



INVESTING IN SUSTAINABLE AND AFFORDABLE ENERGY

PRIORITIES AND CHALLENGES
(ENERGY EFFICIENCY
PERSPECTIVE)

"Prospects for the development of inexpensive, reliable, sustainable and modern energy"
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WHAT IS THE PROBLEM ?

- Increasing energy demand of a country (both domestic, industrial and transport) continues to increase faster than world population, leading to an increase in the average amount of energy consumed per person (per capita energy consumption)
- According to International Energy Outlook 2019 (IEO2019)(EIA) projections are that world energy consumption will grow by nearly 50% between 2018 and 2050. Most of this growth comes from countries that are not in the OECD (growth is focused in regions where strong economic growth is driving demand). WEC also predicts in both of their scenarios increase of 61% or 27% of total primary energy supply.
- The industrial sector (refining, mining, manufacturing, agriculture, and construction) accounts for the largest share of energy consumption of any end-use sector—more than half of end-use energy consumption throughout the projection period. World industrial sector energy use increases by more than 30% between 2018 and 2050.
- Transportation energy consumption increases by nearly 40% between 2018 and 2050
- Energy consumed in the buildings sector (residential and commercial) increases by 65% between 2018 and 2050
- The growth in end-use consumption results in electricity generation increasing 79% between 2018 and 2050.
- Electricity use grows in the residential sector as rising population and standards of living in non-OECD countries increase the demand for appliances and personal equipment. Electricity use also increases in the transportation sector as plug-in electric vehicles enter the fleet and electricity use for rail expands

WHAT IS THE PROBLEM ?

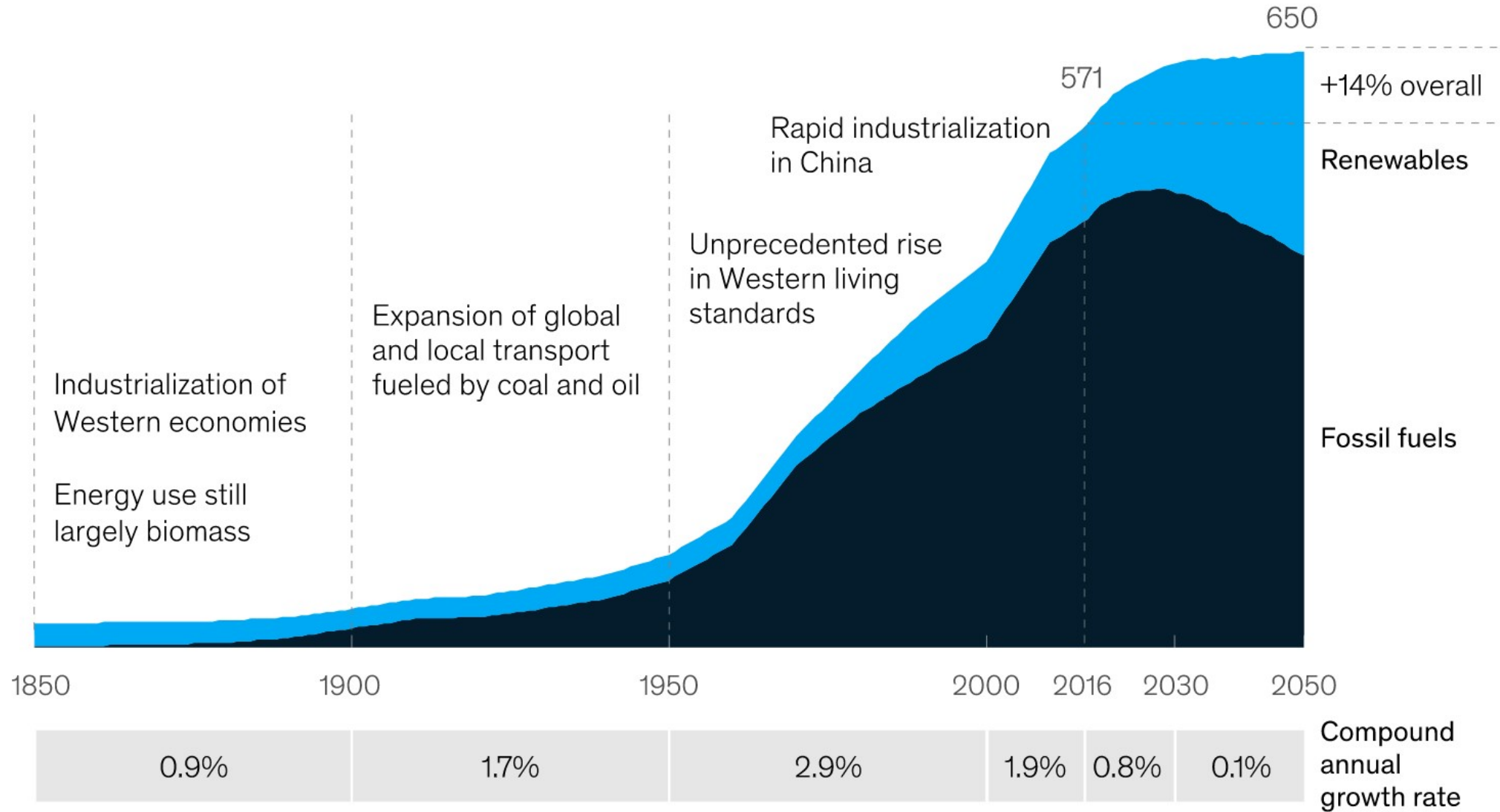
- In any scenarios increased energy demand requires increase in infrastructure costs, possible future stranded assets, increase of curtailment in RE, keeping the status quo regarding new business models
- Rising demand and switching fuels from different technologies shifts entire sectors from one area to another (e.g. electrification of vehicles shifts the transport sector from oil focused area to electricity focus area and adds additional complexity for capacities, intermediate charging, etc.)
- Practically 2° is unachievable if more CO₂ is emitted from new sources, even if those sources are with high efficiency.
- At least 20% of energy used today is wasted on non-productive purposes (lighting for marketing billboard, stand-by equipment, etc) --- note: 10 kWh electricity is 1,2 kg coal and emits 0,34 kg CO₂ per each kWh

DECOUPLING ENERGY DEMAND FROM ECONOMIC GROWTH

The decoupling of the rates of economic growth (climbing steadily) and energy demand growth (ascending, but less steeply) will largely be a function of the following four forces:

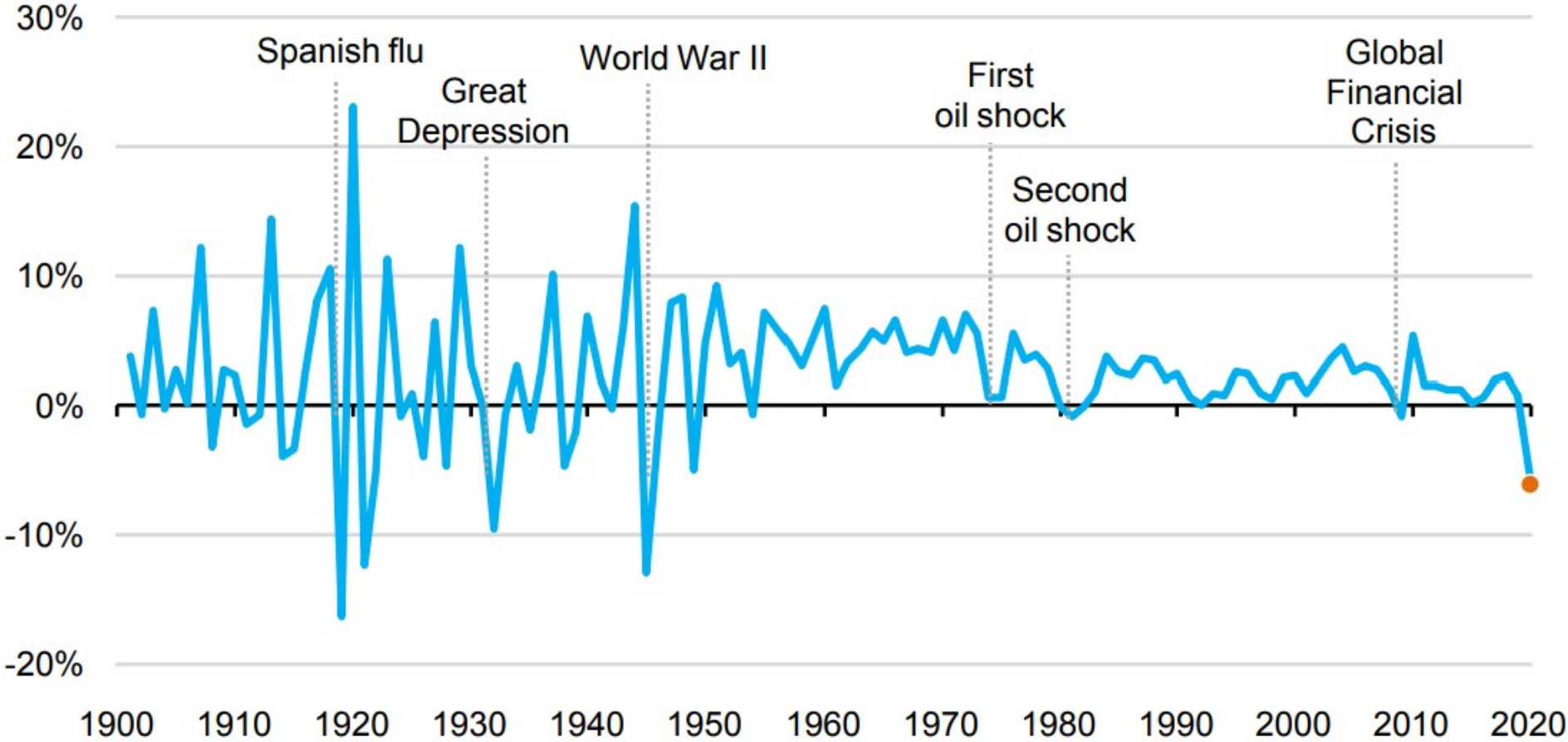
- a steep decline in energy intensity of GDP, primarily the consequence of a continuing shift from industrial to service economies in fast-growing countries
- a marked increase in energy efficiency, the result of technological improvements and behavioral changes
- the rise of electrification, in itself a more efficient way to meet energy needs in many applications
- the growing use of renewables—resources that don't need to be burned to generate power—a trend with the potential not only to flatten the primary energy demand curve but also to utterly change the way we think about power

Global primary energy demand, millions of terajoules

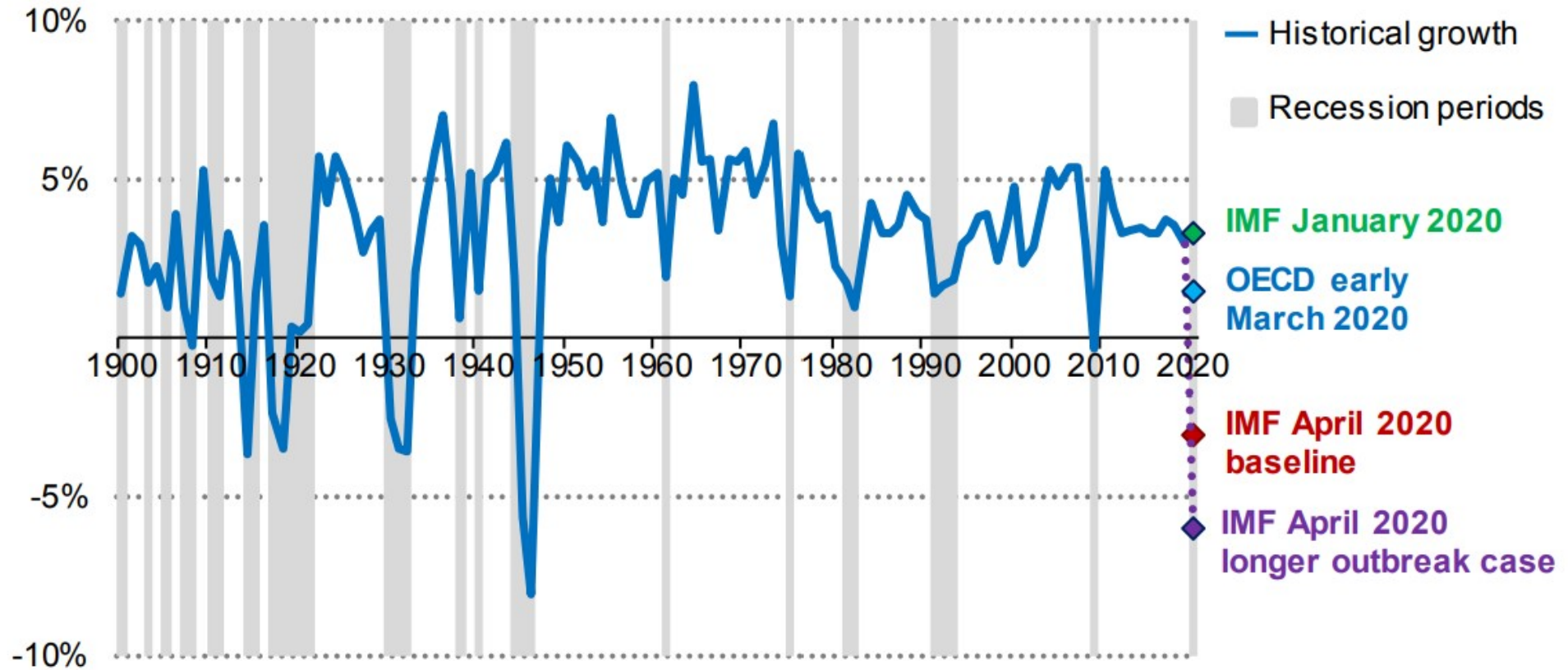


Source: McKinsey Energy Insights' Global Perspective, January 2019

Rate of change in global primary energy demand, 1900-2020



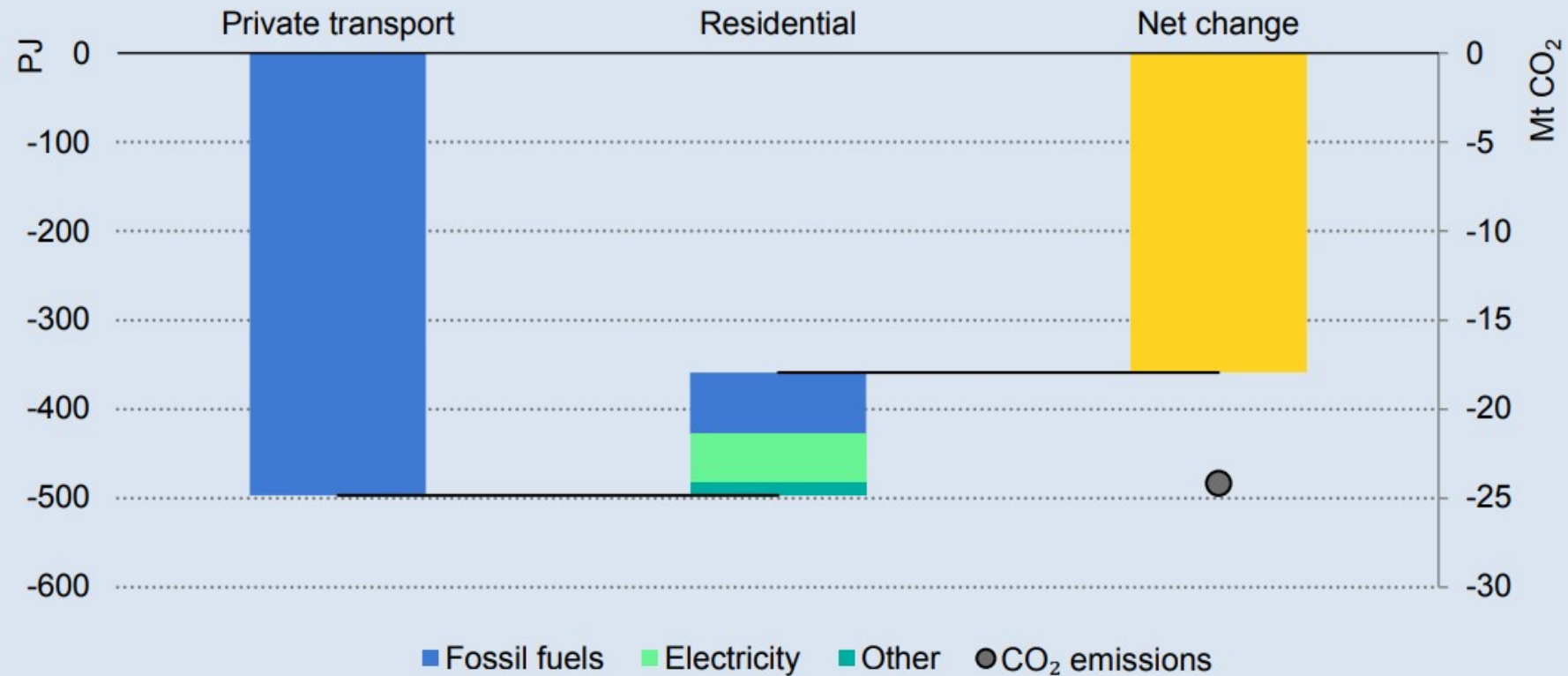
Global annual change in real gross domestic product (GDP), 1900-2020



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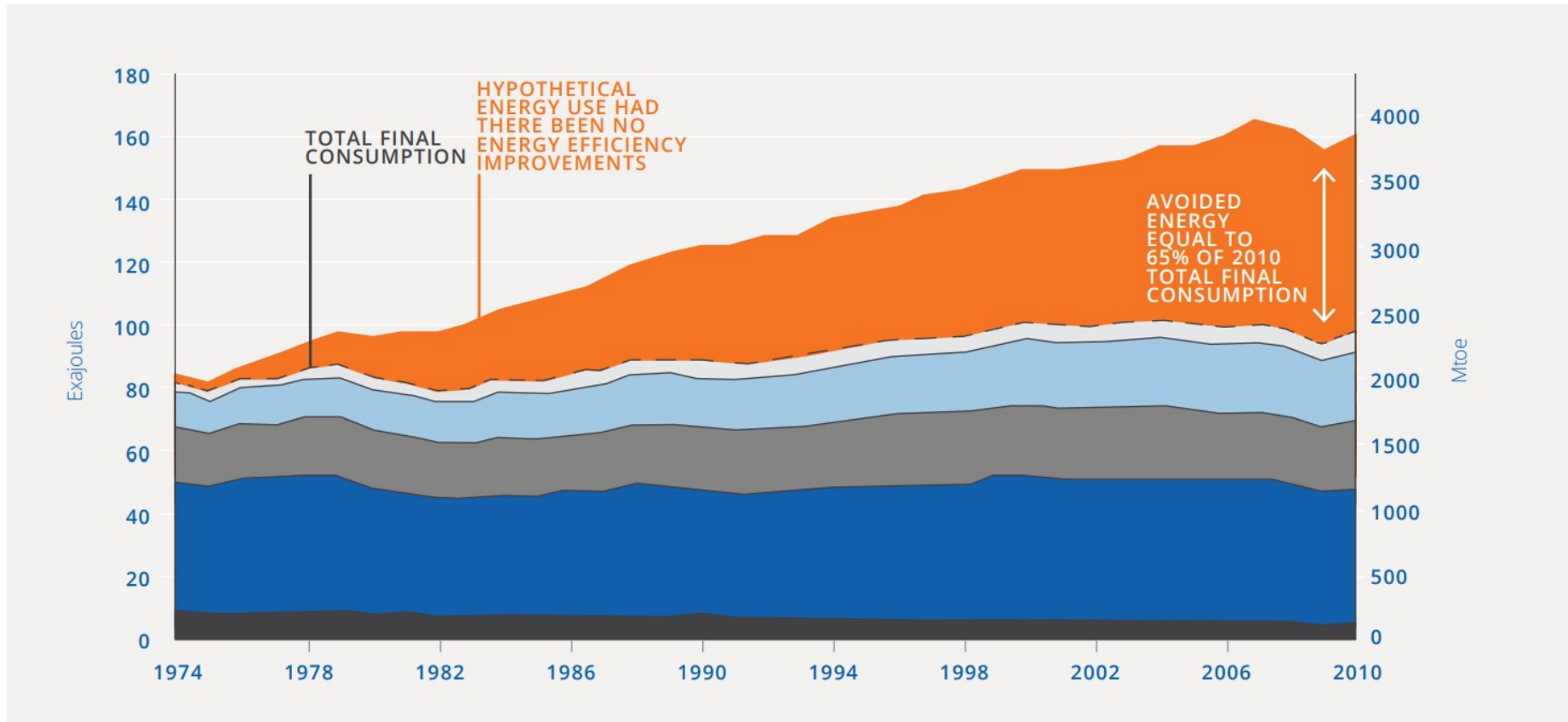
Sources: IEA based on IMF World Economic Outlook (January and April 2020), OECD Interim Economic Outlook Forecasts (March 2020) and Maddison Project Database (2018).

Change in annual global CO₂ emissions and final energy consumption by fuel in the “home working” scenario



Note: Other = heat, modern biomass and other renewables.

AVOIDED ENERGY 1974-2010



Source: International Energy Agency 2013, *Energy Efficiency Market Report 2013*, IEA, Paris.

TFC stands for 'total final consumption'. "Other" includes biofuels plus heat from geothermal, solar, co-generation and district heating.

WHAT IS ENERGY EFFICIENCY AS THE FIRST FUEL ?

- Prioritize investments in energy conservation, energy efficiency and optimized demand side usage before investments in supply side
- Rethinking the energy system as a whole ecosystem instead of sectoral groupings
- Build infrastructure of demand side industries that could reduce the renewable energy curtailment
- Energy efficiency standards

WHAT IS ENERGY CONSUMPTION CAP ?

- The **energy consumption cap** (ECC) sets a **limit** on the amount that **energy** suppliers (country specific) can supply all the consumers in a country.
- This **ECC** can be set for a specific energy consumption of a country (electricity, heat, oil, etc.) limited to a cap amount of the average energy consumed during the last 5 years (to mitigate environmental, social and weather conditions)
- Option 1: energy consumption cap on energy supplied from CO₂ and GHG emitting sources
- Option 2: rolling ECC – for every % of sustainable energy in the energy mix ECC is proportionately increased



WHAT DOES IT SOLVE ?

- Strongly limits the CO₂ and GHG emissions and secures time to make structural and technological transformation of the energy sectors
- Facilitates innovations in technologies, business models and social-economic policies
- Ensures optimization of industrial processes and transport effectiveness
- Priorities usage of local resources, local economic growth and knowledge sharing
- Setting new standards in effectiveness of products, appliances, buildings, vehicles
- Changes the perception from quantity to quality of service
- Ensures increased investments in RE and EE versus fossil based energy
- Savings cap trending schemes will enable better performing economies to get ahead in production (production could not be shifted to lower income/performing economies)
- Collaboration would be the key element in increasing economic value per kwh spent
- Increased GDP per capita with lower investments (in the long run)



WHAT ARE THE DRAWBACKS ?

- Stagnating economic growth on short term
- Need social –economic policies to address the societal changes which are slow to develop
- Regulations and legislative changes would be significant in the adoption period

NATURE IS ENERGY OPTIMIZED ...



...SO SHOULD WE !