The 7th international vgbe Expert Event “Digitalisation in Hydropower” in cooperation with uniper will provide again a comprehensive overview of important topics regarding digitalisation in hydropower dealing mainly with the results and practical experiences of newly developed and implemented innovative digital measures, tested products and tools from the view of the operators. Topics of the lectures are:

- Asset Management
- Workforce Management
- Advanced Data Analytics
- Platform Solutions
- Digital Twins
- Inspection & Measurement
- Visualization (VR, AR, 3D GIS …)

Based on practical examples, you will gain insights into how to implement and apply digital solutions successfully.

**EVENT VENUES**

First day: 15 Oct. 2024 (presentations in the forum)
Riessersee Hotel
Riess 5 I 82467 I Garmisch-Partenkirchen, Germany
www.riessersee-hotel.de

Second day: 16 Oct. 2024 (site visit with stations)
Storage hydropower plant Walchensee
Altjoch 21, 82431
Kochel am See, Germany

Research Institute of TUM at Obernach
Obernach 15, 82432
Walchensee, Germany

**CONFERENCE LANGUAGE AND OFFICE**

The conference language is English and the office will be open from 09.00 a.m.

**EVENING EVENT**

On Tuesday, 15 October 2024, starting at 7:30 p.m., all conference participants are invited to a get-together at the event venue.

**CONFERENCE TICKET**

<table>
<thead>
<tr>
<th>Participation (for 1st and 2nd day)</th>
<th>Single ticket (1 participant)</th>
<th>Package ticket (3 participants)</th>
</tr>
</thead>
<tbody>
<tr>
<td>vgbe non-members</td>
<td>€ 1,100.--</td>
<td>€ 2,900.--</td>
</tr>
<tr>
<td>vgbe members</td>
<td>€ 850.--</td>
<td>€ 2,200.--</td>
</tr>
<tr>
<td>Universities, Authorities</td>
<td>€ 400.--</td>
<td>€ 1,000.--</td>
</tr>
</tbody>
</table>

The participation fees include the conference presentations (after the conference), coffee breaks, lunch, participation in the evening dinner event and bus shuttle on the 2nd day. All participants of the conference are requested to register online. It is not possible to accept credit cards or currency on-site at the conference office.

**EXHIBITION OPPORTUNITY**

Promote your company activities directly in the conference room on 15 October 2024 by booking our exhibition package (€ 450.- plus VAT, 1 roll-up + own brochure display).

**ONLINE REGISTRATION**

https://register.vgbe.energy/30624/

vgbe energy e.V.
Deilbachtal 173
45257 Essen, Germany
Ms. Akalya Theivendran
t +49 201 8128-230
e vgbe-digi-hpp@vgbe.energy

**PRIVACY POLICY & GENERAL TERMS**

Detailed information on data protection as well as the general terms and conditions can be found here.
Enhanced digital controls can boost hydropower performance, cut costs, and optimize asset management. These systems aid decision-making and enhance operational efficiency, which is crucial as many hydropower plants require refurbishment and modernization in the coming years. Based on practical examples you will gain insights into how digital solutions are already successfully implemented and applied.

In this context and as a valuable complement to the lectures, on October 16th all participants are invited to visit the storage hydropower plant at Walchensee where uniper will present implemented and currently tested digitalisation techniques as well as the Research Institute of the Technical University of Munich at Obernach.

The imposing storage hydropower station is considered the cradle of industrial power generation in Bavaria. Completed in 1924, it was one of the largest hydroelectric power plants in the world at the time with an output of 124 MW. Down the road in Obernach, the Institute of Hydraulic Engineering and Water Resources at TUM carries out numerous research projects at its satellite Research Institute.

The Expert Event will bring together experts from leading operator and manufacturer companies as well as related stakeholders to discuss challenges and opportunities for the operation of hydropower fleets accruing from digital transformation.

Information about our Hydropower Industry Guide 2022/23
Get an overview of the leading companies in the hydropower industry and find out about the many topic-specific offers of our media partners.
Free download here: https://www.vgbe.energy/en/hydropower
Site visit and demonstration of uniper’s hydropower plant at Walchensee

On the second day of the Expert Event, uniper, Technical University of Munich and partners will present digital solutions in the hydropower plant Walchensee. Participants can take part in a guided tour, and experts will be on hand to answer questions and be available for further in-depth technical discussions.

*Please note: Sturdy shoes are required for the plant visit!*

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**CEST**

**WEDNESDAY, 16 OCTOBER 2024**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:30</td>
<td>Departure via bus shuttle to uniper’s Walchensee hydropower plant and to TUM’s Research Institute Obernach</td>
</tr>
<tr>
<td>08:30</td>
<td>Welcome and grouping of participants for visit of stations Guided visit to the demonstration stations</td>
</tr>
<tr>
<td>11:00</td>
<td>Networking Snacks, soft drinks, coffee</td>
</tr>
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<td>15:00</td>
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</tr>
<tr>
<td>15:00 - 15:40</td>
<td>Departure by bus shuttle to S7 Train Station Wolfratshausen / Munich with public connection to the main railway station and airport of Munich</td>
</tr>
</tbody>
</table>

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**Demonstration stations and the presenters**

<table>
<thead>
<tr>
<th>Station</th>
<th>Title</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td>Station 1</td>
<td>uniper’s Hydro App-World Info Basis Mobile</td>
<td>Live Demo and User Story (operational) Presented by uniper GER</td>
</tr>
<tr>
<td>Station 2</td>
<td>uniper’s Hydro App-World Digital Workforce Management</td>
<td>Live Demo and User Story (operational) Presented by uniper GER</td>
</tr>
<tr>
<td>Station 3</td>
<td>uniper’s Hydro App-World Dam Control App</td>
<td>Live Demo and User Story (operational) Presented by uniper GER</td>
</tr>
<tr>
<td>Station 4</td>
<td>Advanced Analytics Seeq Tool - Dynamic Data Compilation</td>
<td>Live Demo and User Story (POC) Presented by uniper SWE</td>
</tr>
<tr>
<td>Station 5</td>
<td>Advanced Analytics Condition Monitoring via Advanced Analytics</td>
<td>Live Demo and User Story (operational) Presented by uniper COODE</td>
</tr>
<tr>
<td>Station 6</td>
<td>Advanced Analytics Condition Evaluation Platform</td>
<td>Live Demo and User Story (POC) Presented by uniper COODE and GER</td>
</tr>
<tr>
<td>Station 7</td>
<td>Advanced Analytics Celonis Process Mining in Operations</td>
<td>Live Demo and User Story (operational) Presented by uniper GER</td>
</tr>
<tr>
<td>Station 8</td>
<td>Business Intelligence &amp; AI GenAI: First Applications in Operation</td>
<td>Live Demo and User Story (POC) Presented by uniper COODE and GER</td>
</tr>
<tr>
<td>Station 9</td>
<td>Business Intelligence &amp; AI AI for Fish Detection</td>
<td>Live Demo and User Story (operational) Presented by uniper GER</td>
</tr>
<tr>
<td>Station 10</td>
<td>Business Intelligence &amp; AI Insights into uniper’s Data, Cloud- &amp; AI-Structures</td>
<td>User Story (operational) Presented by uniper COODE</td>
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Site visit and demonstration of TUM’s Research Institute Obernach

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</table>
| **Station 1** Data Modelling  
**Digital Twin for Operational Training**  
Live Demo and User Story (Research)  
Presented by uniper GER and Oceanmaps |
| **Station 2** Data Modelling  
**Advanced Flood Simulator**  
Live Demo and User Story (Research)  
Presented by uniper GER |
| **Station 3** Data Modelling  
**Hydraulic Modelling (TBD)**  
Live Demo and User Story (Research)  
Presented by TU Kassel |
| **Station 4** Data Modelling  
**Hydraulic Test Model – Optimisation of Water Intake**  
Live Demo and User Story (Research)  
Presented by Research Institute Obernach |
| **Station 5** Advanced Analytics  
**Hydraulic Test Model - Optimisation of Weir**  
Live Demo and User Story (Research)  
Presented by Research Institute Obernach |

<table>
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</table>
| **Station 6** Asset-based Digitalisation  
**Digital Dam Surveillance Germany**  
Live Demo and User Story (operational)  
Presented by uniper GER |
| **Station 7** Asset-based Digitalisation  
**Dam Safety – Monitoring and Surveillance 2.0**  
Live Demo and User Story (operational)  
Presented by uniper SWE |
| **Station 8** Asset-based Digitalisation  
**State of the Art Drone Inspections**  
Live Demo and User Story (operational)  
Presented by uniper SWE and Uwtech |
| **Station 9** Asset-based Digitalisation  
**Sensor Fish - Advanced Fish Monitoring**  
User Story (operational)  
Presented by uniper GER and TU Munich |
| **Station 10** Asset-based Digitalisation  
**Process networks (OT) for scale-up of Digitalisation**  
Live Demo and User Story (operational)  
Presented by uniper COODE and GER |
**PRESENTATION CONTENT FROM THE SPEAKERS**

### Welcome and opening of the vgbe/uniper Expert Event

**Speaker:** Dr. Klaus Engels, Director Hydropower Germany, Uniper Kraftwerke GmbH

The rapid evolution of digital technologies presents both opportunities and challenges alike. As we embrace this digital transformation, the landscape of the hydropower industry continually shifts, offering opportunities to enhance efficiency and safety for our workforce. However, this progress also introduces complexities that demand our attention. Emerging technologies such as artificial intelligence or virtual realities are reshaping the operation and maintenance of hydropower plants. At Uniper, we embark on this journey, striving to find the optimal balance between challenges and opportunities to ensure the sustainable future of our business. Therefore, the continuous adaptation of our workforce to new capabilities, as well as the exchange between all stakeholders in the hydropower community, are crucial elements in successfully implementing the right solutions and avoiding missteps on our ascent up the digital staircase.

### Current activities of vgbe energy in digitalisation in hydropower

**Speaker:** Dr. Mario Bachhiesl, Head of Department Renewables, vgbe energy e.V.

Within the vgbe hydropower community, a comprehensive experience transfer takes place in several committees. Profound experiences on topics regarding digitalisation including the latest findings and examples of implementation are part of the discussion in vgbe’s Working Group Hydro “Digitalisation”. Based on practical examples members report on how digital solutions have been successfully implemented and how are the practical experiences in operation. Getting information from the view of operators with practical experiences offers valuable insights for your own implementation strategies for digital measures.

### Session 1

#### Fortum’s journey towards value drive operations

**Speaker:** Alessandro Ferraris, Manager of Technology Development, Fortum Heat and Power Oy

Fortum Hydro Generation’s journey in digitalisation of the hydropower fleet: from scheduled maintenance to real-time supervision of the assets. Successes and challenges with data collection. Overview of areas where digitalisation is supporting today our operations, walkthrough of use-cases of operation monitoring and failure mode detection.

#### A Digital Twin for Alpiq’s hydropower waterways safety

**Speaker:** Bernard Vallée, Head of Projects and Innovation, Alpiq; Dr. Christophe Nicolet, Managing Director, Power Vision Engineering S.à.r.l.

Hydropower plants play an important role in electrical power systems stability due to their operational flexibility and their ability to provide ancillary services leading to frequent starts and stops and power variations. As a result, waterways of hydropower plants are subject to increased number of hydraulic transient phenomena, while the installations are aging and subject to more frequent anomalies. The presentation will introduce the physics-based HydroClone digital twin solution deployed at Alpiq’s major HPP/PSPP to monitor hydraulic transients. Key results related to the 1,200 MW Cleuson-Dixence HPP and to the 900 MW Nant de Drance PSPP will illustrate HydroClone capabilities.
EDP experience in advancing hydro flexibility to be relevant in future electrical system

Speaker: Pedro Diogo Pinto, Hydro Assets Engineering and Optimization, EDP - Gestão da Produção de Energia S.A.

Over the last years, EDP has been actively engaged in various initiatives aimed at advancing hydro flexibility. Among these activities, one of the most notable was the XFLEX Hydro consortium, where EDP played a significant role by contributing with three demonstrators. Through this participation, EDP leveraged the knowledge and technology developed within the consortium to enhance the flexibility of its power plants. These efforts underscore EDP’s commitment to staying at the forefront of innovation in the energy sector and also the effort the keep hydropower relevant in the future electrical system. Here, advanced operation modes like hydraulic short circuit, range extension, fast frequency services, variable speed, among others, will be discussed.

Session 2

Halving maintenance downtime at Hafslund Eco by advanced analytics in Visplore

Speaker: Dr. Harald Piringer, Managing Director, Visplore GmbH

This lecture presents a case study on how advanced graphical analytics empowered maintenance engineers from Hafslund Eco, Norway, for early anomaly detection and decisionmaking. Engineers noticed abnormal temperature increases in a bearing of a Francis turbine. An analysis of 3 years of data in the graphical analytics software Visplore revealed anomalies during the startups and confirmed that a technical issue, not external conditions, caused the problem. Based on these insights, planned maintenance reduced downtime by 50%, saving approximately EUR 1.1 million in avoided revenue loss. Lessons learned can be applied to other locations for early anomaly detection.

RELY - Reliable reinforcement learning for flexible energy systems

Speaker: Carlotta Tuberof, University Assistant Senior Engineer, Technical University of Vienna; Hugo Gotsch, Team Leader Engineering, TIVAG – Tiroler Wasserkraft AG

Due to the increasing complexity, the growing number of players in the energy market and the resulting need for increased flexibility, machine learning algorithms will play a significant role in decision making and coordination of load balancing in the energy system of the future. In this lecture, we present first insights into our research project RELY. To enable the use of machine learning for pumped hydro storage systems despite safety concerns, the goal of RELY is to develop and test a method in which the reliability, robustness, and safety of the artificial intelligence’s actions increase highly. Within the project, a reinforcement learning algorithm is being pretrained on a virtual representation of a reversible pump turbine and then transferred to a lab-scale model machine using a digital twin platform.
Harnessing high-resolution vibration data to improve hydraulic machinery operation

Speaker: **Maximilian Titzschkau**, Expert Data Science/Hydromechanics, Kraftwerke Oberhashi AG; **Dr. Thomas Steinbacher**, Technical Sales, IFTA GmbH

KWO and IFTA report on their joint efforts to implement and harness high-resolution vibration data measurement and 24/7 recording systems at four hydraulic machines. This project has been motivated by the essential role of vibration data in optimizing machine operation. Although 27 KWO machines were equipped with state-of-the-art vibration protection systems, half of them was not accessible at all. For the remaining half, only sparse indicators, such as maximum vibration levels, were accessible, which did not allow for deeper analyses. This talk reports on the practical experiences of equipping all four KWO machines with IFTA Argus systems combining continuous high-resolution monitoring and proven machine protection.

This use case is interesting for operators of hydropower plants who face similar challenges due to limited vibration data, but still wish to start with data-driven optimization of machine operation.

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Session 3

Digital transformation journey with Senkron at Enerjisa Uretim

Speaker: **Serkan Özek**, Hydro Power Plant Maintenance Manager, Enerjisa Uretim; **Salih Özgür**, Central Operation, Control, Monitoring and Development Leader, Enerjisa Uretim

Enerjisa Uretim is the leading generator in Turkey, with a total capacity of about 3,748 megawatts, spread across various types of power plants in different locations of the country. These include natural gas (43%), hydroelectric (37%), domestic lignite (12%), wind and solar (8%) plants. With our Senkron Remote Operation Control Room in Istanbul, we monitor our operations 24/7 without interruption and manage them remotely. Our digital journey started in 2018, with a data driven approach for operation and maintenance activities. We created our own digital solutions including robotics, cybersecurity and digital twin with AI. We still keep exploring new ways and technologies every day.

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More green renewable energy with digitalization

Speaker: **Håvard Grøtan Nilsen**, Digitalization Lead, NTE Energi

In NTE we started our digitalization journey in 2020, and have since then worked focused on reducing downtime and increasing predictability in maintenance on our hydroelectric power plants through digital solutions. In this lecture we will explain our approach to distributing data insights, dataassisted decision making and predictive maintenance and of course, the results we have seen so far. By sharing our experiences with other producers both in Norway and abroad, we believe this will enable increased availability of green renewable energy.

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Digital inspection management (Smart check) for improved Asset Management

Speaker: **Marco Cappicciola**, O&M Hydroelectric, ENEL Green Power

Integrated and digital asset management plays a crucial role in enhancing the efficiency of maintenance and risk assessment processes. The upcoming presentation will delve into the interconnection between maintenance strategies such as preventive, predictive, and prescriptive approaches. Additionally, it will highlight the significance of failure mode classification as a pivotal aspect in asset management. Furthermore, the presentation will underscore the importance of inspections within the framework of Reliability Centered Maintenance, particularly emphasizing the integration of digitalized inspection outcomes through programs like Smart Check for comprehensive analysis.
Outlook for the site visits

Outlook for the visit to the TUM research centre in Obernach and the Walchensee storage power plant

Speaker: Dr. Christian Kunze, Head of Hydro Development & Steering, Uniper Hydro Power

On the second day of the conference, we extend a warm invitation for you to explore and experience the digital solutions presented by Uniper and our esteemed partners. Spanning across 20 stations, our showcase will encompass a diverse array of solutions, including mobile apps, data modeling, advanced analytics, asset-based digitalization, and business intelligence & AI. You’ll have the opportunity to tap into the expertise of our Uniper Hydropower specialists in Germany and Sweden, as well as our central Uniper Digitalization unit, alongside our valued partners. We are particularly excited to welcome our research partners, notably the TUM Research Center in Obernach, renowned for its unique real-world test facilities that often provide crucial data for enabling advanced digital modeling.

We eagerly anticipate your presence and engagement at this event.