

Green: Sunny days ahead for clean energy

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Skies are clear and the forecast is good as sunshine and wind are set to steer India to pole position in power generation... Power! That's the catchword in the world today. Not money power, muscle power or political power but the most "powerful" power of all — the power to generate electricity and set things in motion. The kind of power a country uses determines its progress and advancement as a nation.

In this century, the use of "natural" power sources, like wind and solar energy, are lauded and considered beneficial to the environment as they pave the way for a world that is pollution-free.

As India sets out to increase its share of "renewable" energy in total power generation capacity to 30 per cent, there's an opportunity for us as a nation to achieve world leadership in solar and wind energy.

India has made a commitment to rapidly scale up its renewable energy targets by 2030. This throws open avenues for a worthy transition scenario, but awareness and right policies are the sine qua non to achieving the desired results.

Thanks to some unique advantages, the country will be able to make the most of this transitional journey

to clean energy without losing sight of avowed objectives. Some of these are: equity, sustainability and growth.

So we chalk out a robust roadmap for this transition: commissioning large renewable energy resources, replacing old coal thermal power plants with supercritical and even advanced ultra supercritical coal-fired power plants (AUSc) with a long-term economic advantage. And, the transition will provide an opportunity to generate 50 per cent surplus energy, which in turn can attract investments in production, 24x7 electricity for all, as well as ensure sustainable development.

Over the last 50-odd years, India has developed 700 Mw(e) Pressurised Heavy Water Reactors (PHWRs), which can be installed (to start with, 50 reactors at 8 sites), and to be completed in 10 years. Partnerships between the Department of Atomic Energy (DAE) and Industry will help reduce the cost further through advantages of scale, and time reduction through innovations. Increasing industry participation is an impetus required for these plants to be built in financial sharing mode, and operated by the Nuclear Power Corporation of India, necessitating policy and regulation on private participation of nuclear power.

Such a leap forward can indeed be achieved, resulting in the creation of job opportunities, skill sets, and the growth of high-tech large, medium, small and micro industries. This initiative can be a game changer for India with respect to investments, jobs, economic growth, reduction of local pollution and achieving India's Nationally Determined Contributions (INDC).

Kalpakkam reactor almost ready

Besides, the prototype fast breeder reactor (PFBR) of 500 Mw(e) capacity at Kalpakkam, Tamil Nadu is nearing criticality and is poised to deliver power to the nation in 2017. The capacity of FBRs (fast breeder reactors) with current design and experience can be enhanced from 500 MW(e) to 640 MW(e) through innovations and minimal modifications to enhance competitiveness of this sustainable energy system. Thus, we are on the threshold of consolidating leadership in FBR technology of high importance to India, China, France, Russia, Japan, USA, and other countries.

India, world leader in 'sodium cooled fast reactors'

Our second suggestion of AUSc demonstration plants relates to coal utilisation with high efficiency and low pollution levels. The Advanced Ultra Supercritical (AUSc) plant has been accepted by the Government of India. This technology derives strength from India being acknowledged as the world leader in this "holy grail" technology of Sodium Cooled Fast Reactors.

The third strategy is to adopt an emerging approach of Small Modular Reactors of 50-100 Mw capacity. India can produce 10 to 15 such plants every year in factory assembly mode with an installation time at site of below six months. The technology exists and needs to be packaged for civil power domain with adequate security, safety and regulatory provisions.

Next generation solar photovoltaics

The last approach, which could well catapult India to a leadership position worldwide, is next generation solar photovoltaics (technology to convert sunlight into electricity), energy efficiency revolution for agriculture water pumps based on learning from our unique success story in LED, large-scale recycling of aluminium, steel and concrete to realise savings in energy and avoid land filling spaces and making land-fill spaces available for more wealth generation and mitigating inequality initiatives of the Government of India.

— *Dr Baldev Raj, Director, National Institute of Advanced Studies, Bengaluru, and Dr P S Goel, former Secretary, Ministry of Earth Sciences, New Delhi.*