

**Overview:** In this issue of showCASE, our energy expert analyzes the feasibility of hydrogen fuel cells cars (FCVs), trying to estimate their potential in comparison with battery electric vehicles (BEVs). Are the FCVs a passing fad or will they become an integral part of the world's economy and infrastructure?

## Hydrogen Cars: a Fad or the Future?

By: [Karolina Zubel](#), Energy Economist

Tesla's Elon Musk oftentimes convinces us that battery electric vehicles (BEVs) are the future, adding that "[hydrogen fuel cell cars are extremely silly](#), as it is very difficult to make hydrogen, store it, and use it in a car." In fact, ever since first engineers proved that electricity can be generated through the reaction of oxygen and hydrogen, using platinum as a catalyst in [1839](#), the practical application of storing hydrogen evolved substantially. In the last year or so, almost all carmakers decided to join [Toyota and Honda](#), the current frontrunners, in their hydrogen race.



Photo: Mercedes-Benz F-Cell Class B, [mariordo59](#), (CC BY-SA 2.0), Flickr

Supportive of Musk's reluctance, Daniel Cooper from [Engadget](#) claims that "BEVs are significantly cleaner than fuel cell vehicles (FCVs)." Indeed, a common method of hydrogen production involves separating it from natural gas (in the so-called "steam methane reformation" process), but work is well underway to obtain hydrogen

from biomass, a process that would significantly cut the life-cycle emissions from hydrogen to around [60g/km CO<sub>2</sub>](#). In a similar vein, the Australian Government is starting to use [brown coal to produce hydrogen](#) under similar emissions. These levels are below those that BEVs will achieve, even when electricity is sourced from renewable sources, because of the environmental costs of battery production.

Other opponents focus on the FCVs' alleged danger. In reality, FEVs are much safer than conventional combustion cars. Over the last decade, [hundreds of Toyota Mirai test cars](#) have been thoroughly crash and safety tested. They have racked up millions of kilometers over all sorts of demanding terrains. Their hydrogen fuel tanks have even been shot at by high-velocity weapons. The tests proved that the burning hydrogen does

not endanger the passengers of the car and does not damage the vehicle. Hydrogen, the lightest element in the universe, floats in the form of a narrow column, which is why the flame does not engulf the passenger compartment as in the case of gasoline ignition.

Surely, while electric chargers pop up ever more frequently in the world's urban areas, the same cannot be said of hydrogen stations. While it is possible for manufacturers to copy Tesla and build their own refueling stations, the costs involved are higher. There is a general [consensus among the experts](#) that expansion of the hydrogen infrastructure must precede the mass introduction of FCVs in order for the consumer confidence in the availability of hydrogen fuel to rise. In this regard, the program of building a "[Hydrogen Society](#)" has already started in Japan, which aims for 40 thousand FEVs and at least 160 hydrogen stations by 2020. The Japanese society is also educated that, in contrast to classic electric cars, filling the tank with hydrogen takes only 3-4 minutes. The car also has a much larger range. While Nissan Leaf can drive 220-240 kilometers in real conditions and Hyundai Ionic less than 200 kilometers, a typical FEV can cover up to 700 kilometers, which, with the right infrastructure and the price of individual models, can indeed quickly contribute to a large popularity of the technology.

Speaking of popularity, less than two years ago, Jeremy Clarkson, a former BBC Top Gear presenter, asked in his [column in The Sunday Times](#) "why more carmakers are not embracing hydrogen as a sustainable fuel". Clarkson's plea was one of numerous incentives to form the Hydrogen Council – a global initiative of leading energy, transport and industry companies with a united vision and long-term ambition for hydrogen. Launched at the World Economic Forum 2017 in Davos, the growing coalition of CEOs skillfully promotes hydrogen, and FEVs in particular.

There are still a lot of "ifs" regarding hydrogen, but there are far fewer of them today than there were a decade ago. One should also remember that the use of fuel cells does not end with cars – for example, [hydrogen powered forklifts](#) are becoming a reality, just like some of the latest submarines, such as the [German Type 212](#). Work is also underway on the supply of household appliances with hydrogen. In 2015, [an experimental iPhone 6 hydrogen battery](#), which worked without charging for a week, was created, and the technology is currently being refined. Japan intends to use large-scale fuel cells to supply offices and flats in a firm belief that the key to encouraging FEVs is making them part of a wider "hydrogen economy". Building refueling stations for hydrogen cars alone would be inefficient; instead, the whole energy sector should incorporate hydrogen into the mix, from refueling cars to storing energy for homes. If it is a future, it is really just around the corner.



**This week:** A law that limits Sunday trade came into force this month, banning trade on two Sundays in a month. March 11 became the first Sunday on which trade was banned. The ban will extend to three Sundays in a month in 2019, and Sunday trade will be banned entirely by 2020. The law has been criticized for negative economic effects and imprecision with regard to its numerous exceptions (e.g. for bakeries, petrol stations, post offices, airports).

**GDP (Q4 2017)**

↓ **4.3% y/y (est.)**

Down from 5.2 % in Q3 2017

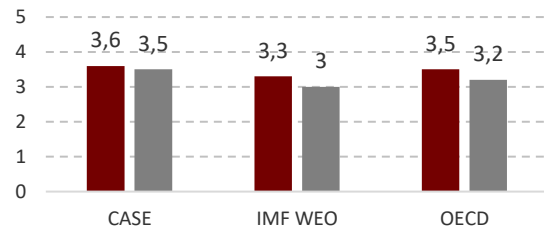
**Inflation (Jan 2018)**

↓ **1.9% y/y**

Down from 2.1% in Dec 2017

**Real GDP forecast (%)**

■ 2018 ■ 2019



**Unemployment (Jan 2018)**

↓ **6.5%**

Down from 6.6% in Dec 2017

**NBP Base rate**

**1.5%**

From 2% in Mar 2015



**This week:** The Russian Central Bank will buy an additional issue of B&N Bank's shares in the amount of RUB 56.9 billion (EUR 812.8 million) to bolster B&N's financial strength. This comes on the heels of the Central Bank's takeover of three private lenders: B&N Bank, Bank Otkritie, and Promsvyazbank (PSB). The new owner has since converted PSB into a defense sector bank, and it plans to merge B&N Bank with Bank Otkritie by April 2019 and then sell the company on the market.

**GDP (Q3 2017)**

↓ **1.8% y/y**

Down from 2.5% in Q2 2017

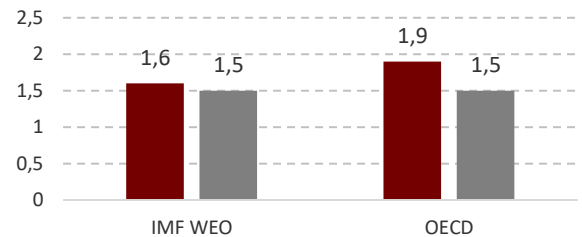
**Inflation (January 2018)**

↓ **2.2% y/y**

Down from 2.5% in Dec 2017

**Real GDP forecast (%)**

■ 2018 ■ 2019



**Unemployment (Jan 2018)**

↑ **5.2%**

Up from 5.1% in Nov 2017

**CBR Base rate**

**7.5 %**

From 7.75% in Jan 2018



**This week:** The number of job vacancies in Germany hit an all-time high in the last three months of 2017, underlining the strength of the labor market, which is pushing up wages and fuelling a consumer-led upswing in Europe's biggest economy. Vacancies surged by 85,000 on the quarter and by 128,000 on the year to reach 1.18 million in Q4 2017, a survey by the IAB labor office research institute has found.

**GDP (Q4 2017)**

↑ **2.9% y/y**

Up from 2.8% in Q3 2017

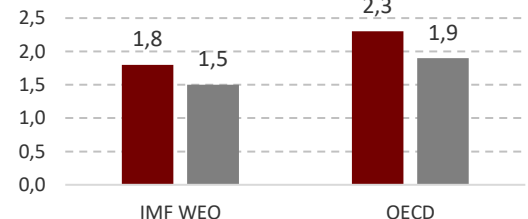
**Inflation (Feb 2018)**

↓ **1.2% y/y (est.)**

Down from 1.4% in Jan 2017

**Real GDP forecast (%)**

■ 2018 ■ 2019



**Unemployment (Jan 2018)**

↑ **3.6%**

Up from 3.5% in Dec 2017

**ECB Deposit rate**

**-0.4%**

From -0.3% in Dec 2015



**This week:** According to the report by AVentures Capital, investment in Ukrainian IT companies reached USD 265 million (EUR 213 million) in 2017, making a 3.3-fold increase from 2016. Foreign capital accounted for 96% of total investment, significantly more than a year earlier, when its share was roughly equal to that of local capital. Last year, Ukrainian startups attracted investment from venture funds (90%), business angels (6%), and crowdfunding platforms (3%).

### GDP (Q4 2017)

↓ 1.8% y/y

Down from 2.1% in Q3

### Inflation (Jan 2018)

↑ 14.1% y/y

Up from 13.7% in Dec

### Unemployment (Q3 2017)

↓ 8.9%

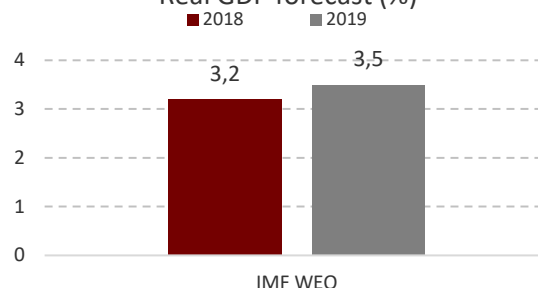
Down from 9.1% in Q2 2017

### NBU Base rate

16.0%

From 14.5% in Dec 2017

### Real GDP forecast (%)



**This week:** The consortium of Škoda Transportation and the Slovak railway company ŽOS Trnava has won a EUR 160 million tender for the delivery of 25 electric units to the state-owned railway operator ZSSK (Železničná spoločnosť Slovensko). The two versions of new RegioPanter electric units will be supplied for regional operation on all electrified lines in Slovakia, allowing the operator to keep a dependable train schedule in difficult conditions.

### GDP (Q4 2017)

↑ 5.2% y/y

Up from 5.1% in Q3 2017

### Inflation (Feb 2018)

↓ 1.8% y/y

Down from 2.2% in Jan 2017

### Unemployment (Q4 2017)

↓ 2.4% (est.)

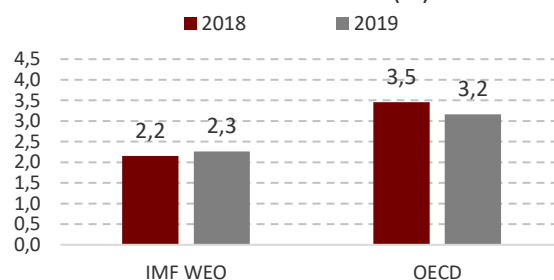
Down from 2.8% in Q3

### CNB Base rate

0.75%

From 0.5% (2<sup>nd</sup> Jan 2018)

### Real GDP forecast (%)



**This Week:** The Hungarian Central Statistical Office (KSH) has informed that Hungary's GDP grew by 4.4% in Q4 2017 and by 4% in the entire 2017, year on year. All the sectors with the exception of agriculture contributed to the growth. According to the latest forecasts presented by the Ministry of Economy, Hungary's economy will expand by 4.3% this year.

### GDP (Q4 2017)

↑ 4.4% y/y (est.)

Up from 3.9% in Q3

### Inflation (Feb 2018)

↓ 1.9% y/y

Down from 2.1% in Jan 2018

### Unemployment (Q4 2017)

↓ 3.8%

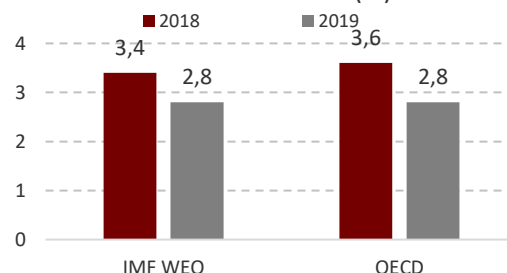
Down from 4.1% in Q3

### MNB Base rate

0.9%

From 1.05% in May 2016

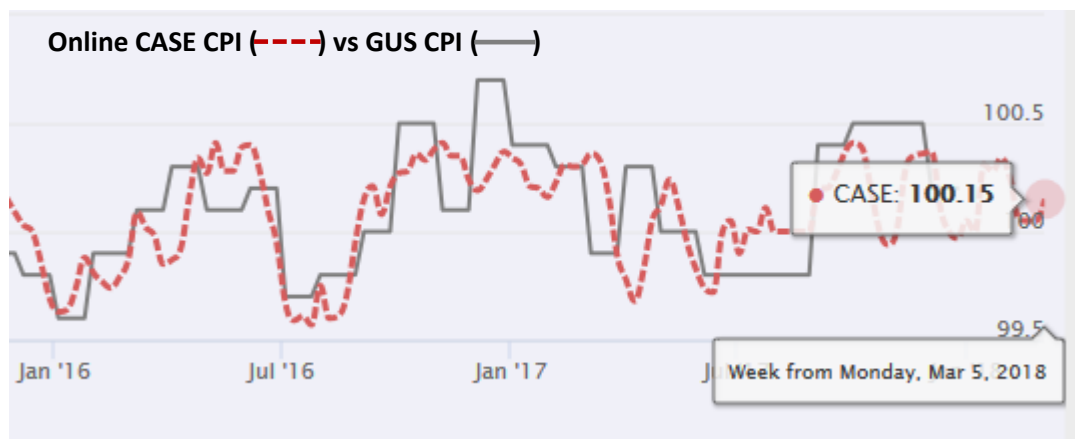
### Real GDP forecast (%)



## The weekly online CASE CPI

The online CASE CPI is an innovative measurement of price dynamics in the Polish economy, which is entirely based on online data. The index is constructed by averaging prices of commodities from the last four weeks and comparing them to average prices of the same commodities from four weeks prior. The index is updated weekly.

### Our weekly online CASE CPI



## Monthly CASE forecasts for the Polish economy

Every month, CASE experts estimate a range of variables for the Polish economy, including future growth, private consumption, and foreign trade, current account balance, and the CPI.

### **CASE economic forecasts for the Polish economy** *(average % change on previous calendar year, unless otherwise indicated)*

	<b>GDP</b>	<b>Private consumption</b>	<b>Gross fixed investment</b>	<b>Industrial production</b>	<b>Consumer prices</b>
<b>2018</b>	3.6	3.6	4.1	3.7	2.5
<b>2019</b>	3.5	3.6	3.3	3.8	2.3
	<b>Nominal monthly wages</b>	<b>Merchandise exports (USD, bn)</b>	<b>Merchandise imports (USD, bn)</b>	<b>Merchandise trade balance (USD, bn)</b>	<b>CA balance (USD, bn)</b>
<b>2018</b>	4.5	233.4	235.2	-1.8	-3.9
<b>2019</b>	3.7	242.7	244.6	-1.9	-4.1

For more information on our weekly online CASE CPI, please visit: <http://case-research.eu/en/online-case-cpi>  
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