Connecting the hydropower resource, especially large hydropower projects, to major load centres can be challenging, particularly where the load centre is located a significant distance away from the generation source.

Long-distance transmission infrastructure can facilitate the delivery of generation to load, while providing access to markets for the export of surplus electricity.

This session explored some of the challenges associated with linking a country’s hydropower capacity or available potential with domestic and international consumers and markets.

For developing countries, linking resources to major energy users can help attract much-needed investment for the development or expansion of hydropower.

When properly planned, that investment can benefit the local population by providing vital access to energy, driving local economic development, and creating jobs.

During this session, experts and decision-makers discussed cases where large hydropower plants were developed and proved successful in terms of business performance and social benefits, as a result of support from long-distance infrastructure.

Speakers

- Ralf Bucher, project manager, Lahmeyer International
- Mosad. M. Elmissiry, senior advisor to CEO, NEPAD
- Jiang Longhua, vice-president, China Electric Power Equipment & Technology Co.
- Simon Mueller, head of energy integration, International Energy Agency (IEA)
- Xiang Zejiang, vice-president, China Huaneng Group
- Zhang Qiping, chief engineer, State Grid Corporation of China (SGCC)
- Xie Kai, deputy general manager, GEIDCO Research Institute (moderator)
Key discussion points

Zhang Qiping provided an overview of the current UHV (ultra-high voltage transmission lines) and the significant advantages of UHV over conventional HV. He emphasised that UHV is unrivalled when it comes to developing large-scale energy bases and promoting the transformation from fossil fuels to clean energy systems.

There are over 50 million kilometres of electricity grids in place – enough to cover the distance from the Earth to Mars.

Simon Mueller gave examples from several regions around the world of where long-distance interconnections are providing a range of benefits to achieve sustainable, secure electricity systems. He pointed out that today there are over 50 million kilometres of electricity grids in place – enough to cover the distance from the Earth to Mars. However, less than 1 per cent of these line lengths are currently dedicated to transmitting power between country borders.

Xiang Zejiang provided illustrative examples of the challenges China is facing in terms of interconnecting various regions. For example, east and west China are unbalanced in terms of resources and economy, while most hydropower projects are located in remote areas of west China, far away from load centres.

He went on to discuss current technological solutions for optimising hydropower operations, better planning of transmission infrastructure and consideration of environmental issues.
Mosad. M. Elmissiry discussed the Programme for Infrastructure Development in Africa (PIDA). The programme promotes regional economic integration by building mutually-beneficial infrastructure and strengthening the ability of countries to trade and establish regional value chains. PIDA has set the ambitious target of achieving 60 per cent energy accessibility in Africa by 2040.

Jiang Longhua presented further case studies of projects in Asia and Africa that illustrate the role UHV transmission is playing in providing access to hydropower. He emphasised that interconnections are key to eliminating energy poverty, and explained that it is imperative that planning electricity consumption and transmission are coordinated.

PIDA has set the ambitious target of achieving 60 per cent energy accessibility in Africa by 2040.

Ralf Bucher provided further examples of grid interconnection for regional development; presenting Lahmeyer’s projects in Sudan and Ethiopia (Ethiopia-Kenya electricity highway).

Key outcomes
The panel discussion that followed the presentations focused on several sub-topics relating to grid interconnection to enable regional and economic development:

- Regional cooperation is needed to ensure that interconnected national grids function as one; to achieve this, operational frameworks (regulations/standards/software in load dispatch centres) need to be harmonised.
• Several European examples were discussed that show progress in coupling markets; connecting different spot markets, with short-term allocation of interconnection capacity.

• The sharing of balancing and operation reserves requires a greater degree of alignment; there are challenges that could be avoided in countries with less mature systems by agreeing on interoperability at an early stage.

• Regional development requires political determination and leadership, and trust between countries to reap the full benefits of interconnections.

• It is essential that local communities and customers are able to see the benefits of regional interconnections; this is necessary to maintain commitment to building required infrastructure.

What next?
Within its work programme, IHA plans to develop a set of recommendations for analysing transboundary project feasibility, with guidance on the role of hydropower in the development of regional power pools and bilateral interconnection agreements.

The recommendations will be proposed in the form of a white paper, which will be developed in cooperation with the knowledge network and expert group on regional interconnections, taking advantage of the expertise within IHA’s broad network.