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A COMMON FUTURE: THE ROLE OF THE CIRCULAR ECONOMY AND GREEN ENERGY IN CREATING SUSTAINABLE DEVELOPMENT

Circular economy is one of the main strategies for achieving sustainable development and combating environmental problems. This article explores the issue of introducing circular business models in Ukraine, taking into account the problems and challenges faced by companies and the state. One of the main challenges for the introduction of a circular economy is the need to change ideas about the use of resources and waste. Many companies have become accustomed to a linear model of production, where the costs of resources and energy have not been properly evaluated. Therefore, new approaches to the design and production of products are needed that allow reuse of resources and reduction of waste.

The article discusses various business models of the circular economy, such as "product-service", "secondary market", "recycling", "exchange", "rental". An algorithm for introducing these business models in Ukraine, taking into account legislation and market conditions, is also provided. The authors of the article draw attention to the need for state support and openness to new initiatives in this area. Effective implementation of the circular economy requires investment in research and development, infrastructure development and legislative change.

In summary, this article provides a clear overview of the circular economy and business models that can be used to achieve sustainable development and combat environmental challenges. It also highlights the problems and challenges that arise during the implementation of circular business models in Ukraine and provides an algorithm for their implementation, taking into account legislation and market conditions. The article emphasizes the need for state support and openness to new initiatives in this area. Introducing a circular economy is an important step towards achieving sustainable development and preserving the environment for future generations.

Keywords: circular economy, sustainable development, circular economy business models, green energy

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СПІЛЬНЕ МАЙБУТНЄ: РОЛЬ ЦИРКУЛЯРНОЇ ЕКОНОМІКИ ТА ЗЕЛЕНОЇ ЕНЕРГЕТИКИ В СТВОРЕННІ СТАЛОГО РОЗВИТКУ

Стаття присвячена темі циркулярної економіки та її впливу на сталий розвиток і зелену енергетику. В ній описується концепція циркулярної економіки та її основні принципи, а також наводяться приклади бізнес-моделей, що допомагають зменшувати відходи та зберігати ресурси. Стаття також звертає увагу на проблеми, що виникають при запровадженні циркулярних бізнес-моделей в Україні, і пропонує алгоритм їх запровадження з урахуванням законодавства та ринкових умов. Запровадження циркулярної економіки є важливим кроком до досягнення сталого розвитку та збереження навколишнього середовища. Ця стаття демонструє необхідність підтримки держави та відкритості для нових ініціатив у цій сфері.

Ключові слова: циркулярна економіка, сталий розвиток, бізнес-моделі циркулярної економіки, зелена енергетика

Introduction

The circular economy and green energy are becoming more and more relevant every year as the world faces serious challenges related to climate change, depletion of natural resources and growing waste.

The circular economy is a system in which resources are used as efficiently as possible and waste is turned into resources for the next cycle of use. This reduces the amount of waste and the consumption of new resources. The circular economy is becoming increasingly relevant in the face of growing waste, environmental pollution and dwindling natural resources.

Green energy is a system that uses energy sources that do not cause carbon and other pollutant emissions. Green energy is becoming increasingly important in the context of growing energy demand and increasing volatility in oil and gas prices. The use of green energy can reduce dependence on oil and gas imports and reduce carbon emissions that cause climate change.

Thus, the circular economy and green energy are becoming more and more relevant every day, as they help reduce environmental impact and preserve natural resources for future generations.

Current research on the circular economy and green energy is important for solving serious environmental and economic problems.

Research in the field of the circular economy allows us to develop new technologies and approaches to the use of resources. They help to reduce waste and reduce the consumption of new resources. This can lead to reduced environmental pollution, increased resource efficiency and reduced dependence on imported resources.

Green energy research helps to develop new technologies and approaches to the use of energy sources. They can reduce dependence on oil and gas imports, reduce carbon and other pollutant emissions, and improve energy efficiency. This can lead to reduced environmental pollution, increased energy security and lower energy costs.

Such research also helps to address the economic challenges associated with dependence on imported resources and changes in energy prices. The development of the circular economy and green energy can be a key factor in creating stable and sustainable economic development.

Research in the field of circular economy and green energy is carried out by scientists from various fields, such as economics, ecology, engineering, chemistry, and others. Some of the most prominent scholars who have done research in these areas include [1–15] McDonough W., Braungart M., Webster K., Bach, Lacy P., Rutqvist J., Pauli G., Hawken P., Lovins A., Lovins L. H. and others. But their research does not exhaust the full range of issues and challenges that are constantly emerging in a rapidly changing world. Consequently, research in this area is still relevant.

The purpose of this article is to determine the role of the circular economy in the field of green energy in order to create sustainable development.

Experimental part

Circular economy business models in green energy are typically based on the idea of using renewable energy sources and reducing waste through efficient use of resources and reuse of materials. One such business model is the use of solar energy to generate electricity. Solar panels are manufactured using recycled materials, such as recycled glass and metal structures. After the panels are used, they can be recycled to make new panels, reducing waste and the consumption of new materials.

Another business model is energy efficiency and energy conservation. Companies can provide energy saving services, install energy efficient systems, and sell energy generated from renewable energy sources. At the same time, companies can attract customers through collaboration and partnerships, creating circular ecosystems where waste from one business becomes a resource for another.

Other business models may also include reusing batteries from electric vehicles for energy storage, using biomass to produce biofuels, and other innovative technologies that reduce the consumption of natural resources and environmental impact. The main goal of these business models is to create efficient, sustainable and competitive ecosystems where waste becomes a resource and negative environmental impacts are reduced.

In addition, the circular economy in green energy can provide additional benefits for companies, such as reduced material and energy costs, increased sustainability of resource supply, reduced environmental impact and increased production efficiency. In summary, green energy circular economy business models aim to address waste and renewable energy issues while ensuring ecosystem sustainability and efficiency.

Here are some examples of circular economy business models in green energy:

Wind turbine power generation - companies can use circular economy principles, such as repairing and recycling wind turbines instead of throwing them into landfill.

Solar panels - companies can reuse solar panels that are no longer in use and recycle them into raw materials for the production of new panels.

Energy efficiency - companies can reduce energy consumption by implementing energy-efficient technologies and reusing materials, which reduces waste production.

Use of biomass - companies can use organic waste, such as crop residues, wastewater and other biological resources, to produce electricity.

Circular energy use - companies can create closed-loop energy systems that conserve and reuse energy from various sources, such as the sun, wind and geothermal energy.

Smart grid management - companies can use smart grid management technologies to reduce transmission losses and ensure more efficient use of energy.

Integration of energy conservation and energy management systems - companies can use integrated energy conservation and energy management systems to ensure optimal energy use and reduce the burden on energy systems.

Resource circularity - companies can ensure the reuse and recycling of resources used to produce green energy, such as metals and plastics, reducing waste production and pollution.

These examples demonstrate that circular economy business models can be applied across a range of green energy sectors. They help to conserve resources and reduce waste production and pollution, which has a positive impact on business sustainability and the environment in general.

However, it is worth noting that the implementation of circular economy business models in the green energy sector may require significant investment and effort to ensure optimal use of resources and energy. However, in the long run, these efforts can lead to a sustainable and environmentally friendly business.

Today, there are several companies using circular business models in the green energy sector. Here are some examples:

1. Tesla is a manufacturer of electric vehicles and energy storage. The company creates energy storage devices that can store electricity from solar panels and wind turbines to meet consumers' energy needs throughout the day.
2. Vestas is a company that specialises in the production of wind turbines. Vestas builds wind turbines that can be fully recycled and recyclable at the end of their life cycle.
3. Enerkem is a company that produces fuel from landfill waste. Enerkem uses gasification technology to convert landfill waste into ethanol and other fuels.
4. Enel is one of the world's leading producers of electricity from renewable energy sources. The company develops renewable energy projects such as wind and solar power plants.
5. Circular Energy Storage is a company specialising in the recycling of old batteries for energy storage. The company ensures the preservation of materials used in old batteries and recycles them into new batteries.
6. Dong Energy is a Danish company specialising in the production of electricity from renewable sources such as wind and solar. They also have a target to reduce their CO2 emissions by 50% by 2025.
7. Neste is a Finnish company specialising in the production of biodiesel and renewable products. They use waste and residues from biodiesel production to produce new renewable products.
8. Ecovative is an American company that produces biodegradable plastic using mushrooms. This plastic can be used as packaging for wind and solar power plants.

All of these companies are excellent examples of how the circular economy can be an important element in green energy and help reduce environmental impact.

– The implementation of circular business models can face a number of challenges, including
– High costs: In the first years of implementing a circular business model, the costs can be very high. Investments in new technologies, processes and equipment, as well as staff retraining, are required.
– Lack of standards: currently, there are no global standards that define the principles and rules for using circular business models. This can lead to inequality in the development of this market and difficulties in interaction between companies and other participants.
– Lack of support from governments: some countries do not provide sufficient support for companies that want to switch to circular business models. This can be an obstacle to the development of this area.
– Lack of market for recycled materials: some companies may face the problem of a lack of market for recycled materials. If there is not enough demand for recycled materials, companies will not be able to effectively use circular business models.
– Changes in consumer habits are needed: Changes in consumer habits are needed to successfully implement circular business models. This can be difficult as many people are used to throwing away waste and buying new products instead of repairing and recycling old ones.
– High implementation costs: The transition to a circular economy may require major investments in new infrastructure and technologies that use resources more efficiently. Many companies may be experiencing great pressure on their financial resources.
– Lack of incentives: In most countries, there are insufficient incentives for companies seeking to make the transition to a circular economy. Most legislation is aimed at encouraging cost and innovation rather than resource conservation.
– Lack of standards: There is a relative lack of standards for measuring and assessing the environmental and societal impacts of circular business models. This can lead to companies not being able to replicate their successes in other regions where different regulations and standards exist.
– Lack of access to necessary resources: Companies may face challenges in accessing the necessary resources to implement circular business models, such as recycled materials, renewable energy and technology. This can lead to dependence on some suppliers, which can be risky in the context of risk diversification and business stability.
– Consumer uncertainty: Consumers may not be sufficiently convinced of the benefits of circular business models and may not like new products and services. This can lead to low levels of demand, which can make the business model more difficult and reduce its profitability.
– Lack of government support: companies may face the challenges of not having the right legislation and insufficient government support to implement circular business models. This may result in companies not being able to compete effectively with traditional businesses that use more costly and less sustainable production methods.
– Business model uncertainty: Some companies may be unsure of how best to implement a circular business model and what changes are needed. This can lead to uncertainty and inefficiency, and increase the risk of wasting resources and money on business model implementation.

– Another challenge is the lack of a regulatory and legislative framework that can support circular business models and facilitate their implementation. Some legal deficiencies may result in some business models not being legally possible or becoming too complex to implement.

– Another problem is the relative novelty of these approaches and the lack of knowledge and skills in their implementation among the business community. Some companies may be unable to understand how to adapt their existing processes and production lines to the circular economy, which may reduce interest in implementing it.

In addition, some business models may require large upfront investments or additional resources, such as new technologies and infrastructure, which may be prohibitive for companies that do not yet have sufficient experience in the circular economy.

It is also important to consider differences between countries and regions. There are various national and regional characteristics that can influence the implementation of circular business models, such as the level of economic development, national cultural characteristics, the level of support from the government, etc.

The introduction of circular business models in Ukraine has significant potential for economic development and environmental improvement. The main prospects for implementing a circular economy in Ukraine include:

a) Reducing waste and improving waste management. The circular economy helps to reduce waste and ensures the reuse and recycling of materials. As a result, the negative impact on the environment and the country's economy is reduced.

b) Development of renewable energy. A circular economy promotes the development of renewable energy and reduces dependence on oil and gas imports. Ukraine has significant potential for the development of renewable energy, in particular wind and solar energy.

c) Creating new jobs and increasing the competitiveness of the economy. The introduction of circular business models can help create new jobs and increase the competitiveness of the country's economy.

d) Development of innovations and improvement of product quality. The circular economy stimulates the development of new innovative products and services, which has a positive impact on product quality and value.

e) Attracting investment and promoting economic development. The introduction of circular business models can be an attractive investment.

Ukraine is in the early stages of developing a circular economy and green energy. The main challenges include the following:

A. Insufficient attention from the state. The Ukrainian government has not created an appropriate legal environment for the development of the circular economy and green energy. The absence of a clear strategy and regulatory framework results in a lack of investment and development of business models in these sectors.

B. Lack of awareness among the population and the business community. Ukrainian consumers and businesses do not have a sufficient understanding of the circular economy and green energy, which may lead to a lack of demand for products based on these principles.

C. Lack of infrastructure. Ukraine lacks facilities for waste recycling and reuse of materials. A developed waste collection and disposal system is needed, as well as infrastructure for renewable energy processing.

D. Financial constraints. Lack of investment and high costs of renewable energy and waste processing discourage businesses from investing in these sectors.

Despite these challenges, Ukraine has the potential to develop a circular economy and green energy. This requires government support, infrastructure development, investment attraction and the creation of a conscious business community.

One of the main obstacles to the introduction of circular business models in Ukraine is the lack of incentives for this area of business development from the state. Currently, there are no legislative acts and regulatory documents that would facilitate the development of the circular economy in the country.

Also, one of the biggest obstacles to the implementation of circular business models is the lack of awareness and interest on the part of the business community in the need to move to this way of economic activity. Many companies in Ukraine do not yet understand how circular business models can benefit not only the environment but also their own business.

There is also a need for support from financial institutions that would provide financial support to companies that want to implement circular business models.

Today, there are a variety of companies in Ukraine that use circular business models. Here are some examples:

Ecosoftt is a water management company that offers innovative water treatment technologies. They use a circular approach by collecting water, treating it and reusing it. The company also works with consumers to help them reduce their water and energy consumption.

DTEK Renewables is a company that produces electricity from wind and solar power plants. They take a circular approach by using renewable energy sources, which allows them to reduce their carbon footprint and helps to conserve resources.

ReCircle is a Ukrainian company that is engaged in the recovery and recycling of used cast aluminium batteries. The company collects used batteries and recycles them into cast aluminium, which can be used again in the production of new batteries.

Recyclix is a company that offers comprehensive solutions for waste management and the use of waste as a raw material in industry. They process waste from polymeric materials and use them as raw materials for the production of new products.

"Kofein is a Ukrainian clothing brand based on the concept of a circular economy. It creates clothes from recycled materials and offers recycling services for existing clothes. The brand is committed to avoiding unnecessary waste and encourages customers to hand in old clothes for recycling.

"U-Rec is a Ukrainian company that recycles plastic and manufactures products from recycled material. The company uses circular economy principles to minimise waste and reduce its negative impact on the environment.

"Eco-Fusion is a company that produces eco-fuels from ordinary garbage and waste. It uses circular economy principles to maximise resource efficiency and minimise waste.

"Green Wave is a Ukrainian company that produces eco-friendly detergents and cleaning products using only natural and biodegradable materials. The company also recovers and recycles used packaging and materials.

"Ekobiotek is a Ukrainian company that produces biofuels from agricultural and food waste. The company adheres to the principles of the circular economy, using waste as a raw material for the production of new products.

Interaction between the government, business and the public in the green energy circular economy is very relevant, as it contributes to the balanced development of the economy, conservation of natural resources and reduction of environmental impact. In the circular economy of green energy, it is important to create conditions for the production and use of environmentally friendly technologies and materials, which will reduce waste and environmental pollution. To do this, it is necessary to develop and implement relevant legal acts, create conditions for innovation and research that will help increase resource efficiency and reduce production costs.

Business, in turn, should ensure that products and services are produced using environmentally friendly technologies and materials, and cooperate with the authorities and the public in creating infrastructure for waste recycling and the use of secondary resources. The population, in turn, can be an active participant in this process, ensuring demand for environmentally friendly products and services, responsible use of resources and separate waste collection. Thus, the interaction between the government, business and the public in the green energy circular economy allows for an efficient and sustainable economy that will contribute to the conservation of natural resources.

Figure 3 shows the algorithm of interaction between the government, business and people for the successful implementation of circular economy business models.

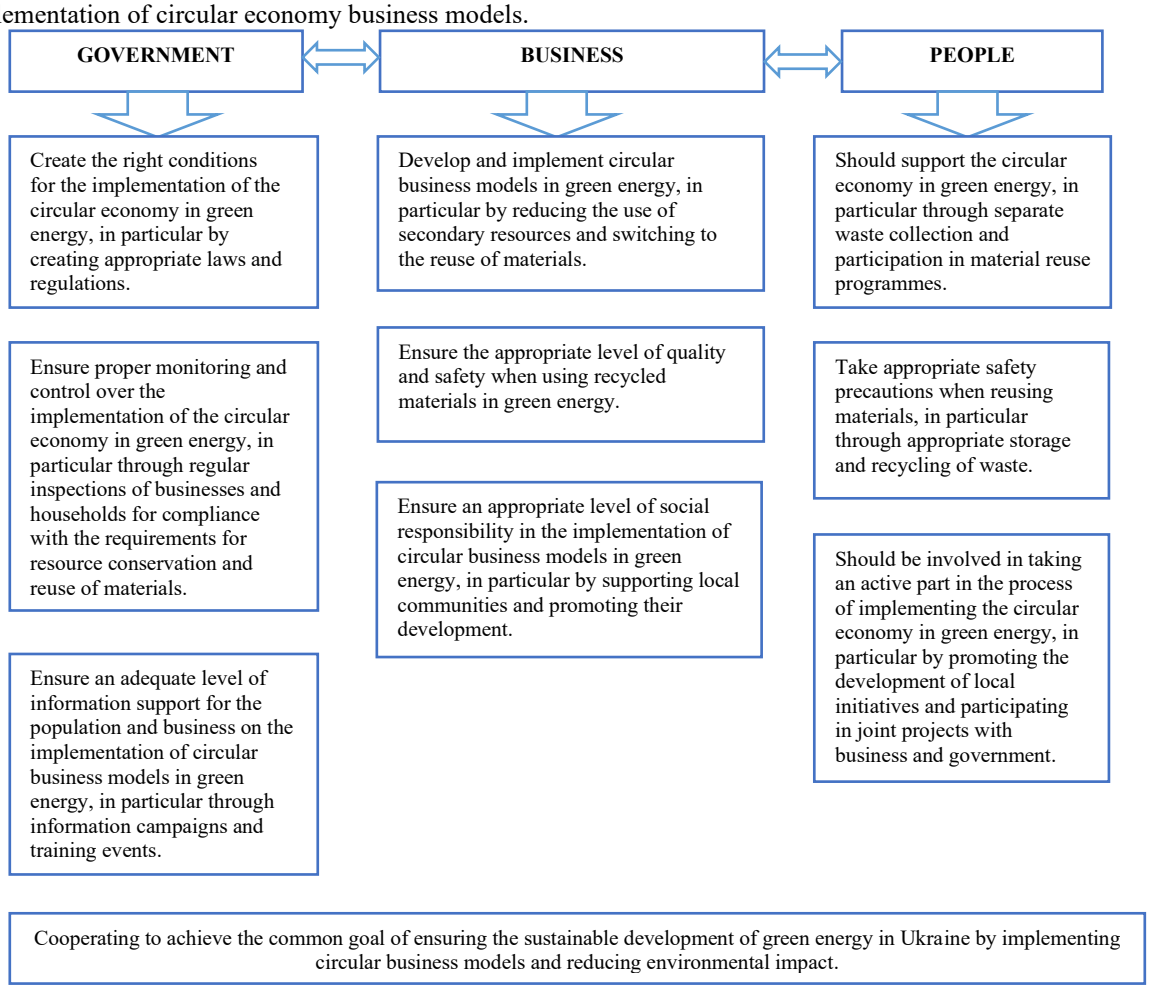

Fig. 1. Algorithm of interaction between the government, business and people for the successful implementation of business models of the circular economy

Conclusion

Based on the analysis of the existing problems and prospects, we will formulate a step-by-step algorithm of what needs to be done in Ukraine to promote the introduction of circular business models in green energy:

Step 1: Create a national green energy strategy that takes into account the circular economy. This strategy should include the definition of goals, objectives, planning and specific measures to increase the use of secondary resources, reduce waste and reuse them.

Step 2: Develop and adopt legislation that will facilitate the development of circular business models in green energy. For example, this could include legislation that promotes the reuse of materials, financial support for businesses that operate in the field of reuse and waste recycling.

Step 3: Establish a support programme for businesses that produce green energy through circular business models. This programme could include measures such as financial support, advisory assistance, development of new technologies, infrastructure development, etc.

Step 4: Promote public awareness of green energy and the circular economy. This can be done through advertising campaigns, educational events, conferences and seminars.

Step 5: Ensure that the necessary infrastructure for the development of a green energy circular economy is in place. This may include the creation of modern sorting lines, processing plants, the development of a waste collection and recycling network, and support for the creation of new circular business models.

Step 6: Promote international cooperation with countries that are already successfully developing a circular economy in green energy. This will allow to acquire new knowledge and technologies, increase competitiveness in the global market and accelerate the development of circular business models in green energy in Ukraine.

Step 7: Monitor and evaluate the effectiveness of the implementation of circular business models in green energy in Ukraine. This will allow for timely identification of problems and shortcomings, as well as implementation of the necessary changes to achieve the goals.

Step 8: Continuously improve and develop green energy policy in line with the circular economy. This will ensure the sustainable and efficient development of green energy and the circular economy in Ukraine in the long term.

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