Europe monitor

The energy systems revolution in Europe
Macroeconomic update Europe
Country update Germany

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The energy systems revolution in Europe

The Green Deal, the European Commission's roadmap towards a net-zero and circular economy in 2050, requires that we change the way in which we produce and consume energy. It requires an energy transition that can only succeed if the systems in the energy sector integrate.

What is energy systems integration and what does it mean for Europe?

Energy systems integration is the process of coordinating the operation and planning of energy systems across multiple pathways and/or geographical scales to deliver reliable, cost effective energy services with minimal impact on the environment. Systems integration focuses on issues such as coupling and optimising the infrastructures for production, transport and storage of energy, finding the optimal transition paths for each. It means linking the various energy carriers - electricity, heat, cold, gas, solid and liquid fuels - with each other and with the end-use sectors.

Climate change is in large part a consequence of energy use. Mitigating climate change depends on whether energy use can be reduced, energy can be decarbonised or both. Renewable electricity is expected to decarbonise a large share of the EU's energy consumption by 2050, but not all of it.

Electrification is not the solution for all sectors

Electrification and the use of renewable electricity will play a vital role in decarbonising electricity use in the construction sector and in (some) road transport and industry. However, for many other sectors a similar decarbonisation will be much harder to achieve.

The maritime and aviation transport sectors require high-density energy carriers such as oil and its derivatives, and certain industrial processes, such as steel making, require high temperature heat. Those are processes that cannot be electrified. In those sectors, renewable and low carbon fuels will more likely become the solution in order to decarbonise those processes.

This is where systems integration comes into play: integrating the different energy systems can enable the reduction of greenhouse gas emissions in sectors where electrification is not a viable alternative. Here the solution will be to close circles and avoid wasting heat released in industrial processes, and to use cleaner fuels where electrification is not the solution.

Breaking down silos

For years, our energy system was built on several parallel, vertical energy value chains, which rigidly link specific energy resources with specific end-use sectors. To some extent this rigidity is still there. For instance, petroleum products are predominant in the transport sector and inputs for industry. Electricity and gas networks are planned and managed independently from each other. Market rules are also largely specific to different sectors.

The last decades have seen changes to this, mainly in the power sector where switching between resources is possible at scale. In order to further decarbonise the European energy system, this integration would need to happen across the whole energy system.

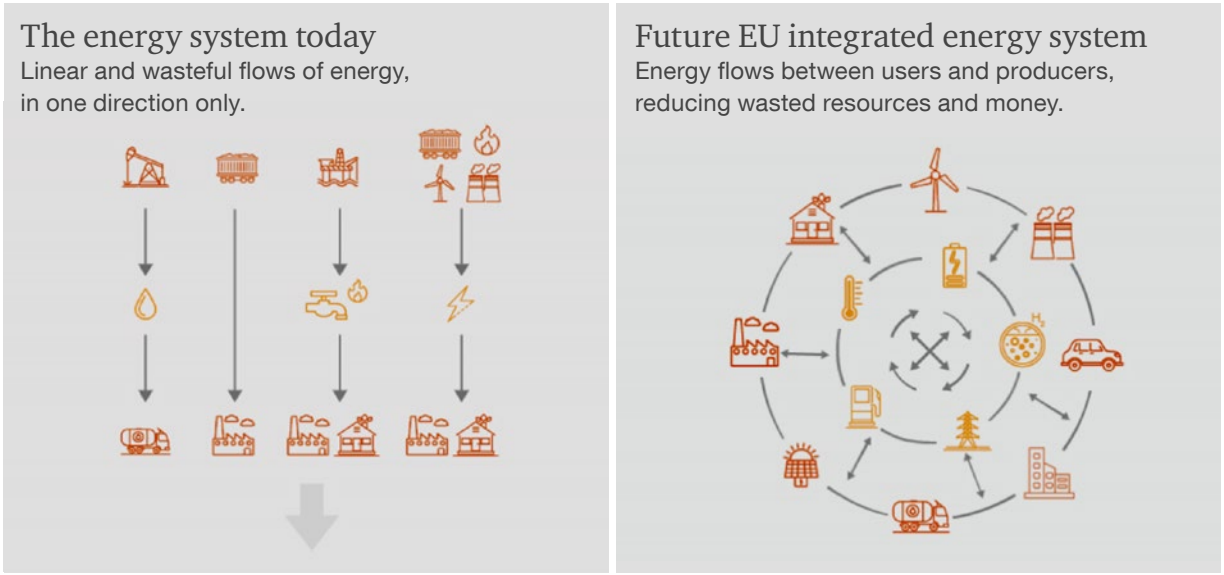
A new energy system

Four aspects must be considered in order for energy systems integration to happen successfully.

1. Sector coupling

Sector coupling is one key element of energy systems integration. Originally, sector coupling referred primarily to the coupling of energy demand (e.g. transport, domestic heating, and industrial heat and steam) with renewable electricity supply. However, as it is unlikely that all demand can be fully electrified, sector coupling has come to refer to the integrated management of the power and gas sectors, including its infrastructure. This would require cooperation between the transmission system operators (TSOs) of gas and electricity networks.

Figure 1 From a linear siloed energy system to a circular integrated one



Source: European Commission

The aim of sector coupling is to optimise the balance between electrification and low-carbon fuels, such as hydrogen, in order to meet energy demand at the lowest societal cost. Electrification becomes the solution where this is the most efficient, but low carbon fuels are used where this is the most efficient. Both electricity and gas networks interact with all end uses, i.e. heating, transport, power consumption, feedstock for industry, etc.

2. Energy circularity

Energy circularity refers to the concept of reusing residual heat and waste streams for energy purposes. This cannot be done without energy systems integration that link energy carriers – such as electricity, heat, cold, gas, solid and liquid fuels - with each other and with various end-users.

A large, yet often unexploited potential is the reuse of waste heat from industrial sites, data centres or other sources. Energy reuse can take place on-site, for example through the re-integration of process heat within a manufacturing plant, or via a district heating and cooling network. To date, 29% of industrial energy demand is wasted, as waste heat is often present at locations where there is no demand for it, or with only expensive and inefficient transport options. However, one example where these challenges have been overcome is in the Swedish city of Luleå which takes advantage of the gases produced by the local steel plant. The plant is connected to the city's district heating network.

3. Cross-border and cluster collaboration

Power systems have increasingly started to operate across borders, mainly for economic reasons. However, collaboration is still happening mostly at a small scale and mainly in the power sector. In order to really achieve a fully integrated European energy system, cross-border integration would need to include the whole energy system, i.e. gas networks, smart grid infrastructure, supply chains and fuel and electrical charging networks for transport.

> The role of governments and the EU is to create a playing field where interests are aligned and externalities are priced-in, while competition is stimulated.

As the whole EU needs to become carbon neutral, countries will need to collaborate to balance the increasing share of intermittent renewable energy sources in the system. To enable this, a common regulatory framework that removes administrative barriers and ensures a level playing field across Europe is needed.

Cross-border collaboration leads to a more optimal use of existing assets (static efficiency), but also to more optimal investment in production capacities and transmission networks by allowing investment flows to find their welfare maximising routes (dynamic efficiency).

Collaboration is about optimising resources and does not concern only cross-border collaboration. Industrial clusters are groups of often specialised companies and other public or private organisations that cooperate closely. Together, those companies can be more innovative as energy projects will benefit from the different competencies and expertise that each party brings.

4. The role of hydrogen

Hydrogen, and especially green hydrogen produced from renewable energy, is among the fuels with the highest decarbonisation potential for hard to abate sectors. Hydrogen offers solutions for the transport system, such as the maritime and aviation sectors. Hydrogen can also replace fossil fuels in some carbon intensive industrial processes, such as the steel and chemical sectors. However, implementing the use of hydrogen at large scale will require systems integration in order to become viable.

Additionally, hydrogen has a strong potential to solve the storage issue created by intermittent renewable energy sources (mainly solar and wind) and can become a vector for renewable energy storage, alongside batteries. Hydrogen storage would ensure back-up for seasonal variations (that batteries cannot provide) and connecting production locations to more distant demand centres.

Unlike the greening of power – which seems broadly on track – the introduction of more low-carbon fuels such as (blue and green) hydrogen is lagging. Fuels, today mostly fossil fuels, are the backbone of the European energy system and will likely remain so as we move towards 2050. Achieving the EU's 2050 target will therefore require switching to lower-carbon fuels as a prime policy priority in the current decade.

The way forward

Creating an integrated European energy system is not going to happen overnight. There are good historical reasons why the energy sector was organised in silos, but it is also clear that this historical heritage has created barriers that prevent energy systems integration from happening at full scale. While energy systems are now more intertwined than before, especially in the power sector, there is still some way to go.

For instance, the divided ownership and opposite interests within the energy sector present a barrier. The electricity sector, for example, has long been in public hands, while the oil and gas sector has been dominated by privately owned large multinationals. The alignment of interests within the electricity sector has further decreased in the past decades, as Europe (and much of the world) has pursued a strategy of privatisation in order to foster competition. Regulation about the separation of production and trading activities has further increased complexity.

To overcome these barriers, companies and governments need to work together. The role of governments and the EU is to create a playing field where interests are aligned and externalities are priced-in, while competition is stimulated. Companies on their hand must dare to look beyond their own short-term profit and loss accounts, and instead get creative in order to find common ground to get projects going. Only by widening the perspective, can the socially optimal solutions be realised.

For more information on this research, please visit the *Green Deal Monitor issue # 2*.

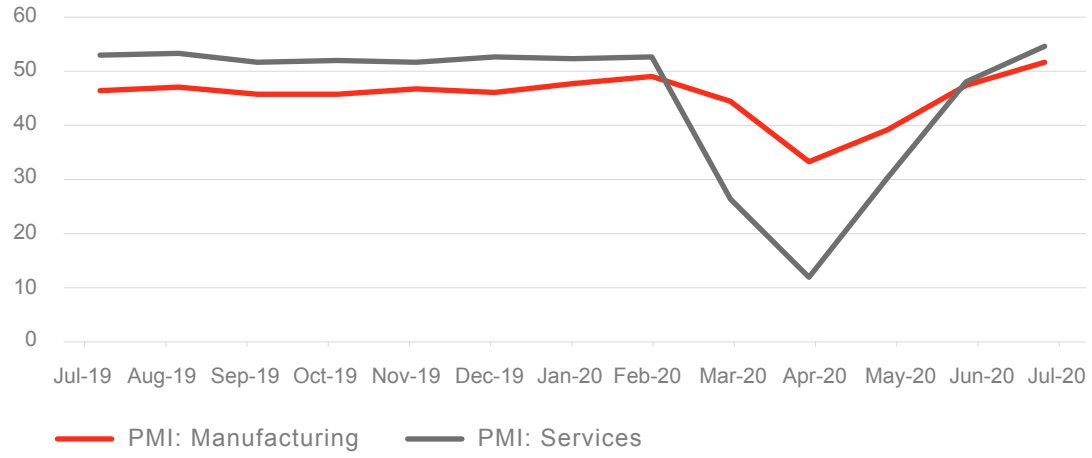
Macroeconomic Update Europe

Defying hope, COVID-19 did not disappear during the warmer summer months, meaning the defeat of the virus remains prominently on policy agendas. Current economic discussion focuses on the magnitude of government aid packages, increasing unemployment, trade disruptions, heightened public debt levels, and the effect of central bank interventions. As expected, the second quarter macroeconomic results of 2020 marked new lows in a number of economic indicators. With a quick V-shaped recovery no longer within reach, the looming question is whether the second half of 2020 will be any better than the first half of the year.

GDP growth and lockdown measures

In the second quarter of 2020, Eurozone GDP contracted by 14.5%, while the Turkish economy contracted by 10% compared to the same period in 2019. The observed contractions have placed renewed interest on the relation between the stringency of lockdown measures and economic growth on a per country basis.

Figure 2 Eurozone Purchasing Managers Index: Services and Manufacturing



Source: Markit Economics

Though it is still too early to conclude, a new study published in August 2020 shows that the drop in GDP is not as tightly correlated with the stringency of the lockdowns as previously assumed.[1]

Services versus manufacturing

As expected, the spread of the pandemic and associated lockdown measures have resulted in a significant drop in the output of both services and manufacturing sectors across Europe. The contraction in activity, as reflected in the Purchasing Managers Index (PMI), was the sharpest in April for both sectors. Services have nonetheless been the hardest hit due to the shutdown of non-essential face-to-face businesses. May and June data showed continued contraction compared to the previous months, with PMI values of below 50[2]. July was the first month to indicate an improvement in economic activity compared to the previous month, with a PMI slightly above 50 in both services and manufacturing. The improvement is expected to continue, absent a second wave of infections and lockdowns. (Figure 2)

1 https://www.mckinsey.com/featured-insights/coronavirus-leading-through-the-crisis/charting-the-path-to-the-next-normal/more-stringent-lockdowns-arent-necessarily-worse-for-gdp

2 A PMI value below 50 indicates a contraction of activity, while one above 50 reflects expansion.

Long-term growth path

The latest projections foresee that it will be later than the end of 2021 before we can go back to pre-pandemic GDP levels. While no one is surprised by the fall in GDP growth as a result of the spread of COVID-19, an impending uncertainty is whether the GDP growth rate in the coming years will be structurally lower than pre-pandemic GDP. A new study suggests that the largest economic cost of the COVID-19 pandemic could arise from a "scarring" of beliefs, i.e. a persistent change in the perceived probability of an extreme, negative shock in the future.[3] These scarred beliefs are found to produce long-term changes in behaviour that produce long-term weaker growth. The authors find that public policies aimed at preventing bankruptcies and the permanent separation of workers and capital, which makes capital idle, can partially offset the future economic slowdown.

Government expenditure

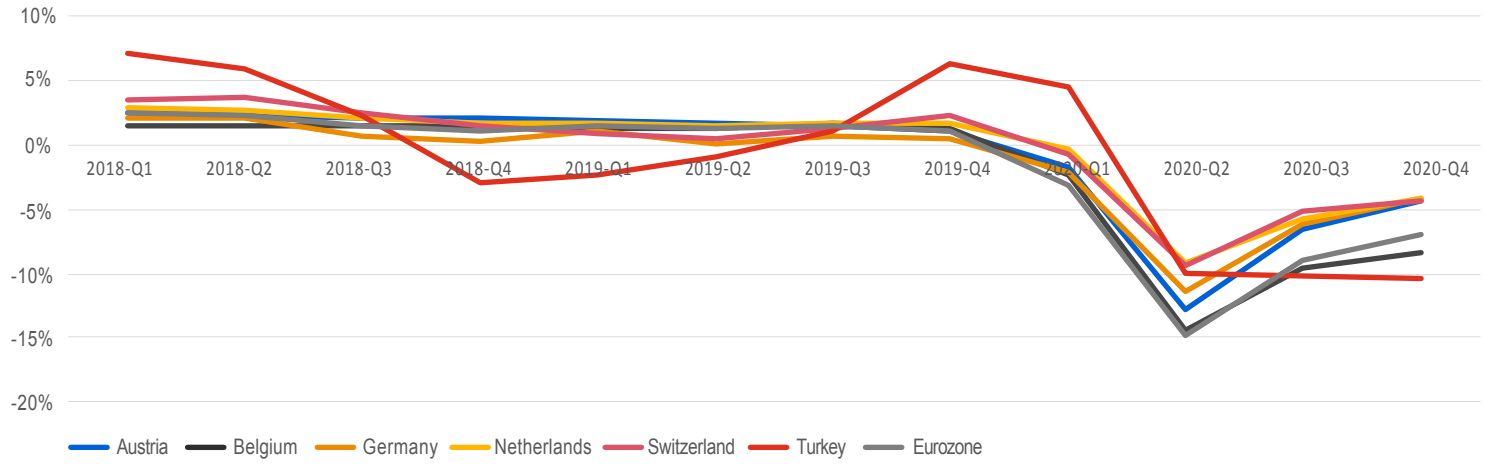
The European Union's € 750 billion fiscal package agreed at the end of July 2020 marked a milestone in the fight against the economic consequences of COVID-19. The package, which amounts to around 5% of EU GDP, will consist of collective borrowing through bonds issued by the European Commission, and will be spent over the coming years. This prospective increase in debt goes hand-in-hand with the agreement that no fiscal rules apply during the pandemic. The agreement allows many European countries' already existing government deficits and government debt to GDP ratios to grow larger, and further surpass the Maastricht limits of 3% and 60% respectively. (Figure 3)

3 Kozlowski, Julian, et al. Scarring Body and Mind : The Long-Term Belief-Scarring Effects of Covid-19. National Bureau of Economic Research, 2020.

Figure 3 Real GDP as % change from a year earlier

Sustainable Development Goal 8: Decent work and Economic growth

Employment and economic growth usually go hand-in-hand. The magnitude of GDP contraction seen in 2020 has however not resulted in unprecedented unemployment so far. This is for the most part a result of government aid packages that do not allow businesses to lay off workers upon receipt of aid. Nevertheless, the temporary nature of these packages casts doubts on the sustainability of low employment if growth does not pick up.



Source: IHS Markit

The 2020 increases in public spending are expected to add to the already high public debt to GDP ratios of many European economies.

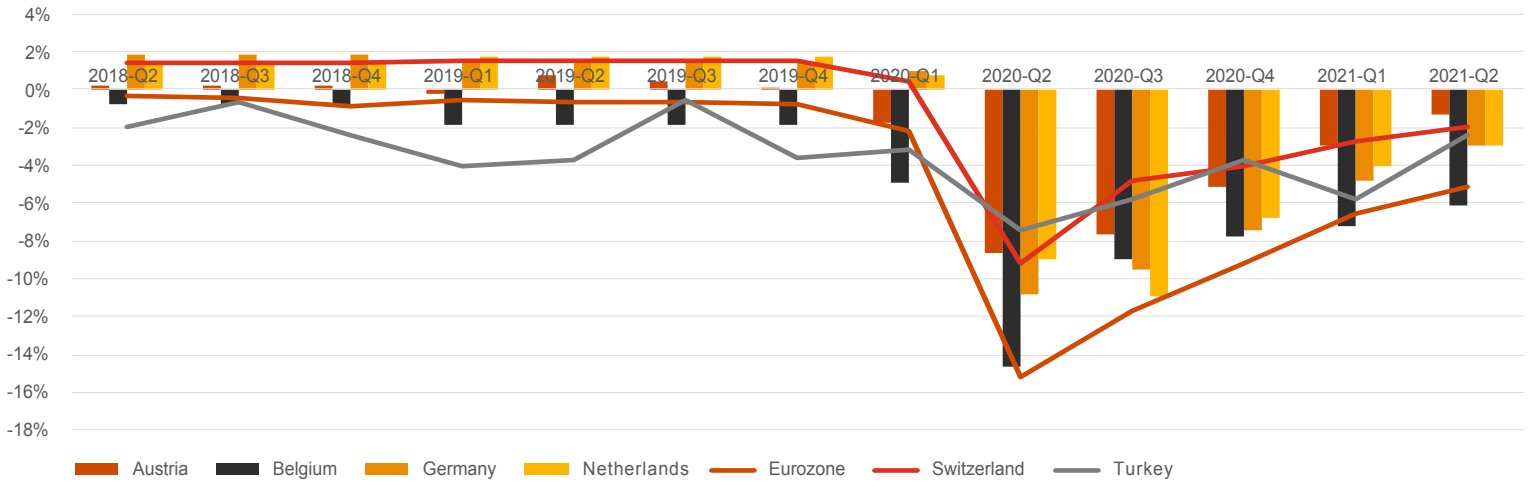
With low and sometimes negative interest rates on government debt, the increasing deficits and debt levels seem less problematic. Nevertheless, the issue of taxation as a means to replenish government budgets, which until now has been accommodative in efforts to spare corporations from further burdens, will become more prominent when COVID-19 fears subside, and economic recovery is underway.

The 2020 increases in public spending are expected to add to the already high public debt to GDP ratios of many European economies. Public debt to GDP for the Eurozone is expected to increase from 84.1% of GDP in the end of 2019 to 103% by the end of 2020. Similarly, Turkish public debt to GDP is expected to reach 39% by the end of 2020, up from 30.5% at the end of 2019. These levels are expected to peak in 2021 and subside thereafter as government expenditure diminishes.

Sustainable Development Goal 13: Climate Action
The decline in pollution has arguably been the silver lining to the COVID-19 pandemic. The hope that the pandemic would result in a rethink of government investment towards a greener economy seems to be closer to reality with the finalisation of the Next Generation EU deal in the European Union. Made up of grants and loans, one of the aims of the package is to invest in a greener EU.

Partially covered by the above recovery fund, France announced in the beginning of September 2020 a € 100 billion economic stimulus package, of which a third will be spent on green energy transition.

Figure 4 Government balance to GDP



Source: Oxford Economics

Employment

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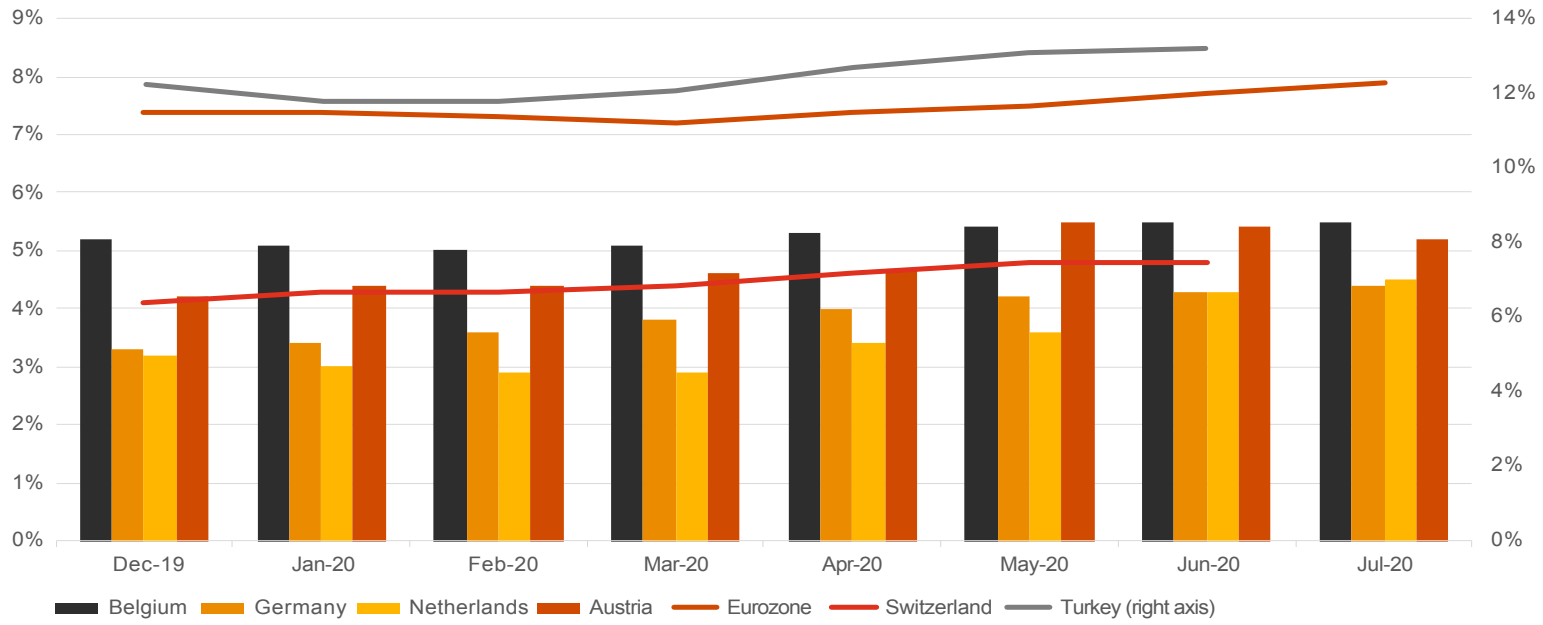
Sustainable Development Goal 1: No Poverty

The temporary nature of government support schemes and the threat of lower employment in the face of a prolonged pandemic has generated renewed interest in the topics of universal basic income (UBI) and shorter work week. Both alternatives are seen as solutions to a potentially structurally lower level of employment, a means to reduce inequalities, and a way of improving the wellbeing of the population.

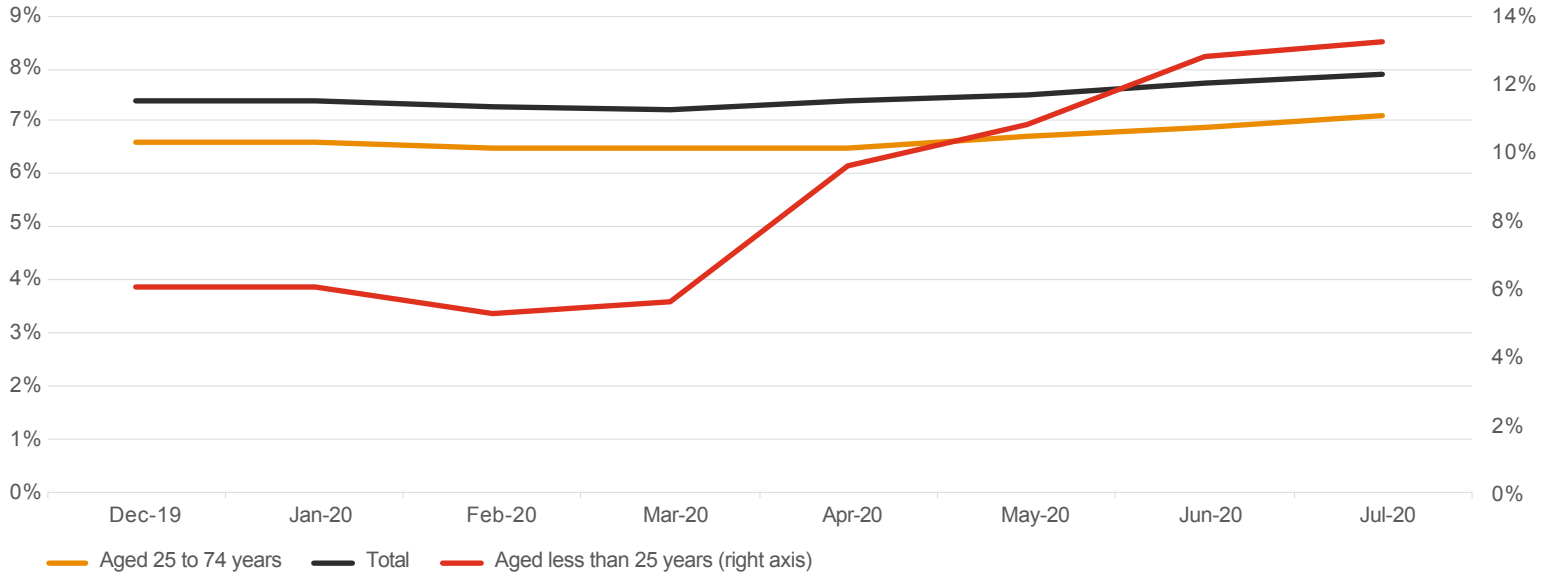
Figure 5 Unemployment as % of active population



Source: Eurostat

Figure 6 Eurozone unemployment as % of active population

Sustainable Development Goal 10: Reduced Inequalities
The increase in unemployment for those under 25 years old has been much more pronounced than the increase in unemployment for other age groups. This trend is thought to reflect both the inability of graduates to find jobs due to low rates of job openings, and the nature of many face-to-face service jobs that are primarily filled with those under 25.



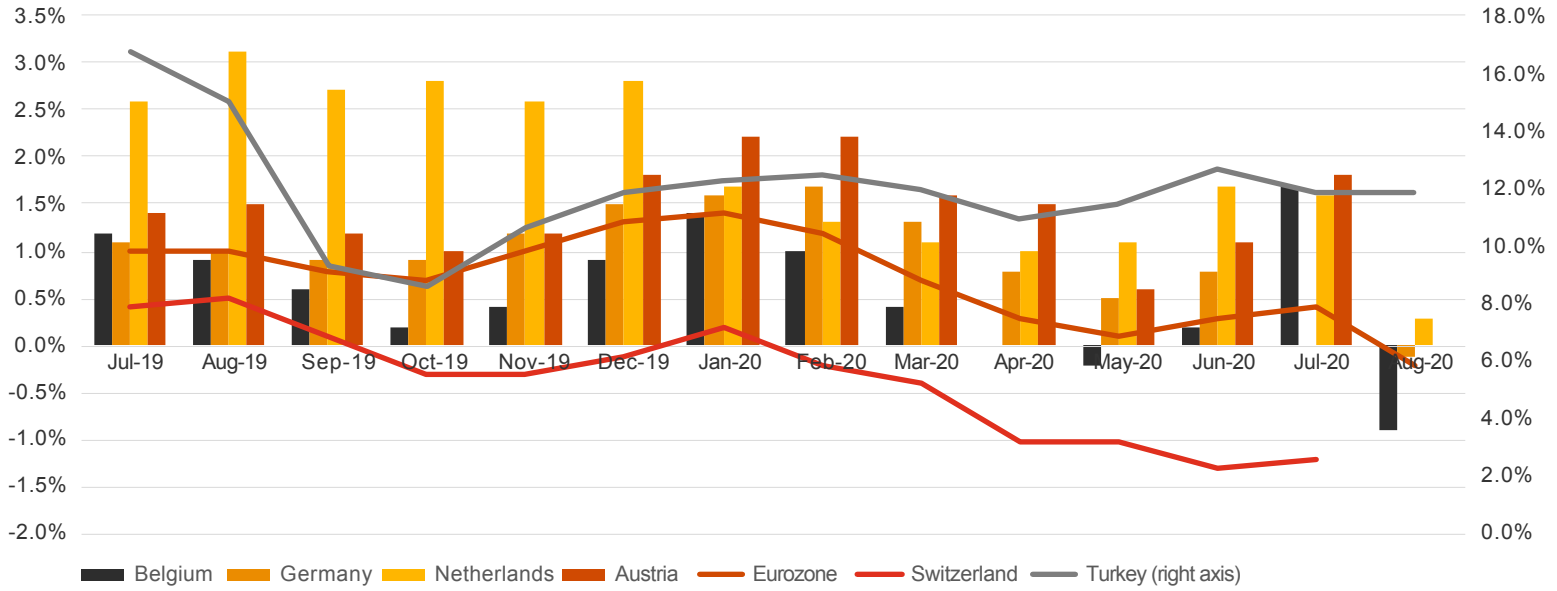
Source: Eurostat

Inflation

Inflation prospects in the Eurozone remain subdued at 0.3% for 2020, with downward pressure from weak consumer demand expected to dominate any upward pressure from supply side disruptions. Oil prices are a main factor holding back inflation. For the Eurozone, inflation excluding energy stood at 0.7% in August 2020, while total HICP inflation (including energy) stood at -0.2%. All this is despite the expansionary stance of the ECB, which includes a € 750 billion Pandemic Emergency Purchase Program and further easing of its existing long-term lending operations.

This is good news for European governments' debt sustainability outlook. Low interest rates support highly indebted governments whose nominal economic growth exceeds their government debt interest rates, providing a way for them to outgrow their debt. Meanwhile, Switzerland is on a deflationary trend since January 2020, with inflation reaching -1.2% in July 2020. In Turkey, inflation stood at 11.8% in August. In Turkey, inflation stood at 11.8% in August. Although the Turkish Central Bank has stopped any easing since June 2020 and started to tighten its monetary policy stance, recent depreciation in the Turkish Lira keeps inflationary risks alive for the rest of 2020. (Figure 7)

Figure 7 HICP inflation



Source: Eurostat Note: Data for Austria and Switzerland is lacking for August 2020

Private consumption

Despite labour market policies that have limited the loss in disposable incomes, household final consumption in the Eurozone decreased by 15.9% in the second quarter of 2020, compared to the same quarter of last year. The reasons for the decline are twofold: precautionary savings because of an uncertain economic outlook, and an inability to spend because of the shutdown of many non-essential activities. While an improvement is foreseen for the rest of 2020, private consumption is expected to contract by 8.9% on an annual basis by the end of 2020.

Table 1 Key economic indicators, selected European economies

	GDP growth (% change)	Industrial production (% change)	Consumer spending (% change)	Capital investment (% change)	Unemployment rate (%)	Consumer prices (% change)
Eurozone	-14.7	-11.9	-15.9	-21.1	7.5	-0.2
Austria	-12.7	-10.4	1.5	-11.4	5.5	1.4
Belgium	-14.4	-10.5	-11.1	-20.8	5.4	-0.9
France	-18.9	-11.7	-23.1	-22.4	7.1	0.2
Germany	-11.3	-11.5	-18.7	-8.6	4.1	-0.1
Italy	-17.7	-13.7	-21.2	-21.6	7.8	-0.5
Luxembourg	-0.2*	-16.4	5.4	-15.0*	7.3	-0.2
Netherlands	-9.2	-7.5	1.2*	-11.0	3.8	0.3
Spain	-22.1	-14.0	3.0	-26.8	15.5	-0.6
Switzerland	-9.4	-8.7**	-12.5	-7.9	4.8	-1.4
Turkey	-10.0	-0.4	-8.7	-6.1	14.1	11.8
United Kingdom	-21.7	-12.5	-27.4	-27.0	3.9	0.2

Note: GDP growth, consumer spending, and capital investment are quarterly, year-on-year, seasonally adjusted figures from the second quarter of 2020 (unless specified differently). Unemployment data is quarterly data from the second quarter of 2020. Industrial production and consumer prices are monthly year-on-year figures from the month of June and August respectively (unless specified differently). Consumer prices are reported according to the HICP methodology, except for Turkey.
* First quarter of 2020, ** May 2020
Source: Thomson Reuters, Eurostat, Federal Statistical Office Switzerland, Turkish Statistical Institute.

A main issue going forward is how risk averse households will be, and for how much longer they will defer spending. This will for the most part be determined by the employment outlook.

Capital investments

The prolonged low profitability of corporations caused by the pandemic has the potential to turn what initially were only liquidity problems into solvency ones. Therefore, despite public intervention, the financial situation of corporations, coupled with continuing uncertainty related to COVID-19, is set to hurt investment prospects.

In the Eurozone, gross fixed capital formation contracted by 21.1% in the second quarter of 2020 compared to the same quarter of the previous year. It is expected to stand at -11.3% at the end of 2020, compared to the end of 2019. In the case of Turkey, fixed investment is projected to shrink in 2020 for the third consecutive year.

At a time when growth is much needed, a lack of capital investment will only exacerbate the outlook as companies will not be able to adapt to a changing economy.

Net exports

The decline in trade and weak demand that have resulted from the COVID-19 pandemic have reduced both imports and exports at the EU level. Therefore, the contribution of net trade to growth has not been substantial in the first half of 2020, and this is expected to continue for the rest of the year. For Turkey, however, the decline in exports has been much more pronounced than the that in imports, thereby negatively contributing to GDP. The spread of the pandemic has affected international supply chains, prompting governments and corporates alike to rethink trade and manufacturing. This rethink of supply chains adds to the unpredictability of future net trade balances.

Country Update: Germany

GDP

The national shutdown to limit the spread of COVID-19 between 22 March and 14 April 2020 had a strong impact on the German economy. Though German infection figures are low compared to other countries, policies to control the spread of COVID-19 still affect the German business environment. In the second quarter of 2020, gross value-added decreased across most German sectors with manufacturing (-20.8%) and services (-16.0%) experiencing the greatest declines[4] (y-o-y, adjusted for price). The German government launched numerous measures to stabilize economic activity in the short term and to stimulate economic recovery. Examples are adjusted regulations for *Kurzarbeitergeld* to avoid high levels of unemployment, credits and financial aid to provide liquidity to enterprises, and a reduced VAT to promote private consumption.[5]

In total, German GDP fell by 11.3% in the second quarter of 2020 (y-o-y, adjusted for price, as are all other GDP related figures), a sharper decline than during the Financial Crisis of 2008/2009, where GDP decreased by 7.9% in Q2 2009. On the expenditure side, this development can be traced especially to a decline in domestic household consumption and a decrease in the German trade balance. Government consumption and investment in construction are the only two components that increased.[6]

Employment

Coinciding with the decision for a national lockdown, the German government eased the conditions for companies to register and access Kurzarbeitergeld. Kurzarbeitergeld is a well-established mechanism in the German social system to ease the economic impact of a time-limited economic crises. To avoid unemployment, the Federal Labour Office subsidizes 60% of the monthly net income, increasing with time to up to 80% (87% for employees with children), for those working reduced hours as a result of an economic downturn. The adjusted regulations are applicable until December 2021.

The shutdown and the impact on the economy led German unemployment to increase from 5.3% in February 2020[7] to 6.3% in July 2020[8], or by about 500,000 people. Yet, at the same time, an additional six million people received Kurzarbeitergeld in April 2020, and more than five million still received this payment in June, stabilising both household income and expectations. (Table 2)

Table 2: Employment in Germany[9]

	02/2020	03/2020	04/2020	05/2020	06/2020	07/2020
Employed	45,037,000	45,035,000	44,895,000	44,642,000	44,623,000	44,649,000
Unemployed	2,395,604	2,335,367	2,643,744	2,812,986	2,853,307	2,910,008
Accessed Kurzarbeitergeld*	133,924	2,600,083	5,979,148	5,818,432	5,355,874	Not yet available

* Figures for 03/2020 to 06/2020 are projections.

4 https://www.destatis.de/DE/Themen/Wirtschaft/Volkswirtschaftliche-Gesamtrechnungen-Inlandsprodukt/Publikationen/Downloads-Inlandsprodukt/inlandsprodukt-vierteljahr-pdf-2180120.pdf?__blob=publicationFile, Page 19

5 A more comprehensive overview is available at https://blogs.pwc.de/german-tax-and-legal-news/2020/04/22/covid-19-summary-of-measures-introduced-to-combat-the-effects-of-the-coronavirus-covid-19-sars-cov-2/

6 https://www.destatis.de/EN/Press/2020/08/PE20_323_811.html

7 https://www.arbeitsagentur.de/datei/arbeitsmarktbericht-mai-2020_ba146527.pdf, Page 53

8 https://www.arbeitsagentur.de/datei/arbeitsmarktbericht-august-2020_ba146633.pdf, Page 54

9 https://statistik.arbeitsagentur.de/Statistikdaten/Detail/Aktuell/iiia7/kurzarbeit-hr/kurzarbeit-hr-d-0-xlsx.xls, accessed 07.09.2020, https://www.arbeitsagentur.de/datei/arbeitsmarktbericht-mai-2020_ba146527.pdf, https://www.arbeitsagentur.de/datei/arbeitsmarktbericht-august-2020_ba146633.pdf

Consumption and Investment

As a result of the stabilizing measures on the labour market, household consumption reflecting 52% of total GDP in 2019 decreased by 1.6% and by 13.0% in the first and second quarters of 2020 respectively, significantly less than industrial production. Government consumption increased by 2.7% and 3.8% respectively in the first quarters of 2020.

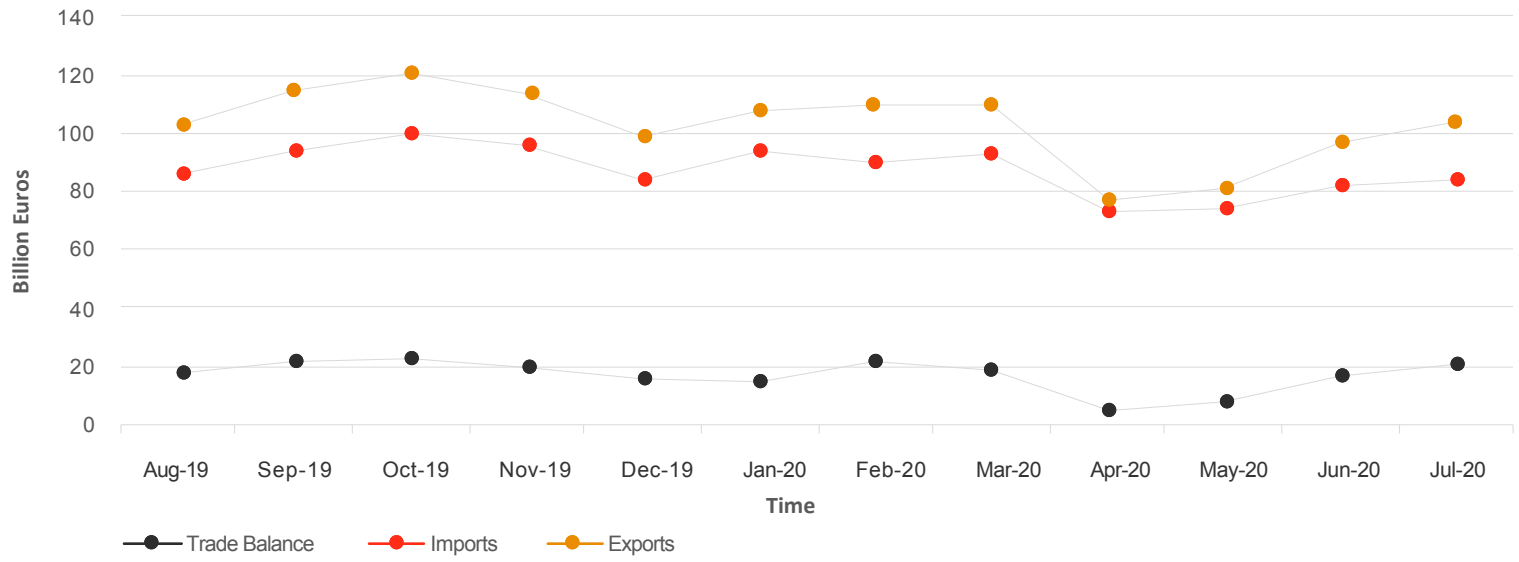
Investments continued their decline, decreasing by 8.8% in the second quarter of 2020. Meanwhile, investment in construction increased slightly, though private sector investments into production stock decreased by 27.9%.[10]

Export Balance

The international economic downturns caused by COVID-19 – especially those in the EU, US, and China – and the significant interlinkage of the German economy with its trading partners deeply impacted German exports. As a result, German trade surplus plummeted in April and May 2020. (Figure 8)

10 *https://www.destatis.de/DE/Themen/Wirtschaft/Volkswirtschaftliche-Gesamtrechnungen-Inlandsprodukt/Publikationen/Downloads-Inlandsprodukt/inlandsprodukt-vierteljahr-pdf-2180120.pdf?__blob=publicationFile*, Pages 22, 39 and 47

Figure 8 German Trade Balance

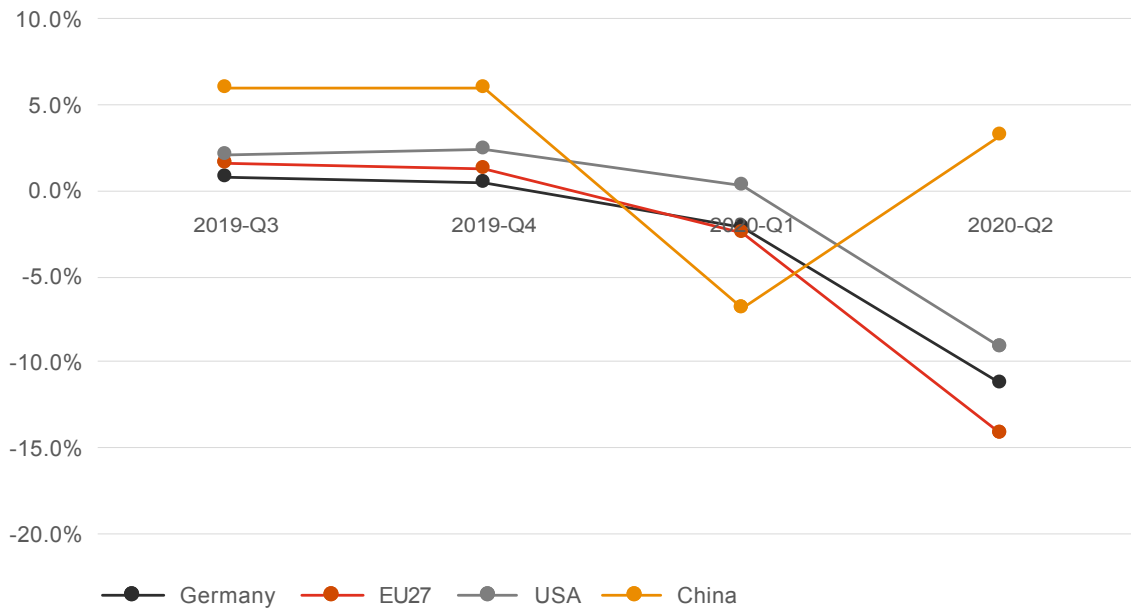


Source: *https://www.destatis.de/DE/Presse/Pressemitteilungen/2020/09/PD20_341_51.html*, accessed 09.09.2020

The decline in EU GDP for the first two quarters of 2020 – by 2.5% and 14.5% - exceeded the decline in German GDP. In the US, the single largest buyer of German exports, GDP was still slightly positive in the first quarter, but decreased by more than 9.0% in the second quarter of 2020. (Figure 9)

These developments contributed to a decrease in German exports by -3.2 % and -22.2 % in first two quarters of 2020. On the other hand, the lowered industry production also decreased imports, though in a smaller scale, by -1.6% and -17.3% in the first two quarters. Hence, the net export balance had a negative effective on GDP.

Figure 9 Change in GDP in Germany, EU 27, USA and China (in %)



Source: *https://data.oecd.org/gdp/quarterly-gdp.htm*, accessed 09.09.2020

Interconnected sectors, such as the automotive sector, were hit disproportionally hard in recent months. The total value of exports in the automotive sector declined by almost 50% from € 16.8 billion in January 2020 to € 9.1 billion in May 2020.

Looking ahead

Looking ahead, several positive indicators and further government measures seem promising.

The number of incoming orders in the manufacturing sector increased by 2.8% in July 2020 . The German Business Climate Index has risen both in July and August in the manufacturing sector, illustrating increasing optimism among German enterprises. Important trade partners such as China report a positive economic development. The Chinese economy, being the first to experience the downturn effect of COVID-19 already in the first quarter of 2020, is picking up speed again with a GDP increase of 3.2% in the second quarter. This development has positively impacted the demand for German products. In July 2020, German exports increased for the third month in a row compared to the previous months, even though they are still lower than in February 2020.

In addition to the prolonged easing of accessing Kurzarbeitergeld, the German government announced a € 300 per child bonus payment and lowered the VAT rate from 19% to 16% and from 7% to 5% for the period July to December 2020. These measures are intended to stabilize and incentivize household consumption in the second half of 2020.

Yet risks remain. As part of the measures to lessen the impact of COVID-19, insolvency regulations were eased until December 2020. A rise in insolvencies after that date might have negative effects on the labour market and domestic economic activity. With the pandemic still ongoing, and with a vaccine timeline still uncertain, Germany's economic development in the coming months strongly depends on keeping under control the number of COVID-19 infections and avoiding further restrictions, both domestically and globally.

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