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THE LEGAL CATEGORIZATION OF FLY ASH IN EU AND THE HUNGARIAN LAW – ANALYSIS OF RELATED CJEU CASE-LAW

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Abstract: The aim of the current article is to examine the rules on utilization of the fly ash in Hungarian and EU law. In order to thoroughly present and introduce these rules, the authors of the current article – in the *first chapter* – first took a glance on the technical assessment of the fly ash. In the *second chapter* the authors introduce the legal standing of the fly ash in the EU law and provide a glance on the international examples, than in the second subchapter they introduce the actual EU law. Having regarded that the European Court of Justice (CJEU) has a paramount role in shaping EU law, one should not omit the introduction of the concerning CJEU case-law.

Keywords: *fly ash, waste management, waste disposal, cyclic environment, EU law, CJEU*

1. INTRODUCTION

The aim of the current article is to examine the rules on utilization of fly ash in Hungarian and EU law. Fly ash, which is a residue material of coal combustion power plants, nowadays is widely used to enhance the mechanical – and other – properties of building materials – e.g. concrete – and to produce geopolymers, which is a relatively novel utilization of fly ash. In doing so – that is to say in utilizing the fly ash – it is not irrelevant what the legal rules and the legal environment allow and what they offer to the economic actors who opt for the utilization of this material instead of depositing it. As an example: while the EU law prefers utilization of waste materials in order to create a circular economy, the principle of proximity – which shall be taken into consideration – does not facilitate the utilization of fly ash, since this principle – alongside economic considerations – excludes the transportation of material for greater distances.

In order to thoroughly present and introduce these rules, the incentives and the difficulties, the authors of the current article – in the *first section* – first take a glance at the technical assessment of the fly ash: its formation and ways of utilization. Taking into consideration that they are lawyers and not technicians, this part only strives to sum up the formation, types and utilization of the fly ash, without going into technical details. Speaking of fly ash – which mainly arises from coal combustion power plants – the sustainability of the coal combustion power plants shall be examined

from an economic and environmental aspect. Thus the authors devoted a subsection to this topic.

In the *second section* the authors introduce the legal standing of the fly ash in EU law and provide international examples, then in the second subsection they introduce the actual EU law and the Hungarian laws and government decrees implementing it. The relevant EU law is rather divergent: while the Waste Directive – which classifies fly ash as waste and thus determines its legal standing – provides the regulatory framework, other directives, regulations and decisions of the Commission provide for the detailed rules of utilizing fly ash. Considering that the European Court of Justice (CJEU) has a paramount role in shaping EU law, one should not omit the introduction of relevant CJEU case law concerning the notion of waste, the classification of materials as waste and concerning coal combustion power plants. Thus, the authors introduce the relevant cases in order to provide a full picture on the utilization of fly ash.

Last, in the third, summarizing section, the authors draw their conclusions.

2. TECHNICAL ASSESSMENT OF FLY ASH: ITS FORMATION AND WAYS OF UTILIZATION

2.1. Energy resources and heating by coal

Power plants can be divided into three groups; depending on the primer – that is to say natural – *energy resources* they are either *thermal, hydroelectric* or *nuclear power stations*. Thermal power plants utilize *coal, oil, oil derivatives* and *natural gas* for combustion. The three categories of coal are *lignite, pitch-coal,* or *hard/black coal*. The latter one is the most commonly used type of coal. Nowadays, power plants fuelled by *biomass* or *household waste* are more common; however the fly ash arising from these has different physical and chemical attributable, which can affect its utilization [1].

In Hungary coal is the third most important energy source for producing electricity after natural gas and nuclear power; the major part of the extracted coal is utilized for this purpose. Thus coal as a source of energy cannot be circumvented and interest in environment-friendly and sustainable *clean coal technologies* (CCT) is on the rise [2].

2.2. The formation of fly ash in power plants and its utilization

Thermal power plants can be categorized based on the coal combustion procedures used. The chosen technology affects the characteristics of the *residues*, which have various names in the literature.[1] These residues can be divided into two major groups: the first group consists of fly ash, *bottom ash* and *boiler slag*, which are the incombustible residues of the coal. The second group is constituted from the residues of the air quality management devices – e.g. *desulphurisation systems* – among others FGD[2] gypsum. [2]

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[1] Among others: reuse waste from coal-fired power plants, bottom ash and slag tap from coal-fired power plants, etc. [2]

[2] Flue Gas Desulfurization.

As mentioned above, power plants can be categorized based on the technologies they use. The first of the three types is *high temperature combustion*, which produces *ash* and *boiler slag*. Ash is the residue arising from the combustion of organic materials and consists of mainly dust or melted material in greater pieces. The melted materials are constituted from the non-volatile residues of the oxidisation: non-organic salts and oxides. In case the ash is cooled in water, the originating residue is *boiler slag*. These kinds of power plants produce fly ash only in a limited extent, and much of it can be fixed in the chimney via abatement technologies [2]. From the total amount of ash produced in power plants, 80–85% arises from *dry combustion power plants* as *ultra-fine* fly ash, which is collected in the *mechanical* or *electro filters*. Fly ash can be defined as the fine-grain part of the coal's ash content, which exits through the chimney together with the combustion/flue gases [3]. *Mechanical dust abatement* devices collect the rough and hard particulars of the fly ash and thus function as a pre-abatement system. Mechanical abatement can be realized through a settling chamber, whirl-tube, etc. Electro-static dust abatement is carried out through electro-filters, which fix the finer and lighter parts of the ash[3] [2]. The third method is *fluidized bed combustion*, where the procedure is carried out without melting. The resulting grains mostly have an irregular shape with a high amount of crystals [1].

The utilization of fly ash from power plants is quite far-reaching: the cement and concrete industry has been using it since the 1930s in order to enhance the characteristics of their products. Furthermore, it has long been used in the construction of motorways and for stemming in the mining industry [44]. As a novel utilization method, fly ash is used for the production of *geopolymers* and to *fix harmful materials* [4].

2.3. Fly ash arising from the combustion of waste materials [5]

Although the aim of the current article is to introduce the fly ash arising from coal combustion power plants, it is worth mentioning that the combustion of waste too, produces fly ash. Based on the literature, *thermal waste management* procedures can be divided into three main categories: *waste combustion*, *cracking*, and *gasification*. The first one is the most common method among them. The procedure – to keep it simple – is the following: the organic components of the waste are transformed into gases and steam, then exit the system as combustion/flue gases. Incombustible materials remain in the system as slag and ash. The aim of this procedure is to *extract and utilize the energy to be found in the waste to the greatest possible extent;* thus, it is quite common that waste combustion plants often produce heat, steam or electricity. This renders a demarcation between the power plants and the waste combustion plants necessary: in this regard Directive 2010/75/EU on industrial pollution provides the necessary guidance, stating that

[3] In case of coals with greater sulphur content, the combustion/flue gases are led into an absorber in order to desulphurize them. The side-product of this procedure is *flue gas desulphurisation (FGD) gypsum*.

the determinant factor is the primary aim of the plant. That is to say, if the management of waste is the primary objective of a plant, then the plant in question shall be regarded as a waste management plant [1].

As mentioned earlier, the fly ash coming from waste combustion has different physical and chemical attributes, which can affect the utilization of the fly ash [1].

2.4. The sustainability of coal combustion power plants and the limitations of utilizing fly ash

Coal as a fossil combustible is the most evenly distributed energy source in the world. Based on the current estimations, the world's stocks of coal will be enough for the next 130–200 years [2]. That is to say, coal combustion power plants should be sustainable for a rather long period of time; their sustainability is affected by two other factors, however. First, regarding the aspects of environment protection, it is necessary to decrease the waste produced worldwide, including the waste produced by these power plants; second, a major part of the coal-combustion plants already run with a negative trade balance, which questions their sustainability in the long run.

Regarding the *first factor* it has to be emphasized that the primary objective is to reduce the amount of waste produced. The *European Coal Combustion Products Association* (ECOBA) in its report estimated that in 2012 the mining and the industrial sector of the then 27 EU member states produced 100 million metric tons of power plant residues per year, 68% of which was fly ash. This amount can be reduced as the technology evolves; however, it cannot be eliminated totally [2]. Furthermore transporting the fly ash for longer distances is not conforming to the *principle of proximity* as contained by Article 16 of *Directive 2008/98/EC* [7] *on waste* (hereafter: waste directive). The article sets out that waste shall be utilized or disposed where it was produced. Last but not least, fly ash cannot be transported on the road economically, which limits its utilization. [8]

Regarding the *second factor* mentioned above, is that *2017 was the point of inflexion in the rivalry between the fossil fuels and renewable energy sources:* from that year – considering the cost of the construction and the index of return – it became more economical to invest in renewable energy sources than in fossil ones. *At the moment 619 coal combustion power plants function within the territory of the EU, half of which exhibit a negative trade balance,* according to a recent report [9] of the *Carbon Tracker*, a think tank specialized in climate change. Based on the calculations of the *Financial Times* [10], by the year 2030 the proportion of power plants with a negative trade balance will grow to 97% from the current 54%. Should governments decide to keep the sector alive, they will have to spend 22 billion euros for that purpose. The costs are enhanced furthermore by the fact that in order to reach the goals of climate protection, these investments should be realized swiftly and productivity should be reduced at the same time. The lost profit must be subsidiarized, which likely means a rise in energy prices, paid by the consumers at the end of the day [11]. Nevertheless, the current plans propose to shut down only one third of

the power plants by 2030. Thus, the amount of fly ash will not reduce by any considerable amount until then.

3. The law of the European Union on fly ash and relevant case law of the CJEU

3.1. Waste management in the EU and the legal standing of fly ash

The most important secondary EU law is the already mentioned waste directive [7]. Given the fact that *the EU law does not have a distinct regulation on the fly ash,*[4] *general waste management rules shall prevail.* Based on Article 3 Point 1 of the waste directive – which defines 'waste as' any substance or object which the holder discards or intends or is required to 'discard' – *fly ash shall be classified as waste.* The exact classification of fly ash is to be found in Commission Decision 2014/955/EU, [12] which in its index list fly ash among wastes, under the number '10 01 02 coal fly ash'.

The reasoning for this classification is that fly ash, bottom ash, boiler slag and FGD-gypsum are created as a result of the functioning of power plants. Strictly speaking, however, the product of these plants is the energy. Any other product originating from the procedure is a by-product, which is not needed by the power plants. As a result these materials are classified as *industrial wastes*, or technological industrial wastes to be more precise [2]. In order to secure the prevalence of the environment protection principles – with special regard to the *polluter pays principle* – the law of the EU prefers to call these materials waste [13], [14]. Thus the secondary sources of EU law list these materials in the waste catalogue. The case law of the CJEU[5] also supports this. It is worth mentioning, however, that in other parts of the world – e.g. in the US or India – the above-mentioned materials are classified as by-products, as their characteristics are identical to natural raw materials and can be utilized as a raw material [2].

Considering the fact that coal combustion power plants produce greenhouse gases, it is worth taking a look at the secondary sources of EU law concerning the topic and the CJEU's case law regarding their applicability. The rules on the emission of greenhouse gases and the system of quotas are to be found in *Directive 2009/29/EC* [15] which – among others – modified the earlier *Directive 2003/87/EC* [16].

Another directive to be mentioned is *Directive 2010/75/EU on industrial emissions* [6]. Articles 28–41 of Chapter III of the directive define the scope of the directive as follows: '[it] covers any combustion plants, the total rated thermal input of which is equal to or greater than 50 MW, irrespective of the type of fuel used.' The articles furthermore contain the specific rules on any combustion device and the rules on monitoring emissions. Article 42 of Chapter IV demarcates the difference between power plants and waste incarceration plans that produce energy as a by-product.

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[4] Contrary to the wastes of the mining industry, which are regulated under a specific directive.

[5] To be introduced in the next sub-chapter.

The related decisions of the Commission and the implementing decisions of the Commission are given in Commission implementing decision (EU) *2017/1442* [17], in which the Commission recorded its conclusions regarding the *best available techniques* (BAT) as provided in Directive 2010/75/EU. *Commission Decision 2011/278/EU* [18] and *Commission Decision 2017/126* [19] are worth highlighting too, where the Commission laid down the transitional Union-wide rules for the harmonized free allocation of emission allowances under Directive 2003/87/EC from 2013 onwards and amended Decision 2013/448/EU, respectively [20]. Commission Regulation (EU) No. 601/2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC [21] is also worth mentioning, where the Commission set out rules for aircraft operators. In order to facilitate the execution of the this directive, the Commission issued guidance on 16 July 2012 [22].

Last but not least, the 2012 opinion of ECOSOC[6] [23] is worth mentioning: ECOSOC reminded us that based on a 2012 ECOBA report on the then EU-27 the mining and the industrial sector produced 100 million metric tons of waste, 68% of which was fly ash. ECOSOC examined the utilization of fly ash and the issue of the high amount of fly ash disposed in landfills. It found that the fly ash is not only suitable to produce geopolymers, but is also suitable for use as an additional material in concrete, as scale in the automotive industry and as a detergent in sewage water management. The body also stated that it would be expedient to carry out voluntary research on the quantity and quality of fly ash and boiler slag created in power plants and factories EU-wide in order to find out the percentage of these by-materials that is being deposited in landfills instead of being utilized. It is worth mentioning, however, that based on the ECOSOC opinion the fly ash being produced in Europe is not always suitable for re-utilization and the potential utilizers are not always well aware of the possibilities.

3.2. The objectives of waste-management

After introducing the secondary legal sources on waste management we introduce how the EU institutions set the objectives based on the secondary sources of law. One of these documents is a 2017 report of the *European Parliamentary Research Centre* [24]. The main objective in this regard is that the single market of the EU shall become a *circular economy* in the future. Thus, waste generation cannot be considered as a necessary evil, instead the member states should strive to (i) reduce the waste generated during production. – The most effective waste-management tool. – Furthermore, member states should strive to (ii) implement a holistic view, which takes into consideration the demand on good quality secondary materials. That is to say, producers should generate as little waste material as possible and – in case it is impossible to avoid the creation of waste – the generated waste should be suitable for re-utilization to the greatest extent possible.

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[6] European Economic and Social Committee.

Both the EU and the member states have numerous tools to achieve these goals and to stimulate economic actors: (i) setting objectives and creating obligations – like the liability of the manufacturer – through *legislation;* applying (ii) *economic incentives* in the field of waste collection and research. Furthermore (iii) *market-based solutions* like taxes, fees and Pay as You Throw Schemes (PAYT) can be applied, or they can (iv) *demand producers to inform consumers on their envirentalism.* Last, but not least (v) *voluntary tools* can be applied, e.g. campaigns, voluntary obligations, labelling, good practices.

Examining the actual status of waste management does not show an appealing picture, however: based on the 2015 report of the *Waste and Resources Action Programme* [25] (hereafter: WRAP) in 2012 the industry of the EU-28 processed a total 5 billion metric tons of raw materials. Only 20% of this amount was secondary raw material. That is to say *the economy of the EU-28 is still linear* and characterized by the wasteful utilization of our limited natural resources: *most of the processed raw materials perish in the end of the process.* The situation is worsened by the fact that 1.2 billion tons are still deposited on landfills, creating a heavy burden on the environment. The report states – in accordance with the EPRC report [24] mentioned above – that the most effective waste-management method is prevention, that is to say the decreasing of the waste generated. Considering that the amount of household waste is on the rise year by year, reversing this trend seems almost impossible. The waste directive demands the utilization of 70% of the waste generated by 2030. Several member states are lagging far behind in this question, however [7].

3.3. Relevant case law of the CJEU

The fact that the waste can be utilized as raw material with a value that can be expressed in money and thus it constitutes "goods" for the purposes of the Treaty was stated in the case *C-2/90 Commission vs. Belgium* [27]. *The definition of waste was elaborated by the ECJ*[7] *in the C-235/02 Saetti et Frediani case*: the domestic court sought for the answer of whether *petroleum coke* constitutes waste for the purposes of Council Directive 75/442/EEC. The ECJ was of the view that: 'Petroleum coke which is produced intentionally or in the course of producing other petroleum fuels in an oil refinery and is certain to be used as fuel to meet the energy needs of the refinery and those of other industries does not constitute waste within the meaning of Council Directive 75/442/EEC' [28].

In the C-252/05 *Thames Water Utilities* case the referring court sought to ascertain whether waste water constitutes waste within the meaning of Directive 75/442 where it escapes from a sewerage network. The ECJ was of the view that the fact that waste water escapes from a sewerage network does not affect its character as 'waste' within the meaning of Directive 75/442. The ECJ stated furthermore that *'the fact that the waste water is spilled accidentally does not alter the outcome'* [29].

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[7] The CJEU is composed of the General Court (GC) and the European Court of Justice (ECJ).

The *C-304/94 Tombesi et al. case* was the first case, where the ECJ – concurring with the opinion of the advocate general – held as a principle that '[t]he Community rules on waste [...] apply to any substances or objects which the holder discards or intends or is required to discard, even where they are capable of re-use and may be the subject of a legal transaction or quoted as being of commercial value on public or private commercial lists'. On the other hand, the advocate general emphasized that *it was difficult to make a distinction between the utilization of waste and the utilization of secondary raw materials* based on then-effective directives since their definitions were ambiguous. Furthermore, it is worth mentioning that this was the first case where FGD-gypsum was nominated *expressis verbis* [30], [31].

The limitation of emissions of certain pollutants into the air from large combustion plants was the subject of the *C-304/15 Commission v. United Kingdom case* [32]. When the case was instituted Directive 2001/80/EC [33] was in force. The Commission launched an infringement procedure because the Aberthaw power plant did not fulfil the criteria provided in Footnote 3 Part 'A' of Annex IV of the directive. The government argued that the criteria were unfounded and it was impossible to fulfil them based on the calculation method demanded by the directive. The advocate general was of the view that the position of the United Kingdom is untenable: since the directive requires compliance on an annual basis it can be fulfilled even if the emission protrudes on occasion due to the insufficient quality of the coal. Thus, the advocate general suggested that the court should order that the UK was in breach of its obligations under the Treaty [34]. The ECJ was of the same view [32].

In the *C-460/15 Schaefer Kalk case* the advocate general was of the view that *producing greenhouse gases does not constitute emission provided that these gases are never released into the atmosphere. In case they are released, however, the date and place of release* – that is to say if they were released from another factory – *is irrelevant*. The advocate general argued that any other interpretation would allow the issuers to play tricks on the emission quotas. On the other hand, the advocate general discarded the arguments of the Commission and the German authority: the Germans argued that the quotas should be applied on the whole amount of the transferred carbon dioxide. The advocate general was of the view that this would be disproportionate compared to the otherwise legitimate objective [35]. The ECJ approved and delivered the following judgement: 'The [mentioned EU laws] are invalid in so far as they systematically include the carbon dioxide (CO_2) transferred to another installation for the production of precipitated calcium carbonate in the emissions of the lime combustion installation, regardless of whether or not that CO_2 is released into the atmosphere' [36],

One of the most recent cases is the *C-58/17 INEOS Köln GmbH v. the Bundesrepublik Deutschland case*. In the preliminary ruling the referring court in essence sought the answer for the question of whether Article 3(h) of Decision 2011/278 must be interpreted as precluding national legislation, such as that at issue in the main proceedings, which excludes from the concept of 'process emissions sub-installation', within the meaning of that provision, greenhouse gas emissions stemming from the combustion of incompletely oxidised carbon in a liquid state? [37] The ECJ

was of the view that the aim of Directive 2003/87 is to reduce the emission of greenhouse gases, with regard to economic aspects. On the other hand, neither Directive 2003/87 nor Decision 2011/278 on its execution refers *expressis verbis* to effective energy recovered from incompletely oxidised carbon in a liquid state. The aim of the directive is to recycle or utilize any by-products – including greenhouse gases – for energy production. Environmental protection rules must be taken into consideration, however: these rules make it clear that incompletely oxidized carbon in a liquid state is not in conformity with the rules. As a consequence, the ECJ was of the view that "[related EU law] must be interpreted as not precluding national legislation, such as that at issue in the main proceedings, which excludes from the concept of 'process emissions sub-installation', within the meaning of that provision, greenhouse gas emissions stemming from the combustion of incompletely oxidised carbon in a liquid state".

Similarly *the definition of sub-installation constituted the subject of the C-158/15 Elektriciteits Produktiemaatschappij Zuid-Nederland EPZ NV case*. The advocate general was of the view that the warehouse is part of the installation, as it is technically necessary for the installation's functioning, thus CO_2 quotas shall prevail. In her view the coal wasted as a result of self-heating does not constitute 'exported' within the meaning of Commission Regulation 601/2012/EU, only if it is transported to other installations or sub-installations which actually fall out of the system. In the case at hand neither condition applied [38]. The ECJ in its judgement was of the same view [39].

In the *C-302/17 PPC Power case* the referring court asked 'whether Directive 2003/87 must be interpreted as precluding national legislation, such as that at issue in the main proceedings, which taxes, at 80% of their value, greenhouse gas emission allowances allocated free of charge which have been sold or not used by the undertakings subject to the greenhouse gas emission trading scheme' [40]. The Court was of the view that: 'By eliminating virtually all of the economic value of emission allowances, *the tax amounts to a negation of the incentive mechanisms underpinning the emission allowance trading system* [and[8] thus the relevant EU law] must be interpreted as precluding national legislation, such as that at issue in the main proceedings, which taxes, at 80% of their value, greenhouse gas emission allowances allocated free of charge which have been sold or not used by the undertakings subject to the greenhouse gas emission trading scheme.' [40]

Last but not least, the *T-57/11 Castelnou Energía SL case* [41] is worth mentioning. In this case the domestic law required the ten electricity plants to source 'indigenous' coal (i.e. coal of Spanish origin), the price of which is higher than that of other fuels, and to produce certain volumes of electricity from that coal. In order to compensate the affected power plants the government created a so called 'preferential dispatch mechanism'. While the Commission was of the view [42] that the above-mentioned mechanism constituted state aid, it decided to dispense with insti-

[8] Emphasis added by the authors.

tuting procedures since 'it declared the aid at issue compatible with the internal market under Article 106(2) TFEU [...] in so far as the application of such rules does not obstruct the performance, in law or in fact, of the particular tasks assigned to them'. *The General Court (GC) dismissed the application on the ground of the lack of locus standi:* the applicant was not the addressee of the contested decision and failed to put forward any specific arguments that the decision directly and individually concerned it [41].

4. SUMMARY

The aim of the current article was to examine the rules on utilization of the fly ash in Hungarian and EU law. We first took a look at the technical assessment of the fly ash, the majority of which comes from power plants, introducing its formation and ways of utilization. We also introduced and examined the sustainability of coal fuelled power plants and found that 2017 was the point of inflexion: from that year on investors should invest in renewable energy sources instead of fossil energy sources. The current energy policy seems determined to subsidize the already loss-making sector until 2030 and only proposes the shut-down of 1/3 of coal fuelled. Keeping such plants in operation provides the industrial sector with the useful secondary raw material – that is to say, with fly ash – but does not conform to the environmental goals of the EU, including the goals of the waste-management, which aims at reducing waste generated.

In the *second section* the authors introduced the legal standing of the fly ash in EU law and provided a glimpse at international examples. The relevant EU law is heterogeneous: the Waste Directive provides the regulatory framework and the framework is filled in with other directives, regulations and decisions of the Commission. Commission decisions provide the detailed rules of utilizing fly ash. The authors introduced the relevant cases in order to provide a full picture of the rules of waste management in the EU, including the notion and classification of waste and the rules on power plants that produce fly ash. The ECJ in its case law tries to strike a fair balance between the interests of environment protection goals and economic actors, as highlighted by the C-460/15 Schaefer Kalk case.

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