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TCFD training for MENA

Part 2: Understanding physical and transition risks

24 March 2021

SESSION OVERVIEW

Participants

- Senior-level sustainability managers
- On-ground implementing colleagues

Key topics

1. Physical risks- extreme events and incremental changes
2. Transition risks- policy, technology, and other drivers
3. Physical and transition risks in the MENA region
4. Introduction to climate scenarios and climate data

Learning objectives

- Develop an understanding of physical and transition risks affecting MENA and the globe
- Learn how to identify physical and transition risks within portfolios

DISCUSSION QUESTIONS

- Do you already see certain physical risks impacting your activities? If so, which ones?
- Which sector(s) do you believe will be more likely to experience severe physical risks?
- What is your institution currently doing to measure and manage climate risk?
 - What qualitative approaches have you considered?
 - What quantitative approaches have you considered?

CLIMATE IMPACTS CAN COME FROM PHYSICAL EVENTS (PHYSICAL RISKS) OR FROM THE SHIFT TO A LOW-CARBON ECONOMY (TRANSITION RISKS)

Transition risks

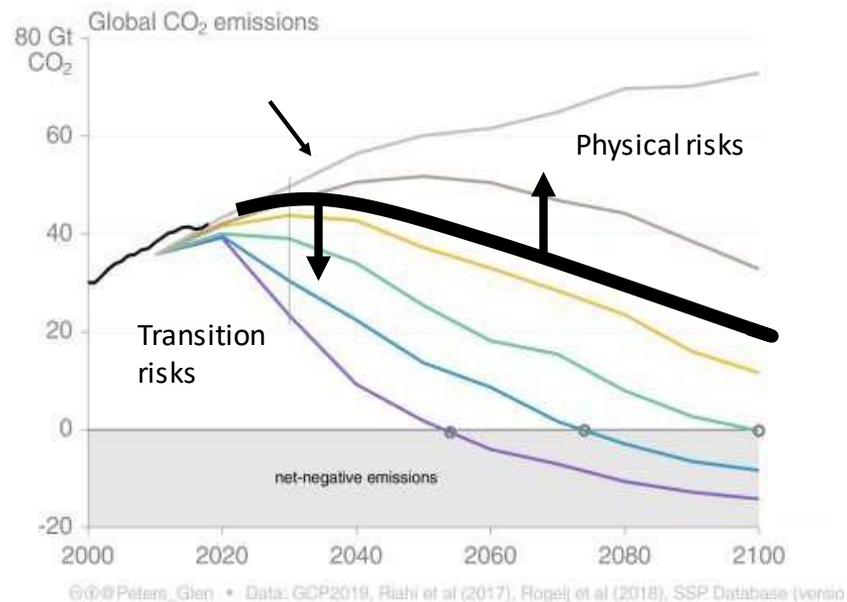
- Driven by the transformation of the economy due to climate action
- Policy risks
 - Regulatory or public policy actions that increase the costs of various activities (e.g., carbon taxes)
 - Regulations or restrictions on certain activities (e.g., fracking)
- Technology risks
 - Changing economics of low-carbon technologies that replace or challenge incumbent emitters (e.g., solar vs. coal)
- Market risks
 - Revaluation of assets based on shifts in demand or the recognition of potential stranded assets (e.g., fossil fuel reserves)
 - Changes in consumer preferences

Physical risks

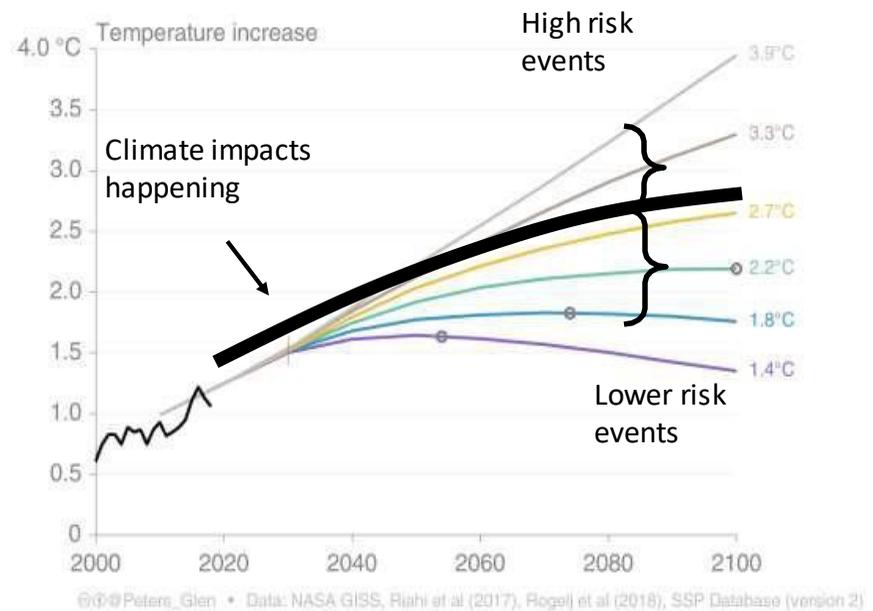
- Driven by changes in the physical systems as a result of climate change
- Incremental risks- long-term changes in baseline conditions as a result of climate change
 - Increasing droughts
 - Desertification
 - Sea-level rises
- Extreme events- short-term events that may be exacerbated or made more common by climate change
 - Heatwaves
 - Hurricanes
 - Fires
 - Floods

THERE IS A TRADE-OFF BETWEEN THE SIZE AND SEVERITY OF PHYSICAL AND TRANSITION RISKS BASED ON THE PATH WE CHOOSE

Transition Risks CO₂



Physical Risks Temperature

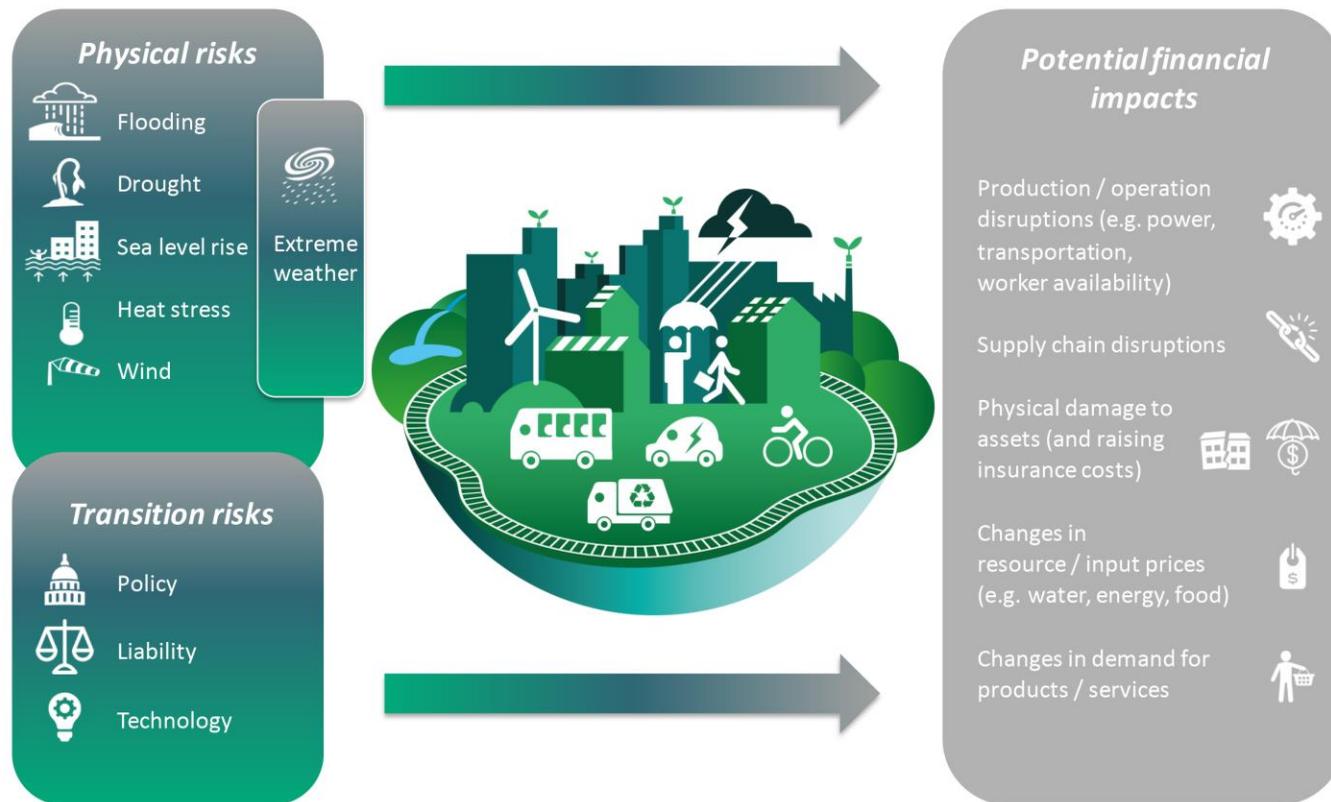


Transition risks are largely moderated by the speed and scale of emissions reductions, while physical risks are more directly related to temperature

HOW PHYSICAL AND TRANSITION RISKS IMPACT FINANCIAL INSTITUTIONS (1/2)

CLIMATE RISKS ARE FINANCIAL RISKS

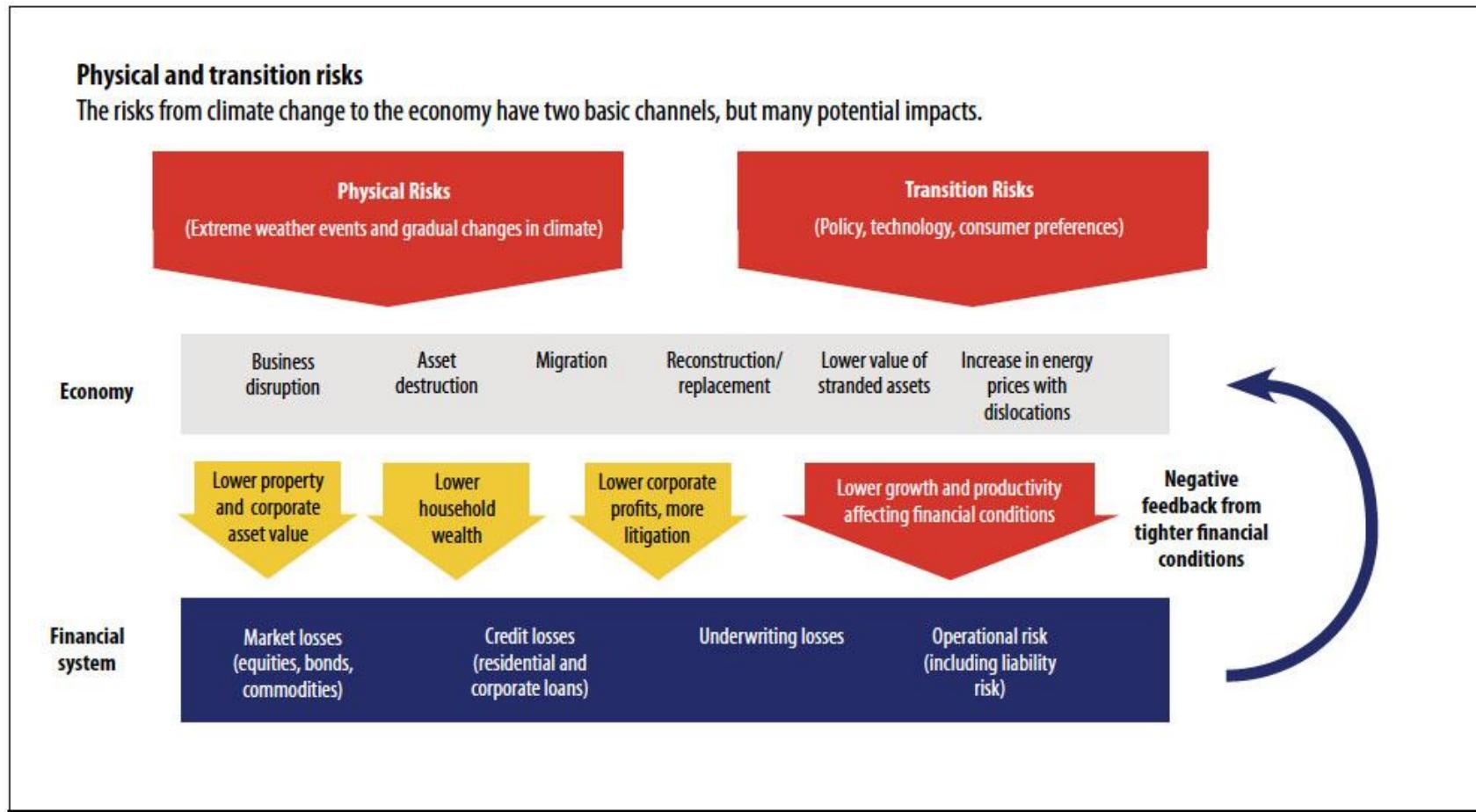
Climate risks and financial impacts₁



HOW PHYSICAL AND TRANSITION RISKS IMPACT FINANCIAL INSTITUTIONS (2/2)

PHYSICAL AND TRANSITION RISKS CAN CREATE A CASCADE OF DESTABILIZING FINANCIAL EFFECTS

Risk transmission in the financial system₁



1. IMF

1

**PHYSICAL RISKS – EXTREME EVENTS AND
INCREMENTAL CHANGES**

PHYSICAL RISKS- EXTREME EVENTS

EXTREME WEATHER EVENTS ARE DISASTROUS FOR SOCIETIES AND ECONOMIES

Extreme event example: Floods

- Floods can arrive extremely fast (“flash floods”), but the conditions in which floods manifest can be predicted with adequate information.
- Flooding can be caused by a large amount of rain, a storm surge, a combination of high tides and high river levels.
- Recently, MENA has experienced a shift in rainfall patterns and flash floods have occurred in several cities e.g. Cairo (2020), Kuwait (2018), Riyadh (2016), Casablanca (2016) resulting in casualties and infrastructure and real estate damages¹.
 - In 2011, the flash floods that the North of Tunisia, especially Zaghuan led to material losses estimated at US\$11 million²

Impacts of floods

- Consequences on agriculture: damage to crop, soil erosion, inability to cultivate land due to water logging of soils
- Consequences on water resources: adverse effect on the quality of surface and groundwater; contamination of water supply
- Consequences on human health: increased risk of deaths, injuries, and infectious, respiratory and skin diseases
- Consequences on industry, settlements and society: disruption of settlements, commerce, transport and societies due to flooding; pressures on urban and rural infrastructure; loss of property

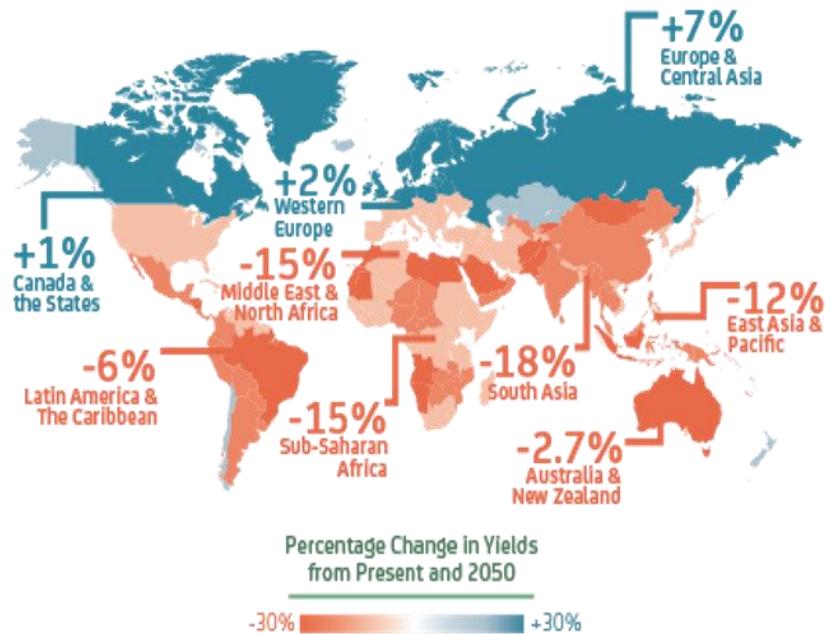
1. Urban Water Journal, 2020

2. Fehri, 2014

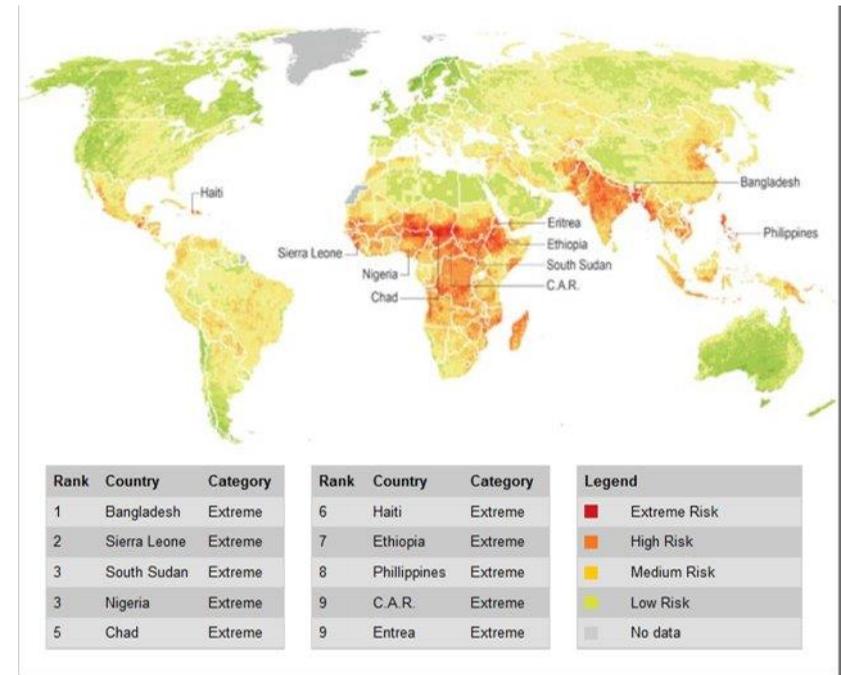
PHYSICAL RISKS-INCREMENTAL CLIMATE IMPACTS

INCREMENTAL CHANGES IN CLIMATIC CONDITIONS CAN ALSO BE DAMAGING FOR NATIONAL AND REGIONAL ECONOMIES

Change in regional crop yields by 2050₁



Climate change vulnerability index₂



Even if Tunisia is expected to see modest gains in productivity by 2050, much of those benefits are diminished or reversed if warming continues to 2100

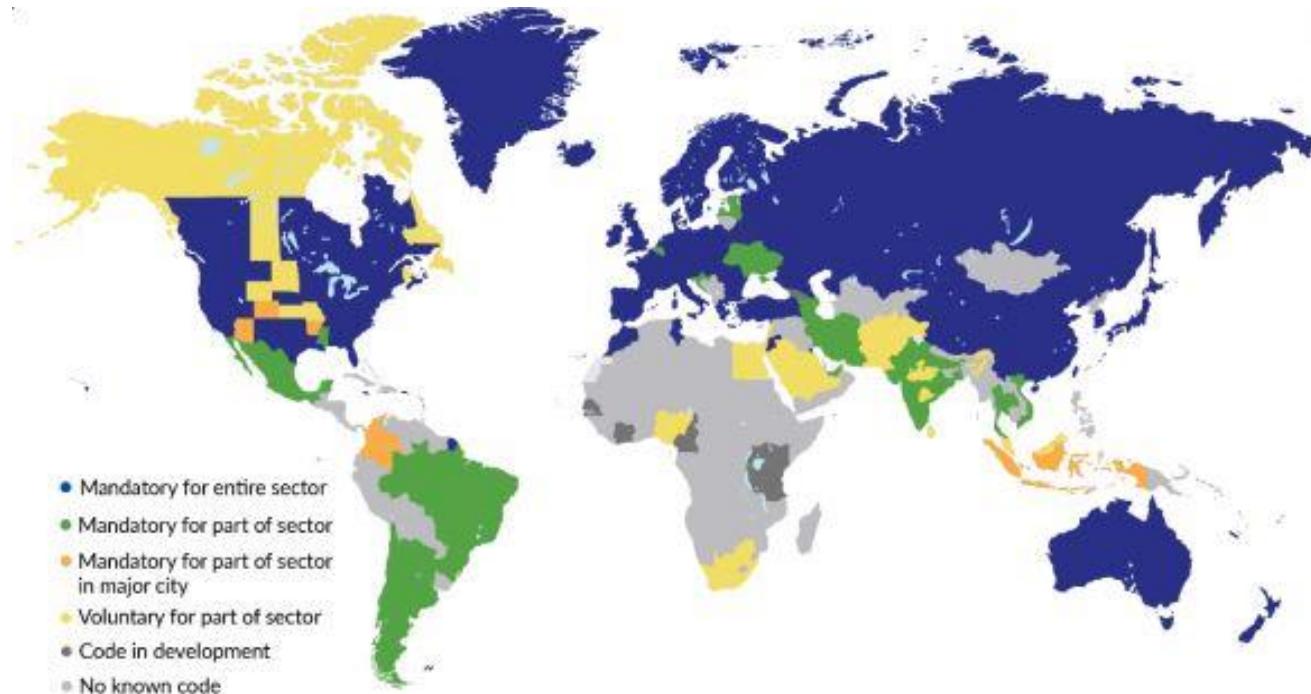
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TRANSITION RISKS – POLICY, TECHNOLOGY AND OTHER DRIVERS

TRANSITION RISKS – POLICY: REAL ESTATE SECTOR

EMISSIONS AND ENERGY-EFFICIENCY STANDARDS ARE BECOMING INCREASINGLY PROMINENT AROUND THE WORLD

Building energy efficiency policies by enforcement, 2019₁



In 2014, Tunisia adopted an action plan (National Energy Conservation Action Plan) with the aim of reducing the demand for fossil fuels by 34% in 2030 and producing 30% of its electricity from renewable sources. They also introduced new energy standards (Minimum Efficiency Performance Standards e.g. fridges)₂

Delayed action increases the risk of a disorderly transition and rapid policy shifts in the future

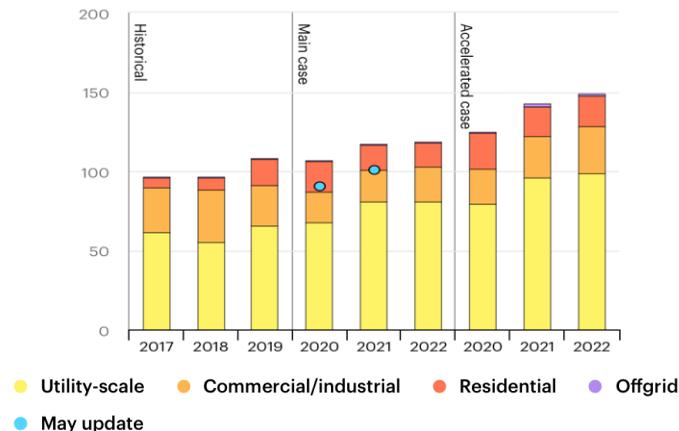
TRANSITION RISKS – TECHNOLOGY

CHANGING ECONOMICS OF LOW-CARBON TECHNOLOGIES MAY CHALLENGE AND ULTIMATELY REPLACE FOSSIL FUEL SOURCES

Technology improvement: the case of solar panels₁

- The use of perovskite solar cells absorbs the complete visible solar spectrum enabling a revolution in solar energy
- Solar cells are being reinvented to fit new forms or textures (e.g. integrated into textiles) and are becoming more efficient
- These improvements could drive demand as the price of the raw materials falls and technologies become more efficient increasing the competitiveness of solar PV
 - Solar panel electricity generation costs have fallen by over 90% in the past decade₂
- Eni (Italian company) has developed two projects in the South of Tunisia reaching a total of around 50,000 solar panels (30GW/year). It is now developing a third one.₃

Solar PV net capacity additions by application segment, 2017-2022₄

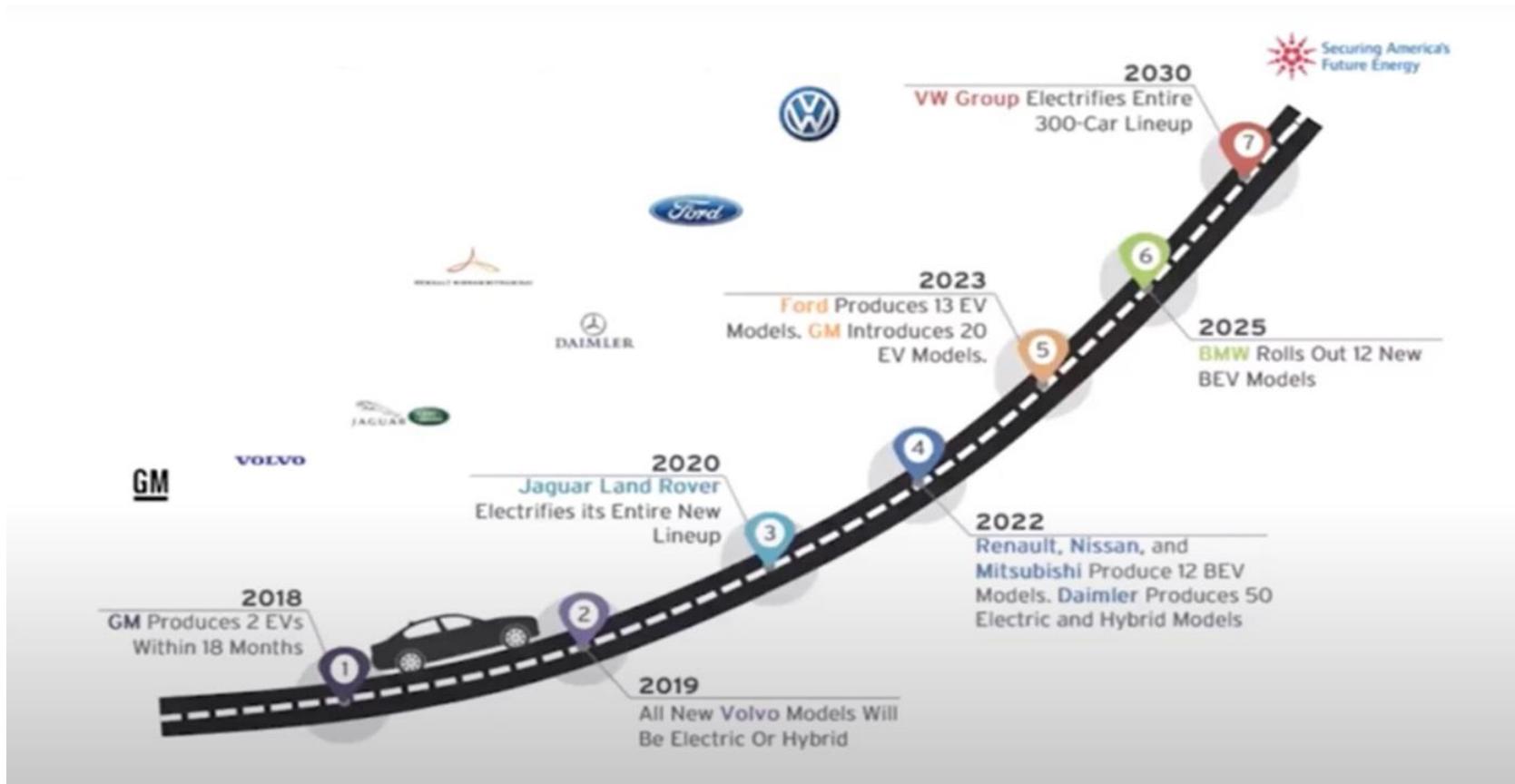


1. Forbes, 2019
2. Applied Materials, 2020
3. AA, 2020
4. IEA, 2020

TRANSITION RISKS – MARKET SHIFT: TRANSPORTATION SECTOR

BOTH AUTOMAKERS AND MUNICIPALITIES HAVE BEEN MAKING THE SHIFT AWAY FROM INTERNAL COMBUSTION ENGINES

Traditional automakers' stated plans for EV production¹



Tunisia's goal is to have 50,000 electric and 80,000 hybrid vehicles by the end of 2025 to renew the car fleet of 1.5M vehicles out of which more than half are over 10 years old²

1. Securing America's Future Energy
2. La Presse 2021

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PHYSICAL AND TRANSITION RISKS IN THE MENA REGION

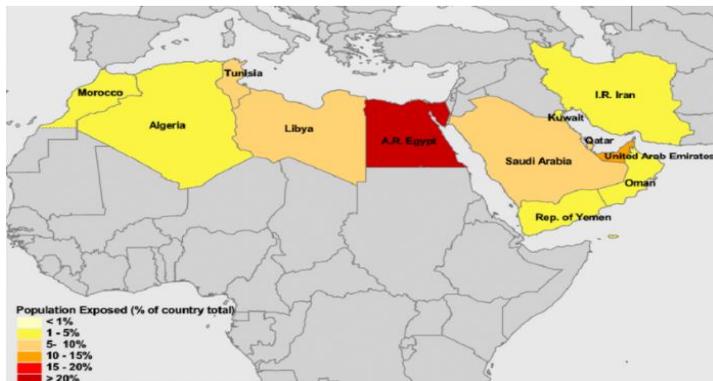
PHYSICAL RISKS IN THE MENA REGION (1/3)

CLIMATE SCIENTISTS ARE CONCERNED THAT THE REGION IS THREATENED BY MULTIPLE SOURCES OF CLIMATE DISRUPTION₁

Impacts of rising seas

- Sea-level rise will threaten coastal cities with substantial flooding, increase the likelihood of high intensities of population movement and agricultural land would be lost
 - 80,000 people could be displaced in Tunisia by 2100₂
 - Projections estimate between 3cm to 61cm in sea level rise this century

Regional effects of a 5-meter sea-level rise₃



Infrastructure demands

- Due to sea-level rise, governments face a trade-off between developing coastal areas for industrial growth and supporting coastal protection that would push commercial and residential areas away from the coast₄
- Current energy infrastructure was not designed to face the consequences of climate change₅
- Developers will have to adapt to these effects (e.g. building resilient water infrastructure in a context of declining supply)
- The infrastructure sector will require heavy investments to mitigate and adapt to climate change e.g.
 - Mitigation: sustainable transport systems
 - Adaptation: drought and flood preparedness plans

Climate change impacts will be exacerbated by pre-existing aridity, drought and water scarcity

1. Göll, 2017

3. Nordman, 2008

2. US Aid, 2020

4. AFED, 2009

5. Klawitter, et al., 2012

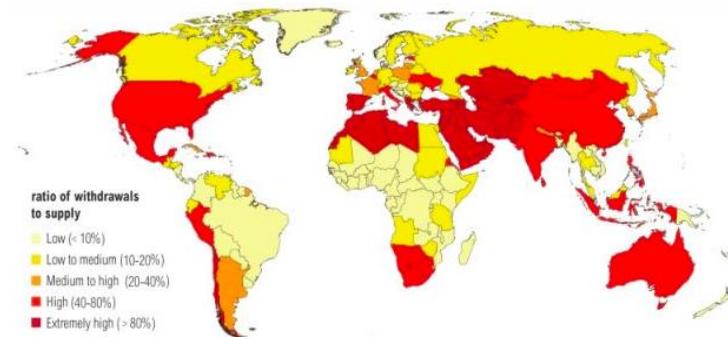
PHYSICAL RISKS IN THE MENA REGION (2/3)

THE REGION IS PARTICULARLY VULNERABLE TO WATER STRESS

Water stress₁

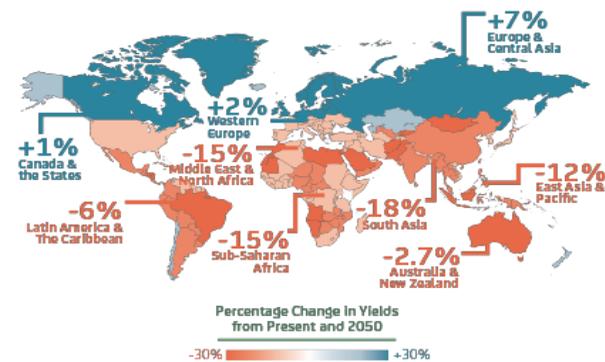
- MENA is the most water stressed region in the world
- Economic impacts from water stress are substantial
 - An annual loss in GDP of 4% was estimated due to the drought in Djibouti between 2008 and 2011
 - Floods in Yemen in 2008 caused damages of 6% of the country's GDP (\$1.6 billion)
- With increasing average temperatures, water flow may decrease significantly in coming years
 - 30% in the Euphrates
 - 80% in the Jordan River
- A change in rainfall patterns and water supply will increase water stress, putting pressure on local agriculture and driving the need for food imports
- Many areas expected to see large population increases are likely to experience large declines in crop yields

Water stress by country in 2040₂



NOTE: Projections are based on a business-as-usual scenario using SSP2 and RCP6.5.

Change in regional crop yields by 2050₃



Studies show that a 1°C increase in temperatures would lead to an 8% decrease in GDP on average₄

1. World Bank, 2014

4. FEMISE, 2012

2. World Resource Institute

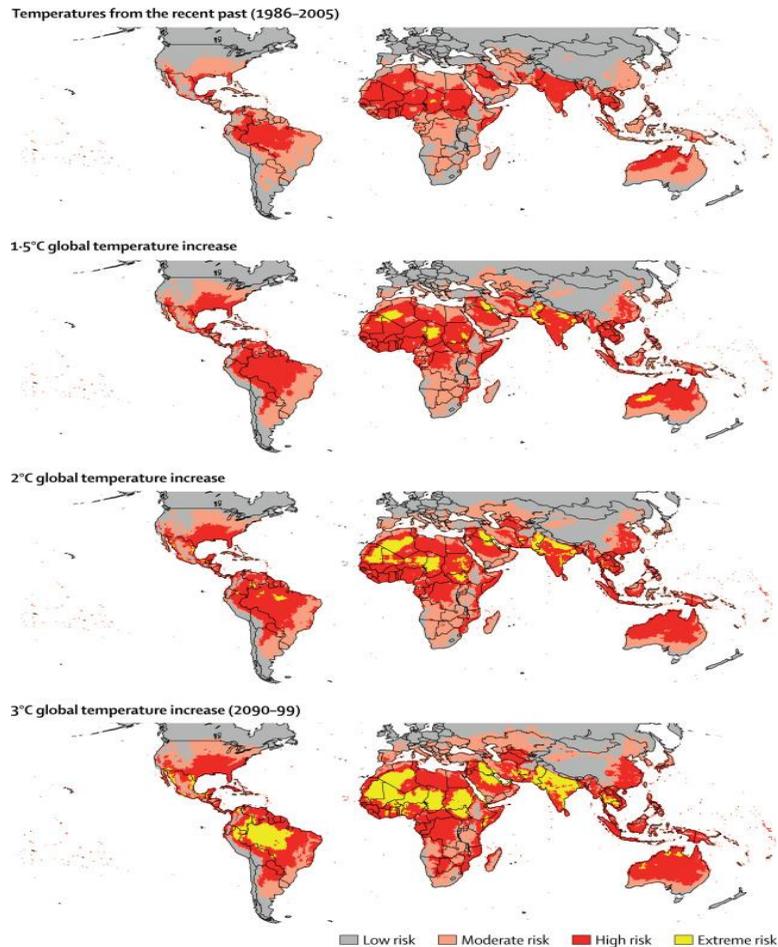
3. World Bank

PHYSICAL RISKS IN THE MENA REGION (3/3)

EXTREME HEAT HAS BOTH ECONOMIC AND ECOLOGICAL CONSEQUENCES

Threats to habitability by temperature scenario₁

Projections for late 21st century



Consequences of extreme heat

- The MENA region is expected to see rapidly rising temperatures₂
 - By 2050, the region may be 4°C hotter
 - By 2100, the highest daytime highs could exceed 50°C with 200 days of exceptional heat per year
- The human body is unable to adequately cool itself when wet-bulb temperatures rise above 35°C
 - Worker productivity falls dramatically at high temperatures
 - Healthcare needs spike due to increasing heat-stress
 - Economic growth also slows
- The frequency of mosquito-borne diseases and waterborne pathogens will increase
- Regional biodiversity is threatened with extinction₃
 - Vulnerable and iconic ecosystems could be lost
 - Tunisian biodiversity e.g. Pasture land, corals

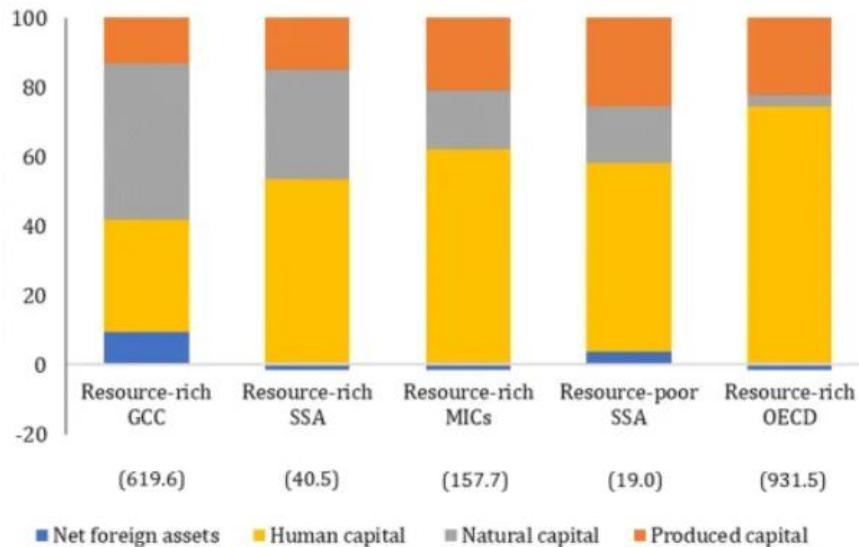
1. Lancet, 2019
 2. Max Planck Institute
 3. UNDP, 2015

TRANSITION RISKS IN THE MENA REGION (1/2)

GOVERNMENTS DERIVING A LARGE SHARE OF REVENUES FROM FOSSIL FUEL PRODUCTION WILL BE FORCED TO RAPIDLY DIVERSIFY

Share of net wealth in natural capital by region₁

Net wealth %



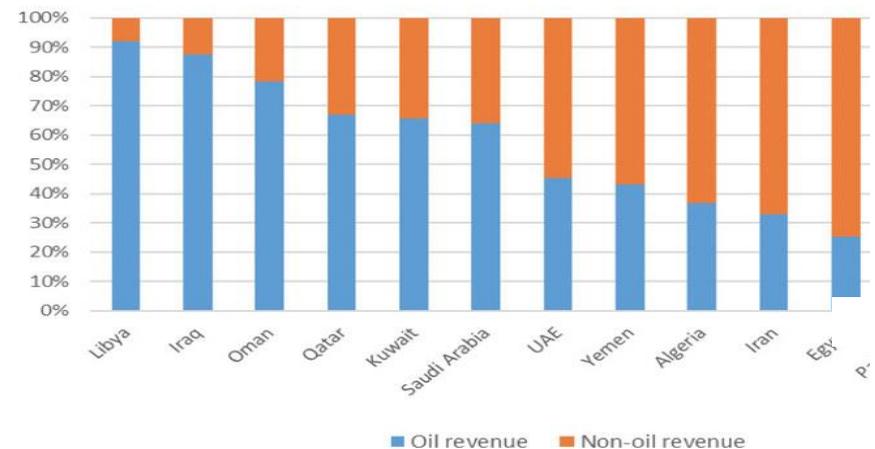
- The Middle East and sub-Saharan Africa are notable for their impressive natural resources
- However, climate change may greatly impact global demand for these resources
- How resources are extracted will also be particularly important in a low-carbon world

1. World Bank, 2018
2. Bruegel, 2016

MENA nations' oil revenue as share of total revenues₂

Revenue %

- The fossil fuel sector will face significant challenges as a low-carbon transition takes place
- Many countries in the MENA region presently depend on fossil fuels for a large share of national budgets
- Diversification is essential in order to avoid a disruptive social or economic transition

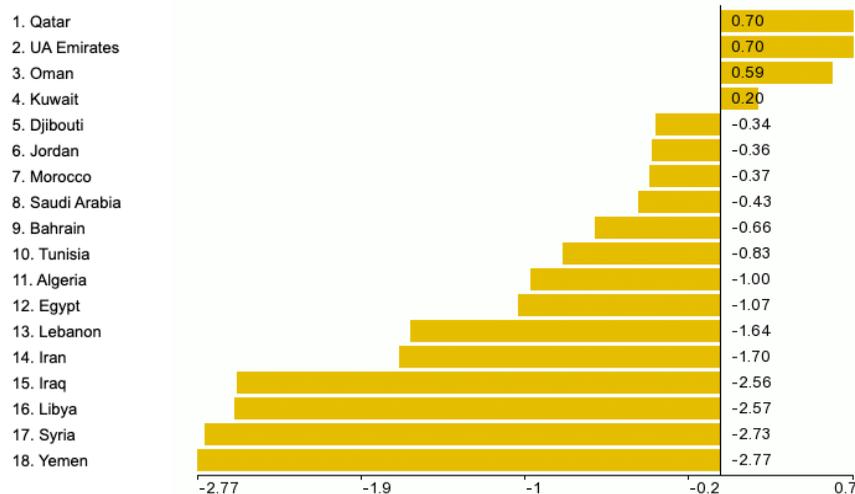


TRANSITION RISKS IN THE MENA REGION (2/2)

ADDRESSING SOCIETAL INEQUALITIES WILL BE KEY TO MAINTAINING FINANCIAL AND POLITICAL STABILITY

Political stability

Political stability index in 2019 (-2.5 : weak; 2.5 : strong)₁



- Regional and national political instability and uncertainty may drive climate mitigation and make adaptation more difficult₂
- The region is subject to socioeconomic inequalities that make societies more vulnerable to climate risks₃
 - Tunisia Gini index in 2015: 32.8
- Establishing ethical energy laws and policies which consider climate justice is crucial
- Failing to implement a just transition could further increase economic stagnation and political instability₄
- A just transition would provide financial stability and a way for investors to address systemic threats

Research shows that rising temperatures increase interpersonal conflicts and intergroup violence₅

1. World Bank, 2019

2. US Aid, 2017

3. Hefron, McCauley & Sovacool, 2015

4. Grantham Research Institute on Climate Change and the Environment, 2018

5. Hsiang, Burke & Miguel, 2013

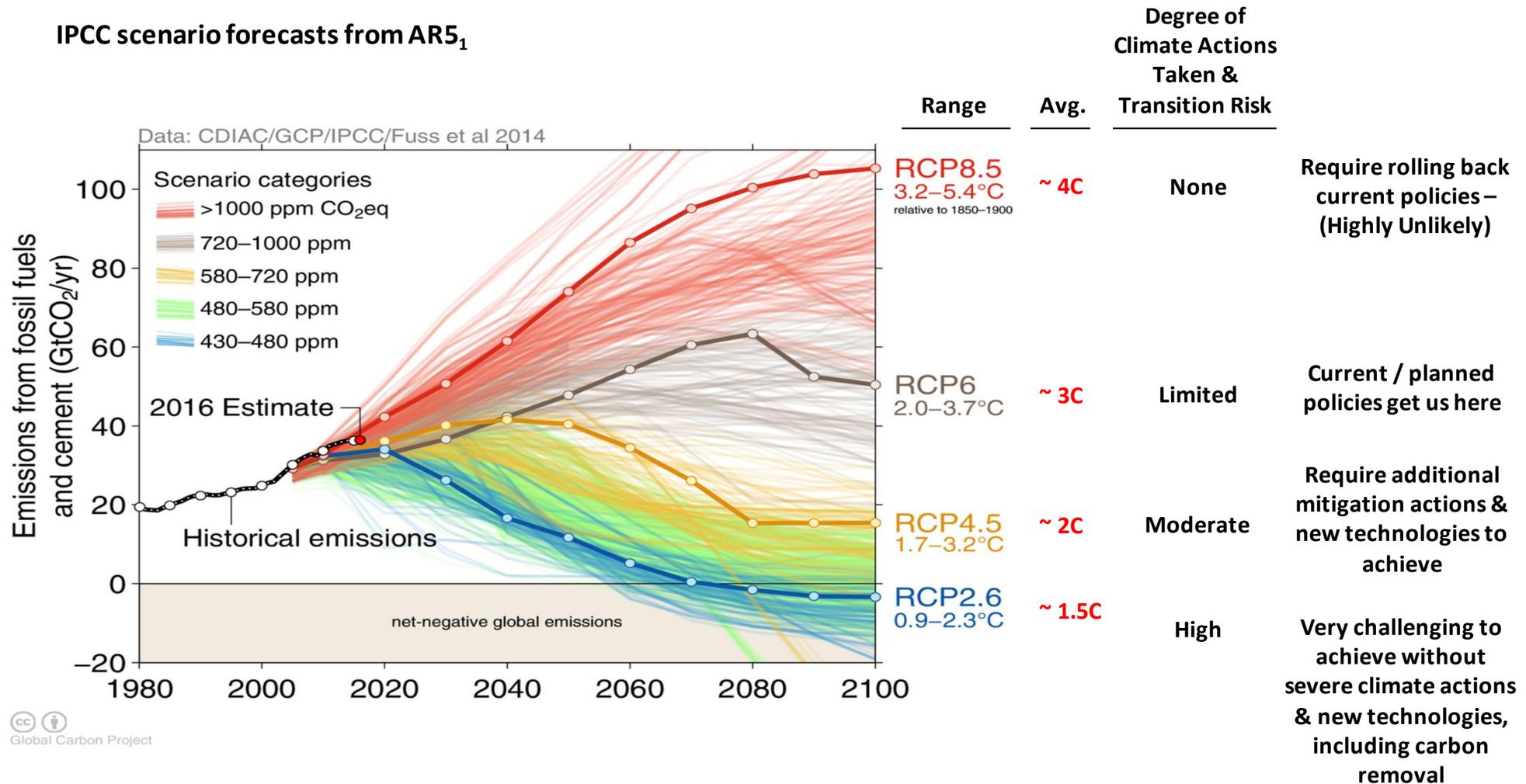
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INTRODUCTION TO CLIMATE SCENARIOS AND CLIMATE DATA

CLIMATE SCENARIOS CAN BE USED FOR ASSESSING TRANSITION RISK

THERE ARE MULTIPLE TRANSITION PATHWAYS DEPENDING ON THE DEGREE OF SOCIETAL ACTION ON CLIMATE CHANGE

IPCC scenario forecasts from AR5₁

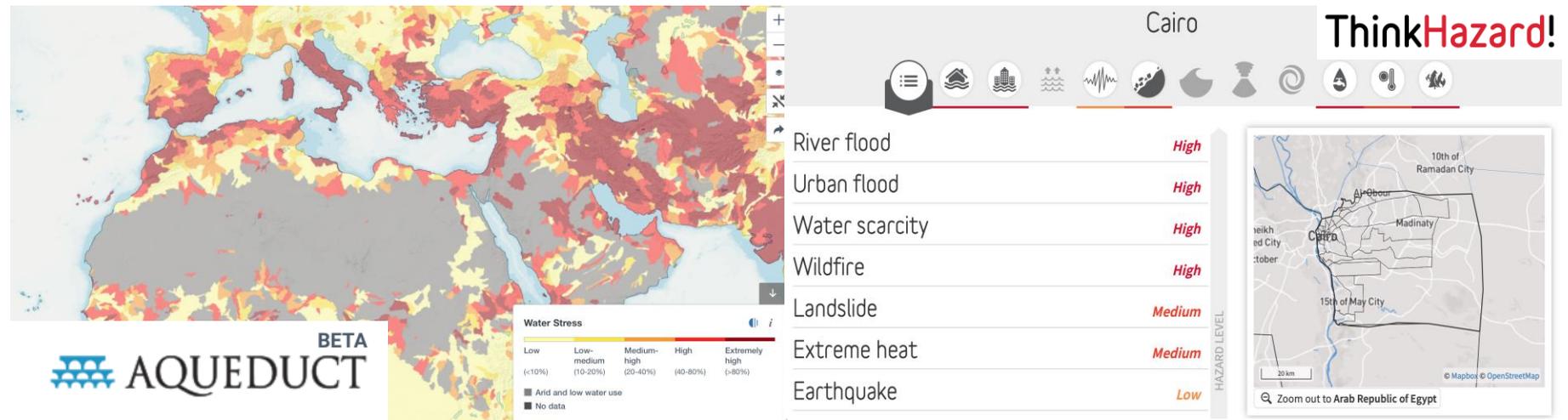


GRANULAR CLIMATE DATA IS NEEDED FOR PHYSICAL RISK ASSESSMENTS

A VARIETY OF DATASETS AND PORTALS ARE AVAILABLE TO ANALYZE PHYSICAL RISKS IN FINANCIAL PORTFOLIOS

Tool characteristics

- Approaches can cover a variety of hazards (e.g., coastal flood, tropical cyclone, drought, wildfire, landslides)
- Spatial resolution, spatial coverage and time periods differs between providers
- Some approaches consider interactions between hazards
- Many methodologies adopt an RCP 8.5 (4°C by 2100) scenario to measure the maximum physical risk



5

NEXT SESSION

QUESTIONS AND DISCUSSION

Poll questions

- Are you already using climate scenarios within your risk assessments? If so, which models are you using?
- Is your institution already using geospatial data in assessing transition risks? If so, what provider?
- What is the biggest challenge in using the tools you currently employ?

Polling will be provided during the session

Discussion questions (after the session with your team)

- Is there anything additional you would like to know about climate scenarios or climate data?
- What are the next steps for your institution in assessing physical risks?
- What are the next steps for your institution in assessing transition risks?

UPCOMING SESSION

Next session: Understanding physical and transition risks

Date: 29 March 2021

Participants

- Senior-level sustainability managers
- On-ground implementing colleagues

Agenda

1. Introduction to IAMs
2. Physical risk analysis- data required
3. Transition risk analysis- UNEP FI methodology
4. Landscape review of climate risk tools

Learning objectives

- Gain an overview of the landscape of tools and methodologies used to assess physical and transition risks
- Understand how climate scenarios can be converted into decision useful financial information

THANK YOU FOR YOUR ATTENTION!

IF YOU HAVE ANY QUESTIONS ABOUT TODAY'S CONTENT OR UNEP FI'S TCFD PROGRAMS, PLEASE DO NOT HESITATE TO REACH OUT



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