

The Worldwide Energy Market

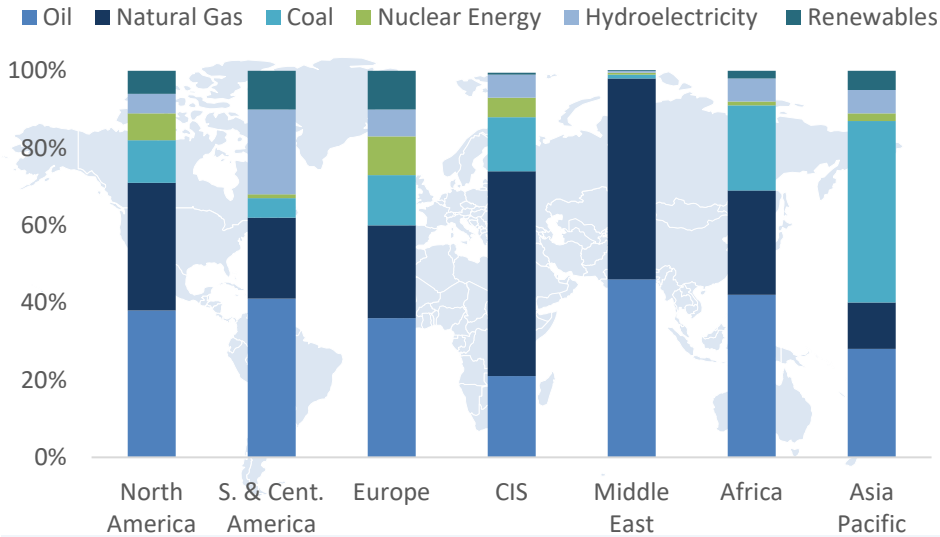
Market Snapshot



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Regional Consumption Patterns 2019 (in Percent)

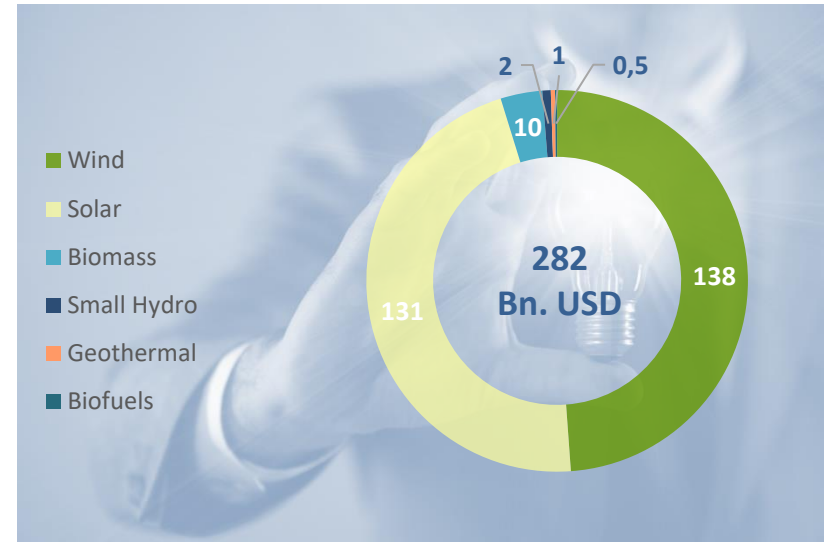


Total World Consumption: 583.90 Exajoules

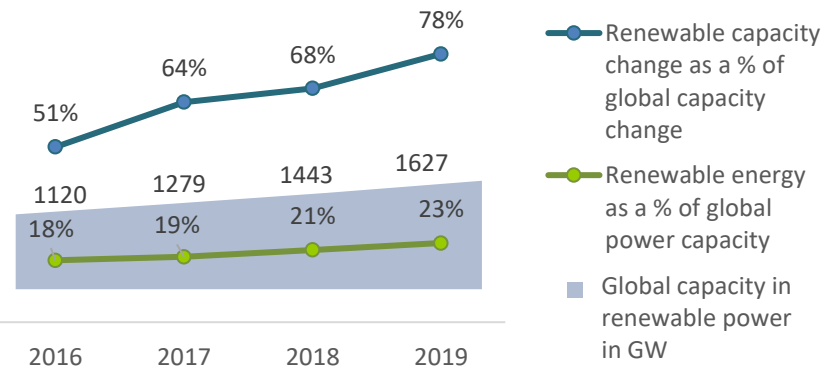
Top 5 Energy Providers

Company	Headquarters	Revenue 2018 (Bn. USD)	Terawatt-hour
State Grid Corp. of China	Beijing, China	347	3,874
Enel	Rome, Italy	85	295
EDF	Paris, France	78	558
Tokyo Electric Power Company	Chiyoda Tokyo, Japan	55	234
Korea Electric Power Corp.	Naju-si, South Korea	53	530

Global Investment in Renewable Energy 2019 (Bn. USD)



Renewable Energy Capacity as a Share of Global Power



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Renewable Energy Sources: Wind, Hydropower & Solar



Wind



Hydropower



Solar Photovoltaic

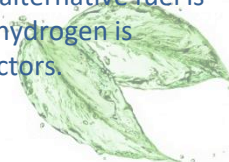
<p>Current Status</p>	<p><i>By 2019, the total installed capacity of wind turbines (WTG) was approximately 651 GW, of which offshore has a share of approximately 4%. There are currently around 5,500 offshore wind turbines worldwide, two thirds of which are in Europe.</i></p>	<p><i>In 2019, the installed capacity from hydropower internationally was 1,308 GW. Around 16% of global electricity generation comes from renewable hydropower. Internationally, China, USA and Brazil are at the forefront of the development of hydropower.</i></p>	<p><i>The globally installed PV capacity reached a cumulative 580 GW by the end of 2019. In 2019, Asia held the largest share of PV installation capacity (330 GW), with Europe in second place (138 GW) and North America in third (68 GW).</i></p>
<p>Investments</p>	<p><i>60 GW of wind energy capacity was installed globally in 2019, a 19% increase from installations in 2018. Offshore wind accounted for 6 GW (10%). In the offshore sector, Great Britain, Germany and China make up 80% of global WTG capacity.</i></p>	<p><i>In 2018, China completed around 8 GW of new installations, which represents more than 90% of total new installations in Asia. Through the support from private companies, Brazil ranked second internationally with 4 GW installations.</i></p>	<p><i>115 GW of new solar installation capacity was achieved in 2019 (12% increase from 2018). The European Union alone invested into 16 GW, with around 27% and 24% of investments coming from Spain and Germany respectively.</i></p>
<p>Potential & Future Development</p>	<p><i>From 2019 to 2023, the worldwide cumulative installed wind turbine capacity is expected to have a CAGR of +9%. In 2023, offshore plants are expected to produce 63 GW and onshore will produce around 835 GW.</i></p>	<p><i>In terms of electricity generation from renewable energies, hydropower has the largest market share. Electricity generation from hydropower will increase steadily in the coming years, but at a lower rate than wind energy.</i></p>	<p><i>Global solar photovoltaic capacity is estimated to increase significantly to 1,583 GW by 2030 as a result of substantial capacity additions from China, India, Germany, the United States and Japan.</i></p>

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Alternative Fuels: Hydrogen

Overproduction of alternative energy sources offers the possibility to produce **green** hydrogen. With new global climate goals and the further development of renewable energy sources, hydrogen as an alternative fuel is becoming more and more attractive. As a result, the use of hydrogen is currently proving to be very promising in many industrial sectors.



Application	Probability	Establishment
Heavy Industry (e.g. Steel and Cement Production)		<5 Years
Turbines (Industrial Drive Technology and Power Generations)		<5-10 Years
Off-Highway Vehicles (Heavy-duty and Construction)		<10 Years
Aerospace (Drive Technology, Use of E-Fuels)		<10-12 Years
Ships (Hydrogen or E-Fuels as Alternative Fuels)		<10-12 Years

High
 Low



Vlissingen, Netherlands

By 2030, one of the largest hydrogen plants in the world is to be built. The electricity from offshore wind turbines is to be used for this purpose. The energy generated will be used to produce 800,000 tons of hydrogen per year.



Portugal

7 billion euros are being invested by 2030 in the expansion of hydrogen infrastructure, which should significantly reduce imports of natural gas.



North Rhine-Westphalia, Germany

In 2022, a public hydrogen network is to supply industrial companies in NRW and Lower Saxony with hydrogen from alternative energies. The project, ran by Evonik, BP, RWE, Nowega and OGE, could be trend-setting for the German industrial landscape



California, United States

Using a technology based on plasma torches and waste, the cleantech-startup, SGH2, is aiming to build a production plant in California by 2023 with which 3.8 million tons of hydrogen could be produced, especially for the heavy industry.



Contact

DTO – a brand of DTO Consulting GmbH

Headquarters Düsseldorf

Benrather Schloßallee 33
40597 Düsseldorf
Germany

+49 211 / 179 660-0
info@dto-research.de
www.dto-research.de

Branch Office Singapore

German Centre for Industry and Trade
25 International Business Park Rd
Singapore 609916 | Singapore

+65 8423 9380
info@dto-research.com
www.dto-research.com