

The Renewable Energy Transition

A Global Revolution, Climate Action
& Its Implications for Bangladesh's Sustainable Energy Future

Selections:

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Synopsis

COP26: Postscript & Action for the Future—*Now!*

About the Author

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Foreword by
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SYNOPSIS

The world is on a path to transition away from fossil fuels to clean, renewable energy in order to address environmental pollution, global warming and energy insecurity. **Mark Z. Jacobson**

The UN-IPCC Report, “ARS Climate Change 2021: The Physical Science Basis” is a code red for humanity...The alarm bells are deafening. This report must sound a death knell for coal and fossil fuels, before they destroy our planet. **U.N. Secretary-General António Guterres**

Our task is to look at the world and see it whole. **E. F. Schumacher**

The global path to “Development”, relying on fossil fuel-nuclear energy sources, has reached a dead end. A catastrophic future scenario impacted by climate change grows worse even beyond the most dire scientific projections. Evidence is greater frequency and magnitudes of hurricanes, tornadoes, cyclones, typhoons, rising sea levels, floods, droughts, desertification, forest fires, heatwaves, freakish weather patterns, climate migration, destruction of biodiversity, outbreaks of new infectious diseases—such as COVID 19—and deaths due to climate change, and the Arctic and Antarctica melting. Add to these oil spills, accidents, nuclear disasters, nuclear waste accumulation with no permanent solution for storage, pollution, toxic contamination of water, air and soil; ever costlier and ruthless exploitation of rapidly depleting fuel reserves—rendering them nonrenewable; more frequent earthquakes due to fracking; safety and security risks; and energy wars.

There’s no respite. Globally, we are in a state of *perpetual* emergency.

This complex crisis will require multifaceted, infrastructural and holistic solutions. And time is of the essence. One *fundamental* solution lies with the revolutionary potential of a transition to a renewable energy future—in a way that is economically advantageous, environmentally responsible, technologically feasible, socially acceptable and politically peaceable. It is one solution but, energy being a lifeline of the economy, one that permeates our sustainability.

The good news is such a transition is happening. The global energy scenario is undergoing a transition toward renewables with growing opportunities and advantages: plummeting costs; record investments; innovation in manufacturing, efficiency, durability, designs, storage, transmission and applications; job creation; affordable financing; cultural demand; and global accessibility of renewable energy technologies. Simultaneously, an unprecedented coalescing of environmental, scientific, technological, economic, educational, academic, religious, political, legal, healthcare, business, governmental and cultural movements, engaging people from all walks of life and across all ages, is creating a synergy to fuel the revolution both with immediate results as well as the potential for a renewable energy future of economic prosperity, equity, environmental justice, safer and healthier humans, regenerated flora and fauna, environmental stewardship and peace.

Both the sound of alarm over climate catastrophe and demand for immediate action by activists for a global transition to renewable energy were the loudest ever, as well as pledges and political rhetoric, during the COP26 United Nations Climate Change Conference held in Glasgow, Scotland, during November 2021, putting policy makers and the fossil fuel industry all over the world on trial. The world is watching.

Bangladesh is one of the worst victims of climate change which knows no border and for which Bangladesh is not solely responsible for the impact of climate change on the country. Climate experts predict that rising sea levels will submerge some 17 percent of the nation’s land by 2050 and displace about 20 million people. Others predict that as much as one-third of Bangladesh will be under water

permanently due to rising sea levels by the end of the century. These predictions warn against worsening national catastrophes of unprecedented magnitude impacting every aspect of the nation's survival.

But Bangladesh is also in one of the most advantageous positions to make the transition. The country is richly endowed with renewable energy sources: light, heat, wind, water movement and photosynthesis. Renewable energy technologies including photovoltaics, wind turbines, ecologically planned hydroelectric generators, solar thermal systems, solar greenhouses, biogas plants and solar cookers for a wide range of domestic, commercial and industrial purposes can revolutionize the economy. Multiple scientific, economic and environmental research and analysis of international stature—combined with the field results of renewable energy applications in Bangladesh since the 1990s—confirm this potential. Furthermore, compared to industrially developed countries, as of now Bangladesh is minimally entrenched into the fossil fuel-nuclear path, which gives the country enormous cost, technological and socio-political advantages to lay down and build upon a renewable energy infrastructure.

The Renewable Energy Transition, a comprehensive and action-oriented book, written by a uniquely qualified and internationally recognized renewable energy educator and activist with more than forty years of experience both in Bangladesh and around the world, looks at the unfolding renewable energy scenario in Bangladesh since the 1980s pilot phase, and by placing it in the backdrop of the global transition toward a renewable energy future, brings to light the country's revolutionary prospect for a renewable energy future. Bangladesh's current generation of barely 4 percent of total energy from renewable sources is a promising step but not enough. Even that has been riddled with inefficiency, corruption and a lack of both transparency and accountability. In the face of coal's losing economic battle against renewable alternatives, combined with diminishing international financial institutions' support for coal production and unwillingness of insurance companies to take the risk of insuring coal-fired plants, during 2020 and 2021 the government decided to cancel the construction of 10 out of 18 of the country's planned coal plants—which is commendable. However, by still planning to construct the rest of the coal plants, and to compensate for the cancelled ones—shifting mainly to liquefied natural gas (LNG) and petroleum for electricity generation, the country remains entrenched in the fossil fuel path. This simply means *choosing one disaster over another*. At COP26 Prime Minister Sheikh Hasina announced Bangladesh's plans to have 40 percent of power generation from renewable sources by 2041. Indeed, this is a promising step awaiting action and performance.

Demand from the civil society for a renewable energy transition is growing stronger, but the government's commitment—*in policy and practice*—is lacking, compared to what's urgently needed and possible to make the transition. The government's pledges and programs in renewable energy and rightful appeal to the global community for financial help in combating climate change and preserving the environment, on the one hand, while autocratically pursuing the fossil fuel-nuclear path, is self-contradictory. The book warns against Bangladesh's obsession with fossil fuel dependent economic growth at any cost—which, beyond a short-term boom, is ultimately suicidal—and the country's turning into a dumping ground for fossil fuel-nuclear resources and technologies that are being rejected around the world.

Instead, the book suggests, to continue to make economic progress or development that's sustainable, equitable, and both economically and environmentally advantageous, we must think holistically and reevaluate the past; put a moratorium on further entrenchment into the destructive and dead-end fossil fuel-nuclear energy path, combined with disincentives such as reduction of subsidies for nonrenewables and a progressive carbon tax and cap on carbon production; and expedite an alternative path by urgently tapping into Bangladesh's practically "untapped energy mine" of renewable energy sources and its revolutionary potential to fuel the transition to a sustainable energy future. Thereby, Bangladesh could also be an inspiring model for the world.

Postscript

COP26: Postscript & Action for the Future—*Now!*

A catastrophic scenario impacted by climate change is growing worse beyond the most dire scientific projections. Greater frequency and magnitudes of hurricanes, tornadoes, cyclones, typhoons, rising sea levels, floods, droughts, desertification, forest fires, heatwaves, freakish weather patterns, climate migration, destruction of biodiversity, outbreaks of new infectious diseases (such as coronavirus and its variants) and deaths due to climate change, thawing permafrost, and the Arctic and Antarctica melting—there's no respite. Globally, we are in a state of *perpetual* emergency and humanity faces an existential threat to its survival.

The much-anticipated COP26 UN Climate Change Conference, held in Glasgow, Scotland, during October 31, 2021— Nov 12, 2021, was hailed as “Humanity’s last chance to save the planet” from catastrophic impacts of climate change. Beyond a few positive outcomes—mostly pledges to be authenticated through action—the conference did not accomplish enough to alleviate the threat.

UK’s Member of the Parliament and COP26 President Alok Sharma’s appeal to national leaders to “consign coal power to history” did not happen. Thanks to over 500 lobbyists representing the fossil fuel industry, along with political leadership with vested interest in, or under the thumb of, the industry, the demand to “phase out” coal was watered down to “phase down,” with some countries maintaining that they will build additional coal-powered plants.

Acknowledging that phasing out would have to be a process and not an overnight change, still— with all the scientific knowledge and evidence we have at hand about the catastrophic consequences of burning coal—to not decide on phasing out coal with the utmost urgency and allowing instead to build more coal-powered plants amounted to nothing short of consigning the future of the Earth—juxtaposed by scorching, freezing and drowning— to a hell. Human greed, hubris, ignorance and moral bankruptcy have never spoken louder. So, on September 28, 2021, Greta Thunberg was on point in her speech at the opening session of a Youth4Climate event at the UN Climate Change pre-Conference preceding COP26 held in Milan, Italy, when she criticized global leaders over their promises to address the climate emergency, dismissing them as “blah, blah, blah.”¹

Furthermore, the lingering commitment from the developed countries to a \$100 billion annual climate finance fund for developing countries did not progress any further and a compensation fund for developing countries for loss and damage from climate disasters failed to be launched. Pledges from countries to reduce CO² emissions through “Nationally Determined Contributions” (NDCs)—not legally binding— lacked establishing enforcement or accountability criteria.

What is also disappointing is that the conference lacked any conversation about the over-consumption patterns and practices that are characteristic of “developed” countries and their economies—long equated with social and economic progress, or “Development,” but which have increasingly led to negative environmental and social consequences, such as “Affluenza” (“The All-Consuming Epidemic” which is “a painful, contagious, socially transmitted condition of overload, debt, anxiety, and waste resulting from the dogged pursuit of more,” as authors John De Graaf, David Wann and Thomas Naylor coined it in their book, *Affluenza: How Overconsumption Is Killing Us—and How to Fight Back*).² In recent years there’s been growing concern over the negative environmental impacts of “carbon footprint” (the total greenhouse gas emissions) resulting from both personal and social consumption patterns. It is futile to discuss the possibility of carbon reduction without seriously addressing carbon footprint spreading “Affluenza,” a virus that’s deadly, addictive and transmittable in the compartmentalized pursuit of progress or development.

There was very little indication, or consideration, of the awareness that *the first and fundamental condition of sustainability is to live within the limits and renewability of natural resources* and not by continuing to deplete the nonrenewables, i.e. oil, coal, natural gas and uranium—resources for fossil fuels and nuclear power, and that both the cause of, and solutions to, climate change must be understood and addressed within this context.

Thousands of activists of all ages from around the world, including researchers united as “Scientist Rebellion,” acknowledged marginal success on some grounds but criticized— even condemned—COP26 for its failure to agree on an action plan to limit warming to 1.5° C by 2030.³ In closing, U.N. Secretary-General António Guterres remarked. “It is an important step but is not enough. We must accelerate climate action to keep alive the goal of limiting global temperature rise to 1.5 degrees.”

Amitav Ghose, a novelist and author of many books including *The Great Derangement: Climate Change and the Unthinkable* and *The Nutmeg’s Curse: Parables for a Planet in Crisis*, offered a more sobering assessment: “Cop26 really underlined that all those political mechanisms and institutions of liberal world governance that we rely on have failed us, and they’re going to fail more and more in the future.”⁴

What was accomplished, however, through exploiting the concern over the coal-climate change connection, was the nuclear industry and advocates successfully pushing through nuclear power as a viable alternative to coal, maintaining that nuclear power is absolutely necessary to cope with the climate crisis.⁵ They succeeded mainly by propagandizing nuclear power as a “zero-carbon” or “carbon-free” alternative—which is not true. Less emission of carbon, compared to burning fossil fuels, does not make nuclear power “zero-carbon” or “carbon-free.” As the physicist and systems theorist Fritjof Capra and Pier Luigi Luisi, Professor of Biochemistry at the University of Rome 3, put it: “Nuclear energy creates significant greenhouse gases and pollution. When the entire fuel cycle is considered, a nuclear plant emits 27% of the CO₂ emitted from a coal plant.”⁶

Moreover, the pro-nuclear push also suppressed or reductionistically bypassed other inherent problems such as having no permanent solution to mounting nuclear waste; runaway construction, maintenance, as well as spent fuel reprocessing costs; depletion of a nonrenewable fuel source (uranium); bombmaking by-product of plutonium and theft; weapons proliferation; decommissioning challenges and costs; and security. All these fundamental concerns in varied degrees remain valid not only related to conventional nuclear power plants, but also to the much-touted innovation in nuclear technology and a new generation of plant designs, such as Small Modular Reactors (SMR). The big push and propaganda for SMRs minimize or avoid questions such as: what are the consequences of mass production (“economy of multiples,” which would be necessary to make them viable) and widespread dissemination (touted as an advantage) of these reactors—in terms of less waste from each but what about the total accumulation from all, safety and security, and cost (economic, social, medical, political and environmental)? On these and other grounds the Union of Concerned Scientists (UCS), in an aptly titled report, “Small Isn’t Always Beautiful: Safety, Security, and Cost Concerns about Small Modular Reactors,” concluded: “Unless a number of optimistic assumptions are realized, SMRs are not likely to be a viable solution to the economic and safety problems faced by nuclear power.”⁷

One may recognize that the title of the UCS report alludes to the classic *Small Is Beautiful: Economics as if People Mattered* by economist and philosopher E. F. Schumacher. I think Schumacher would be pleased with the UCS’s corrective allusion. This is what Schumacher said about nuclear power:

No degree of prosperity could justify the accumulation of large amounts of highly toxic substances which nobody knows how to make ‘safe’ and which remain an incalculable danger to the whole of creation for historical or even geological ages. To do such a thing is a transgression against life itself, a transgression infinitely more serious than any crime ever perpetrated by man. The idea that a civilisation could sustain itself on the basis of such a transgression

is an ethical, spiritual, and metaphysical monstrosity. It means conducting the economic affairs of man as if people really did not matter at all.⁸

Among others, and even more strongly and authoritatively, who have spoken up against nuclear power are four former heads of nuclear power regulation in the U.S., Germany, France and the UK. They are Dr. Greg Jaczko, former Chairman of the U.S. Nuclear Regulatory Commission; Prof. Wolfgang Renneberg, former Head of the Reactor Safety, Radiation Protection and Nuclear Waste, Federal Environment Ministry, Germany; Dr. Bernard Laponche, former Director General, French Agency for Energy Management, former Advisor to French Minister of Environment, Energy and Nuclear Safety; and Dr. Paul Dorfman, former Secretary UK Govt. Committee Examining Radiation Risk from Internal Emitters. In a statement issued on January 25, 2022, they said:

The climate is running hot. Evolving knowledge of climate sensitivity and polar ice melt-rate makes clear that sea-level rise is ramping, along with destructive storm, storm surge, severe precipitation and flooding, not forgetting wildfire. With mounting concern and recognition over the speed and pace of the low carbon energy transition that's needed, nuclear has been reframed as a partial response to the threat of global heating. But at the heart of this are questions about whether nuclear could help with the climate crisis, whether nuclear is economically viable, what are the consequences of nuclear accidents, what to do with the waste, and whether there's a place for nuclear within the swiftly expanding renewable energy evolution.

As key experts who have worked on the front-line of the nuclear issue, we've all involved at the highest governmental nuclear regulatory and radiation protection levels in the US, Germany, France and UK. In this context, we consider it our collective responsibility to comment on the main issue: Whether nuclear could play a significant role as a strategy against climate change. The central message, repeated again and again, that a new generation of nuclear will be clean, safe, smart and cheap, is fiction. The reality is nuclear is neither clean, safe or smart; but a very complex technology with the potential to cause significant harm. Nuclear isn't cheap, but extremely costly. Perhaps most importantly nuclear is just not part of any feasible strategy that could counter climate change. To make a relevant contribution to global power generation, up to more than ten thousand new reactors would be required, depending on reactor design.⁹

From a sustainability perspective, by *choosing one disaster over another*, the nuclear push cleared the path for countries to entrench deeper into a dead-end path, a quagmire, that already seems to be near impossible to pull out of. And the "Super Powers" who have already embarked on a race for superiority in nuclear power—in a sort of nuclear cold war (both for its environmental and weapons proliferation implications)—would have to be justifiably labelled as potential "Super Destroyers." The brewing competition and rush to export nuclear technology around the world—the biggest market being the developing countries—that include "financing" (long-term debts) and construction of power plants is ushering in a new era of techno-colonialism. This is in addition to the nuclear arms race—MAD (Mutually Assured Destruction)—that the Super Powers as well as some other countries are already engaged in, threatening the survival of the whole world. Driven to the brink of extinction today,¹⁰ with nuclear holocausts and a contaminated Earth on record, along with rising political tensions around the world, what have we learned since the 1953 speech by President Dwight D. Eisenhower, "Atoms for Peace," a proven oxymoron, and the blunderous claim by Lewis Strauss, then the Chairman of the United States Atomic Energy Commission (1954), that nuclear power will usher in a future in which "Our children will enjoy in their homes electrical energy too cheap to meter" which, in succeeding years, boosted the sales of nuclear power reactors, both in the United States and some other countries—compounded by hundreds of thousands of metric tons of radioactive waste accumulation with no permanent storage solution, production of bomb-making byproducts and nuclear weapons proliferation? "All nations should declare, all nations, that nuclear weapons must be destroyed," pleaded Mikhail Gorbachev during a BBC

interview on November 8, 2019 and “Those who cannot remember the past are condemned to repeat it,” said American philosopher George Santayana in 1905. Do we remember?

In the propaganda of “Atoms for Peace” and a “nuclear rush” for resource extraction, plant construction and profiteering (as the industry boomed) one terrifying truth that got ignored or suppressed is that nuclear power plants—independent of their bomb-making byproducts and weapons proliferation risks—are themselves security threats. A report by the Union of Concerned Scientists put it this way: “The 2011 accident at Fukushima was a wake-up call reminding the world of the vulnerability of nuclear power plants to natural disasters such as earthquakes and floods. However, nature is not the only potential threat to nuclear facilities. They are also inviting targets for sabotage and terrorist attacks. A successful attack on a nuclear plant could have devastating consequences, killing, sickening or displacing large numbers of residents in the area surrounding the plant, and causing extensive long-term environmental damage.”¹¹ In short, for a country to have a nuclear power plant is similar to setting up within the country’s own territory a target or a nuclear bomb—vulnerable to conventional or nuclear weapons. The Russian attack on the Zaporizhzhia nuclear power plant on March 4, 2022 in Ukraine, with 15 nuclear power plants, exposed this threat. The attack—luckily—did not hit the plant directly and was limited to causing fire on the outskirts of the plant and a Russian takeover of the plant. However, it sent a shockwave around the world and must remain not only a condemnation by the world but also a universal warning against deadly nuclear folly. Even more terrifying is the possibility of a chain reaction such an attack can trigger beyond a national border.

The inability to phase out coal, stop further entrenchment into the fossil fuel-nuclear path, and the regressive diversion into this dead-end path—however rationalized—raises a fundamental question: so deeply entrenched into the fossil fuel-nuclear path, are the “developed” countries even capable of transitioning out of it? If they are incapable today it does not mean they can never become capable, especially if they can expedite the transition at a much faster pace. But for now, such a capability seems questionable. Floods, droughts, forest fires, heatwaves, crop losses, tornados, hurricanes, blizzards, extreme weather, thawing permafrost, infectious diseases—climate change impacts on “developed” countries across Europe and North America continue to accelerate, some causing irreparable damages, which the countries seem to be ill-equipped, even incapable, to deal with. These impacts also incur enormous economic costs. Had these countries not been able to push most of these costs onto future generations—born and unborn, by all accounts they would have to be declared bankrupt—today. The compounding impact of these assaults is leading to a systems collapse, crippling infrastructures which hold societies together and, in an increasingly interdependent world, beyond national boundaries or economies. George Monbiot, environmental campaigner, journalist and author of *How Did We Get Into This Mess?: Politics, Equality, Nature* warns we are reaching a systems tipping point—and the collapse of our liveable planet.¹²

What are the ramifications of all these not only for the future of the “developed” countries themselves, but also the future of the “developing” countries—which, fortunately, are much less entrenched into the fossil fuel-nuclear path and are mostly located in regions that are richly endowed with renewable energy resources with practically untapped revolutionary potential—but, unfortunately, which are getting increasingly entrenched into the nonrenewable fossil fuel-nuclear path, often by aggressively pursuing the conventional and lopsided ideology of “Development”—economic development at any cost—thereby also turning into dumping grounds for fossil fuel-nuclear powered technologies that are being rejected around the world? As we strive to counter the threat and survive the catastrophic consequences of climate change—unforgiving, universal and borderless—from a holistic, ecological and global perspective, these questions must be addressed. And if we choose, for it is a choice—both as a country, as well as a global community—not to succumb to these challenges, then together we must—without any further entrenchment into the unsustainable and dead-end fossil fuel-nuclear path—expedite the transition to renewables much faster than ever. The revolutionary developments with

renewable energy technologies with an incredible range of options and designs that are both economically and environmentally responsible, along with numerous scientific studies based both on practical evidence and projections—among the latest being *100% Clean, Renewable Energy and Storage for Everything* by Mark Jacobson, professor of civil and environmental engineering at Stanford University and director of its Atmosphere/Energy Program—confirm that such a transition is indeed possible.¹³

The good news is such a transition is happening. Some of it shows on the surface, and much of it behind the scene. The global energy scenario is undergoing a transition toward renewables with growing opportunities and advantages: plummeting costs; record investments; innovation in manufacturing, efficiency, durability, designs, storage, transmission and applications; job creation; affordable financing; cultural demand; and global accessibility of renewable energy technologies. Cognizant that technologies impact the environment—from resource extraction through the end-of-life disposal—the good news is also that ecological considerations, guidelines and emerging policies are an integral part of technological innovation and utilization.¹⁴

Together, these developments are transforming the conventional fossil fuel-nuclear energy-based economic infrastructure toward a paradigm-shifting renewable energy-based infrastructure necessary for the transition to flourish and sustain. Simultaneously, an unprecedented coalescing of environmental, scientific, technological, economic, educational, academic, religious, political, legal, healthcare, business, governmental and cultural movements, engaging people from all walks of life and across all ages, is creating a synergy to fuel the revolution both with immediate results as well as the potential for a renewable energy future of economic prosperity, equity, environmental justice, safer and healthier humans, regenerated flora and fauna, environmental stewardship and peace. Several scientific analyses of the potential and projections— and the experience gained from implementation of renewable energy technologies over recent decades, driven by major advancements and breakthroughs—have prompted some countries such as Germany, Denmark, Sweden, Switzerland, Austria, Iceland, Norway, Portugal, Uruguay and Costa Rica to even set their goals of transitioning to 100% renewable energy within a foreseeable future. Other countries are following. The future will tell how well we succeed, but the choice of educating ourselves about the transition and expediting it with the utmost urgency through action is in the present. H. G. Wells put it well: “Human history becomes more and more a race between education and catastrophe.” We can either resign to fear and hopelessness, or act courageously on the revolutionary potential of renewable energy fueling a global, participatory and people powered movement—engaging people from all walks of life, of all ages, in every possible ways and across the world—which has already spread its wings—making it unstoppable. The choice is that clear. Today, that choice of action is also our greatest moral imperative—and hope.

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Change, Prevent Energy Wars, Revitalize the Economy and Transition to a Sustainable Future (Earthscan, UK, 2011), *The Untapped Energy Mine: The Revolutionary Scope of Renewable Energy to Fight Climate Change, Revitalize the Economy and Gain Energy Independence for Bangladesh* (Scholars Publishers, Bangladesh, 2010), *Photovoltaics: A Global Revolution and Its Scope for Bangladesh* (Chapbook, UBINIG: Centre for Development Alternative, Bangladesh, 1989), and *The Renewable Energy Transition: A Global Revolution, Climate Action & Bangladesh's Sustainable Energy Future* (Samhati Publications, Bangladesh, 2022). He received numerous awards, including Boston "Mayor's First Annual Green Award for Community Leadership in Energy and Climate Protection", a "Lifetime Achievement Award" by the U. S. Environmental Protection Agency, and the "Rachel Carson Award" by Massachusetts Interfaith Power & Light. www.sajedkamal.com