Выводы

На качество винной продукции влияет как условия, в которых произрастает виноград, так и особенности ее производства. Исследование миграций тяжелых металлов (Cr, Cu, Ni, Pb, Zn) показало, что они сохраняются на всех этапах жизненного цикла. Для более подробного изучения данной темы необходимо провести анализ каждой стадии производства вина, что позволит детально проследить миграцию элементов в процессе производства.

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Miliute-Plepiene J.
Lund, Sweden
Samoilenko N., Yermakovych I.
Kharkiv, Ukraine

ENERGY RECOVERY FROM WASTE IN THE CONTEXT OF SUSTAINABLE URBAN DEVELOPMENT

Facing challenges of global warming as well as seeking to increase energy independence, one of the main EU policy goals is to achieve a low-carbon economy. Improving energy efficiency in district heating systems, which (together with cooling) represents more than half of total energy use, is among of main priorities in the EU.

Municipal waste might be seen as a resource of thermal energy for district heating, including the production of electricity. E.g. Poland underutilizes its energy potential from municipal waste estimated at more than 13 mega-tones generated annually. There is only one waste incineration plant in operation and a few more are only in planning stages. Meanwhile the main fuel (about 60–70 %) for the district heating systems in Poland is coal, which also stands for the bulk of air emissions resulting in seven Polish cities ranked among the most polluted cities in the EU.

In many Eastern European, including e.g. Poland, landfilling is still the main alternative for waste management with about 60 % of all municipal waste ending up in landfills (with or without treatment) and the share of landfilled biodegradable waste reaching about 80 % (Eurostat data for 2010–2012). Given the high landfilling rates and the dependency on coal, waste incineration could be seen as a better way for waste valorisation, especially when cogeneration is considered. Thus, waste incineration might be seen as a good opportunity from both the environmental (avoiding green gas emission) and economic (securing energy supplies, avoiding expensive gas use) points of view.

However, the decision to go for incineration should consider several other aspects and potential risks.

First of all, conducting public hearings, planning, permitting and procuring are lengthy processes, sometimes taking up to ten years to conclude. The not-in-my-backyard attitude of the public is perhaps the most serious barrier in most countries, especially in Eastern Europe where there generally higher public mistrust in authorities and higher risks of low transparency in public procurement processes.

Second, the economic feasibility of waste incineration is highly dependent on the economies of scale. The main sources of revenue for an incinerator are gate fees and to some extent the sales of thermal energy and electricity. Therefore, waste incinerators should be large, and thus they represent a considerable investment, which is automatically associated with long-term financial liability. For instance, an incinerator of 150,000 ton annual capacity planned in Szczecin requires an estimated investment of ca. 250 million Euro. This represents a long-term financial commitment with capital lock-in for the next 25–30 years (the estimated average lifetime of an incinerator).

Third, building a large incinerator automatically requires the uses of thermal energy to be nearby that is a large industrial consumer or a large enough population with developed district heating network. Placing a large incinerator in tightly populated area is always problematic due to the public scare of the dangerous substances (e.g. dioxins and furans). Furthermore, strict environmental requirements for emissions from waste-to-energy plants are much higher than those for power plants running on traditional fuels. This demands significant investment into complex flue gas cleaning equipment.

Fourth, it is climate policy risk. Although waste-to-energy plants have income from gate fees as well as the production of energy, in the future they may be subject for incineration (carbon) tax, as it has been done in Sweden (now suspended, but was ca. 40 Euro/ton of fossil waste fraction) and is till practiced in e.g. Belgium and Denmark. Moreover, the EU has a clear policy goal for waste management sector – to increase waste prevention (do not generate waste) and to increase material valorisation of waste as highest priorities for waste management. For instance, the EU Waste Framework Directive sets the target of 50 % material recycling for household waste by 2020. This means that less waste will be available for waste-to-energy plants. For example, in Sweden, the overcapacity incinerators are already facing the shortage of waste and drops in its calorific value due to increasing material recovery from waste. As a result, waste is sourced from abroad – for instance from Norway (ca. 80 kilo-tons in 2012) and other countries.

Let us consider these contradictions from the perspective of the overall feasibility waste burning to the society. As you know, it depends on the *economic*, *environmental* and the *technical* component.

In spite of the some difficulties, the existing practice of incineration of municipal waste in the countries of the world shows the economic viability of the process. Waste incineration is made in the amount of several tons, and in large plants to thousands of tons of waste per day. At the same time, the investments made by energy companies in the creation and implementation of waste incineration plants are ranging from several million to several hundred million USD. Considering the great social importance of disposing of municipal waste, the implementation of major projects, it seems appropriate to shareholding funds of the state, which would reduce the scale of investment of private capital.

Environmental viability of municipal waste incineration will analyze from the standpoint of sustainable development of the city. Environmentally sustainable city is a system in which environmental requirements are combined with socio-economic conditions. City takes care of the environmental well-being on their territory, as well as a global public good – the environment for future generations. Functional problems of environmentally sustainable city, in particular, include: resource and energy efficiency in all areas of its life; ensuring environmental safety of the city and environmental sanitation; the greening of technology, education environmental awareness of urban residents and others. Based on this, in an environmentally sustainable cities the problem of rational energy is also important as the significant problem of accumulation, destruction or disposal of waste arising and pollution. Namely, incineration of waste in the absence of negative effects on the elements of nature and human health is the simultaneous solution of two problems facing the city.

Addressing from the standpoint of sustainable urban development to the issue of energy security of their inhabitants by burning coal (non-renewable fuel) and municipal waste (renewable energies), the obvious choice is given to the last one as resources stored (waste has a calorific value of brown coal, about 5 tons of waste is equivalent to 2 tons of coal).

Certainly, considerable experience in operation of incineration of garbage indicates a problem that characterize the work of such enterprises:

– the formation of significant emissions of polybrominated dibenzo-p-dioxins and polybrominated dibenzofurans on inadequately designed or operated facilities;

– the high cost of waste treatment due to strict requirements for the implementation of environmental standards (due to this, some enterprises become unprofitable);

– there are presence of large deposits of waste on the enterprise or, conversely, there are lack of waste for the current processing.

From the point of environmental aspects, the municipal waste incineration of the most significant problem is considered the air pollution by harmful emissions, primarily containing dioxins incoming at a low temperature combustion (at 1250^0 these compound are destroyed within 2 seconds). Furthermore, these emissions consist of nitrogen oxides, sulfur, disperse dust, heavy metals, and by burning chlorinated plastics are furans. However, the emissions produced during combustion of coal are also very harmful. The most important pollutants are SO_2, NO_X, CO, solid particles (fly ash and unburned carbon) CO_2. Other substances are also heavy metals (As, Cd, Cr, Hg, Pb, Se, Zn, V и др.), hydrogen fluoride, halogen compounds, unburned hydrocarbons particles, non-methane compounds, dioxins and furans are emitted in smaller amounts, but characterized by toxicity and stability. In the waste, although in a non-hazardous amounts, but are detected a small amount of uranium and thorium.

Probably, it is impossible to carefully compare the name and number of pollutants present in the emissions from the combustion of coal and municipal waste. Indeed, in most cases, the harm caused to human by environmental pollution, can not only be associated with one specific pollutant but also are with substances that have the effect of “summation". Moreover, even a deep comparative analysis of the effects of pollutants on humans may become inadequate because of the individual characteristics of responding to these. Almost same we can also consider with regarding to selectivity of plants or animals. For instance, lichens are killed at high levels in the air of carbon monoxide, sulfur dioxide, nitrogen and fluorine. Mosses have a greater tendency to accumulate heavy metals, but conifer trees shrink under the impact on them of flue gases.

The technological component affecting on the feasibility of waste incineration in a comparative analysis may be the most significant, because depends on it as energy efficiency of the combustion process and the formation of pollutants entering into the ecosystem. Definitely in choosing a method of waste management is maintained clear hierarchy of preferences: minimizing or preventing the formation of sources – reuse – recycling in the raw materials and products – composting – incineration or disposal with energy recovery – disposal without obtaining energy – incineration without energy recovery. In the case of municipal waste incineration is used of thermal processing technology that have passed industrial approbation: burning on mechanical grates in grate furnaces (currently worldwide is operated over two thousand these facilities), fluidized bed combustion (about 200 facilities), incineration in rotary kilns (20 facilities), combined methods are using pyrolysis and gasification processes, including plasmatrons [1]. Each of the technologies is characterized by advantages and disadvantages, which have been well studied both theoretically and practically defined. Currently, developed the new ones, which have more advanced technical solutions to address the shortcomings of the old methods (combustion in a vortex fluidized bed, burning with a superadiabatic filtration combustion modes, etc.). The implementation the latest scientific research into practice of the municipal waste incineration will not only improve the energy efficiency of its processes, but also significantly reduce the environmental pollution. Latter could be the most powerful factor for the understanding of the need to solve the problems of energy supply of the city and the disposal of waste in a single process.

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