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At the Road to Climate Neutrality of Manufacturing Companies in the Context of Environmental Legal Requirements

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Abstract
The article presents the results of an analysis of the legal requirements related to sustainability for manufacturing companies. It then concludes what new responsibilities and necessities for change result from the mentioned legal requirements. A model for diagnosing the needs in preparation for the environmental-energy transformation of the enterprise was proposed, which enables the implementation of steps to achieve climate neutrality of the enterprise.

Keywords
Climate neutrality, energy independence, European Green Deal, SMEs production companies.

Introduction

The European Green Deal (EGD) is a strategic project of the European Union (EU) to transform the economy to make it climate-neutral (lowering emissions) and resource-efficient. The transformation consists of climate protection, the use of clean energy, energy efficiency, sustainable mobility, circular economy, pollution reduction, protection of biodiversity, and equity in the implementation of the aforementioned processes through the use of appropriate financing mechanisms (Wise Europa, 2022). The main tools to implement the EGD strategy include finance and investment, research and innovation, and energy transition. The objectives are to be realized by 2050 (The European Green Deal, 2022), through the implementation of sub-activities called the Roadmap (Eurostat, 2023; The EU Green Deal – How will it affect my business?, 2022). The main elements of the Roadmap are:

- investing in environmentally friendly technologies;
- supporting industry to innovate;
- introducing cleaner, cheaper and healthier forms of private and public transport;
- decarbonizing the energy sector;
- making buildings more energy efficient;
- working with international partners to improve global environmental standards (Eurostat, 2023).

The range of objectives and actions that make up the Map means that all actors in the economic system are involved to varying degrees in their implementation. One of the larger and more important groups among the economic actors is manufacturing companies. In the remainder of this article, the EGD will be analyzed in terms of its impact on manufacturing companies, with a particular focus on the problems of small and medium-sized enterprises (SMEs).

It can be concluded that, of the EGD-defined measures implemented in the areas: Climate, Energy, Transport, Agriculture, Finance and Regional Development, Industry, Research and Innovation, Environment and Oceans; directly doing business (The Recovery and Resilience Facility, 2022), i.e. also SMEs are affected by the findings in aspects: Energy and Industry. Regulatory requirements in these areas influence the need for changes to existing business models (Koundouri et al., 2024). Activities are implemented according to a defined timetable and, at the same time, requirements are adapted to the current geopolitical situation, which

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has been changing very dynamically over the past five years. This results in regulatory uncertainty and the inability to conduct stable business activities, and makes it difficult for entrepreneurs to define long-term development and investment plans (Campanella et al., 2021). Entrepreneurs face new challenges, including:

- adapting to the requirements of the EGD – ultimately the use of renewable energy sources and closed-loop management;
- the pursuit of sustainability, the need to meet climate neutrality benchmarks;
- with problems of access to energy resources and energy prices – the dependence of business on energy policy issues;
- with dynamically changing legislation and requirements – legal instability;
- lack of or high prices for energy generation and storage infrastructure;
- with long payback times for any green investments;
- with the energy transition;
- with unpredictable price fluctuations and political interference in the energy commodity market;
- with energy efficiency in production processes and competitiveness;
- with energy efficiency in administrative processes;
- with access to business finance;
- with financing of the energy transition SMEs (Detailed Description of Priorities of the Operational Program European Funds for a Modern Economy, 2023; Detailed Description of Priorities of the Operational Program European Funds for Infrastructure, Climate, Environment 2021–2027, 2023; Detailed Description of Priorities of the European Funds for Eastern Poland Program 2021–2027, 2022).

Which results in:

- lack of business continuity;
- lack of competitiveness;
- inability to build a sustainable business strategy;
- the emergence of unreliable business partners;
- the development of new, risky services and mechanisms in the market;
- speculation.

As a result, entrepreneurs are faced with the need to set new or redefined targets for their companies related to:

1. Improving company competitiveness by reducing energy costs: of course, energy costs have always influenced the competitiveness of companies as a price driver; however, it should be emphasized that these costs will increase disproportionately in the coming years (especially if the company continues to use conventional fossil fuel-based energy); the solution is therefore (1) to reduce energy demand, because the cheapest energy is the one we do not consume, and (2) to increase the share of renewable energy in the company's energy mix (because RES energy, especially self-produced energy will become increasingly cheaper relative to conventional energy);
2. Ensuring energy independence and energy security: due to the increasingly deteriorating state of transmission networks in Poland, the risk of local blackouts is steadily increasing, further compounded by the fuel crisis resulting from the war in Ukraine and the consequent risk of temporary shortages of fossil raw materials; for this reason, entrepreneurs who are highly dependent on constant energy supplies (especially the manufacturing/processing sector) must aim to achieve energy independence and energy security by: (1) building their own RES energy production facilities and (2) integrating the company into a local network of RES producers (an off-grid solution – allows for independence of energy supply at the local level from the transmission of energy from large installations exposed to economic fluctuations resulting from the current geopolitical situation and from transmission grid failures);
3. Achieving climate neutrality for business: climate neutrality is no longer just a postulate of environmental activists, but a real factor affecting the cost of doing business; at present, this mainly concerns the cost of pollution emission rights, so the problem mainly affects entrepreneurs from heavy industry and energy; but the European Commission has already imposed an obligation on all large entrepreneurs operating in the EEA to report from 2023 on their environmental impact (so-called ESG reports) (Alshbili et al., 2021), and from 2026 this obligation will also be extended to some companies in the SME sector; the introduction of a border carbon footprint in the EU is also getting closer, which in the near future will force at least those companies that participate in the supply chains of EU importers and exporters to count their carbon footprint; lowering energy demand or increasing the share of RES in one's own energy mix will not be enough to achieve this goal, it will also be necessary to (1) introduce closed-loop economy (hereinafter: 'GOZ') and (2) analyzing and adapting its own supply chain to include as many partners as possible that reduce its own carbon footprint (Schneider et al., 2025).

The purpose of this article is to develop a set of good practices related to the diagnosis of readiness of the enterprise to meet the principles of climate neutrality. The procedure is based on the presentation of the analyses to be carried out and proposals for technical solutions.

Literature review – legal requirements

The overarching document guiding the economic and climate transformation in Europe and therefore shaping the new rights and obligations of individual economic actors is the Communication from the Commission to the European Parliament, the European Council, the Council, the Economic and Social Committee and the Committee of the Regions dated 11.12.2019 – European Green Deal and the Annex to the Communication dated 11.12.2019 – European Green Deal – Action Plan. The implementation of the individual action plans requires the establishment of implementing acts.

Examples of EU normative acts affecting the ways in which organizations doing business (especially SMEs) operate include:

- Regulation of the European Parliament and of the Council establishing on 14.01.2020 – the Fair Transformation Fund. The Just Transition Fund is a new financial instrument within the framework of the Cohesion Policy to provide support to areas facing serious socio-economic challenges resulting from transition in the pursuit of climate neutrality (FENG, 2022).
- Communication from the Commission to the European Parliament, the European Council, the Council, the Economic and Social Committee and the Committee of the Regions of 10.03.2020 – A new Industrial Strategy for Europe, which refers to SMEs, stating that an 'SME for SME' approach is needed. An increasing number of young, tech-savvy SMEs can help more established industrial companies to adapt their business models and introduce new forms of work suitable for the digital age.
- Fitfor55 is a mandatory EU climate target to reduce EU emissions by at least 55% by 2030.
- RED II (Renewable Energy Directive) – EU 2018/2001 of 11.12.2018 on the promotion of the use of energy from renewable sources. RED II indicates standards for the qualification of green energy (Annex IX of the directive – ceilings/templates for the analysis of substrate consumption to yield), provides a basis for investment planning.
- REPowerEU Plan 18.05.2022 COM(2022), 230 – affordable, secure and sustainable energy for Europe. The new geopolitical reality and energy market situation require a decisive acceleration of the transition to clean energy and increasing Europe's energy independence from unreliable suppliers and the unstable fossil fuel sector.
- Corporate Sustainability Due Diligence Directive CSDD – December 2022 (Corporate Sustainability Due Diligence Directive). The directive assigns responsibility to managers and supervisory boards of selected groups of companies in relation to the achievement of sustainability performance in order to counteract the negative impacts of corporate activities on respect for human rights and environmental issues. In theory, small and medium-sized companies are not covered by the Directive, but they participate in the supply chain of large customers, which obliges managers to comply with certain requirements.

The various pieces of secondary legislation of the Union are implemented in different ways in EU member states. Regulations, for example, have general application and are binding in their entirety and directly applicable (Banaś, 2024). Directives oblige the Member States to which they are addressed to achieve a certain result, but leave the national authorities free to choose the form and means (Energy Policy of Poland until 2040, 2021; Fund for a Just Transition, 2024).

The numerous obligations to be met by entrepreneurs, the multitude of laws and their dynamic changes create uncertainty in the conduct of business. Entrepreneurs must keep abreast of current legislation and analyze what will affect the business in some time (Banaś, 2024; BiznesAlert, 2022).

Materials & Methods

Following on from the above discussion of the objectives of the European Green Deal, the authors of this article aim to analyze what tasks at the operational level await small and medium-sized enterprises on the road to climate neutrality (Tab. 1).

Table 1
Goals set for SMEs on the road to climate neutrality

Objectives	Result
To improve the competitiveness of the company by reducing energy costs	To develop a description of good practices related to achieving energy independence and taking into account the principles of the European Green Deal
Ensure energy independence and energy security	
Achieve sustainable resource consumption of the enterprise	

Source: own elaboration based on (Grabowska et al., 2023)

Objective 1 – reducing energy costs

The starting point for reducing costs related to energy consumption is to conduct a proper diagnosis (GlobEnergy, 2022). A number of tools serve this purpose, some of which are derived from common practice,

and some directly from legal acts with the status of a law or regulation. The aforementioned diagnosis is advisable to start with a process analysis of the enterprise, including at least:

- identification and mapping of key processes, i.e. synthetic information on what processes are implemented in the enterprise, their purpose, location, execution time, resources required for implementation (including: personnel, infrastructure, materials, etc.), whether the process is monitored, whether there is a specific procedure for it, whether there are risks / bottlenecks, how a given process is related to other processes
- an in-depth analysis of the tools used for the identified processes, building and technical infrastructure, materials, utilities, with particular emphasis on energy carriers, human resources, etc.

The next step, which includes both diagnosis and identification of specific improvements, is an analysis of the energy intensity of the building and technical infrastructure used in the processes identified earlier (Energy Forum, 2023). Specific tools described in the legislation serve this purpose, including an energy efficiency audit and an energy audit of the building, as well as an energy audit of the company (Law on Support for Thermal Modernization and Renovation and the Central Register of Emissions of Pollutants in Buildings, dated November 21, 2008). The main difference between a business energy audit and an energy efficiency and energy audit is that the former covers all aspects of energy use and addresses all feasible measures affecting energy consumption (Act on energy efficiency, 2016; Energy audits, 2023; Regulation of the Minister of Energy on the detailed scope and manner of preparing an energy efficiency audit and methods of calculating energy savings, dated October 5, 2017, 2017; Regulation of the Minister of Infrastructure on the detailed scope and form of the energy audit and part of the renovation audit, templates of audit cards, as well as the algorithm for assessing the profitability of a thermomodernization project, dated March 17, 2009, 2009). Once the most energy-intensive areas are identified, opportunities to optimize consumption are identified (Tab. 2).

Table 2
Opportunities to optimize energy consumption in production companies

Subject of research and evaluation	**Types of recommendations**
Buildings:	
– state of thermal protection – operation of installation systems	– thermo-modernization – modernization or replacement of installation systems or their components
Production equipment	– modernization or replacement of equipment – introduction of automation introduction of monitoring
Electricity and heat supply system	– modernization or replacement of energy sources and internal networks
Terms and tariffs of energy supply	– change of contractual terms and tariffs – change of energy suppliers
Maintenance and operation system	– improvement of the inspection and repair system – introduction of monitoring
Energy management as a whole	– introduction of an Energy Management System – introduction of monitoring – introduction of an automatic energy use control system
Use of equipment and installations	– introduction of rules for energy-efficient use (regulations, instructions) – training, informing, explaining

Source: own elaboration based on (Grabowska et al., 2023)

Objective 2 – energy independence

Energy independence requires the use of discoverable energy sources. Available technical solutions for energy production include photovoltaic, heat pump, biogas plants, wind turbine (Veers et al., 2023).

Photovoltaic is the most common form of self-generation of electricity by small and medium-sized enterprises. The power of the photovoltaic installation should be selected according to the company's electricity consumption. If the company is planning to expand and in prospect to attach more equipment or machinery, it is worthwhile to provide for this at the stage of estimating the size of the photovoltaic installation.

To plan the establishment of photovoltaics well in a company, the following must be considered:

- location of panels and electrical equipment;
- load-bearing and structural capabilities of the company's building – in the case of installation on the roof, the appropriate area of the plot – in the case of installation on the ground;
- exposure to the sun – photovoltaic panels must have good sunlight, preferably facing south, so that they can produce large amounts of energy; shaded areas, obscured, for example, by trees, chimneys, buildings, or other tall structures, are not suitable for locating panels.

The key to the profitability of photovoltaics is the company's self-consumption of energy. To increase its level it is worth:

- properly plan the operation of equipment – so that energy-intensive devices work during the time of highest electricity production;
- use electrically powered devices;
- change the heating system to electric;
- install energy storage – allowing you to store electricity and use it during periods of no production from photovoltaic panels (Photovoltaic and Energy Storage Industry Association, 2022).

Heat pump – does not produce energy, so no spontaneous combustion takes place in it, but transfers it. Thus, an external power supply for the transfer process is required for the pump. Electricity input expressed in kW generates from 3–6 times more thermal energy, which is why it is so cost-effective (Port PC, 2022).

The types of heat pumps are mainly due to the lower heat source – that is, the "area" from which heat is extracted to the building. The lower source can be:

- air – pumps extract heating energy from the air; they are very easy to install and provide high efficiency; of all types of heat pumps, they work best at outdoor temperatures of about +5°C;
- ground – in the case of pumps extracting heat from the ground, it is required to place special collectors – this is done by means of vertical boreholes or preparing the ground for the placement of horizontal collectors; the advantage of ground heat pumps is stable performance throughout the year (the ground already at a depth of 1 meter maintains the same temperature level);
- groundwater – uses the thermal energy contained in ground or surface water to heat or cool buildings. It works on the principle of heat exchange between ambient water and the heating or cooling system in the building (Enerad, 2023).

A biogas plant is the most stable source of renewable energy – its operation is not determined either by the strength of the wind blowing or the intensity of solar radiation. It can be an excellent solution to the problem of using agri-food waste for owners of poultry farms, piggery, or farms. A biogas plant is a very large investment – up to 10 million zlotys. However, so-called microbiogas plants with a capacity of even 10 kW are much cheaper and do not require a huge herd of cows or a large pig farm to secure constant access to raw material for biogas production (Daxini & Wu, 2024).

The only prerequisite is the availability of substrates that are on the farm, such as residues from pig farming (manure) or as their own corn crop. Farms also have their own energy needs – related to electricity and heat consumption. Thus, a biogas plant makes it possible to manage waste from agricultural production and supplement farms' current energy needs by producing energy from this waste (National Plan for Rebuilding and Increasing Resilience, 2021). In addition, the biogas plant still provides valuable organic fertilizer, reducing the cost of using mineral fertilizers. Having largely its own substrates, the cost of building a biogas plant can pay for itself even within 6-8 years.

Thanks to the operation of biogas plants, emissions of harmful gases into the atmosphere are reduced. Establishments producing livestock-based food and using their own crops for feed purposes can show a very low carbon footprint of their products, as their activities combined with the operation of the biogas plant close the production cycle, in which there is no room for the harmful environmental impact of producing this product (Greenhouse Gas Protocol, 2022; ProAgricola, 2022).

The operation of a biogas plant is based on a simple scheme – supply the substrate, heat it to the desired temperature, ensure proper mixing, cut off access to oxygen, and biogas is produced, which is then converted into electricity and heat for consumption.

Wind energy in the activities of small and medium-sized enterprises is very rarely used. The reason is the huge cost of the investment and the complicated procedures and complexity of the investment itself. The answer to this may be a vertical wind turbine, which will work well as an additional source of energy. It is definitely cheaper than horizontal windmills, generates less noise and allows installation on a building (Polish Wind Energy Association, 2022).

The vertical location of the turbine's axis makes the propellers perpendicular to the ground, so they are sensitive to even a slight wind force. The sail turbine works when the wind blows at 0.7 m/s, even in light winds the blades spin at 50 km/h. This speed guarantees and effects and quiet operation.

If the wind turbine is mounted directly to the supporting structure of the building, no additional permits need to be sought. The same is true when it comes to the process of producing electricity itself – producing electricity for personal use does not require separate legal requirements. When the mast does not exceed a height of 3 meters from the roof of the building on which it is installed, no building permit is required.

The biggest weakness of renewable energy sources is their instability. Energy storage partially solves this problem. It will make the grid function better and more new installations can be connected to it. In the event of a transmission grid failure or repair work, the entrepreneur is protected by his own power source (off-grid).

Among the most important advantages of using energy storage are, first of all:

- optimization of energy consumption – energy storage facilities help to plan distribution and save electricity;
- ensuring energy security – independence from power supply or so-called blackouts;
- environmental considerations (decarbonization) – energy storage facilities; increase the efficiency of the use of "green energy", and will therefore gradually gain in importance;
- support electrification of transport – they reduce transportation costs.

Objective 3 – sustainable resource consumption

One of the tools for achieving the EGD's goals is the transformation of the economy to make it circular. The plan for a circular economy (CE), is a set of interrelated initiatives aimed at reducing the consumption of natural resources. The activities focus on transforming the design, production and consumption of products so that no waste is created. These initiatives involve a wide variety of materials and products, such as packaging, technology, vehicles and textiles.

A closed-loop economy is a production and consumption model that involves sharing, reusing, repairing, refurbishing and recycling existing materials and products for as long as possible. This extends the life cycle of products and also affects the last phase in the product life cycle – disposal. Efforts are made to use and keep in production materials recovered from the dismantling of used products. In practice, this means reducing waste to a minimum.

The transition to a circular economy requires redefining business models for individual organizations in specific industries, for supply chains, and then optimizing them on a macroeconomic scale.

In order to achieve the above, it is necessary to analyze the life cycle of the selected product. Life Cycle Analysis (LCA) is designed to comprehensively examine a product's impact on the environment and natural resources. It begins with the preparation for production – in particular, the extraction of raw materials and the provision of energy – then covers the production and consumption process, ending with the management of waste. Because of its holistic nature, this analysis is sometimes called "cradle to grave" (Cradle to Grave), or because of recycling "cradle to cradle" (Cradle to Cradle). It is also known as "ecobalance" (ecobalance) because of its meticulous study of the exchange of matter with the environment. Still other studies use the names "life cycle inventory" (Life Cycle Inventory) and "life cycle impact assessment" (Life Cycle Impact Assessment) separately. The former refers to the initial phase of the analysis, which consists of identifying the impact, and the latter refers to the interpretation of the results for its overall assessment. The methodological problems of life cycle analysis are primarily related to establishing the "cradle" and "grave". Based on the analysis, circular business models are developed, in the first stage for a particular organization, and then for the entire sector, industry and economy as a whole.

The development of a circular business model for the operation of an enterprise on the basis of GOZ assumptions (GOZtransformation business model), includes the stages of: auditing the enterprise and consulting (aimed at determining the possible directions of transformation in the GOZ stream), and identifying potential opportunities for cooperation with other enterprises in the GOZ stream. The targets are:

- creating and participating in supply chains;
- product life extension;
- eco-design;
- transforming a product into a service or services;
- creation of sharing platforms;
- industrial symbiosis;
- recovery and reuse of waste, broadly defined.

Strategies that can be applied to introduce circularity features into business operations include:

- sourcing renewable raw materials and recyclable parts;
- recovery and use of by-products;
- remanufacturing used parts and reusing them;
- improving the properties, quality and durability of products;
- integration of products and services;
- ensuring accessibility to functionality rather than ownership of products;
- recovery of raw materials or parts.

When analyzing the possibility of modifying the business model to a circular one, it is necessary to analyze which strategies and tools translate into effective results, this requires matching solutions to the industry.

Results

Conducting the analyzes necessary to achieve energy independence and climate neutrality, and then implementing the recommendation proposals resulting from these analyzes, involves the involvement of appropriate personnel and financial resources. These resources will vary depending on which area is involved, whether they require the involvement of external advisors, and finally on the specifics of the business in question.

Step 1

The result of this stage, i.e. the analysis of legal conditions, is the preparation of a report or register of requirements, which apply to a given enterprise's business activities. Many organizations, especially those with implemented standardized management systems, e.g. ISO 14001, have established procedures for accessing and interpreting legal requirements and use the knowledge of employed specialists or the services of external consulting firms.

Step 2

As a result of the analysis of processes and energy consumption, reports on the company's process analysis and audits carried out are created as part of this stage. Depending on the nature and complexity of the business, the size of the company, etc., these can be energy audits of buildings, energy efficiency audits (for a selected installation, such as lighting, for a selected machine or for an entire production line) or an energy audit of the entire company (which takes into account all aspects of energy consumption in the company's operations). The development of audits requires the involvement of qualified external experts with the appropriate software (specialized software (e.g., ArCADia-TERMOCAD, BuildDesk Energy Audit) is required to develop a building energy audit. In addition, in order to conduct audits at all, it is often necessary to order additional expert reports (concerning, for example, a specific piece of equipment) or to perform a technical inventory of the building.

However, the aforementioned reports and expert opinions are only a means to the end of reducing energy demand. While some of the recommendations from the audits that relate to organizational changes can be implemented at no or low cost, a real, sometimes profound energy transformation of the company requires expenditures on either equipment upgrades (cost necessary to be determined individually for each piece of equipment) or thermo-modernisation. Investments in renewable energy generation facilities are discussed in Stage 3.

Step 3

Based on the analysis done in the first 2 stages, design a business plan for the investment. The type of activity, energy consumption, energy efficiency determines the choice of energy source. The market for photovoltaic and heat pump installations is very large and competitive in Poland. There are plenty of comparison sites on the Internet, where you can find the approximate cost of the investment. The final value depends on the quality of construction, software, controllers, manufacturer and many other factors. The most important indicator to follow is the profitability of the project. The final decision depends on it. However, it is worth bearing in mind that we create estimates based on current energy tariffs. It is assumed that energy prices will be higher in the future, so the estimated payback time will be reduced in the future.

Step 4

The result of this stage is the development of a circular business model for the operation of the enterprise based on the assumptions of a closed-loop economy. As for the analysis of the circulation of materials, raw materials and semi-finished products, the task can also be reduced to analyzing the carbon footprint of products. Consulting companies engaged in calculating the carbon footprint offer services depending on the number of scopes, the amount of data, having the results of previous environmental audits, available data on the carbon footprint generated at other participants in the supply chain, the need to prepare an IT tool. You don't necessarily have to prepare a dedicated IT tool, you can use ready-made solutions and licensed databases.

Table 3
Lean Time of diagnosis of readiness to achieve climate neutrality

Steps	Lead time (weeks)
analysis of legal conditions	
energy intensity analysis (process and energy consumption analysis)	
analysis of the circulation of materials / raw materials / semi-finished products	
analysis of available technical solutions for energy production	
analysis of external funding sources for energy/environmental transformation – recomendation	

Source: own elaboration based on (Grabowska et al., 2023)

The realization of a model preparation for the environmental and energy transformation of an enterprise makes it possible to carry out the implementation of measures aimed at achieving climate neutrality for the enterprise (Tab. 4).

Table 4
Risks in the energy transition project

Risk name				
A	B	C	D = B × C	E
Failure to consider all potential needs	0.40	0.80	0.32	Multifaceted analyzis – at each the company's activities are analyzed from a different angle
Internal employee resistance to change	0.70	0.80	0.56	Involving employees in the proces of planning changes, making them aware of the importance and necessity of changes
Lack of financial instruments to implement recommendations	0.80	1.00	0.80	Maximizing the numer of recommendations, the implementation of which does not require financial outlays

Source: own elaboration

Discussion

Preparing a company for energy transition carries certain risks, which were analyzed according to the following methodology (Tab. 4):

- for each identified risk, the probability of its occurrence and its impact on the project were determined (on a scale of 0.00 to 1.00);
- based on the probability of occurrence and the impact of the hazard, the significance of the risk for the project was calculated (as a product of these quantities); the closer the value is to 1.00, the greater the significance of a given risk for the success of the project.

In the context of the analysis of risks for the project presented in the table above, it is important to remember when preparing for the implementation of an enterprise environmental modernization project:

- carry out a multi-faceted analysis: the entire business should be analyzed separately in terms of (1) heat and electricity consumption, (2) material/raw material cycle (GOZ), (3) introduction of new energy sources (RES) and (4) available sources of financing, and (5) level of green indicators; each of these analyzes should comprehensively cover all aspects of the company's operations, so that none of the potential needs will be left out of the analysis, and if omitted at any stage, it will be caught in subsequent analyzes;
- involving employees in the change planning process: any modernization brings change, but energy or environmental modernization of a company must involve a series of deep changes in employee behavior, which will naturally arouse equally deep resistance; it is therefore necessary to increase employee awareness not only of the climate challenges, but also of their impact on the company's cost level, and therefore the level of profitability of the business and, as a result, the level of wages; it is important to consult with employees already at the stage of planning changes, and, if possible, to work on them together; involving employees in the process of change naturally reduces their resistance to making these changes;
- maximize the number of recommendations and recommendations whose implementation does not require financial outlays: energy/environmental modernization of the enterprise is intended to increase its climate neutrality, but an equal goal must be (at least from the perspective of the entrepreneur himself) to improve its market situation, i.e., in the simplest terms, to increase the profitability of the enterprise; a significant part of the changes recommended in energy audits and energy efficiency, CE models, RES investment plans, etc. involve significant financial outlays, which are easy for an entrepreneur to decide on when incentives in the form of subsidies are available; it is much more difficult to decide in a situation where the investment has to be implemented on the basis of own funds or repayable financing; therefore, it is extremely important to maintain in the recommendations an appropriate proportion in the number of recommendations/recommendations that do not require financial outlays or require outlays at a low level – this is, for example, a whole range of organizational changes, or the selection of appropriate suppliers or tariffs.

Taking the above recommendations into account at the project planning stage will avoid, or at least significantly reduce, the most significant risks, which will translate into project feasibility.

Conclusions

The energy crisis has brought many small and medium-sized companies to the brink of bankruptcy. Optimizing energy consumption costs has not been a top priority for many until now. This has been influenced primarily by the relatively low cost of energy. The energy transition and the move to zero-carbon sources is an escape for many entrepreneurs from volatile prices, but also from possible blacktopping. With rising energy prices and even the risk of energy caps, businesses are beginning to look at energy efficiency differently.

It is the energy crisis that will have a decisive impact on companies in the years to come. For only 3% of Polish SMEs, the energy price hikes that have affected their companies have not been affected at all. Only one in three SMEs has not once faced a power outage during the year, and 37% say they use electricity from renewable energy sources. Investments in RES will increase in the coming years. The sooner production companies benefit from the energy transition, the sooner they will gain a competitive advantage. 80% of SMEs believe that energy transition based on RES is an inevitable direction of change – primarily due to environmental protection (60%) and rising electricity prices (52%). 39% of SMEs among those claiming that RES is an inevitable direction of change believe that it will be necessary due to the obligation to comply with EU directives being introduced ((Statistics Poland, 2022). Investment in renewable energy sources is inevitable, and it is RES that is the answer to the biggest pains resulting from the crisis, namely price stability and security and guarantee of energy supply. Also, European Union legislation imposes, and will continue to impose, increasingly stringent obligations on us to reduce our carbon footprint and reduce CO2 emissions. The awareness of small and medium-sized entrepreneurs is crucial in this case. How they respond now will set their development path for the coming years. The energy transormation preparation plan presented in this article is intended to help decide on the solutions to be used, and is intended to ensure efficiency by gathering all the most important business information in the context of Europe's planned 2050 climate neutrality.

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