MESSAGES FROM...

DR. FATIH BIROL

Executive Director, International Energy Agency

The International Energy Agency is committed to a secure, sustainable and economically efficient energy system. We firmly believe in the importance of an "all fuels, all technologies" approach in tackling sustainability and energy security challenges. While global CO_2 emissions reached a historical high in 2018, the large majority of the 38 key technologies covered by our *Tracking Clean Energy Progress* report remain off track. Unfortunately this includes nuclear power as well.

Electricity is the cornerstone of clean energy transitions. Electricity generation today is the largest source of greenhouse gas emissions and a major contributor to local air pollution. Cleaning up electricity supply is an essential step towards decarbonising the energy system. Despite impressive growth in deployment of wind and solar PV, growth in renewables generation still significantly lags global electricity demand growth.

IEA analysis, including *Nuclear Power in a Clean Energy System* which was showcased at the 2019 Clean Energy Ministerial in Vancouver, shows that nuclear power—as a dispatchable, energy dense, low carbon source of electricity—can play a key role in transitions to a cleaner energy future.

Today's nuclear power technology, though mature, faces major challenges. Decade long project lead times, serious project management risks, and limited operational flexibility, mean that nuclear power plants are not always an obvious fit in a transforming energy system. Innovation is needed to overcome these limitations. New reactor designs offer the prospect of modular construction that will be inherently safer, easier to finance and less risky to build, with flexible operations to complement renewables in a cleaner electricity system. There is a clear need to accelerate innovation and deployment of these new designs through appropriate government—industry cooperation. The NICE Future initiative's work on nuclear innovation is both timely and complementary to that done by the IEA.

WILLIAM D. MAGWOOD IV

Director-General, Nuclear Energy Agency

Energy has been both the source and the result of human progress since the day we first learned to make and control fire. With charcoal, we learned to smelt and shape iron. With coal and oil, we launched the industrial revolution and brought light to city nights. We learned to harness the wind, the flow of rivers, and the light of the sun to generate electricity.

But perhaps the single most impressive technological achievement of our species began when Albert Einstein published his equations showing mass–energy equivalence: the famous $E=mc^2$. His theories ignited an international wave of research and advancement, the like of which had never been seen before.

Otto Hahn, Lise Meitner, and Fritz Strassmann discovered atomic fission and in a few short years, theory became science; science became technology; and technology became electricity—electricity and progress. Under responsible stewardship, nuclear energy and the technological advancements that came with it helped rebuild Europe, Japan, and Korea after the Second World War and were an important part of the economic expansion of Canada and the United States in the post-war period.

The world is now poised for a new era of research, discovery, and progress. Rather than rebuilding after war, we today face a far greater challenge: powering modern societies and providing a path for people in all countries to enjoy better, healthier lives—and doing so while preserving the environment.

As before, nuclear technology is poised to be part of a future with plentiful, clean, reliable energy for all the world's people. The innovations to bring this vision to reality are before us. The work for the future begins here and it begins now.

DR. STEVEN PINKER

Johnstone Family Professor of Psychology

Humanity is standing at a crossroads. Over the past few decades, global development has brought about a massive reduction in extreme poverty worldwide, together with reductions in other scourges such as disease, illiteracy, crime, and war. One driver of this progress has been the abundant and affordable energy that has powered hospitals, schools, transportation, and the rest of the infrastructure of modern society. Yet our survival as a prosperous global civilization is at risk precisely because of the unintended consequences of this cheap energy, namely the waste from burning fossil fuels, which currently provide over 85% of global primary energy.

For poor countries to become richer, they must have access to affordable energy—yet the world must transition to carbon-free energy technologies. World energy consumption will and should rise. The question is how: how can we decarbonize our energy systems rapidly while expanding power for the people?

While everyone loves renewable energy with hypothetical storage technologies, all too often the most abundant and scalable carbon-free energy source is overlooked and often stigmatized: nuclear power. Nuclear's tremendous energy density and dispatchability make it an ideal complement to variable renewables such as wind and solar, and experts who do the math agree that we'll need to use all the tools available to transition to 100% clean energy. Though today's nuclear technologies must be on the world's decarbonization road map, we needn't be shackled to the technologies of the 20th century indefinitely. Advances in the size, scale, safety, affordability, and sustainability of nuclear power are remarkable, and they promise nothing less than the means by which we can save the world.