Techno-sphere safety of non-waste production

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Abstract. A non-waste production approach is the Industry 4.0 strategy direction to minimize the industrial company technological load for the environment. A non-waste production applies the best available technologies and provides the complex prevention of the industrial rejections significant volume and its negative influence on the environment. A company of non-waste production interacts the nature safety alternative energy subsystems and implements the engineer cyber-systems (ECS) in the industrial recycling sections to regulate the air and being dropped water cleaning quality. The industrial company cyber-space proposed scheme equipped with ECS and realizes an item non-waste production. The interaction mechanisms of a non-waste production company and a recycling factory are described to provide the solid wastes final recycling until they receive a secondary raw material. The interaction scheme of a non-waste industrial production company and a recycling factory is proposed.

1. Introduction
The Industry 4.0 main points are directed to create a closed cycle production using alternative sources of energy resources and the best available technologies [1, 2]. The main understanding how to organize a non-waste production is the industrial ecological core of advanced economies, which supposes everywhere implementation of resource preserving ways of item manufacturing [3, 4].

Industrial and ecological production integrity as a matter of non-waste production is based on the company direction course of actions, which is for the environment technological wastes negative influences significant reduction [5, 6]. To minimize the ecology technological damage is done with a non-waste production technologies and the second raw materials recycling technologies [7, 8].

A non-waste production methodology is based on understanding of the ecology environmental contamination complex prevention social and economy significance formed with technological rejections into the nature [9]. The Industry 4.0 manuals include the ecology experts position to re-engineer the classical production models by cancellation of non-effective industrial technologies for the production cycling models [10, 11].

The tools to provide a non-waste production according to the new ecological standards are the company infrastructure engineer cyber systems (ECS) to regulate the technological influences level for the environment [12, 13]. The ECS implementation in the company engineer infrastructure is a cost-some way to modernize the production, which makes the organization technological processes closer to ideal [14, 15].

The ECS advantage is a dynamic analysis of contamination levels made after the production process
and controlling commands for the cleaning facilities to minimize the industrial rejections [16].

The company economic profit from the ECS application is a rational consumption of the production ecological cleanness tools after which the industry accepts the new ecological standards. By the Industry 4.0 concept meaning the ecology experts predicted that in the future some special state companies preferences to apply some nature safety ECS as an engineering provision of a non-waste production [17, 18].

To unite industrial and ecological politics is the future of the company market strategy where the commercial interests are concentrated on the long-term project realizing where the renewable energy resources are engaged. The infrastructure ECS capital investments are not a one-time action but the company systematic activity, which pretends to be called a non-waste production [19, 20].

2. A non-waste production system

A non-waste production orientation engaged in the Industry 4.0, which defines the company infrastructure special organization engaged in the industry. An alternative classical scheme how to unite the machines is a cyber-space to connect informative tides of ECS clusters on the base of a single company data center. The company cyber-space scheme of a non-waste production is given in figure 1.

The non-waste production system contains the following clusters of cyber-systems (CS):

- a cluster of manipulating CS to support the working process of the item assembly;
- a cluster of experimental CS to support the working process of the item testing;
- a cluster of ECS to support the working process of the industrial waste cleaning;
- a cluster of energy CS to support the nature protecting processes to generate electricity.

The new principle to form a non-waste production is a source of effective solutions to prevent the industrial rejections and its negative influences on the environment. The ECS recycling capacity is defined with a nomenclature of profile cleaning facilities and its number engaged in the company infrastructure.

![Figure 1. The cyber-space company scheme of a non-waste production.](Image)

The non-waste production system increase of ecological cleanness is provided with the engineer
infrastructure objects connections to the company data center, which provides online analysis of the contamination levels being formed and its separation into industrial wastes types.

A non-waste production company construction is reasonable in the territories which are maximum closely to the item consumers and which climate conditions have the natural resources for the alternative electro-energy being modified constantly. To select an area depends highly on the environment characteristics including seismic stability, water resources for hydro-electro plants, atmospheric tides for wind generators, sun radiation for autonomous batteries and other. A non-waste production company successful location is a key of the territory stable economic development.

The ECS chosen tools provide the industrial wastes minimizing to increase the company profile assets cost and develops the safe production technologies for each market participants. To reduce the company expenses, which has something to do with the special taxation rates application for an ecologically clean production, which increases the profit from the projects and reduces the time of its cost returning.

An efficient non-waste production company strategy is based on the alternative energy industry to provide autonomous electricity generation and continuous regional industry functionality. Ecological principles to preserve the bio-resources guarantee the company a significant competitive advantage in the market to increase the chances to organize to gain some foreign investments.

A non-waste production new practices gaining helps to integrate the industrial companies into the world society to make popular today the comfortable living environment concepts. The power and business mutual understanding of the industrial technologies safety for the human health justifies to make stricter the technical norms and the non-waste production ecological standards. The non-waste production development state preferences make higher the company responsibility for ecologically ineffective solutions and make the business authority in the international arena.

The State political will to fight for the ecological industry cleanness is done in particular with inter-government agreements and nature safety laws directed to minimize the general production segment harm effect for the environment and civilian lives quality. The Industry 4.0 ecological strategy defines a viable social population development to create a comfortable environment for the competitive industry, which uses the technologies of a non-waste production.

The total recognition of non-waste production priority forms the methodology of the best available technologies applied in the industry and which provides the profile specialists attention to the problem to preserve the ecology.

3. Interaction of a non-waste production and a recycling factory

As a result of the company industrial activity the solid wastes are formed which must be recycled in a recycling factory. The solid wastes recycling includes its separation into the components, which will be utilized directly and the components, which will be processed with ECS to gain some secondary raw material.

The secondary raw material obtaining is an integrate procedure of the waste recycling industry which means some direct operations to extract from the wastes the rear terrestrial and valuable metals, poisonous metals, plastic elements and other. The solid wastes recycling results are used in the radio electronics industry, metallurgy, optical item designing and other to manufacture new components. The production cycling is an industrial state policy element oriented for reasonable natural usage. The interaction scheme of a non-waste production industrial company and a recycling factory is given in figure 2.

The recycling factory ECS are represented as mechanical action type equipment (vibration platforms, filtering centrifuges, hydraulic presses, capacity collectors and other) to support the utilizing with a returning effect. The secondary application of extracted raw materials is a circulating economy tool oriented for partial expenses replenishment for the item manufacturer.

A non-waste production system company picture analysis may develop some measures, which justifies the company efficiency influence mechanisms, which participate in all stages of the item life cycle which can minimize the industrial contaminations of the nature.
A non-waste production company placement in the vicinity from a recycling factory creates almost zero the industry harmful effect for the environment. A production factory and a recycling factory commercial union forms a profile business group to provide the solid and liquid wastes industrial recycling full cycle and also the air weighted things filtration, which contain some toxins.

![Diagram](image)

**Figure 2.** The interaction scheme of a non-waste production industrial company and a recycling factory.

4. **Conclusion**

Objective contradictions after the commercial companies marginal profit and their significant expenses to support the ECS infrastructure, which makes it more complicated for a non-waste production strategy. The company expenses for repair and maintenance of ECS are negative for the business competitive state so that why they require some special measures to stimulate the industry for rational resources application and to reduce the technological load for the ecology.

As for the Industry 4.0 innovations the industrial equipment designers must concentrate for ECS projection to provide the company running water cleaning, atmospheric rejections filtration and other. An accompanying way to provide the industrial production ecological cleanliness is to develop the wastes recycling branch, which grant companies the secondary resources and services to utilize a non-condition production.

A non-waste production factory and a recycling factory interaction is done according to the circulating economy principles to minimize the contaminations rejection to the environment. The activity approach to organize of the raw material application closed system, which is a consequence of socially oriented position of the company owners who care of the natural resources preservation for the future generations.

Under the limited resources conditions and the inertial thinking vector to develop the companies for a non-waste production stated as the Industry 4.0 requires some optimizing of the company business processes and to apply in the technological cycles only the best technologies available to minimize the climate influence. In the modern industry aspect the catalysts to acquire new production results are CS and cyber-technologies integrated into company engineer infrastructure.

A non-waste production main component is a system of the company energy provision based on the alternative mineral natural resources transformation. A perspective energy source for a non-waste production according to the ecological targets and which are capable to generate the industrial quality electricity could be potency machines of mini hydro power plants, sun batteries, wind generators and bio fuel obtained after the human life activity products recycling.
To justify the ECS implementation into company infrastructure and additional administrative and control business expenses oriented for a non-waste production to justifies the regulator positive dynamics (the State) to develop the new generations ecological standards called for the Industry 4.0 ideas. The eco standards digital tools may control the industrial companies compliance the nature protection laws oriented for a global resources preservation.

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