Appendix 1

DESCRIPTION OF THE COMPETITION TASK

Competition for students "Circular transformation - developing a strategy for industrial symbiosis."

Deadline for stage 3 'competition task': 1 September - 11 October 2024

In this stage, project teams complete a competition task which consists of developing and describing the circular industrial symbiosis strategy presented in the first stage of the competition. The strategy must include an up-to-date market analysis, identifying bottlenecks, opportunities and possibilities in selected economic sectors, proposing the implementation of an industrial symbiosis, developing legislative challenges, creating an implementation plan and planning marketing activities. The task is to be completed in the form of a presentation, which the entire project team will present to the Jury during the Competition Final.

COMPETITION TASK

Objective of the competition task: To present a strategy for cross-industry industrial symbiosis to support the circular transformation of the national economy (of any chosen country).

Format: The assignment must be submitted in the form of a multimedia presentation (max. 35 slides) and a text description in PDF format not exceeding 4,000 characters including spaces.

Deadline: The competition task must be sent to kontakt@innowo.org by 23:59 on 10.10.2024.

Detailed task description:

<u>The solution presented in the work must include:</u>

1. **a description of an innovative industrial symbiosis of two or more companies** that could be implemented in Poland or in any chosen country.
2. **an up-to-date market analysis**, **determining bottlenecks, opportunities and possibilities** in selected economic sectors, **proposing the implementation of an** industrial symbiosis, developing **legislative challenges**, creating an **implementation plan** and planning **marketing activities**.

The work should include industrial symbiosis solutions as defined below:

An industrial symbiosis is a collaboration between at least two entities in which by-products, waste or energy from one entity are used by another entity. The result of an industrial symbiosis is economic, social or environmental benefits. The actors involved complement each other through the efficient use of raw materials, technology or energy.

Proposal for a multimedia presentation outlining a solution to the industrial symbiosis strategy:

1. Introduction
    a. Description of the problem
    b. General context
    c. Analysis of the current market situation
2. Our approach
    a. Entities involved in the symbiosis
    b. Mode of cooperation in symbiosis
3. Results
    a. Economic effects
    b. Environmental effects
    c. Social effects
4. Implementation options
    a. Proposal of implementation method or plan
    b. Resource flow diagram
    c. Financial flow diagram
    d. Planning of marketing activities
5. Barriers and opportunities
    a. Identification of implementation bottlenecks
    b. Technologies conducive to implementation
    c. Potential legislative challenges
6. Summary and next possible steps

Issue description:

Around the world, the industrial sector is experiencing significant changes. Companies are adopting more efficient technologies, seeking sources of raw materials with low environmental impact and adapting to markets and regulations that increasingly value sustainability efforts. These changes are taking place against the backdrop of the larger challenge of the triple planetary crisis involving the climate crisis, biodiversity loss and pollution.

However, action towards a more sustainable future is still insufficient. They are taking place too slowly and on too small a scale. One possible solution to this situation is to demonstrate the benefits of cooperation for a more efficient use of resources. Industrial symbiosis could be a solution. This is an approach to commercial operations - using, recovering and diverting resources for reuse - that results in resources remaining in productive economic use for longer. This creates business opportunities, reduces demand on natural resources and is a step towards a circular economy.

Activities of this kind start with simple ideas, backed up by sound analysis. This is what the student competition to which we invite you is all about.

Evaluation criteria for the competition task:

The evaluation of the main task will be carried out by the Jury according to the same criteria as in Stage 1. It will be evaluated:

1. **Implementability** - feasibility **of the** solution - 25 points.
2. **Comprehensiveness** - the description of the symbiosis activities should take into account the operating characteristics of the companies in the selected industries, the realities of the business and proven technologies - 25 points.
3. **Innovativeness** - the proposed solutions should not directly duplicate already existing symbiotic applications, but can significantly develop them - 20 points.
4. **Effectiveness** - the proposed solution should result in effects that are most likely to convince companies to actually implement the solutions - 30 points.

The second stage of the Competition - the Final:

The 10 best entries will be selected for the Competition Final.

Each of the 10 selected teams will have to present their solution in front of the Jury during the Final. The presentation time is max. 15 min.

Date of the Final: 22.10.2024

Place of the Final: Warsaw School of Economics

Examples of industrial symbiosis with description

Symbiosis in Kalundborg (Denmark)

The network in Kalundborg has evolved over five decades. It all started in 1961, when the local refinery needed a water supply. The first pipes supplying water from a nearby lake were laid by the town of Kalundborg and financed by the refinery. In 1972, the refinery entered into an agreement with a local gypsum company to supply surplus gas from the refinery's production. The gypsum manufacturer used the gas to dry the plasterboard produced in their furnaces. The following year, 1973, the power plant was connected to the Statoil water supply. Over the years, more and more companies were combined in the Kalundborg symbiosis, and in 1989 the term 'industrial symbiosis' was used for the first time to describe the cooperation. The Kalundborg symbiosis now has 17 private and public partners and involves around 50 symbiotic exchanges. The Kalundborg Symbiosis was developed based on commercial agreements between the partners. The early development of the network was based on the initiatives of the companies themselves, especially the efforts of the refineries to find a solution for the supply of water to the refineries. Several industries are located in

close proximity, which made it possible to install pipes for water and energy exchange. The companies are not key competitors to each other, which facilitated mutual trust. This trust was essential in the development of the network.

More information: https://www.symbiosis.dk/en/

Symbiosis at Kawasaki in Japan

The challenge that led to the implementation of Industrial Symbiosis in Kawasaki was the need for the municipality to find a solution to dispose of municipal waste in a sustainable way, while strengthening the local economy. The linkage process began in 1997. The national government funded the establishment of several waste recycling facilities in the region to enable the reuse of municipal and industrial waste in the area. The municipality then began a series of discussions with local companies to identify and implement potential waste exchanges.

The main prerequisite for implementing Industrial Symbiosis at Kawasaki was the presence of relatively large iron, steel and cement industries. These industries proved to be suitable consumers for a wide range of different waste streams. In addition, some exchanges involving iron and steel mills and cement were already well known and widely used at the time (e.g. the use of blast furnace slag for cement production).

More information: https://www.sciencedirect.com/science/article/abs/pii/S0360544213009675

Symbiosis in Kwinana, Australia

Australia has developed an Industrial Symbiosis project where the entire city of Kwinana shares water, energy and waste. There are about 150 resource flows operating on a commercial basis among industrial companies located in the area. These exchanges have developed organically over at least 40 years.

According to data provided by the official website of the town of Kwinana, the industrial symbiosis has avoided the disposal of around 25 000 tonnes of waste per year, thus reducing the industry's CO2 emissions by around 100 000 tonnes per year. An example of the link created is as follows: the chemical industry supplies cooling water to the steel company, while slag from the steel industry is used as a base material for asphalt. The by-products are considered an input product for the chemical processes of others. Energy in the form of steam or hot water is seen by someone else as an economically viable resource.

More information: https://kic.org.au/industry/synergies/