Annual treatment with NovoEight® and Esperoct®

Carbon Footprint Report

Sep 2025 (version 1.0)

Contents

1. Background

Novo Nordisk's environmental strategy, Circular for Zero, and the certified ISO14001 Environmental Management System, drive continuous improvements in our environmental performance by setting high ambitions and integrating environmental considerations into daily business activities. Here, life cycle assessment/product carbon footprint is an integrated part of our product development process.

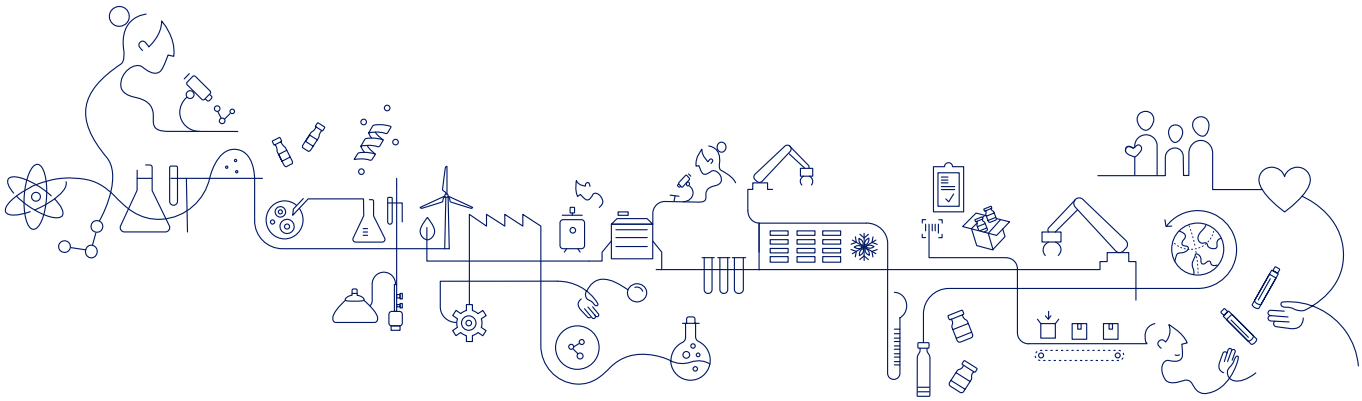
This document presents the Product Carbon Footprint of one year treatment with the haemophilia products NovoEight® and Esperoct®. The single use delivery system for this treatment is the Haemophilia Drug Kit (hereafter referred to as Drug Kit) and the Administration Set. Together the Drug Kit and Administration Set are intended for reconstitution and intravenous delivery of coagulation factor products, when coagulation factors are given as replacement therapy and/or treatment of bleeds in patients with haemophilia.

The carbon footprint for the annual treatment is based on full third-party verified carbon footprint reports for the drug substance (turoctocog alfa (N8) and turoctocog alfa pegol (N8-GP)) and delivery solution (Drug Kit and Administration Set) included in this report.

The data presented in this document supports marketing claims and Q&As about the product carbon footprint. The data should not be used for comparison with competitor products or for claims related to 'green' or 'environmentally friendly' products.

2. Methodology

The carbon footprint of a product is calculated by adding the greenhouse gas emissions (in kg CO_2 equivalents) from different stages of the product life cycle. The product carbon footprint of one year of treatment is calculated by adding the contributions from the drug substance and the delivery system[1].



The Novo Nordisk carbon footprint calculations follow the Greenhouse Gas Accounting Sector Guidance for Pharmaceutical Products and Medical Devices[2], which is built on international life cycle assessment standards. The reports are third-party reviewed by PwC Advisory.

The carbon footprint calculations for N8 and N8-GP are based on production data from 2024. The Drug Kit and Administration Set are based on production data from 2024.

The calculations cover the relevant drug substance and delivery system (Drug Kit and Administration Set) as shown in Table 1. The carbon footprint is calculated for the use in three major markets: Europe, the US and Japan. The calculations are made using Excel and the life cycle assessment tool *LCA for Experts*[3].

Table 1. Products involved in the calculations for one year of treatment with NovoEight® and Esperoct®.

Drug substance	Delivery system**
• Turoctocog alfa (N8) • Turoctocog alfa pegol (N8-GP)	• Drug Kit and Administration Set • Excipients* (incl. WFI)

* Excluded due to proven low impact on carbon emissions, except for water for injection.

** Including both secondary & tertiary packaging.

[1] Including the primary, secondary and tertiary packaging for the delivery system. Primary packaging is considered part of the prefilled device.

[2] Greenhouse Gas Accounting Sector Guidance for Pharmaceutical Products and Medical Devices, GHG Protocol Product Life Cycle Accounting and Reporting Standard, November 2012. At: http://ghgprotocol.org/sites/default/files/ghgp/Summary-Document_Pharmaceutical-Product-and-Medical-Device-GHG-Accounting_November-2012_0.pdf.

[3] Formerly GaBi.

2.1 Drug substance

NovoEight® and Esperoct® are administered per body weight and in the calculations, the average adult patient is assumed to have a body weight of 70 kg.

2.1.1 Turoctocog alfa (N8)

For patients aged 12 years and older, factor VIII (N8) is generally administered at 20 to 40 International Units (IU) per kilogram of body weight every second day. NovoEight® comes in vial with prefilled syringe at different concentrations, see Table 2. The specific activity for N8 is 8337 IU/mg.

Table 2. Description of different variants of NovoEight®. The average variant is calculated based on the average dose of 30 IU and with body weight of 70 kg.

Variant	Vial size [ml]	API content (dose)	Concentration
1	5 ml	250 IU	50 IU/ ml
2	5 ml	500 IU	100 IU/ ml
3	5 ml	1000 IU	200 IU/ ml
4	5 ml	1500 IU	300 IU/ ml
5	5 ml	2000 IU	400 IU/ ml
6	5 ml	3000 IU	600 IU/ ml
Average dose 30 IU, body weight 70 kg.		2100 IU	

2.1.2 Turoctocog alfa pegol (N8-GP)

For patients aged 12 years and older, the recommended prophylactic regimen of N8-GP is 50 IU per kg of body weight administered every 4th day. Esperoct® comes in vial with prefilled syringe at different concentrations, see Table 3. The specific activity for N8-GP is 9500 IU/mg.

Table 3. Description of different variants of Esperoct®. The average variant is calculated based on the average dose of 50 IU and with body weight of 70 kg.

Variant	Vial size [ml]	API content (dose)	Concentration
1	5 ml	500 IU	100 IU/ ml
2	5 ml	1000 IU	200 IU/ ml
3	5 ml	1500 IU	300 IU/ ml
4	5 ml	2000 IU	400 IU/ ml
5	5 ml	3000 IU	600 IU/ ml
6	5 ml	4000 IU	800 IU/ ml
7	5 ml	5000 IU	1000 IU/ ml
Average dose 50 IU, body weight 70 kg.		3500 IU	

2.2 Delivery system

Drug Kit and Administration Set is compatible with a variety of Novo Nordisk's haemophilia drug products, available in a range of strengths tailored to the specific treatment. This report includes the products NovoEight® and Esperoct®.

The Drug Kit is a drug/device combination product consisting of a vial with the freeze-dried drug, a prefilled syringe with a solvent, a plunger rod, and a vial adapter (see Figure 1 for illustration). The vial and syringe size is identical in size and shape for NovoEight® and Esperoct® for all available strengths. Likewise, an NaCl solution is used as solvent in the prefilled syringe for both products. For other type of haemophilia drug products (not included in this report), the size of the vial and syringe in the Drug Kit varies according to the different strengths.

The Administration Set is offered together with the haemophilia Drug Kit. The included infusion set is to be connected with the syringe in the Drug Kit. The content of the Administration Set is:

- 1 sterile, single packed infusion set (butterfly needle for intravenous use)
- 2 sterile, single packed band aids
- 1 sterile gauze pad
- 2 sterile, single packed alcohol swabs (see Figure 1 for illustration)

The drug can also be administered with use of any other infusion set with a standard luer lock interface.

Figure 1 Overview of components for Drug Kit and Administration Set

Table 4 shows the assessed products and average product strength variants calculated based on average dose for patient with body weight of 70 kg (see Table 2 and Table 3).

Table 4 Average products assessed in this report.

Product name	Frequency	Drug substance content [mg]
NovoEight (2100 IU)	Every other day	0.25 mg
Esperoct (3500 IU)	Every 4 days	0.37 mg

3. Carbon footprint

This section presents the carbon footprints for specific treatments (assumptions described in Section 2) in the three markets (Europe, US and Japan). The contributions to the carbon footprints from drug substance and delivery system (Drug Kit and Administration Set) are shown as well as the total carbon footprint per patient per year.

To put the results into perspective, the resulting carbon footprints have been recalculated into the distance driven by an average car (see Section 3.4).

The carbon footprint has inherent uncertainties and should be regarded as an indicative level and not as a precise measure. The uncertainties relate to the data collected from Novo Nordisk production, the data on carbon footprint for each of the processes (e.g. plastic granulate production), carbon footprint impact factors and the key assumptions (e.g. distribution patterns). Moreover, the calculations consider that Novo Nordisk sources renewable energy (electricity and heat) as well as Sustainable Aviation Fuel (SAF) through certificates, which results in a lower carbon footprint than if average electricity was used.

3.1 European market

Table 5. Carbon footprint for the drug substance, delivery system (including primary packaging) and packaging (secondary and tertiary) required for one year's treatment of a patient in the **European** market with Drug Kit and Administration Set. *Note that Drug Kit includes prefilled vial and Administration Set includes a butterfly needle. Vial and needle are therefore already a part of the delivery solution and should not be included separately.*

Product name	**Drug substance** [kg CO_2-eq./year]	**Drug Kit and Administration Set** [kg CO_2-eq./year]		**One year treatment** [kg CO_2-eq./year]	
		Delivery system	**Packaging**	**Excl. packaging**	**Incl. packaging**
NovoEight 2100 IU	55.4	64.7	8.6	120.1	128.7
Esperoct 3500 IU	72.2	32.3	4.3	104.5	108.8

3.2 US market

Table 6. Carbon footprint for the drug substance, delivery system (including primary packaging) and packaging (secondary and tertiary) required for one year's treatment of a patient in the **US** market with Drug Kit and Administration Set. *Note that Drug Kit includes prefilled vial and Administration Set includes a butterfly needle. Vial and needle are therefore already a part of the delivery solution and should not be included separately.*

Product name	**Drug substance** [kg CO_2-eq./year]	**Drug Kit and Administration Set** [kg CO_2-eq./year]		**One year treatment** [kg CO_2-eq./year]	
		Delivery system	**Packaging**	**Excl. packaging**	**Incl. packaging**
NovoEight 2100 IU	55.4	86.4	10.3	141.8	152.2

Product name	Drug substance [kg CO_2-eq./year]	Drug Kit and Administration Set [kg CO_2-eq./year]		One year treatment [kg CO_2-eq./year]	
		Delivery system	Packaging	Excl. packaging	Incl. packaging
Esperoct 3500 IU	72.2	56.1	5.2	128.3	133.4

3.3 Japanese market

Table 7. Carbon footprint for the drug substance, delivery system (including primary packaging) and packaging (secondary and tertiary) required for one year's treatment of a patient in the **Japanese** market with Drug Kit and Administration Set. *Note that Drug Kit includes prefilled vial and Administration Set includes a butterfly needle. Vial and needle are therefore already a part of the delivery solution and should not be included separately.*

Product name	Drug substance [kg CO_2-eq./year]	Drug Kit and Administration Set [kg CO_2-eq./year]		One year treatment [kg CO_2-eq./year]	
		Delivery system	Packaging	Excl. packaging	Incl. packaging
NovoEight 2100 IU	55.4	133.8	4.8	189.2	194.0
Esperoct 3500 IU	72.2	66.9	2.4	139.1	141.5

3.4 Comparison to other measurements

To put this into perspective for a non-expert, the carbon footprint of the yearly treatment (including API, delivery system and packaging) has been recalculated into a distance driven by an average new car at the European market in 2023[4].

One year of treatment with Drug Kit and Administration Set corresponds to driving 1023-1823 km in an average new car in Europe. For a more detailed comparison, select a specific treatment in Table 8.

Table 8. The distance (km) travelled in an average new car in Europe that would equal the carbon footprint of one year's treatment of a patient with the specified treatment.

Product name	EU	US	JP
	Km travelled	*Km travelled*	*Km travelled*
NovoEight 2100 IU	1210	1430	1823
Esperoct 3500 IU	1023	1254	1330

[4] European Environment Agency (2023). Average carbon dioxide emissions per km from new passenger cars (106.4 g CO2 eq/km), CO2 emissions performance of new passenger cars in Europe | European Environment Agency's home page

4. Plastic footprint

The plastic footprint is defined by Novo Nordisk as the amount of plastic[5] used by a patient or an organisation during a specific treatment. The footprint includes any plastic placed on the market by Novo Nordisk, regardless of its origin (virgin, recycled, fossil or non-fossil). The plastic footprint is calculated both with and without secondary and tertiary packaging.

This section presents the plastic footprint for specific treatments (assumptions described in Section 2) in three markets (Europe, US and Japan). The contribution to the plastic footprints from the delivery system (including primary packaging) and packaging (secondary and tertiary) is shown as well as the total plastic footprint per patient per year.

Table 9 Plastic footprint for the delivery system (including primary packaging) and packaging (secondary and tertiary) required for one year's treatment of a patient with Drug Kit and Administration Set. *Note that Drug Kit includes prefilled vial and Administration Set includes a butterfly needle. Vial and needle are therefore already a part of the delivery solution and should not be included separately.*

Product Name	**Drug Kit and Administration Set** [g plastic/year]		
	Delivery system (All markets)	**Packaging (All markets)**	**Total (including packaging) (All markets)**
NovoEight 2100 IU	2245	91	2336
Esperoct 3500 IU	1122	46	1168

[5] Rubber not included

References

Haemophilia Drug Kits & Administration Set Carbon Footprint Report, Novo Nordisk, October 2025

Turoctocog alfa (N8) & turoctocog alfa pegol (N8-GP) Carbon Footprint Report, Novo Nordisk, September 2025

Assumptions and background for carbon footprint assessments, Novo Nordisk, August 2025

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