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Practical Tools for Managing the Waste Pyrolysis Project in Russia

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Practical Tools for Managing the Waste Pyrolysis Project in Russia

Tatiana Smetanina

Abstract

Udmurt Republic is a testing site for the implementation of the Waste Recycling Project in Russia. Green Light Energy Solutions Corporation (US) provides the original Waste Conversion Pyrolysis Technology with capacity estimated up to 300 tons of garbage per year (including the launch of three production lines). It's approved by Udmurt Republic as the Best Available Technology for the Region. At the same time it is a good example of international cooperation between the countries in currently geopolitical realities.

Nevertheless, there are serious economic barriers on the way of Project implementation. The main points are:

1) Lack of necessary legislative acts;
2) Insufficient community outreach (very important everywhere!);
3) Interaction logistic schemes between Waste Producers, Transport Business and Waste Treatment Plant (waste consumer) & Tariff Policy.

The issue views the tasks of current environmental situation in Russia, necessary legislative basic work for the providing a real practice on Ecology and Energy National Security, emphasizes the regions rights and self-government objectives, as well as shows the federal opportunities for the improvement environmental conditions.

Optimizing garbage logistic schemes, revising the garbage collection utility tariffs for individuals and organizations, scanning the ways of Community Outreach for creating the positive Public Opinion of the Waste Treatment Project are the main points for the goal to get a real implementation it in Practice.

It should be done concerning the real national economic situation and official conditions for the stakeholders (especially for Russia).

Sustainable Development challenges unite people of our planet. The problem of waste disposal is one of the most urgent. The issue devotes to help the Republic in saving new territories from the massive waste landfills, also to ensure its Energy supply due to the Pyrolysis plant activity.

We talk not only about the organizational and technical project points, but also about the Ethical Aspects of the process ensuring.

Keywords: Waste Conversion Pyrolysis technology, BAT, Energy and Environmental efficiency, Russian Environmental Legacy, Community outreach, Tariff Policy

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Introduction

Subject of Sustainable development is now a priority for International Community. Environmental Issue has outstripped on the importance the other Global challenges and requires careful attention. While the countries fight for Power and Resources, Nature is slowly and surely accumulates generated negative by human activity.

At this moment, it is impossible to address the questions of further economic development strategy for Global Economy and Energy Security without reference to Waste Disposal Problem. It would seem, Environmental Issues are very popular in the United States and in Europe. But it is worth to mention the natural damage of Shale Gas Production (US) or, for example, the problem of fictitious computer equipment disposal, or the problem of unfair separation of household waste (topical even for prosperous Germany), as it becomes clear that Ecological Culture requires the close attention of all countries. Waste Treatment Questions are not solved, but rather aggravated.

Why our work relates to Pyrolysis Project? Cause at the moment it is the only optimal opportunity to support urban agglomerations from the capture of new and new waste storage areas and recycle the garbage that cannot be sorted and reused. Besides, it's a great opportunity to provide communities with electricity and hot water.

It is clear Absolutely Perfect and Ideal Technological Solutions don't exist, but there are optimal technologies for the certain stage of Social Development. This is related to the concept of BAT, Best Available Techniques of the current Economic Situation.

Legislative Support

Russian Ecological Doctrine (2002) was developed as the basic in Presidential Decree "Fundamentals of Environmental Policy of the Russian Federation for the period up to 2030" (2012). The document states Environmental situation in Russia is characterized by a high level of human impact on the Natural Ecological Systems. 40 Regions of Russian Federation suffer from very high air pollution (54% of urban population). The trend towards deterioration of soil and land is topical for the all Russian Regions, the amount of waste is increasing.

It should be noted that to date the final package of Legislation on Environmental Protection has not been managed.

The work on formation of Environmental Doctrine of the Russian Federation started in 2002. Background Documents adopted, but there is lack of the branch and cross-sector principle acts.

The package of the main basic documents concerning Environmental Quality includes: the President Decree "On some measures to improve the energy and environmental efficiency of the Russian economy" (2008), "National Security Strategy of the Russian Federation until 2020" (2009),

"Climate doctrine of the Russian Federation" (2009) and the "Energy strategy of Russia for the period up to 2030" (2009).

The first item in the list of the National Environmental Policy tasks is the Development of State and Municipal Environmental Management by its Legal support.

Supporting Self-government System in Russian Regions

For Russia, the problem of self-government in its regions is very important. If the Europe Union operates as society of National Economics, United States as well, principle of interaction between the autonomous territories on the huge Russian space requires the optimization of Territorial Administration Management. Without it, the rise of the national economy cannot be reached.

Development of the State and Municipal quality Management System and Environmental Protection implies a clear power distinction between Federation, its Subjects and Local governments. Competent coordination activities of these authorities will create a real healthy motivation for stakeholder's activity.

It is necessary to optimize the key criteria to evaluate the performance of local authorities, including indicators of the region "sustainability".

Environmental efficiency should prevent a negative Environmental impact, contribute to the restoration of disturbed Natural Ecosystems, to implement modern methods of waste disposal.

Federal Governance Objectives

The important point is the active political strategy in promoting international cooperation in the field of environmental protection ensuring participation of Russia in all multilateral programs related to the implementation of Sustainable Development.

International agreements require the transition to quota volume of the environment impact for all economic regional actors and ensure the normalization of maximum permissible loads. Environmental quality standards should take into account the territorial peculiarities of the Regions, besides their number should not be excessive. Principle of reasonable sufficiency should be respected, in order to operate in practice.

Supporting BAT practice should be a priority (Green Project, 2012).

The State must be tough in establishing and improving the obligation of the State Ecological Expertise of the construction project papers. Growth of Green Construction must be great political supported according to International Certified Systems.

The tasks of Federal and Regional Government levels primarily are to develop of market-based environmental safety instruments. We are talking

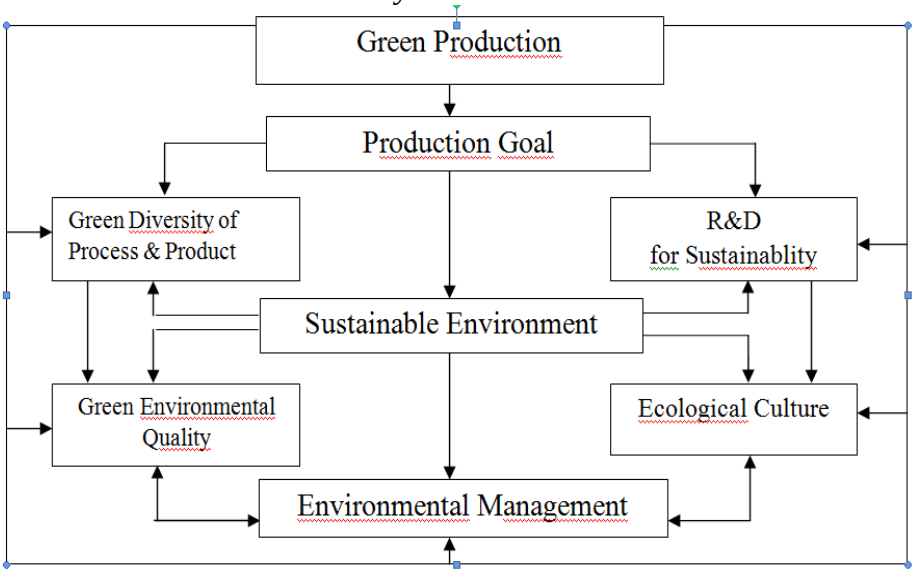
about the implementation of Environmental Management principles (including certification schemes and insurance).

A common structure model of Sustainable Production principles are shown in Figure 1.

Mechanisms of environmental declaration and audit considered as part of the Integrated Management of territorial security and Environmental Management Systems of enterprises.

Federation should create political and legal conditions in order to encourage municipalities to the collection, sorting and utilization of waste as secondary raw materials and energy.

Figure 1. *Sustainable Production System*



Import of equipment and technology in Russia must also comply with current environmental requirements (Green Public Procurement). The same recommendations apply to public contracts for the supply of goods, works and services for Regions needs.

Funding mechanisms, preferential loans, tax incentives can encourage investment in the environmentally friendly production, energy saving innovative technologies that meet International Standards.

A very important aspect of public policy is the formation of the National Ecological Culture. This task involves complex issues of education and training. Formation of environmentally responsible world outlook of the population is only possible by a constant mass vowel work.

The State is obliged to devise a spread media system of environmental, ecological and resource-oriented information. Environmental issues should be included in the new educational standards.

Formation of the personal citizen responsibility should be supplemented to improve the environmental and social responsibility of Business - level shall be the active position (proactive stance) to respect society obligations (Griffin & Pustay, 2006).

Organizational and legal issues of environmental documentation, declarations and permissions, educational programs, community initiatives, public activities, illumination of progressive technological experience, company's non-financial reports on Sustainable Development should help to create a positive public image of the company and show a good example for the followers.

GLES' Pyrolysis Process

GLES Corporation represents a Technology secured by several national and international patents. It is the international interest for many countries. High-temperature Pyrolysis Technology is designed for the processing of municipal and industrial unsorted solid waste followed by obtaining electricity and supply of the surrounding areas.

Technological support process involved enterprises from Russia, USA, Germany, Italy and other countries. It is truly an example of close international cooperation in order to ensure the interests of nature conservation.

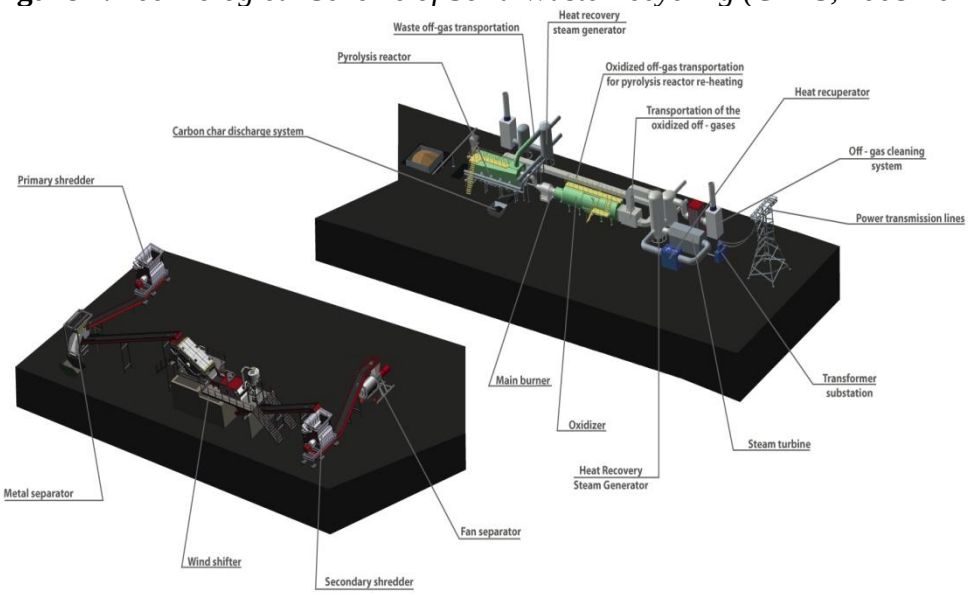
MSW Processing Technology are approved by Udmurt Republic as BAT for the Region.

The Waste Conversion Pyrolysis technology implements a high-temperature continuous feed pyrolysis process and transforms mixed municipal waste that comes unsorted to the landfills into 90-98% of combustible syngas and 2-10% of solid carbons char which has further use.

In order to meet the needs of today's polluted environment, Waste Conversion Pyrolysis units are constructed with a production capacity of 305 TPD (with average waste moisture content 60%), assuming 40 TPD (15%) of recyclable materials are filtered out at the pre-processing line for further sale and that 265 tons of waste with average moisture content 60% per day are converted into energy. The electric energy output is 5+ MW (depending on the feedstock).

A waste pre-processing line offered by the German manufacturers (Weima/Westeria/Spaleck) we can see at Fig. 2.

Figure 2. *Technological Scheme of Solid Waste Recycling (GLES, 2008-2015)*



The modular design of the systems allows for multiple processing lines making the whole system capacity infinitely expandable. A multi-system comprising 3 modules is recommended by GLES to allow for quick and timely service without interrupting the conversion process and to ensure constant guaranteed energy supply to the consumers.

Pyrolysis of waste is the state-of-the art process providing destructive decomposition of waste materials in the absence of oxygen. Its combustion-free methodology allows eliminating residual and fly ash emission into the environment. GLES' solutions provide the extraction of maximum energy potential contained in the waste materials in the form of high calorific gas, without any liquid tar fractions and with only a small amount of solid residue being formed. This is the only system to provide complete molecular decomposition and destruction of dioxins and furans, allowing for the most environment-friendly approach to waste treatment and commercial use of the solid residue.

The conversion technology provides the treatment of waste materials while generating electricity and steam for the surrounding communities and industrial application.

The Advantages are**:**

- ✓Conversion of up to 100% of waste
- ✓No Greenhouse and other harmful gas emission into the atmosphere
- ✓No toxic waste to dispose of
- ✓No dioxins in the off-gas and the solid residue
- ✓Reduced public health risk
- ✓Simultaneous treatment of various types of waste materials
- ✓Reliable energy source, high energy output
- ✓High conversion efficiency
- ✓Carbon credits production
- ✓Low capital and operation costs
- ✓Low energy consumption (as compared to the alternative management scenarios)

Source: GLES. *GLES' Pyrolysis Process*. http://www.glescorp.com/en/energy_dep/what_pyrolysis.html

The Waste Conversion Pyrolysis System is suited to handle various types of feedstock: Municipal Solid Waste, Automobile Tires, Biomass, Industrial waste, Hazardous waste, PCB's, plastics, Sewage sludge, Crude oil sludge.

Optimizing Garbage Logistic Schemes

At first glance Trash Logistics is well understood and proven. However, there are a lot of questions related to the peculiarities of the region's economy in Practice, technical and organizational problems, bureaucracy and administrative barriers.

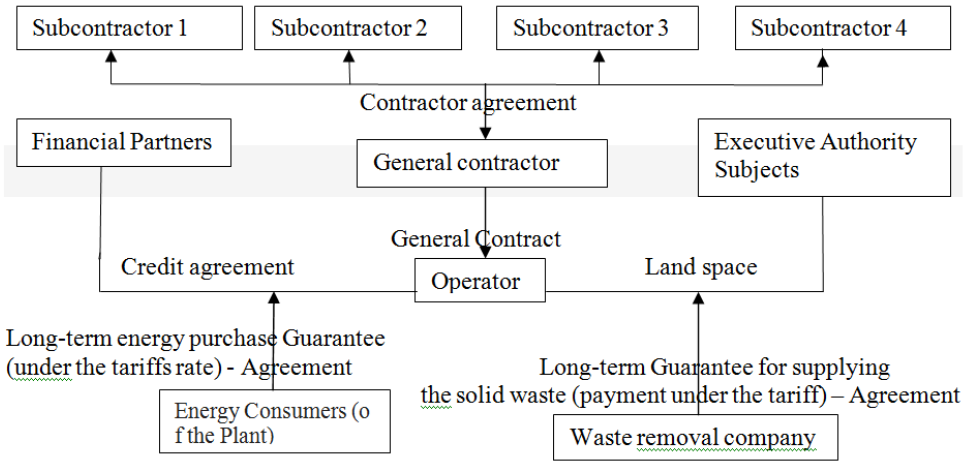
That is why we are talking of the main problems of Legislative support and Environmental Management process in the first sections.

It is important not only to have access to technology and even investment resources, but also to provide an interaction structure of stakeholders, which is a real incentive for Businesses, Government representatives and Public.

In the real economic situation in Russia and the Udmurt Republic separately, as it turned out, it is not easy to do. The main motive, of course, is profit of companies involved in the process. It is important to build correctly the treaty process, to ensure the interests of all participants in Waste collection, transportation and recycling.

General organizational structure interaction can be seen in Figure 2.

Figure 3. *Organizational Structure of Interaction between Stakeholders of Waste Recycling Project (GLES, 2014*)



Tariff Formation for Households and Organizations

The current tariffs for garbage disposal do not correspond with the removal and recycling company interests. The prices of services for the waste collection, transportation and recycling will increase. It is very important to

find a balance between the interests of industrialists and solvency of the population in the problem to transit to new modern technologies.

Regional tariffs in the Udmurt Republic develops and approves the Regional Energy Commission (REC, 2014)

The main stages of the price formation are: economically reasonable tariff analysis and adjustment of the actual costs of providing the service, the formation of the planned cost, checking it according to the standards, indicators and profit (Tariffs Guidelines, 2003).

The basis of the calculation of this rate is the need of specialized organizations of the total income. This amount consists of the planned costs: financial assets at current activity and reproduction of fixed assets, income for the development, the social fund and taxes, as well as the volume of the service sales to the Public and Business.

Tariff should provide the function of the current production program and implementation and the development plan for the enterprise. The calculated values must meet the standards (the problem of State control), and thus it is necessary their correction according the local business features.

Tariff Policy on Going to the New Technology

Staged putting capacity for solid waste recycling in Udmurt Republic will gradually increase tariffs for the population and organizations. They have to cover increased costs for solid waste disposal on the way of the transition to the new technology instead of dumping on polygons.

Current rates for removal of solid waste for individuals and organizations are: for population - 1.92 rub./m2, for organizations: 300 rub./ m3.

Specialists consider for the implementation of the project without the Energy sale (the first line) is sufficient indexation tariff according the inflation. However, the implementation of second and third lines will require the tariff increase for organizations a half time (in the second and third years) also with matching the inflation level (FS, 2013).

Entering the fourth and fifth line will require a subsequent tariff increase for organizations of about 30% annually, or compensation the increasing tariff for organizations through the rate level for population (spare variant).

According to the strategy considered the final tariff increase for 5 years will be: for the population to 2.74 rub./m2 (average annual growth rate of 7.4% - a total of approximately + 43%), for organizations - to 1140 rubles. for 1 m3 (average annual growth rate of 30.6% - total + 280%). In this case, practically all volume of the Izhevsk waste will be transferred from disposal to recycling.

Providing tax incentives can offset the planned growth tariff rate. Taking into account the sales of energy, implementation of the project would also reduce growth rates.

In this case, summary values will be: for the population - to 2.64 rubl./ m2 (average annual growth rate of 6.6%; total + 38%), for organizations - up to

766.74 rub./m3 (average annual growth rate of 20, 64%; total + 256%) (FS, 2013).

Tariff Problems

It is known that there are massive violations of the law in the field of Waste Management in practice. Particularly it applies to compliance with the Federal Law "On Production and Consumption Waste" (FL, ed.2014). A number of necessary by-laws and decrees are preparing now by deputies of the State Duma of the Russian Federation.

Current tariffs do not stimulate Transporter Business to transit the trash for recycling.

Let's present an example. In 2015, St. Petersburg introduces a single tariff for recycling and disposal of solid waste. The tariffs were significantly different up to this year. Prices of the burial of 1 ton of the waste before 2015 were from 372 to 495 rubles, and for recycling 1356 rubles. By law, 21% of all waste must be disposed of, and 79% - transit to the landfill. In practice, transporters massively transit garbage for burial, not observing these proportions marked. As a result Waste Treatment Plants are not working at full capacity.

For this reason it was decided to make a unified payment for garbage. In St. Petersburg, it will be 710 rubles per 1 ton of waste. This decision should lead to greater loading of waste recycling plants, as well as stimulates the transport companies to recalculate and optimize the logistics and service costs (BaltInfo, 2014).

In implementing the Pyrolysis Project in Udmurt Republic the operation of tariff level and tariff policy for garbage collection and waste delivery to the recycling plant will be the key.

Community Outreach and Public Opinion in Project Implementation

Another problem of the project is the Public Work, Public Opinion and also, the local bureaucracy. In practice, project management is faced not only with the conservative officials and commercial interests of competitors - ghostly guardians of the city purity, but also with a lack of public understanding the importance of the issue.

Lack of the knowledge, information, necessary competencies, ignorance of environmental issues pose very serious obstacles on the way of Pyrolysis Project implementation.

Fears of residents and officials

Residents:

- Fear to have the Waste Recycling Plant close to a residential area;

- Reluctance to change the life style, to be included in the partial waste sorting process and just unwillingness to think about this problem (social apathy);
- The problem of "enlightened" part of the population is fear of the growth tariffs for solid waste removal.

Administration and Business:

- The fear of losing their own profits, fear of competition, trash market monopolization, disappearance of "easy money" due to the landfills;
- Primacy of "foreign technology";
- Unwillingness and inability to create a positive image of social projects.

However, we think that these difficulties can be overcome.

From the first category - the residents - should be active continuous educational work, for business and government officials, in addition to training and education, it is need an effective and strong economic incentives.

Effectiveness of advocacy depends on many factors. The main ones are: the content and sequence, connection brought into the minds of people with public and private interests and needs, authority of the impact source (Vaysburg, 1982).

In case of need the positive conclusion of the "Public hearing" on the construction of a Pyrolysis Plant could be used wide-known methods of political technologies (in the formal mode), international practices of election campaigns and other well-known PR-technologies.

Politicians are usually used as legal methods, as well as the "black PR", just some of the methods and actions are not advertised. General methods of Public opinion formation are shown in Table 1.

Table 1. *Methods of Working with Public Opinion (stages*)

Gathering information	Evaluation of the information collected	Development of strategy	Application of strategy
Investigation of public opinion	Determination of strengths and weaknesses of competitors	Determination of the target audience	Public meetings, press conferences, mass media work, social networks
Competitive Information	Request of society to address the problem	Communication style, image, slogans, promotional products	Campaign materials, economic incentives

Conclusion

In addressing the challenges of Sustainable Development, caring for the environment and human health cannot be boundaries and national isolation.

In the current world economic system, people should look for the ways to address global challenges together. Interdisciplinary studies, international technologies and multilateral cooperation - this is an inevitable process in the post-industrial society.

The aspects presented in the article of the Waste Pyrolysis Project implementation in Russia - Legislative Support, Organization and Management service, Tariff Policy, Public Outreach - show the direction of the current and future work for its practical realization.

We should emphasize the obligation of multilevel cooperation in environmental protection and solving the garbage problem. Step by step: level of United Nations (international organizations – agreements), National Level (structured legislation), Regional Level – and all of this through the Economic Regulative Mechanism approved. It should be used tariff and non-tariff methods of regulation, soft loans, subsidies, grants.

Very important is Political Will (and support), the Process of making management decisions and Control over their execution.

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