

# THE WORLD BANK GROUP

## MIDDLE EAST & NORTH AFRICA

### CLIMATE ROADMAP (2021-2025)

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Driving transformational climate action and  
green growth in MENA

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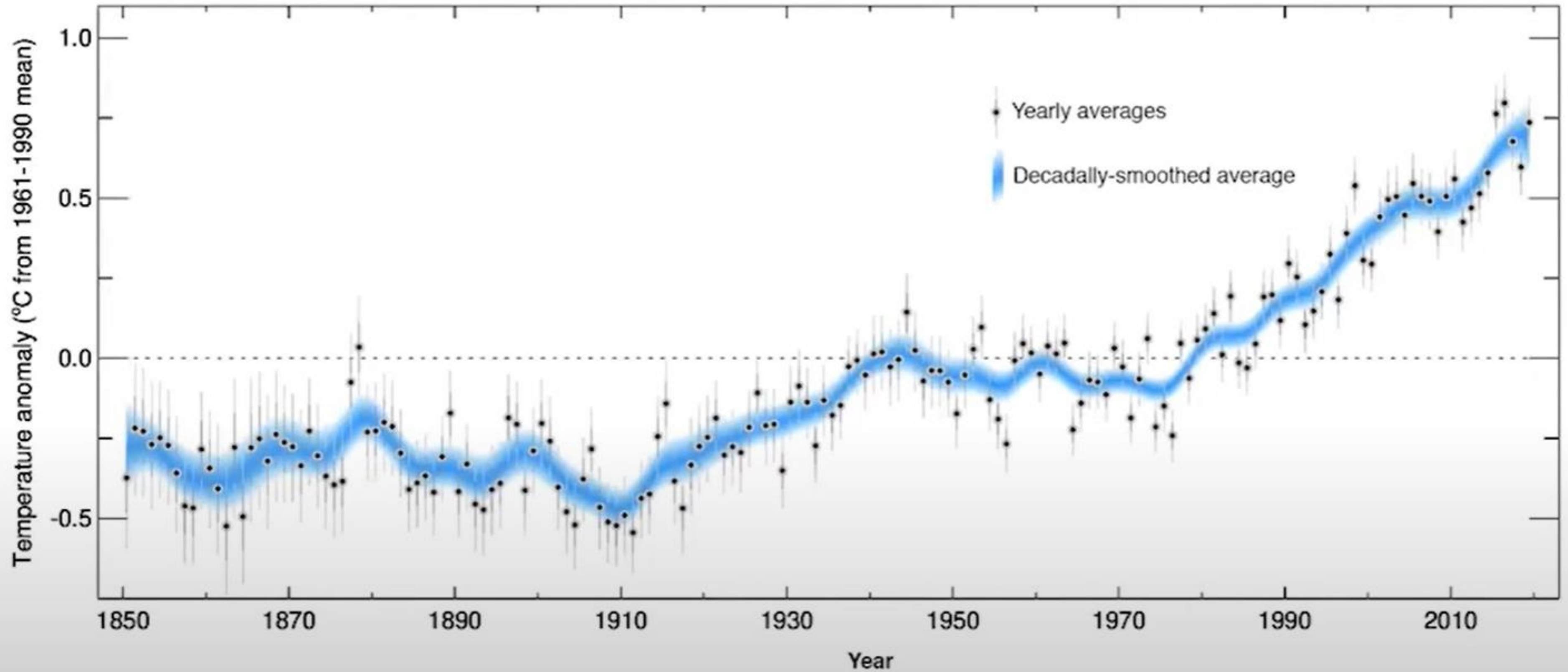
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**BIG PICTURE:  
Why does climate  
change matter to  
public sector  
policy makers in  
MENA....**

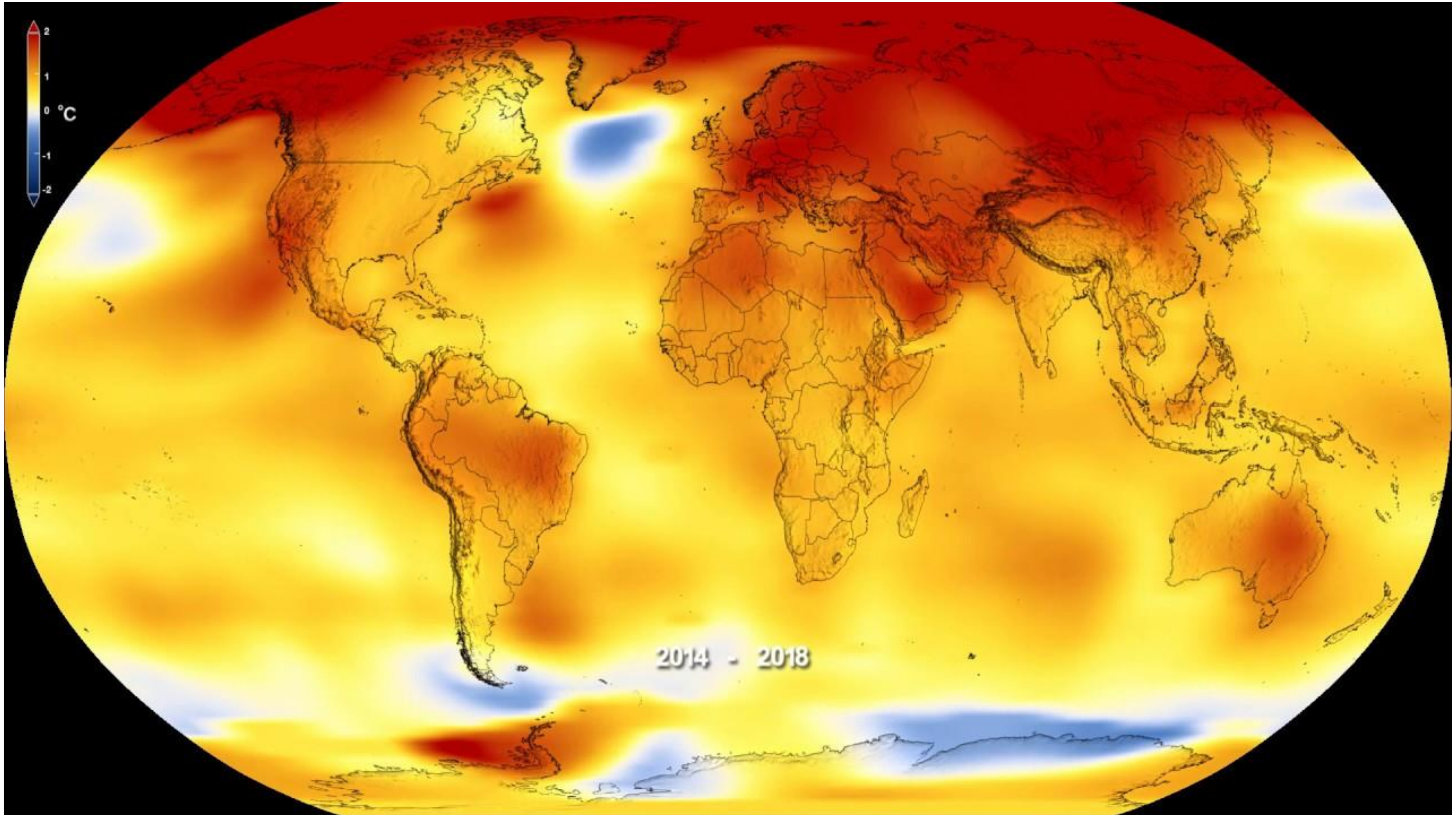


# Why does climate change matter to public sector policy makers....

HadCRUT4 global surface air temperature



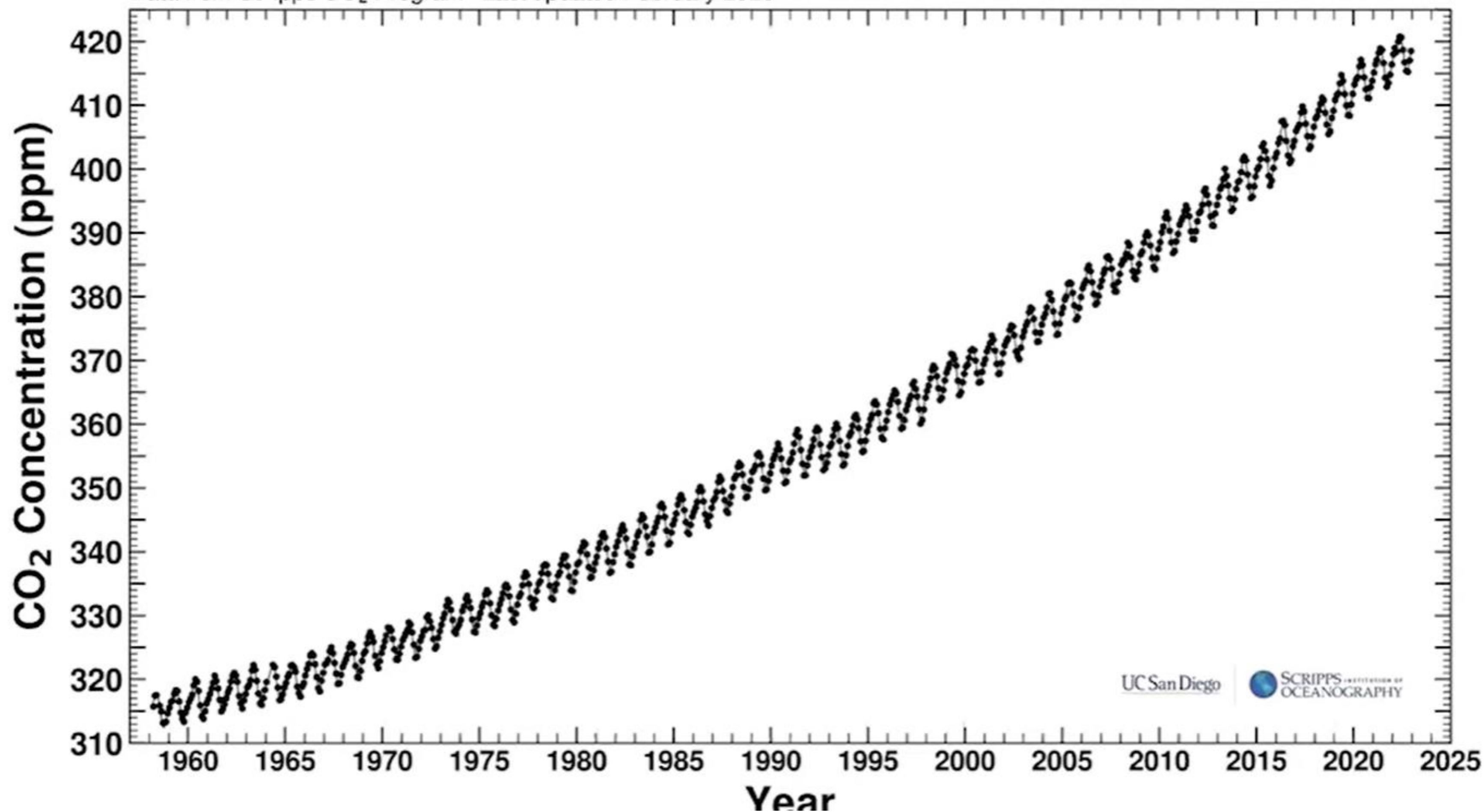
Data: Climatic Research Unit, University of East Anglia



Temperature anomaly map

# Mauna Loa Observatory, Hawaii Monthly Average Carbon Dioxide Concentration

Data from Scripps CO<sub>2</sub> Program Last updated February 2023



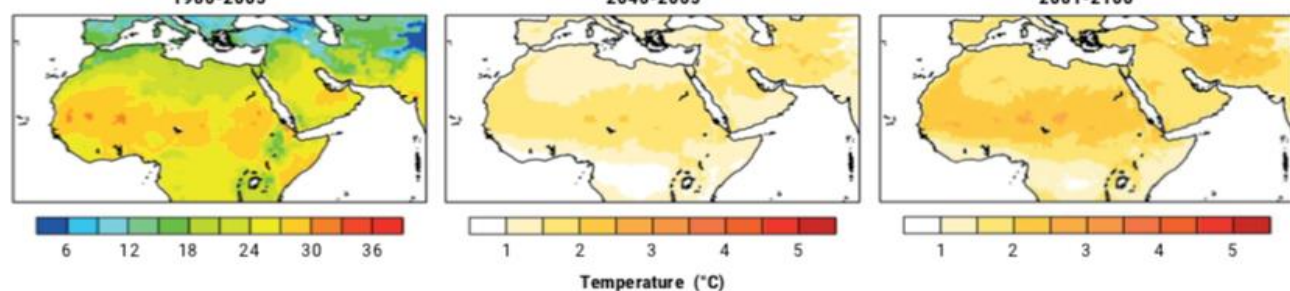
# MENA is one of the most climate-vulnerable regions

## TEMPERATURE RISE

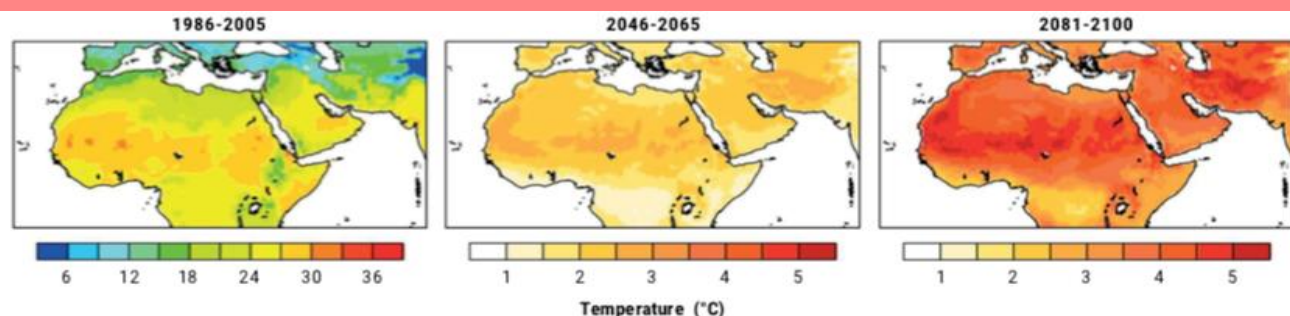
**Extreme high temperatures of up to 56°C could become the norm in MENA** in a world where global average warming reaches 4°C above pre-industrial levels. Summer temperatures are expected to be up to 8°C warmer in parts of Algeria, Saudi Arabia and Iraq by the end of the century.

TEMPERATURE PROJECTIONS FOR MENA COMPARED TO THE BASELINE (1951–1980). WORLD BANK

RCP 4.5: 1.2 °C–1.9 °C at mid-century and 1.5 °C– 2.3 °C by end-century



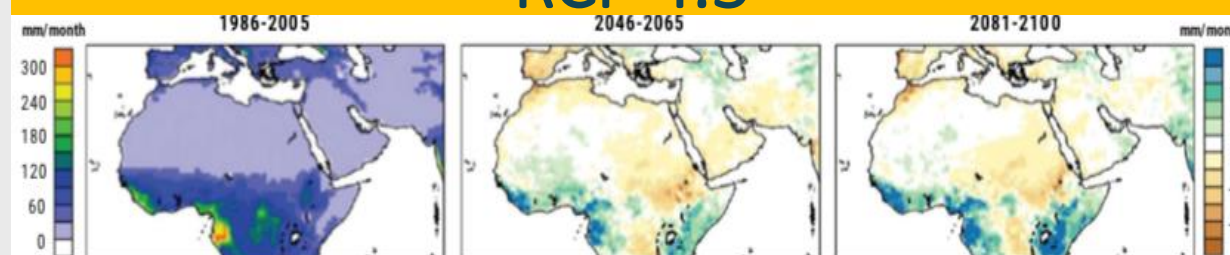
RCP 8.5: 1.7 °C–2.6 °C for mid-century and 3.2 °C–4.8 °C by end-century



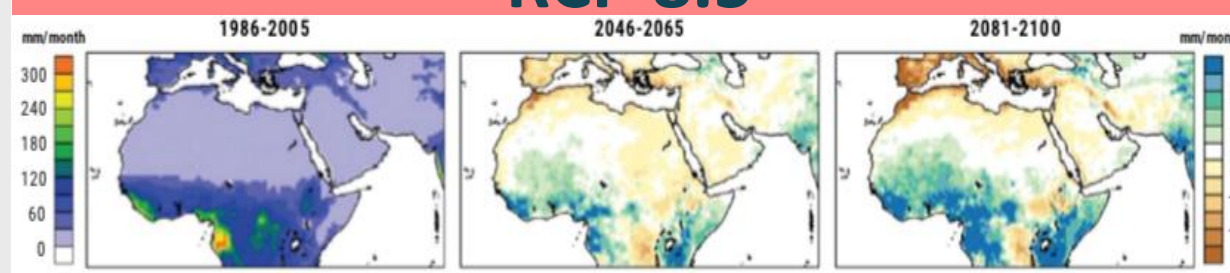
## PRECIPITATION VARIABILITY

**Both droughts and floods will worsen due to climate change.** Mediterranean coasts will receive about 10-20% less rain in a 2°C world and up to 50% less rain in a 4°C world. Southern parts of the Arabian Peninsula are projected to become wetter (up to 50% more rain in a 2°C world).

### RCP 4.5

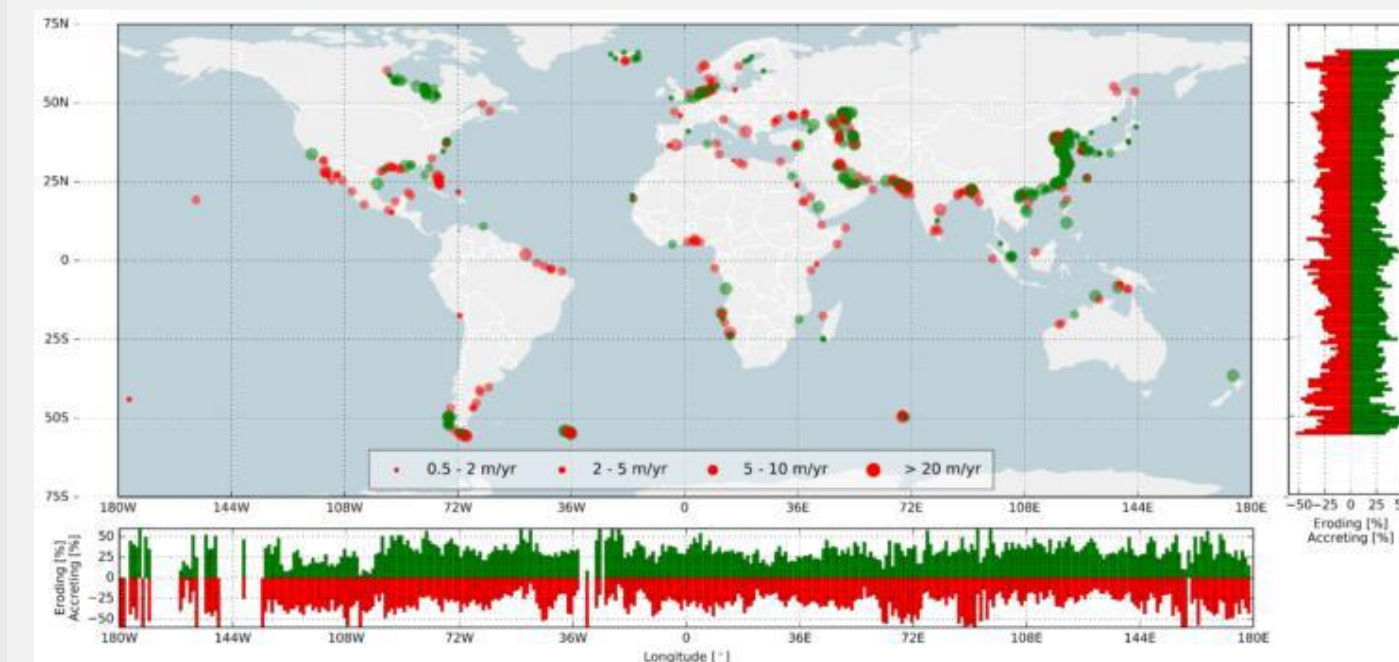


### RCP 8.5



## SEA LEVEL RISE

Sea level rise by an average of 0.36m in a 1.5°C world and 0.6m in a 4°C world. **Maghreb is the fastest eroding region in the world after South Asia and Tunis could experience a 1.2 m sea-level rise by 2080** (Fig 2). Sea level could rise by an average of 0.36m in a 1.5°C world and 0.6m in a 4°C world. GCC's coasts accreted substantially, owing in parts to coastal reclamation and development projects.



# Leading to significant impacts across sectors...

## Agri-Food Systems

- Crop yields expected to decline by 30 percent with 1.5–2°C warming and up to 60 percent with 3–4°C warming (w/ large regional variation and without considering adaptation).
- Unprecedented heat extremes could affect 70–80 percent of the land area.
- Unusual weather conditions can create conditions for environmental pests (e.g. locusts) to thrive.

## Water Security

- Availability of freshwater resources will drop by 30–70% by 2025, where 60% of the population already lives in areas with high water stress.
- Water productivity in MNA half the world average.
- Economic impacts of Water Scarcity could be as much as 14% of GDP

## Natural Hazards and Essential Services

- Globally the total number of disasters has doubled in a quarter of a century, where the MENA region saw these events triple in number during the same time period.
- Increasingly frequent disruptions in the delivery of essential services such as power, water and sanitation, transport, and telecom would seriously undermine the capacity of MENA countries to meet their development objectives.



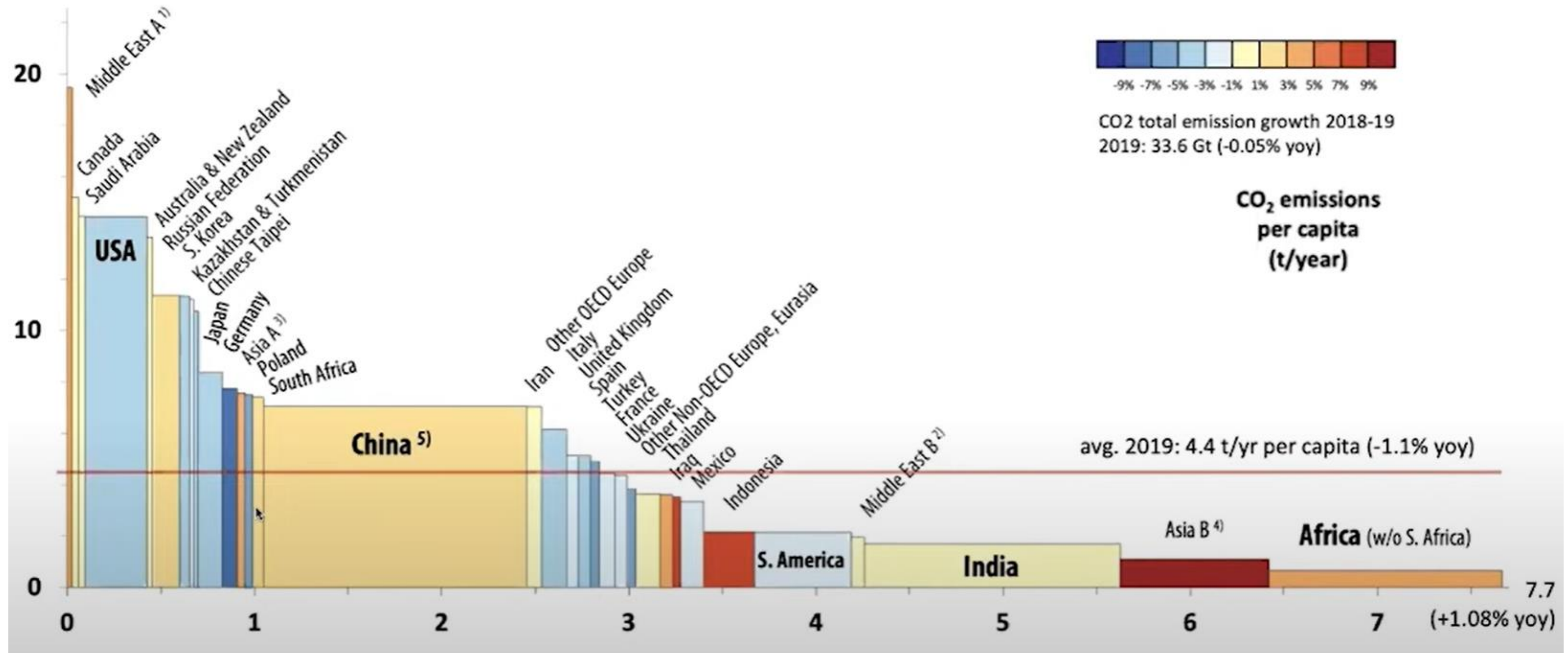
## Coastal Populations and Infrastructure

- Currently about 7% of the total population lives in areas less than 5 meters above sea level, with 100 million people expected to be at risk by 2030.<sup>5</sup>
- Many capitals and several of the fastest-growing cities are located on low-lying coastal zones or islands, especially in the Arabian Sea and Persian Gulf region.
- Ocean acidification will have devastating impacts on marine and coastal ecosystems, such as the coral reefs, fisheries and aquaculture.

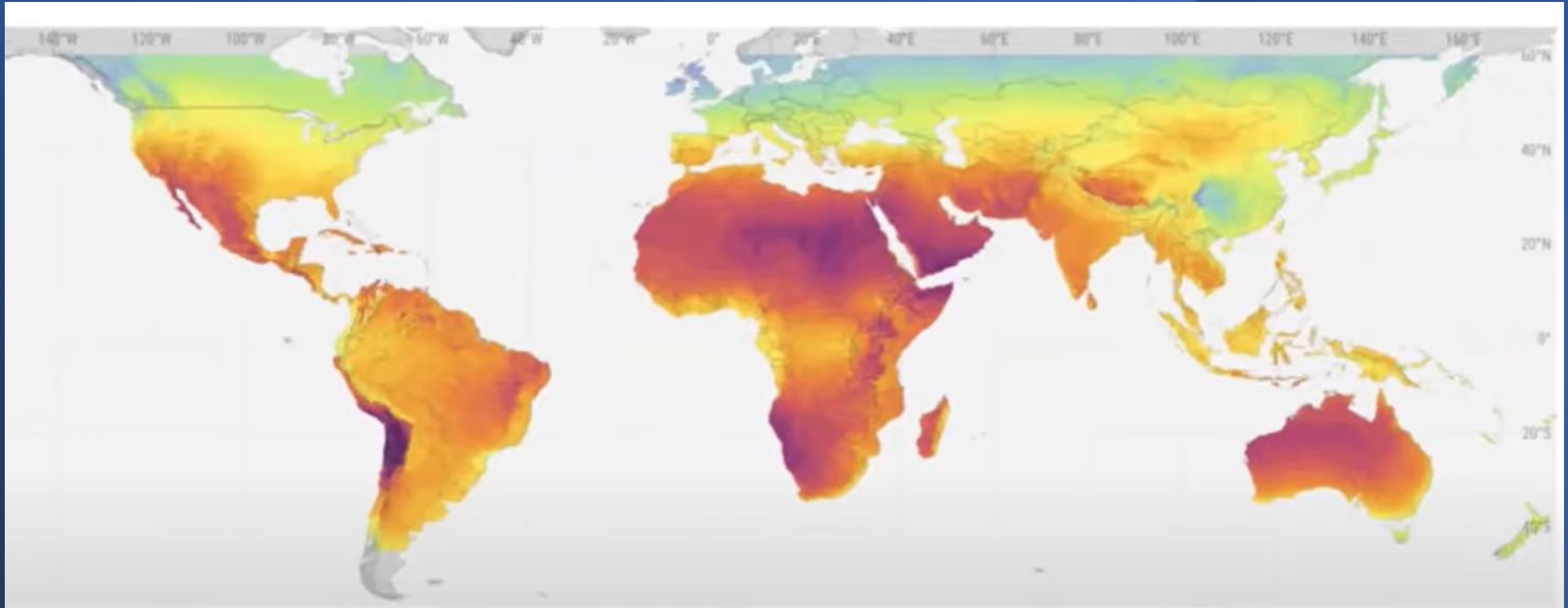
## Land Degradation and Ecosystem Services

- More than half of all land and a quarter of arable land in MNA is already degraded.
- One in five people in MNA already lives on degraded lands, where 40% of the region's poor live.
- Land degradation and desertification result in the loss of biodiversity and jeopardize critical ecosystem services such as carbon sequestration, soil stabilization and moisture retention.

# Emissions Per Capita are highly unequal



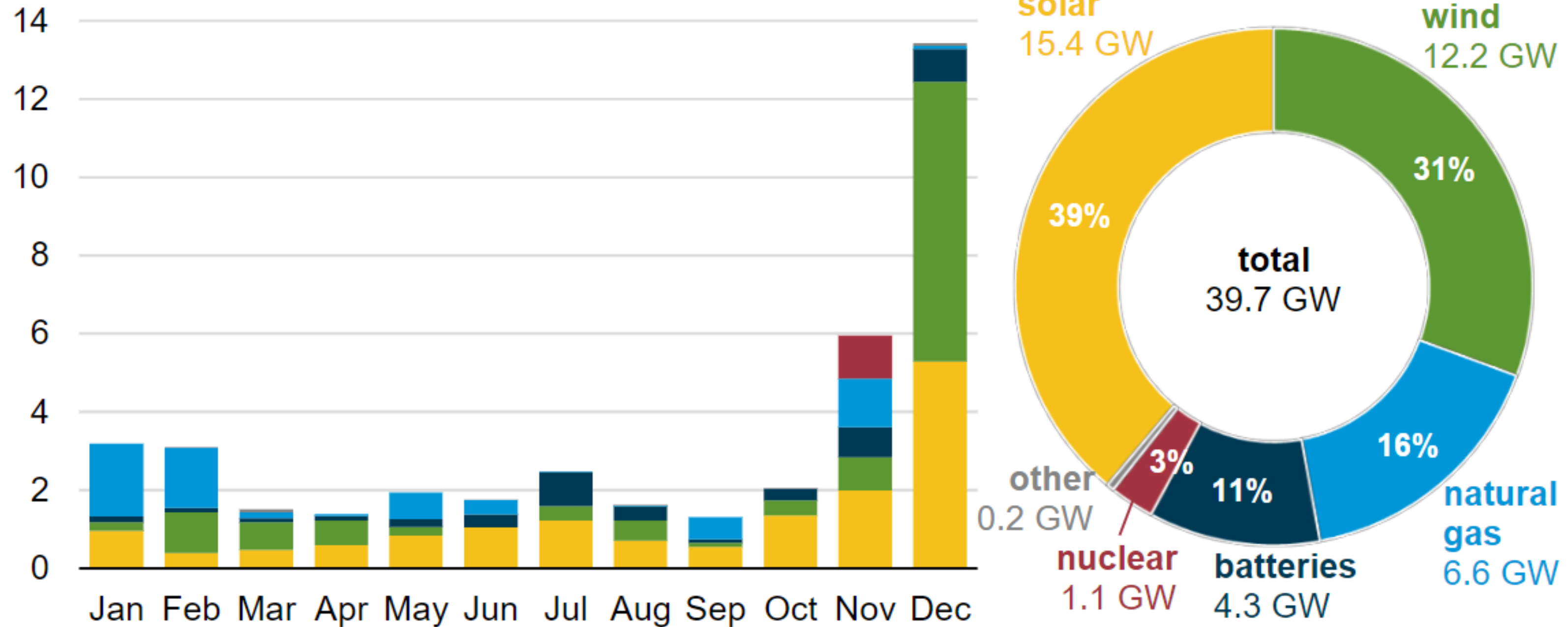




Long-term average of GHI

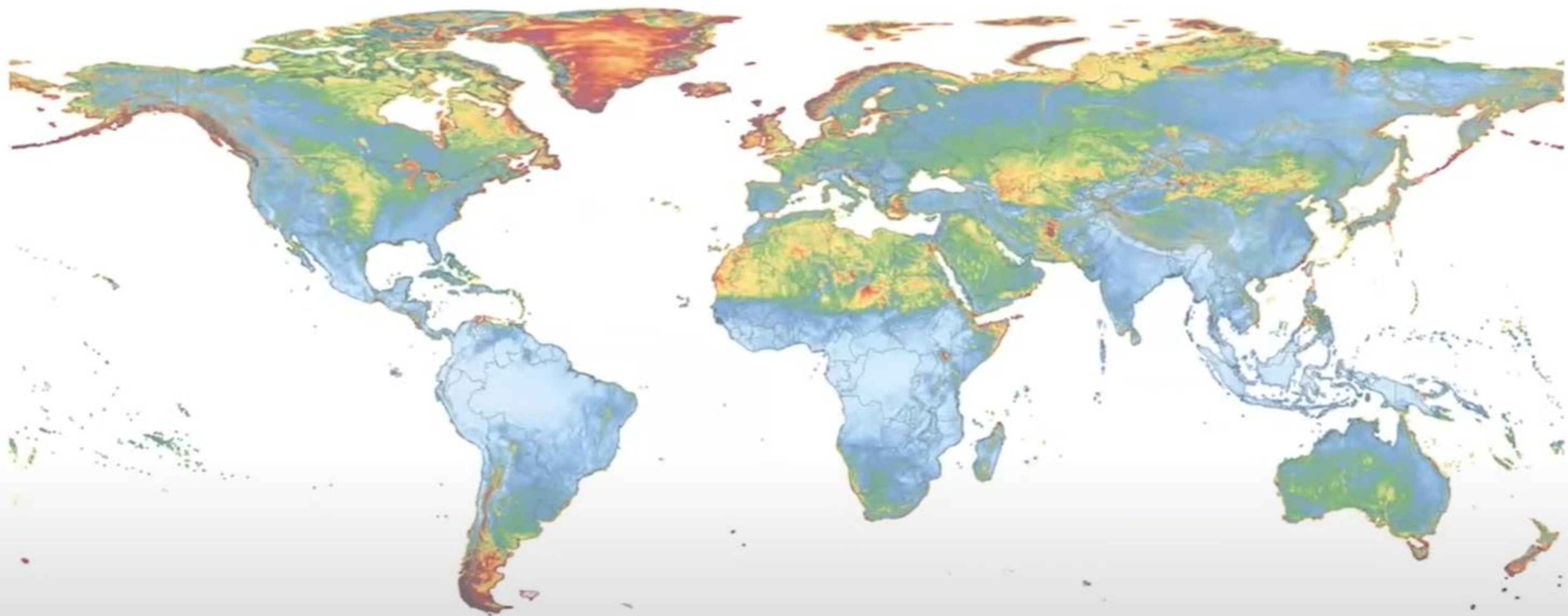


## Planned U.S. utility-scale electricity generating capacity additions (2021) gigawatts (GW)

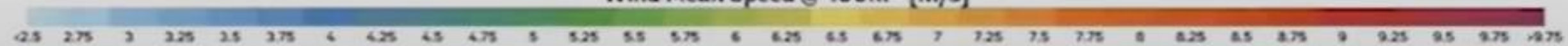


Source: U.S. Energy Information Administration, *Preliminary Monthly Electric Generator Inventory*, October 2020

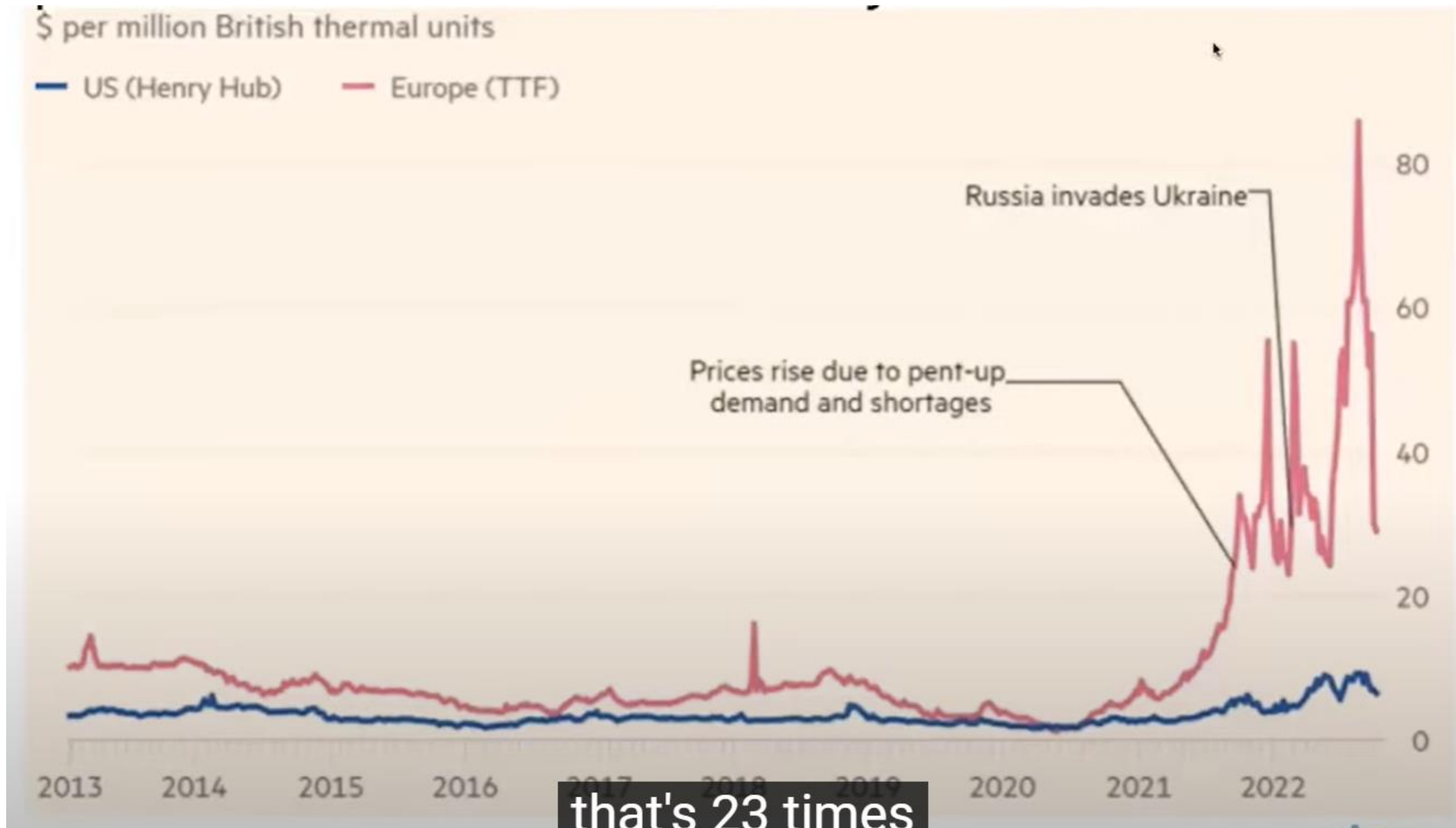
Economics trumps politics. Some of the wind farms were established in the republic states.



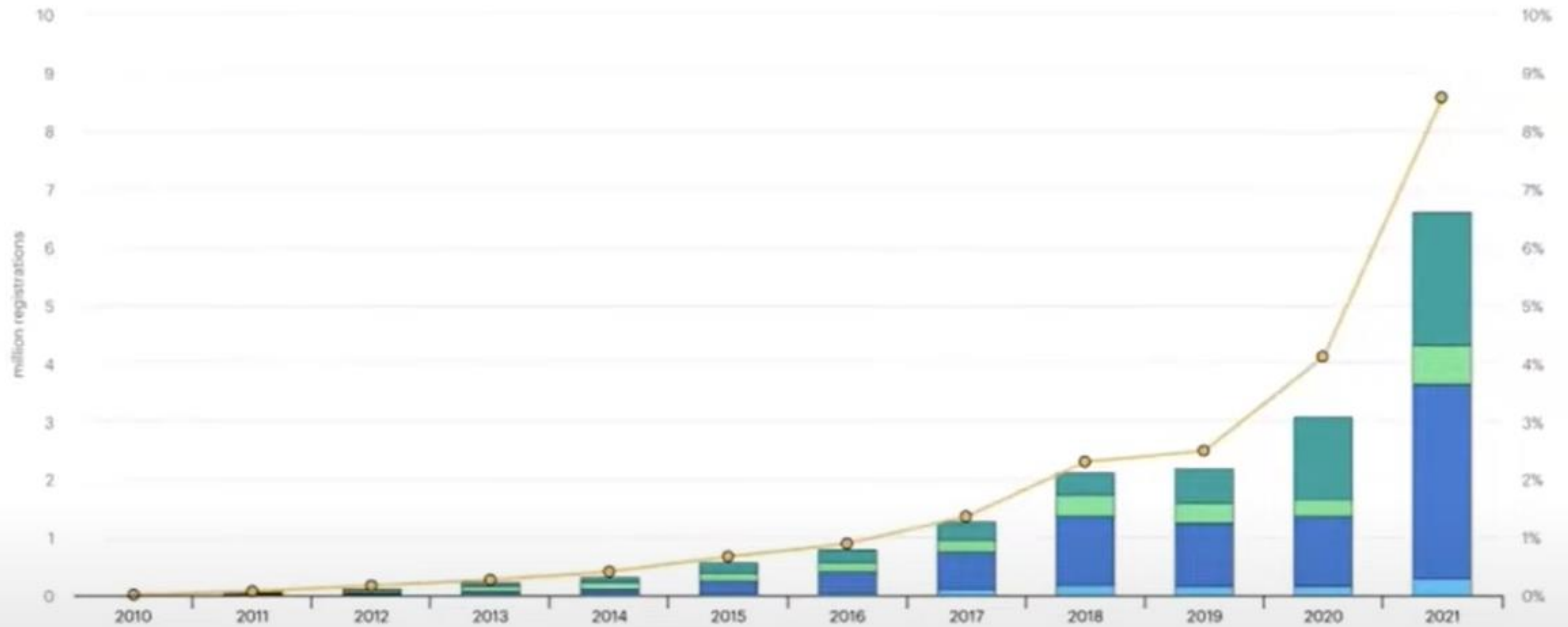
Wind Mean Speed @ 100m - [m/s]



# The price of natural gas US vs Europe in 2023



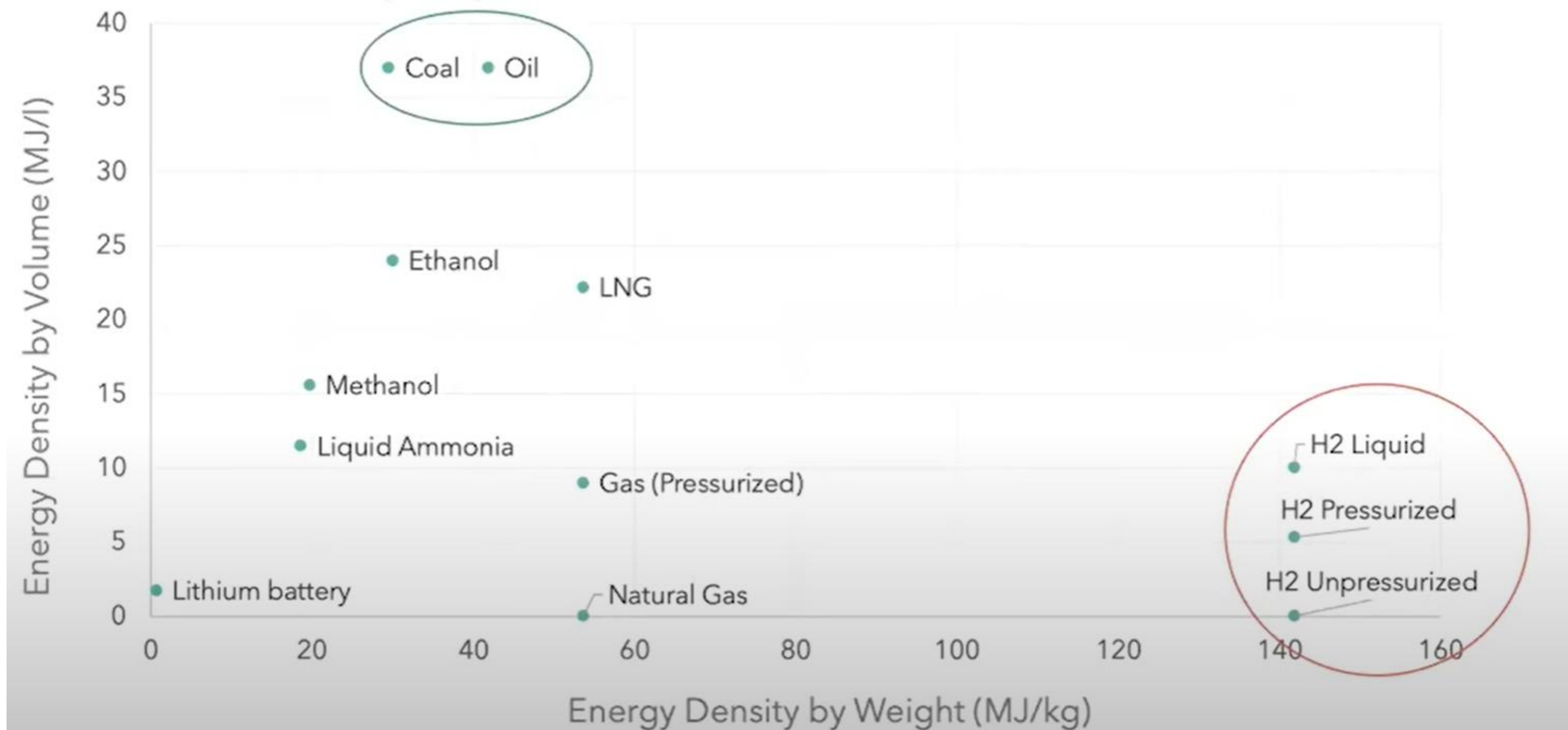
Global sales and sales market share of electric cars, 2010-2021



IEA. All Rights Reserved

Others China United States Europe Global market share

## Density of various energy inputs affects the cost of transport



# The region is on a critical time path for economic diversification

## Physical risks

### Chronic stressors

- Drought
- Extreme Heat
- Coastal erosion
- Desertification
- Salinity

### Acute hazards

- Flash flooding
- Cyclones
- Storm surges
- Epidemics

## Transition risks

- Stranded Assets
- Policy and institutions
- Reputation risks

- Liability
- Technology
- Market risks



## Potential financial impacts

- Physical damage to assets and rising insurance costs
- Economic productivity disruptions  
Supply chain disruptions
- Changes in resource/input prices (e.g. water / energy / food)
- Changes in demand for products and services

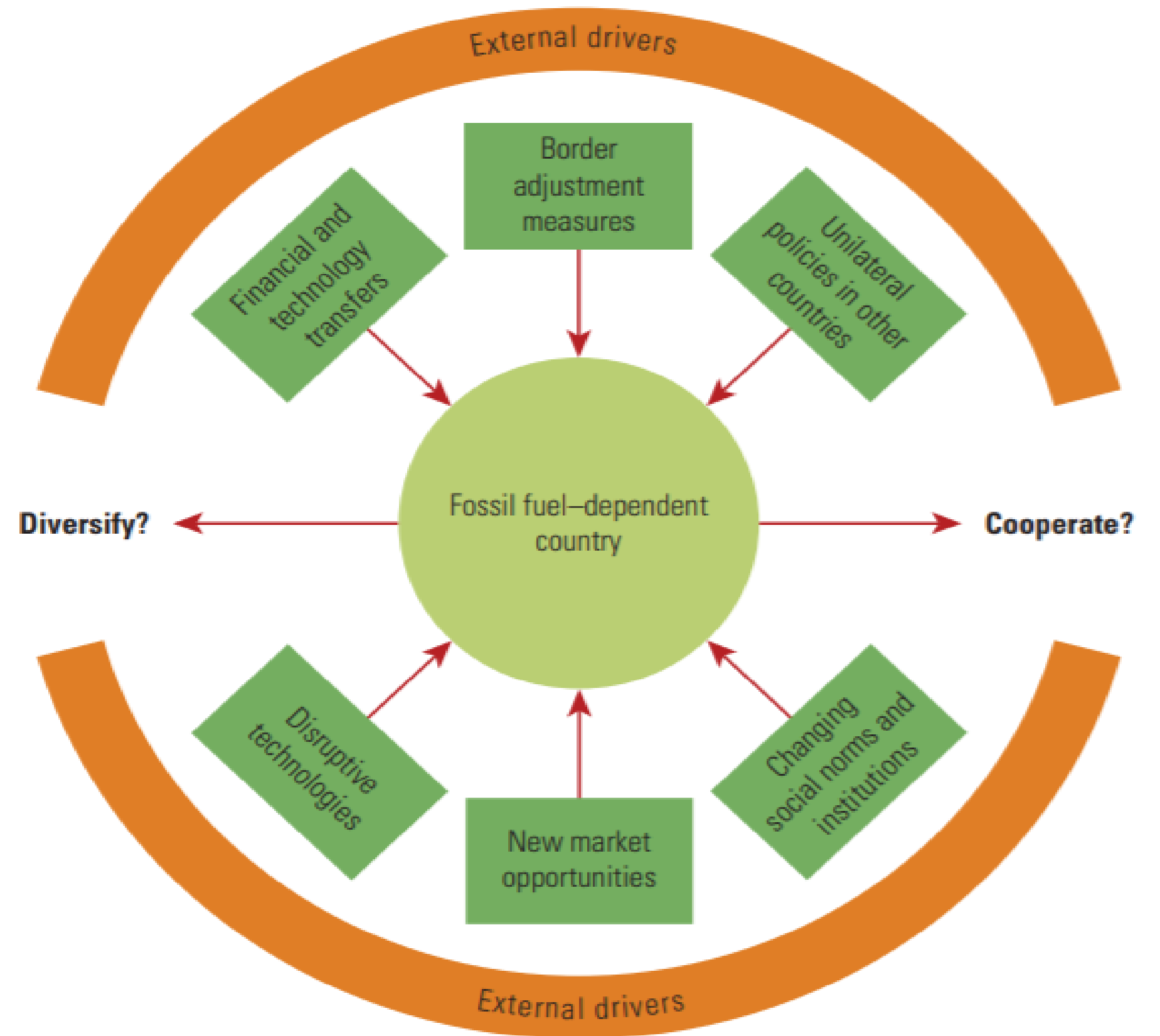
*Diversification pathways: How could the low-carbon transition unfold? How can hydrocarbon dependent economies prepare for it?*

*Green Growth is not about how you can lower your emissions but rather about Growing your economy while helping the world decarbonize*

*How?*



*By making things that help the world decarbonize (Mining Boom, Manufacturing and Supply Chain Opportunities)*



*Diversification pathways: Positioning the country in the global trade and investment landscape*



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# World Bank – Climate Change Action Plan and MENA Regional Climate Roadmap



# Climate change and development must be tackled together

Climate change, poverty, and inequality are defining challenges of our time. The WBG Action Plan focuses on integrating climate and development, identifying and prioritizing action on the largest mitigation and adaptation opportunities, and using those to drive our climate finance and leverage private capital in ways that deliver the most results. **Country Climate & Development Reports Launched**



## Ramping up Climate Finance to Make the Most Impact

Supporting programs that make the greatest impact, which means helping the largest emitters flatten their GHG emissions curve and accelerate the downtrend, while also ramping up financing on adaptation to help countries build resilience to climate change.

## Green, Resilient, and Inclusive Development

Advancing green, resilient, and inclusive development (GRID) by enhancing support for WBG clients to integrate climate into their development strategies. Support will be tailored to individual client demand and based on country-specific circumstances.

## From Green Projects to Green Economies

Pivoting from supporting “green” projects, to greening entire economies through a whole-of-economy approach, focusing on policies and plans to create the right enabling environment for climate action to deliver transformative change, including private sector-led growth.

**...as the poorest countries are most impacted**

# With right policies, these risks can be turned into opportunities

## ***Whole of Government Approach***

- Mainstream climate action in core government functions and institutions.
- Facilitate sectoral and vertical integration in support of well-coordinated government strategies/plans.

## ***Climate-FCV nexus***

- Enhance understanding of relationship between environmental degradation and FCV risks.
- Pragmatic, select interventions to address climate in fragility and to disrupt any vicious cycles.

## ***Digital and Technology Innovation***

- Support digitally-enabled, climate smart service delivery (e.g. smart meters for utilities, traffic congestion management solutions).
- Scale up use of satellite imagery to map and manage risks, predict and provide predict weather patters and provide early warning systems.

## ***Green skills and Jobs***

- Targeted investments in reskilling and upskilling to leverage the job multipliers of the low carbon transition.
- Support strategy development for carbon-intensive sectors, with a focus on vulnerable groups.

## ***Just transition, Inclusion and Social Protection systems***

- Develop vulnerability maps to assess poverty, distributional impacts, and opportunity gaps, disaggregated by vulnerable groups
- Support climate-adaptive social protection systems, effectively targeting the most vulnerable

## ***Regional Integration***

- Enhance cooperation and collaboration across borders to support efficiency bring solutions to scale.
- Examples include coordinated management of transboundary waters and other natural resources, energy production and trade, and transport corridors.

## ***Citizen Engagement***

- Develop plans and strategies for a meaningful citizen engagement for climate risk management and solutions.
- Support communication plans for a meaningful citizen engagement to mitigate a myriad of stressors on service delivery and the social contract.

## ***Private Sector Participation***

- The role of private sector is critical in climate transitions from bridging the financing gaps, providing latest technologies and innovative approaches (decentralized RE solutions) are essential for low carbon and resilient pathways. Countries must review and address barriers to private sector investment in a systematic manner.

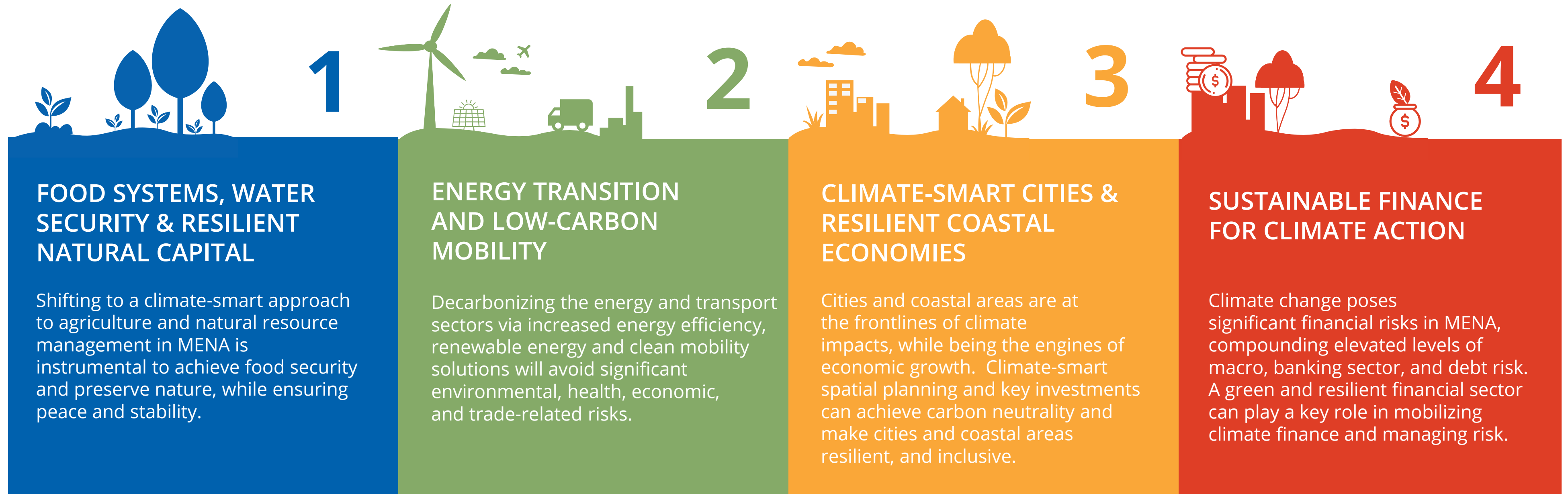
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# Four Transformation areas for a Climate- Smart Future in MENA



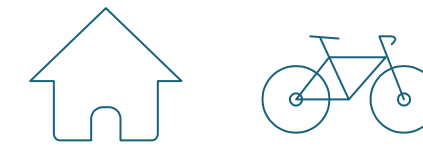
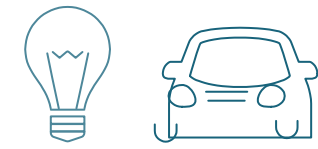
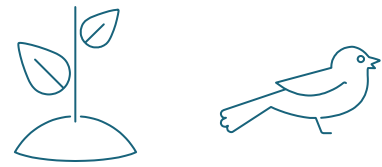
# Prioritizing Key Transformation Areas



## CROSS-CUTTING CONSIDERATIONS

Whole of Government Approach, Social & Spatial Inclusion, Citizen Engagement, Just Transition, Fragility, Conflict & Violence, Private Sector Mobilization, Climate Data & Digital Innovation, Regional Integration

# Examples and Opportunities for private sector participation



## 1. Food Systems, Water Security & Resilient Natural Capital

- Import substitution with a phased project development approach to tackle dairy imports
- Water re-use and water desalination using Renewable energy.
- Focus on water efficiency and smart irrigation for horticulture.
- Unlock finance for Climate smart Agri (Example: ENDA Project - Tunisia); Wastewater treatment, water efficiency (linkages to blue loans/bonds).

## 2. Energy Transition and Low Carbon Mobility

- Increase energy efficiency in industrial and commercial sectors through climate technology solutions.
- RE to meet growing demand and replace costly and obsolete thermal capacity.
- Crowding in private sector and mobilizing external capital through PPPs.
- Rooftop Solar for Public Buildings.
- E-mobility market studies for solutions such as e-buses, charging stations
- Temperature-controlled logistics through third-party carriers

## 3. Climate-Smart Cities & Resilient Coastal Economies

- Develop transactions focusing on green building and captive solar plants.
- Municipal projects, making cities more Energy Efficient and climate resilient.
- Increase EDGE certification adoption and cross-selling EDGE to new asset classes (light industrial buildings, pharma, auto, factories etc.) and green mortgages
- Sustainable energy finance to support EE, RE, and circular economy.
- Waste-to-Energy solutions to address the Increasing waste issue in MENA.
- Resilience-focused municipal bonds.

## 4. Sustainable Finance for Climate Action

- Mainstreaming green buildings (residential, commercial, industrial) through incentives
- Sustainable infrastructure investment platform for cities
- Align financial sector with NDCs, assist banks with reducing climate risk and coal exposure
- Mainstream innovative climate solutions with FIs through advisory/investment services.
- Develop capital market instruments for financing of new “green” asset classes developed
- Socialize green bonds in the real sector; support issuance of green sovereign bonds and sukuk.
- Advisory projects on green loans



The World Bank Group  
Middle East & North Africa Climate Roadmap

Driving transformational climate  
action and green recovery in MENA

FY 2021-2025

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For questions:

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Senior Climate Change Specialist, WB MENA Region



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# Annex slides





# Hydrocarbon dependency and rising emissions call for urgent action

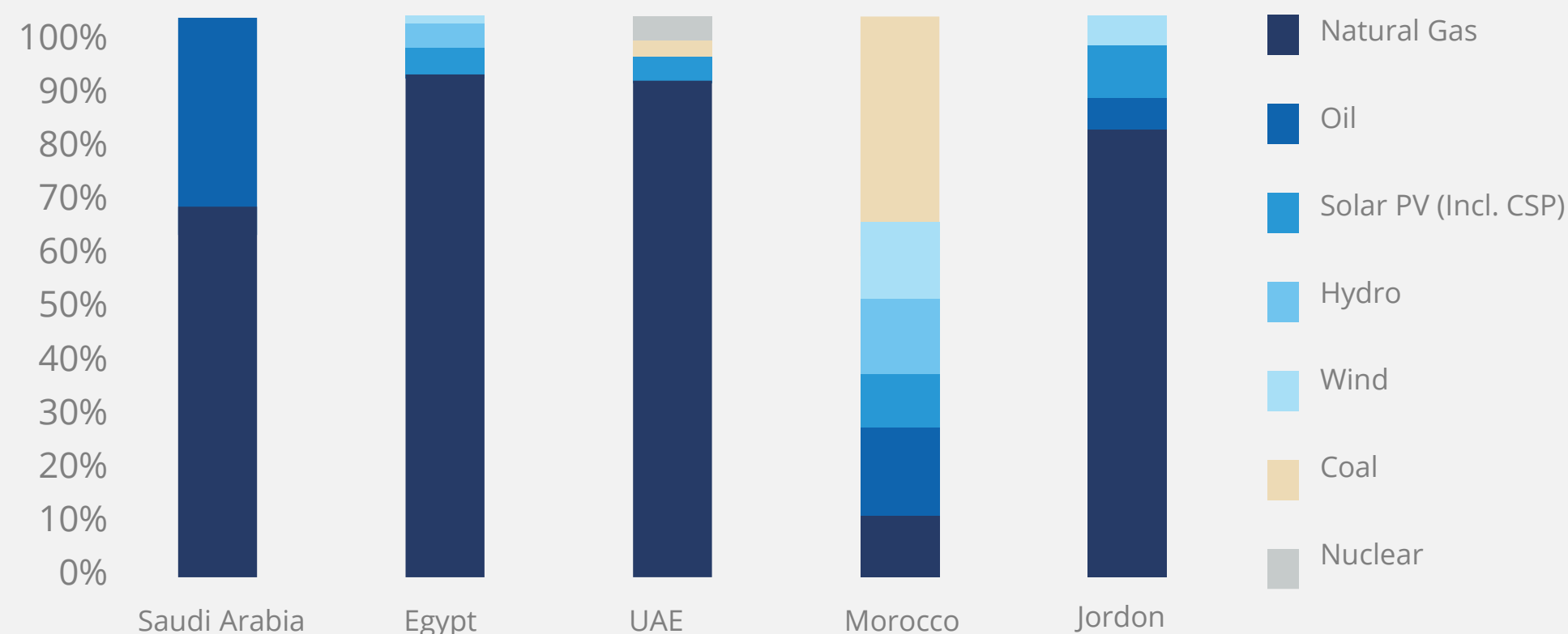
## FOSSIL FUEL DEPENDENCY

- MENA's major resource-rich countries are economically dependent on the oil and gas trade. Fossil fuels average 50% of exports for the GCC, Iraq, Libya, Iran.
- Primary energy demand is expected to double by 2030 and the region's share in global oil production is expected to increase from 35% to 44% in 2030 due to population and economic growth (EIA).
- Both oil and gas exporter and importer countries face increasing fuel insecurity and vulnerability, as climate change and decarbonization efforts will pose significant transition risks.

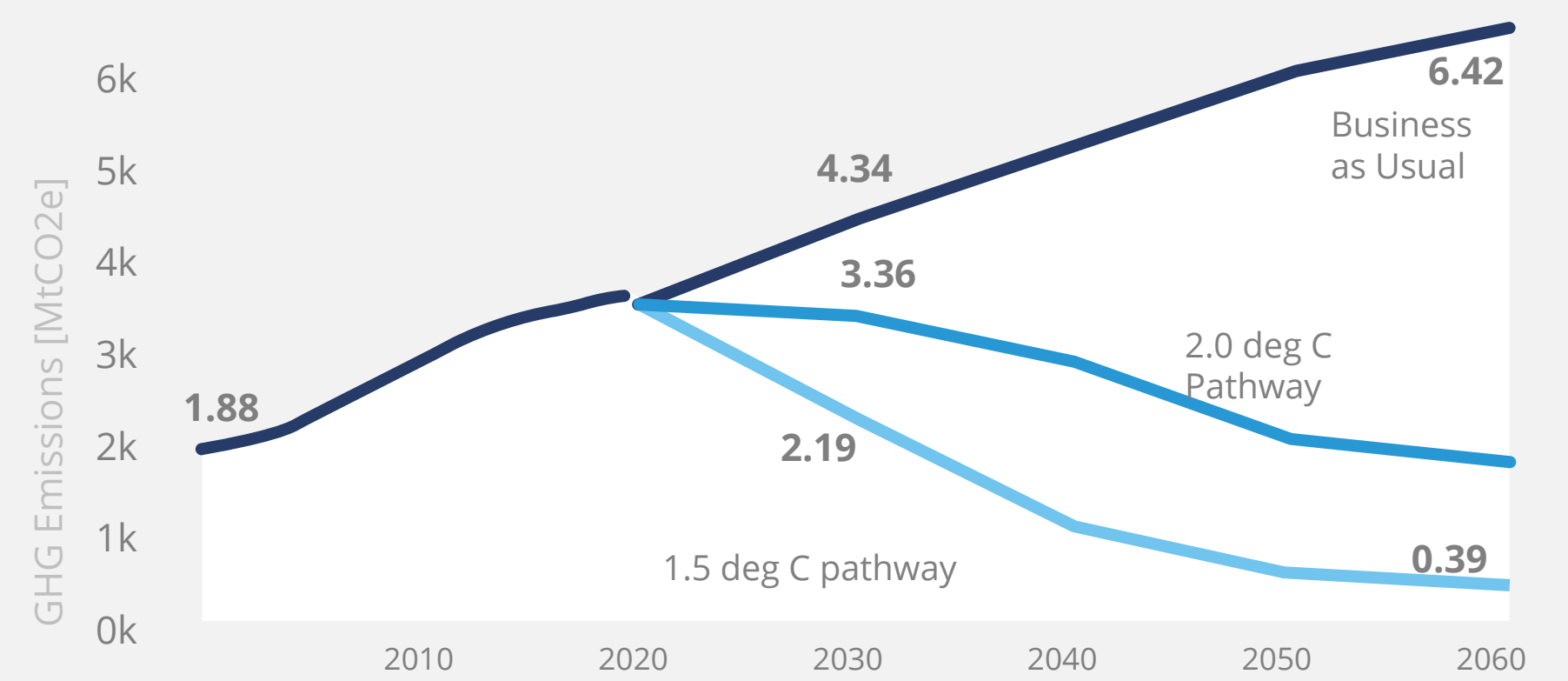
## REGIONAL GHG TRENDS

- MENA's GHG footprint is low when compared to other regions (8.7% of global emissions (CAIT 2020) but the region is also home to the world's top 10-per capita carbon emitters in the world (Qatar, Kuwait, UAE, Bahrain and Saudi Arabia)
- MENA is the only region in which growth of CO<sub>2</sub>e emissions per capita has outpaced the growth of average incomes.
- GHG emissions would more than triple by 2060 (from 2000 baseline) under a BAU scenario.

THE POWER GENERATION MIX IN SELECTED MENA COUNTRIES IN 2020 VS. 2019



GHG EMISSIONS IN MENA UNDER BUSINESS AS USUAL, 2C OF 1.5C PATHWAYS



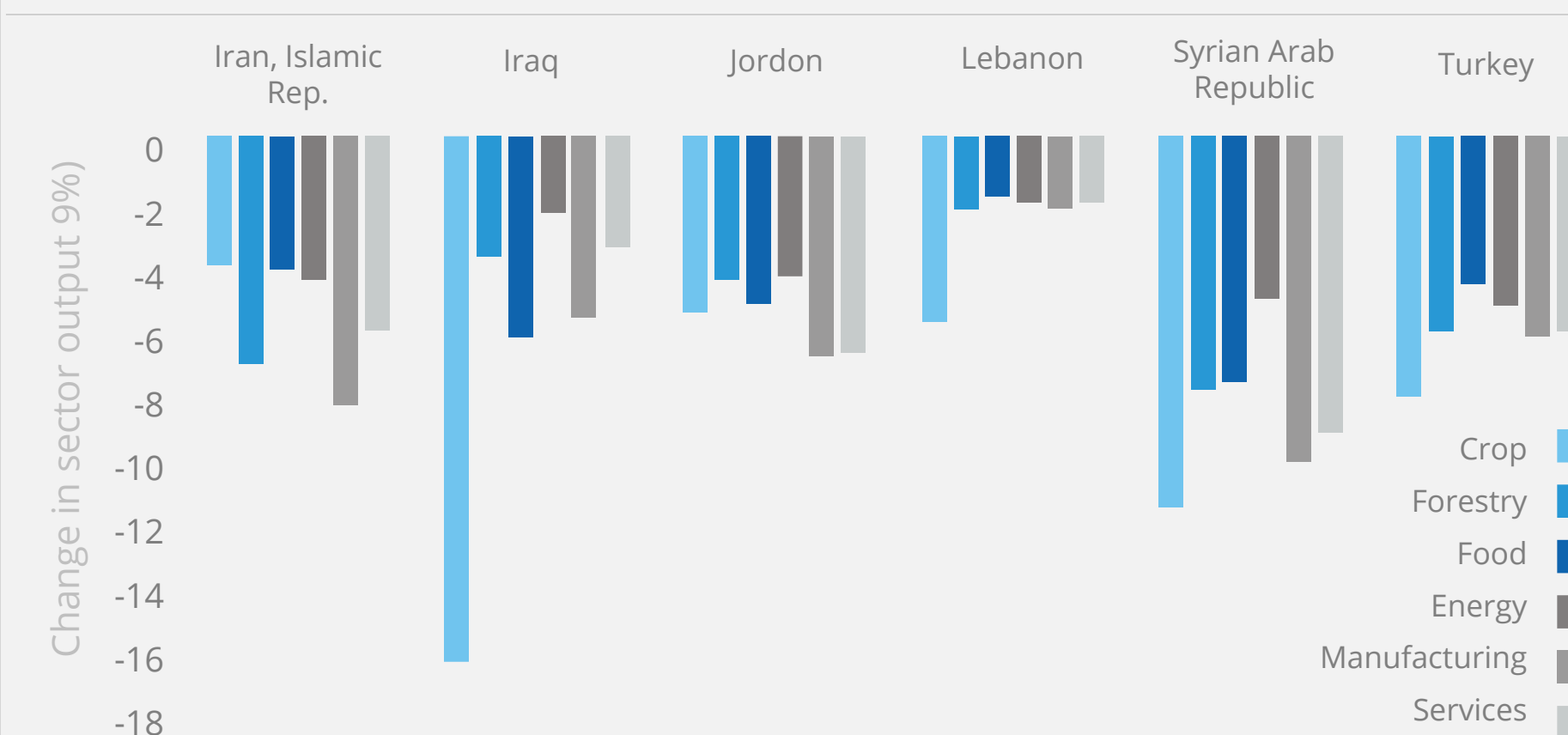
# Climate-driven impacts on food, agriculture and land degradation

Climate change is a fundamental threat to food systems and a significant “hunger-risk multiplier” in MENA. Nearly 55 million people were already food insecure in the region before COVID-19 (2019). The situation is particularly worrying in countries affected by conflicts and violence: Iraq, Syria and Yemen. Moreover, countries which are highly dependent on food imports will face fluctuating food prices.

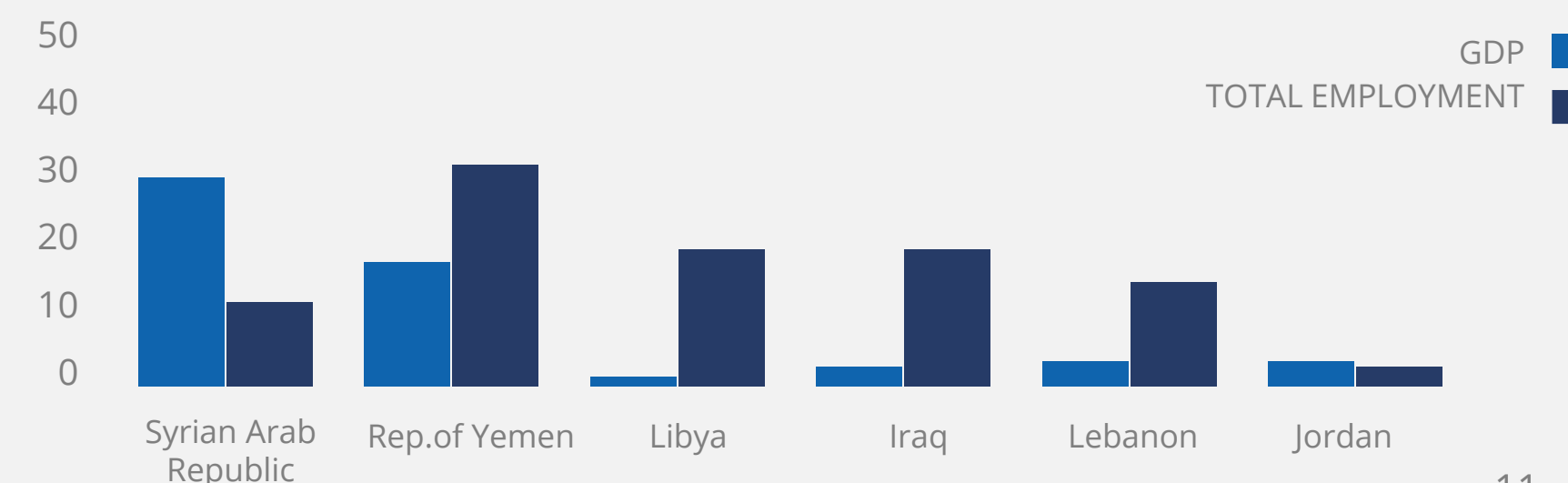
The agriculture sector is 70% rainfed and highly exposed to climate change. Agriculture is the largest employer in many countries and contributes significantly to national economies. Heat extremes and drought already affect about one-third of land areas, with consequences for food production. In a 2°C world, agricultural losses could reduce household incomes by billions. Losses of US \$2billion in Syria and Tunisia alone, and up to US \$9 billion in Yemen.

Desertification endangers almost half the land area in the Mashreq, 28.6% in the Nile Valley and the Horn of Africa, 16.5% in North Africa and 9% in the Arabian Peninsula.

THE IMPACTS OF CLIMATE CHANGE-INDUCED WATER SCARCITY AND CROP YIELDS CHANGE ON SECTORAL OUTPUTS, BY COUNTRY



SHARE OF AGRICULTURE (CROPS, FORESTRY AND FISHING) IN TOTAL EMPLOYMENT AND GDP, 2017



Source: ESCWA calculations from FAO and ILO data.

# Without bold action, climate change will deepen existing vulnerabilities



## INCREASE POVERTY

**Unchecked, climate change will push 132M people into poverty by 2030** (World Bank). Increasing frequency of natural disasters will jeopardize lives and livelihoods of the poorest first. Smallholder farmers and women are hit hard by loss of agricultural productivity.



## DISPROPORTIONAL IMPLICATIONS OF ENERGY TRANSITION

**Energy transition can potentially lead to great social risks in MENA.** Some locations will experience a loss of jobs, decline of taxes and revenues, potentially affecting essential public services.



## PUBLIC HEALTH AND LABOR CONDITIONS

**Climate change poses significant public health risks, due to water/air-borne diseases and increasing heat extremes,** affecting vulnerable groups. 40% of lost working hours due to heat stress in 2030 are in the construction sector, disproportionately vulnerable and migrant workers.



## HUNGER MULTIPLIER

**Change will weaken countries' agri-food systems.** Nearly 55 million people were already food insecure in Arab States before COVID-19 (2019). Climate change will reduce domestic agricultural productivity and affect food-importing countries facing international food price shocks.



## FRAGILITY, CONFLICT AND VIOLENCE

**Climate risks, notably water scarcity, can amplify root causes of fragility in a highly vulnerable region.** Indeed, one in five people in MENA already live within 60 km of conflict and the region is home to a quarter of forcibly displaced people in the world (16.3 million in 2016). Increasing exposure of women and girls to climate-related hazards drives further gender-based violence (GBV).



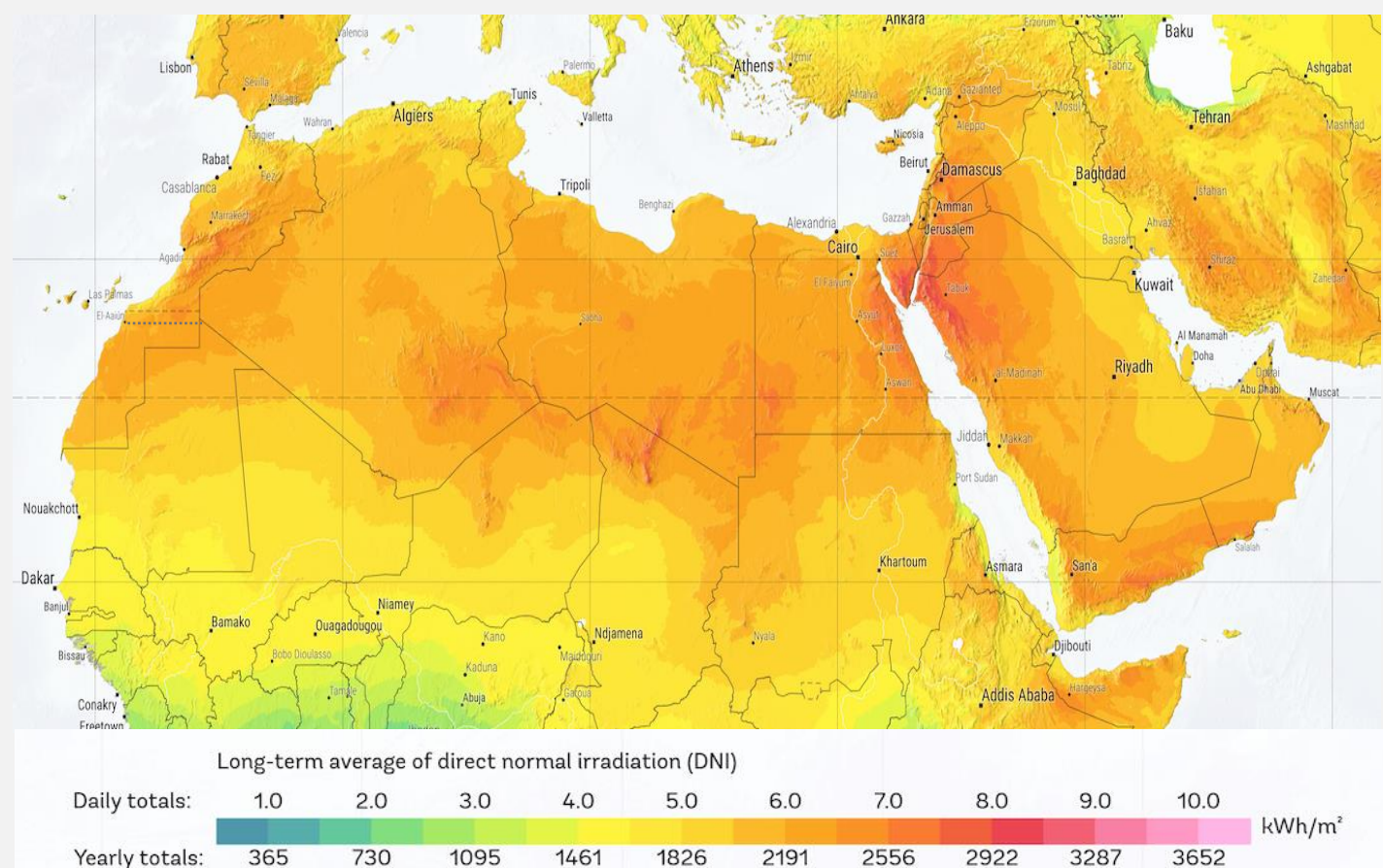
## CLIMATE MIGRATION

**Climate change can serve as 'push' factor in migration.** Sea level rise alone could displace millions of people along MENA's densely populated coasts. In North Africa, there could be up to **19.3 million** internal "climate migrants" by 2050, accounting for 9% of the subregion's total projected population.

# Renewable energy presents a major economic and social opportunity

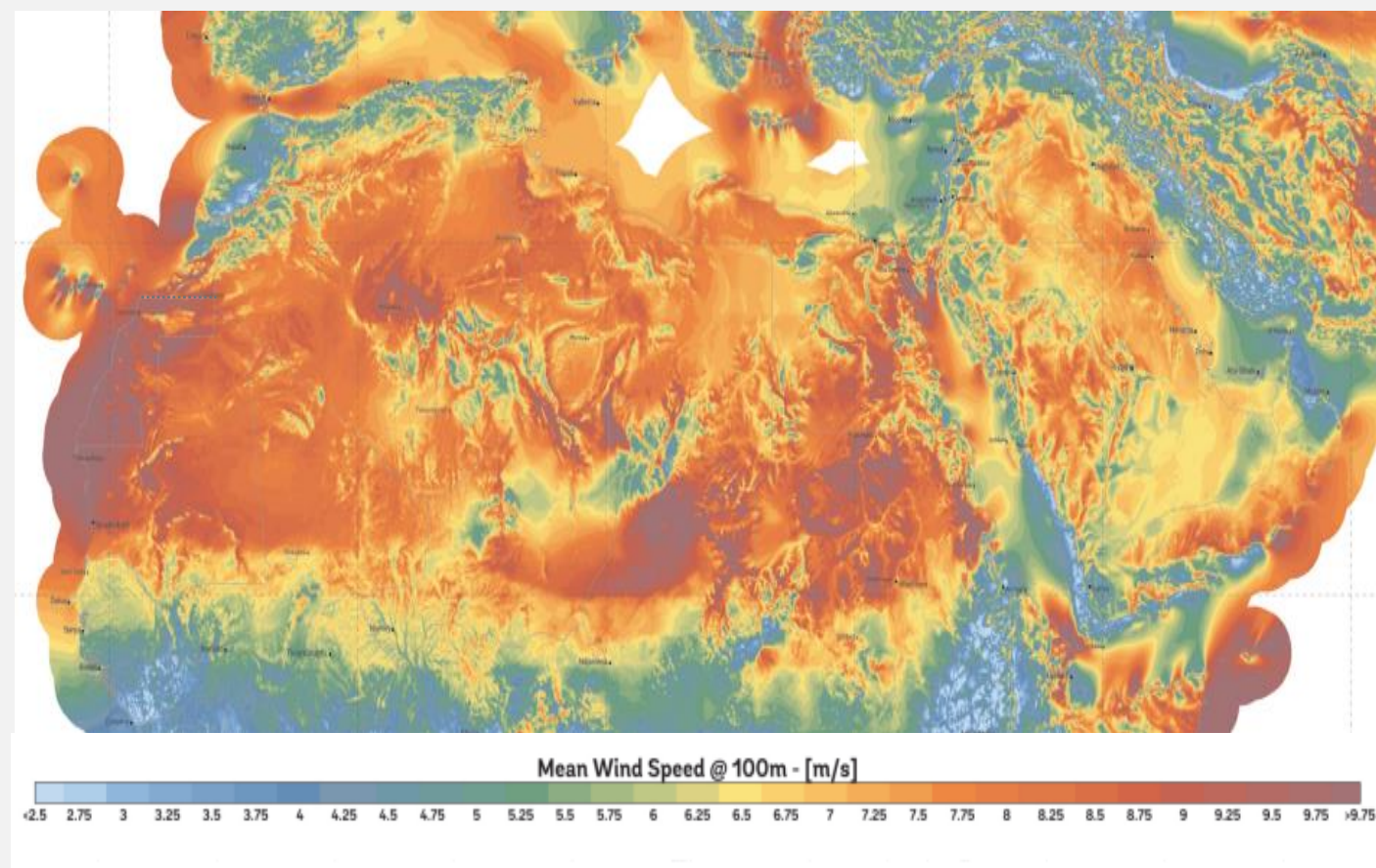
Renewable energy (not including hydropower) is responsible for less than 1.5% of all electricity generation in the region (vs 10% global average). Thanks to high potential in renewable energy resources. MENA can decarbonize its energy systems with significant socio-economic and environmental benefits.

**MENA receives 22-26% of all solar energy striking the earth.** Solar energy potential in MENA per square kilometer is equivalent to energy produced by 1-2 million barrels of oil annually and could meet at least 50% of global electricity demand.



**Direct Normal Irradiation in MENA.** Source: *Global Solar Atlas*

**75% of MENA has average wind speeds that exceed the minimum threshold for utility-scale wind farms.** Wind speeds in countries such as Morocco, Egypt and Tunisia are amongst the highest in the world.



**Average Wind Mean Speed in MENA.** Source: *Global Wind Atlas*

A transition to low carbon energy systems could drive economic growth through industrial diversification, new value-chain activities, strengthened regional trade and economic cooperation.

The development, management and maintenance of renewable installation can create sustainable jobs with a just transition approach, as the workforce shifts in locality and skillsets. In Morocco only, the cumulative net job creation in the next 30 years could amount to 761,914.

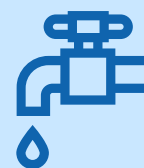
Energy transition presents an opportunity for increased female labor, as globally women represent 32% of fulltime employees in renewable energy, compared to 22% in average in the global oil and gas industry.

# Food Systems, Water Security & Resilient Natural Capital



## PROMOTE CLIMATE-SMART AGRI-FOOD SYSTEMS

Building climate-resilient food systems will reduce growing food insecurity in a region of high import dependency and 70% rain-fed agriculture.



## ENHANCE CLIMATE-SENSITIVE WATER RESOURCE MANAGEMENT

Climate-smart water resource management will increase adaptive capacity to cope with increasing water scarcity, in the most arid and semi-arid region in the world.



## BUILD RESILIENT NATURAL CAPITAL

Incorporating climate into natural capital management will yield vast mitigation and adaptation benefits, whilst preserving biodiversity and vital ecosystems.

### P R I O R I T Y I N T E R V E N T I O N S

- **Climate-smart agriculture action plans**, modern irrigation and cropping practices
- Reforms to **reduce food loss and waste** along agricultural value chains
- Technologies to **strengthen farmers' adaptive capacity**
- **Sustainable fisheries and aquaculture management**, including livelihood diversification for vulnerable fishery communities

- **Integrated water resource management strategies**, balancing freshwater withdrawals and replenishments
- Systematic reforms to **remove inefficiencies in water sector**
- **Effective treatment of wastewater** for discharge and reuse
- Clean technologies for **water treatment systems**
- **Transboundary water cooperation** and conflict prevention

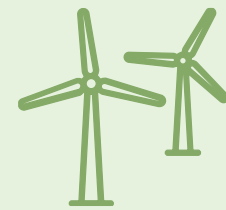
- **Analysis of biodiversity loss** linked to adaptation and carbon sinks
- Further enhance **understanding of Nature-Based Solutions (NBS) potential** and improve natural capital accounting
- **Increasing investments in NBS** (regeneration of vegetation, integrated landscape management approaches, blue carbon, nature-based tourism)

# Energy Transition and Low-Carbon Mobility



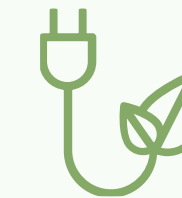
## PROMOTE LONG-TERM EMISSIONS REDUCTION AND ECONOMIC DIVERSIFICATION STRATEGIES

Readiness and capacity building to underpin policies and investments for long term, deep decarbonization strategies for a clean and resilient energy system.



## SCALE UP RENEWABLES AND ENERGY EFFICIENCY

Policies and programs to drastically increase share of renewables in the energy mix and achieve energy efficiency goals.



## SHIFT TO LOW-CARBON AND RESILIENT TRANSPORT SYSTEMS

Low carbon transportation will significantly improve air quality and livability of densely populated areas while reducing GHG emissions.

### P R I O R I T Y I N T E R V E N T I O N S

- **Upstream engagement and analytics** (e.g. Low emission power sector strategies)
- Support to **distribution sector reforms**, including energy subsidy reforms, reduction/ utilization of gas flaring
- Policies for **industrial decarbonization**, green competitiveness, and circular carbon economy
- Support to country or sector-specific demand-side **energy efficiency**

- Enhance **grid integration (including through pan-regional trade)** and enabling infrastructure to deploy intermittent renewable energy
- Inform Renewable Energy (RE) and storage policy and **develop nascent RE and storage technologies**
- Enhance **resilience of critical power grids**, and improving **access to affordable clean electricity** for the most vulnerable

- **Climate-smart transport policies**, integrated planning and capacity building
- Investments in **public transport** infrastructure and services
- Improve enabling environment for **e-mobility solutions**
- Mainstream **resilience in infrastructure investments** throughout asset life cycle (transport, energy, digital)
- Activities encouraging **non-motorized transport options**

# Climate-Smart Cities & Resilient Coastal Economies



## PROMOTE CLIMATE-SMART URBAN DEVELOPMENT AND PLANNING

Climate-smart urban development, with a focus on coastal cities is critical to improve livability of cities, promote economic growth.



## ENSURE CLIMATE-SMART PUBLIC SERVICES

With the appropriate institutional frameworks and master plans, MENA can build readiness to ensure the continuity of critical public services, especially in water, sanitation and waste management.



## DEVELOP RESILIENT COASTAL ECONOMIES

Integrated coastal management and climate adaptive coastal economies will mitigate significant risks in the face of increasing climate hazards and reduce livelihoods.

### P R I O R I T Y I N T E R V E N T I O N S

- **Climate-smart urban strategies**, in hotspots including guidelines for Disaster Risk Management, green growth, low-carbon transit
- **Green buildings**: innovation, green retrofitting, reforms for planning and building codes, green technologies
- Spatial planning for urban interventions with a focus on **liveability, green space, use of data and digital technology**

- Clean energy and energy efficient systems for **water treatment and wastewater reuse**
- **Solid waste management plans** for waste recovery, landfills and recycling centers.
- **Leverage private finance** and build-operate-transfer to expand non-conventional water resources and develop technologies for providing clean water.
- Measures to **reduce air pollution** via technologies and new indicators that are useful for protecting health

- **Blue economy, blue carbon sequestration** and climate adaptation of coastal cities
- Support to **improve climate data** to measure sea level rise and coastal erosion
- **Marine and coastal ecosystem restoration and conservation**
- Strategies for increased **resilience of the tourism sector**

# Sustainable Finance for Climate Action



## GREENING FINANCIAL SYSTEMS

Greening the financial institutions, systems and instruments will be the cornerstone of climate-smart transitions. The WB, IFC and MIGA will jointly support this transition working closely with national and private sector institutions.



## IDENTIFY AND ADDRESS TRANSITION RISKS

Identifying climate-related physical and transition risks to the economy will be essential to formulate policies for resilient financial institutions and governance in MENA.



## UNLOCK GREEN FINANCING FOR CLIMATE SMART INVESTMENTS

Supporting national budgets and expenditures to align with green financing needs; unlocking private capital flows for green investments.

### P R I O R I T Y I N T E R V E N T I O N S

- **Climate stress tests identifying climate-related risks** in the financial system and supervisory response.
- **Climate risk management guidelines, standards and regulation** for financial institutions such as supervisory guidance in climate risk monitoring
- **Support to regulators on climate risk financing**
- Develop **green financial tools and instruments**

- Assessments of **financial exposure of assets and investments** to climate risks and disasters
- Support in **estimation and management of disaster-related contingent liabilities** to manage fiscal burden from climate hazards
- Develop **national risk financing** and support domestic and international **insurance products and instruments**.
- Assessments of **trade risks** (e.g. from CBAM, EU Green Deal) and strategies for sectoral transitions to **cope with contingent liabilities, avoid stranded assets and economic losses**

- **Green taxonomies, and national expenditure reviews** in alignment with climate goals
- Developing **green financing frameworks, guidelines** aligned with climate goals and long-term reforms
- Support to increase **treasury markets/private banks** for green and climate resilient investments
- Identify **innovative business models, technologies** for private sector investments in climate action