



## SANCOLD 2025 hydropower course outline

### Day 1

Topic	Time	Overview of topic
Overview	08:00 – 08:30	Introduction to hydropower covering the following: <ul style="list-style-type: none"> <li>- Global and Africa potential</li> <li>- Hydropower basics (formula)</li> <li>- Hydropower plant typical components</li> <li>- Hydropower plant risks</li> </ul>
Using streamflow data in hydropower design	08:30 – 09:30	Sizing a plant based on streamflow hydrology <ul style="list-style-type: none"> <li>- Streamflow data and measurements</li> <li>- Flow duration curve</li> <li>- Dam water resource modelling</li> </ul>
Applying flood hydrology for hydropower	09:30 – 10:00	The importance of flood hydrology in hydropower design. <ul style="list-style-type: none"> <li>- Flood determination</li> <li>- Flood control design measures</li> </ul>
Coffee break	10:00 – 10:30	
Climate Change	10:30 – 11:00	Impact of climate change on hydropower plants <ul style="list-style-type: none"> <li>- Climate change impact studies examples</li> </ul>
Topography information	11:00 – 11:30	The importance of accurate topography surveys <ul style="list-style-type: none"> <li>- Topographic survey methods</li> <li>- Surveying challenges</li> <li>- Development of digital terrain models</li> </ul>
Layout types of HEPs	11:30 – 12:30	Different types of hydropower plant configurations: <ul style="list-style-type: none"> <li>- Low head run-of-river plants</li> <li>- Hydropower plants with storage</li> <li>- High head plants</li> </ul>

		<ul style="list-style-type: none"> <li>- Conduit hydropower plants</li> <li>- Cascaded hydropower plants</li> <li>- Pumped storage hydropower</li> </ul>
Lunch	12:30 – 13:30	
Mitigating environmental and social impacts	13:30 – 14:00	<p>Overview of the environmental and social risks and mitigations with hydropower plants</p> <ul style="list-style-type: none"> <li>- Environmental flow</li> <li>- Sediment control</li> <li>- Fish migrations</li> <li>- Resettlement</li> <li>- Social impacts</li> </ul>
Determining net head of HEP	14:00 – 15:00	<p>How is the net head determined for hydropower plants?</p> <ul style="list-style-type: none"> <li>- Head losses in a plant</li> <li>- 2D (HECRAS) and 3D (CFD) numerical modelling</li> </ul>
Coffee break	15:00 – 15:30	
Energy Yield calculation modelling	15:30 – 16:30	<p>How is energy yield calculated?</p> <ul style="list-style-type: none"> <li>- Calculation basics</li> <li>- Energy losses</li> <li>- Annual energy yield calculations</li> </ul>

**End of day 1**



## Day 2

<b>Topic</b>	<b>Time</b>	<b>Overview of topic</b>
Overview of electro-mechanical (EMEC) equipment	08:00 – 09:00	Introduction to EMEC equipment: <ul style="list-style-type: none"> <li>- Turbine selection</li> <li>- Generators</li> <li>- Auxiliary EMEC equipment</li> <li>- Turbine runaway and transient analysis</li> </ul>
Overview to electrical systems for HEPP	09:00 – 10:00	Introduction to electrical systems: <ul style="list-style-type: none"> <li>- Single line diagram</li> <li>- Digital and communication systems (network architecture)</li> <li>- Protection block diagram</li> <li>- Power evacuation</li> </ul>
Coffee break	10:00 – 10:30	
Overview of hydro-mechanical (HMEC) equipment for HEPP	10:30 – 11:00	Introduction to hydro-mechanical equipment <ul style="list-style-type: none"> <li>- Types of gates</li> <li>- Cranes</li> <li>- Trash management</li> </ul>
Overview of water conveyance structures – Part 1	11:00 - 12:00	Introduction to HEP water conveyance systems: <ul style="list-style-type: none"> <li>- Intakes</li> <li>- Desanders</li> <li>- Canals/low pressure pipelines</li> <li>- Penstocks</li> <li>- Bifurcations</li> <li>- Powerhouse</li> <li>- Tailrace</li> </ul>
Lunch	12:00 – 13:00	
Overview of water conveyance structures – Part 2	13:00 – 13:30	- Geotechnical investigations and assessments
Project implementation	13:30 – 14:00	Development of a hydropower project <ul style="list-style-type: none"> <li>- Project phases</li> <li>- Contract types</li> <li>- Risk management</li> </ul>
Financial viability	14:00 – 14:30	What influences the financial viability of a plant? <ul style="list-style-type: none"> <li>- Capital cost</li> <li>- Operation and maintenance cost</li> <li>- PPA</li> <li>- Annual energy yield</li> <li>- Pumped storage hydropower round trip efficiency</li> <li>- Ancillary services</li> </ul>
Fatal flaws and project failures	14:30 – 15:30	- Critical success factors <ul style="list-style-type: none"> <li>- Typical fatal flaws and severe/high risks</li> </ul>
Test/case study	15:30 – 16:30	

**End of day 2**