Small-scale hydropower can play an important role in providing energy access to remote areas in developing countries. They have also proven successful in other contexts.

The short lead time for developing and constructing these types of facilities can be an incentive for smaller-scale systems.

Connecting remote generating facilities to isolated mini-grids can bring electricity to communities where connection to a central grid is economically unfeasible.

However, when evaluating potential sites, it is important that an overall energy plan and watershed management scheme has been implemented. This approach is essential for ensuring that small-scale hydropower development is done sustainably, with appropriate consideration of environmental and social issues.

This session explored the rationale, benefits and challenges associated with small-scale energy systems.

The session explored the role small-scale energy systems can play in meeting a country’s energy needs in the context of an increasing global need for green energy. Participants also discussed the best basin-wide planning practices to deliver the greatest benefits.

**Key discussion points**

Anton-Louis Olivier pointed out the importance of developing small hydropower plants, particularly in countries where the electricity system is underdeveloped. He
suggested that small-scale systems are most likely to be implemented by local and regional independent power producers (IPPs).

Rana Singh noted that high energy cost has a negative impact on a country’s industrial development, and therefore on its overall economic growth.

Small-scale schemes have the potential to engage remote rural populations in their own economic activity.

He cited the example of smaller-scale hydropower in China, which represents an installed capacity equivalent to the sum of country’s four largest hydropower plants; demonstrating that smaller power plants can make an important contribution.

Singh explained that smaller schemes have the advantage of providing energy on the spot with the least energy lost in transmission. As such, small-scale schemes have the potential to engage remote rural populations in their own economic activity.

Frédéric Louis presented EDF’s approach for the development of smaller-scale hydropower projects. He pointed out the interest in developing project portfolios, rather than isolated projects, starting with the simplest projects with the lowest risks.
He also pointed that schemes with small reservoirs can be coupled with photovoltaics (PV), connected to the plant switchyard. This would allow 24-hour supply to remote communities and small industries.

Ghislain Nicolas presented GE’s experience with Kaplan’s low-head turbines and pointed to the danger of over-specification. He also mentioned the interest in digitisation, which facilitates smart intervention on the machinery.

Nicolas pointed out that small-scale hydropower makes an important contribution to sustainability, having become more flexible and with a wider operating range. It is therefore better suited to areas where the grid capacity or connection is weak. Small-scale hydropower can also help to reduce the cost of energy with proper involvement from technology companies to ensure a safer and more reliable investment.

Nuns at the Tulila hydropower plant were trained to operate the plant themselves.

Sister Yoela Luambano presented the unique experience of a community of Benedictine nuns from Tanzania, who developed, built and now operate the 5 MW Tulila hydropower plant, with funding from a Swiss donor. The project benefits from a high USD 0.26/kWh feed-in tariff with the Tanzanian state energy company, TANESCO. The nuns were trained to operate the plant themselves.

Alexandros Korkovelos, 2017 IHA Young Researcher of the Year, presented his initial findings on the technical assessment of small-scale hydropower (0.01-10 MW) in Sub-Saharan Africa using open-source geospatial datasets.

**Key outcomes**

Smaller scale hydropower developments are usually run-of-river projects. Due to their versatility, low investment costs and relatively low impact on the environment at a project level, they play an important role in producing sustainable, inexpensive energy.
Such plants are particularly important in rural or developing areas, where small-scale hydropower can represent a locally-available, reliable source of energy where larger generation is not feasible.

Standardised projects can significantly decrease investment costs and make smaller-scale systems more readily available.

There is growing recognition that site selection and evaluation of the most suitable project size is critical for successful hydropower development. There is a need for more integrated basin-level planning, in order to optimise not only energy systems, but also broader environmental, social, water and climate change outcomes.

A tendency to promote and subsidise smaller-scale hydropower up to specific capacity limit, rather than considering the most appropriate option for the site, can lead to poor decision-making and wasted potential.

The discussion highlighted that it was important that the international community be able to overcome limited the view of classifying hydropower into ‘big’ and ‘small’ or ‘good’ and ‘bad’. Instead, participants were invited to look at hydropower as a whole, selecting the best option for the specific site during the planning stage, and building it in the most sustainable way.

It is clear that smaller-scale systems have an important potential to fulfil, and that this technology is likely to become increasingly popular due to a growing need for energy in the developing world.

The Tulila hydropower project is an excellent example how rural electrification through small-scale systems can make a real difference. It is important to pay attention to smaller-scale energy systems and isolated grids, which can often be overshadowed by larger energy system issues.

What next?

Small-scale systems will be analysed through several angles in the upcoming two-year work programme of IHA: sustainability performance, clean energy systems, as well as finance and investment. A number of IHA members are already involved in the development of small hydropower systems and IHA will continue to connect members and partners, including governments, who are interested to collaborate on this topic.