Carbon Free Generation – Creating Future for the Global Energy

Round Table Introduction – ATOMEXPO 2019

Anton Poriadine, Partner
Strategy Practice Leader

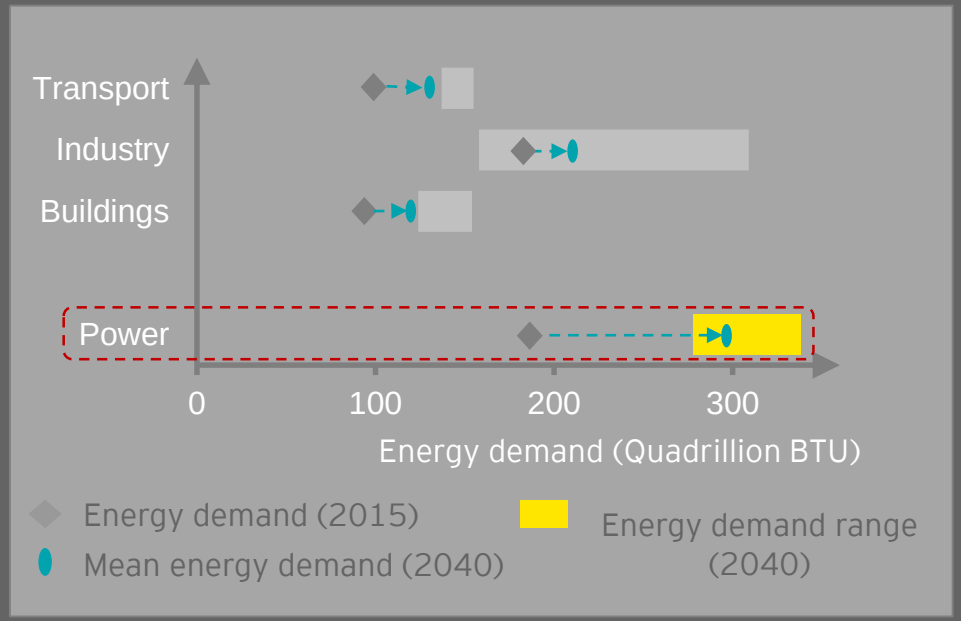
EY
Building a better working world

Global energy demand is set to grow by ~30% over the next 25 years and will further influence the energy mix going forward

Drivers of energy demand

- Rising population
- Economic growth
- Urbanization
- Electrification
- Energy efficiency

Primary energy demand projections (2015 – 2040)*



Notes (*): Energy demand range (2040) reflects projections from IEA, EIA and Exxon. Energy demand under central scenarios is considered from sources where more than one scenario was available.

Source: IEA's WEO 2016 New Policies Scenario

~50%

Power sector's share of total growth in primary energy

Transport: growth due to fuel economy, however, potential electric vehicles revolution

Industry: growth weighed down by efficiency gains and shift away from energy intensive sectors; uncertainty around the structural economic shift in China

Buildings: slow growth due to improved efficiency measures

EY

Three major factors drive carbon free energy transition with an ever-faster pace

Sustainable development

- Climate policy measures tailored to achieve the COP21-objectives (~2°C increase vs. ~3-4 °C) e.g. changes to the CO2-trading mechanism

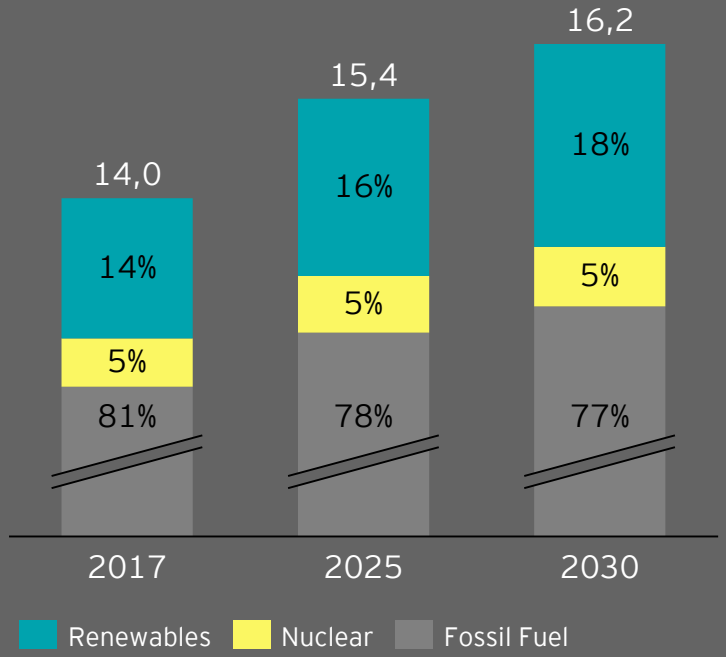
Maturing technologies

- Liberalization and greater support for renewables, storage, e-mobility
- Rapid decline in delivery technologies: renewable generation – currently $40-50/MWh for 20-year contracts as well as the cost of e-storage and e-mobility
- Enabling technologies (IoT, micro grids, digital services…) gain maturity

Consumer behavior

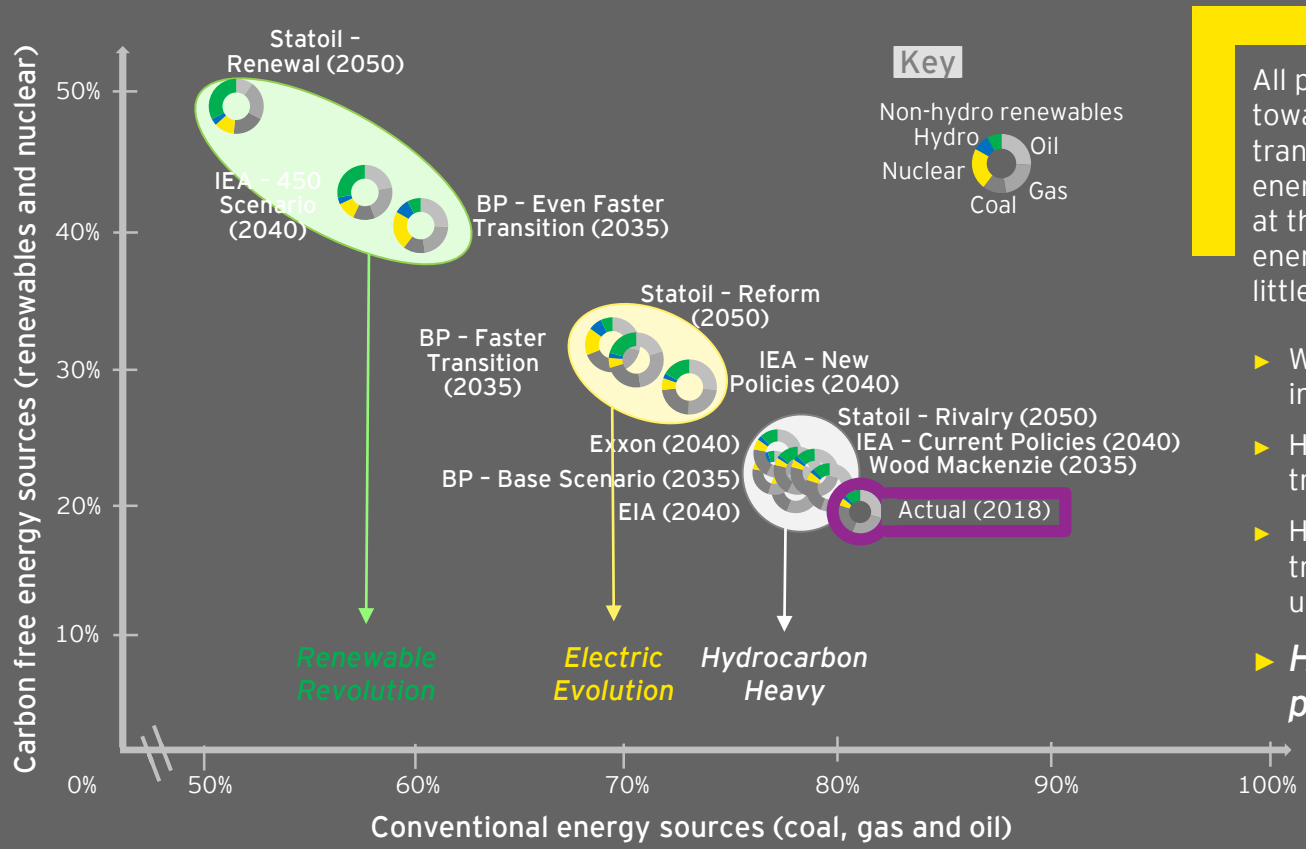
- Prosumers gaining momentum
- Consumers require socially responsible choice of energy supply (a trend already visible in the other industries)
- Social connectivity on the rise

Total primary energy demand – base case scenario, Gtoe



Source: IEA's WEO

Divergent views exist on the future of clean energy penetration going forward although the trend is clear



All projections agree on the direction towards which global energy mix is transitioning – with share of clean energy sources expected to increase at the expense of conventional energy sources – however, there is little consensus on:

- What will the energy mix look like in the next 20 years?
- How to ensure the smooth transition - "keep the lights on"?
- How disruptive will a renewable transformation be? Do we face unpopular decisions?
- ***How can P&U companies prepare themselves?***

Source: IEA, Exxon, BP, EIA, Wood Mackenzie and Statoil

Note: Biomass/Bioenergy/Biofuels are considered part of non-hydro renewables

EY

EY and the Skolkovo Business School developed four Global Energy Scenarios – 2050

Innovations and new technologies

Spread rapidly

Spread slowly or not utilized

BLADE RUNNER

10% 75% 15%

- Consumers power and innovations are a key sector change force
- Energy becomes an exchange commodity, players from other sectors enter the market
- Insufficient incentives for carbon free energy and lack of coordinated government policy
- Nuclear generation develops, including SMRs

INTERSTELLAR

10% 60% 30%

- Technologies are rapidly introduced and widely used, bring down their cost and allowing maintaining of an environmental balance
- Decentralization is a strong trend, guided above all by natural factors (wind currents, the number of sunny days, etc.)
- Issues involved in accumulating and storing energy are resolved

THE DAY AFTER TOMORROW

5% 80% 15%

- The current status quo, involving the use of fossil fuels, prevails
- Global targets for change are not achieved and are forgotten
- Innovations and new technologies play a minor role
- Major players dominate national markets
- Climatic conditions worsen, and there is a danger of social conflict

STAR WARS

Developed countries

10% 60% 30%

- A divided world: Developed countries introduce new technologies and take action against climate change
- Barriers to the spread of technologies, the high cost of technologies and a lack of financial incentives left emerging countries with traditional energy sources (including nuclear)

Emerging countries

5% 80% 15%

Weak

Strong

Climate change policy

Nuclear Coal, gas Renewable

Source: Energy Scenarios 2050 – Skolkovo-EY

EY

Introducing the focal questions of our discussion

Focal questions

- What is the plausible ***scenario of the energy mix*** of the future? ***How carbon free*** is it going to be?
- How will the ***business models*** of power companies of the future will look like?
- ***What should be changed*** to product lines, services, competencies?

Main topics

1. Carbon-free generation trends
2. Green generation for energy sector leaders: transformation success criteria
3. SMR as an energy source for remote and isolated regions
4. SMR as the first step for nuclear power development in new countries
5. Business models' transformation as a key driver of changes in the renewable energy market
6. Energy storage developing: status and best practices
7. Energy consulting as an instrument for energy mix shaping