CEE Bankwatch Network

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Assessment of the planned recovery of worn tyres by thermal depolymerisation in Handlova, Slovakia[1]

The Office of the Deputy Prime Minister of the Slovak Republic for Investments and Informatisation has collected project concept notes as part of the just transition of the Upper Nitra region since 2018. HUTIRA Slovakia, Ltd., submitted four projects, including 'Thermochemical processing of tires', worth EUR 12 million in public finance support. The Office of the Deputy Prime Minister sent the project proposal to JASPERS (Joint Assistance to Support Projects in European Regions) experts for assessment as part of a package of seven selected projects with values above EUR 3 million.[2] Independent environmental experts assessed publicly available information from the Environmental Impact Assessment of a proposal 'Recovery of worn tires by thermal depolymerisation', submitted in 2015-2016 by the same company, HUTIRA Slovakia, Ltd. (the applicant).[3] This assessment aims to provide independent and concise information about the technologies detailed in this proposal and their environmental and other impacts. It covers toxic substances, the availability of secondary raw material, sustainable alternatives, greenhouse gas emissions and other aspects. Its conclusions indicate that thermal depolymerisation projects should not be part of Upper Nitra's just transition.

CEE Bankwatch Network's mission is to prevent environmentally and socially harmful impacts of international development finance, and to promote alternative solutions and public participation.

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[1] The full study in Slovak can be found here: https://zivotpouhli.sk/novinky/item/329-posudok-k-zameru-vystavby-zariadenia-na-zhodnocovanie-odpadovych-pneumatik-termalnou-depolymerizaciou-v-meste-handlova

[2] Ján Kováč, 'Uhlie má nahradiť teplo zo zeme aj metán. Pozrite si projekty pre hornú Nitru', *Denník*, 25 August 2020.

[3] Zhodnocovanie odpadového materiálu tepelnými postupmi, Handlová, *Enviroportal*, accessed 22 February 2021.

Executive summary

Toxic substances

The applicant's documentation contains insufficient information on the composition of the end products of thermal depolymerisation in terms of toxic substances. However, the presented information also suggests that polyaromatic hydrocarbons will be produced by the pyrolytic decomposition of tyres. Analyses of the end products in the processing of tyre shredding using the present, and similar technologies, have shown the presence of **significant concentrations of substances that are precursors to highly toxic dioxins (phenols).** According to the applicant's documentation, chlorine will also be present in the end-product oil at a concentration of 10 - 18 ppm, thus **meeting the conditions for the formation of dioxins**, even if oxygen access will be restricted by the technology. Nevertheless, the applicant does not present any information on their presence in the oil and other end products.

Analyses of the presence of dioxins in the pyrolytic waste treatment products indicate the risk of metal influx into the process (which acts as a catalyst for dioxin formation). **The amount of dioxins measured in the output of pyrolysis waste treatment from cars and refrigerators was many times higher** (compared to the measurements of the treatment of tyres stripped of the metal rebar) **in pyrolysis oil** (2.1 ng TEQ/g) **and carbon residue** (0.74 ng TEQ/g), even with limited oxygen access. **An important factor was the presence of metals as a catalyst.**

The risk of toxic substance formation and activity is associated with additives in tyres, for instance flame retardants. The presence of organic bromine compounds in thermally treated waste leads to the formation of brominated forms of chlorinated dioxins (PCDD/F), i.e., brominated dioxins (PBDD/F), which have a similar toxicity to chlorinated dioxins. **The formation of brominated dioxins during pyrolysis of waste containing one of the groups of brominated flame retardants** (polybrominated diphenyl ethers (PBDE)) **has been demonstrated** by a scientific study. **Another study has identified the presence of brominated dioxins in junkyard waste pyrolysis products.** It should not be assumed that the pyrolysis of tyres containing brominated flame retardants would not produce brominated dioxins; thus, brominated dioxins should be measured in the pyrolysis output. However, the intention to monitor and address these toxic substances is absent from the applicant's documentation.

The vulcanisation process also uses additives, the presence of which in the recovered waste **may lead to the formation of dioxin-like sulphur compounds. In terms of the effects on human health and living organisms, some of these polychlorinated**

dibenzothiophenes (PCDTs) act in a way similar to dioxins, and belong to the category of chemicals known as endocrine disruptors.

The applicant's documentation under evaluation from 2015 presents partially outdated data and does not reflect the new emission requirements. In 2019, a new document on the best available technologies for waste incineration was enacted. Among others, it imposes stricter requirements for monitoring dioxins, mercury, and brominated dioxins.

Availability of secondary raw material

The applicant's project is redundant and counterproductive in terms of the need for environmentally-friendly recycling of waste tyres in the Slovak Republic, and will be either dependent on imports of the majority of waste tyres from other countries, or become an economic failure. In addition to the social issue, importing the majority of waste tyres from other countries would also lead to **increased greenhouse gas production and environmental burden caused by transport.** The applicant falsely claims that the planned capacity of the facility will be almost fully supported from the districts of the Slovak Republic. They completely **ignore the true state of the market, where existing operating facilities in the Slovak Republic already treat the material from almost 90% of waste tyres** (87.4 % in 2019, 89.8% in 2018), and which are **currently sufficient for the entire production of waste tyres in the Slovak Republic.** From the waste tyre market saturation point of view, it can be argued that in 2019, 92.9% of waste tyres collected in the Slovak Republic were used for material and energy recovery. Only 2,057 tonnes were left over, while in some recent years, the amount of leftover uncollected and unrecovered tyres in the Slovak Republic has been even lower – only a few hundred tonnes. In terms of capacity and practice in the Slovak Republic, the more environmentally- and climate-friendly mechanical recycling is more widespread.

Sustainable alternatives

Mechanical recycling is more environmentally-friendly than chemical recycling, including thermal depolymerisation. Mechanical recycling has **lower energy requirements, a smaller carbon footprint, and produces fewer toxic by-products** in comparison to chemical recycling. The incineration of chemical recycling products results in CO_2 emissions equivalent to the incineration of plastic waste, or tyres. The life cycle of their production, high temperature treatment, chemical reactions and end products incineration leads to a large carbon footprint.

Greenhouse gas emissions

Due to the absence of comprehensive information by the applicant, we are unable to fully and accurately assess the impact of the planned thermal depolymerisation on the climate. Based on the information presented by the applicant, we have conducted the first partial

estimates of CO_2 emission equivalents modelled on processes where information is available.

- Greenhouse gas emissions in the case of exclusive fission gas incineration:
  - The incineration of 1,270 t of fission gas has produced 2,882.36 t of CO_2 equivalent.
- Greenhouse gas emissions in the case of exclusive fossil natural gas incineration:
  - The incineration of 1,270 t of natural gas has produced 3,429.76 t of CO_2 equivalent.
- On the grounds that the applicant has not even outlined the proportion of the material and energy recovery of the end product oil, or a plan or analysis on this matter, we present the equivalents of emissions in terms of different proportions of greenhouse gas emissions from the incineration of the end product oil:
  - incinerating 1 % of the end product oil will generate 214.7 tonnes of CO_2;
  - incinerating 8-12 % of the end product oil will generate 1,718 - 2,576 tonnes of CO_2;
  - incinerating 50 % of the end product oil will generate 10,735 tonnes of CO_2;
  - incinerating 100 % of the end product oil will generate 21,470 tonnes of CO_2.

Amendments and clarification by the applicant would be required for an appropriate determination of the impact of the proposed thermal depolymerisation on the climate. Further greenhouse gas emissions from other processes, including from the treatment and purification of end products, should be taken into account.

Other aspects

The majority of the chemical recycling proposals in the Slovak and the Czech Republic failed before their operation even started, either in the stage of notifying the affected municipalities and residents, during the environmental impact assessment, or amidst land registration and construction proceedings. Those that did succeed often struggle with economic difficulties, problems with quality and demand for the end products and routine accidents, as well as with complaints from the neighbouring residents about polluting their environment with odours, black dust and emissions.

In the impact assessment documentation, **the applicant presented a series of false, insufficiently substantiated and contradictory claims.** They state, for instance, that the failure to implement their project will result in the, ‘possible landfilling of a significant number of worn tyres’ – which is false, since the landfilling of waste tyres is legally prohibited, and was prohibited even at the time of writing of this documentation.

On the one hand, the applicant declares the production of *end products for material utilisation* as the main purpose of this thermal depolymerisation of waste tyres project, otherwise: ‘these organic materials would have been incinerated in power plants, heating

plants, cement plants or other solid fuel incineration plants in a non-ecologically friendly manner'. However, the same paragraph contradicts itself: 'Thermal depolymerisation technology thus enables transformation into... commodities that can be used, for instance, in the production of fuel, or activated carbon as cheaper fuel for households and the like'. They also promote incineration and the energy recovery of these end products in other parts of the documentation. For instance, in the chapter on end product oil, they argue: 'This oil can be used as high-quality fuel for industrial furnaces and power plants'.

The full study in Slovak can be found here.

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