mega

URBANIZATION

According to current predictions, the global population will increase to about 10 billion people in 2050. By then, half of the world's population will live in major urban centers. Currently, cities cover just 0.5% of the earth's surface. However, they consume 75% of global resources. By 2030, there will likely be 40 megacities with more than 10 million inhabitants each. These megacities will require billions of dollars of infrastructure investment. Furthermore, despite increasing energy efficiency, the energy demands of such megacities will be enormously high. Urban technologies are racing ahead to meet this challenge. An example is the emergence of "smart cities" and "responsive cities". In smart cities, inhabitants are able to interact intelligently and efficiently with their urban environment while in responsive cities, humans and human well-being are the central focus of planning concepts. Production and use of energy using smart and responsive systems are a key part of sustainable development in urban centers.

CONNECTIVITY

As the principle of networking based on digital infrastructures, connectivity describes the dominant basic pattern of social change in the 21st century. Networking and communication technologies are fundamentally changing the way we live, work, and do business. But the digital transformation also has social and cultural impacts. Digitalization should not be equated with technology only but also understood more comprehensively. The digital transformation will play an increasingly important role in all areas of life, resulting in a new awareness of the digital opportunities and a more reflective use of digital devices and technologies.

DEMOGRAPHIC DEVELOPMENTS AND ECONOMIC CHANGES

Every minute the world's total population increases by some 150 people overall and yet there are drastic regional differences in demographic development. In industrialized nations, populations are typically shrinking, and the majority of the people will soon be over 65 years old. Meanwhile, the population of Asian and African nations is growing. For example, Africa's population will probably have doubled by 2050. This is resulting in a political and economic shift, increasing the economic power of these developing countries and their emerging markets. These changes are also having a profound effect on current and future energy use in developing regions like Asia and Africa.

CLIMATE CHANGE AND RESOURCE SCARCITY

With an increasing global population, the trend for urbanization, and growing energy demand, it is clear that conventional fossil-based energy sources will reach their limits in the near future. Alternatives to fossil fuels are urgently needed. Without significant change, the average surface temperature of the planet will continue to rise. Although approximately 27% of the world's demand for electricity is currently satisfied through renewable resources, much more growth in renewable energy capacity is compulsory over the coming years if catastrophic climate change is to be avoided. At 60%, hydropower represents by far the largest share of renewables, even as other renewable sources like wind, biomass, solar, and geothermal energy are growing rapidly. Nonetheless, far more renewable energy capacity, including hydropower, is needed to avoid disaster.

Research and development of other zero-carbon energy concepts, such as green hydrogen, is also in full swing. Integrated solutions that optimally combine various renewable technologies are emerging and will be in even greater demand in the future. Environmental awareness and sustainability are now a central economic factor that already influences investment decisions in all businesses.

trends

Megatrends develop slowly, but they are enormously powerful. Gross global changes affecting every aspect of the economy and society, they are exerting a profound influence on companies, institutions, and individuals. Consequently, they form the basis for the evolution of entire economic sectors and are often the starting point for far-reaching strategies in government policy, companies, and industries, as well as other organizations and stakeholders.

Megatrends are interwoven too. Globalization and urbanization both have a direct impact on our environment, mobility, and connectivity. They all are part of the big whole.

7.8 billion
world population today

10 billion
projected world population by 2050

Global megatrends are shaping not only our present but our future too. Today, numerous global research and development projects are focused on megatrends. To face the challenges of a changing world, new concepts, innovative ideas, and alternative approaches are needed, especially in how we source, deliver, and use energy.

Megatrends and hydropower

Megatrends like urbanization, climate change and the digital transformation are fundamentally changing all aspects of our lives. Change can be challenging but also offers scope for positive change and for even greater opportunities for those companies, organizations and societies willing to embrace new realities.

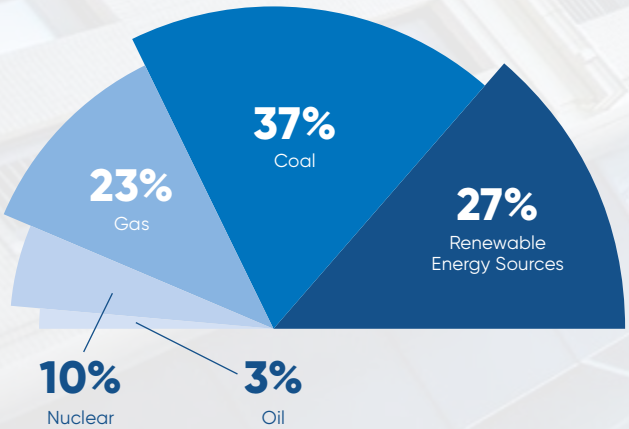
Although the technically feasible potential of hydropower is an unbelievable 16,000 TWh per year, today not even one third of this potential has been exploited. Around the world people are working to develop this huge clean energy potential by building new hydropower plants, as well as modernizing and upgrading existing ones. According to the 2021 Hydropower Status Report from IHA, an estimated 21 GW of hydropower additions took place in 2020 alone, bringing the total installed capacity to 1,330 GW (including pumped storage) and producing some 4,370 TWh, close to 17% of the world's total electricity generation.

In regions where energy demand will increase dramatically in the next few years – such as in Asia, South America, and Africa – new large plants and a multitude of small hydropower projects will be implemented. There is also huge potential in Europe and North America, since half of the facilities here are older than 40 years and can make a more significant contribution toward power supply in the future through modernization. Alongside its environmentally friendly generation characteristics, the benefits of pumped storage hydro to provide flexibility and cost-effective bulk storage make it an invaluable asset for the clean energy transition.

The IEA's Net Zero by 2050, A Roadmap for the Global Energy Sector forecasts that hydropower generation will grow by at least 9.5% through to 2025 to reach 4,650 TWh but the report also notes that hydropower capacity growth during 2023–2025 could be 50% higher per year on average if project development were accelerated. It is critical that all opportunities to develop the huge potential for sustainable hydropower are embraced to secure our world for future generations. Indeed, IRENA's Global Renewables Outlook estimates that an additional 850 GW of hydropower is required by 2050 for the world to stay on a climate-safe track in line with the Paris Agreement.

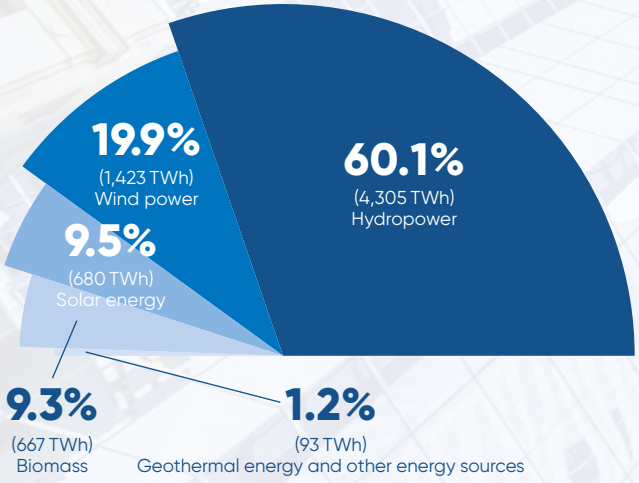
With 180 years of innovation, ANDRITZ has long been at the forefront of development, responding to megatrends with pioneering technologies and concepts and leading the transition to new and better approaches to meet the needs of society. That philosophy holds as true today as it did when the company was first founded. Faced with the profound impacts of global megatrends, hydropower and ANDRITZ innovation will be a long-term megatrend too.

Percentage distribution of worldwide power generation



Source: IEA World Energy Outlook 2020

Percentage distribution of power generation from renewables



Source: IEA World Energy Outlook 2020

HYDROPOWER POTENTIAL PER REGION

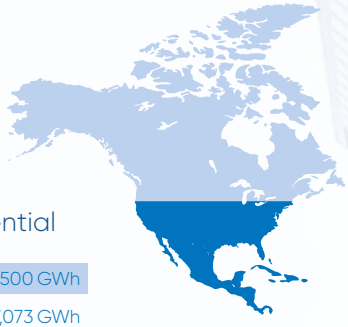
North America

62%

Hydropower potential

1,909,500 GWh

717,073 GWh



Europe

54%

Hydropower potential

1,195,500 GWh

550,217 GWh

South America

75%

Hydropower potential

2,850,300 GWh

700,246 GWh

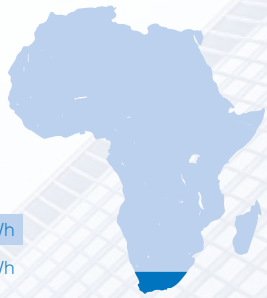
Africa

91%

Hydropower potential

1,627,900 GWh

138,625 GWh



Asia (excl. China)

83%

Hydropower potential

5,446,900 GWh

902,021 GWh

China

52%

Hydropower potential

2,720,000 GWh

1,304,400 GWh

Sources: World Bank, Zukunftsinstitut, PRB Population Reference Bureau, pwc, IEA, REN-21, IRENA, IHA, Hydropower & Dams World Atlas 2020

Technically feasible hydropower potential

Power generation from hydropower