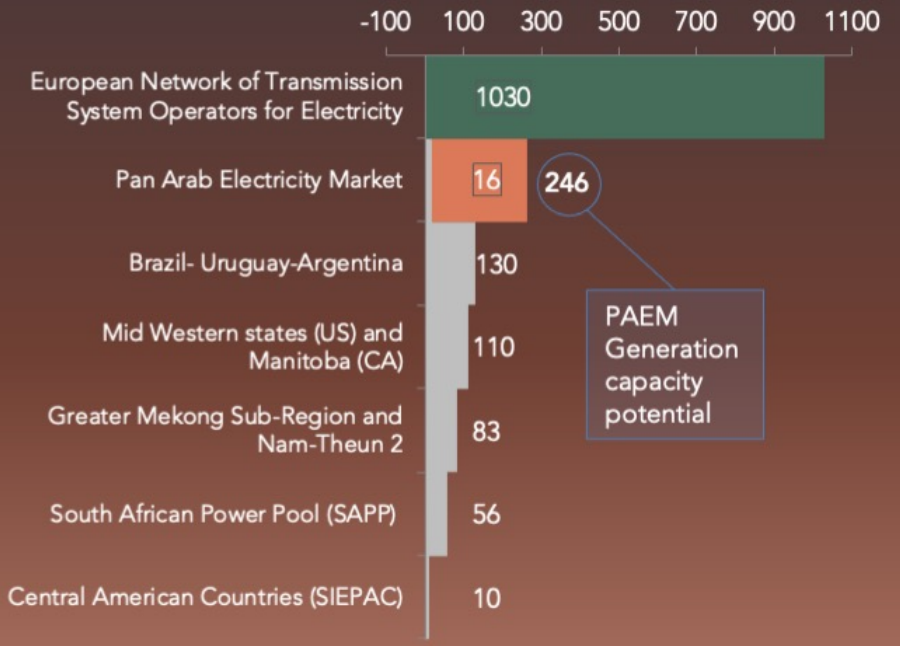
The Pan Arab Electricity Market and its potential to boost regional interconnections

Europe is the most interconnected region with **1030 GW** of integrated generation capacity

Existing cross-border transmission lines in the MENA region connect around **16 GW of generation capacity across borders**.

With a **potential of 246 GW**, the new Pan Arab Regional Electricity Market (PAEM) represents an opportunity for the MENA Region **to become the second largest region in electricity trading after Europe**

GLOBAL INTERCONNECTED/INTEGRATED GENERATION CAPACITY (GW)



The Arab Ministerial Councils of Electricity (AMCE) ratified the PAEM legal and market agreements in the summer of 2020. While this marks an important milestone for regional cooperation, the operationalisation of the market will be long and complex, and will require high levels of commitment from governments.

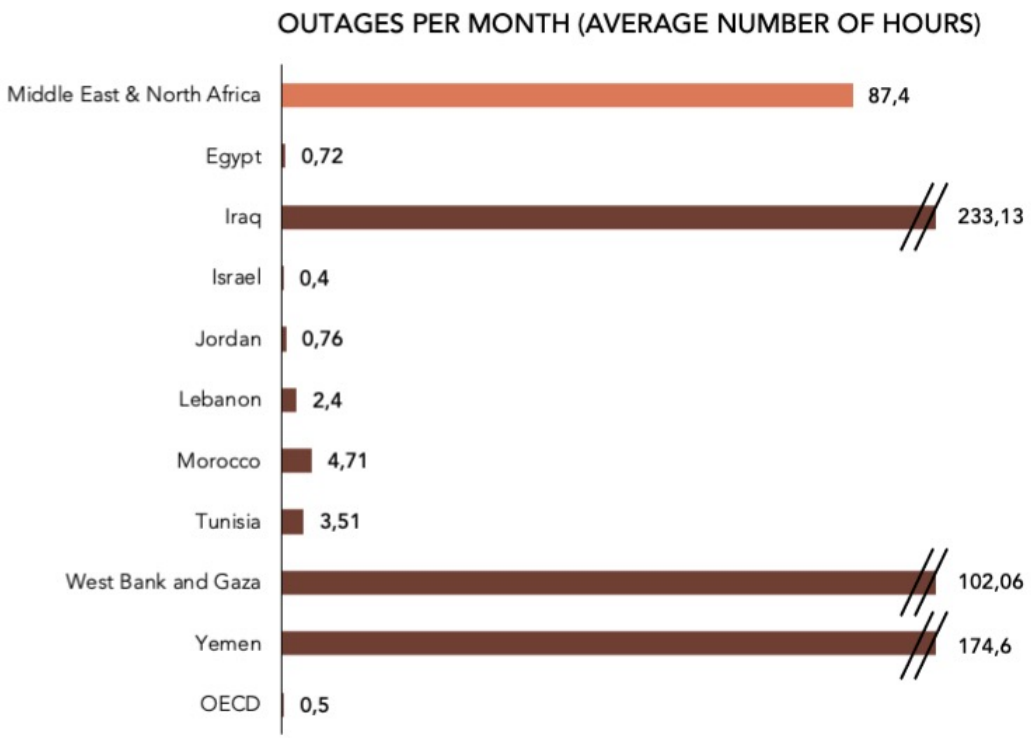
Notes: Countries involved in the PAEM: Morocco, Algeria, Tunisia, Libya, Egypt, Sudan, West Bank and Gaza, Saudi Arabia, Yemen, Oman, Qatar, Bahrein, Kuwait, Syria, Iraq, Lebanon, Jordan, UAE

Source: World Bank, Power System Implications of Subsidy Removal, Regional Electricity Trade, and Carbon Constraints in MENA Economies 2020

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Significant power outages generate a negative impact on the private sector annual sales

- There is a consistent difference among countries in the region.
- Only a few countries can be compared to OECD standards, namely Jordan and Egypt.
- The region accounts for an average of over 80 hours of outages per month.
- Most firms (38%) own generators, providing on average 30% of the electricity they consume.
- Almost 5% of private sector annual sales is lost due to outages



Source: World Bank, Enterprice Survey Indicators Data , various years

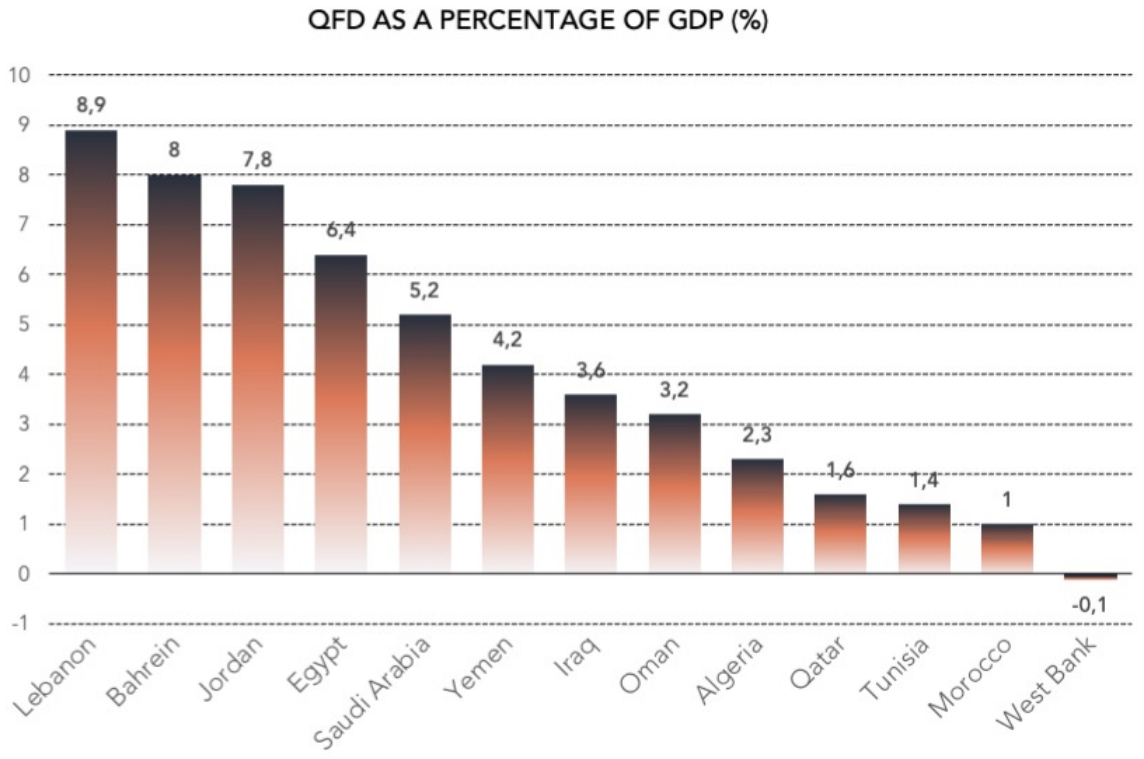
CONNECTING THE DOTS

THE POWER SECTOR FACES A WIDE RANGE OF CHALLENGES

Utilities' Quasi-Fiscal Deficit is high across the region and hampers investment capacities

On average, the quasi-fiscal deficit of utilities in the MENA region amounted to 4.4% of GDP. In comparison, electricity investments needed to keep up with MENA's demand have been estimated at about 3% of its projected GDP.

While the quasi-fiscal deficits currently constrain investment in MENA's electricity sectors, they also represent an opportunity, as eliminating the inefficiencies could free up sufficient resources to make the necessary investments.



Notes: QFD is the difference between the net revenue of an efficient electricity sector covering operational and capital costs and the net cash collected by the utilities. Countries included: Lebanon, Jordan, Iraq, Saudi Arabia, West Bank and Gaza, Qatar, Oman, Yemen, Bahrein, Tunisia, Morocco, Egypt, Algeria

Source: World Bank 2017

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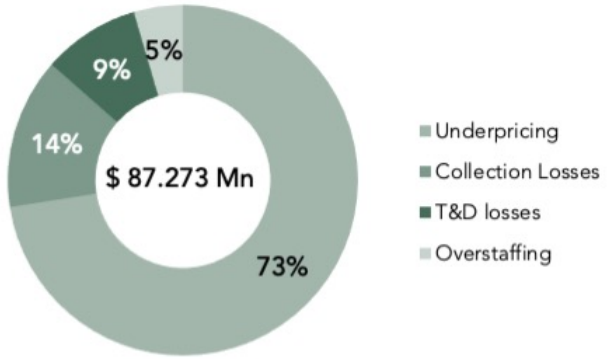
THE POWER SECTOR FACES A WIDE RANGE OF CHALLENGES

Underpricing is the highest contributor to utilities' inefficiencies

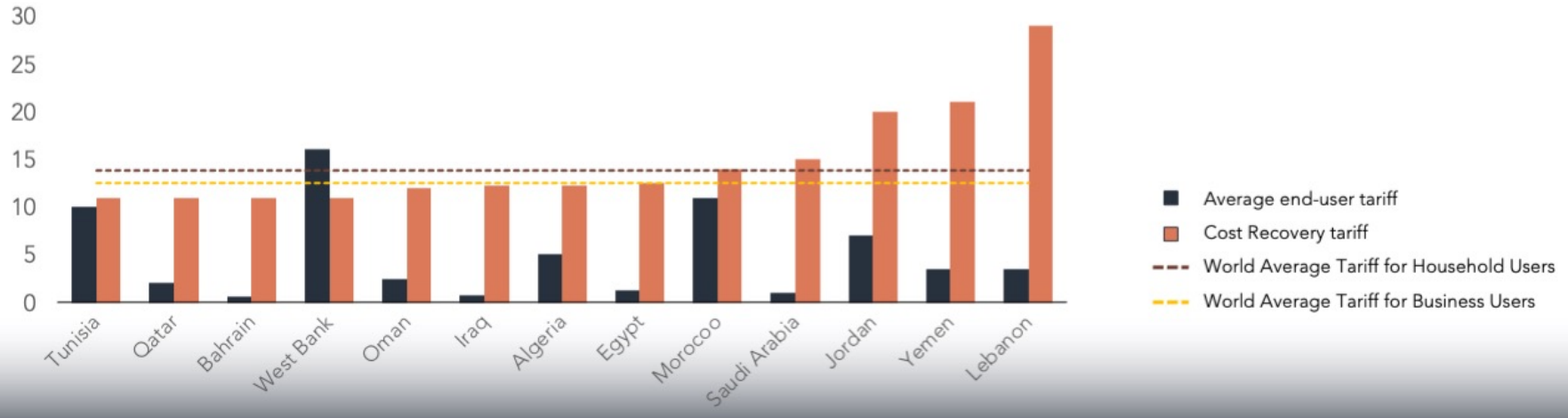
The most significant driver of the quasi-fiscal deficits is the **underpricing of electricity**, which costs on average 3.2% of GDP, and accounts for about 73% of hidden costs.

Most of MENA's economies see end-user tariffs fall under the global average price per MWh ($13.9). Yet there is a general lack of political will to restructure tariffs and cut subsidies to improve cost-recovery.

BREAKDOWN OF HIDDEN COSTS



COMPARISON OF AVERAGE END-USER AND COST-RECOVERY TARIFFS IN THE REGION



Source: World Bank, 2017

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CONNECTING THE DOTS



2. What limited the RE growth

RES4AFRICA FOUNDATION

HIGH RISK PERCEPTION STRONGLY AFFECTS PRIVATE INVESTMENTS

Existing and/or perceived barriers result in a unfavourable business environment

The weak investment appetite in the Region can be interpreted as a sign of market unreadiness and high-level of perceived risk of the business environment mainly due to the lack of:



Source: World Bank, How transparency can help Middle East and North Africa, 2020

Risk perception reflect the reliability of the country to implement a clear environment for RE investment and its ability to reach the targets

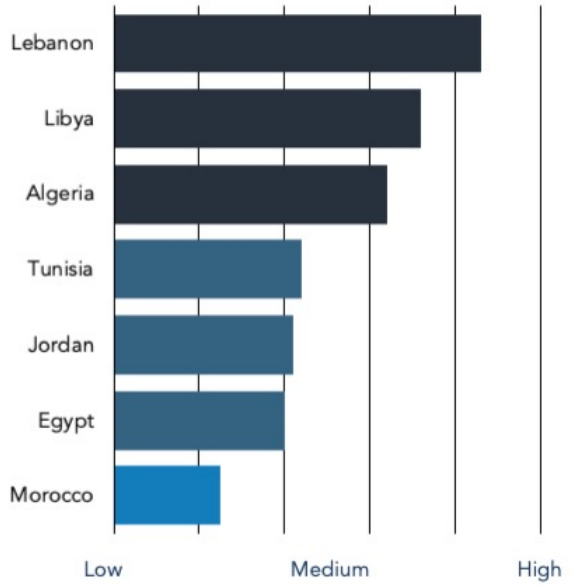
According to a survey assessing renewable energy investors' risk perceptions in 7 MENA countries, it is possible to set up three risk clusters, from low to high risk perception.

Morocco emerges as the clear frontrunner. The country has built on its 2009 National Renewable Energy Strategy through efforts to improve the regulatory environment, and is broadly on track to meet its targets by 2030. This is strongly reflected in the change in investors' perception of risks: in Morocco, by comparing the results of 2021 survey with the study conducted 5 years ago, evidence show that investors' perception of risks greatly decreased moving from high risk to low-risk.

Some countries like Egypt, Tunisia and Jordan are improving as well, more slowly, but confirming the trend in the future, they may follow the pace of Morocco.

Nevertheless, there is a consistent gap between private and public sector risk perceptions, reinforcing the need to improve efforts for coordination and cooperation across sectors.

RISK PERCEPTION IN SELECTED ECONOMIES



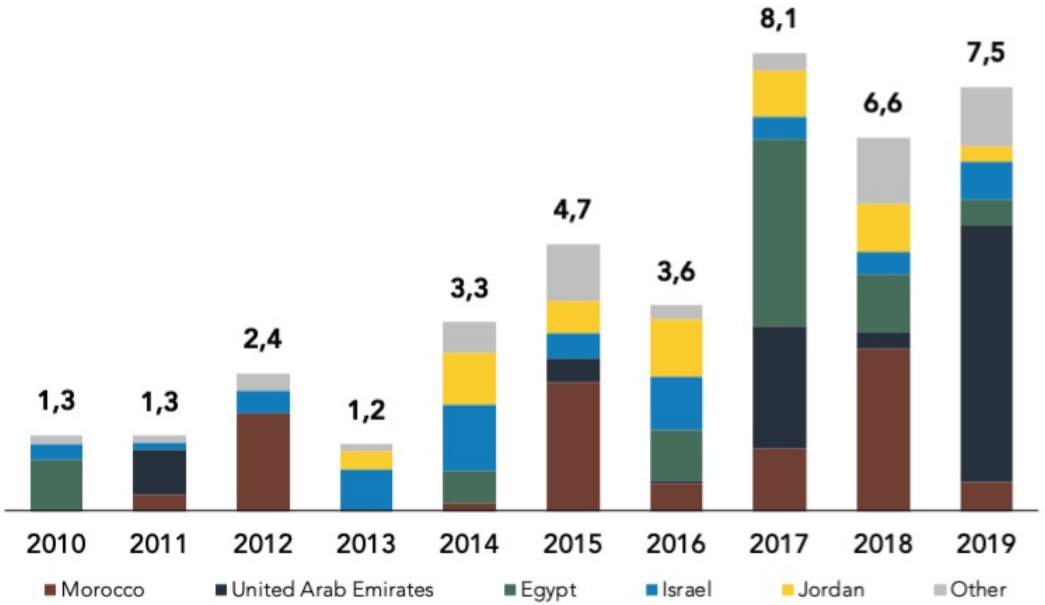
Notes: This RES4Africa and PwC survey is based on research conducted between June 2020 and March 2021 with 142 stakeholders active in the Med. The stakeholders include representatives of independent power producers, technology providers and EPCs, finance (corporate as well as multilateral), professional services and the public sector. As a rule, each company or institution was represented by only one survey respondent.

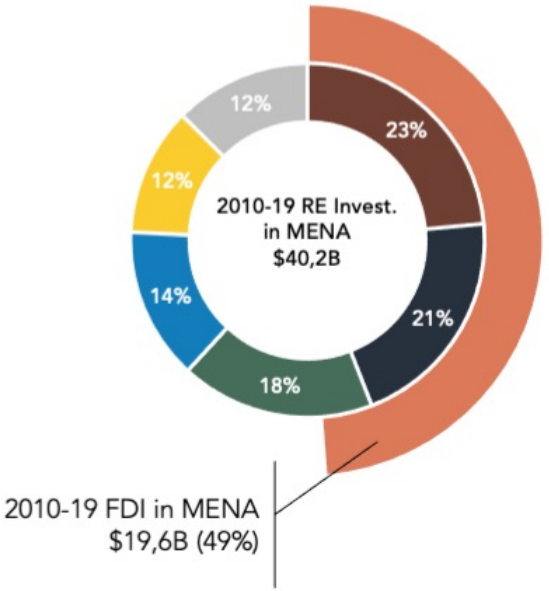
Source: RES4Africa and PwC, Assessing investment risk in renewable energy - A survey on Southern and Eastern Mediterranean Countries, 2021

HIGH RISK PERCEPTION STRONGLY AFFECTS PRIVATE INVESTMENTS

Risks and barriers have limited RE investment in the region, that is highly relying on FDI

- FDI represents 6% of the global RE investment, in MENA this share rise to almost 50%
- Due to the pandemic, global energy investments are estimated to have dropped by 18% in 2020





Notes: The graph only includes disclosed new investment into renewable energy

Source: BNEF, 2010 - 2019

HIGH RISK PERCEPTION STRONGLY AFFECTS PRIVATE INVESTMENTS

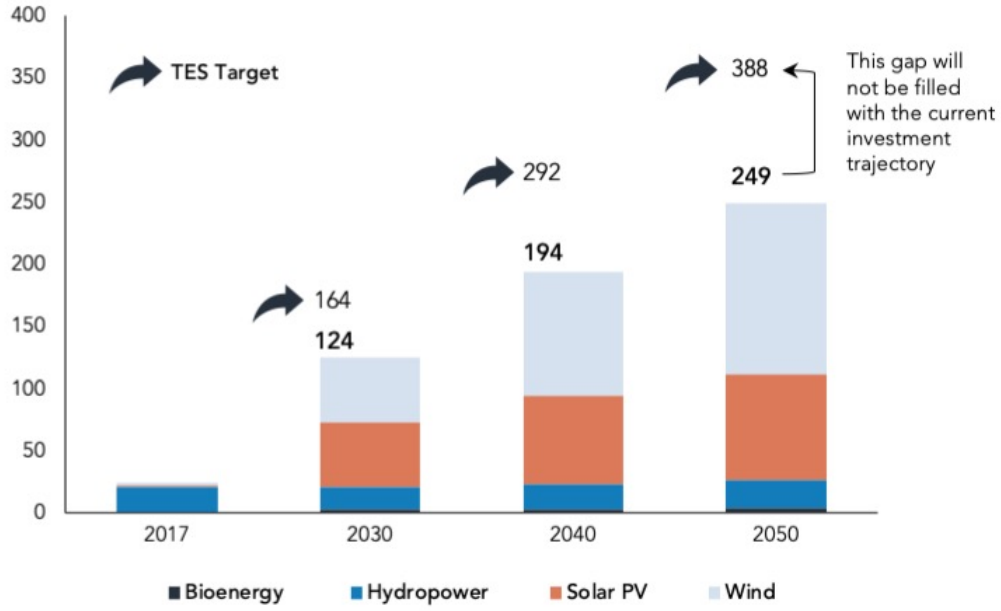
To meet the IRENA 1.5°/2°C Scenario, it is necessary to double RES investments

An average of $16 billion per year is needed to meet the IRENA's Transformative Energy Scenario (TES), while current expenditure is only half of that

On the other hand, investments in non-renewables are estimated to be higher than they should be to meet the TES Scenario: $22 billion compared to a recommended no more than $14 billion a year

In terms of installed renewables capacity, although improvements are in sight, even if present plans are fully implemented, it will not be sufficient to meet the TES goals.

RENEWABLE INSTALLED CAPACITY VS TARGETS (GW)



Notes: Transformative Energy Scenario = the path needed to keep the rise in global temperatures to well below 2 degree Celsius (°C) and towards 1.5°C during this century

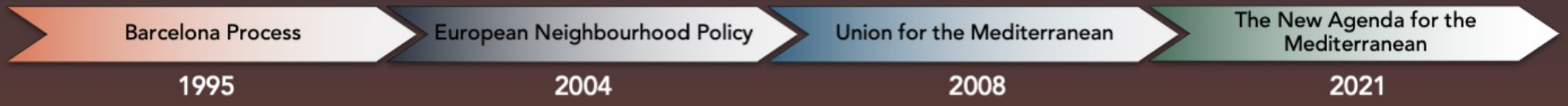
IRENA, Global Renewables Outlook, 2020

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The EU is set to play a strategic role as a partner in MENA energy transition

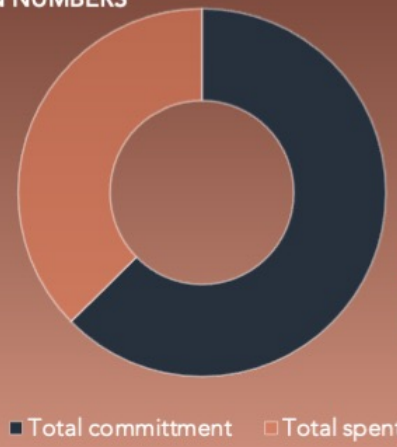
THE EVOLUTION OF EU POLICY IN THE MEDITERRANEAN



As of April 2020, the EU is the leading donor in the MENA region. Between 2009 and 2019, the EU committed a total of $603M to RE projects in the MENA region; the consolidated relationship between the EU and MENA is set to grow in the next years to face the common global challenge of climate change.

EU'S COMMITMENT IN NUMBERS

$360M
EU Institutions total expenditure in RE projects



$603M
EU Institutions financial commitment in RE projects

The New Agenda For The Mediterranean 2021-2027 allocates €7 Billion with an addition €30 billion in Private to Public investment

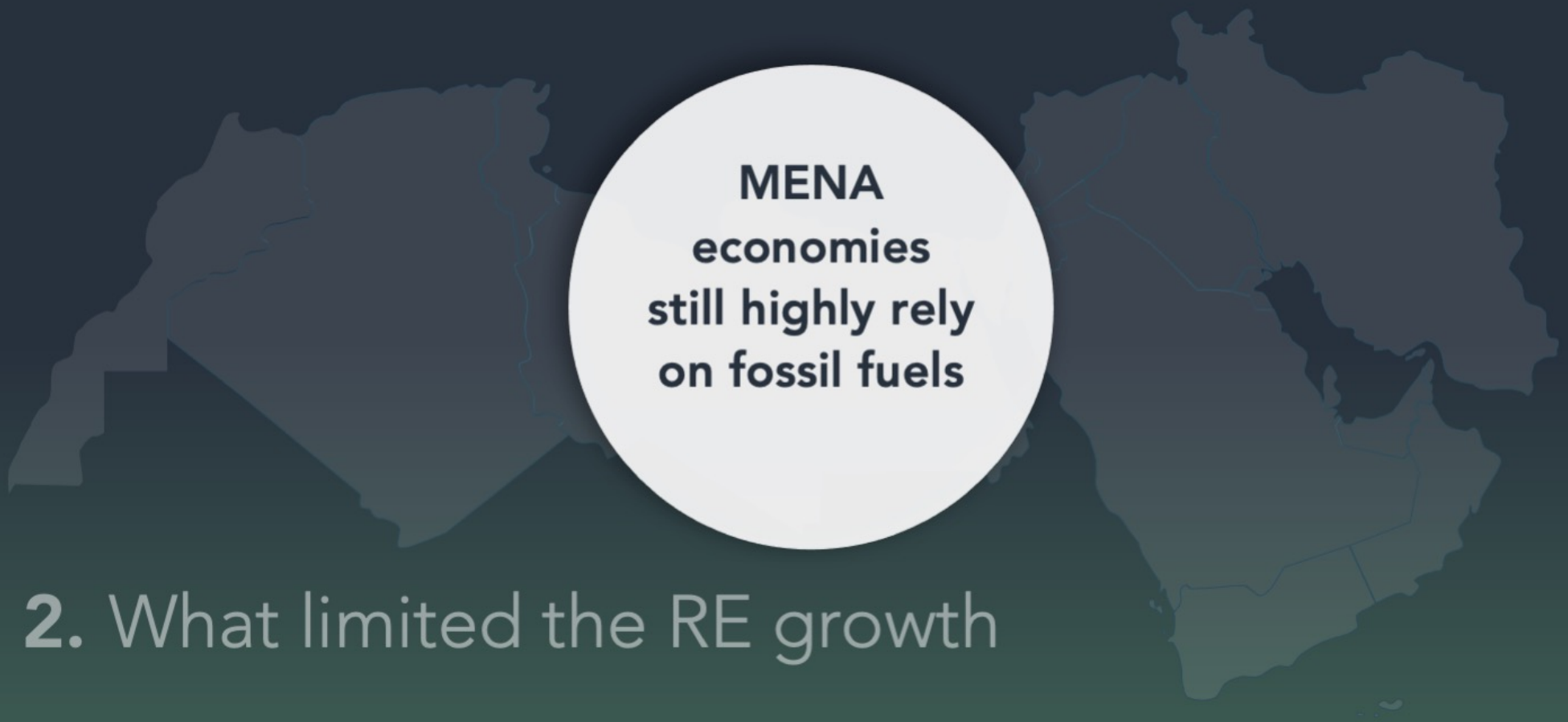
For Renewable Energy projects that will run until 2024, EU Institutions have allocated US$334M of which US$214M have already been spent. On average, 7,8% of EU Institutions cooperation funding is allocated to the energy sector.

European Bank for Reconstruction and Development has The European Bank for Reconstruction and Development plans to allocate US$686M to Renewable Energy projects in the MENA region from 2019 to 2038.

Source: IATI, 2021

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CONNECTING THE DOTS



2. What limited the RE growth

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MENA ECONOMIES STILL HIGHLY RELY ON FOSSIL FUELS

Renewable energies represent both an opportunity and a challenge for the region

IMPORTERS

- Energy security has been a critical strategic issue for all energy importing states but could become a minor concern in a RE-based economy.
- Importing countries are vulnerable to risks of supply disruption and price volatility caused by political instability or conflicts.
- RE resource-rich countries can become electricity exporters.
- Decentralized energy supply through RES can foster energy independence.

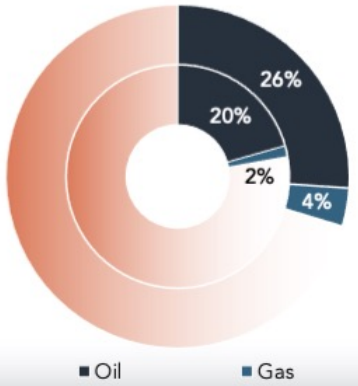
EXPORTERS

- Dependence on oil rents contributes to increase the countries' economic vulnerability
- Collapse in oil and natural gas revenues for fossil fuel-dependent countries could have consequences for national priorities, "social contracts", and foreign policy with neighboring countries.
- Economic diversification to reduce dependence on oil rents has been a long-standing policy goal of many oil-exporting countries.

OIL AND GAS ROLE BY COUNTRY



SHARE OF OIL AND GAS REVENUES ON GDP



Total GDP

1998: 573 B$

2018: 2527 B$

Notes: The «Social Contract»: Oil & Gas Industry guarantees jobs and social peace. As en exemple, 30% of Saudi and Iraqi workforce and 15% of Kuwait workforce are employed in the public sector

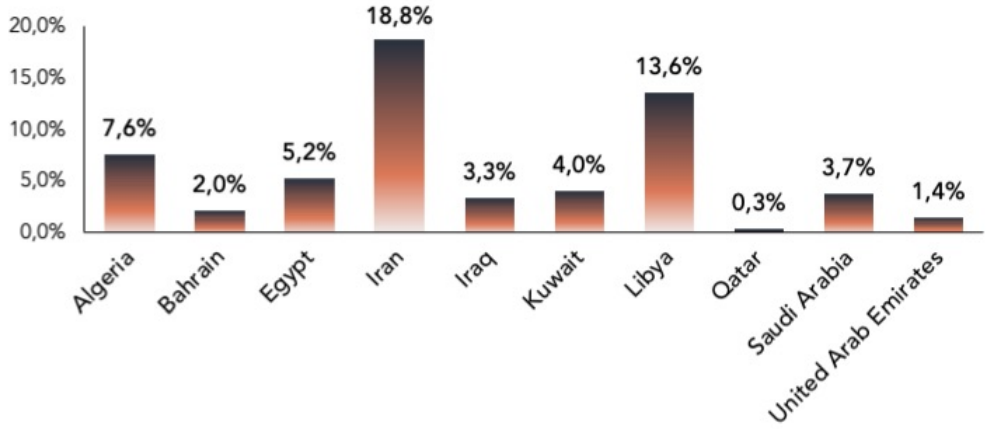
Source: FEEM, 2018

MENA ECONOMIES STILL HIGHLY RELY ON FOSSIL FUELS

The fossil fuel industry is heavily subsidized and constitutes a huge share of exporters' fiscal revenues

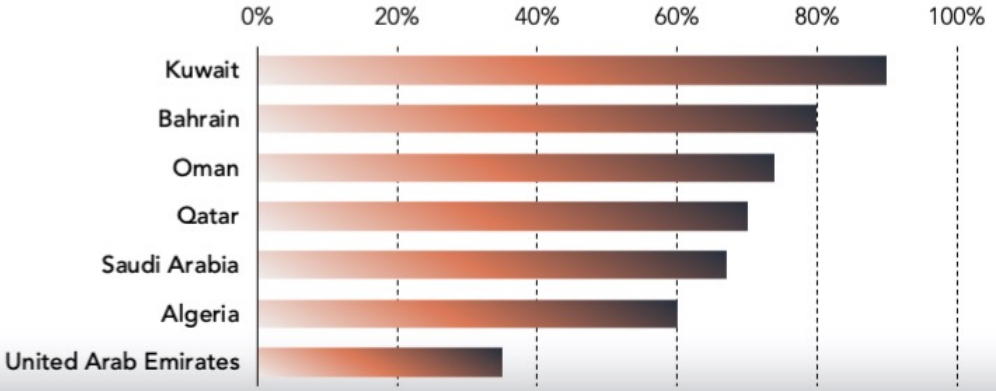
Fossil fuels subsidies remain high, with Iran's subsidies as the largest in the world.

TOTAL SUBSIDY AS SHARE OF GDP FOR SELECTED ECONOMIES 2019 (%)



Oil and gas are the primary source of fiscal revenues for oil exporting countries. They represent almost two thirds of fiscal revenues for all Gulf Cooperation Countries economies, except for the UAE, where they account for just over 35%.

OIL AND GAS FISCAL REVENUES (% ON TOTAL FISCAL REVENUES)



Source: IEA, 2019; DELOITTE, Impact of the oil industry crisis on the GCC and potential responses, 2020

CONNECTING THE DOTS

MENA ECONOMIES STILL HIGHLY RELY ON FOSSIL FUELS

Because of decarbonization policies and technological innovation, MENA countries may not be able to exploit their fossil resources



A third of global oil reserves, half of gas reserves and over 80% of current coal reserves should remain unused from 2010 to 2050 in order to meet the 2 °C target.



MENA contributes to **37% of global oil production and 35% of global natural gas production**;
within these shares, oil production is dominated by Saudi Arabia, Iran and Iraq, while the first three runners in gas production are Iran, Qatar, and Saudi Arabia.

In this context, it is estimated that the Middle East will be able to exploit only about 60% of its oil reserves – leaving more than 260 billion barrels underground – and about 40% of its gas reserves.

Gas will nevertheless maintain its role as an important component of global decarbonization due to its key role in displacing coal from the energy mix.

Such a development would represent an unprecedented challenge for MENA oil exporters. Their entire economic and socio-political models would need to structurally change – or keep on changing - in order to adapt to the new reality.

Notes: Oil production: Saudi Arabia (35%), Iran (14%) and Iraq (13%). Gas production: Iran (28%), Qatar (22%) and Saudi Arabia (14%)

Source: Bruegel, 2020

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FOCUS ON

Some countries in the Region have included diversification strategies in their national programs

Country	Year	Title of the Initiative	Main objectives
Iraq	2014	Private Sector Development Strategy	o Private sector GDP Share up to 60% by 2030 o Improve country's business environment o Reduce unemployment rate to 4% by 2030
Kuwait	2015	Kuwait Development Plan	o Private sector GDP Share up to 40% by 2030 o Enhance PPP for infrastructure projects o Increase employees in the private sector from 92K to 137K by 2020
Oman	2016	Ninth Five-Year Development Plan	o Reduce the contribution of oil to GDP from 44% to 26% by 2020 o Enhance PPP and private sector participation (SMEs)
Saudi Arabia	2016	Vision 2030	o Raise share of non-oil exports in non-oil GDP from 16% to 50% by 2030 o Generate 9,5 GW of renewable energy by 2030 o Increase non-oil government revenues from SAR 163 Bln to SAR 1 trln by 2030

Notes: Paper Funded by the EU Horizon 2020

Source: MENARA, Working Paper – The Mena Region in the Global energy Market, 2018

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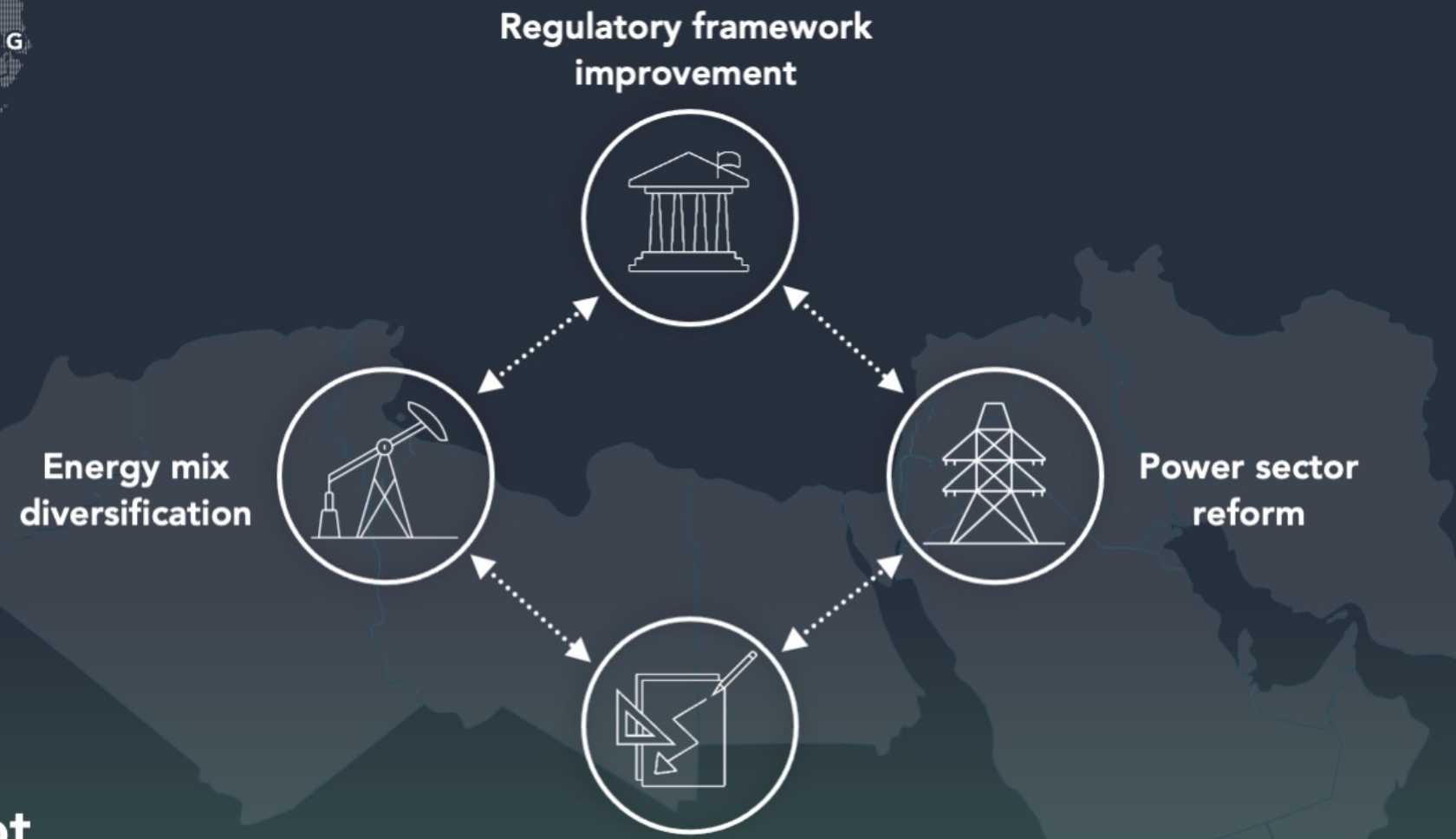
CONNECTING THE DOTS

What limited the RE growth



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It is not an easy task, but...

3. The time to act is now

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CONNECTING THE DOTS

THE TIME TO ACT IS NOW

The energy transition can only happen by addressing structural challenges

MENA has a **tremendous opportunity** to leap-frog some of the problems already encountered in the European electricity markets, where renewables have been imposed on a market designed on fossil fuels. MENA countries could embed vital lessons in the design of their own electricity markets.

Strengthening of public acceptance and consumer preference

- generate a higher level of awareness to encourage a proactive change of behavior and consumption patterns
- create an environment with a growing number of self-generators and the possibility to create a peer-to-peer market to compete with the traditional "vertical market"

Development of institutions

- improve the capacity of existing institutions
- institutionalize accepted and recognized standards and protocols
- improve communication among authorities, systems and networks

Development of technologies

- address the challenges of digitalization and decentralization through smart solutions
- enable a greater flexibility of operations
- enhance energy efficiency innovations and technologies

Source: The Oxford Institute for energy Studies, Electricity Markets in MENA: Adapting for the Transition Era, 2018

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THE TIME TO ACT IS NOW

An improved policy and regulatory framework will boost sustainable investments

Regulate the **implementation of Direct PPAs between IPPs and bulk users**. This requires cost-reflective tariffs

Focus on **efficient organization and management of auctions**, which are the most effective scheme to add RES capacity

Develop a clear and comprehensive **Masterplan for RES** with challenging but realistic targets



Create an **Independent Regulator** to guarantee market transparency.

Enhance developments in regulation and reform processes to ensure **political stability**

Ensure **consistency** of the Regulatory Framework.

The regulatory framework has improved in most of the MENA countries in the last decade, however there is still a high risk perception from investors due to slow implementation of reforms, lack of transparency, and unreliable tendering procedures.

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CONNECTING THE DOTS

THE TIME TO ACT IS NOW

Reforms and cooperation will strengthen the power sector and enhance regional trade

Improve **cooperation among countries** to deal with different speeds of domestic reforms

Optimize the region's national resources, increase the capacity utilization of generation resources, and pool resources to reduce additional investments.

Build a functional electricity market by working on **pricing policies**, to ensure that tariffs match the cost of production

Reduce **utilities' inefficiencies**, especially underpricing and collection losses, to unlock new resources for investments



An integrated pan-Arab electricity market could support the Region in exploiting its natural assets while freeing up resources to invest in a structural reform of the power sector

Notes E.g. : Between 2011 and 2016, the GCC electricity trading let to more than 2,2 billion USD in cost savings (capital and operating) and avoiding outages thanks to emergency supporting mechanisms.

Source: World Bank, Power System Implications of Subsidy Removal,Regional Electricity Trade, and Carbon Constraints in MENA Economies, 2020

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CONNECTING THE DOTS

THE TIME TO ACT IS NOW

Decoupling traditional energy sources from the region's growth model will contribute to achieving economic resilience

Diversify the energy mix to reduce the dependency of the MENA economies on oil & gas and increase resiliency



Develop clear energy transition plans while improving **regional cooperation** among importers and exporters to achieve overall energy security

Advance with subsidy reforms to **move away** from highly-subsidized and distorted fossil fuel-based markets

Reduce dependency on hydrocarbon fiscal revenues to move to a **sustainable fiscal path**

The future of MENA is bound to the investments made in its energy sector today. National governments should state their objectives in order to respect the Paris Agreement. The oil & gas industry may fuel the growth for a while longer, but the political decisions and the investments to mitigate the economic dependency on fossil fuels must be taken now

Source: University of Birmingham ,The use of fossil fuels in the Middle East and North Africa, 2020

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