حوارات تجارة
Tejarah Talks

Green Transition

منتدى عمان للأعمال
OMAN BUSINESS FORUM

Sultanate of Oman
سلطنة عُمان
وزارة التجارة والصناعة وترويج الاستثمار
Ministry of Commerce, Industry & Investment Promotion

تجارة حوارات
Tejarah Talks

OMAN IS ONE OF THE PLACES IN THE WORLD I'VE CALLED A FUTURE RENEWABLE SUPERPOWER

MICHAEL LIEBREICH
Former CEO, BloombergNEF

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About Tejarah Talks

Tejarah Talks is organized by Oman Business Forum in association with the Ministry of Commerce, Industry & Investment Promotion. With a firm focus on Oman's current and future business, export and investment environment, Tejarah Talks is a series of informal, interactive evening discussions that brings together some of Oman's most inspirational and innovative thinkers and doers to share their stories, insights and ideas with an enthusiastic crowd. It is a platform for positive interaction.

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Tejarah Talks 'Green Transition' 14 September 2022 was moderated by His Highness Sayyid Dr. Adham Al Said, Founder, The Firm. The panelists were Sayyid Fahar Al Said, Co-founder and CTO, YUZU Agriculture; Dr. Sausan Al Riyami, Director, Oman Hydrogen Centre, GUtech; Rayan Al Kalbani, Partner & Executive Director, METS and Talal Hasan, Carbon General, 44.01 .

Green Transition Panelists

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Talal Hasan
Carbon General
44.01

1

The Green Transition

Tackling climate change is an increasingly urgent need. According to the latest report of the UN Intergovernmental Panel on Climate Change (IPCC), everything points to the fact that, by the year 2100, life as we know it will have changed radically because of rising global temperatures, rising sea levels and melting ice at the poles.[1]

Avoiding this scenario is in everyone's hands and the first step towards achieving it is to change our production and consumption model to a more sustainable one that leads to a positive environmental impact. The set of measures to implement this change in economic model is known as the green transition.

The green transition refers to the period of time between now, when our way of life is unsustainable in the long-term and the time when our activity will not endanger the health of the planet. Today, we are at the beginning of this transition, with governments, organizations, companies and individuals taking action to reach the goal of sustainability as quickly as possible.

Moving towards an economy based on sustainability is the only way forward, and finding ways to make this possible is everyone's responsibility, but it is primarily governments and businesses that have the greatest ability to take action in driving these solutions forward.

Meeting the Sustainable Development Goals of the 2030 Agenda is the first step towards achieving this.[2] The UN-led initiative launched in 2015 as a follow-up to the Millennium Development Goals (MDGs). This manifesto sets out 17 goals and 169 targets that the 193 member states of the UN have pledged to achieve in order to end global inequality, improve the Earth's health, and, ultimately, make our planet a better place for all living things.

The foundations of what we now call green transition were detailed in the Paris Agreement – the first international, universal and legally binding agreement on climate change, adopted by the Paris Climate Change Conference (COP21) December 2015. Its main aim was to ensure, through a variety of means, that global temperatures never exceed more than 1.5% of pre-industrial era levels.[3]

But what measures can countries take to achieve this goal, so important to the survival of mankind?

Some examples include:

- Draft and prioritizing a climate action plan.
- Promote decarbonisation and favouring green energy over fossil fuels.
- Commit to green transport.
- Increase investment in energy efficiency.
- Support business and science innovation.
- Design competitive electricity markets.
- Draft action plans and national strategies for the circular economy.
- Increase green public investments.

1.5°C

The Paris Climate Change Agreement has a target of keeping global warming to below 1.5°C

Opting for green energy, travelling on public and sustainable transport and working on public awareness are important factors in the green transition, but the reality is this: real change can only be achieved through an inclusive and collaborative approach by all sectors of society. Both at the individual and business level, it is vitally important to support innovation projects that contribute to sustainability beyond green washing and, in turn, continue training and development to be able to join the change in a transformative role.

A great example of this transformation is the Finnish city of Lahti, chosen as the European Green Capital 2021. Lahti, thanks to co-operation between citizens, businesses and the authorities, has gone from an industrial town to being a benchmark in sustainability, the circular economy and climate neutrality. It boasts energy-efficient homes and schools, 100% reliance on renewable energy sources and a unique groundwater system that UNESCO certified as the best drinking water in the world.[4]

Lahti, Finland, European Green Capital 2021

Transition to 100% Renewables

Researchers at Stanford University and other US and European universities have plotted roadmaps for 139 nations to transition to 100% renewables by 2050.[5] While the individual power mixes of each country vary, the vast majority (94.7%) of all energy demand is predicted to be met by established wind and solar power technologies.

The study aims to completely remove reliance on fossil fuels by switching all energy use to renewable sources.

It claims doing so would deliver the Paris Climate Change Agreement target of keeping global warming to below 1.5°C. It could also help avert the 7mn premature deaths connected to air pollution each year.

7mn

There are 7mn premature deaths connected to air pollution each year

Renewable Energy & Socio-economic Development

If we look at the cities engaged in a 100% renewable energy approach, it is apparent their actions are linked to socio-economic development opportunities. Cities promoting renewable energy and energy efficiency clearly want to reduce their energy bill, to the benefit of residents and local economic players. In fact, cities are responsible for three quarters of global carbon dioxide emissions (CO2e).
Today, more than 600 cities worldwide have targets for 100% renewable energy.[6]

This clean-energy revolution is also transforming cities into centres of innovation. Reykjavik, for example, has taken full advantage of its sources of geothermal energy to supply its electrical grid and heat network. It is now working towards decarbonizing the rest of its energy system – with an aim to make all cars and public transit fossil-free by 2040.

For many cities in the developing world, renewable energy is an opportunity to improve the overall reliability of electricity supply.

Like Reykjavik, Nairobi is tapping into its geothermal resources to feed the city's energy needs. It has also introduced new regulation that requires large buildings to harness the city's abundant solar potential – reducing pressure on the grid.

Other examples also include Harare, Dar Es Salaam and Mazabuka where solar already provides 5% of total electricity supply.

Where these pioneering cities lead, others are following. Over 80 towns and cities in the UK have pledged to shift to 100% clean energy by 2050.[7] In June 2017, the US Conference of Mayors, representing 58 cities, resolved to support the procurement of 100% renewable power for cities by 2035.[8]

3

Cities & Energy Use

Today, more than ever, it is cities that are deciding the future. In every part of the world, including Oman, cities are growing in size and importance. Urban areas are now home to over half the world's population and account for 80% of our economic output. They consume 67% of global energy use and 70% of greenhouse gas emissions a level that is expected to reach 75% by 2030 when two thirds of the world's population will live in cities.[9] In fact, each week the global urban population grows by 1.4 million people, which is the equivalent of Muscat.

Cities consume 67% of global energy use and 70% of greenhouse gas emissions

This rapid growth places huge pressure on cities. More people means greater demand on transport, telecommunications, energy, water, waste and building infrastructure. Thinking strategically and making smart infrastructure choices can help cut air pollution, reduce traffic congestion, improve energy efficiency, increase energy production and perhaps most importantly, contribute to our cities' livability. The quality of life that Omani cities offer increasingly determines their competitiveness, as well as their ability to attract visitors, talent and investment.[10] Indeed, if Oman's cities do not work for investors, employers and citizens, then the interconnected flows of trade, capital, people and technology will stall. Planning and developing the urban eco-system – including managing the impacts to Oman's rural areas that get absorbed into the expanding urban area – is just the start.

Smart Buildings

Buildings make up a large part of the operational expenses of many Omani businesses and organizations. Increasing a building's energy and resource efficiency reduces operational expenses, which in turn boosts ROI. In addition, smart building solutions can enhance employee productivity by reducing time lost on maintenance and providing a better and more comfortable working environment.[11]

The value of using cutting-edge technology in Oman's buildings is obvious as well as lucrative. Research by McKinsey Global revealed IoT economic impact on buildings could reach US$6.3tr by 2025.

Today, cooling, heating and powering offices, homes and factories accounts for 27% of global energy-related CO2e.[12] In order to address this and contribute to reducing global CO2e, the real estate sector is looking at ways to improve building energy and resource efficiency. Globally, ICT-enabled smart buildings can generate a CO2e emission reduction potential of 1.96 Gt CO2e, 5bn MWh of energy saved and 261bn liters of water saved from being wasted due to use of data-driven more efficient processes.[13]

27%

Cooling, heating and powering offices, homes and factories accounts for 27% of global energy-related CO2e

4

Oman's Green Revolution: A Snapshot

Inaugurated in January 2022, the Ibri II 500 megawatt solar photovoltaic plant is Oman's biggest solar PV project, receiving US$86mn in financing from the Asian Infrastructure Investment Bank, AIIB's first renewable energy financing not just in Oman but in the region. At its peak, this 1.5 million-panel plant will generate enough electricity for 50,000 Omani homes, offsetting 340,000 tonnes of carbon emissions a year.

HYPORT Duqm is a game-changing green hydrogen and ammonia project – one that has the potential to position Oman as a world-scale producer and exporter of zero-carbon fuels to international markets.

Situated on a 150 km^2 site allotted for alternative energy – 3x the size of the City of Oxford – the proposed 500MW green hydrogen and ammonia plant on the Special Economic Zone in Duqm is led by the HYPORT Coordination Company, a joint venture between OQ Alternative Energy and Belgium's DEME Concessions.

And with almost 50,000 km^2 of land available – 31x the size of London – for sustainable use of wind and solar radiation, Oman is in an excellent position to generate renewable power for the grid, as well as power the manufacture of green hydrogen to meet domestic demand and export to global customers. Indeed, green hydrogen has the potential to decarbonize a range of heavy industries long associated with carbon emissions – something that has important implications for Oman's growing manufacturing sector. In fact, SOHAR Port & Freezone, Jindal Shadeed and Germany's Hydrogen Rise are working together on the development of the first green hydrogen plant in Suhar.

Wind & Solar Potential

The wind resources in Oman – particularly in Dhofar and Al Wusta – are outstanding. In 2019 Spain's REVE magazine, in association with the Spanish Wind Energy Association, ranked Oman second in the world in terms of wind energy potential. Oman has 320 sunny days each year and high-intensity sunlight with a range of 5,500 to 6,000 watt hours per m^2 a day.

Green Awards

Project Hajar is a partnership between London-based Mission Zero Technologies and Omani start-up 44.01. A joint venture that recently won a US$1mn Milestone Prize as part of the Musk Foundation's XPRIZE Carbon Removal competition. This impressive project connects two complementary technologies so rocks in Oman's Al Hajar Mountains can be used to remove tons of heat-trapping CO2e that have been pumped into the air since the beginning of the Industrial Age. This award-winning project is a glowing endorsement of UK and Omani-led climate innovation potential.

XPRIZE CARBON REMOVAL

Project Hajar, winners of the Milestone Prize as part of the Musk Foundation's XPRIZE Carbon Removal competition

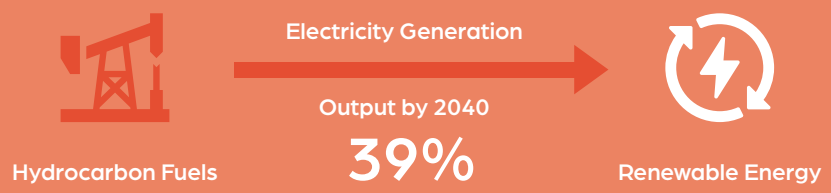
Duqm's US$2.5bn Green Hydrogen & Chemicals SPC facility is the first project globally to be awarded TUV Rhineland's Green Hydrogen and Green Ammonia Certificate for the production of carbon-neutral hydrogen.

Dhofar's Harweel Wind Farm which generates 7% of Dhofar's electricity received the 'Wind Power Project of the Year' Asian Power Awards 2019.

Subsidies & Domestic Energy Consumption

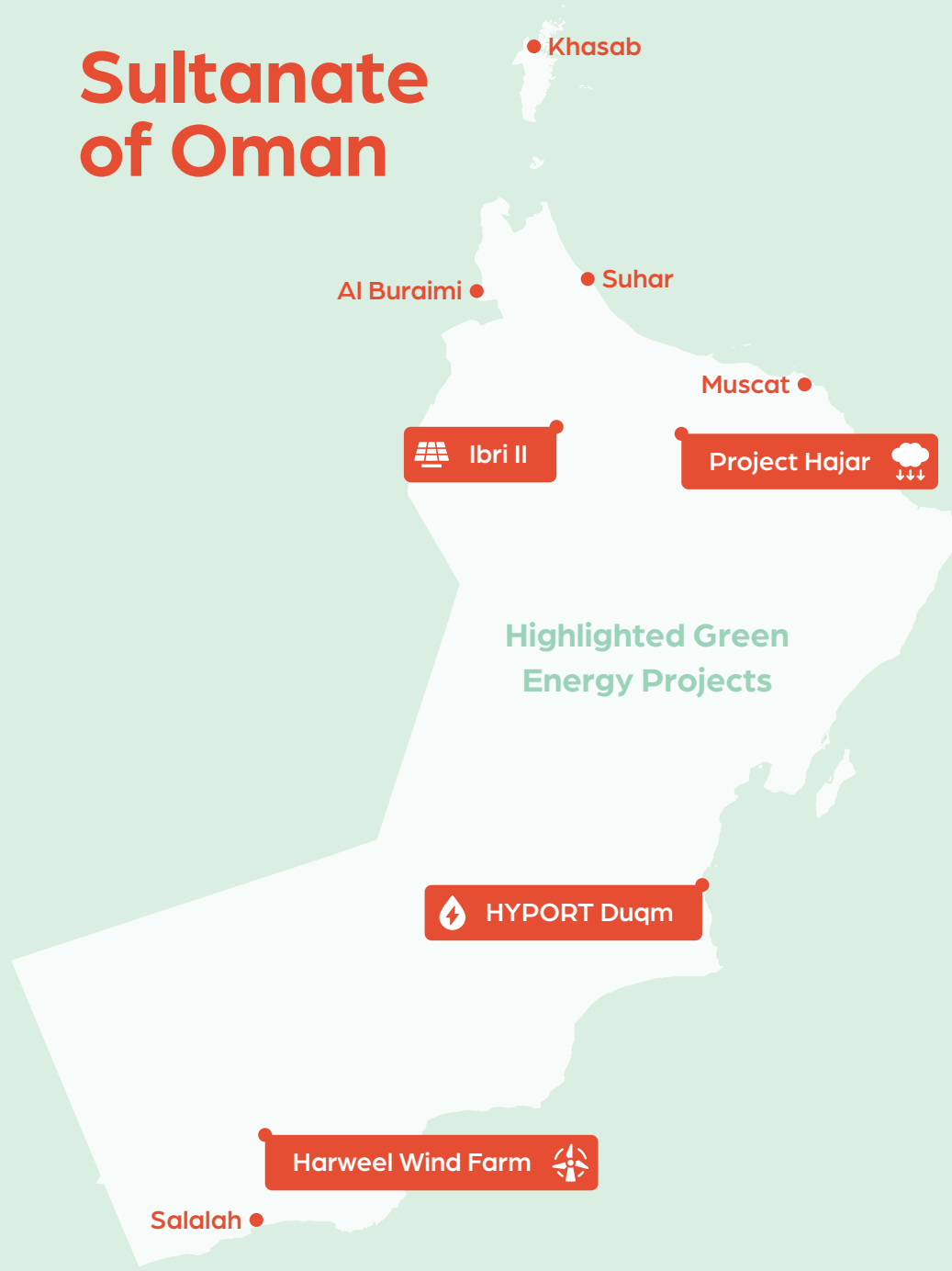
The impact of the extraordinary growth in renewables has mostly been felt in the electricity sector. Since 2012, renewables have added more new power generation capacity than conventional sources of energy.[14]

In 2022, the Omani Government subsidised electricity to the tune of RO568mn (US$1.4bn) down from RO614mn (US$1.5bn) in 2020.[15]



About 35% of Oman's domestic natural gas production is used to power electricity generation. The government's National Energy Strategy 2040 seeks to ensure the country's long-term energy sustainability. The strategy envisions a substantive role for non-hydrocarbon fuels in power generation and has set a target of at least 39% of electricity output from renewables by 2040.[16]

Sultanate of Oman



Area km2	Capital	Local Time
309,501	Muscat	+4 GMT

Investment, Jobs & Legislation

From the merits of the US Green New Deal to Greta Thunberg's speech before the UN, renewable energy and climate change have been front and centre headlines. According to the REN21 report, solar and wind power provided more than 10% of the world's electricity for the first time in 2021. While over 130 countries have set targets for net zero GHG emissions.[17] The IEA's Sustainable Recovery Tracker shows government-spending commitments have jumped to US$71bn – 40% above the levels after the 2008 global financial crisis.[18]

Wood Mackenzie estimates the combined global capex spend on wind and solar projects will range from US$165bn to US$190bn a year between 2020 and 2035. This calculation is based on realistic growth scenarios as well as project development at a global average cost of around US$1.00 per watt for onshore wind and solar.[19]

According to an IFC report, tackling climate change could unlock investment opportunities worth US$23tr by 2030 in emerging markets alone.[20] Meanwhile in the US, renewable energy is creating jobs twice as fast as any other industry.[21] In fact, there is considerable evidence that decisive climate action generates economic vitality. Most studies indicate climate policies can result in net employment gains of 0.5 – 2%, or 15–60mn jobs globally, with the International Labour Organization estimating a net increase of 18mn jobs.[22]

Green GCC Jobs

According to an International Renewable Energy Agency report, GCC states could create 200,000 jobs through solar projects by 2030 – 45% in the UAE, 33% in Saudi Arabia, 10% in Kuwait, 7% in Oman (1,400), 4% in Qatar, 1% in Bahrain. [23] The report also suggests if GCC green energy plans and targets are achieved, 11tr liters of water, 400mn barrels of oil in the power sector could be saved. And per capita carbon footprint could be reduced by 2030.[24]

Green Legislation

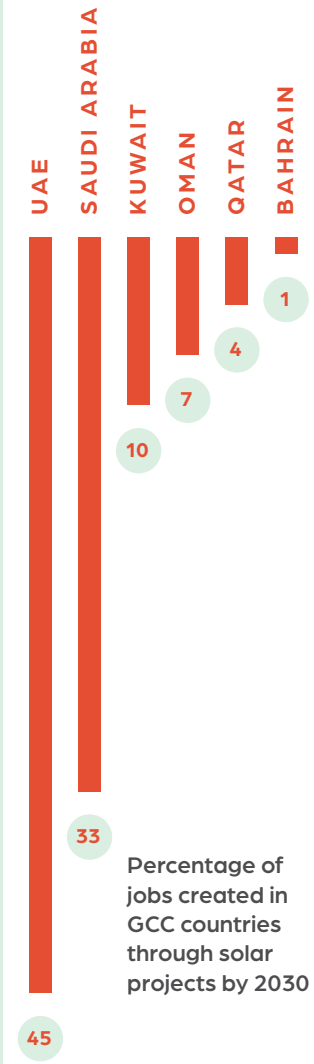
Climate change will increase risk for organizations across the board. First, there is the physical risk companies are exposed to through climate chaos with the increasing incidence of fires, floods and supply chain dislocation.

Second, there is legislative risk, as companies are outmaneuvered by government responses to climate change. Indeed, there has been an explosion in climate related legislation and policies. When the Kyoto Protocol was signed in 1997 there were only 70 laws or policies addressing climate change. In 2022, the number of laws and executive acts on the subject has reached nearly 3,000. Companies risk being caught flat-footed if they do not proactively incorporate sustainability concerns into corporate strategies.[25]

Third, there is the financial risk of being tied to stranded assets as laws restrict the value of carbon heavy assets.

The Green Bottom Line

A green transition presents alpha opportunities for Omani businesses in areas ranging from utilities; transport; green buildings; waste conversion; solar and wind energy; to business services. In addition, expanding markets for greener goods and services in other countries will create opportunities for Omani companies to increase exports. Research shows the provision of sustainable products and services bolsters sales growth, market share, brand value and reputation. It is a win-win scenario. The companies and cities currently leading the green transition realize it is not about bravery – but about the bottom line.



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Green Disclosures

Governments around the world have started to make climate-risk reporting mandatory instead of voluntary, unleashing a complex accounting-style challenge that many businesses, asset managers and banks will have to address in the near term.

Several climate risk-reporting frameworks exist, but the one that many policymakers have endorsed is the Taskforce on Climate-related Financial Disclosures (TCFD).[26] The taskforce designed standardized guidelines to help organizations disclose material climate risks, explain plans to manage exposure, and describe how the shift to a zero-carbon economy would affect their operations. In other words, the TCFD is a way for a company to look under the bonnet of its operations and determine what impact its activities are having on the climate, and, in turn, what impact rising temperatures could have on its business.

In April 2021, New Zealand became the first country to introduce mandatory TCFD "comply or explain" disclosure for financial institutions, whereby about 200 large financial organizations would make climate-related disclosures starting in 2022.[27] Another early mover, the UK has declared it will make TCFD-aligned disclosures mandatory across the economy by 2025, with many of the requirements in place by 2023.

Hong Kong has also set a date of 2025 for its mandatory TCFD plan, while Switzerland has said it will enshrine TCFD reporting into law and make it 'binding.'[28] Canada tied pandemic bailout funding to TCFD-aligned disclosures, and the Bank of Canada has said it is 'working towards aligning its future disclosures' with the guidelines.[29]

The EU has not officially adopted the TCFD for its member countries, but it is implementing the Sustainable Finance Disclosure Regulation (SFDR), which has a broader reach than the purely climate-focused TCFD.[30]

But perhaps the strongest signal for compulsory TCFD disclosure came in June 2021, when G7 finance ministers and central bank governors said they backed the idea. Their statement saying:

"Investors need high quality, comparable and reliable information on climate risks. We therefore agree on the need for a baseline global reporting standard for sustainability, which jurisdictions can further supplement."[31]

Three powerful sets of market stakeholders are driving the shift to mandatory reporting: Investors, who increasingly want greater clarity about their exposure to the risks of climate change; financial hubs such as London and Hong Kong, which want a foothold in the nascent but promising market for climate-linked securities; and governments, such as that of New Zealand, which consider TCFD reporting to be vital in the broader quest to reduce corporate emissions.

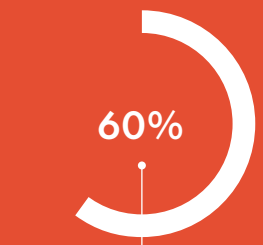
TCFD

In April 2021, New Zealand became the first country to introduce mandatory TCFD

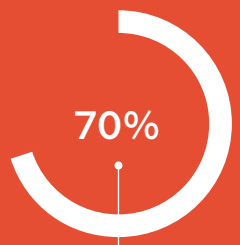
Food

Agriculture is at the heart of our food system; as our population grows, so too does our dependence on it to feed and nourish us. In order to meet this growing demand, it is estimated agriculture will need to produce 60% more food globally by 2050.[32] However, agriculture, forestry, other types of land use, and the food system as a whole – processing, packaging, transport and retail – are responsible for a quarter of global GHG emissions.[33]

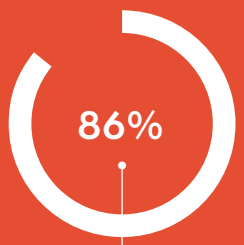
On top of these emissions which contribute to climate change, our global food system is the primary driver of biodiversity loss, with agriculture alone being the identified threat to 86% of species at risk of extinction.[34] Current agricultural practices also account for approximately 70% of all freshwater withdrawals globally and are responsible for huge areas of land and soil degradation.[35]



Agriculture will need to produce 60% more food globally by 2050



Current agricultural practices account for around 70% of all freshwater withdrawals globally



86% of species are at risk of extinction due to the threat of agriculture

Ensuring the sustainability of food production and encouraging responsible food consumption is clearly vital. To achieve this, it is not only necessary to change our eating habits, but also to promote a change in agricultural and livestock production, as well as to increase investment in rural infrastructure and technological development.

EU's Farm-to-Fork Strategy (F2F)

The EU's F2F strategy is at the heart of the European Green Deal aiming to make food systems fair, healthy and environmentally friendly. Food systems cannot be resilient to crises such as the COVID-19 pandemic if they are not sustainable. We need to redesign our food systems which today account for nearly one third of global GHG emissions, consume large amounts of natural resources, result in biodiversity loss and negative health impacts and do not allow fair economic returns and livelihoods for all actors, in particular for primary producers.[36]

Putting Oman's food systems on a sustainable path would bring new opportunities for operators in the food value chain. New technologies and scientific discoveries, combined with increasing public awareness and demand for sustainable food, will benefit all stakeholders.

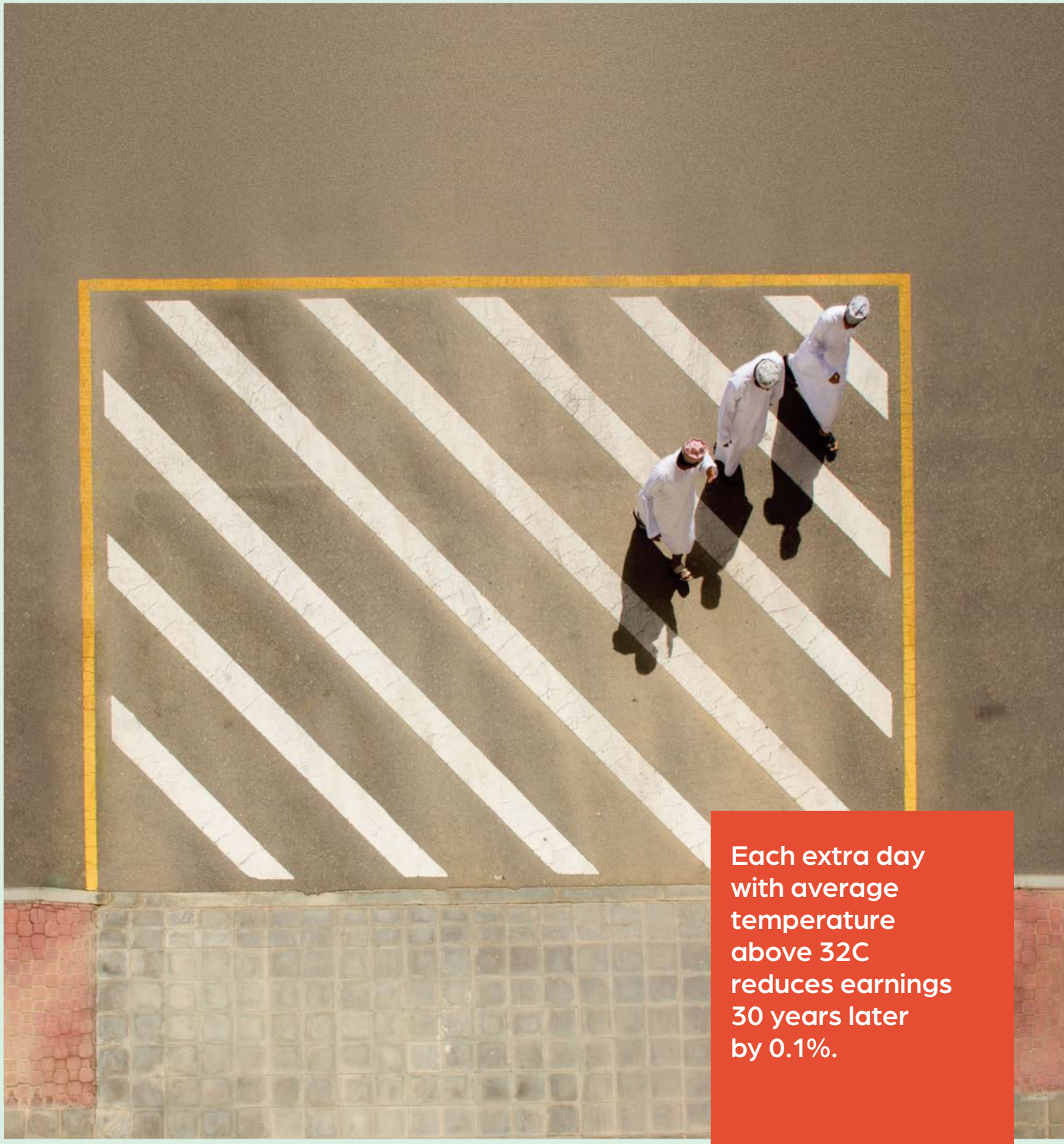
The EU's F2F strategy aims to accelerate the transition to a sustainable food system that should:[37]

- Have a neutral or positive environmental impact.
- Help to mitigate climate change and adapt to its impacts.
- Reverse the loss of biodiversity.
- Ensure food security, nutrition and public health, making sure everyone has access to sufficient, safe, nutritious, sustainable food.
- Preserve affordability of food while generating fairer economic returns, fostering competitiveness of the EU supply sector and promoting fair trade.

Heat: Education & Earnings

A long-term impact of increasingly hotter weather involves how it affects children's ability to learn – and thus their future earnings. Research has shown that hot weather during the school year reduces test scores. Math scores decrease more and more as the temperature rises beyond 21°C.[38] Reading scores are more resistant to high temperatures, which research claims is consistent with how different regions of the brain respond to heat.

One study suggested that students in schools that lack air conditioning learn 1% less for every 1 degree Fahrenheit increase in the school year's average temperature.[39] Lost learning results in lower lifetime earnings and hurts future economic growth.[40] The impact of extreme heat on development, in fact, begins before we are even born. Research has found that adults who were exposed to extreme heat as fetuses earn less during their lifetime.[41] Each extra day with average temperature above 32°C reduces earnings 30 years later by 0.1%.[42]



Each extra day with average temperature above 32C reduces earnings 30 years later by 0.1%.

Russia–Ukraine

Russia's actions in Ukraine has resulted in an unprecedented wave of economic sanctions against Moscow. Efforts to cut ties with Russian oil and gas producers has gone as far as justifying a re-opening of old polluting coal-fired power plants, contradicting an agreement reached at Glasgow's COP26, October 2021.[43] The current energy crisis will likely lead to a delay in reaching climate neutrality, potentially kicking the climate crisis into the long grass.

High Energy Prices Helps Renewables?

Oil and gas prices have skyrocketed since the beginning of the Russia–Ukraine conflict and are widely expected to remain high. However, the price rise tilts the balance in favour of investments in alternative energy sources, making them even more appealing with respect to the current fossil-based alternative. For example, at current oil prices, each kilometre driven in an electric vehicle (EV) is 3–4 times cheaper than in an internal combustion engine car, providing an extra motivation to speed up their adoption.[44]

Similar considerations will apply to the heating of homes, at a time when natural gas prices are at an all-time high in Europe and Asia.

1973 Oil Crisis – Been Here Before

Once the conflict is over and energy prices normalize, renewable energy structural changes will have become entrenched. We know this is the case because it is not the first time it has happened. During the Oil Crisis of 1973, when the price of a barrel of oil trebled in a short period, radical long-lasting shifts in the global economy and society ensued.[45]

Power & Smaller Japanese Cars

In an effort to break its dependency on oil, France made a concerted push towards nuclear energy – introducing the Messmer Plan. As a result, nearly 50 years on, it is still one of the industrialized countries with the lowest GHG emissions per capita. More broadly, in Europe and the US, smaller cars captured market share, paving the way for the success of Japan's auto industry, which featured a smaller engine and higher fuel efficiency. Nor is it by chance that today Japan is a top car exporter and a pioneer of EVs.

National Security & Renewable Energy Aligned

There is another more political reason why the current global energy crisis will accelerate the green transition. The current tense situation with Russia will instill a sense of immediate urgency into slashing fossil fuel consumption. The fact national security concerns and a switch to renewable energy are aligned can be a boon. The new reality implies that green policies are no longer the sole concern of young, educated urban cosmopolitan elites.

European Winter of Discontent

Politicians and economists are talking about the possibility of energy rationing winter 2022–23.[46] European governments are urging households and businesses to cut their energy use as they try to avoid power cuts and rationing this winter. Germany has already capped heating of public offices at 19°C. Hanover has cut off hot water in public buildings, swimming pools, sports halls and gyms in an effort to reduce the city's energy consumption by 15%. Berlin has turned off fountains and stopped lighting up monuments and public buildings. In Spain, air conditioning in hotels and restaurants can go no lower than 27°C; and in France, air-conditioned shops that do not keep their doors shut to save energy risk a US$750 fine. Energy rationing could result in a drop in global economic growth by 2.6% in 2022 another 2% in 2023 with negative repercussions on purchasing power and public finances.

An Equitable Transition

As Oman journeys on, a clean energy future is not an equitable future by default. In other words, it does not do away with the creation of winners and losers by virtue of being clean.

If we want to make a meaningful difference in people's lives, we need to appreciate the complexity of a green transition. For example, this is about education, labour and investment policies, economic development, environmental remediation, supporting the fiscal solvency of government as well as regulatory and legislative mechanisms. Indeed, it will be important to question where and how the public fits into the green transition, who this transition is for, who is impacted, the available tools, who is paying for it and what role different people can play in it, such that their lives, livelihoods and communities are secure. What is apparent is the need for a conversation about what a just green transition really is and can be and the policy options available to achieve it.

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Footnotes

Page		*Footnote*
6	1	IPCC, Climate Change 2022: Impacts, Adaptation & Vulnerability
	2	UN, Transforming Our World: the 2030 Agenda for Sustainable Development
7	3	UN, The Paris Agreement. What is the Paris Agreement?
8	4	Euronews, This Small City in Finland is Leading the Way as a Model Sustainable City
9	5	Joule, 100% Clean & Renewable Wind, Water & Sunlight All-Sector Energy Roadmaps for 139 Countries of the World
10	6	RENI21, Renewables in Cities: 2021 Global Status Report
11	7	Ibid
	8	The US Conference of Mayors & C2ES, Mayors Leading the Way on Climate How Cities Large & Small are Taking Action
12	9	Smart Cities Dive, New Study Identifies How Cities Can Cut Energy Use by 25% by 2050
	10	WHO data shows almost all of the global population (99%) breathe air that exceeds WHO guideline limits and contains high levels of pollutants, with low- and middle-income countries suffering from the highest exposures. Approximately 7 million people die each year due to air pollution
13	11	CNBC, How Unlocking the Potential of a Smart Building Can Reduce Cost & Boost Business
	12	The Economist, The Property Industry has a Huge Carbon Footprint. Here's How to Reduce It
	13	UN, Towards a Zero-emission, Efficient & Resilient Buildings & Construction Sector
16	14	IRENA, Renewable Energy Statistics 2018
	15	Oman Observer, Subsidy to Oman's Power Sector Slides 7.5pc to RO568m
	16	S&P Global, Oman Connects its Largest Utility-scale Renewables Project to Grid
18	17	RENA21, Renewables Global Status Report
	18	IEA, Clean Energy Spending in Governments' Economic Recovery Packages has Surged by 50% Since the end of October, Reaching Unprecedented Levels
	19	Green Tech Media, Who Will Fund the Renewables Boom of the Next 15 Years?
	20	IFC, Climate Investment Opportunities Total $23 Trillion in Emerging Markets by 2030, Says Report
	21	World Economic Forum, Jobs in Renewable Energy are Growing in the US – Here are the Highlights
	22	ILO, Green Jobs
	23	IRENA, Scaling up Renewable Energy in the GCC
	24	Ibid
19	25	London School of Economics, Climate Change Laws of the World

Page		*Footnote*
20	26	Task Force on Climate Related Financial Disclosures, Climate Change Presents Financial Risk to the Global Economy
	27	New Zealand's Ministry of Environment, Mandatory Climate-related Disclosures
	28	Swiss Federal Council, Federal Council Sets Parameters for Binding Climate Reporting for Large Swiss Companies
	29	South Pole, Canada Environmental Trailblazer: Ties Bailouts to TCFD Reporting
	30	European Commission, Sustainability-related Disclosure in the Financial Services Sector
21	31	UK HM Treasury, G7 Finance Ministers & Central Bank Governors Communique
22	32	UN, Feeding the World Sustainably
	33	Our World in Data, Sector by Sector: Where do Global Greenhouse Gas Emissions Come From?
	34	UN, Our Global Food System is the Primary Driver of Biodiversity Loss
	35	World Bank Blogs, Globally, 70% of Freshwater is Used for Agriculture
23	36	Nature Food, Food Systems are Responsible for a Third of Global An thropogenic GHG Emissions
	37	Europarc Federation, EU Farm to Fork
24	38	Joshua Graff Zivin, Solomon M. Hsiang & Matthew Neidell, Journal of the Association of Environmental & Resource Economists, Temperature & Human Capital in the Short & Long Run
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	40	David Card, Handbook of Labor Economics, The Casual Effect of Education on Earnings
	41	PNAS, Adam Isen, Maya Rossen-Slater & Reed Walker, Relationship Between Season of Birth, Temperature Exposure & Later Life Wellbeing
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26	43	Energy Intelligence, King Coal Makes Comeback in Europe
	44	Nicolas Rivero, Quartz, It's Now Three Times Cheaper to Fuel an Electric Car than a Gas-powered Car in the US
	45	The Guardian, Background: What Caused the 1970s Oil Price Shock?
27	46	The Guardian, Europe Could Face Energy Rationing as 'Really Tough Winter' Looms, Shell Boss Warns

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