c) Energy Security of the Future

By *Irene Giner-Reichl*

Abstract

The UN's blueprint for planetary sustainable development, Agenda 2030, contains - in Sustainable Development Goal 7 - a global consensus on how to move towards sustainable energy for all by 2030. Current implementation trends will not achieve attainment of the threefold goal: universal access to electricity and clean cooking; doubling the share of renewables in global energy end use; and significantly increasing energy efficiency.

Transitions to future-ready and decarbonized energy systems entail deep transformations of societies and economies everywhere. Renewable energy – by virtue of its wide availability, the possibility of distributed generation, digitalisation and intelligent nets – blurs the lines between consumers and producers and offers a major democratisation of energy systems (and by extension the development process), thereby profoundly altering the functioning of societies and international relations.

Diplomacy of the 21st century has an important role to play in accompanying and mitigating the negative effects of geopolitical shifts and the anticipated significant wealth displacement. Some countries – among them in my view China – will have particular leverage. Developing countries can leapfrog to sustainable energy systems; they should be supported to do so. Infrastructure – both existing and new one – needs to be made carbon-neutral which will also require major international and regional cooperation. An international architecture for sustainable energy governance needs to be widely discussed and speedily established.

1. Introduction

Agenda 2030 recognizes the crucial importance of energy in the context of defining a sustainable development model for the planet. Three sub-goals, to be reached by 2030, are enshrined in Sustainable Development Goal (SDG) 7: providing access to the billions of women and men who currently don't have access to electricity and/or cook their food with solid fuels and polluting, inefficient stoves; doubling the share of renewables in the energy end use; and increasing energy efficiency improvements.

There are significant connections between SDG 7 and some of the other SDGs – notably on climate change, industrialisation and infrastructure, urbanisation. It has been argued – and I agree – that sustainable energy will be instrumental to reach any of the SDGs.

At least since the politically motivated oil embargo and steep oil price rises of 1973, energy security has been regarded by States and alliances as a key ingredient of

national security. Out of this concern, the International Energy Agency was created to secure oil supplies for OECD-members[18]. Conversely, ensuring access to fossil fuels has been a major driver for inter- and intra-state armed conflict[19].Diversifying – and reducing dependence from middle-Eastern suppliers – has been a major incentive for European countries (and China) to buy gas from the Russian Federation and build thousands of miles of pipelines for its transport.

This article will explore 2 major questions:

- How is SDG 7 implementation advancing?
- What does it take to get to secure and sustainable energy systems?

Box: Energy's slow ascent to the sustainability agenda[20]

Even though it is hardly conceivable to discuss "sustainable development" without also examining the production, distribution and use of energy, some 20 years had to pass since the 1992 Rio Earth Summit before energy considerations started to be included into global governance. Neither Agenda 21, the seminal program of action passed at the United Nations Conference on Environment and Development in Rio de Janeiro, 1992, nor the Millennium Development Declaration, adopted in 2000, did include energy considerations.

Informal multi-stakeholder platforms operating patiently over a decade[21] and major international scientific endeavours[22] contributed greatly to building a consensus about the role of energy in the pursuit of sustainable development. In the late 1990s and the first decade of the 21st century, recognition spread that poverty eradication would remain elusive as long as extreme energy poverty was not tackled; that none of the MDGs could be attained without appropriate energy interventions; and that curbing greenhouse gas emissions would require a major shift to more sustainable energy futures.

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18 https://www.iea.org/about/history.

19 See, for example, ScienceDirect, The Extractive Industries and Society. Elsevier 2019; or the overview presented by https://extractiveshub.org/topic/view/id/5.

20 *Giner-Reichl, Irene* (2017): Energie im Dienste nachhaltiger Entwicklung. In: *Bayer, Kurt* & *Giner-Reichl*, Irene (Eds.): Energie Entwicklungspolitik 2030 – Auf dem Weg zur Nachhaltigkeit, 169-182.

21 Among them the initiative of the GFSE, www.gfse.at, launched in 1999 and for which I convened 8 international meetings between 2000 and 2008; they paved the way for the biennial Vienna Energy Forum, first organized in cooperation between UNIDO, IIASA and the Austrian Foreign Ministry in 2009 (cf. www.viennaenergyforum.org).

22 The Global Energy Assessment, www.globalenergyassessment.org.

The Commission on Sustainable Development debated energy at its 9th session[23] in 2001.[24] Expert groups such as the Advisory Group on Energy and Climate Change[25] brought together major stakeholders to build consensus. The Vienna Energy Forum meetings of 2009 and 2011 (www.viennaenergyforum.org), drawing on the international network built in yearly meetings of the Global Forum on Sustainable Energy (www.gfse.at) since 2000, prepared the ground for the launching of the Initiative of the UN Secretary-General on "Sustainable Energy for All" (SE4All, www.se4all.org) in December 2011.

Various reports and a global consultation process about targets and indicators eventually paved the way for the adoption by consensus of Agenda 2030, at the UNGA in 2015[26].

2. State of Implementation of SDG 7

2.a) Characteristics of the Current Global Energy System

The global current energy situation is unsustainable:

- Because it continues to rely heavily on fossil fuels which is incompatible with stabilizing the global climate at a warming of below 2 (preferably 1.5) degrees Celsius as per the Paris Climate agreements;
- Because it withholds access to modern energy services to more than a third of the world's population;
- Because it continues to fan inter- and intra-state tensions and conflicts.

Heavy Reliance on Fossil Fuels

In 2018 the global final energy consumption was about 378 Exajoules[27]. 79,9 percent of it are met by fossil fuels; 11,0 percent are met by modern renewables, 2,2 percent by nuclear energy and 6,9 percent by traditional biomass.

[23] It was prepared by a two-year Open-ended Intergovernmental Group of Experts that I co-chaired with Iranian diplomat Mohammad Reza Salamat.

[24] https://www.un.org/ga/search/view_doc.asp?symbol=E/CN.17/2001/19%20(SUPP)&Lang=E.

[25] AGECC, https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=140&menu=1515.

[26] https://sustainabledevelopment.un.org/post2015/transformingourworld#:~:text=We%20resolve%2C%20between%.

[27] REN 21, Global Status Report 2020, 32; www.ren21.net

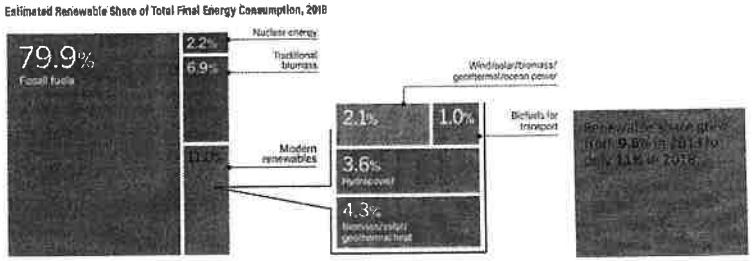

Illustration 1: Fossil fuels dominate; source: REN21, Global Status Report 2020, 32

Renewables are Advancing

For several years in a row, REN21's Global Status Report has announced yet another period of unprecedented growth of energy generated from renewable energy sources. Over the last 10 to 15 years, prices of relevant renewable energy technologies have come down significantly due to economies of scale and the rise of (State-subsidized) Chinese companies who out-crowded most European equipment providers in solar thermal and photovoltaic and provide strong competition to more established players in all fields of renewables. The global growth of installed capacity for the generation of electricity from renewables has been impressive: With 21,5 percent renewables grew – albeit from a small base - almost three times as fast as total final energy consumption (+ 7,2 percent and significantly faster than fossils (+ 5,7 percent) in the period 2013 to 2018.

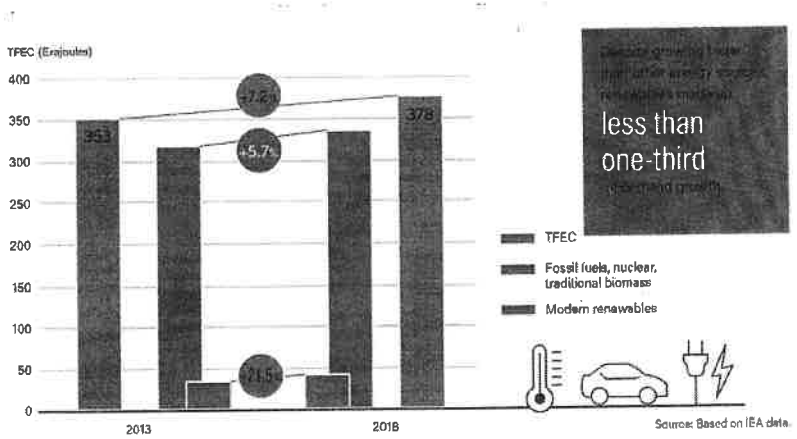

Illustration 2: Growth of renewables in comparison; Source: REN21, Global Status Report 2020, 33

Electricity Leads; Transport and Heat are Lagging Behind

Renewables are contributing most to electricity: more than 200 Gigawatts were added globally in 2019; and REN21 calculates that 26,4 percent of the world electricity consumption were generated by renewables in 2019. The power sector, however, accounts only for about 17 percent of global final energy consumption.

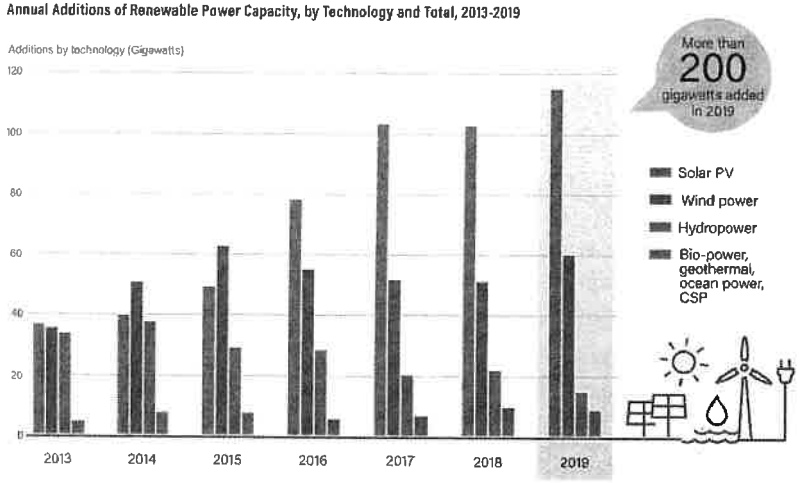

Illustration 3: Annual additions of renewable power capacity;
Source: REN21, Global Status Report 2020, 46

The sectors that use up most of global energy – transport (32 percent heating and cooling (51 percent – register only marginal increases of renewables.

In transport, only 3.3 percent of the energy used comes from renewables, 3 percent from bio-fuels, 0.3 percent from electricity generated from renewables. This sorry state of affairs can be linked to lack of adequate policies; only nine countries mandate the use of renewables in transport in a significant way; public subsidies continue to be showered on fossil fuels; alternative options in aviation and shipping are limited.

The share of renewable heating and cooling in buildings grew from 8 percent in 2010 to a little over 10 percent in 2018.

A continuation of the expansion of renewables at current rates will clearly not suffice to fulfil the SDG 7 target of doubling the percentage of renewables in the final energy demand by 2030.

2.b) Insufficient Access to Modern Energy Services

The most recent stock-taking of the implementation of SDG 7 yielded the following sobering figures:

Even though electrification rates went up, from 83 percent in 2010 to 89 percent in 2017 (which means that an additional 920 million people gained access), there are still about **840 million people without access to electricity** (and according to recent analysis from the IEA, the current COVID-19 pandemic worsened the situation[28]). In Sub-Saharan Africa alone, 572 million people – more than half of the population – lack access to electricity; Burundi, Chad, Malawi, the Democratic Republic of Congo, and Niger had the lowest electrification rates. Disparities persist between urban and rural areas; inner cities and many informal settlements have to rely on fragile distribution networks.

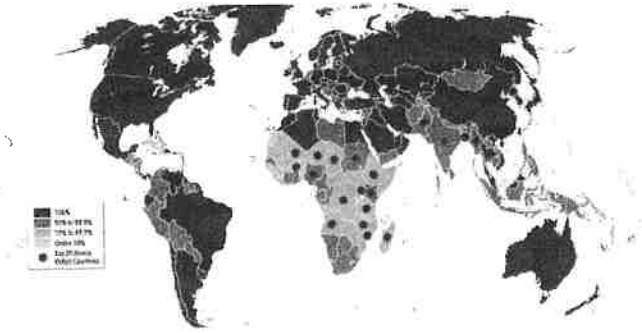

Illustration 4: Population with access to electricity in 2017
Source: Tracking SDG 7 (2020) 11

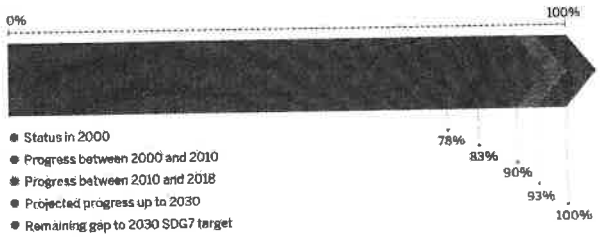

Illustration 5: Progress on access to electricity; Source: Energy Progress Report (2019) 23

Unless current efforts are stepped up significantly, according to the Energy Progress Report 2020[29], "an estimated 620 million people would remain without access to electricity in 2030 – 85 percent of them in Sub-Sahara Africa (page 10); this number could become even higher with the impact of the COVID-19 pandemic. Of the total investment flows to developing countries in support of clean and renewable energy of 21.4 billion in 2017 (double the level of 2010), only 12

28 https://www.iea.org/topics/COVID-19.

29 https://www.irena.org/publications/2020/May/Tracking-SDG7-The-Energy-Progress-Report-2020.

percent reached the least-developed countries, which are the furthest from achieving the SDG 7 targets (page 9).

Clean Cooking Remains Elusive for Two Fifths of World Population

The situation with regard to clean cooking is even worse: while the share of the populations with access to clean cooking increased from 57 percent in 2010 to 61 percent in 2017, because of continued population growth, the absolute number of people without access to clean cooking solutions remains at close to 3 billion people. India and China account for the largest shares of the global population without access to clean cooking at 25 percent and 20 percent respectively[30]. In some of the worst access-deficient countries – such as DRC, Ethiopia, Madagascar, Mozambique, Uganda, or Tanzania – less than 5 percent of the population is able to use clean fuels and technologies for cooking.

To realize universal clean cooking targets by 2030 the annual average rate of increase would need to rise six-fold from the current 0,5 percent to 3 percentage points.

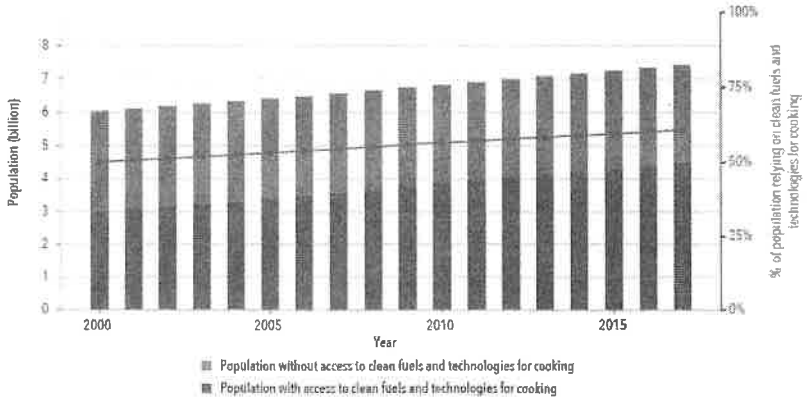

Illustration 6: Towards clean cooking for all; Source: The Energy Progress Report (2019) 6

2.c) Energy Efficiency: The low hanging fruit that does not get picked

In many ways, improving energy efficiency should be a no-brainer. If it is possible to get the same energy services with less energy input, why not rake in the significant savings? After all, the fuel not used is definitely the cheapest fuel available.

It would be good for nations' balances, companies' bottom-lines, household budgets AND for the environment, since it would decrease air-pollution from the burning of oil, gas, coal or wood and reduce the carbon-footprint of energy systems. Yet these obvious advantages are not realized, often because current legal frameworks give the burden of the improvement to one party and the benefits to another.

30 The Energy Progress Report 2019: 6.

Example: better insulation for buildings: the insulation needs to be paid for by the landlord, while the tenants enjoy the lower energy bills for heating and cooling.

The IEA posits in its Sustainable Development Scenario, in which cost-effective energy efficiency potentials are maximized, that the rate of intensity improvement between 2017 and 2030 reaches 3.6 percent Given current and planned policies, however, energy intensity improvements are projected to average only 2.4 percent per year between 2017 and 2030[31].

The world needs mandatory energy efficiency policies with targeted fiscal and financial incentives that leverage market-based mechanisms. It is also necessary to disseminate information about the potentials for energy efficiency and mobilize the responsible agency of individual consumers. Energy efficiency improvements will come about through technological advances AND behaviorbehaviour of end-users that favorsfavours low-carbon solutions across the board.

2.d) Summing-up the Current State of Implementation of SDG 7

SDG 7 currently is not on track for complete and timely implementation. And even if it were fully implemented, it would not ensure global energy security. The continuation of current trends would actually undermine global safety and prosperity in general by further intensifying global warming beyond the 1.5 degrees Celsius established as a goal at the Paris climate meeting. It would furthermore continue to lock significant shares of the world population into severe energy poverty characterized by lack of access to electricity (estimated 620 million in 2030) and/or lack of access to clean cooking (estimated 2.3 billion in 2030). Because of insufficient progress on energy efficiency, valuable resources would continue to be wasted and development opportunities missed.

2.e) There Are, However, Many Opportunities for Climate-benign Technologies and Attitudes

Renewables with Even More Potential

In order to stabilize the global climate as agreed in Paris, the world has to stop to emit greenhouse gases by 2050 and move towards negative emissions beyond that date.

The good news is that renewables have become cost-effective for electricity generation in practically all regions of the world. Safe ways of integrating high shares of intermittent renewables are practiced by grids around the world[32]. In the EU, as of 2015, Denmark, Germany, Ireland and Portugal were satisfying more than

31 Tracking SDG7 (2019, 10).

32 https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/IRENA-ETSAP_Tech_Brief_Power_Grid_Integration_2015.pdf, 22.

20 percent of their national power demand from wind energy[33]. According to REN21's Global Status Report 2020, in 2019 Denmark, Germany, Ireland and Uruguay met more than 30 percent of their electricity generation from variable renewables in 2019[34].

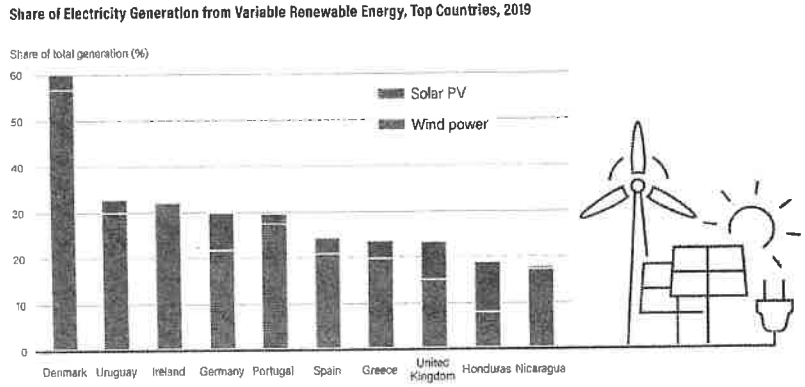

Illustration 7: Share of electricity from variable renewable energy; Source: REN21, Global Status Report 2020, 176

Impacts of COVID-19 are Worrying ...

At the time of this writing, it is unclear how the COVID19 crisis will impact on the implementation of Agenda 2030 in general and on SDG 7 in particular. Due to the general economic slow-down, there is a current decrease in the emissions of greenhouse gases; we know from other economic crises though, that emissions rebound as soon as "normal" economic activities are resumed unless truly structural changes are introduced. We have anecdotal evidence that more affluent segments of the population renew favouring the individual car, and possibly SUVs, over public transport options for mobility in the hope of avoiding contagion.

International organisations and development banks warn that the pandemic and the lockdowns imposed to control it will throw hundreds of million people back into severe poverty and that welfare gains of decades will be annulled. It is to be feared that discretionary spending of governments – for development cooperation for example – will dry up even more severely as national budgets come under increasing pressure. So there clearly are a lot of factors to worry about.

33 https://www.greentechmedia.com/articles/read/intermittent-renewables-are-up-so-where-is-all-the-gas.

34 REN21, Global Status Report 2020: 176; www.ren21.net.

Yet Optimism Prevails

As he presented IEA's Energy Technology Perspectives 2020[35], IEA *DG Fatih Birol* saw ground for optimism that the up-ward trend of renewables will continue, and mainly for these reasons: "solar leading renewables to new heights", interest rates will stay lower for longer; more governments are throwing their weight behind clean energies, companies are stepping up and innovation is gathering steam[36]. He calls for more countries and governments to sign up to ambitious clean energy commitments while not leaving anyone behind. Tackling emissions from existing infrastructure are flagged as posing a particular difficulty.

Decarbonizing transport and heating/cooling is technologically feasible. Experts agree widely on what it takes to do that:

- Promote sector coupling;
- Integrate energy strategies;
- Put a price on carbon that truly reflects externalities;
- Work with supply *and* demand-size measures, including innovative social policies and social engineering;
- Foster green financing.

2.f) Conclusion

Technologies are ripe and, analysis is abundant. In order to decarbonise the energy sector, interventions from companies and citizens are needed. The finance sector needs to align to this goal as well. Government policies are essential to steer decisions in the right direction.

We have the tools to make our energy systems compatible with climate stabilisation, overcoming extreme poverty and enabling human well-being at planetary

35 https://www.iea.org/news/reaching-energy-and-climate-goals-demands-a-dramatic-scaling-up-of-clean-energy-technologies-starting-now; when releasing the World Energy Outlook 2020, Birol calls "solar" the "new king of electricity"; https://www.iea.org/news/world-energy-outlook-2020-shows-how-the-response-to-the-covid-crisis-can-reshape-the-future-of-energy.

36 https://www.linkedin.com/pulse/despite-COVID-19-crisis-heres-why-im-increasingly-optimistic-birol/.

scale in harmony with nature. What is needed is political will and long-term integrated strategies.

3. What Does it Take to Get to Secure and Sustainable Energy Systems in the Near Future?

3.a) Profound Changes Flowing from New Energy Systems

Guided by the threefold objective of SDG 7, stakeholders everywhere strive to evolve existing energy systems towards low-carbon situations. The changes entailed are major. The current energy system is based on a certain type of resources – fossil fuels - that are geographically concentrated, finite by nature and – looked at through the prism of economics – scarce. This has given fossil-fuel rich countries a particular geopolitical clout. The new system is based on renewables, which are potentially abundant in practically any country, enabling all countries to develop a degree of energy-independence and of realizing significant economic savings because of avoided fuel importation costs.

There are significant implications for fossil fuel producing and exporting countries, including a re-dimensioning of their political influence and a disruption of trade patterns. Forward-looking fossil fuel producing countries are anticipating these changes and attempt to re-position their economies through diversification. Other countries whose national economies rely heavily on the fossil fuel-based income may be less prepared but will be equally impacted by the pace of the global move towards sustainable energy.

The decentralized nature of future energy sources is in sharp contrast to the heavily centralized nature of current energy systems. In the future, also smaller actors will be able to produce energy; by doing so they will improve their socio-economic well-being. This energy decentralisation also opens the door for more political and economic decentralisation and sustainability. It empowers communities to exercise more effective agency over their communities' development paths. Changing to renewables-based energy systems has a profoundly democratic impact on societies, down to changing stereotypical gender-roles.

Electrification will be another salient feature of more sustainable energy systems of the future; and electrification has been shown to enhance efficiency[37]. Digitalisation - the internet of things, and intelligent grids - will effectively blur the lines between producers and consumers, and optimize the allocation of energy and other resources, at the most economic rates.

3.b) Energy Transitions, Job Creation and Social Transformation

Energy transitions have been initiated at national and sub-national levels, in the private sector, in large corporate businesses in small scale community ventures, and at the household level.

[37] REN21 Global Status Report 2020 on synergies between RE and energy efficiency, 24.

Renewables have the added potential to buffer against wider socio-economic stresses and shocks that can lead to conflict: by improving access to energy for the poor, by creating jobs, reducing local pollution, promoting sustainable development and alleviating competition over scarce natural resources.

A sustainable energy sector is emerging and projected to grow significantly, from a current 11,5 million to 42 million employees in 2050[38].

The global energy transition – in addition to changing energy systems – will affect wide sectors in the economy; many will be winners, but there will also be losers, so compensatory and coping strategies are necessary. New skills will be needed and therefore fostering innovation and (re-) skilling of the work-force is of the essence. IRENA has recognized the importance of managing energy transitions in an integrated way and has invited a number of relevant organisations to jointly elaborate policy recommendations through its Sustainable Energy Jobs Platform[39].

While new technologies will play an important role to drive the transition to low-carbon energy systems, we should not underestimate the role of behavioural changes and the emergence of new life-style paradigms in harmony with cyclical and sharing economies. Social engineering will therefore also gain in importance[40].

3.c) Towards Greater Diversity and Inclusivity

The necessary energy transitions offer unprecedented challenges and opportunities for deep societal transformation. For the energy transitions to be scaled up and accelerated as required to meet agreed climate goals and to overcome extreme poverty, sustainable energy needs to harness talent in all its forms and foster innovation across a vast array of skills, applications and specialisations. This presents an opportunity, in particular, to transition to a more inclusive workforce and to societies that leave no one behind.

A major step towards harnessing all available talent will be to ensure the full and equal participation of women together with men in future sustainable energy systems. Currently this is not the case. While there are no unified data sets, according to IRENA [41], women make up at best around 32 percent of the sustainable energy work force. When we look at women in STEM (Science, Technology, Engineering and Mathematics) [42] or in leadership positions the picture is even bleaker: accord-

[38] https://www.globalwomennet.org/renewable-energy-and-jobs-annual-review-2019/.

[39] http://sejplatform.org.

[40] See e.g. GFSE Policy Paper: Engaging Citizens via Social Innovations for the Energy Transition, www.gfse.at

[41] https://www.globalwomennet.org/renewable-energy-a-gender-perspective/.

[42] Education at a Glance 2017, OECD indicators.

ing to a study on the situation in the EU, there were 11 percent of women (compared with 22 percent of men) among those who graduated in science and technology with energy content[43]. In leadership positions – e.g. C-Suite functionaries - the numbers drop to 18 percent for women, with a very similar trend in other (non-energy) sectors as well[44].

Inclusion is Good for Companies' Bottom-Lines

There is ample evidence that diversity is good for business of companies and national economies. The GWNET commissioned study "Women for Sustainable Energy – Fostering Female Talent for Transformational Change" [45] extensively discusses existing literature and presents good practice and strategies successfully employed by various stakeholders to increase diversity.

In the literature (discussed in GWNET, Women for Sustainable Energy, 2020) increased participation of women is credited with

- increased company profitability;
- decreased risk and over-confidence;
- increased environmental concern and decreased environmental liability.

Inclusion Benefits Global Development

The McKinsey Global Institute began publishing its global surveys exploring the potential benefits of women in leadership positions in their Women Matter series in 2007[46] just prior to the global financial crisis.

Their economic projection demonstrates that if the entire world closed the gender gap to the same extent as the most gender equal country on earth (at that time and still, Iceland) by 2025, it would add 28 trillion USD to the annual global economy. This is equivalent to the combined annual GDP of China and the USA. [47].

43 *Clancy, J.* & *Feenstra, M.* (2019): Women, Gender Equality and the Energy Transition in the EU.

44 McKinsey and Company (2018): Women in the Workplace.

45 GWNET (2020): Women for Sustainable Energy – Fostering Female Talent for Transformational Change. [Online] https://www.globalwomennet.org/women-for-sustainable-energy/.

46 McKinsey & Company (2007): Women Matter: Gender Diversity, a Corporate Performance Driver.

47 McKinsey Global Institute (2015): The Power of Parity: How Advancing Women's Equality Can Add 12 Trillion to Global Growth.

Christine Lagarde, President of the EU Central Bank and former Managing Director of the International Monetary Fund (IMF) put it succinctly: "When more women join the workforce, everyone benefits". [48]

Illustration 8: Economic case for gender parity; Source: GWNET (2020) 28.

48 *Lagarde, C.* & *Ostry, J.* (2018): When more women join the workforce, everyone benefits. Here's why. World Economic Forum Blog.

Inclusion Drives National Sustainable Development

Annually the World Bank, not usually suspected of left-leaning ideologies, publishes a widely-respected and -used Development Report; the Development Report of the year 2012 was focused on Development and Gender[49]. Here are some of its main messages:

- Gender equality is a core development objective in its own right;
- Treater gender equality is also smart economics, enhancing productivity and improving other development outcomes, including prospects for the next generation and for the quality of societal policies and institutions;
- Economic development is not enough to shrink all gender disparities; corrective policies that focus on narrowing persisting gender gaps are essential.

The report points to four priority areas for policy going forward. First, reducing gender gaps in human capital - specifically those that address female mortality and education. Second, closing gender gaps in access to economic opportunities, earnings, and productivity. Third, shrinking gender differences in voice and agency within society. Fourth, limiting the reproduction of gender inequality across generations: [50]

The value of women's inclusion in the global workforce, at all levels, and under the right circumstances, has demonstrable benefits to women, their families and communities and to their national economies, as shown in the IMF figure below:

49 The World Bank (2012): World Development Report 2012. Washington.

50 https://openknowledge.worldbank.org/handle/10986/4391.

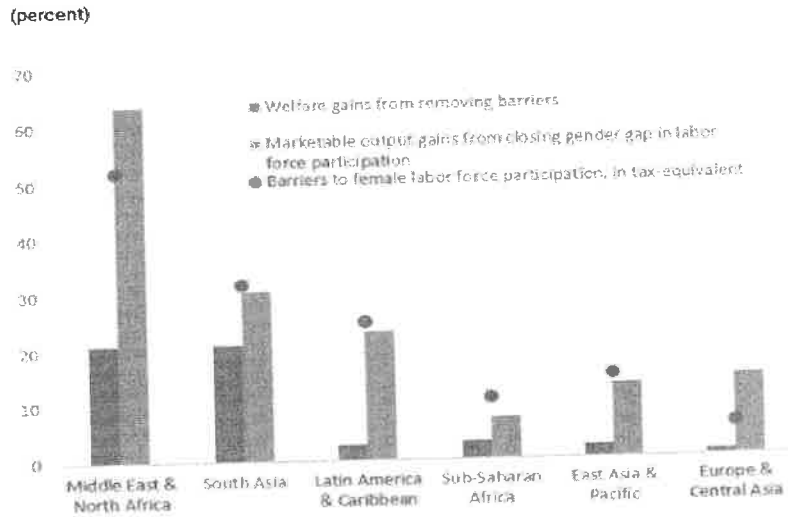

Illustration 9: Reducing barriers to women in the workplace boosts growth; Source: IMF 2018[51]

With these well-established facts in mind, responsible stakeholders seek to identify and replicate strategies for increasing the participation of women in non-traditional sectors. The GWNET Study, "Women for Sustainable Energy: Fostering Women's Talent for Transformational Change"[52], offers an overview over existing strategies and good practices.

But there are many more examples. Chile, e.g. in discharging her responsibilities under the APEC 2019 deliverables under the Women, SMEs and Inclusive Growth Priority, published an "Action Strategies Toolkit" to "assist economies in the development and implementation of effective gender diversity strategies, with the purpose of attracting, retaining and promoting talented women in traditionally male-dominated sectors of the economy.[53]

The toolkit puts emphasis on

- Attracting talented women in non-traditional sectors by challenging gender stereotypes, implementing gender-sensitive processes and instruments to

51 https://blogs.imf.org/2018/11/28/economic-gains-from-gender-inclusion-even-greater-than-you-thought/.

52 www.globalwomennet.org.

53 APEC-Chile (2019) 4.

actively attract women to work in the industries of energy, mining and transport; and by collaborating with key stakeholders;

- Retaining talented women in non-traditional sectors by promoting an inclusive work culture, promoting balance between work and personal life, facilitating flexible working conditions;

- Developing talented women in non-traditional sectors by promoting networking instances, training for leadership, mentoring and sponsorships.

These days, many countries are adopting major stimulus packages to support their economies in the wake of the pandemic; often these stimulus packages contain major climate change /sustainable energy components (the EU, e.g., intends to use its 880 billion EURO COVID-19 recovery plan extensively also for climate measures[54]). This also entails chances to making sustainable energy more inclusive.

During the COVID-19 pandemic, women have been on the frontlines of the coronavirus pandemic. According to initial studies, the economic hardships wrought by the pandemic hit women even harder than men. Because of persistent gender-stereotypes, the lockdowns and social distancing measures brought particular challenges for women. It became apparent that women need modern and affordable energy to keep up the fight against the virus and to support the economic recovery, to make their households, communities and businesses more resilient. In a joint piece women leaders in sustainable energy[55] highlighted in particular:

- Women and men should get equal opportunities to participate in and support the clean energy economy, as entrepreneurs and employees, and get equal funding and investment for their businesses;

- The energy sector must mitigate gender-based vulnerabilities that have worsened with the pandemic, in health care, gender-based violence, and the digital economy;

- Women need better energy access and suitable appliances to support their roles in the care economy. Clean cooking is of special importance here

54 https://www.scientificamerican.com/article/e-u-s-coronavirus-recovery-plan-also-aims-to-fight-climate-change/.

55 *Oparaocha, Sheila* & *Cecelski, Elizabeth* (ENERGIA); *Ferroukhi, Rabia* (IRENA); *van der Lans, Dymphna* (Clean Cooking Alliance); *Giner-Reichl, Irene* (GWNET); *Madu-ekwe, Monica* (ECREEE); *Shah, Ajaita* (Frontier Markets): Women leaders call for action in response to COVID-19: Opening opportunities for gender equality in the transition to sustainable energy https://www.energia.org/women-leaders-call-for-action-in-response-to-COVID-19-opening-opportunities-for-gender-equality-in-the-transition-to-sustainable-energy/.

- Women need to have a place at the table when strategies about energy transitions and post recovery strategies are planned and decided on.

3.d) Energy Transitions Can Make Our Societies More Future-ready

Energy transitions entail deep societal transformations, open up opportunities for greater democratic participation of citizens and should be used to make our societies more inclusive and just and more future-ready. This will require determined political decisions and mobilisation of all stakeholders.

3.e) Characteristics of a Future-Ready Sustainable Energy System

Decarbonisation Is a Must

Currently roughly 80 percent of the global final energy consumption is made up by fossil fuels; the energy system is responsible for about two thirds of global greenhouse gas emissions and for an estimated 4 million premature deaths as a result of air pollution, especially in developing countries' mega-cities.

In order to be secure, a future energy system needs to be compatible with stabilizing the global climate at levels of warming below 1.5 (2) degrees Celsius above pre-industrial levels. If climate change continues to accelerate largely un-checked, as it currently does, nobody and nothing will be secure on the planet since catastrophic floods and droughts will multiply, sea levels will rise and inundate vast stretches of inhabited land, ecosystems that provide life-support services to humanity will tip and become dysfunctional. Since poorer segments of the population are always and everywhere hit earlier and more severely by climate stress, social tensions will be exacerbated, migratory flows will increase and political unrest is pre-programmed.

Challenges for Multilateralism

Since its signing in 1992 at the Earth Summit in Rio, the UN Framework Convention on Climate Change (UN FCCC) has been the multilateral locus for attempting to stabilize the global climate by elaborating and adopting legal obligations for countries to limit their GHG emissions. Despite the annual Conferences of the Parties and numerous meetings of subsidiary bodies[56], despite the impressive scientific evidence produced and agreed on by consensus by the over 1200 scientists of the International Panel on Climate Change (IPCC) in its five Assessment Reports[57], until this day the UN FCCC negotiations have been bogged down in all-out battles around preserving short term vested interests of certain groupings at the expense of long-term and inclusive sustainability. I am not focussing on UN-FCCC's rather limited achievements in this article; rather I am attempting to show what is technologically feasible, economically reasonable and politically desirable

56 www.unfccc.int.

57 www.ipc.ch.

in terms of decarbonizing the energy system. I am also attempting to show that numerous socio-economic benefits will go with decarbonisation.

Many civil society organisations, academia and international organisations have long attempted to mobilize the needed political will. The Youth Movement of Fridays for Future[58] of *Greta Thunberg* has given an important impetus to these endeavours. Climate change and energy transitions – two sides of one coin – have gained in importance in several national elections[59] (even displacing migration as a frontrunner topic), and the 2019 elections to the European Parliament[60], resulting in a significant strengthening of the Green Party. The Covid19 pandemic, unfortunately, has disrupted the rise of citizens' concerns somewhat, at least for now.

Decarbonisation is Possible

So without any doubt, the **global energy system has to be de-carbonised in order to be future-ready**. The task at hand is herculean and the time to do it is very limited. There is a silver-lining: We have seen that renewable-based technologies – at least for the electricity sector – are mature and price-competitive in practically all regions of the world. Financing is shifting away from fossils to renewables and renewables' stocks are rising[61]. Consumer awareness is growing. Small – but growing - numbers of people attempt to consciously adopt low-carbon life styles and cultivate behaviours such as buying locally, recycling and re-using, sharing (instead of owning), un-cluttering and decelerating (slowing down). Digitalisation and intelligent grids will hasten the electrification of overall energy-use, making it also more efficient, and blur the lines between producers and consumers, thereby creating new democratic and participatory decision-making.

The major challenges ahead are in the area of **clean cooking, transport and thermal applications** (heating and cooling). These challenges can be solved by policy attention and adequate regulation – in particular putting a price on carbon - that stimulates market-based solutions which have driven the energy transition to a large degree until now.

What adds to the challenge is the absence of good multilateral processes to help in the transformation. Where can the necessary deals be made which compensate for legitimate losses and incentivize social and technological innovation and demand-side management? While SDG 7 is part of Agenda 2030 and hence agreed

58 www.fridaysforfuture.org.

59 E.g. in Austria, cf. https://www.brusselstimes.com/news/belgium-all-news/70094/austrian-parliament-declares-climate-emergency-four-days-from-elections/, for Switzerland, cf. https://www.bbc.com/news/world-europe-50116400; for UK, cf. https://www.theguardian.com/environment/2019/nov/21/climate-crisis-topping-uk-election-agenda-is-unprecedented-change.

60 http://www.climateaction.org/news/climate-change-now-a-priority-in-european-election-results.

61 https://about.bnef.com/clean-energy-investment/.

by consensus, there are no solidly established comprehensive multilateral fora to debate, let alone to address the multifaceted challenges of the global energy transition in an integrated fashion. There are many technical organisations which are doing valuable work, IOs like IRENA, UNIDO; policy-networks like REN21, international NGOs like SEForALL – and attempt to build consensus on the aspects of energy transitions that are germainegermane to their specialized mandates. But there is no place yet to come together and work out compensatory schemes or look at issues holistically.

It would be worthwhile to consult widely and come up with a new proposal for a multilateral energy transition agenda, architecture and toolbox. The High-level Dialogue at the UN General Assembly on sustainable energy in 2021[62] might be a first major occasion to do that.

Wealth Displacement Needs to be Addressed Pro-Actively at All Levels of Governance

The needed new policies will by necessity displace wealth-generation – e.g. away from coal-mines, SUV-manufacturers and oil companies – with potentially severe impacts on prevailing employment and income situations. At the **national level**, governments will need to find ways to **buffer this wealth-generation displacement through appropriate measures**, such as re-training of the labour-force, fostering of new economic opportunities, and where needed social transfer schemes.

At the **international level**, it will take a **re-ordering of the geopolitical web of** (power and economic) **relations** of momentous magnitude[63]. The energy system of the 20th century was fuelled by oil. It gave exceptional clout to oil-producing countries and created dependencies that dwarf ideological alliances.

Recent decades, as a result of technological advances in prospecting and developing of fossil fuel deposits – including off-shore and in remote areas, such as the arctic – have significantly increased the number of countries which aspire to draw wealth from their fossil fuel endowments; many of these countries are located in the so-called "Global South".

China has risen as a major player also in the area of energy trade and cooperation. China has led the pack in terms of additions to installed capacity fuelled by renewables over the last several years. It has re-committed (most recently, through the

62 https://www.un.org/en/conferences/energy2021/about#:~:text=The%20High%2Dlevel%20Dialogue%20on,held%20in%20Nairobi%20in%201981.

63 https://www.irena.org/publications/2019/Jan/A-New-World-The-Geopolitics-of-the-Energy-Transformation#:~:text=Chaired%20by%20former%20President%20% C3%93lafur,%2C%20trade%2C%20environment%20and%20development

speech of XI Jinping before the UN GA in September 2020[64]) to an ambitious national climate policy which will also help it address a major domestic challenge which the Party needs to overcome successfully, namely air pollution[65]. China dominates the manufacture of most renewables equipment and its powerful State Grid is a major investor in the energy sector in all continents, especially in Africa. Virtually all of the world's electric busses operate in China[66].

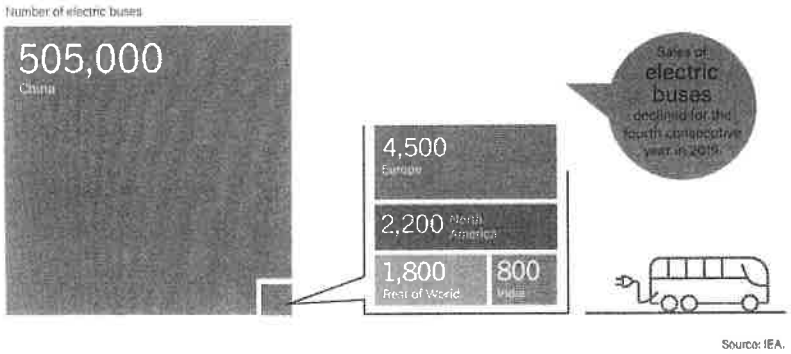

Illustration 10: Share of Electric Buses; Source: REN21 Global Status Report 2020, 181

China will continue on this path of de-carbonisation[67], high-tech production and digitalisation, no matter what the rest of the world does, mainly to satisfy its own middle class which insistently demands clean air and a healthy environment. Its constitution and the high level of acceptance of the government by the Chinese people allow it to go full steam ahead. Through the Belt and Road Initiative[68] which reaches a good two thirds of the world's population, I expect China to export its approach to its partner countries as well (China has received stinging criticism for the number of fossil-fuel based investment projects that are currently under way and will surely want to avoid being tarred and feathered again).

64 https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1817098.shtml.

65 *Giner-Reichl, Irene* (2019): Domestic and International Strategies of the PR of China: Chances for Climate Neutral Development. In: *Kaminski* ; *Gerd* (Ed.): Chinese Strategies in Politics, Foreign Policy, Security Policy, Economy and Law. Vienna.

66 REN21, Global Status Report 2020, 181.

67 In September 2020 China announced to become carbon-neutral by 2060 https://news.un.org/en/story/2020/09/1073052.

68 *Giner-Reichl, Irene* (2017): One Belt One Road – Chinas Seidenstraßen-Initiative. In: *Bayer, Kurz* & *Giner-Reichl, Irene* (Eds.): Entwicklungspolitik 2030 – Auf dem Weg zur Nachhaltigkeit. MANZ.

The COVID-19 pandemic dried up the demand for oil by a fifth[69] [70] and the oil prize collapsed. This foreshadows in a certain way what needs to come in terms of decarbonizing the global energy system. The oil prize is now at around 40 $ a barrel; oil states such as Saudi Arabia need it to be at about 70 to 80 $ in order to balance their budgets. Roughly 900 million people live in "petro-states". If the energy transition accelerates – as it must in view of achieving climate stabilisation – competition among the oil-producing countries will become fiercer, with potentially huge impacts on peace and stability in key regions of the world.

3.e) Conclusion

There will be a strong temptation to slow down the energy transition to accommodate those with vested interests in the current system. I believe that we need to resist this temptation. Rather than slowing down decarbonisation, governments everywhere need to adopt an **integrated policy approach** in order to address the multi-dimensional challenges of the energy transition comprehensively, with social justice as a key priority.

At the **international level**, through existing and new mechanisms, nations need to work together to **develop new collaborative approaches** to usher in the new geopolitical realities and to cushion against harsh side-effects of the energy transition that could result in armed strife, social unrest and unmanaged migration.

4.For a New Energy Diplomacy in the 21st Century

The needed transition to low-carbon energy systems, in my view, should be paired with re-newed and vigorous endeavours of energy diplomacy, both bilateral and multilateral. I see at least five strategic areas of action:

- We need pathways and international cooperation to support petro- and coal states in managing their "carbon withdrawal" discomfort and as they evolve more diversified national economies;
- We need to assist so-called developing countries to avoid the "Global North"'s" mistakes of the past; instead of replicating 20th century's patterns of development, they can leap-frog to energy systems of the future. This seems all the more important as mega-cities spring up and grow fast in many developing countries which risk to lock in undesirable infrastructure for decades to come, unless better alternatives are given to them now;
- It will be key that new infrastructure be carbon-neutral; and that existing infrastructure be retro-fitted as much as possible. We can expect most of

69 The Economist, 13, Sept. 19, 2020.

70 https://www.iea.org/news/world-energy-outlook-2020-shows-how-the-response-to-the-covid-crisis-can-reshape-the-future-of-energy.

the infrastructure to cross national borders [71] which will raise many issues, from legal liabilities to protection of the investment to labour rights issues and strategic (in-)dependence. To achieve best results, standards and good practices should be evolved and implemented. Modalities for multilateral cooperation around infrastructure issues (where they exist) need to be improved; in many instances they will need to be grown from scratch;

- The EU needs to pro-actively engage with China. China's strong role in sustainable energy is seen by some as a threat. I would see it as a compelling reason to place energy and climate change diplomacy at the forefront of our dealings with China;

- We need to conceptualize – in an inclusive and participatory process – the international architecture and tools needed to address the multifaceted dimensions of energy transitions peacefully and cooperatively and in the most effective ways.

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[71] State Grid, China's huge State grid makes major strives to create an integrated grid infrastructure on the context of the Chinese government's Belt and Road initiative; cf. e.g. https://www.beltandroad.news/2020/10/10/state-grid-of-china-to-further-step-up-innovation/;"China already has a number of power lines connected to other countries, including Myanmar, Laos and Vietnam, while lines into Thailand, Pakistan and Bangladesh are under consideration. For emerging economies hampered by chronic electricity shortages, such investments may be a blessing", https://asia.nikkei.com/Spotlight/Asia-Insight/China-s-Belt-and-Road-power-grids-keep-security-critics-awake.

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