



HYDRO

RENEWABLE ENERGY SOLUTIONS FOR HYDRO

COMPANY PRESENTATION

APRIL 2023

ANDRITZ

ENGINEERED SUCCESS

MULTIPLE ROLES OF HYDROPOWER



ELECTRICITY

transportation, heat,
power & light

WATER STORAGE



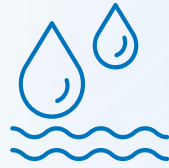
flood mitigation, irrigation,
water supply & navigation



ENERGY STORAGE

peak load generation,
energy balancing & grid stability

POSSIBILITIES AND OPPORTUNITIES



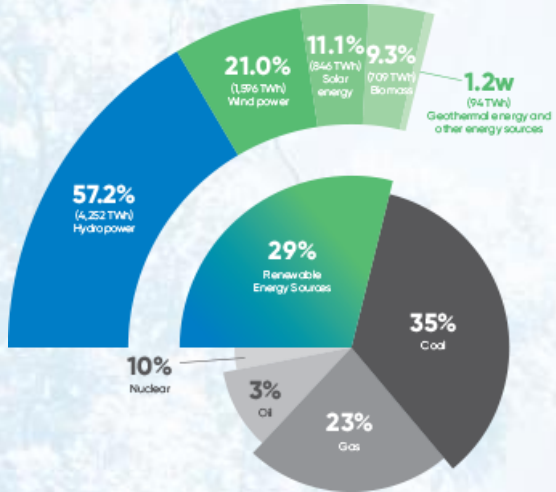
Hydropower generation

~4,278 TWh/year

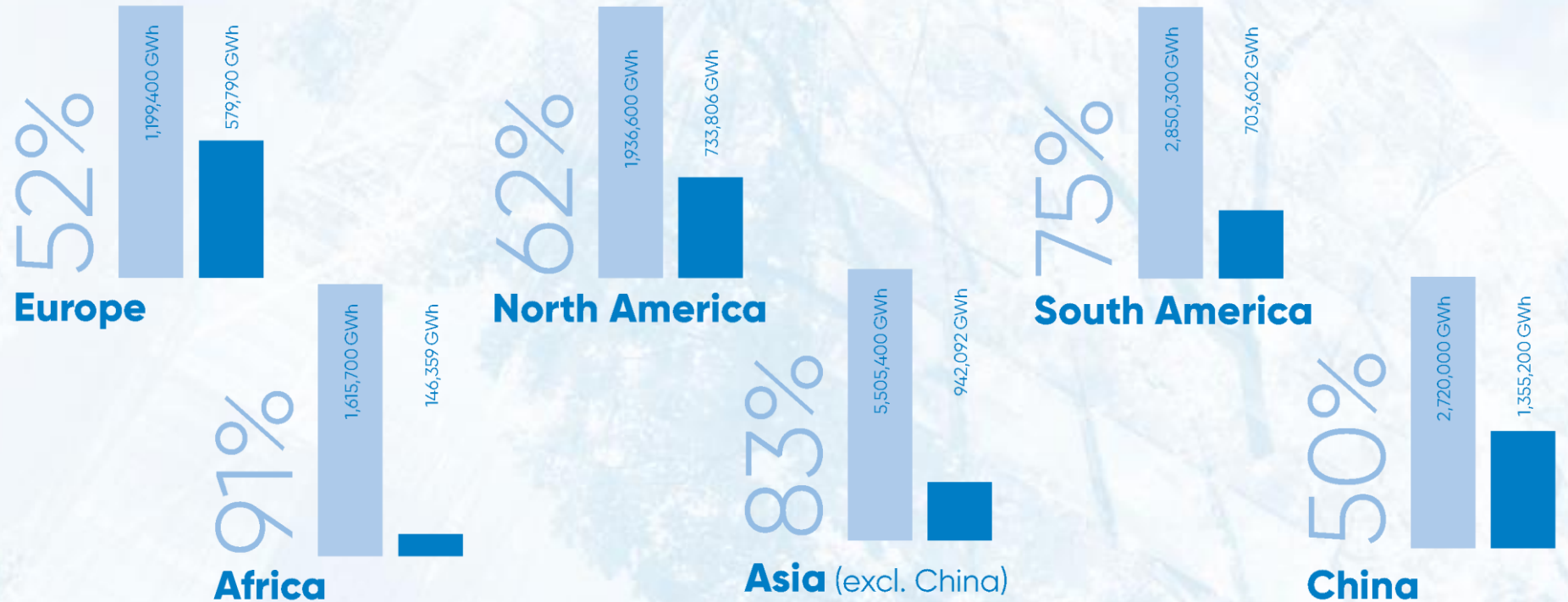


Technically feasible potential

~15,800 TWh/year



Source:
IEA World Energy Outlook 2021



Technically feasible hydropower potential (GWh/year) Power generation from hydropower (GWh/year)

POWER GENERATION FROM HYDROPOWER

SCENARIO 2050



1 Pumped Storage

2 Run-off-River

3 Small Hydropower

4 Low-head

5 Very low-head

6 Hybrid (Hydro and Wind)

7 Tidal current array

8 Hybrid (Hydro and Solar)



WORLD MARKET LEADER for hydraulic power generation

YOUR

leading in **SERVICE & REHABILITATION**

>180 YEARS of turbine experience

GLOBAL

>125 YEARS electrical equipment experience

>25 GW total installed capacity of Compact Hydro units

>31,900 turbines (>471,000 MW) installed

PARTNER

Complete range up to more than **800 MW**



FROM THE HISTORIC PIONEERS OF TECHNOLOGY TO A MODERN MARKET LEADER

THE PIONEERS CREATED THE FOUNDATION

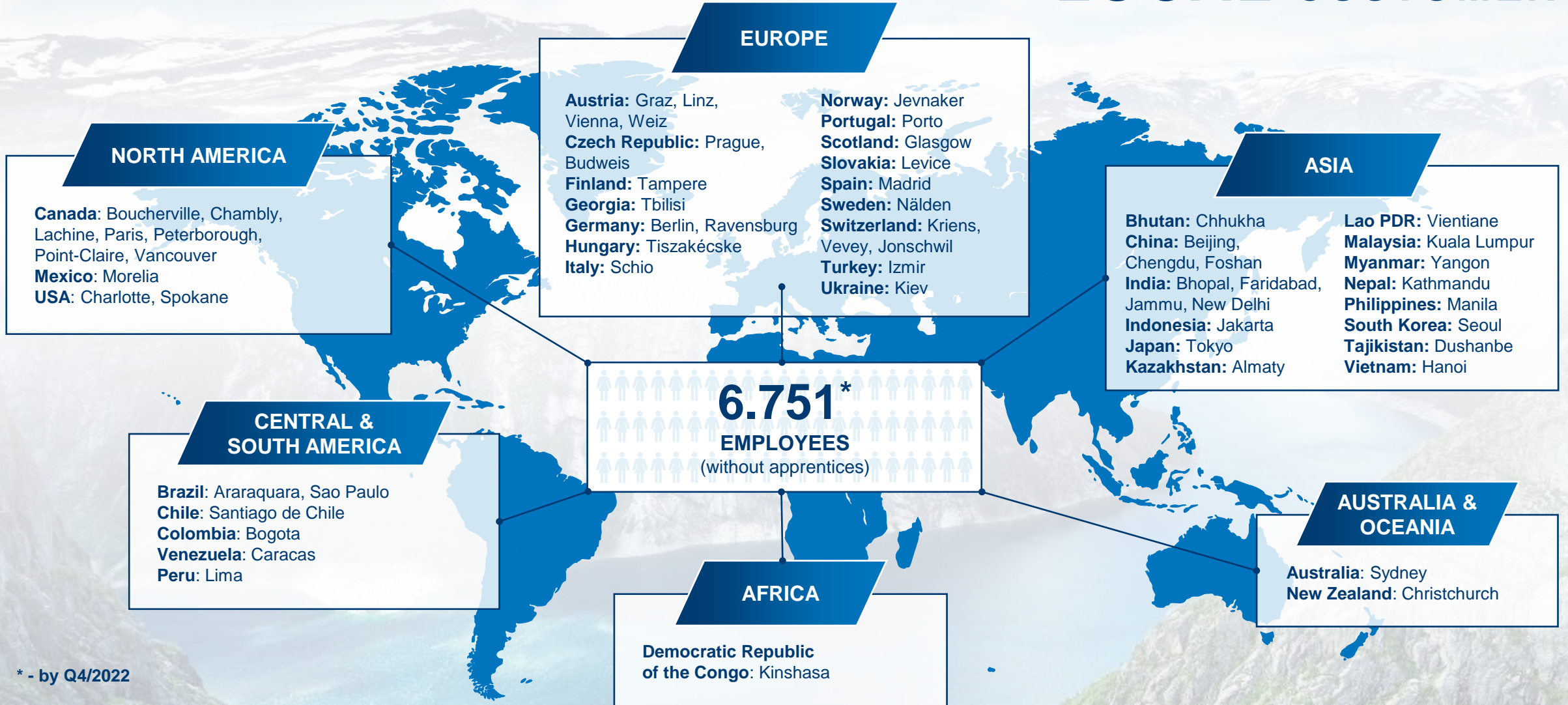
OUR PIONEERS (ALPHABETICAL ORDER):

AFI ANDRITZ Andritz VA TECH HYDRO Ateliers des Charmilles
Ateliers de Constructions Mécaniques de Vevey (ACMV) Baldwin-Lima-Hamilton
Bell Bouvier Boving C.E.G.B. Dominion Engineering ELIN English Electric
Escher Wyss Finnshyttan GE Hydro GE Hydro Inepar General Electric
Hammerfest Strom Hemi Controls HMI Construction Hydro Vevey
I.P.Morris KAMEWA KMW Kvaerner Møller NOHAB Pelton Water Wheel
Pichlerwerke Precision Machines Ritz Pumpenfabrik SAT Sulzer Hydro
Tampella VA TECH HYDRO VOEST Voest MCE Waplan

- 2021** Largest rehabilitation project (Mexico)
- 2021** Co-located energy plant (Kidston, Australia; PSP, Solar, Wind)
- 2016** First commercial tidal current array unit (Meygen, Scotland)
- 2012** World largest Hydromatrix plant (Ashta, Albania)
- 2011** World largest Bulb turbine (Jirau and St. Antonio, Brazil)
- 2008** World largest tidal power plant (Sihwa, South Korea)
- 2008** 770 MW Francis turbine (Simon Bolivar, Venezuela)
- 2002** First var speed motor-generator outside Japan (Goldisthal, Germany)
- 1991** World largest manifold (Tarbela, Pakistan; World Record)
- 1896** First large commercial hydropower plant
- 1839** First turbine supplied
- 1805** Foundation of Escher Wyss & Cie, Switzerland

GLOBAL PRESENCE

CLOSE TO OUR LOCAL CUSTOMER



* - by Q4/2022

FACTS AND FIGURES



LARGE HYDRO

SERVICE & REHAB

SMALL HYDRO

Figures
2022(*)

Order intake
1,956.6 MEUR

Order backlog
3,165.5 MEUR

Revenue
1,538.0 MEUR

EBITA
114.7 MEUR

(*) – incl. pumps division

FROM WATER TO WIRE



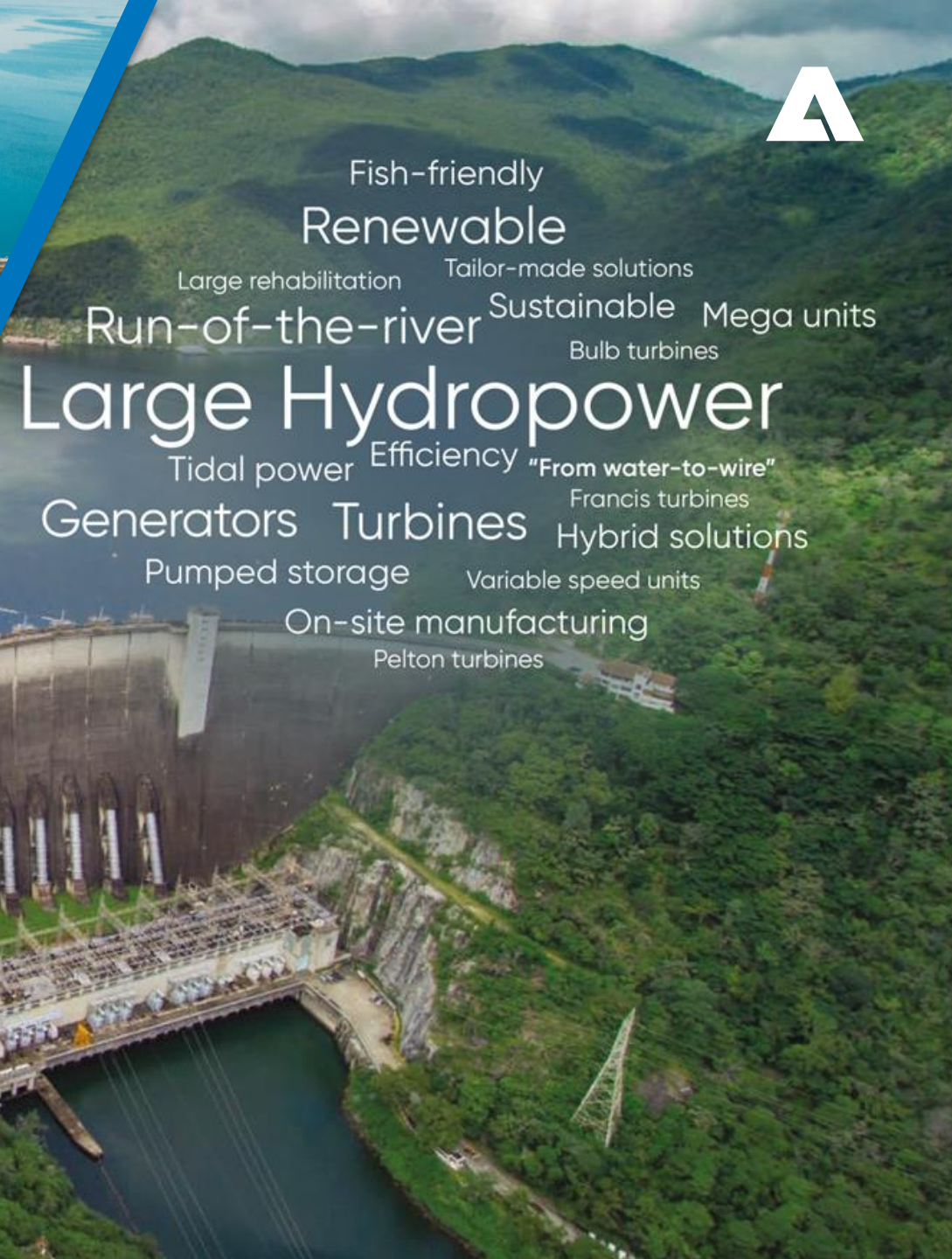
-
- 1 Gates
 - 2 Penstocks
 - 3 Inlet valve
 - 4 Turbine
 - 5 Generator
 - 6 Automation, control and protection
 - 7 Medium voltage switchgear
 - 8 Power transformer
 - 9 Large Battery Storage
 - 10 High voltage switchgear
 - 11 Transmission line

FROM WATER TO WIRE



We support the
WHOLE LIFE CYCLE
of a power plant!

- Design
- Model test
- Manufacturing
- Installation
- Commissioning
- Training
- Spare part Service
- Maintenance
- Operation



Fish-friendly
Renewable

Large rehabilitation Tailor-made solutions
Run-of-the-river Sustainable Mega units
Bulb turbines

Large Hydropower

Tidal power Efficiency "From water-to-wire"
Generators Turbines Francis turbines
Hybrid solutions

Pumped storage Variable speed units
On-site manufacturing
Pelton turbines

LARGE HYDRO

- Turnkey electro-mechanical equipment
- Rehabilitations and Upgrades
- New hydropower plants

SMALL HYDRO

Turnkey solutions (< 30 MW / unit)

Modular system design

Off-grid design



Global supplier
Compact Hydro
Short delivery
Mechanical auxiliaries
Quality
Automation
Clean
Governor
Upgrade
Customer
Ecological
Kaplan
Service
Low investment
Worldwide
Pre-assembled
Economical
Electrical equipment
Low environmental impact
Efficiency
Francis
Pelton
Growing market
Modernization
Single source
Modular design
Mini Compact Hydro
Sustainable
Optimum solution
Generator
Renewable
"From water-to-wire"
Limited interfaces
Leader





Modernization
 Upgrade and Uprate
 Operation & Maintenance

SERVICE & REHAB



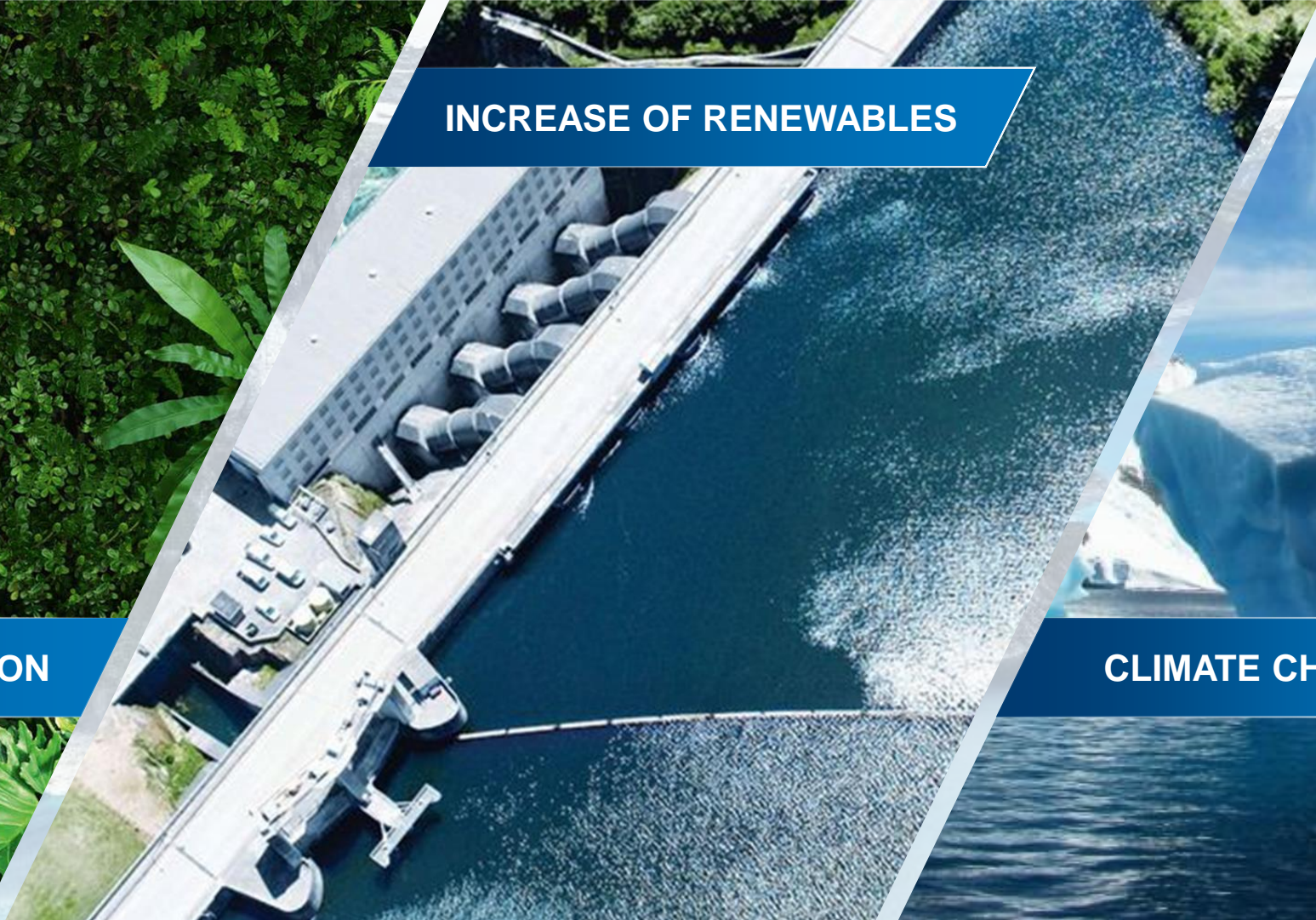
Service
 "From water-to-wire"
 Tailor-made solutions Electro-mechanical
 Value Operation and Maintenance
 Renewable Rehabilitation
 Modernization Spare parts 24 / 7
 Digitalization Global Training Overhaul Repair
 Life cycle analysis Upgrading Flexibility
 Competence Modernization Three-Phase-Approach
 Diagnosis Innovation Hydro-mechanical
 Improved performance

ISO 55001:2014 // ISO 27000: 2013

THE GLOBAL MEGA TRENDS



ENERGY TRANSITION



INCREASE OF RENEWABLES

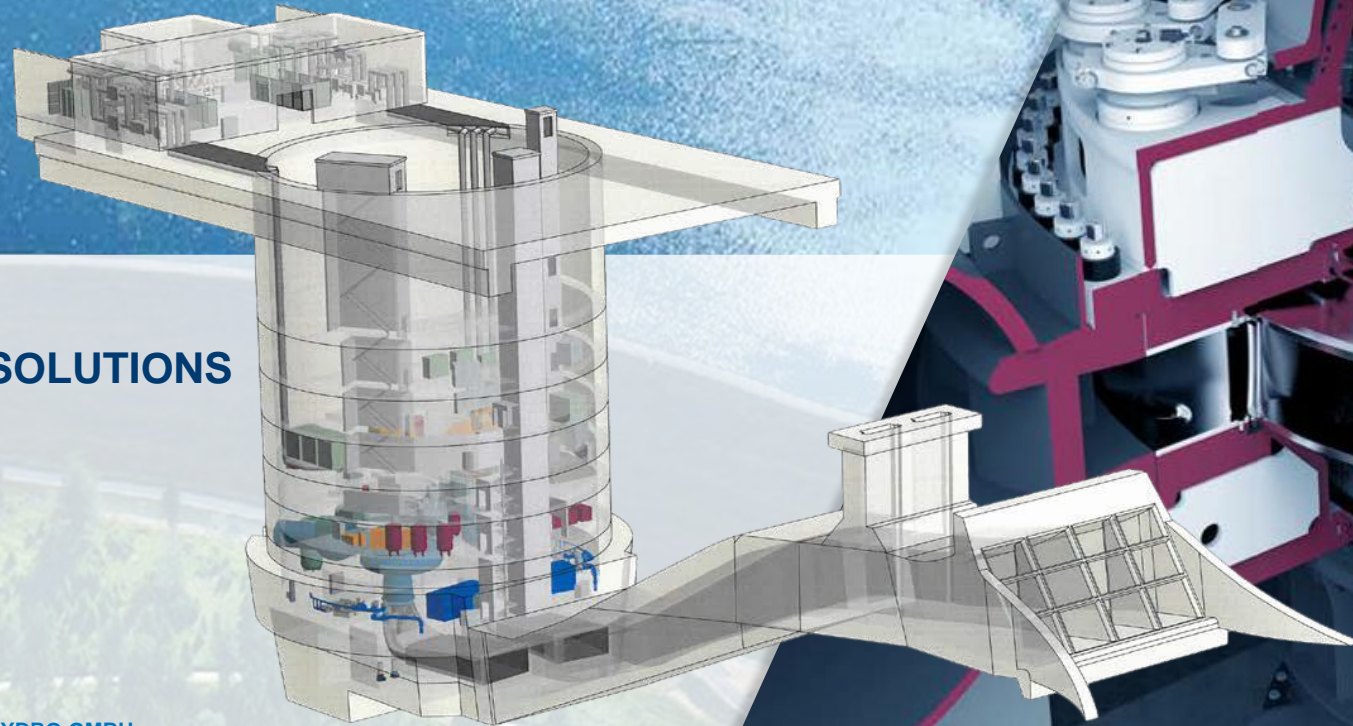


CLIMATE CHANGE

RENEWABLE SOLUTION: PUMPED STORAGE

BALANCES VOLATILITY OF
ENERGY DEMAND

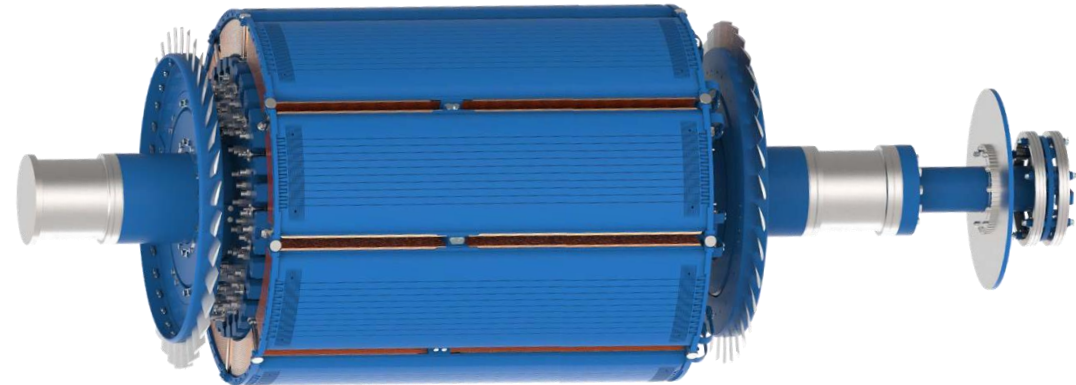
"FROM WATER-TO-WIRE" (W2W) SOLUTIONS
FIXED OR VARIABLE SPEED
GRID CODE COMPLIANCE



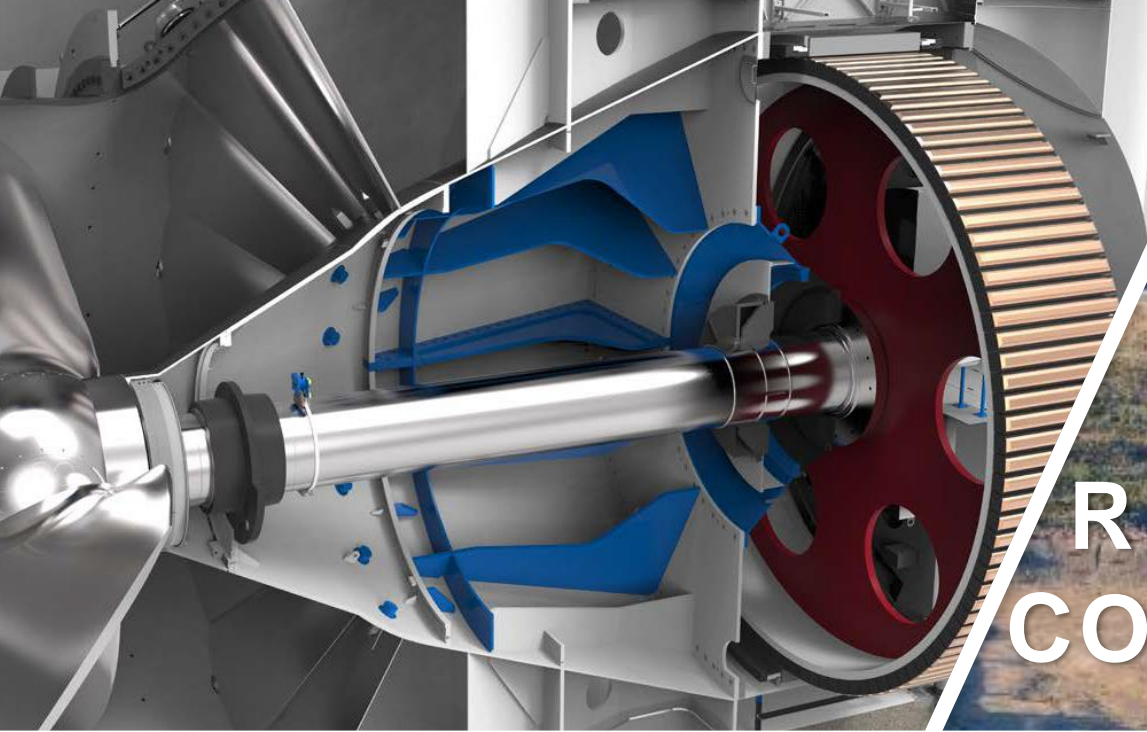


RENEWABLE SOLUTION: SYNCHRONOUS CONDENSER

BALANCES GRID VOLATILITY
EFFECTED BY WIND AND SOLAR



RELIABLE, PROVEN AND COST-EFFECTIVE TECHNOLOGY
LARGE ROTATING MASS TO IMPROVE GRID STABILITY, PROVIDING INERTIA
PROVIDES OVERLOAD CAPABILITY, SHORT CIRCUIT POWER, REACTIVE POWER



RENEWABLE SOLUTION: CO-LOCATED ENERGY PLANT

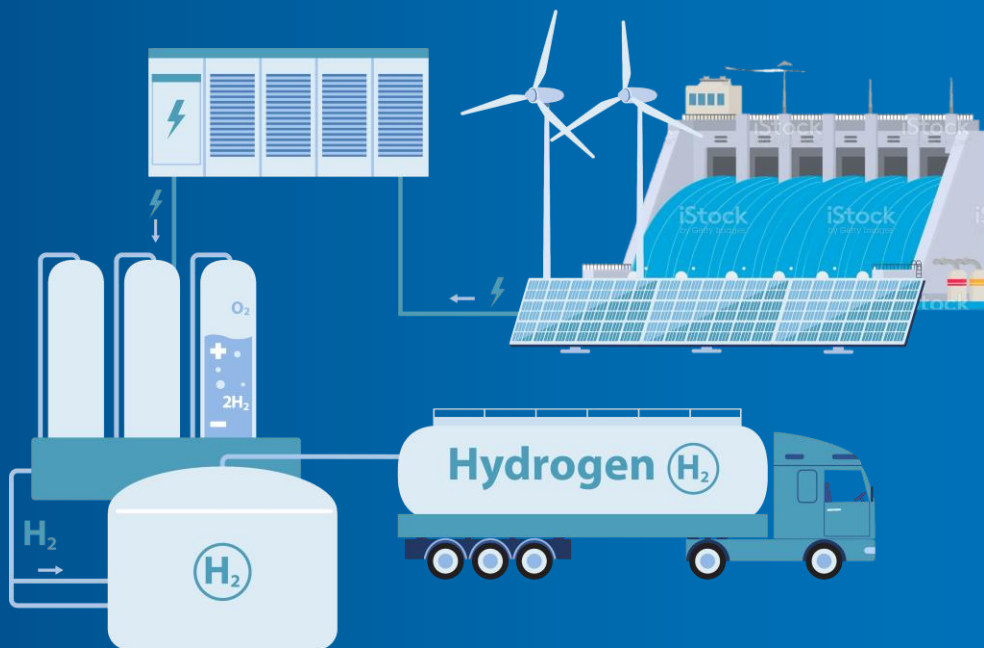
COMBINATION OF DIFFERENT RENEWABLE ENERGY SYSTEMS
CORE COMPONENT - PUMPED STORAGE SOLUTION
COMPENSATE VOLATILITY LOCALLY



NEW TECHNOLOGIES AND CONCEPTS



HYDROGEN. Installed electrolysis capacity up to **100 MW.**



OCEAN ENERGY. GENERATING POWER from ocean waves, currents or tidal streams



RENEWABLE SOLUTION: AUTOMATION AND DIGITALIZATION

SEAMLESS AND SECURE ACCESS
WITH MODERN DIGITAL SOLUTIONS

Integrated Automation

Digital Operation & Maintenance

Cyber Security



YOUR GLOBAL PARTNER FOR HYDRO SOLUTIONS

Follow us:



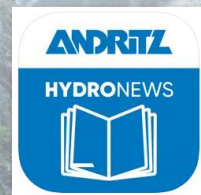
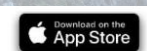
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