SUSTAINABLE DEVELOPMENT ON A BASIS OF GREENING OF PRODUCTION-CONSUMPTION CYCLE

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The "greening" of the economy implies a targeted process of economic transformation aimed at reduction of ecological impact on the environment. The concept of greening is realized through a system of organized measures, innovations, restructuring, technological transformations, and environmental policy activities at macro- and micro levels. Special attentions in greening the economy is devoted to the environmental innovations, as they are both profitable and environmentally friendly.

Important components of innovative environmental activities are forming of conceptual directions of greening tasks (Fig. 1).
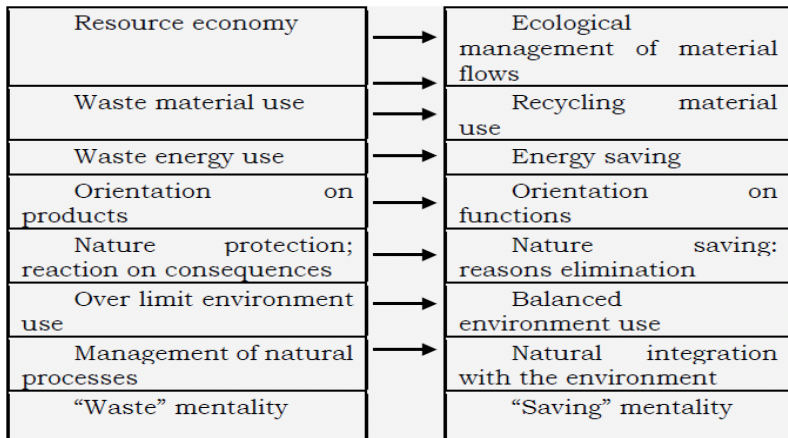

Figure 1 - Conceptual directions of greening tasks forming

Based on the production-consumption cycle, it is easy to conclude that to reduce environmental press can bring the refusal of the most damage intensity consumer products (those that have the most ecodestructive chains), shortening of the chain (replacement of primary natural resources on those that waste recycled), production efficiency (increasing the depth of use of material and energy resources) and, finally, the overall reduction of material and energy consumption of commodities.

The concept of product life cycle can be described as a process of continuous improvement of stress environmental characteristics on the environment at all stages of the product life cycle.

The main stages of scientific and methodical approach to the greening of product life cycle are:

1. Formulation purposes of product life cycle greening including stakeholders' views.

2. Inventory of the product life cycle, which includes collection and processing of relevant environmental information in accordance with certain segments of product life cycle making the greatest destructive environmental impact.

3. Formation of the ecological balance of products that have to evaluate energy and material resources used for the production of the item, as well as emissions and all kinds of environmental damage that have been identified in the previous stage.

4. Evaluation of the overall impact on the environment and calculation of ecological capacity level of different products to be compared. Impact assessment on the environment of the separate life cycle stages of different products to be compared can be carried out as follows:

$$P_e^{`} = \left(\sum_{i=1}^{n} \sum_{j=1}^{m} (A_{ij}^{``} \cdot \alpha_{ij}^{``} - A_{ij}^{`} \cdot \alpha_{ij}^{`}) / P^{`} \right) \cdot \left( \frac{T^{`}}{T^{``}} \right) \cdot \left( \frac{F^{`}}{F^{``}} \right) \cdot \left(\frac{R_{ren}^{`}}{R_{ren}^{``}} \right) \cdot \left( \frac{Rec^{`}}{Rec^{``}} \right), \quad (1)$$

where P_e- level of ecological capacity of initial goods which is analyzed; i=1 ... n - a kind of natural resources which is withdrawn and used at a certain stage of life cycle; j=1 ...m - a kind of influence on the environment at a certain stage of life cycle; A,,, A,, - indicators of influence on the environment of initial goods and the compared sample at a certain stage of life cycle, units; **a,** — indicators of per unit losses from influence on the environment of initial goods and the compared sample at a certain stage of life cycle, hrn; T , T - useful life of corresponding kinds of goods, years;

F , F - quantity of the functions inherent in corresponding kinds of goods; Rec , Rec - a share of a waste which is exposed to a reuse at certain stages of life cycle of corresponding kinds of goods; P - volume of production of initial goods, hrn.

5. Definition an order and strategy formulation to improve each stage of the product life cycle by environmental SWOT-analysis.

6. Implementation of an integrated strategy of the product's life cycle, monitoring, evaluation of results and preparation of environmental report, aimed at establishing linkages with stakeholders.

7. New goals formulation of product life cycle greening.