Context

- Electricity is increasingly important in the modern world, to date:
  - Electricity demand has been growing twice as fast as total energy demand
  - Investment in the power sector is larger than that in the oil and gas sector
  - The rise of solar PV and wind power is transforming electricity supply
  - Overall energy-related CO₂ emissions are back on a rising trend in 2018
  - For the first time, the global population without access to electricity fell below 1 billion

- Policy makers need well-grounded insights about different possible futures & how they come about. The WEO provides two key scenarios:
  - New Policies Scenario
  - Sustainable Development Scenario

- The Future is Electric Scenario was introduced to explore the implications of more rapid electrification of end uses and the digitalization of the economy
In 2000, more than 40% of global demand was in Europe & North America and some 20% in developing economies in Asia. By 2040, this situation is completely reversed.
Solar PV growth outpaces all other technologies

Installed power generation capacity by source in the New Policies Scenario

Renewables make up two-thirds of all capacity additions worldwide to 2040, capturing 70% of power plant investment
Two directions for nuclear power

The contribution of nuclear power could decline substantially in leading markets, while large growth is coming, as China takes first position within a decade.
The electricity landscape is transforming

World electricity generation mix by source

Coal and renewables switch roles by 2040, mainly driven by policy support and accelerated by the improving competitiveness of renewables
Higher shares of variable renewables raise flexibility needs and call for reforms to deliver investment in power plants, grids & energy storage, and unlock demand-side response.
Market designs will be under stress

Share of long-run generation costs covered by energy sales in the European Union

The widening gap between electricity sales and total generation costs in some markets raises questions about the ability of competitive markets to attract timely investment.
Looking beyond the levelised cost of electricity

Technology costs and value

Value-adjusted LCOEs (VALCOEs) in China

Costs remain an important indicator of competitiveness, but better metrics are needed to reflect the changing nature and needs of power systems.
Our energy destiny lies with governments

Power sector investment to 2040

$20 trillion

Regulated/contracted (generation and grids) 93%

Wholesale market pricing 7%

Power sector investment continues to be driven by regulated market frameworks
Implications of greater electrification

Increased electrification leads to a peak in oil demand, avoids 2 million air pollution-related premature deaths, but does not necessarily lead to large CO₂ emissions reductions.
Can we unlock a different energy future?

Global energy-related CO₂ emissions

Coal plants make up one-third of CO₂ emissions today and half are less than 15 years old; policies are needed to support CCUS, efficient operations and technology innovation.
Conclusions

- The links between energy & geopolitics are strengthening & becoming more complex, a major factor in the outlook for energy security.
- The rapid growth of electricity brings huge opportunities; but market designs need to deliver both electricity and flexibility to keep the lights on.
- A comprehensive strategy to electrify end uses and decarbonise the power sector is needed to achieve environmental goals.
- There is no single solution to turn emissions around: renewables, efficiency & a host of innovative technologies, such as storage, nuclear, CCUS & hydrogen, are required.
- The future pathway for energy is open: governments will determine where our energy destiny lies.