Visit KKNPP – an initiative for public understanding of nuclear power

The southernmost tip of mainland India, Kanyakumari, is a famed tourist spot that attracts countless visitors from across the world. Located just a few kilometres away from it is a tiny village called Kudankulam, which is now a site of scientific interest, mainly of nuclear science.

The Kudankulam Nuclear Power Project, popularly known as KKNPP, is one of the modern-day nuclear power plants that has one 1000 MW capacity nuclear power reactor in operation and another under commissioning. The units here are of VVERs (water–water energetic reactor) that belong to the pressurized water reactor (PWR) type developed by Russia. In India, these are the largest power-producing units of any kind. India's renowned nuclear scientist M. R. Srinivasan said, 'Kudankulam nuclear power plant belongs to the improved third generation reactors and has several new safety measures'. This view was echoed by the former President of India, A. P. J. Kalam after he paid a visit to Kudankulam. He said, 'KKNPP has more safety features than all the safest reactors in the world'.

Visiting this mammoth power generation unit is everyone's wish. Students want to understand how a nuclear power plant functions, while the general public wants know how safe it is. No wonder, people in the region throng Kudankulam.

KKNPP has gained national importance for two reasons. First the plant has largest capacity and huge potential. It is the only 1000 MW plant in India. At its full capacity unit-1 alone can supply electricity to more than 70 lakh homes. Second, there was prolonged protest that affected the progress of the plant in 2011. With speculative apprehensions that were further fuelled those who ideologically oppose nuclear energy, people around the plant ran a series of anti-nuclear campaigns. The work was stopped for nearly 8 months and the project was delayed by 18 months. This drew national and international attention.

It was then the nuclear community realized that the ongoing public communication about nuclear energy was not enough, they also understood that clearing the myths among the public regarding nuclear power and creating awareness were as essential as producing power. The engineers and scientists set out to address the concerns of the public on nuclear energy and KKNPP by kick-starting an extensive communication programme. A dedicated team comprising experts from various specialities was formulated and a structured strategy was put in place. Awareness lectures were organized in schools and colleges, nuclear energy campaigns were run in nearby places, meetings between scientists and the public were held, informative television advertisements and entertaining radios jingles were broadcast.

Also, to enlighten the people living around KKNPP on how a nuclear power plant functions, an exclusive programme 'visit KKNPP' was launched. This allowed the visitors to see what goes on inside the plant and get first-hand information about the state-of-the-art safety features.

'When we started the "visit KKNPP" initiative on 2 October 2012, we did not know that we will have such tremendous response. Now, about 100 to 150 visitors come inside KKNPP everyday and understand how a nuclear power plant functions', says R. S. Sundar, the Site Director of KKNPP.

About 1200 such visits have been organized in the last four years and over one lakh people have seen the plant, understood its functioning, and gained wisdom in their areas of interest. Among them, about 25,000 were commoners from the nearby places and the rest were students from educational institutions across Tamil Nadu and Kerala.

Requests to visit the Kudankulam plant are on the rise. Colleges from Chennai, about 700 km away from this coastal plant, want their students to pay a visit to this plant. 'At least two to three requests are received every day and our visitors schedule is completely full for next two months', says P. Pandaram, Member Secretary of the Public Awareness Committee, KKNPP.

In fact, KKNPP is cognizable beyond state borders. Occasionally, people from states other than Tamil Nadu and Kerala also visit this plant. 'Once a group of students from Jammu and Kashmir visited our plant', says Pandaram.

'Visit KKNPP' is a structured programme being organized by a team of professionals, including nuclear and communication experts. Visitors are received at the main gate of the plant and after the security formalities, they are taken to an auditorium where a professional briefs them about the basics of nuclear energy and the functioning of the Kudankulam reactors. Then a 'question and answer' session addresses doubts of the visitors about nuclear power by the subject experts. Later, the trainer leads them to a display hall and allows them to explore more about nuclear energy through scientific displays. A scaled-down model depicts the layout of the plant.

Having understood the basics of nuclear power generation, the visitors proceed to the plant. In this guided tour, led by a nuclear expert, they first enter a special area called operating island in which the nuclear power reactor, turbine and other associated facilities are located. The visitors wear helmets given by the guiding team according to the industrial safety regulations. They then go to the 80 m tall reactor building (unit-2 of KKNPP which is in the final stage of commissioning), a dome-shaped structure that majestically stands touching the sky.

Kudankulam is one of the least earthquake-prone zones of the country (zone 2 according to the earthquake-resistant design code of India) and no active faults are there in the vicinity. Neither any major earthquakes occurred here in the past. Nonetheless, severe earthquake-like situation was considered while designing, and the plant was built to withstand seismic activities. Secondly, the KKNPP is located as far as 1500 km from the tsunamigenic fault where usually tsunami originates. Even if one occurs, by the time the tsunami waves reach the Kudankulam shores it will lose its strength. Above all, the plant is positioned at a higher elevation – the ground floor of the reactor building is at 8.7 m above the mean sea level.

The 30-min tour inside the reactor building enlightens the visitors about the basics of nuclear power generation. The polar crane that rotates 360° and moves large size equipment to any direction with less human effort and time, the fuelling machine that can load and unload fuel bundles in the reactor, the deep reactor pressure vessel in which the actual fission process takes place, the hydrogen re-combiners – a latest safety feature,

and many other parts inside the reactor building take the visitors to the world of nuclear power generation.

On the way out, while passing through the containment structures they stop by at each wall – the 4 ft thick primary containment and the 2 ft thick secondary containment that are made up of reinforced pre-stressed concrete – and appreciate the degree of precision that has gone into the construction of the reactor.

They then visit the gigantic turbine floor where the country's first largest single-unit turbine and generator (unit-1 of KKNPP) are functioning. Next they see the 400-kV gas insulated switchgear that evacuates the power produced from KKNPP to the power grid from where actually it is distributed to the users. Finally, they visit the water intake structure that takes sea water into the plant for cooling purposes. The special fish protection system employed in this structure admits only water into the plant, thus sending the fishes back to the sea without harming them. This is another unique system first introduced in KKNPP.

The visitors come out of the plant with a novel experience and complete contentment. 'It doesn't look like an industry; the surroundings are so green while the inside is so neat,' a visitor expressed.

'Words alone can't make the people understand about such a complex technology. That's why the "visit KKNPP" initiative. The gates of KKNPP are open to people, learners and anyone who wishes to understand nuclear power generation', says R. S. Sawant, Chairman of KKNPP Public Awareness Committee.

With growing interests among scholars and the public, KKNPP has become a place of scientific importance in the region.

J. Devaprakash, Nuclear Training Centre, Kudankulam Nuclear Power Project, Kudankulam 627 106, India.
e-mail: devaprakash.jinadoss@gmail.com

MEETING REPORT

Science writing workshop*

The Current Science Association has introduced Science Writing Workshops for the benefit of students, teachers and researchers to improve their science writing skills. The first such workshop was held in Bengaluru. Inaugurating the workshop, P. Balaram (Molecular Biophysics Unit, IISc and former Editor of *Current Science*) gave a brief history of *Current Science*. The journal, founded in 1932 has completed 84 years. He mentioned that punctuality in publication has been a remarkable feature of the journal. Drawing from his experience of writing editorials for the journal, he mentioned that, despite difficulties, he tried to keep up to his commitment so that the journal comes out on the 10th and 25th of every month. This made him appreciate newspaper editorial staff who bring out the newspaper every day without a break. Though one may criticize the language or find spelling mistakes or even misreporting in newspapers, the quality of keeping to deadlines is truly admirable.

Balaram reminded participants of the importance of reading which should precede writing. Science writers need to read widely and go beyond known pastures and comfort zones. He mentioned titles of a few books that inspired him. Talking to people who work in diverse fields helps us understand the intricacies of even the most obscure scientific topics.

He explained that the first few pages of *Current Science* target general readers, providing news, correspondence, opinion pieces, etc. while the last part is made up of obituaries, book reviews and so on. The middle part targets readers from narrow disciplines. While research papers go through a rigorous peer-review process, the decisions about the sections that target all readers from diverse disciplines are made by the editors.

Replying to a question from a participant, Balaram mentioned that *Current Science* has a bias towards subjects that are specific to India, as our national, geological and biological diversity is not very important to other international journals. But fields such as bioinformatics, nanotechnology, etc. which do not have India-centric content, can be published in any international journal. They do accept such articles but the decision rests on the reviewers and the editorial board.

In the second session, Rohini Godbole (Centre for High Energy Physics, IISc) talked about women in science. She looked back on her career as a researcher in High Energy Particle Physics and was grateful that she did not experience much gender discrimination. Yet, as she was invited to fora that dealt with women in science, she became aware of such problems. She spelt out the issues and suggested solutions, some of which needed to be tackled by science writers, some that needed lobbying and advocacy. Cultural mindsets and stereotypes need to be addressed by writers, but the task takes time. Lobbying and advocacy for changes in rules and policies are such that they become gender neutral and may take less time, but effort is needed. Despite burdens of childbearing and rearing, women can also be good scientists. Any break in their scientific activity during that time, and entering into scientific research later, needs to be looked into.

She pointed out that while universities and colleges have a better sex ratio, research institutions have a wider gap. She suggested that a minor tweaking of the rule – to take the number of years worked as a scientist rather than age – might help women Ph D holders enter a scientific research career. Providing crèches in research institutions and hiring both husband and wife in the same institution if both are scientists, are steps that can be taken.

In my role as trainer, the present writer made participants aware of the number of fruitless hours spent in English classes. Without decent mastery over the

*A report on the 'Workshop on Science Writing', organized by the Current Science Association, and held on the premises of the Indian Academy of Sciences from 20 to 25 June 2016 in Bengaluru.