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Bibliography
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The European economy is currently facing a long-awaited dynamic recovery. Consumer and business confidence is rising, and industrial production growth is accelerating. Even more encouragingly, the upturn is broad-based, driven not only by domestic consumption, but increasingly also by investment and export stimulus from a growing global economy.

However, these short-term successes should not disguise the long-term challenges facing the European economy. Therefore, the recent economic recovery gives no grounds for complacency. Instead, the opportunity must be taken to improve the potential for sustainable long-term growth in Europe. To do so, significant efforts must be devoted to strengthening the European innovation system. Europe and its policymakers must become more open to innovation and new technologies. Europe should embrace the many opportunities and manage the respective risks rather than banning or restricting technologies pre-emptively. More public and private investment in innovation is needed, and markets for risk capital need to become more efficient.

A positive climate for innovation is even more important in view of the fact that digitisation is currently transforming industrial production processes and business models worldwide. Utilising the great potential of digitisation for higher productivity and competitiveness requires an efficient digital infrastructure and an EU internal market without barriers but with harmonised high standards for data and cybersecurity. Educational systems must respond to the new requirements of digital economies on all levels.

International openness is a further prerequisite for the sustained growth of Europe’s industry, deeply integrated as it is in global value chains. However, public acceptance of globalisation and economic integration is fading. This is reflected in the political arena: Negotiations for a transatlantic trade agreement are stalling, and U.S. tax reform plans even contain significant new trade barriers for multinational players. But we need not look so far from home: European economic integration is at risk as well. European companies lack any orientation on the future relationship with the United Kingdom. Clarification of the conditions for further movement of goods, services, capital and people and on the length of a transition period to any new regime is urgently required to ensure that both the EU27 and the UK remain forceful and integrated players in global markets.

Finally, Europe also needs to champion industrial competitiveness when shaping energy, climate and environmental policies. Europe leads in these respective indicators and can therefore contribute more to global targets by exporting the best technologies rather than by unilaterally increasing domestic targets.

The 2017 edition of the ERT Benchmarking Report presents a comprehensive overview of the European position in the fields of economic performance, trade, digital economy, innovation, energy and climate, and labour markets.

We are confident that you will find it interesting to read.

Yours sincerely,

Kurt Bock
Chairman of the ERT Competitiveness Working Group
Chairman of the Board of Executive Directors, BASF SE
Executive Summary

Economic performance and competitiveness

Industry continues to play a pivotal role in the EU economy as a major employer, supporting high value jobs. Industrial companies also indirectly support jobs and value added in other sectors. But European companies risk falling behind global competition. The European share of the largest companies by market capitalisation has decreased and is now well below the US. The European share of ‘unicorn’ start-ups is even weaker and far behind the US and China.

We can no longer take for granted that European households and businesses will continue to enjoy the benefits from openness. The EU’s economic diplomacy must help to reverse the trend towards protectionism and government interventions intended to distort trade while taking appropriate measures to guarantee fair trade and to avoid any detrimental effect on European industry. We must also ensure Europe remains competitive as a destination — and a source — for market-based direct investment.

Global trade and investment

Europe has a largely healthy set of bilateral trade relationships, with surpluses and deficits that reflect relative consumption preferences and production strengths. But Europe’s share of global trade is declining and our companies face barriers to trade and investment in many countries. Almost eight million jobs in the EU are supported by foreign investment from outside the EU. European leadership in FDI is also under threat from competition in Asia and elsewhere.

The US remains the single most important trade and investment partner for the EU, with the EU and the US highly dependent on each other as a source of investment, as an export market, and a source of intermediate inputs into production. Over three million American jobs are supported by EU investment.

We can no longer take for granted that European households and businesses will continue to enjoy the benefits from openness. The EU’s economic diplomacy must help to reverse the trend towards protectionism and government interventions intended to distort trade while taking appropriate measures to guarantee fair trade and to avoid any detrimental effect on European industry. We must also ensure Europe remains competitive as a destination — and a source — for market-based direct investment.

European policymakers, industrial companies and other stakeholders in European manufacturing must avoid complacency if Europe’s leading position in manufacturing is not to be further eroded. Productivity must increase if European manufacturing is to remain competitive. This requires investment in skills, efficient labour markets, capital investment and policy frameworks that are supportive of growth. Both the private and the public sectors have a role to play in this.

Politicians in the EU, the US, and elsewhere, must continue to make a strong case for openness to foreign investment — and fair and equal treatment for foreign investors — because it supports jobs, makes businesses more competitive, and benefits consumers by increasing choice and reducing the price of goods and services.
Digital economy

Almost half of Europeans say security concerns are holding them back from some online activity, preventing people from reaping the full benefits of digital innovation. While Europe has a good record in addressing cybersecurity concerns, there is no room for complacency, as the number of attacks remains high.

Exploiting the benefits of digital innovation in areas like artificial intelligence and smart cities requires more investment in digital infrastructure. Investments are hindered by declining revenues from telecoms services in Europe, while the data demands on infrastructure are growing rapidly. Moreover, due to the fragmented nature of spectrum policy in the EU, Europe has lost the lead in mobile broadband to other regions.

As security threats multiply and evolve, there is a risk that consumers lose confidence in the privacy of their data, negatively affecting their ability to transact online. It is important that the regulation of cross-border data flows is not exploited for protectionist purposes while securing the trust of consumers and enabling businesses and society to innovate.

EU telecom rules and new legislation need to be reviewed to create an environment that is more conducive to investments in digital infrastructure. Aligning spectrum allocation policy with EU growth and jobs goals would boost the competitiveness of European companies relative to foreign giants. This would help to accelerate the investments necessary to seize digital opportunities.

Energy and climate change

The European economy is substantially less energy-intensive and less CO₂-intensive than the Chinese, Russian or American economies, while the European share of global CO₂ emissions has fallen to just 10%. Carbon pricing initiatives are expanding outside the EU, but the pace is slow.

Europe has shown global leadership in reducing energy intensity and CO₂ emissions. Other countries must show similar commitments to ensure the Paris Agreement is fully implemented. This means following the European lead in establishing carbon pricing, both to increase the share of global emissions covered and to ensure a level playing field across regions and industries.
Innovation
The European share of large tech start-ups is below what is required to remain competitive with China and the US. Investment in R&D by the EU is below the OECD average and now lags behind major competitors, including China. The European share of venture capital deals and capital invested is falling, just as Asia has emerged as a major centre for high-value investment.

The digital single market is not yet supporting European start-ups so they can compete at scale with other major economies. More venture capital is required to allow companies to grow. More investment in R&D is now critically important, particularly as competition is increasingly driven by the development of new technologies.

Employment, skills and education
Income inequality is lower than in the US and has fallen since the financial crisis, but remains high, and has risen in the euro area. Europe is also creating relatively few mid-level jobs. The proportion of young people not in employment, education or training has fallen, but remains extremely high in many Member States.

Income inequality and social exclusion have been linked to populism. In an economy where the pace of innovation — and disruption to jobs — is high, it is essential to ensure the workforce’s continuous employability by better enabling lifelong learning. Embedded (“dual”) learning should become part of school curricula. A dialogue between government, schools and industry should also make sure students acquire the right skills and attitudes for the future.
The growth outlook is mixed

Confidence is returning to the euro area, which is now experiencing a long-overdue cyclical recovery, but the longer-term economic growth outlook remains tepid and points to a slowdown in some of Europe's major economic partners.

The subdued outlook for growth in some key trading partners means that internal demand will be important to sustain the recovery in Europe. It could also render the political challenge of maintaining open markets and a global level playing field even harder.
Manufacturing competitiveness is under pressure

European manufacturing is losing global market share and export share due to strong growth of Chinese and other Asian producers. While the lost share of manufacturing value added is comparable to the US, the lost share of manufactured exports is much greater.

Manufacturing sector performance

European manufacturing has many strengths, particularly in medium and high-tech sectors. But European policymakers and stakeholders must avoid complacency if Europe’s leading position in manufacturing is not to be further eroded.

Technological complexity of manufacturing

Source: UNIDO

*The average for Germany, Italy, France and the UK
Labour productivity needs to rise

Labour unit costs in the euro area are increasing, while they are shrinking in the US, Japan and Mexico. Productivity is increasing in Eastern European countries and in Spain, but this is insufficient to close the gap with the US in GDP per hour.

All European countries must increase their productivity if European manufacturing is to remain competitive. This requires investment in skills and capital, as well as the design of efficient labour markets and policy frameworks that are supportive of growth.

Change in real labour unit costs, 2006-2016

GDP per hour worked ($)

Note: 2010 US$ prices, estimated at purchasing power parity.
Source: OECD
Low investment is constraining competitiveness

There has been a sharp drop in investment since the financial crisis, particularly among the countries worst affected by the debt crisis that followed. While private investment has begun to recover slightly, public investment continues to be sluggish.

In some countries investment rates were unsustainable before the crisis. But investment rates are now too low if Europe is to remain competitive, particularly in new technologies. Both the private and the public sectors have a role to play in this.

EU gross fixed capital formation, % of GDP

Gross fixed capital formation 2006-2016, % of GDP
Private debt levels remain high

While household debt has fallen marginally in the EU, corporate debt has edged up in the euro area. Both household and corporate debt remain high in many European countries, which have not seen debt deleveraging at the same pace as the US.

A sustained rise in confidence, consumer spending and investment requires that the finances of both households and companies are healthy. The relatively high levels of indebtedness in many EU countries are a concern.
Industry remains the cornerstone of the EU economy

Industry continues to play a pivotal role in the EU economy as a major employer, supporting high value jobs. Industrial companies also indirectly support jobs and value added in other sectors of the European economy.

Ensuring the competitiveness of EU industry should remain a top priority for politicians and policymakers.

Industry share of total employment in 2016*

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>24%</td>
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<td>Germany</td>
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<tr>
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<tr>
<td>Sweden</td>
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<td>UK</td>
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<td>US</td>
<td>11%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>10%</td>
</tr>
</tbody>
</table>

*Includes mining, manufacturing and utilities but not construction

Industry share of total gross value added in 2016*

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
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<td>Korea</td>
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<tr>
<td>Germany</td>
<td>26%</td>
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<tr>
<td>Japan**</td>
<td>23%</td>
</tr>
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<td>Sweden</td>
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<td>EU</td>
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<tr>
<td>Italy</td>
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<td>Spain</td>
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<td>US**</td>
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<td>Netherlands</td>
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<td>France</td>
<td>14%</td>
</tr>
<tr>
<td>UK</td>
<td>13%</td>
</tr>
</tbody>
</table>

**Data for 2015

Source: OECD, own calculations

Source: OECD, own calculations
The nature of global competition is changing

European industry risks falling behind global competition. The European share of the largest companies by market capitalisation is falling and is now much lower than the US share. The European share of ‘unicorn’ start-ups is far behind the US and China.

The global corporate landscape is changing rapidly and European firms risk losing out to their American and emerging competitors. Europe must become a successful incubator for start-ups. This requires an innovation-friendly regulatory environment.

Note: a unicorn is defined as a start-up with an estimated valuation above $1bn

Source: CB Insights, Forbes
European economies are ageing fast

The old-age dependency ratio is set to remain higher than in many other large economies. The size of the problem varies significantly across Member States, with some of the worst affected also having high public debt.

A combination of migration, productivity improvement, retraining and social security reform is required to address the challenge presented by an ageing population. Many policy changes have long lead times before they are effective.

The old-age dependency ratio*

* Defined as the ratio of people older than 64 to the population aged 15-64.

Source: UN

Projected change in the old-age dependency ratio

The diagram shows the projected change in the old-age dependency ratio for various countries and regions, including EU28 range, US, Russia, China, India, Japan, EU, Romania, France, Germany, Spain, Netherlands, Sweden, Poland, United Kingdom, Czech Republic, and Romania. The changes are displayed for the years 2010 to 2020 and 2030.
The EU27 and UK economies are interdependent

There is a strong mutual dependence between the UK and EU27 economies, with two-way trade flows and investment across sectors that is supporting jobs and helping to maintain European competitiveness.

It is important that unnecessary disruption to trade and investment relationships — and the jobs that these support — is avoided, which means economic interests must be considered alongside political interests in Brexit negotiations.

Intensity of economic ties between the EU and UK

<table>
<thead>
<tr>
<th>EU share of UK</th>
<th>UK share of EU</th>
</tr>
</thead>
<tbody>
<tr>
<td>... good exports*</td>
<td>47%</td>
</tr>
<tr>
<td>... services exports*</td>
<td>39%</td>
</tr>
<tr>
<td>... outward FDI stock**</td>
<td>40%</td>
</tr>
<tr>
<td>... inward FDI stock**</td>
<td>41%</td>
</tr>
<tr>
<td>... total foreign companies***</td>
<td>41%</td>
</tr>
<tr>
<td>... employment by foreign companies***</td>
<td>39%</td>
</tr>
<tr>
<td>... value added by foreign companies***</td>
<td>40%</td>
</tr>
</tbody>
</table>

*Figures for 2016  **Figures for 2015  ***Figures for 2014

The EU trade balance with the UK, broken down in 2015, €bn

Source: Eurostat, ONS

Source: ONS, own calculations
The transatlantic relationship is essential

The US remains the single most important trade and investment partner for the EU, with each highly dependent on the other as a source of investment, as an export market, and a source of intermediate inputs into production.

There is a strong mutual dependence among manufacturers on both sides of the Atlantic. The ability to invest in production in each others’ market and draw on transatlantic supply chains is essential for maintaining global competitiveness in all manufacturing sectors.

The EU’s top investment partners in 2015

<table>
<thead>
<tr>
<th>Country</th>
<th>Outward FDI Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>40%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>5%</td>
</tr>
<tr>
<td>Brazil</td>
<td>12%</td>
</tr>
<tr>
<td>Canada</td>
<td>4%</td>
</tr>
<tr>
<td>China</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>37%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Inward FDI Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>39%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>11%</td>
</tr>
<tr>
<td>Canada</td>
<td>3%</td>
</tr>
<tr>
<td>Japan</td>
<td>4%</td>
</tr>
<tr>
<td>Brazil</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>41%</td>
</tr>
</tbody>
</table>

Source: Eurostat

Importance of US in ranking of export markets in 2016:*

<table>
<thead>
<tr>
<th>Country</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>1</td>
</tr>
<tr>
<td>Belgium</td>
<td>1</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>1</td>
</tr>
<tr>
<td>France</td>
<td>1</td>
</tr>
<tr>
<td>Germany</td>
<td>1</td>
</tr>
<tr>
<td>Greece</td>
<td>2</td>
</tr>
<tr>
<td>Ireland</td>
<td>1</td>
</tr>
<tr>
<td>Italy</td>
<td>1</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1</td>
</tr>
<tr>
<td>Poland</td>
<td>2</td>
</tr>
<tr>
<td>Portugal</td>
<td>1</td>
</tr>
<tr>
<td>Romania</td>
<td>3</td>
</tr>
<tr>
<td>Slovakia</td>
<td>1</td>
</tr>
<tr>
<td>Spain</td>
<td>1</td>
</tr>
<tr>
<td>Sweden</td>
<td>2</td>
</tr>
<tr>
<td>UK</td>
<td>1</td>
</tr>
</tbody>
</table>

*The rankings are based on extra-EU exports only.

Source: OECD
The global trade outlook is uncertain

The period 1987-2007 saw a near doubling of the openness of the global economy to trade, but over the past ten years that trend has stopped, as goods trade, in particular, has become more volatile. Europe’s share of global trade is declining rapidly.

The expansion of global trade has brought benefits for producers and consumers, as global supply chains have become more efficient, allowing better products to be produced at lower cost. Due to increasing protectionist tendencies, we can no longer take for granted that these benefits will continue.

Global trade as a share of GDP

Share of total world merchandise trade*

<table>
<thead>
<tr>
<th>Year</th>
<th>EU</th>
<th>US</th>
<th>China</th>
<th>Japan</th>
<th>RoW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>18%</td>
<td>21%</td>
<td>4%</td>
<td>9%</td>
<td>48%</td>
</tr>
<tr>
<td>2007</td>
<td>17%</td>
<td>15%</td>
<td>10%</td>
<td>6%</td>
<td>52%</td>
</tr>
<tr>
<td>2016</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>5%</td>
<td>50%</td>
</tr>
</tbody>
</table>

*Excluding intra-EU trade

Source: World Bank

Source: WTO
Barriers to trade and investment are widespread

European companies face barriers to trade and investment in a wide range of advanced and emerging economies. These measures are found both at the border and behind the border. The top-10 most restrictive markets are all members of the G20.

European economies remain among the most open in the world for trade in goods and in services. It is essential that all major economies reverse the trend towards protectionism seen in recent years and open up their markets.

Trade and investment barriers recorded at the end of 2016

Note: This figure shows the number of active trade and investment barriers recorded in the European Commission’s Market Access Database.

Source: European Commission
EU trade looks both East and West

The EU’s two biggest trade relationships are with China and the US. They are also the most unbalanced relationships, with the EU running a surplus with the US, but a deficit with China. Overall the EU enjoys a surplus in manufacturing and services, with a deficit in energy.

Europe has for the moment a healthy set of trade relationships, largely thanks to lower energy prices, with a combination of surpluses and deficits reflecting consumption patterns and production strengths. It is essential that public interventions either at or behind the border don’t distort this.

EU trade balance, €bn*

Source: Eurostat
EU leadership in FDI is being challenged

The EU remains the single most important region for both outward and inward foreign direct investment, but increasingly it is Asia and the rest of the world that accounts for the bigger share of flows, meaning European leadership in this area is under threat.

It is essential for European industry that the EU remains competitive as a destination — and a source — for direct investment. Government and EU policies can help or hinder investment flows, but are rarely neutral. This is a priority for the EU’s economic diplomacy.
FDI supports jobs

Foreign investment supports jobs, both in Europe and around the world. Almost eight million jobs in the EU are supported by foreign investment from outside the EU, while over three million American jobs are supported by EU investment.

Politicians in the EU, the US and elsewhere, must continue to make a strong case for openness to foreign investment — and fair and equal treatment of foreign investors — because it supports jobs, makes businesses more competitive and benefits consumers.

Direct employment in the EU and member states by foreign, non-EU controlled companies, 2014

Direct employment outside the EU by affiliates of EU enterprises, 2014

Manufacturing  Wholesale, retail trade  Information and communication  Administrative and support services  Professional, scientific, technical  Other

*Excluding the financial sector

Source: Eurostat, IMF, own calculations
The EU needs to catch up in digital services

European economies have only just started to reap the potential benefits from digital innovations. The US enjoys a large trade surplus with the EU in ICT and potentially ICT-enabled services, suggesting that European companies are lagging behind US firms in exploiting the commercial opportunities from digitalisation.

Captured digital potential by country

EU trade balance with the US in ICT and potentially ICT-enabled services in 2015 (% of GDP)

European institutions and Member States need to put the right framework in place to ensure European industry invests in the opportunities offered by digital innovation. Europe should take a global lead in establishing industry standards.

*weighted average of the six European countries shown here

Note: The captured digital potential is the extent to which the digital capabilities and practices of the overall economy match those of the digital frontier, defined as the US ICT sector.

Note: Potentially ICT-enabled services are outputs that can be delivered remotely over ICT networks.

Data flows are important for the economy

Cross-border data flows have grown sharply, particularly as digital providers seek to tailor their services more to the individual. The enforced localisation of data disrupts this, even within the EU, and is costly for European economies.

There are important privacy and security reasons for regulating cross-border data flows. But there are also circumstances where policymakers, in Europe and beyond, are exploiting this for protectionist motives, which is damaging for businesses and consumers.

Data localisation measures implemented globally

The potential cost from national data localisation requirements

Source: ECIPE Digital Trade Estimates 2016
Source: ECIPE 2016, Eurostat, own calculations
Trust needs to be built in digital security

Almost half of Europeans say security concerns are holding them back from some online activity. The picture is not significantly worse than it was five years ago. It is worrying as it will constrain Europe from reaping the full benefits of digital innovation. The level of concern varies across Member States.

As security threats multiply and evolve, there is a risk that consumer confidence in the privacy of their data, and their ability to transact online, is compromised. European policymakers and businesses must innovate and learn from best practice, while securing the trust of consumers.

Security concerns inhibiting online activity by consumers in the EU

Security concerns inhibiting online activity across countries in 2015

Note: Shield shows change since 2010

Source: Eurostat
Europe is leading on cybersecurity

European countries are judged to be among the most committed globally to addressing cybersecurity concerns. This is shown across all five pillars used by the International Telecommunications Union in its assessment, with Europe leading under the technical pillar. There is no room for complacency on cybersecurity by either policymakers or companies, as the number of breaches remains high, with the potential to undermine consumer confidence.

Global Cybersecurity Index 2017

Note: The Global Cybersecurity Index is a survey-based measure of the commitment of the 134 ITU members to addressing cybersecurity under each of the five pillars and based on consultation with a group of experts.

Source: ITU Global Cybersecurity Index 2017
Artificial intelligence offers opportunities, but is disruptive

Artificial intelligence (AI) offers a big opportunity for Europe between now and 2030, potentially adding over ten percent to the size of the economy. Achieving these gains will inevitably involve disruption to the types of job that people do and how work is rewarded. The global economy is only just at the start of a process where new technologies, such as artificial intelligence, have the potential to profoundly change the world of work. Policymakers and businesses must work together to ensure there is broad support for this change.

Estimated potential economic gains from artificial intelligence by 2030*

Why the potential gains are larger for some

Companies in North America are thought more likely to be early adopters of new AI technologies that boost productivity. Advanced applications are already available today and consumers are considered to be relatively open to new ways of business.

China will need more time to benefit from AI, because it still has to develop the required advanced technologies and expertise. However, its large manufacturing sector ensures the potential benefits from productivity increases are huge.

*This is the estimated additional static economic benefit by 2030. This is not an estimate of the impact on the growth rate.

Source: PwC
Smart cities: Europe’s leading position challenged

While some European cities are among the most innovative, most of the world’s ‘smartest’ major cities are found outside Europe. The ranking of many of Europe’s cities has also declined in recent years.

Civic authorities and industry in Europe need to work together to ensure that leading technologies are deployed in order to seize the potential benefits which smart cities offer, both commercially and for public services.

Innovation Cities Index in 2016-2017

Note: The Innovation Cities Index shows each city’s potential as an innovation economy, based on an analysis of 162 indicators.

Source: 2thinknow Innovation Cities™ Index, 2016-2017
EU telecoms infrastructure needs investment

Revenues from telecoms services are falling in Europe — and the gap with the US is widening — just as the data demands that are being placed on telecoms infrastructure are growing rapidly. Telecoms infrastructure needs more investment in Europe if the increasing demand for services is to be satisfied. Telecom rules and new EU legislation need reviewing in order to create an environment that is more conducive to competitive investment.

Data traffic in the EU

<table>
<thead>
<tr>
<th>Year</th>
<th>Fixed data traffic (GB/line/month)</th>
<th>Mobile data traffic (GB/use/month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>60.2</td>
<td>1.1</td>
</tr>
<tr>
<td>2016</td>
<td>71.8</td>
<td>1.6</td>
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<tr>
<td>2017</td>
<td>85.8</td>
<td>2.5</td>
</tr>
<tr>
<td>2018</td>
<td>102.7</td>
<td>3.7</td>
</tr>
<tr>
<td>2019</td>
<td>122.9</td>
<td>5.5</td>
</tr>
<tr>
<td>2020</td>
<td>142.5</td>
<td>7.4</td>
</tr>
</tbody>
</table>

Source: IDATE

Telecom services revenue in the EU and the US

<table>
<thead>
<tr>
<th>Year</th>
<th>EU revenues in €mn</th>
<th>US revenues in €mn</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>254,772</td>
<td>308,900</td>
</tr>
<tr>
<td>2016</td>
<td>220,483</td>
<td>283,000</td>
</tr>
</tbody>
</table>

**The market for spectrum is fragmented**

In Europe, Member States allocate radio spectrum via uncoordinated national auctions. Such mechanisms generate high costs and limit market access beyond national borders and hence hinder investment and innovation in telecom infrastructures.

Aligning spectrum allocation policy with EU growth and jobs goals would boost the competitiveness of European companies relative to foreign giants. It would also accelerate the investments necessary to seize digital economy opportunities.

**The price paid for spectrum in European countries**

Note: this shows the price paid by all operators for all spectra in all bands sold at the same time as the 800 MHz band.

**The US and EU frameworks for spectrum compared**

<table>
<thead>
<tr>
<th>Markets</th>
<th>Regulators</th>
<th>Jurisdictions</th>
<th>Spectrum assignment</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>1</td>
<td>1</td>
<td>Coverage of population</td>
</tr>
<tr>
<td>28</td>
<td>29&lt;sup&gt;2)&lt;/sup&gt;</td>
<td>29&lt;sup&gt;3)&lt;/sup&gt;</td>
<td>29&lt;sup&gt;4)&lt;/sup&gt;</td>
<td>Coverage of population and area</td>
</tr>
</tbody>
</table>

<sup>1)</sup> One government regulator (NTIA) and one commercial regulator (FCC)
<sup>2)</sup> Independent regulators from member states and European Commission
<sup>3)</sup> 28 member states and EU law
<sup>4)</sup> Spectrum assignments in the EU are not coordinated between member states and the European Commission

Source: GSMA
Europe is leading in reducing energy intensity and emissions

The European economy is substantially less energy-intensive and less CO₂-intensive than the Chinese, Russian or American economies, while the European share of global CO₂ emissions has fallen to just 10%.

Europe has shown global leadership in reducing energy intensity and emissions in the past — and must continue to do so. All countries will have to show similar commitments to ensure the Paris Agreement is fully implemented.

### Energy intensity*

<table>
<thead>
<tr>
<th>Country</th>
<th>2000</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>0.12</td>
<td>0.09</td>
</tr>
<tr>
<td>India</td>
<td>0.12</td>
<td>0.09</td>
</tr>
<tr>
<td>US</td>
<td>0.18</td>
<td>0.13</td>
</tr>
<tr>
<td>Russia</td>
<td>0.19</td>
<td>0.30</td>
</tr>
<tr>
<td>China</td>
<td>0.22</td>
<td>0.15</td>
</tr>
</tbody>
</table>

*Million tonnes of oil equivalent of primary energy consumption/GDP (PPP constant 2011 $ billion)

### CO₂ intensity (gramme per $ GDP)

<table>
<thead>
<tr>
<th>Country</th>
<th>2000</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>276</td>
<td>188</td>
</tr>
<tr>
<td>India</td>
<td>367</td>
<td>282</td>
</tr>
<tr>
<td>US</td>
<td>461</td>
<td>311</td>
</tr>
<tr>
<td>Russia</td>
<td>423</td>
<td>716</td>
</tr>
<tr>
<td>China</td>
<td>460</td>
<td>717</td>
</tr>
</tbody>
</table>

In tonnes per year/GDP (PPP constant 2011 $ billion)

### Share of global CO₂ emissions

<table>
<thead>
<tr>
<th>Country</th>
<th>2000</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>10%</td>
<td>6%</td>
</tr>
<tr>
<td>India</td>
<td>17%</td>
<td>4%</td>
</tr>
<tr>
<td>US</td>
<td>10%</td>
<td>6%</td>
</tr>
<tr>
<td>Russia</td>
<td>16%</td>
<td>4%</td>
</tr>
<tr>
<td>China</td>
<td>14%</td>
<td>14%</td>
</tr>
</tbody>
</table>

### Tonnes of CO₂ emissions per capita

<table>
<thead>
<tr>
<th>Country</th>
<th>2000</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>8.4</td>
<td>6.8</td>
</tr>
<tr>
<td>India</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>US</td>
<td>16.5</td>
<td>10.1</td>
</tr>
<tr>
<td>Russia</td>
<td>21.2</td>
<td>10.4</td>
</tr>
<tr>
<td>China</td>
<td>716</td>
<td>460</td>
</tr>
</tbody>
</table>

Source: BP, World Bank, own calculations
Energy and climate change

Carbon pricing is expanding, but limited outside Europe

Carbon pricing initiatives are expanding outside the EU, but aggregate coverage is still less than one sixth of global emissions. The share of global emissions covered by EU initiatives is much higher than by any other economy. Many countries have followed the European lead in establishing carbon pricing. There is still a long way to go before global coverage matches the EU share of emissions covered. Policy needs to ensure a level playing field across regions and industries.

The share of global greenhouse gas emissions covered by carbon pricing initiatives*

*There are other forms of carbon regulation, which may impact on emissions, that are not covered by pricing schemes.

Note: by 2017 the other countries and regions with carbon pricing initiatives are – in declining order of the share of the country or region’s total emissions covered – Australia, South Africa, Mexico, Ukraine, Kazakhstan, Ontario (Canada), Alberta (Canada), Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, Vermont (US), Quebec (Canada), Washington (US), Colombia, Chile, British Columbia (Canada), New Zealand, Norway, Switzerland, Tokyo and Saitama (Japan), Iceland and Liechtenstein.

Source: World Bank, Ecofys
Taxation is leading to disparity in electricity prices

Tax now accounts for 43% of the electricity price for industrial users in the EU and contributes to sustaining prices at high levels even though wholesale prices have fallen back.

Energy prices, including electricity prices for industrial users, are a major driver of competitiveness in many industrial sectors. Energy Union and industrial policies must be closely aligned to maintain competitiveness. Minimise and harmonise regulatory costs across the EU.

EU electricity price for industrial consumers* (€ per MWh)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total electricity price</th>
<th>Excluding taxes and levies</th>
<th>VAT and other recoverable taxes</th>
<th>Other taxes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>124.8</td>
<td>10.4</td>
<td>22.1</td>
<td>92.3</td>
</tr>
<tr>
<td>2010</td>
<td>128.4</td>
<td>14.2</td>
<td>23.3</td>
<td>90.9</td>
</tr>
<tr>
<td>2012</td>
<td>143.8</td>
<td>21.6</td>
<td>28.1</td>
<td>94.1</td>
</tr>
<tr>
<td>2014</td>
<td>149.8</td>
<td>31.4</td>
<td>29.2</td>
<td>89.2</td>
</tr>
<tr>
<td>2016</td>
<td>141.6</td>
<td>33.9</td>
<td>27.6</td>
<td>80.1</td>
</tr>
</tbody>
</table>

* The price shown is for industrial consumers using between 500-2,000 MWh

Note: data is bi-annual and the values shown are for the second half of the year.

Source: Eurostat

Variation of electricity prices* across the EU in 2016 (€ per MWh)

Note: Data in the chart does not follow the 2016/1952 regulation, which alters the composition of different items for electricity prices. For some specific countries this effect might be relevant and data should be considered purely indicative.
EU leadership in renewables is being challenged

Europe remains a global leader in renewable energy investment, but China is now the world’s biggest investor and Europe’s lead over the US has fallen. Within Europe there is a significant variation in the level of investment across countries.

The global energy transition and the deployment of new renewable technologies is a major opportunity for European industry. EU policy (trade, innovation, etc.) should be shaped to boost industry’s chances to take advantage of these opportunities.

New renewable energy investment around the world ($bn)

Note: renewables include marine energy, biomass and waste-to-energy, geothermal energy, liquid biofuels, solar energy, wind energy and hydropower

The European countries that saw the largest investment in 2016 ($bn)

The circular economy offers great potential

The circular economy has the potential to substantially increase GDP and household income, while reducing CO₂ emissions, by avoiding waste and increasing productivity at home, in the office and for industry.

The opportunities from the circular economy are clear, but harnessing them is more difficult. It requires innovation by businesses, policymakers and households. Policy must be developed in consultation with stakeholders if unintended consequences are to be avoided and the full potential of the circular economy is to be realised.

### Treatment of municipal waste in 2015

<table>
<thead>
<tr>
<th>Country</th>
<th>Recycled</th>
<th>Composted</th>
<th>Incinerated for energy recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea*</td>
<td>58%</td>
<td>48%</td>
<td>4%</td>
</tr>
<tr>
<td>Germany</td>
<td>42%</td>
<td>32%</td>
<td>26%</td>
</tr>
<tr>
<td>Australia</td>
<td>42%</td>
<td>32%</td>
<td>26%</td>
</tr>
<tr>
<td>Sweden</td>
<td>32%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>27%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>UK</td>
<td>26%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>Poland</td>
<td>26%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>Norway</td>
<td>26%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>Italy</td>
<td>22%</td>
<td>22%</td>
<td>22%</td>
</tr>
<tr>
<td>US</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>France</td>
<td>17%</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>Japan*</td>
<td>11%</td>
<td>11%</td>
<td>11%</td>
</tr>
<tr>
<td>Spain</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

* Data for 2014

Source: OECD

### The potential of the EU circular economy, percentage point difference*

- **Household disposable income**
  - **2030**: 11%
  - **2050**: 20%

- **GDP**
  - **2030**: 7%
  - **2050**: 12%

- **Direct consumer costs**
  - **2030**: -9%
  - **2050**: -15%

- **CO₂ emissions**
  - **2030**: -17%
  - **2050**: -22%

* Excluding Croatia

** Only covers mobility, food, and built environment

Source: McKinsey
R&D spending needs to increase

China is now investing more in R&D as a share of GDP than the EU. Investment in R&D by the EU is significantly below the OECD average and now lags behind major competitors. The gap for business enterprise R&D is even higher than other sources of R&D.

In a world where competition is increasingly driven by the development of new technologies, investment in R&D is critically important. More needs to be done to close the gap between the worst and the best in Europe.
The EU must maintain its position in science

Europe is a leading global centre for scientific research, employing over 1.8m scientific researchers. The EU lags behind the US in patent applications in key sectors and behind China and Japan in the ICT sector. Scientific research in universities, research foundations, public bodies and by the private sector is essential if the European industry is to remain competitive, particularly in the most highly-innovative sectors. This should be a priority for the EU’s next Framework Programme.
Europe needs more venture capital

European venture capital deals and capital invested declined in 2016, with the European share of the global total continuing to decline. While the US dominates the global market, Asia has emerged as a major centre for high-value investment.

Venture capital financing is important for a vibrant, innovative economy, both because it allows the most innovative businesses to get access to capital and because of the experience that investors bring to those businesses.

Number of venture capital deals

Capital invested in venture capital deals

Source: KPMG
The disruptive potential of digitisation

The internet of things offers the potential to transform business models and consumer experiences. The most digitally-advanced Member States are ahead of the US and Japan, but many other European countries are lagging behind.

Businesses and consumers alike need to embrace the potential of the internet of things. But businesses and policymakers must also consider how to mitigate the disruptive consequences, which are potentially very large in some sectors.

Machine-to-machine mobile cellular subscriptions, Dec 2016

Projected growth in IoT units within the EU, 2025 versus 2015

Source: OECD

Source: IDATE, own calculations
European start-ups are being left behind

The European share of tech start-ups, either by number or value, is very low, and far short of what should be expected of the European economy, if it is to remain competitive with China and the US.

The number of unicorns created by year and by country/region

The digital single market has yet to deliver an environment in which European tech start-ups can grow to compete at scale and in sufficient number with other major economies.

Total unicorns and their valuations by country/region

Note: A unicorn is a company valued $1 billion or more.

Note: Bubble size indicates total value.

Source: CB Insights
There is no room for complacency on income inequality

Income inequality remains high and has even risen in the EU and the euro area since the financial crisis. Europe is also creating relatively few mid-level jobs. However, the EU average is lower than in the US.

Income inequality has been linked to the rise in populism that has been seen on both sides of the Atlantic. In an economy where the pace of innovation — and disruption to jobs — is high, it is essential to ensure the workforce’s continuous employability by better enabling lifelong learning.

Gini coefficient for disposable household income after taxes and transfers*

<table>
<thead>
<tr>
<th>Country</th>
<th>2007</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>0.35</td>
<td>0.38</td>
</tr>
<tr>
<td>Spain</td>
<td>0.33</td>
<td>0.33</td>
</tr>
<tr>
<td>Italy</td>
<td>0.32</td>
<td>0.32</td>
</tr>
<tr>
<td>EU area</td>
<td>0.31</td>
<td>0.31</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>Poland</td>
<td>0.29</td>
<td>0.29</td>
</tr>
<tr>
<td>France</td>
<td>0.28</td>
<td>0.28</td>
</tr>
<tr>
<td>Germany</td>
<td>0.27</td>
<td>0.27</td>
</tr>
<tr>
<td>Belgium</td>
<td>0.26</td>
<td>0.26</td>
</tr>
<tr>
<td>US</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Japan</td>
<td>0.24</td>
<td>0.24</td>
</tr>
<tr>
<td>Canada</td>
<td>0.23</td>
<td>0.23</td>
</tr>
</tbody>
</table>

* A higher coefficient indicates higher income inequality.

Source: OECD, Eurostat

Change in employment in the EU by social-economic group, 2011-2016, millions

- Managers and professionals: +4.33
- Technicians and associate professional employees: +2.35
- Clerks and skilled service employees: +0.04
- Skilled industrial employees: +0.33
- Lower status employees: +2.14
- Small entrepreneurs: -1.09

Source: Eurostat
### Economic inactivity among the young remains high

The proportion of young people not in employment, education or training has fallen, but remains extremely high in those Member States that have suffered the most protracted economic problems.

It is essential both to prevent social exclusion and to ensure Europe’s long-term competitiveness that a higher share of young people remain in either education, training or employment. Embedded (“dual”) learning should be part of school curricula, also in other areas beyond vocational education and training.

#### The proportion of young people, aged 15-29, not in employment, education or training (2016)

<table>
<thead>
<tr>
<th>Country</th>
<th>Youth Unemployment Rate</th>
<th>Total Unemployment Rate 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>11.7</td>
<td>10.1</td>
</tr>
<tr>
<td>Greece</td>
<td>23.5</td>
<td>11.1</td>
</tr>
<tr>
<td>Spain</td>
<td>19.6</td>
<td>5.1</td>
</tr>
<tr>
<td>France</td>
<td>17.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Ireland</td>
<td>13.0</td>
<td>8.8</td>
</tr>
<tr>
<td>Portugal</td>
<td>13.6</td>
<td>4.8</td>
</tr>
<tr>
<td>Hungary</td>
<td>13.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Poland</td>
<td>19.9</td>
<td>7.0</td>
</tr>
<tr>
<td>Estonia</td>
<td>20.1</td>
<td>4.1</td>
</tr>
<tr>
<td>Finland</td>
<td>15.0</td>
<td>4.1</td>
</tr>
<tr>
<td>UK</td>
<td>10.5</td>
<td>3.1</td>
</tr>
<tr>
<td>Belgium</td>
<td>18.8</td>
<td>10.8</td>
</tr>
<tr>
<td>Czech Rep</td>
<td>18.7</td>
<td>8.5</td>
</tr>
<tr>
<td>Germany</td>
<td>10.4</td>
<td>4.9</td>
</tr>
<tr>
<td>Sweden</td>
<td>5.2</td>
<td>3.1</td>
</tr>
</tbody>
</table>

*Latest figure from 2015; **Latest figure from 2014

Source: OECD
Lifelong learning is now essential

The EU rate of investment in adult skills is similar to international peers, while varying considerably across Member States, with the share of those in employment and participating in education or training in some cases more than double than in others.

In an economy that is rapidly changing (ageing, digitisation) there is a constant need for adults to keep reinvesting in skills through lifelong learning. This is as true for those in employment as it is for those who are unemployed or inactive.

The percentage of 25-64 year old adults in education or training (by employment status)

Note: For Greece and Turkey the year of reference is 2015. For all other countries, year of reference is 2012. Data for Belgium refer only to Flanders and data for the United Kingdom refer to England and Northern Ireland only.

Source: OECD
ICT skills need to increase

ICT proficiency varies across Europe. There is a high demand for ICT skills across sectors and many firms are finding it hard to recruit sufficient ICT specialists, and not only in the ICT sector itself.

More investment in ICT and digital skills is required to capture the full potential from the so-called Fourth Industrial Revolution. Business and schools have a shared responsibility to ensure the pipeline of skilled staff is strong (e.g. updating teaching methodologies and curricula).

ICT proficiency rates among 16-65 year-olds

EU enterprises that recruited or tried to recruit ICT specialists in 2016

Source: OECD

Source: Eurostat
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US Bureau of Economic Analysis
World Bank World Development Indicators
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Tony Smurfit - Smurfit Kappa Group
Ulrich Spiesshofer - ABB
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Johannes Teyssen - E.ON
Hans Van Bylen - Henkel
Jacob Wallenberg - Investor AB
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