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REPORT

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INSIGHT

A photograph of several large, dark, cylindrical cooling towers of a nuclear power plant. The towers are silhouetted against a bright, hazy sky at sunset or sunrise. The sun is visible on the right side, creating a lens flare effect. In the foreground, there is a field of green grass and a small, light-colored plant with several buds.

**Who will win, who will lose?  
Environmental threats and  
business in Poland**



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WWF is one of the world's largest and most experienced independent conservation organizations, with over 5 million supporters and a global network active in more than 100 countries. WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

# POLITYKA INSIGHT

## **Polityka Insight**

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Polityka Insight is the first platform of knowledge in Poland designed for business CEOs, politicians and ambassadors accredited to Poland. It was founded six years ago and currently consists of three business lines: analytical services (PI Premium, PI Finance and PI Energy), tailored research services (e.g. reports, presentations and workshops prepared for companies, administration and international organisations), as well as high-profile events and conferences.

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# ENVIRONMENTAL CHANGES POSE A BUSINESS RISK FOR ENTREPRENEURS IN POLAND

**This report aims to identify challenges and opportunities arising from environmental changes for enterprises operating in Poland.**

The report is based on data from the publication *2050 Poland for Generations*, prepared by WWF Poland and Boston Consulting Group (BCG), and also includes a stakeholder mapping and an analysis of statistical and review data. The present report, which is aimed mainly at the management of small and medium-sized enterprises, suggests that it is essential that business in Poland undertakes pro-environmental activities and that doing so may prove fruitful in the future. On the following pages, we determine how environmental changes will affect Polish companies, indicate who will be more or less resistant to those changes and we identify relevant trends and steps that businesses need to take to remain profitable in the long term.

**According to *The Global Risks Report 2019*, published by the World Economic Forum (WEF),**

**environmental threats are among the most important global challenges.<sup>1</sup>**

Of all the challenges identified in the WEF report (Chart 1), those related to the environment are also the most likely to occur. WEF respondents, including public- and private-sector decision makers, as well as scientists and representatives of non-governmental organizations, recognize extreme weather phenomena, the failure of climate change mitigation and natural disasters as the three most-anticipated environmental risk factors. Moreover, environmental risks have the strongest impact on social risks, such as water and food crises.

**The risks associated with environmental changes are also acknowledged by Polish enterprises.** In 2017, 59 of the 100 biggest Polish companies published corporate social responsibility reports in which they described the climate threats, limiting CO<sub>2</sub> emissions and the need to implement the UN Sustainable Development Goals for the year 2030. The number of companies publishing reports on this subject has increased by 5 percentage points since 2015, although the global average also increased at the same rate over this period (Chart 2).<sup>2</sup> As illustrated in the report *Odpowiedzialny Biznes w Praktyce. Dobre praktyki* (2019), although 101 out of 229 companies indicated the need to implement pro-environmental practices, only 15% of them took relevant actions (Chart 3).<sup>3</sup> In this context, one should keep in mind that environmental changes cannot be mitigated by a single action; they require a profound and permanent shift in a business's strategy. In the long term, such a shift will lead to profits and consumer appreciation.

<sup>1</sup> World Economic Forum, *The Global Risks Report 2019*, 14th ed. (Geneva: World Economic Forum, 2019).

<sup>2</sup> KPMG, *The road ahead: The KPMG Survey of Corporate Responsibility Reporting 2017* (KPMG, 2017), 31. KPMG analysed the reports published by the 100 largest firms in 49 countries worldwide.

<sup>3</sup> Own calculations based on a report published by Forum Odpowiedzialnego Biznesu. See: *Raport Odpowiedzialny Biznes w Praktyce. Dobre praktyki* (Warszawa: Forum Odpowiedzialnego Biznesu 2019).

**CHART 1. MAP OF GLOBAL RISKS (SCALE 1-5)**

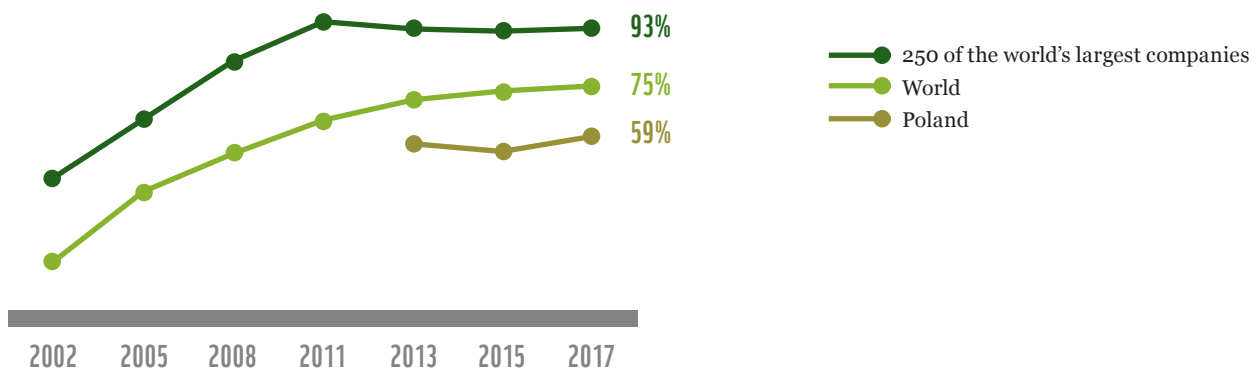


SOURCE: POLITYKA INSIGHT'S OWN ELABORATION BASED ON A WEF REPORT.

**As confirmed by economic data, environmental risks pose a real threat to business.** Due to extreme weather phenomena, the Polish economy loses PLN 9 billion a year, which is the equivalent of approximately 0.6% of GDP.<sup>4</sup> Moreover, Poland is among European countries with the highest air pollution with particle pollution of PM10 and PM2.5, as well as benzo(a)pyrene (as many as 36 of the 50 most polluted cities in Europe are in Poland). Air pollution of this kind results in approximately 46,000 early deaths a year<sup>5</sup> and places a burden on employers and results in additional costs for the public healthcare system. The loss of biodiversity is another problem, including biodiversity in the Baltic Sea (where cod and herring are already at risk due to overfishing) and mainland biodiversity (where over 70% of natural habitats protected under the Habitats Directive is in either an unsatisfactory or a poor state). Poor water and land conditions mean higher costs for ecosystem services and an increase in water, energy and food prices. Even if primarily affecting one industry only, environmental changes will likely result in a chain reaction throughout the entire economy.

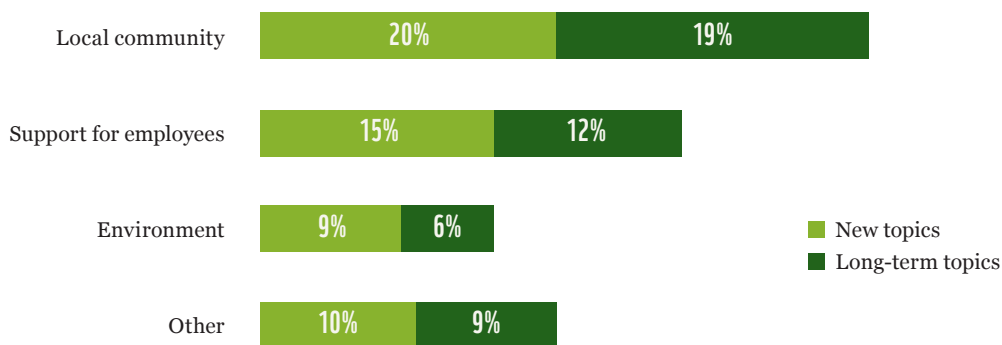
4 Fundacja WWF and Boston Consulting Group, *2050 Poland for Generations* (Warszawa: Fundacja WWF and Boston Consulting Group, 2018).  
 5 "Premature deaths attributable to air pollution," European Environment Agency, last modified 21 April 2016, <https://www.eea.europa.eu/media/newsreleases/many-europeans-still-exposed-to-air-pollution-2015/premature-deaths-attributable-to-air-pollution>.

### CHART 2. CSR REPORTS PUBLISHED



SOURCE: KPMG SURVEY OF CORPORATE RESPONSIBILITY REPORTING 2002–2017.

### CHART 3. THEMES OF CSR PRACTICES



SOURCE: BASED ON ODPOWIEDZIALNY BIZNES W PRAKTYCE, WARSAW 2019.

# WHO WILL BE IMPACTED BY ENVIRONMENTAL CHANGES AND HOW?

No single sector can remain resistant to anthropogenic environmental changes. The impact felt by each actor, however, differs from sector to sector.

The implications that human action has had on global ecosystems are often described with reference to macro-phenomena such as climate catastrophe, the extinction of species and increased pollution. Such a classification can make it difficult, however, to understand the impact that these changes could have on various sectors of the economy and various types of enterprises, such as small and medium-sized enterprises and companies that operate in areas seemingly unaffected by these changes. In practice, environmental phenomena such as the risk of a climate catastrophe, decreasing biodiversity and deteriorating water and air quality are already having an impact on economic processes, encompassing all branches of the

economy and progressing with time.

In each of the four areas listed below (covering climate and air quality, rivers, the Baltic Sea and biodiversity), anthropogenic environmental changes are a risk factor and threaten the future of the economy.

**TABLE 1. ENVIRONMENTAL CHANGES AND ASSOCIATED ECONOMIC RISK FACTORS**

AREA	LOGIC OF CHANGE IN THE CONTEXT OF BUSINESS RISK
Climate change and air quality	Poland currently emits three times more greenhouse gases in relation to GDP and 18% more per capita than the EU average, which is largely connected with the dependence of the energy sector on coal. In this context, public policies such as gradual investment in energy efficiency and the development of renewable energy sources are not going to improve the air quality. Maintaining the current model will furthermore result in the deterioration of the security of the energy supply and an increase in energy prices. This will also continue to limit Poland's ability to reduce its emission of greenhouse gases. High energy costs combined with low energy efficiency can also contribute to a reduction in business revenues for companies, which, as a result, could be forced to undergo restructuring, undertake layoffs, or even terminate their operations. This would weaken the entire economy.

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**AREA**


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**LOGIC OF CHANGE IN THE CONTEXT OF BUSINESS RISK**


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**Rivers**

Around 4 million people live in areas of Poland that are at risk of flooding.<sup>6</sup> These areas are also used as arable land. Excessive exploitation of river valleys, poor spatial planning, drainage of wetlands, regulatory and maintenance works on rivers accelerating water flow and an aggressive policy of support for inland navigation will increase the scale and frequency of the negative consequences of both drought and floods. This will additionally expose the state to unforeseen expenses. Apart from irreversible changes in river ecosystems, these changes will threaten sources of drinking water and agricultural production, while also posing a risk to industries that require the use of water for cooling purposes and reducing the availability of recreational areas; at the same time, they will **increase insurance losses and prices.**

**The Baltic Sea**

The Baltic Sea is one of the most environmentally sensitive seas in the world. 97% of the surface of the Baltic Sea is currently affected by eutrophication, i.e. excessive fertilization of a body of water. Maintaining the levels of nitrogen and phosphorus emissions entering rivers that flow into the Baltic Sea, along with excessive exploitation of the sea by fisheries and the maritime industry, will weaken the entire ecosystem. Eutrophication will also contribute to the reduction of fish stocks and blooms of cyanobacteria. **The resulting closure of coastal beaches will translate into lower profits from tourism.**

**Biodiversity**

Over 70% of natural habitats protected under the Habitats Directive in the continental region (about 96% of Poland) are in an unsatisfactory or poor condition, and the percentage of national territory dedicated to national parks is only one-third the European average. If the existing nature protection policy (i.e. insufficient concern for the condition of existing habitats and the failure to establish new national parks) were to continue, this would lead to the deterioration of habitats, which could, in turn, result in the loss of biodiversity and further weaken the strength of ecosystem services, **such as retention and automatic water purification or soil renewal. Thus, the costs of water and sewage collection will increase. For local tourism companies, deteriorating habitats could result in an outflow of customers, who will travel to places where the quality of nature is better.**

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<sup>6</sup> 2050 Poland for Generations.



## KEY STAKEHOLDERS

### EMPLOYMENT IN POLAND BY SECTORS OF THE ECONOMY

0.1%

FISHING

0.4%

FORESTRY

0.4%

PAPER INDUSTRY

0.8%

COAL MINING

1.2%

FOOD INDUSTRY

1.6%

FURNITURE INDUSTRY

2.4%

CHEMICAL INDUSTRY  
(INCLUDING PHARMACEUTICAL AND  
RUBBER PRODUCTS)

2.5%

ACCOMMODATION,  
GASTRONOMY

2.9%

METAL INDUSTRY

3.2%

FOOD INDUSTRY  
(INCLUDING DRINKS AND TOBACCO  
PRODUCTS)

4.4%

TRANSPORT  
(INCLUDING ENERGY TRANSMISSION)

7.5%

CONSTRUCTION

9.1%

AGRICULTURE

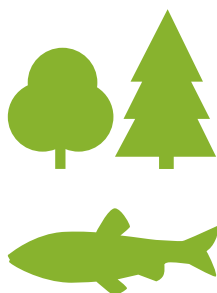
SOURCE: EUROSTAT (2018 R.)

**The influence that environmental changes have on entrepreneurs is already profound and will continue to grow.** A lot of companies, however, might find it difficult to identify or even to feel its effects. This fact, in combination with a relatively low degree of awareness of environmental threats as a business risk, might result in ignorance in relation to environmentally responsible action or at least an ambivalent attitude towards the cause and associated investments. Nonetheless, it is difficult to generalize at this point, especially since environmental changes impact different entrepreneurs in different ways: Two enterprises conducting similar activities might feel the effects in different ways, depending, for instance, on their sources of energy and materials, the location of their production facilities and their respective transportation methods.

In order to identify the impact that environmental changes have on the economy, it is enough to understand the underlying logic of the processes mentioned above and the way they influence the entire supply chain. As a result, it can be seen that even companies that are not currently directly affected by the changes are indirectly dependent on them, as they influence their suppliers and customers.

In practice, every entity and every citizen in the country is a stakeholder in the changes that are taking place; for some sectors, however, these changes are of particular importance. In this report, the various sections of the Polish Classification of Activities (PKD) were adopted as research units and broken down into aggregated groups of departments in individual fragments of the analysis. **The key stakeholders of change identified include those sectors of the economy that meet two criteria: (1) they are very important for the Polish economy (due to the number of employees, value added or share in exports); and (2) they have a significant impact on the natural environment and thus are particularly vulnerable to changes.**

**Key change stakeholders (both positive and negative) include:**



### THE AGRICULTURE, FORESTRY AND FISHING INDUSTRIES:

These sectors depend directly on the state of the environment and, at the same time, make direct use of its resources. The agriculture sector is particularly sensitive to weather anomalies, which can result in floods and droughts, especially on flood plains that are often used for farming. Two other sectors with similar sensitivities are forestry, which also depends on the sustainable forests management, ecological biodiversity (e.g. animal occurrence) and access to water; and the fishing industry, which is impacted by the quality of waters in the Baltic. In the same context, the agriculture sector is responsible for 8% of greenhouse gas emissions in Poland and for 14% of total water use (along with forestry; available statistics do not indicate these divisions, but it should be assumed that agriculture is responsible for the larger part of this impact). Furthermore, fertilizers used in agriculture are one of the main causes of eutrophication in the Baltic Sea.

**TABLE 2. EU COUNTRIES WITH THE LARGEST IMPACT OF AGRICULTURE, FORESTRY AND FISHERIES ON THE ECONOMY**

COUNTRY	NUMBER OF EMPLOYEES (THOUSANDS)	SHARE IN THE NUMBER OF EMPLOYEES	SHARE OF GDP
EU	8347	3.5%	1.4%
Romania	1657	18.9%	4.3%
Greece	438	9.4%	3.7%
Bulgaria	197	6.1%	3.6%
Hungary	210	4.6%	3.6%
Latvia	61	6.4%	3.3%
Slovakia	57	2.1%	3.0%
Croatia	91	5.1%	2.9%
Lithuania	93	6.6%	2.7%
Spain	798	3.5%	2.6%
<b>Poland</b>	<b>1517</b>	<b>9.0%</b>	<b>2.5%</b>
Finland	82	3.1%	2.5%
Estonia	20	3.0%	2.2%

SOURCE: EUROSTAT (2018)



### TRANSPORT:

This sector has a significant impact on climate change, mainly due to high greenhouse gas emissions (12% of emissions in Poland, most of which are generated by individual and freight road transport) and its impact on smog (8% of PM<sub>2.5</sub> emissions). The sector's impact on the climate is also significant beyond the borders of Poland: around 40% of all international road transfers in the European Union are undertaken by Polish companies, while as much as 60% of truck work carried out by trucks registered in Poland takes place entirely beyond the country's borders. After considering domestic transport, the share of Polish road transport in the entire European Union is 17.1%.<sup>8</sup> The EU is also under strong regulatory and social pressure to reduce emissions and is a key stakeholder when it comes to pursuing the electrification of road transport. Particular attention should also be paid to air transport, which is responsible for about 2,5% of global carbon dioxide emissions from burning fossil fuels.<sup>9</sup>

<sup>7</sup> Road transport is responsible for 5% of all PM<sub>10</sub> emissions, yet it hardly affects emissions of benzo(a)pyren.

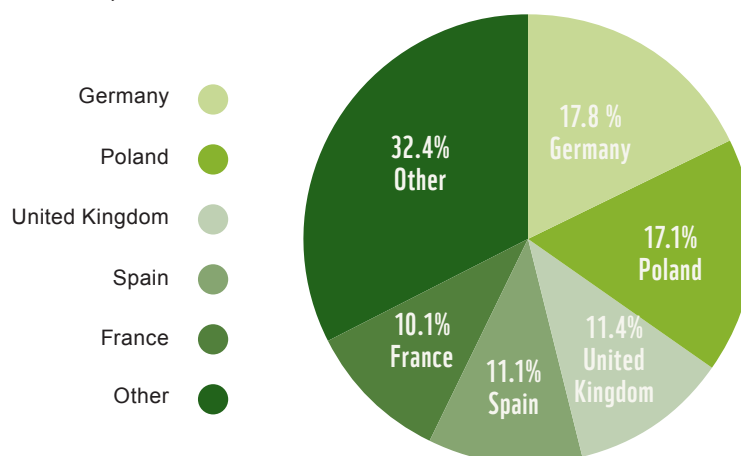
<sup>8</sup> "Annual road freight transport vehicle movements, loaded and empty, by reporting country (Mio Veh-km, 1 000 Jrnys) (road\_go\_ta\_vm)," Eurostat.

<sup>9</sup> The International Council on Clean Transportation, CO<sub>2</sub> emissions from commercial aviation, 2018, online, <https://theicct.org/publications/co2-emissions-commercial-aviation-2018>.

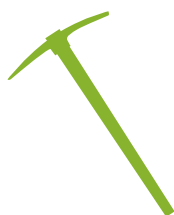
**TABLE 3. / CHART 4. ROAD FREIGHT TRANSPORT BY VEHICLE'S COUNTRY OF REGISTRATION (MLN VEHICLE KM)**

COUNTRY	NUMBER OF VEHICLE-KILOMETRES	TOTAL SHARE IN TRANSPORTATION IN THE EU
EU	169 114	
Germany	30 123	17.8%
<b>Poland</b>	<b>28 967</b>	<b>17.1%</b>
United Kingdom	19 297	11.4%
Spain	18 809	11.1%
France	17 142	10.1%
Other	54 776	32,4%

\*Vehicle-kilometre - unit of measurement equal to one kilometre driven by one vehicle.



SOURCE: EUROSTAT (2017), SELECTED COUNTRIES



### THE MINING SECTOR:

The mining sector is another stakeholder due to the considerable importance that coal has in Poland's energy policy. Burning fossil fuels for energy purposes is responsible for 82% of greenhouse gas emissions in Poland, half of which are produced by the energy sector, which in 78% still uses coal. At the same time, coal mining is almost entirely dependent on the energy sector due to the lack of other, equally large sources of demand for this raw material. The oil-and-gas sector will also be affected by changes in the Polish energy mix and changes in the transport sector (i.e. the distribution of gas and electric vehicles). However, since these branches of the Polish economy are given a lot of attention in the public debate on the impact of human activities on the natural environment (especially coal mining), they will not be especially highlighted in this report.

**TABLE 4. EU COUNTRIES WITH THE LARGEST NUMBER OF PEOPLE EMPLOYED IN MINING**

COUNTRY	NUMBER OF EMPLOYEES (THOUSANDS)	SHARE IN THE TOTAL NUMBER OF EMPLOYEES IN THE COUNTRY
UE	727.4	0.3%
<b>Poland</b>	<b>195.2</b>	<b>1.2%</b>
United Kingdom	131.9	0.4%
Germany	72.0	0.2%
Romania	66.2	0.8%
Spain	33.5	0.2%
Czech Republic	33.3	0.6%
Bulgaria	31.8	1.0%
Italy	25.0	0.1%
France	20.0	0.1%

SOURCE: EUROSTAT (2018)





### THE CONSTRUCTION SECTOR:

This sector is not going to be directly impacted, especially given the changing requirements aimed at improving energy efficiency, particularly energy refurbishment and the need to introduce numerous climate change-related urban planning activities in cities (e.g. investments related to the reconstruction of infrastructure in response to the autonomy and electrification of transport or the afforestation in cities). This sector is a so-called positive stakeholder, i.e. the more investments in eco-infrastructure and energy refurbishment are pursued, the greater the chances for the construction sector to grow. The construction sector is also leading numerous projects in the area of so-called climate resilience, i.e. resistance to weather anomalies. Examples include investments in new flood protection, urban drainage and strengthening wind resistance in existing building structures. Regardless of the development programme adopted by the government, large investments in infrastructure will continue, while keeping the construction sector involved at the same time.

**TABLE 5. EU COUNTRIES WITH THE LARGEST IMPACT OF THE CONSTRUCTION SECTOR ON THE ECONOMY**

COUNTRY	NUMBER OF EMPLOYEES (THOUSANDS)	SHARE IN THE TOTAL NUMBER OF EMPLOYEES IN THE COUNTRY	SHARE OF GDP
EU	15279	6.4%	5.0%
<b>Poland</b>	<b>1227</b>	<b>7.3%</b>	<b>7.0%</b>
Slovakia	238	8.8%	7.8%
Estonia	58	8.6%	6.7%
Lithuania	100	7.1%	6.4%
Finland	193	7.2%	6.3%
Latvia	73	7.7%	6.2%
Spain	1214	5.4%	5.9%
Austria	340	7.6%	5.8%
Sweden	342	6.5%	5.7%
Romania	676	7.7%	5.4%
United Kingdom	2251	6.9%	5.4%
Czech Republic	378	7.2%	5.2%

SOURCE: EUROSTAT (2018)

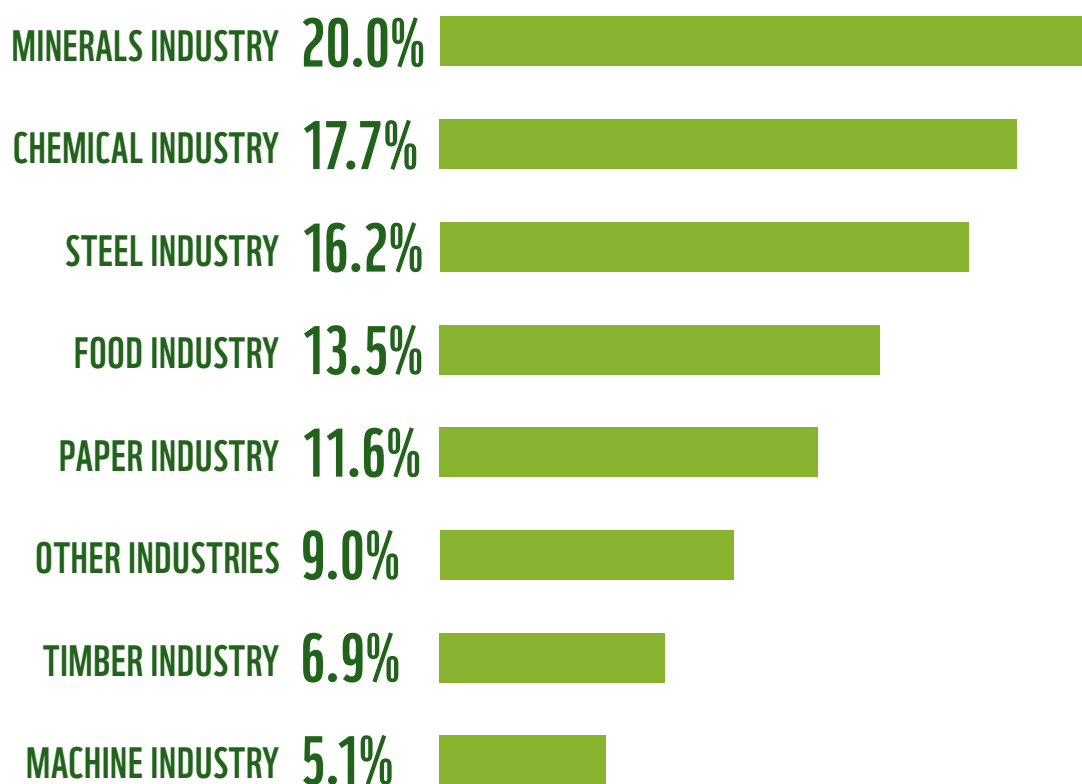


### INDUSTRY:

Individual industry branches are, to varying degrees, stakeholders in the processes described. Energy-intensive sectors are particularly sensitive to changes, including the mineral sector (responsible for 20% of energy consumption in the processing industry), the chemical sector (17.7%), metallurgy (16.2%), food (13.5%) and the paper sector (11.6%)<sup>10</sup>. Other sectors that are dependent on the changing availability of natural resources will be also affected, such as the food, timber, chemical and other industries that depend on the availability of water. These industries are important, since their products play a special role in the economy in terms of both satisfying domestic demand and providing exports.

<sup>10</sup> Główny Urząd Statystyczny, Departament Przedsiębiorstw, *Efektywność wykorzystania energii w latach 2007–2017* (Warszawa: Główny Urząd Statystyczny, 2019).

**TABLE 6. ENERGY CONSUMPTION IN THE PROCESSING INDUSTRY IN 2017**



SOURCE: CENTRAL STATISTICAL OFFICE (GUS)

# TWO SCENARIOS FOR THE DEVELOPMENT OF POLAND'S ECONOMY

When analysing different directions for the development of Poland's economy in the context of environmental impact and the use of natural resources, two basic scenarios<sup>11</sup>, which also represent two opposing paths of development, can be identified.

The Baseline scenario implies the continuation of current trends. The Future Generations scenario, on the other hand, predicts the implementation of more sustainable solutions. The latter strategy would result in cumulative savings of PLN 447–462 billion in the years 2020–2050. This would be equivalent to an average of PLN 15 billion per year, amounting to as much as 1% of annual GDP.

**TABLE 7. TWO SCENARIOS FOR THE DEVELOPMENT OF POLAND'S ECONOMY – SELECTED DATA FOR 2050**

	<b>BASILINE SCENARIO</b>	<b>FUTURE GENERATIONS SCENARIO</b>
<b>Electricity consumption in the country</b>	196 TWh	177 TWh
<b>Annual share of electricity obtained from renewable sources</b>	36%	75%
<b>Imported gas (per year)</b>	7 billion m <sup>3</sup>	9 billion m <sup>3</sup>
<b>Production cost of 1 MWh of electricity</b>	PLN 516–554	PLN 578–590
<b>CO<sub>2</sub> emissions in the power sector</b>	333 tonnes/GWh	110 tonnes/GWh
<b>Share of electric cars in Poland</b>	36%	50%
<b>Share of passenger cars in passenger transport</b>	72%	60%
<b>Investment outlays (cumulative for the years 2020–2050)</b>	PLN 162–278 billion	PLN 194–354 billion
<b>Gross savings on energy costs (cumulative)</b>	PLN 44 billion	PLN 167 billion
<b>Annual added value of the tourist sector in the Baltic Sea area</b>	PLN 11.9 billion	PLN 14.5 billion
<b>Annual fishing revenues</b>	PLN 17.3 billion	PLN 18.5 billion

<sup>11</sup> These scenarios, along the recommendations suggested for the implementation of the Future Generations, scenario were described in the report *2050 Poland for Generations*.

Both scenarios presented include numerous economic and investment trends – often independent of one another – related to the four key environmental areas identified above: climate and air quality, rivers, the Baltic Sea and biodiversity. While describing all these trends is beyond the scope of this report, it is worth taking a closer look at a few selected key change directions. This will allow us to better understand the underlying logic behind the impact that environmental risk factors have on entrepreneurs. Taking a holistic view of the economy as an interconnected whole, one should keep in mind that if one producer is impacted, other actors, such as suppliers and customers, will consequently be impacted in an indirect way. The trends identified below are divided according to their positive contributions to either the Baseline or the Future Generations scenario.

## THE BASELINE SCENARIO

KEY TRENDS	IMPACT ON STAKEHOLDERS
<b>Slow improvements in energy efficiency</b>	As a result of slow actions to improve energy efficiency in the industrial sector, total electricity consumption will increase by 60% by 2050 to 80 TWh. A slight improvement in efficiency combined with consistently lower electricity prices (resulting from, among other things, the operation of decapitalized coal-fired power plants) will result in a decrease in the unit cost of energy-intensive companies – this applies to the <b>mineral, chemical, metallurgy, food and paper industries</b> . This, in turn, will lower the prices of the products made by these industries, which will benefit the recipient sectors. For instance, the cost of steel production for the <b>machine-building industry</b> or fertilizers for <b>agriculture</b> will be slightly lower, which will generate indirect cost reductions for sectors that themselves are less dependent on electricity prices
<b>Severity of extreme weather phenomena</b>	<b>Agriculture</b> is a major sector affected by losses from extreme weather phenomena. Drought is one of the most common threats. This was especially evident from May to July 2019, when the climate water balance for all of Poland was on average -94 mm, which means that the amount of evaporated water exceeded the total sum of precipitation. During this period, 30% of land used for growing rapeseed in the country experienced drought, while this figure was 22% <sup>12</sup> for cereal crops. By the end of August 2019, losses due to drought exceeded PLN 3 billion <sup>13</sup> throughout the entire country. In the future, droughts, strong winds and torrential precipitation leading to floods will generate more and more losses for agriculture. They will also result in rising costs associated with crop insurance and an increase in prices of agricultural products (also indirectly, as more expensive grains will translate into more expensive feed for animal husbandry), while, at the same time, lowering the sector's export potential. Furthermore, the increase in agricultural costs will lead to much higher costs for the <b>food industry</b> and biofuel production. This will indirectly affect individual consumers, who will need to deal with a rapid increase in vegetable, cereal and meat prices. Weather anomalies can also lead to a collapse in food export, which currently accounts for 13.7% of Poland's foreign sales – we could even run out of vegetables and fruits for export. At the same time, this creates an opportunity for the <b>financial and insurance sectors</b> to develop new products.

<sup>12</sup> Institute of Soil Science and Plant Cultivation, *System Monitoringu Suszy Rolniczej*

<sup>13</sup> "Susza 2019: straty wynoszą już 3 mld zł i stale rosną!" Topagrar.pl, 3 September 2019, <https://bit.ly/2nO5zaq>.

**Investments in inland navigation and the development of flood areas**

The implementation of government plans to invest up to PLN 90 billion in inland navigation will cause only a slight increase in the share of inland navigation in the transport of goods from 0.4% to 3.1% in 2050.<sup>14</sup> This is because Poland has poor conditions for the development of this type of transport (due to, among other factors, the low water level in rivers and the lack of a network of canals). The annual expenditure on maintaining the waterway network will consume up to PLN 2.5 billion a year, and the benefits will be very limited – only selected sectors will benefit slightly from inland waterway transport. The transfer of budget funds for river investments will slow down the development of the railway network and prevent a more efficient allocation of funds in other areas. The regulation of rivers, the construction of new hydrotechnical facilities and poor management of floodplains (i.e. enabling development and cultivation in these areas) will intensify flood damage. This trend predicts an increase in the profits of **construction companies** that have a particular focus on water infrastructure and a slowdown in the development of railway construction.

<sup>14</sup> 2050 Poland for Generations.

**Growing pollution and the eutrophication of the Baltic Sea**

In the short term, continuous intensive fishing will support the development of **fishery** revenues. However, the continuation of overfishing will lead to the depletion of fish populations, especially cod and herring stocks, which, together with increasing pollution levels, could lead to a sharp slump in revenues in the industry and a simultaneous increase in costs. Fishing in depleted stocks takes more time and is also very expensive due to the lower detection rate and availability of fish. It may also result in higher fish prices and translate into higher costs for the **food industry**. Water pollution can also adversely affect revenues from **coastal tourism** due to the fact that fewer people will decide to spend their free time at the seaside. In 2018, Baltic bathing beaches were closed due to blooms of cyanobacteria for a total of 446.5 bathing days<sup>15</sup>, i.e. more than three times the total number of closures in the five previous years.

<sup>15</sup> A bathing day is a unit that indicates that one bathing beach is open for one day.

**Persistent use of coal in the energy mix until 2050**

The persistent demand for hard coal and lignite (in this scenario, both will be responsible for 29% of generated electricity in 2050) will result in a slower decline in revenues for **coal mines**. Ongoing coal mining will allow rail operators to maintain revenues (for PKP Cargo, coal and other solid fuels account for about one-third of freight transport). However, the costs of coal mining will increase due to the increase in labour costs, and costs for the **energy sector** due to the costs of emissions associated with burning coal. This will lead to an increase in electricity prices for consumers, which in turn will increase the costs of energy-intensive sectors. At the same time, less pressure put on the development of new technologies will not provide an impetus for the development and growth of revenues in the **machinery and electromechanical sectors**.



## THE FUTURE GENERATIONS SCENARIO

### KEY TRENDS

### IMPACT ON STAKEHOLDERS

#### Intensive energy refurbishment

Large investments related to the energy refurbishment of buildings will primarily result in a dynamic increase in **construction** revenues, as well as the development of related industries, especially the **chemical, metals and electromechanical industries**. The financial sector will record higher revenues due to the development of new products financing energy refurbishment. Households and enterprises located in buildings subject to energy refurbishment will also benefit from this due to a decrease in energy costs: By 2050, intensive energy refurbishment will result in PLN 79 billion in net savings in this respect.

#### Replacement of coal with renewable energy sources

In this scenario, there will be no place for coal in Poland's energy mix in 2050. This will result in a faster decrease in revenues in the **mining sector** than predicted in the scenario where the use of coal is maintained. The replacement of coal with other renewable sources that require investments, will cause an increase in the cost of energy production in the short term, while, at the same time, indirectly contributing to the increase in costs for all energy-consuming sectors. At the same time, however, the air quality will be significantly improved, contributing to a decrease in the number of illnesses. Along with this, the productivity of Poles and the attractiveness of the country as a tourist destination will improve. Ultimately, the costs of energy production will be cheaper: The threat of resource depletion and the need to import energy will disappear, enabling energy independence, which would otherwise be impossible for Poland in the case of using conventional fuels. The **electromechanical industry** and the **construction sector** will benefit from the development of new technologies, e.g. the production of components for wind and solar farms. The acceleration of the use of renewable energy sources will enable the expansion of financial products related to these technologies.

#### Halting the eutrophication of the Baltic Sea and sustainable fishery

Halting further over-fertilization of the Baltic Sea and more sustainable fishing will lead to improved water quality and an increase in stock numbers. Short-term limitation in fishing will reduce **fishery** revenues, but it will enable avoidance of crises and ensure more sustainable revenues in the medium and long term. Employment in this sector will decrease but at a much slower pace than in the scenario where intensive fishing is continued. This sustainable approach will make it possible to generate an additional 4,000 jobs<sup>16</sup> by 2050 (as demonstrated in the report *2050 Poland for Generations*). Improving water quality and reducing the frequency of cyanobacterial blooms will have a positive impact on tourism revenues, i.e. up to 11,000 more jobs can be created than in the Baseline scenario. A more sustainable approach to fisheries will increase the costs in the **food industry** in the short term. In the long term, however, this will help prevent a crisis related to the collapse of the fish population

<sup>16</sup> 2050 Poland for Generations, 114.

**Development of rail transport and electromobility**

An increase in investment outlays and regulatory actions promoting rail transport will increase revenues in the **construction sector** and industries related to railway development, e.g. rolling stock factories, rails (metal and machinery industry) and aggregates (in the case of aggregates, the railway sector is more promising than the road sector given its larger investment needs). Further electrification of railway lines (slightly more than two-thirds of the national rail network is currently electrified) will increase revenues in the **energy production and transmission sectors**. Furthermore, this will slow down the growth of road transport revenues due to the shift of freight transport to rail. The **automotive industry** will have to undergo a transformation related to the proliferation of electric vehicles: The revenues of Polish factories producing combustion engines and a large percentage of workshops specializing in repairing these types of cars will decrease (their future will depend on whether they are ready to switch to the production and service of electric vehicles). The revenues of new factories producing components for electric cars will increase.

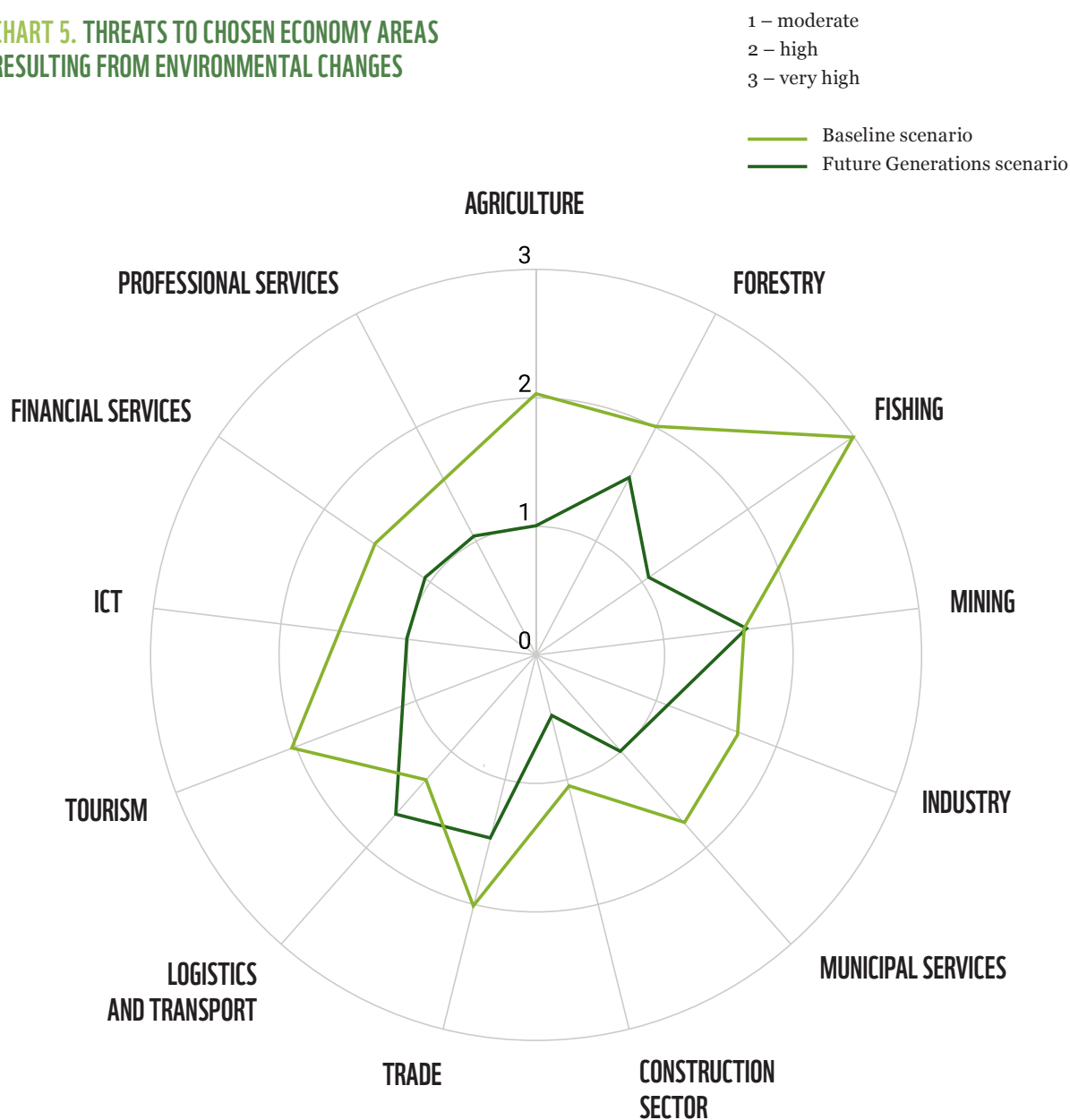
**Extension of biodiversity protection activities**

The creation of the Turnicki National Park and the expansion of the Bieszczady and Białowieża Natural Parks by 2020, along with further developments in the future, will allow local municipalities to benefit from tourism. Data from the past 30 years shows that those municipalities that are near national parks have greater revenues than those that are located farther from nature reserves.<sup>17</sup> Along with this, revenues in the **services, retail and transport sectors** in the area will increase. At the same time, the reduction of logging in these areas will not increase the costs of the **timber industry** (and indirectly the furniture industry). Although cutting down trees in areas that are of high nature value and are currently not protected are not profitable, reducing these activities would limit the supply of wood on the market, which could have a negative impact on the wood industry. On the other hand, a more sustainable policy of forest resource management will generate long-term benefits and help prevent the possible collapse of the wood supply.

17 Ministerstwo Rozwoju, *Perspektywy rozwoju polskiej branży ICT do roku 2025* (Warszawa: Polska Agencja Rozwoju Przedsiębiorczości, 2017).

# CHANCES FOR BUSINESS GROWTH IN BOTH SCENARIOS

**CHART 5. THREATS TO CHOSEN ECONOMY AREAS  
RESULTING FROM ENVIRONMENTAL CHANGES**

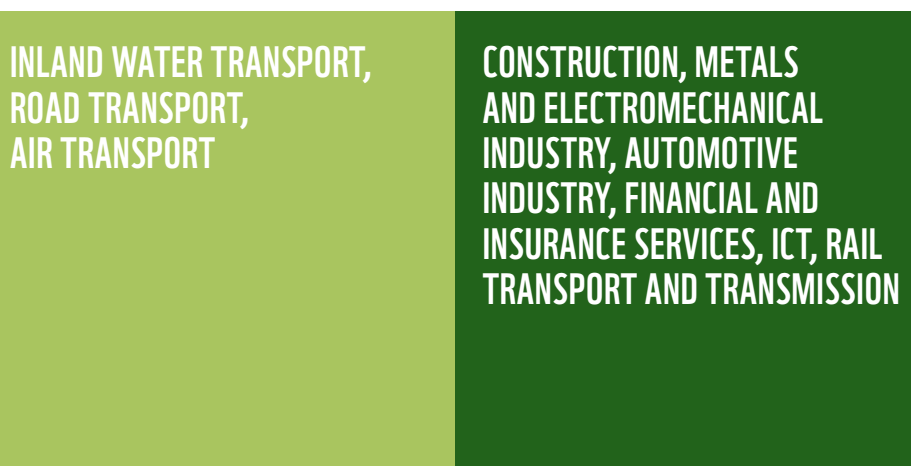


SEE: METHODOLOGICAL ANNEX, P. 36

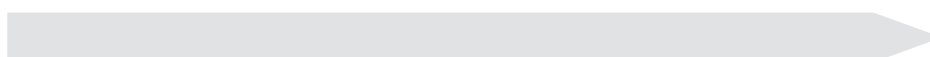
The diagnostic theses outlined in the report *2050 Poland for Generations* describe the consequences of phenomena, events and changes occurring in the areas of climate and air quality, rivers, the Baltic Sea and the most valuable natural areas in Poland. These theses translate into business risks for enterprises related to the exploitation of the environment.

**Regardless of the pessimistic conclusions deriving from the diagnosis demonstrated above, this report posits that almost all sectors will retain opportunities for dynamic growth by 2050.** The sectors that have greater or lesser chances for development, regardless of the scenario, and those that are likely to win or lose are discussed below.

FUTURE GENERATIONS SCENARIO



LESS  
CHANCES



GREATER  
CHANCES

BASELINE SCENARIO



## WHO HAS A GREATER CHANCE FOR GROWTH REGARDLESS OF THE SCENARIO?

In both scenarios, the industries associated with a low-emission economy have very good opportunities for growth. This includes the following sectors:



### THE CONSTRUCTION SECTOR

In the Baseline scenario, dynamic growth is predicted for the hydrotechnical construction, necessity for construction of intermodal-port-inland hubs and roads. In the Future Generations scenario, on the other hand, passive construction along with investments in more comprehensive energy refurbishment and non-residential buildings, such as P&R car parks and railway infrastructure, are promoted to a greater extent. Both scenarios identify the development of transmission infrastructure, i.e. the modernization and construction of power grid support structures and transformers.



### THE AUTOMOTIVE INDUSTRY

A decrease in the cost and an increasing use of electric vehicles will accelerate market development in both the individual vehicles and public transport (bus, tram and railway) segments. In the Baseline scenario, this change will occur later and will result from a decrease in the unit price of an electric vehicle, and it will also be characterized by the use of mainly imported cars. In the Future Generations scenario, on the other hand, it will be the result of a deliberate industrial policy. Furthermore, this will allow Poland to take the strategic position of an innovator in the production of componentry of electric cars. In the Baseline scenario, the share of electric cars in the sale of new passenger cars will be 50% in 2050, while it will reach 70% of the market in the Future Generations scenario.



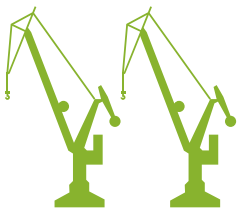
### THE METALS AND ELECTROMECHANICAL INDUSTRIES

In both scenarios, the popularity of energy-saving home appliances such as heat pumps, lighting fixtures and air conditioners will increase. At the same time, some parts of the industry, such as companies producing solid-fuel boilers, may lose in the Future Generations scenario even if they reorient their production towards boilers in emissions class 5 that meet the eco-design requirements.



### Case study: The lighting industry – LED manufacturers

Among companies in the metals sector, those that produce energy-saving lighting, including the fast-growing LED lamp industry, may benefit in both the Baseline scenario and the Future Generations scenario. An example of such a company is LUG S.A. from Zielona Góra, which is one of the leading manufacturers of lighting fixtures in Poland and Europe. In 2018, the company employed 614 people and operated in 70 markets. The expected popularity of LED lights in both of the above-mentioned scenarios is the result of the possibility for a quick return on investment. Despite the relatively high cost of installation, industrial customers and property managers seeking savings are deciding to modernize their lighting. This allows us to be optimistic about the development of companies supplying this type of technology.



### THE SHIPBUILDING INDUSTRY IN THE SCOPE OF OFFSHORE WIND TOWER CONSTRUCTION

Both scenarios assume the development of the offshore sector, where Polish shipyards have considerable experience. As an illustration, a specialized company called GSG Towers, which operates in Gdańsk, has in its portfolio investments for some of the largest offshore wind farms in the world. There is also the ST3 Offshore shipyard, which has its own engineering and design department in Szczecin.



### RAIL TRANSPORT

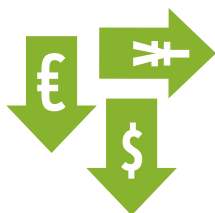
Both scenarios predict the development of the railway industry. The Baseline scenario, however, suggests that the scale of freight transport by rail in 2050 will be less than half that of the Future Generations scenario, which assumes full electrification of the rail network and the development of new networks. What follows is that one can expect further rail investments, which could stimulate demand for transport services and enable access to currently secluded locations. In the Baseline scenario, however, the programme for modernization of the railway network will be reduced due to parallel investments in inland navigation infrastructure.



### ICT AND PROFESSIONAL SERVICES

Regardless of the scenario chosen, the ICT industry will play a decisive role in Poland's technological progress. The ICT sector generates about 6% of Polish GDP and the highest, on average, annual turnover increase in Europe.<sup>18</sup> The Future Generations scenario may further mobilize the ICT sector to develop mobile solutions, applications for smart homes and tools for managing climate risks. Leading examples of the success of Polish software companies in the areas of the environment and sustainable transport are Krakow-based start-up Airly Sp. z o.o., which developed and popularized an air-quality assessment application based on its own sensor network, and City-Nav Sp. z o.o., the creator of the jakdojade.pl application, which has improved the use of public transport in Polish cities. Both scenarios foresee a high demand for professional services. Under the Future Generations scenario, however, the importance of experts responsible for spatial planning will increase, as will the number of full-time jobs and the salaries of employees of national parks.

18 Maciej Bukowski, Aleksander Śniegocki, and Zofia Wetmańska, *Od restrukturyzacji do trwałego rozwoju. Przypadek Górnego Śląska* (Warszawa: WiseEuropa and WWF Polska, 2018).



### THE FINANCIAL INDUSTRY

In the coming years, the number of financial-sector products related to climate-change risk and low-emission investments will increase. We are already observing the development of loans for renewable energy sources, the energy refurbishment of residential buildings and the replacement of production lines with solutions that consume less energy. Loans for low-emission investments are offered by the majority of municipal governments, which entrust the capital to Polish and foreign banks and loan funds.

#### **Case study: Cooperative banks and renewable energy resources for farmers.**

The financial sector is increasingly interested in lending for renewable energy and investments in energy efficiency. In Poland, support for these purposes is provided by state-owned banks (Bank Ochrony Środowiska), commercial banks (Eurobank, BNP Paribas, Alior Bank, Getin Noble Bank), loan funds (Pomeranian Loan Fund, Kuyavian-Pomeranian Loan Fund, Socio-Economic Initiatives Association) and non-governmental organizations (Silesian Development Foundation).

Pro-ecological financial products are also being developed by cooperative banks, which represent a traditional and trusted source of capital for farmers and small enterprises from rural areas. Cooperative banks offer attractive interest-bearing loans that can be used to finance solar panels, heat pumps, solar collectors and biomass boilers. These loans have a long grace period and a repayment period of up to 20 years. Thanks to the large number of branches and local offices, cooperative banks can play an important role in helping the Polish countryside adapt to environmental changes.

## WHO HAS LESS CHANCE FOR GROWTH REGARDLESS OF THE SCENARIO?

In the long term, **hard coal and lignite mining** will suffer. In the Baseline scenario, there will be a slow decline in extraction and a decrease in the use of coal in households. The Future Generations scenario, on the other hand, assumes a faster pace of mine closure and heat source replacement, along with more rapid progression in terms of technology development for CO<sub>2</sub> capture and relevant storage technologies. The losses for hard coal and lignite mining will be the result of the higher cost of raw material extraction regardless of the scenario and a decrease in the popularity of coal mining in local communities.<sup>19</sup> The demand for coal in the municipal and household sector will be reduced by applicable anti-smog resolutions, the extension of the range of gas networks and stimulation of the heat pump and photovoltaic market by programmes such as Clean Air and regional operational programmes. Due to the increase in ecological awareness, which is a result of, among other things, the activity of more than 100 anti-smog social movements, residents already recognize the external cost of using coal for heating purposes (e.g. increased expenditures on health). For these reasons, the prospects for coal extraction in both scenarios are not positive despite the fact that, as predicted in the Baseline scenario, eight coal-fired power plants will remain the basis for the operation of the Polish power system until 2050.

In addition to hard coal and lignite mining, **the forestry sector** may also suffer losses in both scenarios. In the case of the Baseline scenario, climate change and the resulting extreme phenomena will prolong the drought period in Poland, increasing its onerousness and consequences (e.g. insect gradations, fire frequency<sup>20</sup>). In the For Generations scenario, the area of protected forests will be expanded, leading to the reduction in the area covered by commercial forests. Although in some cases this will lead to the cessation of loss-making logging, in the overall picture the sector will face reduced revenues.<sup>21</sup>

## WHO HAS BETTER CHANCES FOR GROWTH IN THE BASELINE SCENARIO?

Industries that are more likely to grow dynamically in the Baseline scenario include **road, air and water transport industries**. These industries are resource-intensive and generate environmental costs (especially water transport, which, now in its infancy, will require expenditures of PLN 90 billion on infrastructure). Road transport will increase its share of the freight transport market by 3 percentage points by 2050, while air transport will continue to account for 10% of passenger transfers without taking into consideration potential activities related to the optimization of CO<sub>2</sub> emissions that are otherwise anticipated in the Future Generations scenario.

<sup>19</sup> Łukasz Adamkiewicz and Julia Huscher, *Spalanie węgla w domowych piecach: zagrożenia zdrowotne* (Bruksela: Health and Environment Alliance, 2014).

<sup>20</sup> *2050 Poland for Generations*, 114.

<sup>21</sup> Fundacja WWF, Boston Consulting Group, *2050...*, dz. cyt., s. 114.

## WHO HAS BETTER CHANCES FOR GROWTH IN THE FUTURE GENERATIONS SCENARIO?

The implementation of the Future Generations scenario creates opportunities for the sustainable and dynamic development of **fishery and tourism**. In this scenario, there will be 4,000 more jobs in the fishery sector in 2050, and revenues will increase by PLN 1.2 billion. Coastal tourism will also generate 11,000 more jobs per year and PLN 2.6 billion in revenue more than in the Baseline scenario. In addition to industries relevant to the Baltic Sea area, **the agriculture and food processing industries** also have greater chances for growth. Continuing practices focused on maximizing profits, as assumed in the Baseline scenario (e.g. floodplain cultivation and chemicalization), will expose these industries to a very high risk of annual losses, especially given the heightened frequency of extreme phenomena (such as violent storms or droughts, which impacted 53% of Poland's agricultural land in 2018). Such a heightened risk of extreme weather phenomena may also interrupt commercial supply chains and communication routes, which would force the **logistics and trade** industries to provide relevant compensation. In the Future Generations scenario, **energy-intensive industries** such as the **chemical and clothing industries**, as well as municipal engineering, will also benefit. Investments in energy efficiency will result in lower power consumption per unit of value added (a decrease by 59% compared to 2016). In the Future Generations scenario, the state will introduce stronger incentives for renewable energy production that are already being used by some municipal companies to reduce water and sewage charges.

### Case study: Investments in renewable energy in the municipal economy sector

An example of energy-saving measures is the investment strategy carried out by the municipal company Wodociągi Słupskie Sp. z o.o., which is lowering the price of water and sewerage for city residents by increasing energy production from renewable sources according to its own needs.<sup>22</sup> This is one of the first strategic models of this type in a Polish municipal company. Another example comes from the Potęgowo commune and Nadmorskie Elektrownie Darżyno Sp. z o.o., which involves the supply of district heat produced by a local biogas plant. This solution is not only greener but also provides nine stable jobs in a rural area and stimulates local entrepreneurship.

22 Magdalena Lipiecka, "Słupski Klaster Bioenergetyczny – wzorcowy przykład realizacji," *Czysta Energia* 7–8 (2017): 25–27.

# WHICH ECONOMIC TRENDS WILL HELP SEIZE THE OPPORTUNITY?

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Among numerous economic trends whose implementation would favour realization of the Future Generations scenario, there are four that are particularly impactful. The selected scenarios are already being implemented (as confirmed by case studies) and are based on technologies that are already available or are being developed, rather than solutions with either a limited scale or no chance for extensive market implementation in the near future.<sup>23</sup> They are thus worth being analysed and further supported in their implementation.

## ENERGY-SAVING STRATEGIES IN INDUSTRY AND THE CONSTRUCTION SECTOR

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Improved management of electricity consumption, leading to decreasing costs, is an activity with a very fast economic rate of return and would thus not need to be linked to environmental reasons as such. The share of energy costs in the total costs of enterprises varies depending on the sector, while amounting to a mere 2.2% on average. In the most energy-intensive sectors (including cement production and the steel and chemical industries), it exceeds 7%.<sup>24</sup> This shows that companies have, in fact, an economic interest in reducing energy consumption, which they have indeed been doing for a long time. In the years 2008–2017, energy consumption in the metals industry decreased, in value-added terms, by 10.5% on average per year, while it dropped by 9.5% and 6.7%, respectively, in the textile and production industries. At the same time, none of these industries has experienced an increase in unit energy consumption.<sup>25</sup> According to the BCG estimates, in the Future Generations scenario, annual electricity consumption in Polish industry will reach 46 TWh in 2050, a decrease of 20.7% compared to 2020 despite an 118% increase in GDP and maintaining industry's share in the economy at 35%. This means that the energy consumption will drop by more than 32% per unit of GDP generated by the industry.

<sup>23</sup> The report *2050 Poland for Generations* is based on the same assumptions.

<sup>24</sup> Maciej Bukowski and Aleksander Śniegocki, *Energia elektryczna a konkurencyjność przemysłu* (Forum Analiz Energetycznych, 2014).

<sup>25</sup> *Efektywność wykorzystania energii w latach 2007–2017*.



### Case study: Energy-saving buildings

For developers and tenants of office space in Polish cities – and increasingly also of residential and commercial buildings – the importance of environmentally friendly buildings is growing. In 2018, two-thirds of all modern (i.e. built in recent years and rated as class B or higher) office space in Poland (including 80% of office space in Warsaw) and 37% of commercial space had an ecological certificate.<sup>26</sup> The number of certified buildings reached 29% in 2018, an increase of 6 percentage points from the year before. According to experts in the field, there will be a further acceleration in this market segment, covering not only new buildings (where obtaining a green certificate is becoming a standard) but also older buildings. This trend includes housing construction, but only to a limited scale: Only nine residential buildings were certified in Poland in 2017 and 28 buildings in 2018. The movement towards environmentally friendly construction is not just about certification. In 2018, 19 world metropolises, including London, New York and Paris, declared that, from 2030 onwards, only zero-emission buildings would be constructed. These trends are a result not only of increasing environmental regulation but are above all a consequence of increasing expectations on the part of customers: One in three developers say that it is the demand for environmentally friendly architecture that is behind their decisions to expand construction in this field. According to investors, new environmentally friendly buildings can decrease costs by up to 14% over a five-year period.<sup>27</sup>

<sup>26</sup> Polskie Stowarzyszenie Budownictwa Ekologicznego, *Certyfikacja zielonych budynków w liczbach. Raport 2019*. (Gliwice: Polskie Stowarzyszenie Budownictwa Ekologicznego, 2019).

<sup>27</sup> Dodge Data & Analytics, *World Green Building Trends 2018* (Bedford, MA: Dodge Data & Analytics, 2018).

## CIRCULAR ECONOMY

An economic trend that allows more sustainable use of natural resources is the circular economy, whose main principles include a reduction (and ultimately the elimination) in the use of raw materials and resources through their reuse, repair, regeneration, recycling or upcycling. The introduction of these solutions is largely a consequence of regulatory activities, particularly at the European level. In 2015, the European Commission adopted an action plan to support the circular-economy model and allocated funds for this purpose. In 2016–2020 alone, the EU will have allocated over EUR 10 billion to initiatives related to the circular economy. A directive adopted in the first half of 2019 introduced a ban on the use of certain disposable plastics (e.g. straws or plates) to be implemented in 2021. From 2029 onwards, member countries will be required to recycle at least 90% of plastic bottles. The goals related to the circular economy are not just about plastic: At least 55% of municipal waste in the EU is to be recycled by 2025 (including households and enterprises). The target will increase to 60% by 2030 and to 65% by 2035. By 2025 and 2030, the targets of 60% and 70%, respectively, will need to be met in the recycling of the packaging waste.

# ELECTRIFICATION AND TRANSPORT REFORM

According to the Future Generations scenario, as much as 38% of Polish electricity use in 2050 will be consumed by electromobility. It is worth noting that the development of electric vehicles will be the main factor affecting the increase in demand for electricity, having a greater impact than the decrease in industrial energy consumption associated with the development of energy-saving technologies. It has been possible to observe this trend for a long time already, and its intensity is increasing. According to data from the industry organization JATO, 6.1% of cars sold in 2018 had an engine based on an alternative to fuel. Electric vehicles were the fastest-growing segment of new car sales, increasing by 47%, with over 195,000 cars sold.<sup>28</sup> Although this number represents only 1.2 % of all newly sold passenger cars, it is growing every year. This also applies to Poland, where 1,324 electric cars (including plug-in hybrids) were registered in 2018, an increase of 22% from 2017.<sup>29</sup> It can be expected that the number of these types of cars will continue to increase for both economic (as they become cheaper) and regulatory reasons. The government's Electromobility Development Plan assumes the ambitious goal of seeing one million electric cars in use in Poland by 2025.<sup>30</sup> The implementation of the Future Generations scenario is also supported by the rail development programme, which is related to, among other factors, the implementation of the Central Communication Port. This assumes the construction of up to 1,500 kilometres of new railway lines. In addition, the abandonment of costly plans for the development of inland navigation will free up an additional several billion zlotys annually for investments in rail transport and electromobility.

28 "New Passenger Car Registrations by Fuel Type in the European Union: Quarter 4 2018," European Automobile Manufacturers Association, accessed 5 November 2019, <https://bit.ly/2BEyvpk>.

29 Plan Rozwoju Elektromobilności. "Energia do przyszłości", Ministerstwo Energii, 2018, accessed 3 November 2019, <https://bit.ly/2nQ6EP7>.

30 "Przewozy intermodalne w 2018 r.," Urząd Transportu Kolejowego, accessed 3 November 2019, <https://bit.ly/2nO6PKM>.

## Case study: Trucks for tracks

One of the economic trends observed throughout Europe is the modal shift in the transport of goods from road to rail. Under the slogan 'trucks on tracks', the transport of semi-trailers on railway carriages has been proposed. However, this trend also includes the broadly understood promotion of intermodal transport, i.e. combining several means of transport, which most often concerns the transport of containers that are transhipped between trains (sometimes also ships) on main routes and trucks on initial and delivery sections. In 2018, rail transport of this type increased by 13.4% (in terms of transport performance), making 2018 the best period in history for Polish intermodal transport (its share in all freight transport in terms of weight increased by 0.7 percentage points to 6.8%<sup>31</sup>). Investments carried out by railway companies, ports, airports and logistics companies, as well as EU funding in this area, confirm that there is an excellent chance for further development of this type of transport.

31 Data from EcoPassenger.com.

## RESPONSIBILITY FOR THE FUTURE

Another trend that is worth analysing is the growing environmental awareness among consumers. Businesses that do not take environmental issues into account or that are not perceived as environmentally aware are risking a loss of reputation. Those that demonstrate environmental responsibility, on the other hand, can stand out from their competition by emphasizing the sustainability of their business model. One recent example of such a consumer approach is the phenomenon of *flygskam*, i.e. shame of flying. *Flygskam* has a real impact on business, primarily in Scandinavia, where passengers choose to travel by train not because of the price, time or comfort, but in order to avoid flying, which has a greater impact on the environment than other forms of travel. On the route from Warsaw to Berlin, for instance, carbon dioxide emissions per passenger when flying are double that of travelling by train<sup>32</sup>. A similar trend can be seen in the gastronomy and trade sectors, where some companies have stopped using disposable packaging.

Although this sort of consumer behaviour is still rare in Poland, it is likely to gain in importance over time. Other consumer approaches are important too, such as, for instance, the avoidance of food waste (smart applications that facilitate the purchase of cheaper food from restaurants that would otherwise be thrown out are gaining in popularity), the dissemination of organic or vegetarian food and efforts to eliminate the use of disposable packaging (e.g. by using one's own reusable cups). Despite the unquestionable importance of political and business activities, individual consumer choices can be important for reducing harmful effects on the environment even when regulations and business trends do not keep up. As an illustration, washing clothes in cold water reduces carbon dioxide emissions by 0.25 tonnes per person per year, while giving up one's car decreases emissions by 2.4 tonnes per person per year<sup>33</sup>.

<sup>32</sup> Data from EcoPassenger.com.

<sup>33</sup> Wynens, S., Kimberly A. N., *The climate mitigation gap: education and government recommendations miss the most effective individual actions*, "Environmental Research Letters" 2019, 12 (7).

### Case study: FSC-certified wood

Forest Stewardship Council (FSC) certificates are awarded to logging companies in accordance with standards of responsible forest management, and they take into account social, ecological and economic aspects. This standard is already very common, but still the wood buyers are aiming for further implementation. In Poland, the FSC standard covers about 7 million hectares of forests, including almost all state forests (except for the Regional Directorate of State Forests in Krosno and three forest districts covered by the Regional Directorate of State Forests in Białystok). It also encompasses private ownership, with the first certificate awarded to a private owner in 2017. Worldwide, the number of certificates has increased by 26% in the last five years to more than 1,600. At the same time, the area of certified forests has increased by 8% to almost 200 million hectares. One of the most ambitious goals associated with requiring FSC certification from suppliers can be seen in the example of Ikea, which aims to use certified wood only by 2020. The Swedish group has nine production plants in Poland (only China produces more Ikea furniture), which are already using wood that is almost 100% is certified.

# HOW DO BUSINESSES INVEST?

Entrepreneurs often perceive the financial aspect of pursuing initiatives related to sustainable business development and climate change mitigation as one of the biggest obstacles to success. This widespread perception is, however, less and less reflective of reality.<sup>34</sup> In practice, the availability of public and private capital associated with sustainability initiatives is increasing rapidly. More than 80% of institutional

investors have declared their readiness to allocate capital for the achievement of the Sustainable Development Goals.<sup>35</sup> Moreover, past experience shows that this type of financial activity is profitable for investors. According to data from Fitch Ratings, the value of assets in global funds guided by so-called ESG (environmental, social and governance)<sup>36</sup> values increased by 15% in the first half of 2019 to USD 52 billion<sup>37</sup>. At the end of 2018, this value amounted to USD 41.7 billion, while it did not even exceed USD 10 billion four years earlier. The number of funds that are guided by ESG principles and focused on sustainable investments is rising equally fast. According to Bloomberg, there were fewer than 50 at the end of 2014 and around 230 at the end of 2018. On the whole, an increasing number of investors, shareholders and fund managers are paying attention to sustainability values, and their portfolios are often more profitable than traditional ones. This further supports their chances for development and increases the availability of capital related to sustainable development.

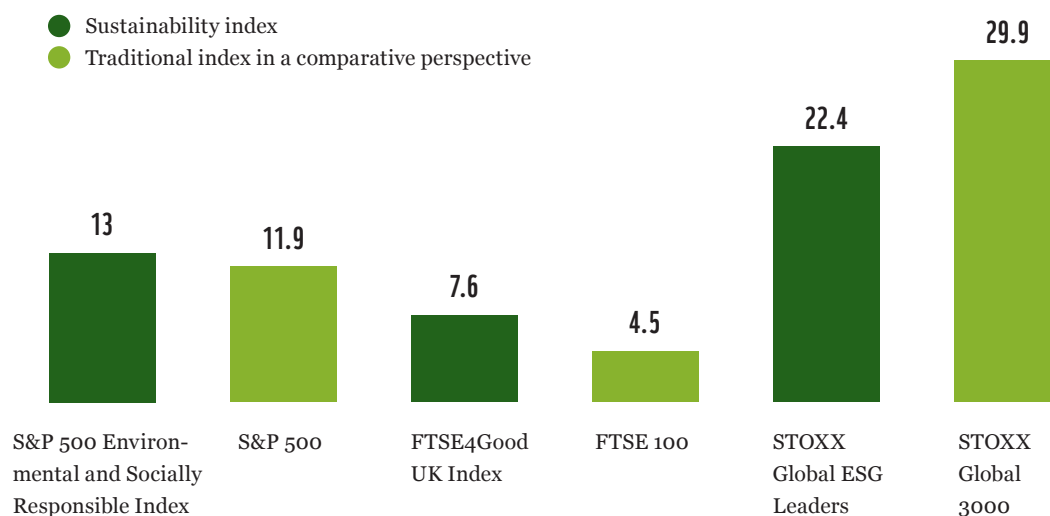
<sup>34</sup> Brigitte Hoogendoorn, Peter van der Zwan, and Roy Thurik, "Sustainable Entrepreneurship: The Role of Perceived Barriers and Risks," *Journal of Business Ethics* 157, no. 4 (July 2019), 1133–1154.]

<sup>35</sup> "A Blueprint for Responsible Investment," PRI, accessed 3 November 2019, <https://bit.ly/2CnEpM5>.

<sup>36</sup> ESG stands for environmental, social and governance criteria. This term is used to describe investment funds that take into consideration the environmental, societal and managerial qualities of a business when making investment decisions.

<sup>37</sup> "ESG money market funds grow 15% in first half of 2019," *Financial Times*, 14 July 2019, <https://on.ft.com/2nNntKz>.

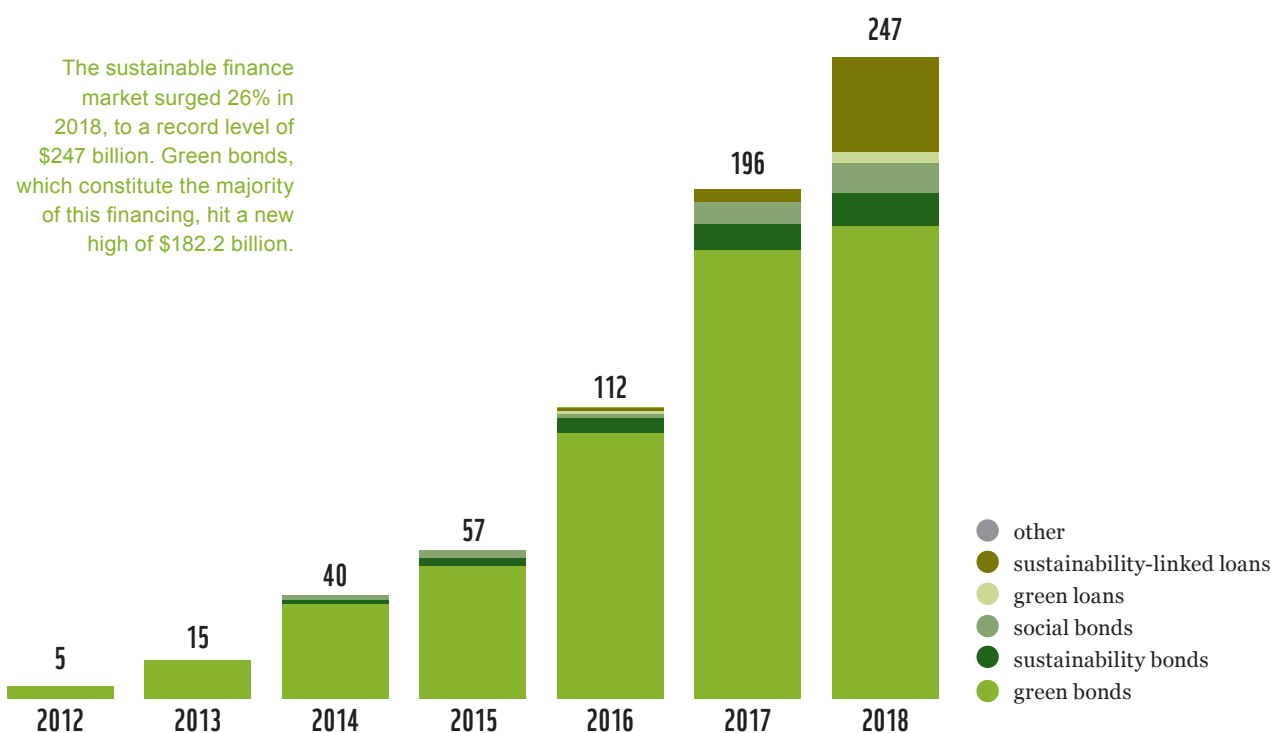
**TABLE 3. RATE OF RETURN OF SUSTAINABILITY INDICES AROUND THE WORLD (PERCENT)**



POLITYKA INSIGHT'S OWN CALCULATIONS, AS OF 13 AUGUST 2019.

According to Bloomberg, the debt market related to financing sustainable projects is also rapidly growing. In 2012, it was valued at only USD 5 billion, most of which was covered by green bonds (bonds issued to finance initiatives related to reducing harmful effects on the environment). In 2018, the market value increased almost fiftyfold, reaching USD 247 billion. While green bonds still make up the vast majority of this financing, loans are also becoming increasingly important.

### CHART 6. SUSTAINABLE DEBT MARKET SEES RECORD ACTIVITY (BILLION DOLLARS)



SOURCE: BLOOMBERGNEF

Entrepreneurs can increasingly count on interest from investment funds in various aspects of environmental sustainability enterprises. The vast majority of green investment funds are diversifying their pro-environmental investments, while others remain more specialized, such as funds focusing on the sustainable use of water resources, the reduction of carbon dioxide emissions or support for the use of renewable energy sources.<sup>38</sup> In the face of the increasing availability of private financing and its increasing diversity, Polish entrepreneurs should stop treating access to capital as a barrier to investing – and often an excuse for not investing – in a more sustainable business model.

38 "The European Green Funds Market 2018," Novoethic, accessed 3 November 2019, <https://bit.ly/2P4ACrX>.

# ON THE PATH TOWARDS SUSTAINABLE DEVELOPMENT: RECOMMENDATIONS FOR FIRMS

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## BUSINESS RECOMMENDATIONS

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- 1** **Due to the limited nature of environmental resources, entrepreneurs should make sustainable development of their companies a priority at the expense of immediate financial benefits.** If continued, the irresponsible use of environmental resources in the medium and long term can lead to their total depletion and thus the necessity to terminate a company's business operations.
- 2** **Entrepreneurs should think of the economy as a holistic system and of the natural environment as part of this system, with the potential to have an impact on their economic activity.** As an illustration, attempts to maximize the production of wheat or fish in the food industry can result in the erosion of soil, the eutrophication of seawater and the depletion of fish stocks, consequently leading to reduced harvests and lower incomes for employees. This could result further in lower revenues for industry or the tourism sector.
- 3** In this context, **activities that have sustainability at their core should be seen as investment opportunities and not as costs.** Already in 2019, the costs associated with the negative effects of human activity, and most of all of the anthropogenic climate change, will amount to as much as PLN 9 billion a year in Poland. While these costs are unevenly distributed at the moment, it is likely that sectors that are still unaffected today will soon feel the effects of weather anomalies, among other things.
- 4** Entrepreneurs should pay attention not only to their own business and the sustainable use of natural resources, but they should also **demand the same from their suppliers, and they should accept the higher costs involved.**

- 5 **Financial institutions should develop an offer related to financing investments in sustainable activities** and take into account the broadly understood indirect effects of climate change and other anthropogenic transformations in the natural environment when calculating the rate of return. For instance, banks that lend to agribusiness should take into account not only the increase in revenues of a given company but also potential losses caused by droughts or floods when calculating loan profitability.
- 6 **Motivated by their own economic interest, key stakeholders should be change leaders.** For instance, construction companies should initiate energy refurbishment in order to generate profits in the short term and motivate other sectors to change.
- 7 **Entrepreneurs should redefine business models and disseminate the ones based on the principles of the circular economy.** According to the sharing economy, the long-term leasing of products to customers, instead of selling them, is a good solution. After a certain period of time, companies could collect or enable the return of goods and provide replacements. In this way, consumers will not generate waste, and entrepreneurs will be able to convert old products into new ones.

## OTHER RECOMMENDATIONS

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- 1 During election campaigns, entrepreneurs should look out for political parties that **propose actions aimed at reducing external costs as much as possible instead of focusing only on direct levies.** The costs of ignoring the environment and prolonging the practice of unsustainable practices represents, in fact, just another type of taxation.
- 2 It is worth supporting entrepreneurs who invest in pro-environmental solutions and pursue sustainable business practices. Industry associations and chambers of commerce should introduce a new policy that combines incentives and penalties for pro-environmental activities and the lack thereof. The best players should be rewarded with certificates, while those that ignore pro-environmental solutions should be ostracized. This could be done through both industry and consumer-oriented activities (e.g. by suspending membership in associations or chambers). Such businesses could, for instance, be 'anti-certified' and would thus be required to provide information about their non-compliance. Along the same lines, business chambers could conduct an information campaign about environmental compliance. This could follow the same logic as the labelling of eggs, where the organizing principle is the type of farm an egg comes from.
- 3 The most environmentally friendly companies should be supported. The state administration could, for instance, give environmentally friendly players higher priority in every economic mission planned. Environmental criteria should be also used in tenders.
- 4 Greater emphasis should be placed on the education and promotion of pro-environmental solutions, including efforts aimed at educating entrepreneurs about the costs of ignoring the environment.



# METHODOLOGICAL ANNEX

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The research unit in this analysis is the classification of the Polish Classification of Activities (PKD) grouped in terms of similarity of the economic activity being conducted. First, the authors used the conclusions of the report *2050 Poland for Generations* to list trends affecting each distinct research unit (in terms of costs and revenues in both development scenarios). Then these trends were analysed qualitatively in terms of direction (positive or negative) and strength of influence in relation to the current economic situation. A positive result, however, means not that the industry will record profits but that its revenues will increase or that its costs will decrease compared to the current situation. A negative result, on the other hand, means a decrease in revenues or an increase in costs, but it does not have to mean a loss.

In the Baseline scenario, considered as the basic variant for the whole economy and modified by the identified trends, it was assumed that revenues for individual sectors will remain at the current level (impact 0) and that costs will gradually increase due to rising expenditures on the mitigation of environmental problems (impact -1). In turn, in the Future Generations scenario, it was assumed that revenues would increase (impact 1) due to the development of new services and products related to changes in the way the environment is used; costs will be fixed (0), as larger investments would be offset by smaller losses caused by environmental changes. In the third stage, opportunities and threats were identified by comparing forecasts of changes in both scenarios.

SECTOR	BASILINE SCENARIO	FUTURE GENERATIONS SCENARIO
agriculture	-1	1
forestry	-1	-1
fishing	-2	1
coal mining	-1	-3
oil-and-gas mining	1	0
metal mining	0	1
other mining	-1	0
food industry	-2	0
clothing industry	-1	0
paper industry	-1	-1
chemical industry	-1	0
metallurgy industry	1	2
electromechanical industry	1	2
automotive industry	1	2
furniture industry	0	-1
energy sector	0	2
water and waste management	-1	1
municipal waste	0	1
construction	1	2
retail	-1	0
road transport	1	-2
rail transport	1	3
transmission	-1	0
inland waterway transport	1	-1
air transport	1	-1
logistics and shipping	0	1
tourism (accommodation / gastronomy)	-1	1
ICT	0	1
financial and insurance services + real estate	0	1

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