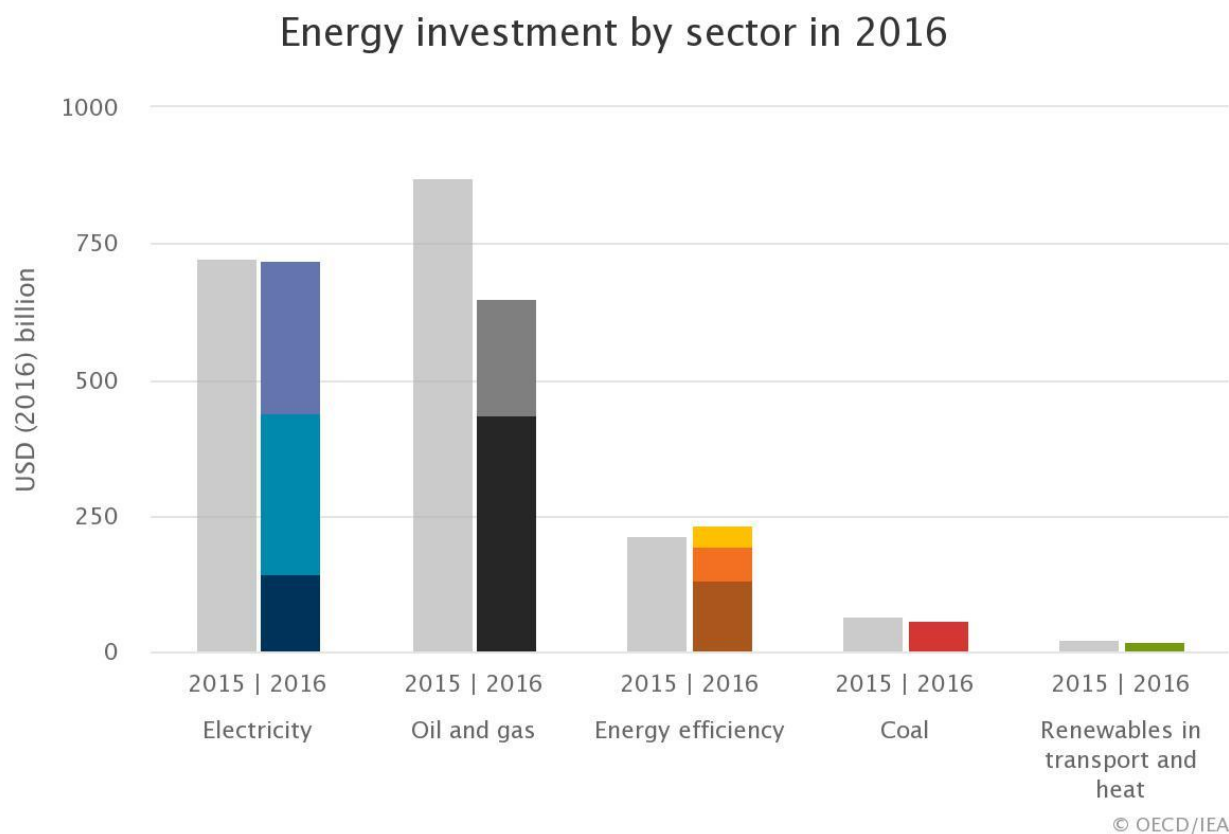




# The snapshot of oil industry

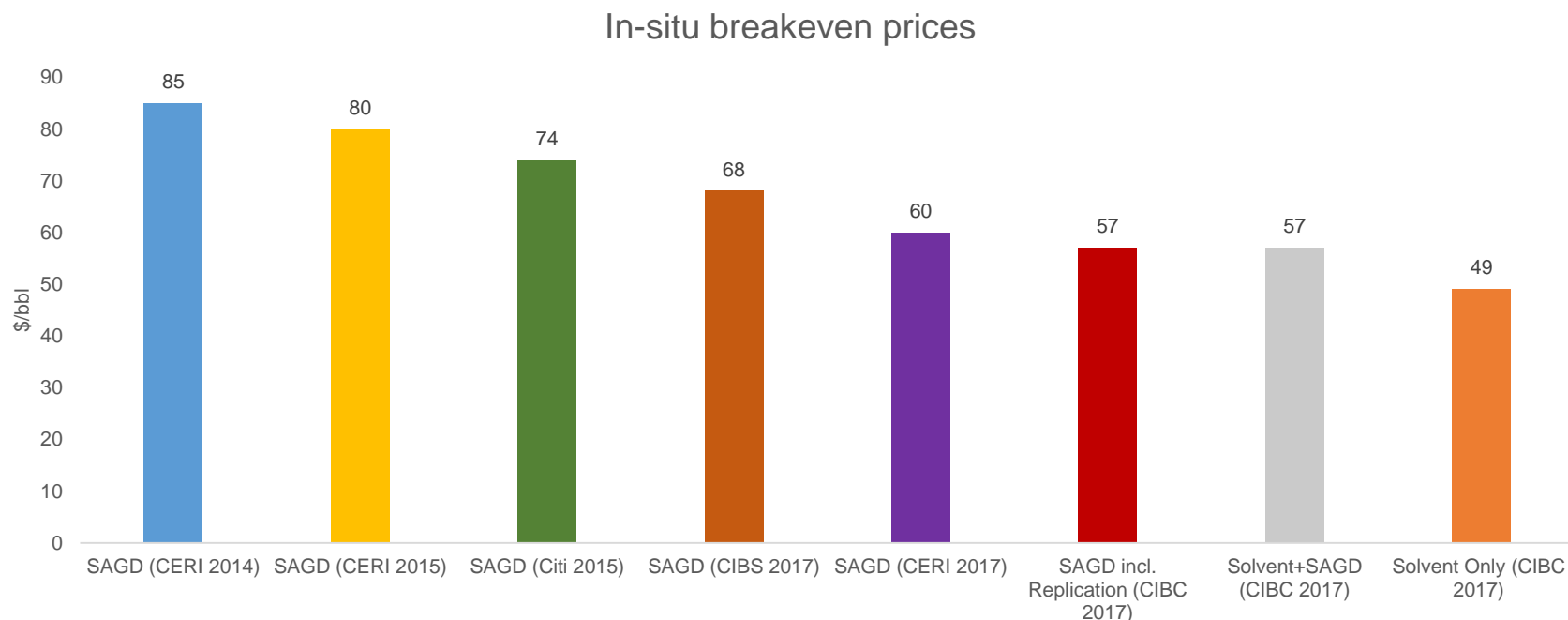
Ekaterina Grushevenko  
Energy center SKOLKOVO  
November, 30 2017

# Oil and gas investments felt sharply in 2016 comparing with 2015



***Falling unit capital costs, especially in upstream oil and gas was a key reason for lower investment, though reduced drilling***

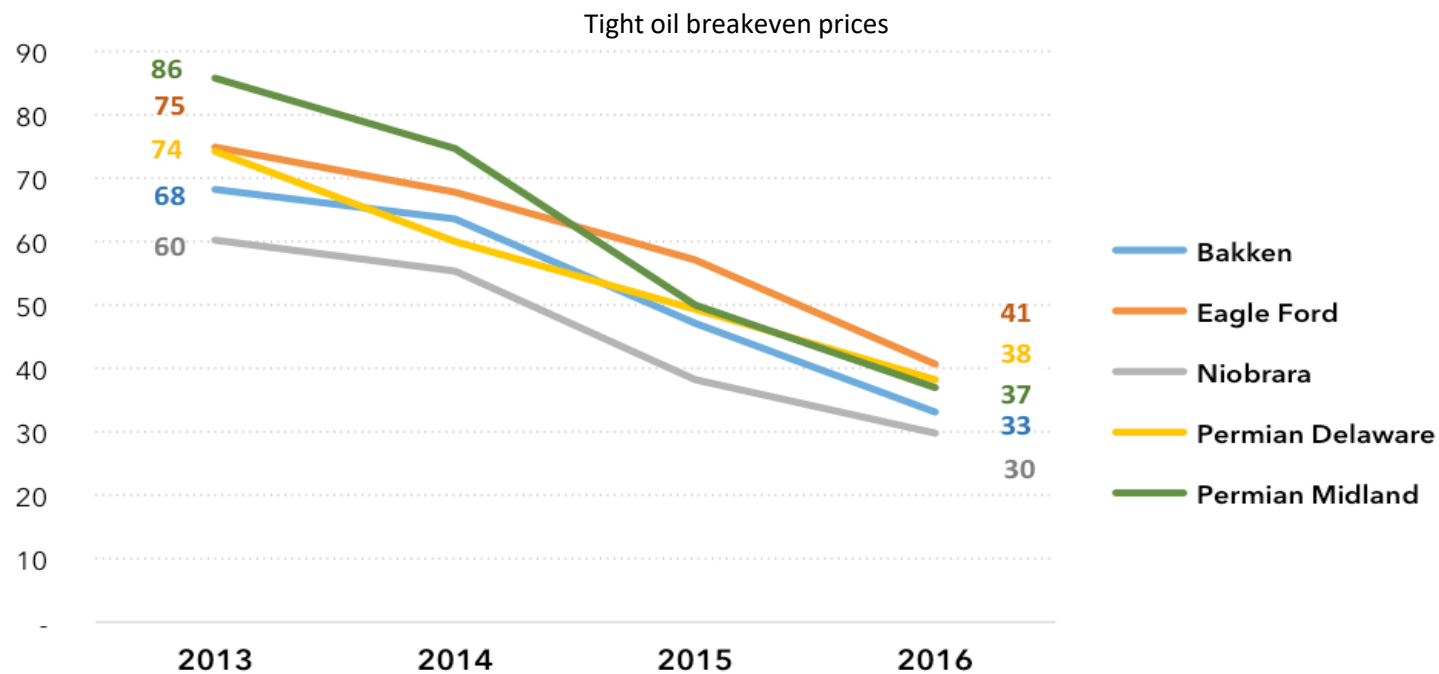
# Oil production breakeven costs felt by 40% in Canada...



Source: Oxford Institute for Energy Studies

***During last years new in-situ methods of oil sand production allowed to decrease costs sharply***

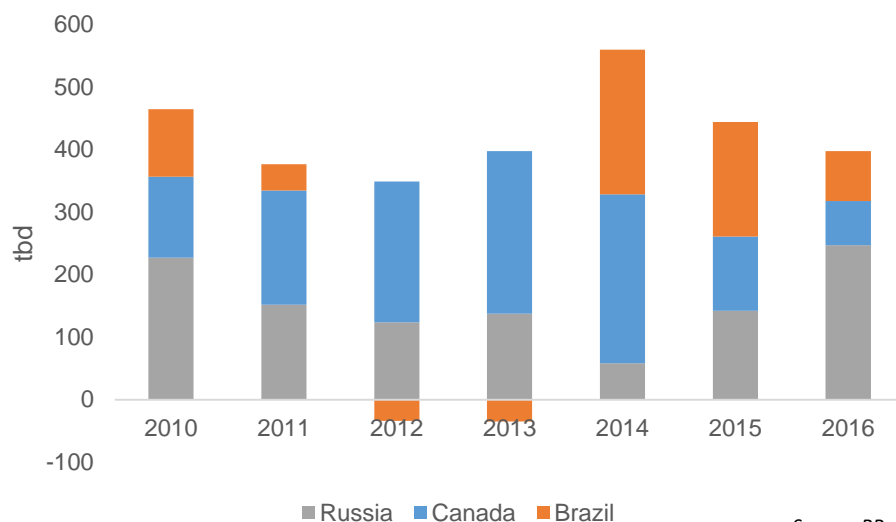
# ... and by 50% in the US...



Источник: Rystad Energy NASWellCube

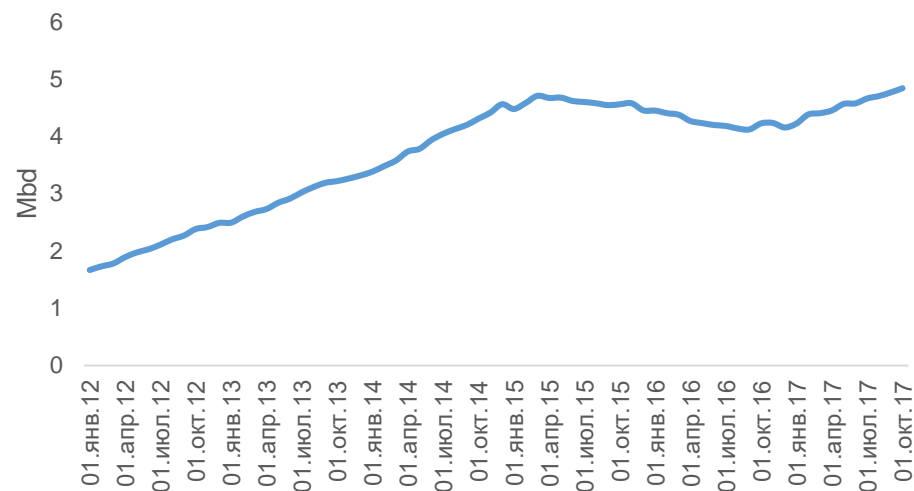
# ...that led to high oil production growth in several countries

Y-y oil production growth



Source: BP

US tight oil production

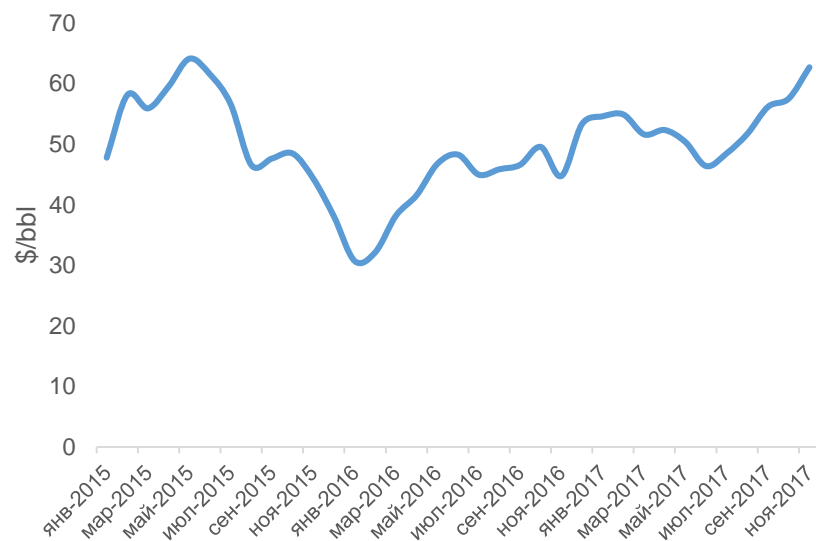


Source: EIA

***Production growth was caused by the weakening of the exchange rate against the dollar (for example, in Russia), technological progress, the cheapening of exhibition services. This caused an oversupply on the market***

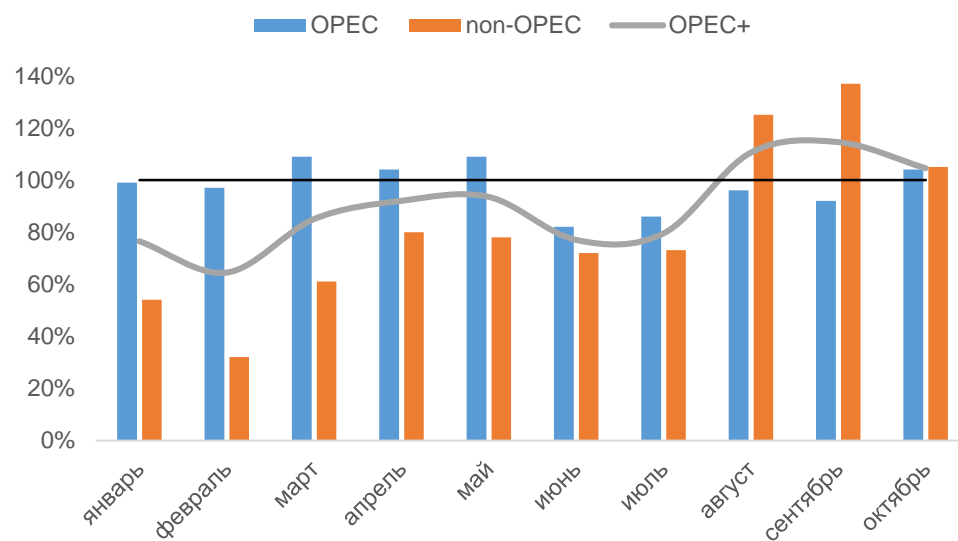
# What's the effect of OPEC+ deal?

Brent crude oil price



Source: EIA

OPEC+ deal compliance

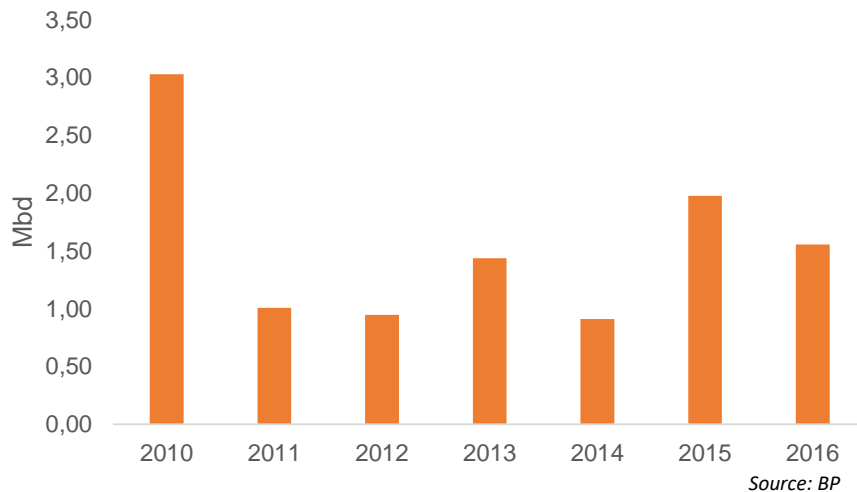


Source: Bloomberg

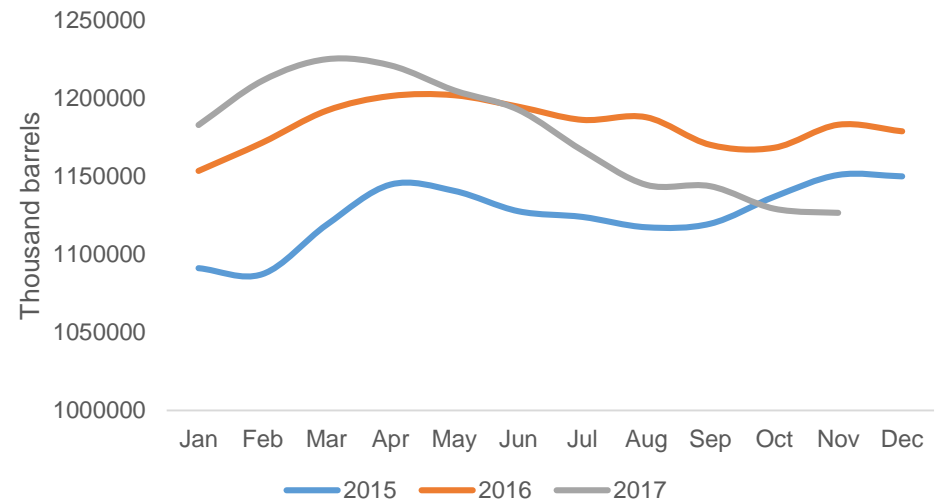
**Total US stocks are falling at an unprecedented rate.  
Oil price in November exceeded the level of 60 \$/bbl**

# Oil demand surprises on the upside reflecting better global economic performance and also low oil prices

Global oil demand growth y-y change



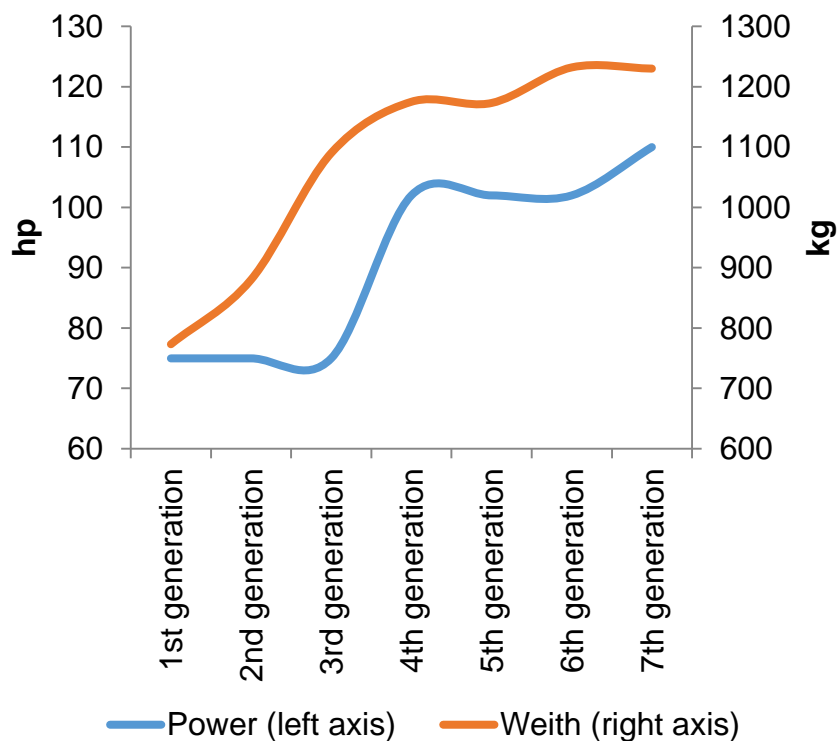
US total petroleum stocks (including SPR)



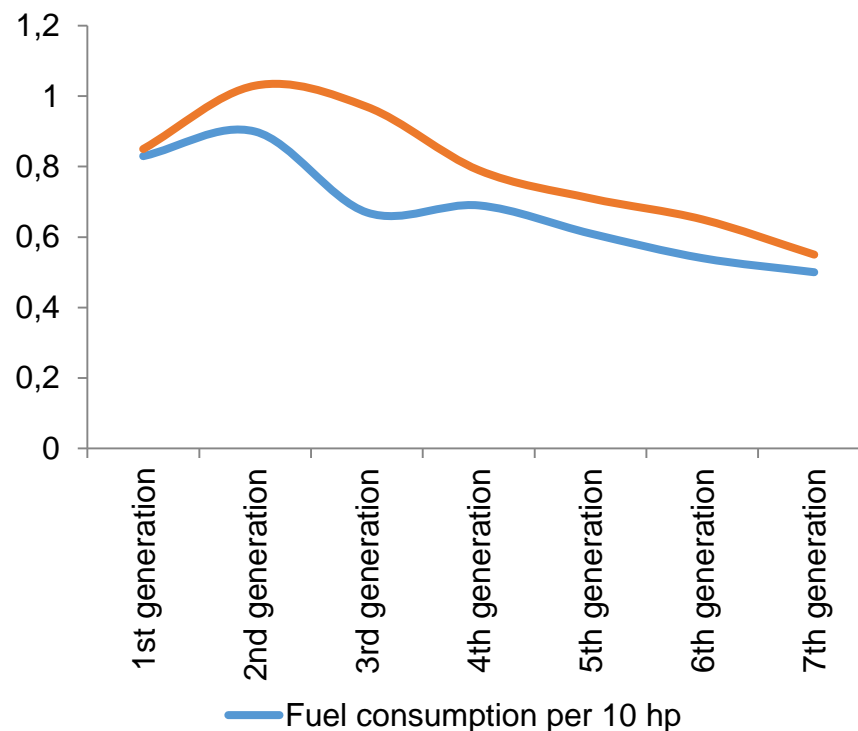
***But in the long time period it can be affected by interfuel competition***

# Energy efficiency is the key factor affecting oil demand in the road transportation sector

## Changing horsepower and weight of VW Golf 1,6 in 40 years



## Changing fuel consumption of VW Golf 1,6 in 40 years





# Automobile energy conversion efficiency is estimated at 17-20% - there is good potential for improvements

## 17-18%

**Technologies, allowing to increase efficiency of the engine:**

system of turbo charging and reduction of the engine's volume

deceleration fuel shut off, synchronizing system of valve operation, cylinder deactivation system and direct fuel injection

## 4-6%

**Other technologies:**

Decreased car weight,  
low rolling-resistance tyres, rise of aerodynamic performance,  
low resistance of the brake trailing

## 30-40%

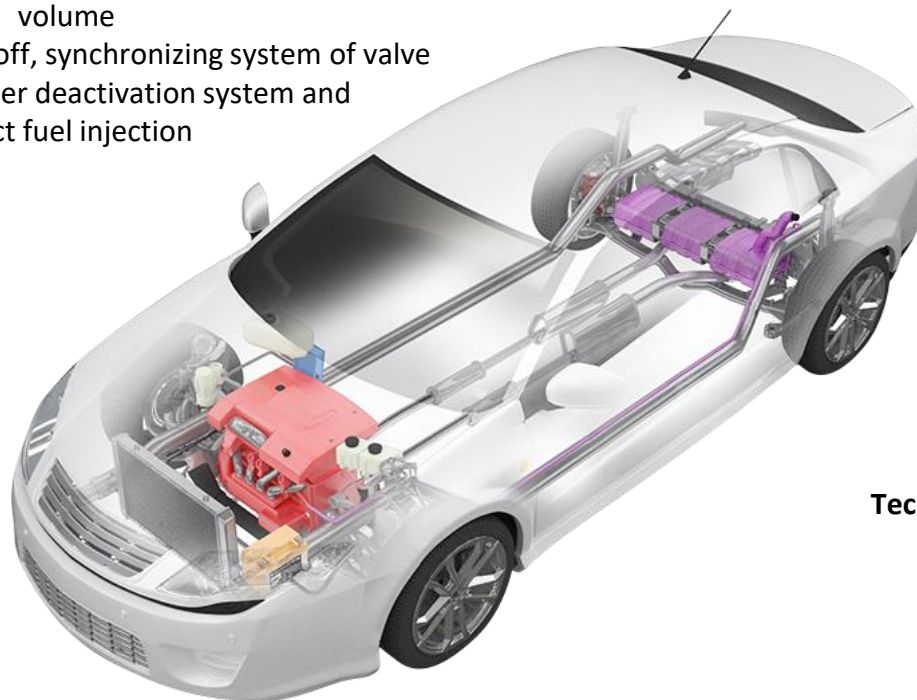
**Electrification:**

"Start-stop" system,  
"soft" hybrids, complete hybrids, electric steering

## 8-12%

**Technologies, improving efficiency:**

Additional transmission,  
Flexible transmission,  
Two-clutch transmission

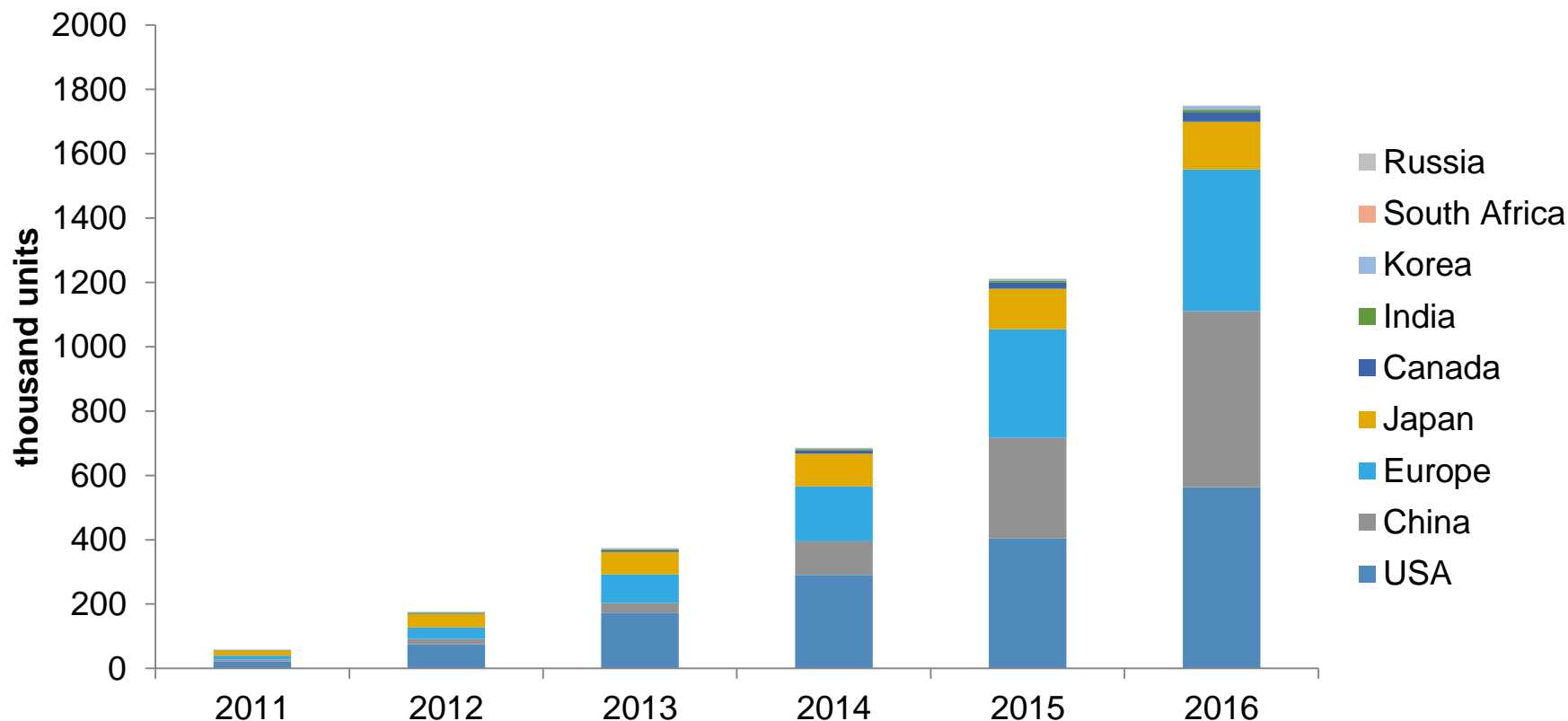


Source: EIA

***Modern technologies allow to increase automobile efficiency by 50-60%***

# The number of EVs has increased 30 times in 6 years...

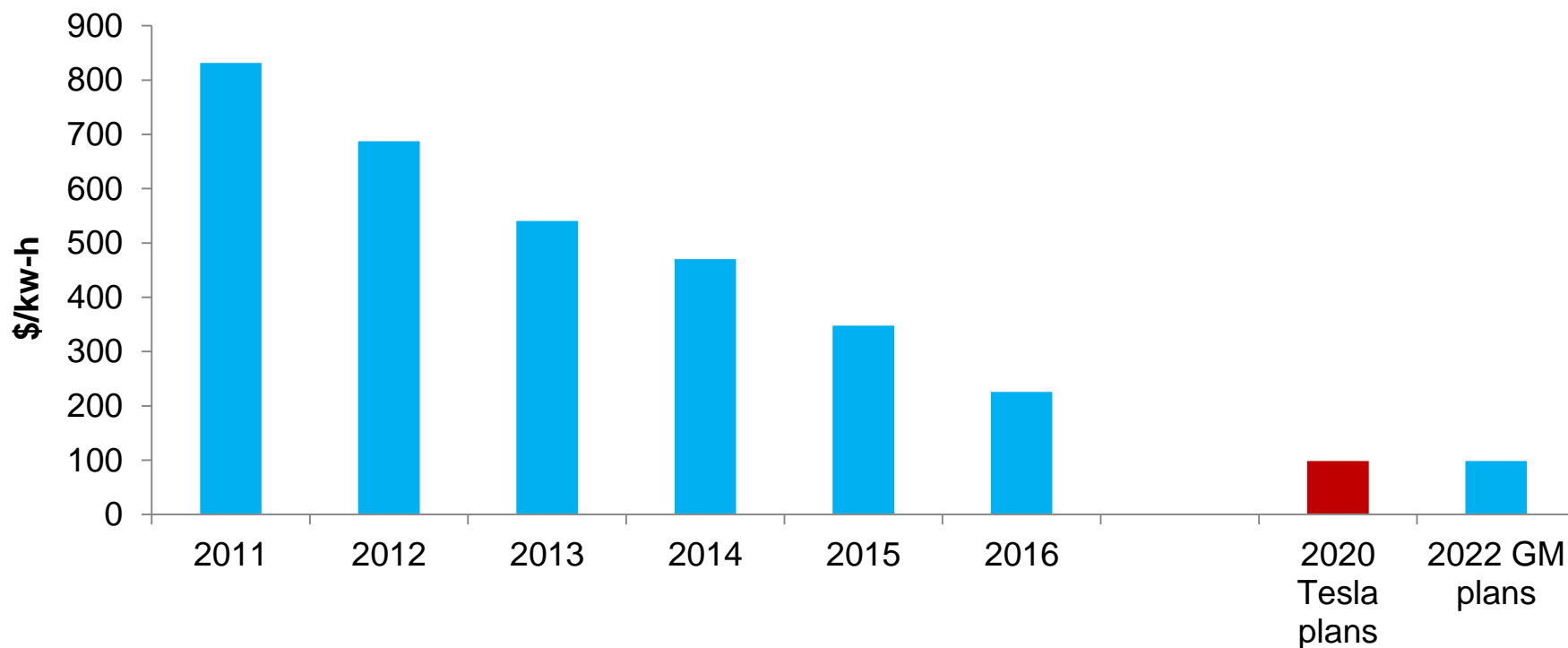
## Number of EVs in the world



Source: IEA

...while cost of batteries has decreased  
3,7 time on average during the same  
period of times

Average cost of BEV's battery

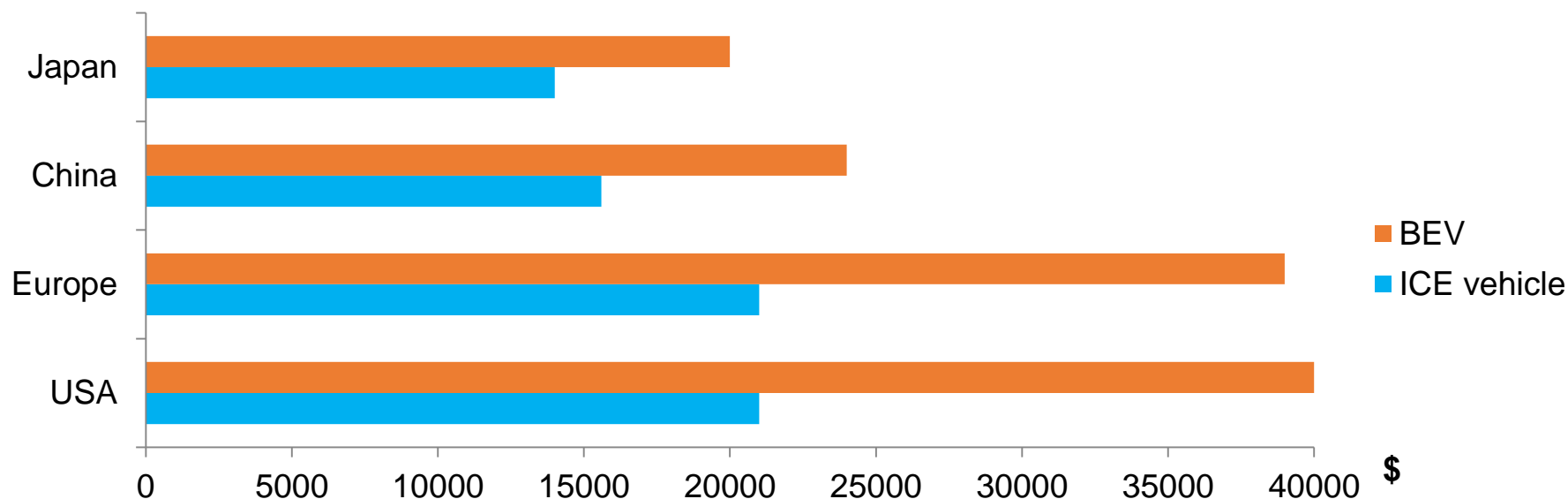


Sources: IHS, Bloomberg New Energy Finance

***In the end of 2016 Tesla has announced 190 USD/kW-h cost of battery***

But still progress in batteries costs reduction, required to make BEVs competitive with the ICE, is huge

Average price for ICE vehicle and for BEV in selected countries

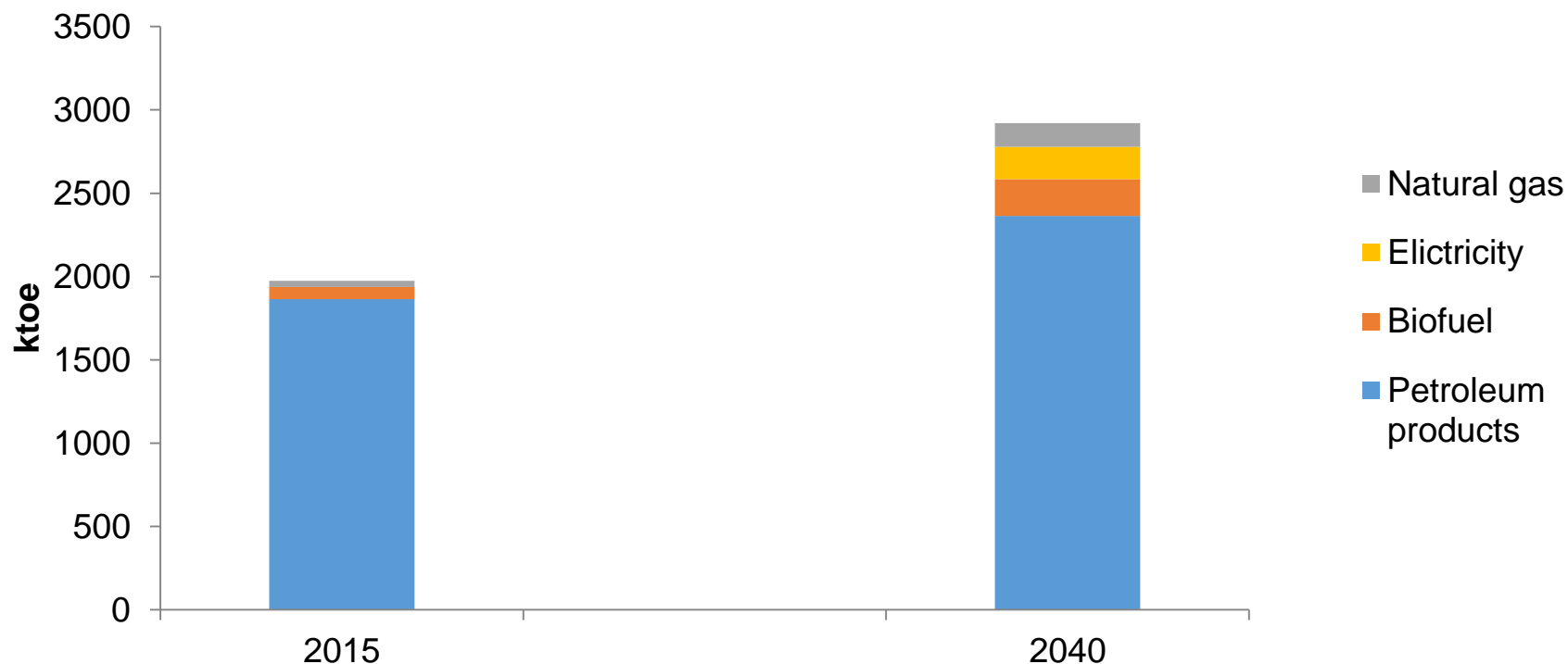


Source: SKOLKOVO Energy Centre

**According to SKOLKOVO Energy Centre estimates, the price for EVs should decrease by 1.5-2 times in order to make BEVs competitive without subsidies. Roughly the same numbers comes from McKinsey calculations: according to them the cost of batteries should go down to \$100 /kw-h**

Our modelling shows that oil products will remain dominant in the road transportation sector for the long-term perspective

**Demand structure in the road transportation sector by fuel type, Baseline scenario**



Source: ERI RAS

***Share of the alternative fuels in the road transportation consumption will exceed 12-16% by 2040***

## Energy efficiency improvements will make higher contribution to the oil demand destruction, than inter-fuel competition

### Factors affecting demand for liquid fuels in the road transportation sector by 2040

