

# LIFE CYCLE ASSESSMENT

according to ISO 14040 and ISO 14044

## GASOLINE AND FEEDSTOCK FOR CHEMICALS



**LCA holder:**  
Eesti Energia Aktsiaselts  
Lelle 22  
11318 Tallinn  
[www.energia.ee](http://www.energia.ee)

**Life cycle assessor:** PeoplePlanetProfit GmbH  
**Preparation date:** 24.10.2023  
Note: The LCA was calculated with the software Umberto LCA +. The method of preparation can be requested.

**Validity period:** 24.10.2028  
Note on validity: These manufacturer-specific balances are valid for five years from the date of preparation.

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### Summary

#### PCF holder

Eesti Energia Aktsiaselts  
Lelle 22  
11318 Tallinn  
www.energia.ee

#### Life cycle assessor

PeoplePlanetProfit GmbH  
Kapuzinerstraße 8  
88212 Ravensburg

#### Designation

Gasoline from oil shale pyrolysis plant  
Feedstock for chemicals from oil shale pyrolysis with GTC plant  
Feedstock for chemicals from oil shale and plastic waste co-pyrolysis with GTC plant  
Feedstock for chemicals from oil shale, plastic waste and end of life tyres co-pyrolysis with GTC plant

#### Description and definition of the product

**Shale gasoline** is a mixture of hydrocarbons obtained as a lighter fraction of the distillation product from the shale oil pyrolysis.

##### Feedstock for chemicals:

- **Naphtha** is a mixture of hydrocarbons, used as a feedstock for polyolefins production from which plastic packaging, fertilisers, synthetic rubber, and textiles are made from.
- **LPG** is a mixture of hydrocarbons, used as a feedstock for polyolefins production from which plastic packaging, fertilisers, synthetic rubber, and textiles are made from.
- **Plastic waste co-pyrolysis product** is a mixture of hydrocarbons obtained as a lighter fraction of the distillation product from the shale oil and plastic waste co-pyrolysis.
- **Plastic waste and ELT co-pyrolysis product** is a mixture of hydrocarbons obtained as a lighter fraction of the distillation product from the shale oil, plastic waste and end of life tyres co-pyrolysis.

#### Document number

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**Preparation date** 24.10.2023

**Validity period** 24.10.2028

**Objective** This life cycle assessment is intended to report the environmental aspects of gasoline and feedstock for chemicals from Eesti Energia Aktsiaselts (cradle to gate).

**Method and Notes**

The method for the preparation of the PCF can be requested.

These manufacturer-specific balances are valid for five years from the date of preparation.

A comparison of the LCA values is possible in principle, but not recommended, as assumptions in the report, models and the balancing software can differ from each other.

The LCA was calculated with the software Umberto LCA + on the basis of ISO 14040 and ISO 14044.

The method is documented in a background report. The LCA study includes the definition of the objective and the scope of the study, the life cycle inventory, the impact assessment and the interpretation.

**Considered life cycle** In the LCA, the manufacturing phase was taken into account (cradle to gate).

**Data base** The LCA data was collected by Eesti Energia Aktsiaselts and reviewed by PPP.

**System boundaries** The system boundaries refer to the site in Auvere, Estonia. Outsourced processes were not present. The data for the GTC plant reflects a potential situation in 2029/30.

**Functional / declared unit** The declared unit is 1 kg of gasoline or 1 kg of feedstock for chemicals (naphtha and LPG). The functional unit is as follows:

Product	Calorific values
Gasoline	43,20 MJ/kg
Naphtha	44,50 MJ/kg
LPG	46,00 MJ/kg

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### Information modules

The following information modules or life cycle phases were considered were considered:

- Production A1 - A3

### Interpretation of results

The differences in the environmental impacts of the products are due to the different raw materials used and their different masses. Especially the use of oil shale in gasoline as well as the emissions released has an influence on these differences. Since the consumptions for the plastic waste co-pyrolysis respectively the plastic waste and End-of-Life Tyres (ELT) co-pyrolysis and the subsequent GTC processes tend to be lower and the upstream chain of the raw material plastic waste and tyres is not applicable due to the use of recycled material, the environmental impacts for these products are also low as a result.

The main environmental impacts in the manufacturing of gasoline are caused by the electricity consumption for production, the raw material oil shale, the resulting emissions and the disposal of production waste. As far as plastic waste or ELT are used, the extraction of sediment in the oil shale production process becomes less important. On the other hand, the transport of raw materials becomes more important.

With regard to the feedstock for chemicals (FFC), the main environmental impacts result from the energy consumption for their production as well as the raw material gasoline (and its drivers mentioned above).

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### Environmental aspects over the life cycle of gasoline and feedstock for chemicals

	Manufacturing phase			Construction phase		Use phase						Disposal phase				
	Provision of raw materials	Transport	Production	Installation	Transport	Use	Inspection/maintenance/cleaning	Repair	Exchange/replacement	Operational energy use	Operational water use	Dismantling	Transport	Waste management	Landfill	Recycling potential
	X	X	X													

X: Declared