The energy stored in fossil fuels comes from solar energy captured in plants millions of years ago. Fossil fuels have driven global economic development over the past century. Extraordinarily efficient in terms of energy conversion, fossil fuels are, however, finite resources — which means that they will run out at some stage. Resources, as they become scarce, also become more expensive.

Of more immediate concern is the fact that the extraction and burning of fossil fuels causes permanent harm to the environment. Atmospheric emissions from the burning of fossil fuels could lead to potentially catastrophic changes in the Earth’s climate. In other words, we are in desperate need of alternative sources of energy.

Nuclear power, a more recent addition to the energy mix, brings problems of its own. A nuclear accident (e.g. a core meltdown and/or reactor leak) at a power facility can spread lethal doses of radiation over a wide area. The two worst nuclear accidents in history took place in Chernobyl, Ukraine, in 1986; and Fukushima, Japan, in 2011. Apart from safety concerns, there is the serious problem of how and where to store nuclear waste. Even spent fuel rods stored underground remain dangerously radioactive for many years, leaving future generations to deal with the consequences. The need for robust safety measures and disposal procedures makes nuclear energy both politically controversial and expensive.

Renewable energy is generated from natural resources such as sunlight, wind, rain, tides and geothermal heat. These sources are inexhaustible, are generally less polluting than fossil fuels, and can be obtained virtually anywhere in the world. By using new forms of technology to harness and convert these resources into usable energy, it may one day be possible to power our cities from 100% renewable sources. However, this will require a huge amount of innovation, commitment and cooperation.

For the time being, we are faced with two separate challenges. The first involves large-scale, long-term planning and budgeting for converting fossil fuel–powered infrastructure into renewable energy infrastructure. The second challenge is to live our daily lives in ways that use existing energy infrastructure as efficiently as possible.