



Danish Ministry of the Environment  
Environmental Protection Agency

# Novo Nordisk's environmental profit and loss account

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Novo Nordisk's environmental profit and loss account

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# Project

This E P&L is sponsored by the Danish Ministry of Environment, conducted for the pharmaceutical company Novo Nordisk A/S and conducted by the consultants; NIRAS A/S, Trucost PLC and 2.-o LCA consultants.

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# 1. Foreword: Novo Nordisk

Environmental responsibility has been on the agenda for Novo Nordisk since 1975 with the inception of a dedicated environmental department and adoption of a corporate policy. Since then, we have proactively sought to provide transparent disclosure of practices and performance, achievements and challenges. Our first environmental report in 1994 was a break-through, a 'first' in Denmark, preceding the adoption of mandatory green accounts for Danish companies.

At Novo Nordisk, our business philosophy is one of balancing financial, social and environmental considerations – we call it the Triple Bottom Line. Since 2004 Novo Nordisk has published an integrated annual report, which accounts for the company's financial, social and environmental performance as a manifestation of how the Triple Bottom Line principle applies to the business. The strategic commitment to sustainable development has brought the company onto centre stage as a leading player in today's business environment, recognised for our stakeholder engagement and performance within sustainable development. Continued leadership requires bold steps to keep pushing the limits, staying on top of new agendas, and a preparedness to invite stakeholders to address our challenges with us, – big and small.

This report is the outcome of a project that took a deep dive into Novo Nordisk's value chain. This first Novo Nordisk Environmental Profit and Loss Account<sup>1</sup> (E P&L) has helped us explore the opportunities to reduce the company's environmental impact in the upstream part of our value chain.

Novo Nordisk has adopted global standards for responsible sourcing. Suppliers are required to document that their work is carried out in accordance with the laws and standards for environment, health and safety, labour and human rights, and business ethics. The E P&L provides additional knowledge that will enable us to focus our efforts on the areas of our business that cause the largest environmental impacts, and hold potential for reductions. Conducting an E P&L is a natural step to enhance our reporting and efforts to create results in a Triple Bottom Line perspective, and we encourage other businesses and governments to adopt the methodology and help refine it. We would like to take the opportunity to thank the Danish Ministry of Environment for taking the initiative to road test the E P&L method in a Danish context and to the consultants for guiding us through the work. To all involved – thank you for your dedication and forbearance.

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<sup>1</sup> An Environmental Profit and Loss Account is a means of placing a monetary value on the environmental impacts along the entire value chain of a given organisation.

## **2. Foreword: NIRAS A/S, Trucost and 2.-o LCA consultants**

All three companies are invested in the continuous development of the E P&L methodology. E P&L reporting is evolving into a strong and transparent tool for prioritising environmental action throughout the value chain.

NIRAS is a major Danish Engineering consultancy with strongholds in environmental footprinting, and environmental and social economic analysis, and was responsible for project management throughout the analysis. Trucost is specialised in environmental data collection and valuation, and has in-depth experience from the PUMA E P&L. 2.-oLCA is specialised in advanced LCAs and developing country specific environmentally extended input-output (EIO) tables under major EU programs.

Through this partnership, NIRAS, Trucost and 2.-oLCA (hereafter ‘the partners’) have combined their unique and extensive experience in EIO modelling, life cycle assessment and environmental valuation in order to conduct the most robust E P&L possible within the scope of this project. This analysis has been conducted with an aim to remain consistent with previous E P&L applications, yet still deviate slightly from the original methodology where opportunities to contribute to the evolution of the process were identified. The partners understand that there must be a paradigm shift if businesses want to accurately assess risk and opportunities relating to environmental impacts. Environmental accounting and the measurement of these impacts in economic terms is the first step in this shift.

The quantification and valuation of impacts through Novo Nordisk’s supply chain are outlined in the following report. We hope the results will inspire movement toward E P&L reporting and away from the current economic model.

We very much appreciate the action taken by the Danish Ministry of Environment to initiate this pilot project and would like to thank Novo Nordisk for an inspiring and fruitful collaboration.

### 3. Executive summary

The results of the Novo Nordisk E P&L reveal that Novo Nordisk's most material impacts on nature occur within the first and third tiers of the supply chain. If environmental costs relating to water consumption, greenhouse gas (GHG) emissions, and air pollution were to be internalised, Novo Nordisk would have to pay 29 million EUR in 2011 for operational activities (core activities) alone. Looking further down the value chain, the costs increase substantially. Environmental costs across tiers 1, 2 and 3 amount to 194 million EUR or 87% of the total cost. Impacts in tiers 1, 2, and 3 are generated by suppliers and their respective supply chains in different geographical regions throughout the world.

EUR million	Water use	GHGs	Air pollution	Total	% of total
Novo Nordisk Operations	7	21	1	29	13%
Tier 1	10	58	12	80	36%
Tier 2	3	23	1	27	12%
Tier 3	14	69	4	87	39%
<b>Total</b>	<b>34</b>	<b>171</b>	<b>18</b>	<b>223</b>	<b>100%</b>

TABLE 3.1: THE NOVO NORDISK ENVIRONMENTAL PROFIT AND LOSS ACCOUNT 2011

GHG emissions, a strong focus area in Novo Nordisk's current reduction strategy, constitute the majority (77%) of the total cost.

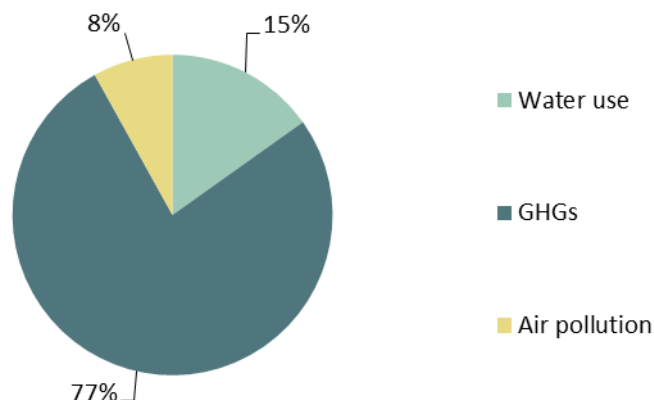


FIGURE 3.1: ENVIRONMENTAL COSTS DISTRIBUTED BY EKPIS

Impacts in tiers 1, 2, and 3 are outside of Novo Nordisk's direct control and therefore more difficult to influence through corporate policy and target setting. The opportunity to reduce impacts lies in direct engagement with suppliers, stakeholder engagement, and complete transparency measures throughout the value chain. Novo Nordisk already has numerous initiatives in place to reduce environmental impacts across core activities, which address many of the material areas identified in the E P&L.

The E P&L will help Novo Nordisk to validate their current reduction strategies and identify additional areas which could be included in future reduction strategies.

It should be noted that the monetary value of Novo Nordisk's environmental impacts in this report is a non-regulated indicative cost and is not considered in the company's performance reporting.



# 4. Readers' guide

The Novo Nordisk E P&L is reported in two parts.

1. The main report presents the results and conclusions of the Novo Nordisk E P&L 2011. Focus is on Novo Nordisk and how the E P&L is applied in a company context. The 7 steps of the E P&L have been applied for transparency, so other companies may identify the approach and understand the process of conducting an E P&L.
2. The methodology report describes the methodological contribution to the E P&L. The report goes 'behind the scenes' of the methodology and presents the contribution to the Environmentally-extended Input and Output (EIO) model as well as valuation of impacts.

This main report will guide you through the results and conclusions of the Novo Nordisk E P&L 2011.

## 4.1 Terms

Concept	Definition
<b>Profit</b>	Environmental benefit due to business activities.
<b>Loss</b>	Environmental negative impact due to business activities.
<b>Environmental impact</b>	Natural resource depletion and environmental pollution.
<b>Ecosystem services</b>	Benefits that people and businesses derive from nature.
<b>Monetary value</b>	Economic value to society of the profits/losses.
<b>Environmental Profit and Loss Account</b>	A means of placing a monetary value on the environmental impacts along the entire value chain of a given organisation.
<b>eKPI</b>	Environmental Key Performance Indicators. For more detail see accompanying methodology document.
<b>iLUC</b>	Indirect Land Use Change. Refers to the occupation of land that occurs indirectly through the demand of agricultural products.

TABLE 5.4.1: TERMS AND DEFINITIONS

# 5. What is an E P&L?

In 2012, PUMA was the first global corporation to publish an E P&L. This study both adopts the previous methodology applied by PUMA and builds upon the methodology where opportunities were identified.

An Environmental Profit and Loss Account (E P&L) is an effort to account, in financial terms, for the Ecosystem Services upon which a company and its entire value chain rely. It can certainly be discussed whether or not money is the best unit with which to measure environmental impacts, since it is difficult to place universal monetary values on fundamental services such as fresh water, clean air, biodiversity and land. Nevertheless, a monetary value allows for direct comparison between the E P&L and the regular Profit and Loss Account, which shows company's net earnings.

In the E P&L, the "Profit" refers to any company activity that benefits the environment, whereas the "Loss" refers to activities that adversely impact the environment. Almost all companies will have a deficit in the E P&L, reflecting the net cost to the environment. In the current system, the losses are not costs that a company will have to pay, and are therefore called 'external costs'. Adding the external costs to the current financial costs gives reflects the true cost of conducting business, and incentivises companies to reduce environmental impacts (the "loss" in an E P&L). Some costs are already internalised, such as fees to local governments for water treatment and waste disposal. Over time, it is expected that more of the external costs will be internalised through taxes and fees, and thus the E P&L is a tool for risk management.

E P&L accounting is an evolving field, and valuing environmental externalities is an inexact science that requires various assumptions. The methodology document outlines the approach taken and assumptions made in the process. It is recognised that others may have different views on the most appropriate approach, and all comments and critiques that can strengthen the methodology further are welcomed. As such, the project partners wish to continue open collaboration as done following the first E P&L.

The methodology document is built on the expert review of the PUMA E P&L<sup>2</sup> and explains where advancement has been made in this E P&L. Further methodological improvements are suggested in the recommendations section. The project team hopes that academics and business practitioners will comment on and critique the analysis, so that the E P&L can continue to evolve and improve.

## 5.1 How is an E P&L applied?

As discussed in the previous section, an E P&L aims to place a monetary value on the environmental impacts of an organisation and its value chain. This quantity aims to reflect the value of nature's services that the organisation depends on, such as provision of natural resources, absorption of gases, filtration and cleaning of air and water etc. In this respect, an E P&L can be applied to an organisation in the following ways:

- **Awareness and Transparency Tool:** An E P&L enables an organisation to understand the reliance on nature's services and which services are integral to the delivery of goods and services. The monetary value of an E P&L allows for a comparison of the importance of nature's services to other Key Performance Indicators, such as economic revenue and

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<sup>2</sup> PPR (2012): An expert review of the Environmental Profit and Loss account

profit. In that way, an E P&L approach aligns with a triple bottom line approach.

- **Identification of Environmental Hot Spots:** An E P&L allows for prioritisation of Environmental Key Performance Indicators e.g. global warming, water footprint, land use etc. Additionally, hot spots can be identified throughout the supply chain and within application areas (functions, product series, business areas etc.).
- **Risk Management:** Measuring and quantifying reliance on nature's services allow an organisation to manage and reduce risks. For important Environmental Key Performance Indicators the organisation can act to reduce impacts and mitigate the legal, resource and market related risks connected to them.
- **Sustainable Supply Chain Management:** Understanding the distribution of Environmental Key Performance Indicators throughout the supply chain allows an organisation to engage with the most material suppliers and work with those suppliers to encourage impact reduction and resource efficiency, which can be achieved through collaboration.

# 6. The road to Novo Nordisk's E P&L

The Novo Nordisk E P&L is a pilot-project initiated by the Danish Ministry of Environment. The project was initiated due to high interest from the Ministry to coordinate an E P&L for a Danish company. Depending on the company size, complexity and data availability, an E P&L can take anywhere from 12 to 18 months. In order to conduct a thorough and robust E P&L, 18 months is suggested. With additional time and resources, there are areas of this pilot study that Novo Nordisk would investigate further, such as primary data collection and extended hybridisation of additional spend categories.'

The 7 steps of the E P&L conducted for Novo Nordisk follow the standard steps of the high level approach for an E P&L. The approach is described in the illustration below, with the guiding steps described on the left hand side and the specific Novo Nordisk activities on the right hand side.

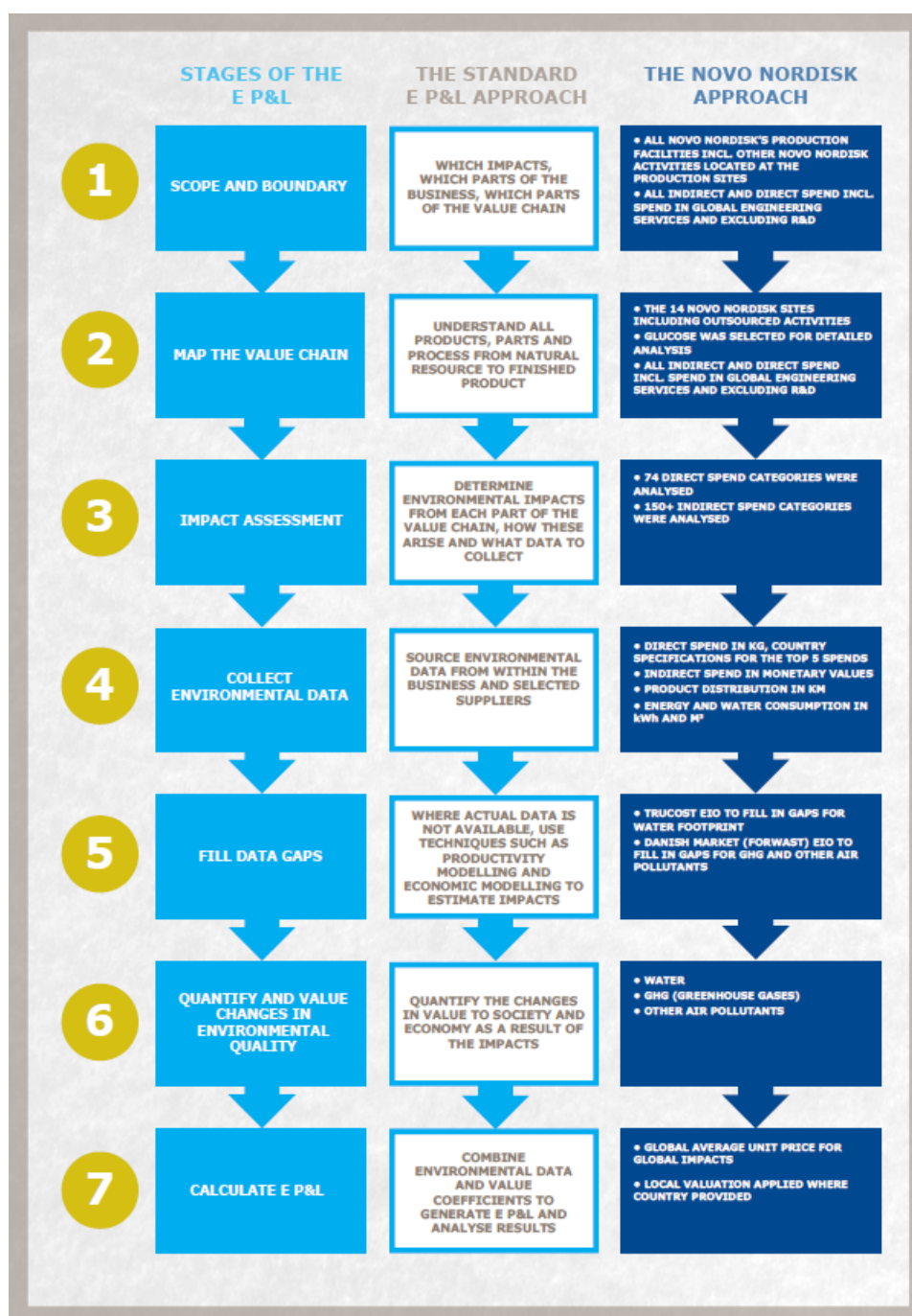


FIGURE 6.1: HIGH LEVEL PROJECT APPROACH. THE 7 STEPS OF THE NOVO NORDISK E P&L

1. The process begins with an explicit description of the scope and boundary of the analysis, including which impacts to assess, which business units and services to include, and what part of the value chain to include.
2. The next step is to gain an understanding of the business, products and value chain within the defined scope and boundary. This creates the foundation for the collection of environmental data.
3. Before environmental data has been collected and impacts quantified, it is possible to conduct a high level environmental impact assessment. This aids the further process of collecting data by identifying materiality throughout the value chain.

4. Collection of data includes environmental data such as energy consumption, the purchasing of chemicals, methods of transportation etc. But it also includes economic accounts describing the expenditure made by the company. Using expenditure data, EIO modelling can be used to estimate environmental impacts and identify significant suppliers from which environmental data might be relevant to obtain.
5. If primary data is not obtained from suppliers, the gaps are filled out with modelled data. Modelled data uses sector averages to estimate environmental impacts, and can be obtained on a regional level, depending on the supplier's geographical location. Additional data sources include secondary LCA data from existing LCA databases.
6. Once data has been collected and implemented into a calculation model, quantification of impacts can be conducted.
7. The final step of the E P&L is the application of valuation to the environmental impacts.

The next sections will describe the different steps of the E P&L process for Novo Nordisk.

## 6.1 Scope and boundary

This analysis is comprehensive and covers all production lines and support functions throughout the entire value chain from cradle to gate. The analysis also covers expenditure relating to the purchase of products that are not directly used in production, such as computers, furniture, travel etc. Novo Nordisk global production sites are illustrated in the below graphic, all of which were included in this analysis.

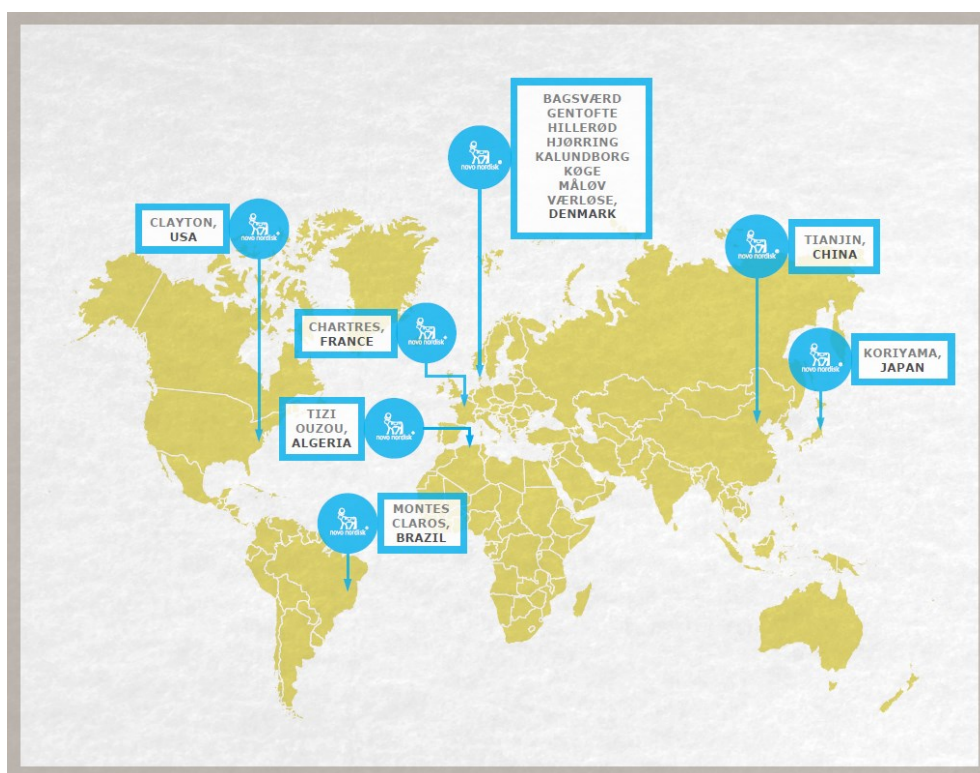


FIGURE 6.2: LOCATION OF NOVO NORDISK'S 14 PRODUCTION SITES

Novo Nordisk owns and operates the 14 sites depicted in the figure above. These are the facilities that contribute to the bottom line by delivering products to market. These locations also include managerial functions and some R&D-activities.

The scope of the study includes impacts from raw material extraction, processing of materials, production sites, product distribution between production sites and from production sites to affiliates, direct customers and importing distributors. Distribution from affiliates to pharmacies, hospitals and wholesalers is not included, nor are the impacts relating to in-use or end-of-life impacts of products. The in-use and end-of-life phases of Novo Nordisk's value chain are negligible in terms of environmental impacts.

Two exclusions have been made due to the structure of data. These are Novo Nordisk's initial investments in new factories and operations of R&D functions outside Denmark. eKPIs quantified include GHG emissions, other air pollutants, and water consumption. For one key input, glucose, land use has also been quantified.

#### **6.1.1 Drivers of environmental impact**

Data provided by Novo Nordisk is analysed and converted into eKPIs. A valuation is then applied to these impacts.

The E P&L evaluates the following eKPIs:

- **Greenhouse gas (GHG) emissions**
  - GHG emissions are generated throughout the supply chain but are primarily related to raw material sourcing, such as farming, the processing of raw materials, such as injection moulding, and logistics and distribution, such as air freight.

GHG emissions are quantified and valued across all datasets.

- **Other air pollutants**
  - Air pollutants occur primarily in the raw materials phase from fertiliser application to crops (glucose) and from raw materials extraction and processing.

Other air pollutants are quantified and valued across all datasets.

- **Water consumption**
  - Water consumption occurs primarily in the raw materials phase, i.e. crop growing. Process water during manufacturing is also a significant factor. Water is relatively immaterial for direct operations and logistics.

Water consumption is quantified and valued across all datasets. Primary water consumption data was provided for the 14 Novo Nordisk sites. Additionally, water consumption for glucose production draws from country specific crop data.

- **Land Use Change (iLUC)**
  - iLUC is measured in terms of land occupation (ha yr). iLUC is applied as a rough proxy for biodiversity and ecosystem services. No distinction between land use types is made. It should be noted that GHG emissions relating to iLUC are reported under GHG emissions and not land use. Further, it should be noted that the indicator covers significant differences in impacts on biodiversity and ecosystem services. Ideally, indicators for these impact categories should be included instead.

iLUC valuation is quantified and valued in the detailed analysis of glucose only.

The eKPIs have been identified based on their materiality to the Novo Nordisk business. GHG emissions are already a main area of focus for Novo Nordisk and a reduction strategy has been embedded in the company's environmental strategy. Air pollution is particularly relevant for

logistical activities, which Novo Nordisk relies on heavily due to the global nature of its business. This includes product distribution, sales activity in cars, travel and general distribution. Water and iLUC are especially relevant for agricultural services, which is particularly of interest to Novo Nordisk considering the large quantities of glucose and other chemicals used in pharmaceuticals and devices.

## 6.2 Novo Nordisk's Value Chain

Novo Nordisk is a global health care company with core competencies in the development and production of pharmaceuticals (primarily insulin) and in the development and production of medical devices, primarily for delivering insulin. The Novo Nordisk value chain is illustrated below.

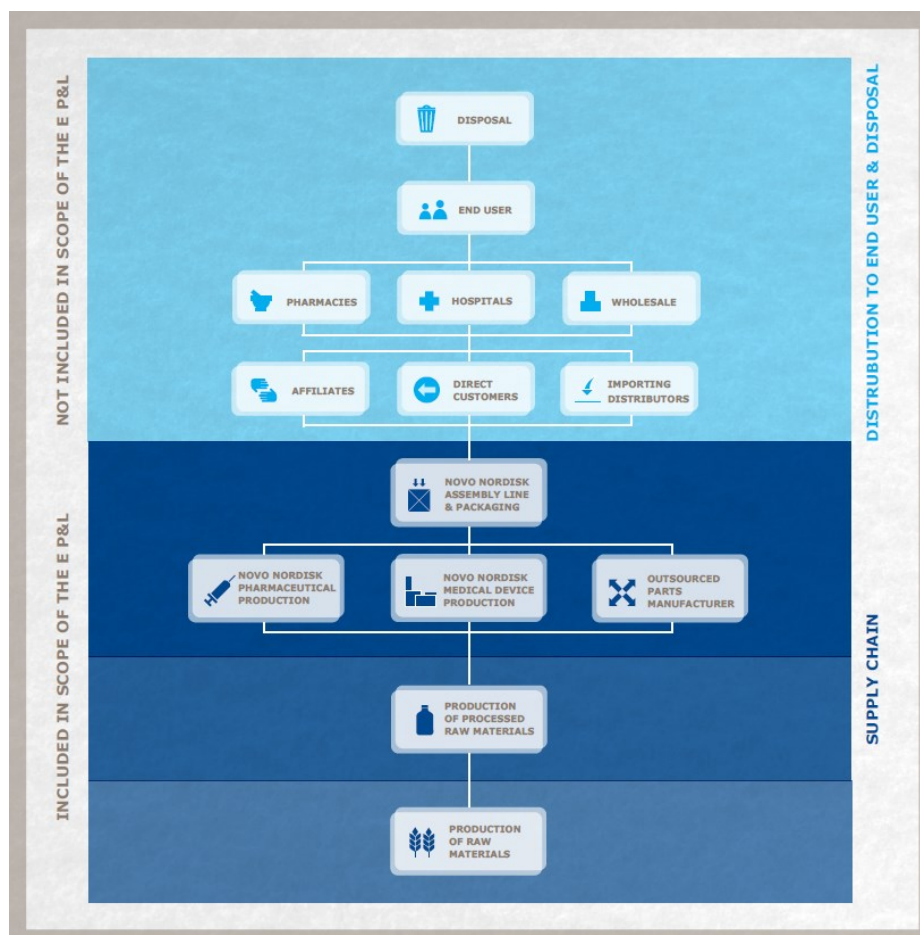


Figure 6.3: Novo Nordisk value chain

The figure illustrates the value chain from raw materials to finished product, including distribution in between tiers, end user and disposal. As mentioned previously and illustrated by figure 6.3, distribution from affiliates to pharmacies, hospitals and wholesalers is not included, nor are the impacts from the in-use or end-of-life of products.

For additional insight into the value chain, two examples of the journey from raw materials to finished product are described below.

The raw material corn (i.e. maize), is milled and processed to produce glucose, the key ingredient in the production of insulin. The insulin is then filled in ampoules and packaged for distribution.

In devices, plastic is a common material. The journey begins with petroleum oil, which is refined into ethane and propane, and mixed with chemicals to create a polymer. The polymers are then extruded into plastic pellets, which are used by the parts manufacturer (both insourced and



outsourced) to produce plastic parts. These parts are then assembled into a device, and packed to be distributed.

### 6.2.1 Tier definitions

The definition of a “tier” can vary from business to business and from sector to sector. Tiers vary depending on the process map of each individual product and the value chain of that product. In this instance, the tier definition is as illustrated in the figure below.

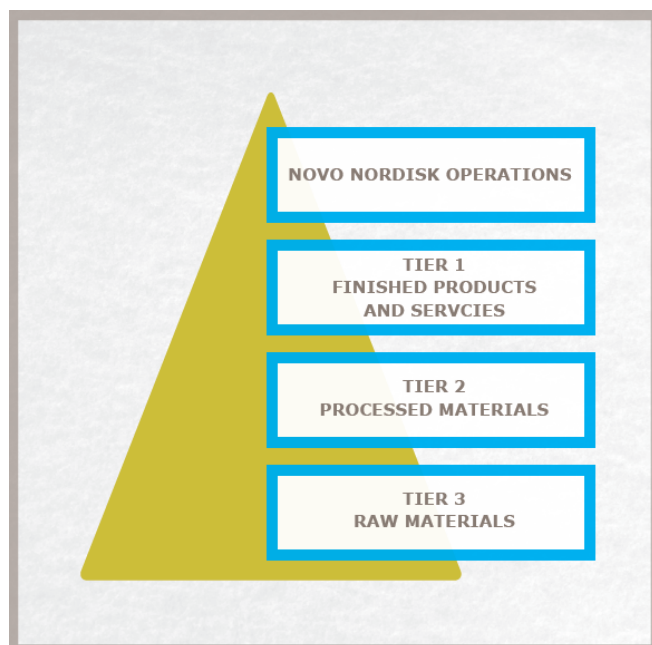


Figure 6.4: Tier definition for Novo Nordisk

#### **Novo Nordisk operations**

Novo Nordisk operations include the core activities for pharmaceuticals production, production of devices, filling, assembly and packaging. A large portion of the parts production is outsourced, but is still considered part of Novo Nordisk operations, since Novo Nordisk owns the moulds and approves all suppliers for the production of device parts.

Direct impacts from Novo Nordisk operations are mainly related to energy use in the production facilities.

#### **Tier 1 Finished products and services**

Novo Nordisk sources a large number of finished products and services to support administration, Research and development, product distribution and maintenance of production facilities. Tier 1 includes impacts from production of products and services such as production equipment, clinical and laboratory services, transportation services, IT and office supplies. E.g. environmental impacts occur at the factories manufacturing the machines/products demanded by Novo Nordisk, and/or occur due to the distribution of these products by truck, ship and/or air transport.

#### **Tier 2 Processed materials**

The impacts associated with Tier 2 come from the processing of raw materials, for example transforming oil into plastic granulates, corn into glucose, and bymilling starch into syrup. Novo Nordisk sources a large quantity of processed raw materials for direct use in their own or outsourced production facilities. A finished product in Tier 1 (i.e. a machine) draws processed materials from Tier 2, which includes processes such as rolling and extruding of metals.

### **Tier 3 Raw materials**

Impacts in tier 3 come from the extraction of raw materials or cultivation of farm crops. Commodities such as corn are highly water intensive during this stage. In addition, fertiliser application and harvesting contribute to air pollution and GHG emissions in this phase. Impacts from raw materials such as crude oil and petroleum, which are key inputs for plastic and other chemicals used in the Novo Nordisk value chain, come from energy and water use associated with the extraction of materials. Novo Nordisk indirectly source raw materials through tier 1 and 2 suppliers.

## **6.3 Impact assessment**

Using an understanding of the Novo Nordisk value chain and the tiers defined in the previous section, the partners conducted an initial impact assessment. A close dialog with key persons at Novo Nordisk, combined with knowledge of processes in the pharmaceutical and plastic sectors, led to the identification of preliminary hotspots.

Within Direct spend, the top five largest spend categories were identified and chosen for detailing. Only the largest spend (glucose) was detailed using secondary LCA data to modify the process.

## **6.4 Available data**

Novo Nordisk had begun working to measure and reduce environmental impacts within the value chain prior to this project. This made it possible to obtain large amounts of well-processed input data in a relatively short time span.

Additionally, companies within the health industry are required by various National Drug Agencies to provide detailed documentation of material inputs in order to market their products. Because of these regulations, Novo Nordisk already has high levels of visibility throughout their value chain. Novo Nordisk's expenditure is divided into Direct and Indirect spend.

Indirect spend covers all products and services which are not part of the final consumer product. Indirect spend is managed by Corporate Procurement and affiliates and are sourced from tier 1 suppliers. Data for indirect spend included a list of all purchases, in monetary value. Indirect spend includes, for example, IT, office furniture but also production equipment and machinery.

Direct spend relates to the production of Novo Nordisk pharmaceuticals and devices and covers processed raw materials sources from tier 2.

Direct spend includes, for example, glucose for insulin production and plastic granulate for pen components production. In Novo Nordisk, Direct spend is managed by the Strategic Sourcing Team. Input data for this study included a complete list of materials in kilograms (kg) and thus the partners were able to quantify the environmental impacts of the exact purchased materials used in the products.

The bill of materials reflects the total material use in kilograms (kg) by Novo Nordisk sites, and an estimated purchase quantity by outsourced device components production facilities. The estimated quantities are assumed to be accurate since outsourced production can only source from Novo Nordisk approved tier 2 suppliers and Novo Nordisk have complete control over the component makeup.

Novo Nordisk provided energy (GJ) and water (m<sup>3</sup>) use for all 14 production sites. The energy and water data were disclosed for the entire site and not divided between the production functions and the managerial functions.

Although primary data availability in this project has been high, about 75% of the total environmental cost has been derived using the EIO model. This large percentage of modelled data is driven by high impacts occurring among suppliers outside of Novo Nordisk's operational control, where primary data is currently less available.

# 7. Novo Nordisk's E P&L results 2011

The impacts of the Novo Nordisk E P&L are presented and illustrated throughout this chapter in various ways. It is important to emphasize that the results currently reflect the *loss* of the E P&L and not the *profits*. The *profits* would likely occur downstream, when assessing the use and disposal phase of the value chain. This might be reflected in activities such as closed-loop recycling i.e. the avoidance of material extraction. These phases are not part of the initial scope of the project, but could be included in a subsequent assessment.

The results are presented through a high level summary of Novo Nordisk's total environmental impacts, as well as broken down by spend category.

## 7.1.1 Overview of total impacts

The table below illustrates the total environmental impacts in financial terms, of Novo Nordisk. The total impacts are vertically divided into tiers to illustrate where in the value chain the main impacts occur, and horizontally the total impact is distributed between the three eKPIs.

EUR million	Water use	GHGs	Air pollution	Total	% of total
Novo Nordisk operations	7	21	1	29	13%
Tier 1	10	58	12	80	36%
Tier 2	3	23	1	27	12%
Tier 3	14	69	4	87	39%
<b>Total</b>	<b>34</b>	<b>171</b>	<b>18</b>	<b>223</b>	<b>100%</b>

TABLE 7.1: THE NOVO NORDISK ENVIRONMENTAL PROFIT AND LOSS ACCOUNT 2011

The total environmental impact amounts to 223 million Euro, including both Novo Nordisk operations and indirect impacts throughout the supply chain. The main environmental impacts occur in tier 1 and tier 3 (75%). Novo Nordisk's own operations constitute only 13% of the total environmental impact.

The results of the Novo Nordisk E P&L reveal that Novo Nordisk's most material impacts on nature occur in tiers 1 and 3 with the emission of GHGs.

In addition to the 3 eKPIs listed above, the environmental cost of iLUC was analysed for **glucose only**. Glucose is purchased by Novo Nordisk in large quantities relative to other inputs and relies heavily on agricultural land during the farming of maize. Thus, the iLUC from production of glucose was selected for a sub-analysis and valuation exercise. It is important to note that this value is not representative of iLUC throughout Novo Nordisk's entire supply chain, but instead is intended to expose risk from iLUC during the

production of glucose and to identify an additional eKPI that may be material to include in future analyses.

Novo Nordisk glucose land use (ha)	Land use change value (EUR million)
<b>3,940</b>	<b>37</b>

For a better understanding of the results and the underlying impacts, the following section outlines a spend analysis, where the impacts are allocated according to the two spends; Indirect spend and Direct spend.

## 7.2 Indirect spend

Indirect spend constitutes more than 85% of the total spend at Novo Nordisk in 2011. The environmental impacts relating to Indirect spend total 156 million Euros, or 70% of the total environmental cost. Indirect spend includes machinery and production equipment purchased for the production sites, which drives tier 1 impacts. Within tier 3, GHG emissions contribute most to the environmental cost due to primary contributions from iLUC in agricultural processes, extraction of metals and extraction of oil and natural gasses used for plastic products. Tier 1 and 3 are the largest contributors to the environmental costs relating to water consumption, likely driven by raw materials extraction, farming, machinery and equipment, buildings, etc.

EUR million	Water use	GHGs	Air pollution	Total	% of total
Novo Nordisk Operation	0	2	0	2	1%
Tier 1	4	50	11	65	41%
Tier 2	2	20	1	23	15%
Tier 3	4	59	3	66	43%
<b>Total</b>	<b>10</b>	<b>131</b>	<b>15</b>	<b>156</b>	<b>100%</b>
High impact purchase area	6	63	9	78	50%
Medium impact purchase area	4	60	6	69	44%
Low impact purchase area	<1	8	<1	9	6%
<b>Total</b>	<b>10</b>	<b>131</b>	<b>15</b>	<b>156</b>	<b>100%</b>

**TABLE 7.2: MONETARY VALUE OF ENVIRONMENTAL IMPACTS FROM INDIRECT SPEND**

The table also shows the distribution of impacts across different purchase areas within Indirect spend. The purchase areas have been divided into three groups; high, medium and low impact. High impact purchase areas contain spend relating to Consultancy services, production equipment and travel. Medium impact purchase areas contain spend relating to clinical and laboratory equipment, distribution of products, management of facilities, marketing and meetings and events. The last group, Low impact purchase areas, contain spend relating to It & telecommunication and office supply and print.

Reporting impacts by purchase area is useful to better understand the overall distribution of impacts, but it is also important to consider the intensity of each purchase area when deciding which areas to prioritise and which suppliers to engage with. Some purchase areas have a high intensity and are therefore more imperative to focus on, while others have a low intensity and will not likely benefit from the same level of attention when considering reduction tactics.

### **7.2.1 GHG Intensity in indirect spend**

The intensity chart below illustrates each of the three impact purchase areas 'contribution to GHG emissions and contribution of total purchase volume. The dark-blue bar represents the share of spend, the pale-blue bar represents the share of GHG emissions and the orange bar represents the intensity (gram CO<sub>2</sub>e/DKK).

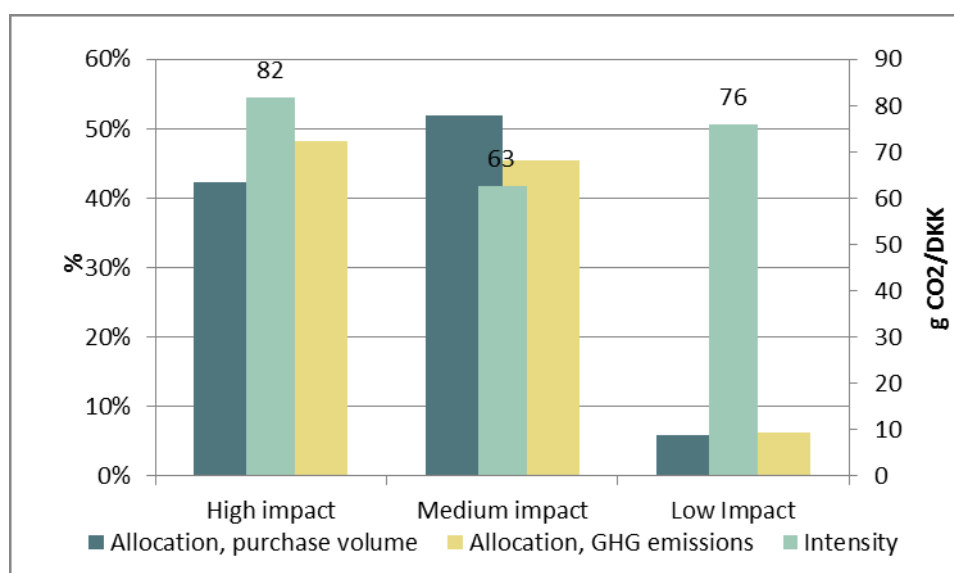


FIGURE 7.1: GHG INTENSITY IN INDIRECT SPEND

The chart above shows the relative GHG intensity of each spend category in addition to absolute GHG emissions and spend quantities. The 'High impact' category has the highest GHG intensity, at 82 g CO<sub>2</sub> per DKK. This means that for every DKK spent with suppliers in this category, 82 g of CO<sub>2</sub> are emitted into the atmosphere. As shown by the blue bars, though Novo Nordisk spent just over 40% of 2011 purchase volume on suppliers in this category, they contributed to almost 50% of total GHG emissions. This high intensity is driven by activities such as travel and production equipment. On the other hand, suppliers in the medium impact category, which includes marketing activities and facilities management, account for over 50% of total spend but only contribute to around 44% of the GHG emissions. This is due to the lower intensity of companies in this spend category. Though suppliers in the 'Low impact' category have a higher GHG intensity than those in the 'Medium impact' category, the absolute quantity of GHGs generated by these suppliers is much lower, due to low spend. In the future, if spend in this category increases Novo Nordisk might consider shifting focus to these suppliers, but for the 2011 this category is relatively immaterial.

### 7.2.2 Indirect spend impacts allocated to Tiers

Within Indirect spend, the biggest environmental impacts occur in tier 1 and tier 3, which account for 84% of the environmental cost. With an additional 15% from tier 2, 99% of all impacts occur outside of Novo Nordisk operations. The 1% of environmental costs that occur within Novo Nordisk operations are mainly related to the fuels purchased for Novo Nordisk vehicles. Environmental impacts from travel in general are allocated in tier 1.

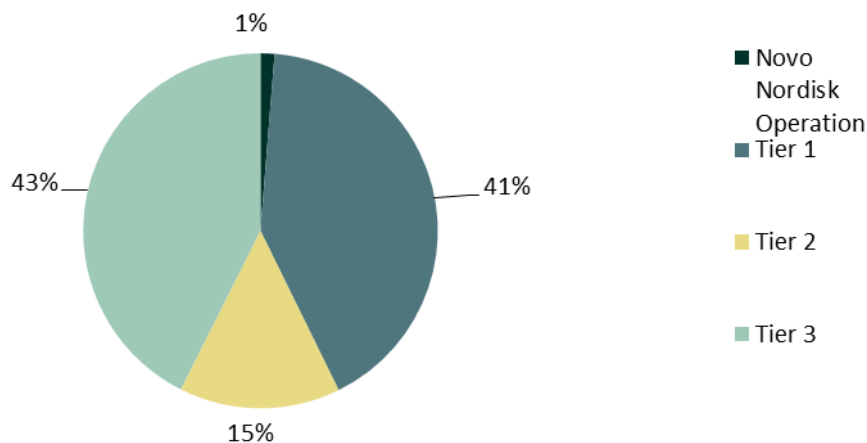


FIGURE 7.2: ENVIRONMENTAL IMPACT - INDIRECT SPEND ALLOCATED TO TIERS

### 7.2.3 Indirect spend impacts allocated to eKPIs

GHG emissions, contribute the most to indirect environmental costs, at 84%. Air pollution and water consumption contribute 10% and 6% respectively.

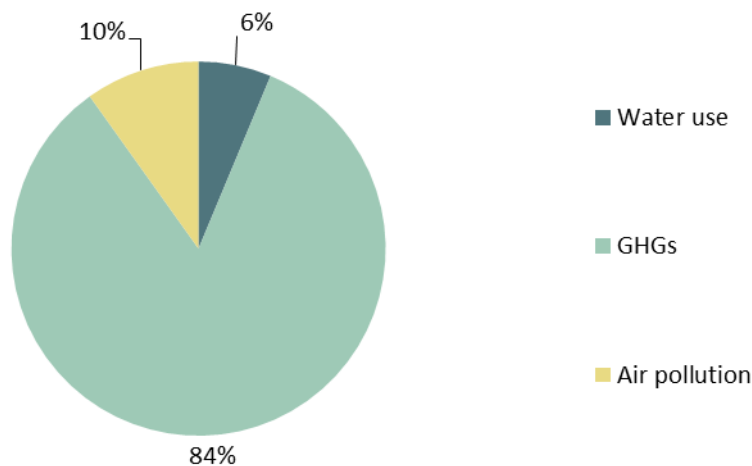


FIGURE 7.3: ENVIRONMENTAL IMPACT - INDIRECT SPEND ALLOCATED TO EKPIs

A very small percentage of GHG emissions relate to Novo Nordisk operations. The majority of GHG emissions are related to upstream activities in the value chain from the products Novo Nordisk purchase.

Air pollution impacts are generated primarily by travel, which is a tier 1 activity. Travel accounts for almost 40% of all air pollution emissions.

Water use relating to indirect spend is primarily driven by tiers 1 and 3, relating to spends within machinery, raw materials, and crop farming.

## 7.3 Direct spend

Direct spend accounts for a smaller share of the total spend, but includes operational energy usage, water usage and a large share of product distribution.



EUR million	Water use	GHGs	Air pollution	Total	% of total
Novo Nordisk Operation	7	19	1	27	40%
Tier 1	6	8	1	15	22%
Tier 2	1	3	0,4	4	7%
Tier 3	10	10	0,5	21	31%
<b>Total</b>	<b>24</b>	<b>40</b>	<b>3</b>	<b>67</b>	<b>100%</b>
Devices	3	2	0	5	7%
Distribution	0,2	8	1	9	15%
Energy (Novo Nordisk owned sites)	0	8	0	8	12%
Energy (Outsourced sites)	0	11	1	12	18%
Water Consumption (Novo Nordisk owned sites)	0,5	0	0	1	1%
Maintenance	0,03	1	0	1	1%
Packaging	1	3	0	4	6%
Pharmaceuticals	19	7	1	27	40%
<b>Total</b>	<b>24</b>	<b>40</b>	<b>3</b>	<b>67</b>	<b>100%</b>

**TABLE 7.3: MONETARY VALUE OF ENVIRONMENTAL IMPACTS FROM DIRECT SPEND**

The total environmental cost relating to Direct spend is 67 million Euros, approximately 30% of the total impact of the E P&L. Though Novo Nordisk provided water consumption data and energy consumption data for its directly owned sites, similar data was unavailable for outsourced operations, which are responsible for the production of a significant part of all Novo Nordisk devices. The impacts associated with outsourced facilities have been quantified using EIO modelling and estimations based on available secondary data.

In Table 7.3, Direct spend impacts are allocated according to tiers and categories. The categories differ from the categories in Indirect spend, as they reflect the main production activities. Two *Energy* categories are illustrated in the table. One represents energy usage at Novo Nordisk sites and the other represents energy usage at outsourced device manufacturer. Additionally, a *water consumption* category is included, which reflects water consumption on Novo Nordisk sites. It is interesting to see the distribution of environmental impacts relating to the production of *Devices* versus the production of *Pharmaceuticals*, relative to *Product distribution*, *Packaging*, *Maintenance* and *Energy*. *Devices* have a much lower impact than *Pharmaceuticals*, which is likely driven by agricultural dependency and high energy intensity. Amongst the supporting functions, *Energy (Outsourced Sites)* has the highest impact account for 18% of environmental cost. This is driven by the vast outsourced manufacturing in the Novo Nordisk supply chain.

### 7.3.1 GHG Intensity in direct spend

The intensity analysis for Direct spend is not measured in carbon intensity per EUR but carbon intensity per physical volume (kg). In the figure below, only the four categories whose unit of measure is kg are listed. Energy, which is measured in kWh, is not included. The categories have been sorted from highest to lowest according to GHG emissions, with the largest contributor to the far left. The dark-blue bar represents the share of volume, the pale-blue bar represents the share of the GHG emissions and the orange bar represents the intensity (kg CO<sub>2</sub>e/kg purchase).

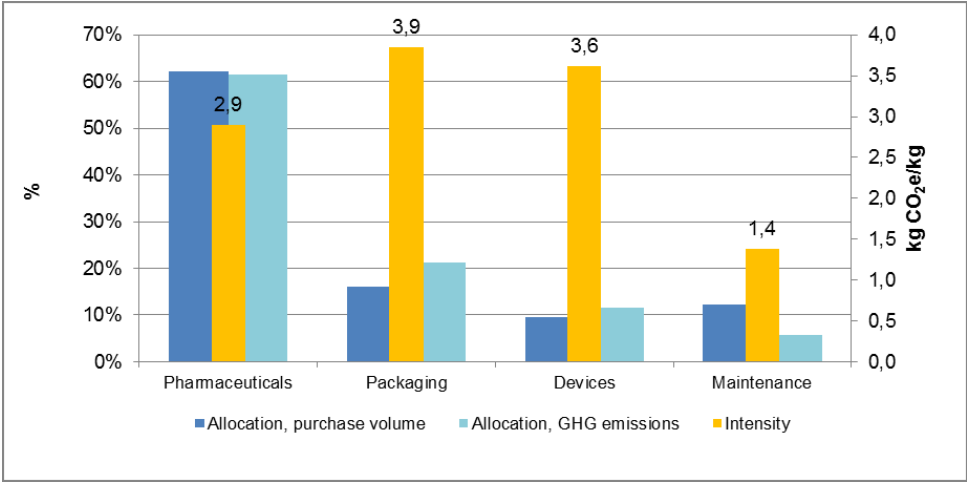


Figure 7.4: Intensity in Direct spend

*Pharmaceuticals* are by far the largest contributor of GHG emissions accounting for more than 50%. The intensity, however, is lower than that of *Packaging* and *Devices*, 3.9 kg CO<sub>2</sub>e/kg and 3.6 kg CO<sub>2</sub>e/kg, respectively.

### 7.3.2 Direct spend impacts allocated to Tiers

The tier distribution shows that the main impacts are located in Novo Nordisk operations, and tier 3. Novo Nordisk operational environmental costs are driven by the energy and water consumption at the production facilities, tier 1 impacts are driven by product distribution, tier 2 from processing of raw materials and tier 3 includes raw material impacts, primarily from corn production for glucose and oil extraction for plastic materials.

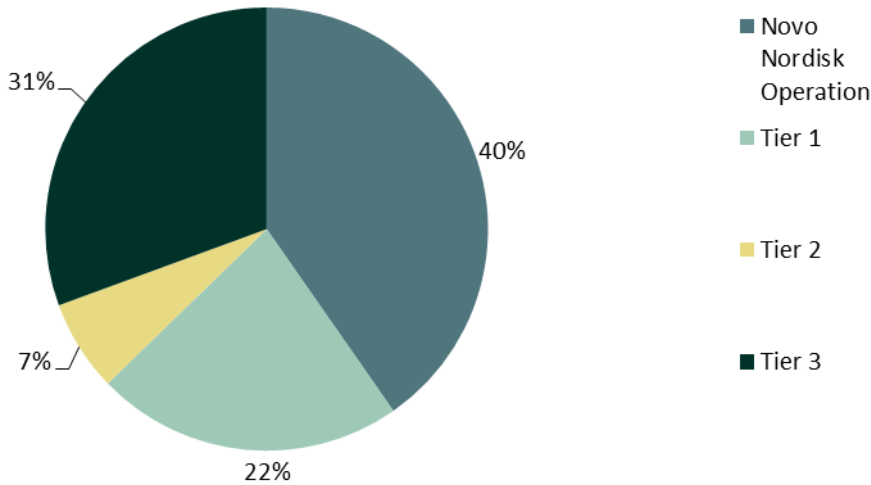


FIGURE 7.5: ENVIRONMENTAL IMPACT - DIRECT SPEND ALLOCATED TO TIERS

As mentioned above, Novo Nordisk Operations would have been underestimated if energy consumption of the outsourced facilities was not included. Assuming that the outsourced facilities have energy consumption with the same ratio of *energy usage* to *production volume* as the facility in Hillerød, which produces 9% of all devices, then Novo Nordisk Operations would be as illustrated in the figure above.

The profile of eKPIs for Direct spend is different from that of Indirect spend. As shown in the figure below, water use has a relatively higher contribution due to highly intensive products used in the pharmaceutical production. Glucose, which is used in large quantities, has a significant water footprint.

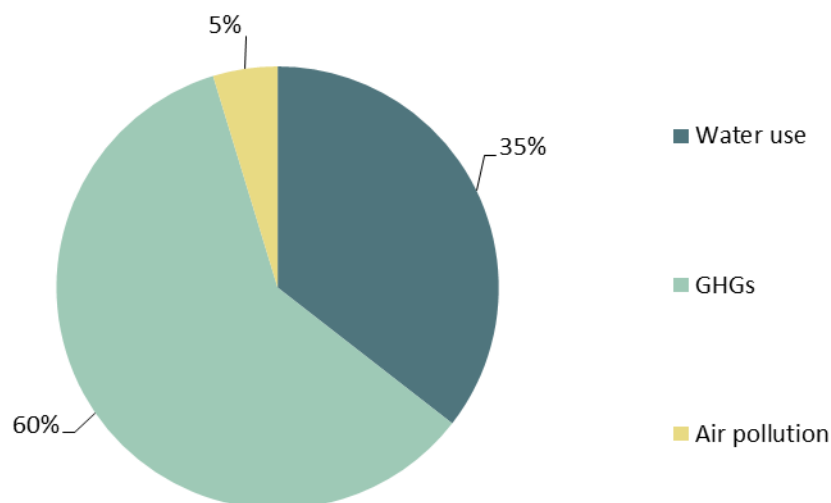


FIGURE 7.6: ENVIRONMENTAL IMPACT - DIRECT SPEND ALLOCATED TO EKPIs

### 7.3.3 Glucose

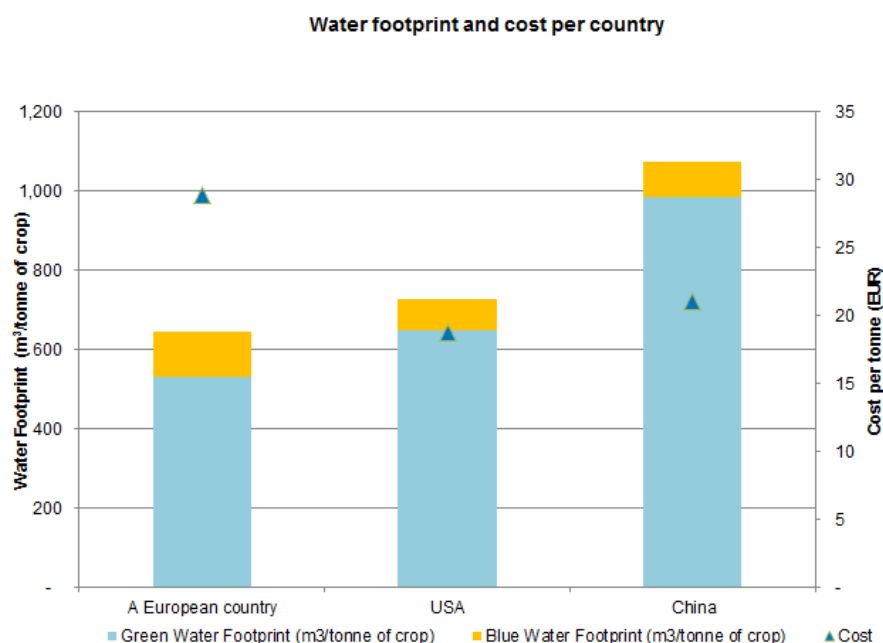
Within Direct spend, the impacts relating to the production of glucose have been hybridised (see methodology document for further information on hybridisation). The hybridisation includes a detailed profiling of the EIO model to align it with the profile of purchased glucose by Novo Nordisk. The hybridisation uses LCA data to improve the production processes, country data to enhance the geographical scope and crop data to improve the agricultural processes.

### 7.3.4 Scenario analysis of Novo Nordisk's water footprint

Novo Nordisk sources its crop inputs primarily from Europe.

Using water data from Mekonnen and Hoekstra, which measures water footprints of crops by country, Novo Nordisk can gain a better understanding of how sourcing location and regional water scarcity might influence risk in the production of its key input, glucose. It is important to note that grey water is not included in the scope of this analysis and green water is not valued.

The chart below shows a comparison of water footprints (m<sup>3</sup>/tonne) and water cost (EUR/tonne) between a European reference country, the USA, and China (two of the world's largest corn producers).



**TABLE 7.4: SCENARIO ANALYSIS OF WATER FOOTPRINT**

Per tonne of product, China requires the most water, at 1,073 m<sup>3</sup>/t of crop, and the European reference country requires the least, at 643 m<sup>3</sup>/t of crop. The picture changes slightly when valuations are applied to the water quantities to gain a better understanding of water scarcity and the environmental impact of water consumption in different countries.

The European reference country requires the least water per tonne of corn produced, but has the highest environmental cost, at EUR29. The USA, on the other hand, has a much lower environmental cost of EUR19. In the context of Novo Nordisk's environmental impacts, moving production of glucose from Europe, with a relatively high water cost, to a country like the USA, with a lower water cost might be something to consider when mitigating risk for raw material inputs.

# 8. How Novo Nordisk applies the E P&L

As stated by PUMA in its E P&L, the E P&L will enable an organisation to make better, more informed business decisions that take account of environmental impacts as well as more traditional financial and operational considerations, as the E P&L provides the following supplementary tools to businesses: Strategic tool, Risk management tool and a Transparency tool.

The results of the Novo Nordisk E P&L reveal that according to the E P&L methodology, Novo Nordisk is responsible for 29 million EUR worth of services delivered by nature in 2011 for operational activities alone. Including tier 1, 2 and 3 would increase the environmental cost substantially, contributing an additional 194 million EUR or 87% of Novo Nordisk's total monetary value of their environmental impact.

The results show that 70% of Novo Nordisk's environmental cost is related to Indirect spend and 30% is related to Direct spend. Although the majority of impacts lie within Indirect spend, Direct spend is where Novo Nordisk has a greater sphere of influence. That is an important consideration when Novo Nordisk works to manage and prioritise future actions.

What is clear from these numbers is that the majority of Novo Nordisk's environmental costs lie outside its direct control and therefore is more challenging to reduce. Novo Nordisk recognises that it has a responsibility, but that efforts must be made to work together and synergise with other companies in the supply chain. Novo Nordisk already has numerous initiatives to reduce its environmental impact within core activities which covers most of the material areas identified in the E P&L. There are, however, areas which Novo Nordisk will have to investigate further in order to establish materiality and possible actions.

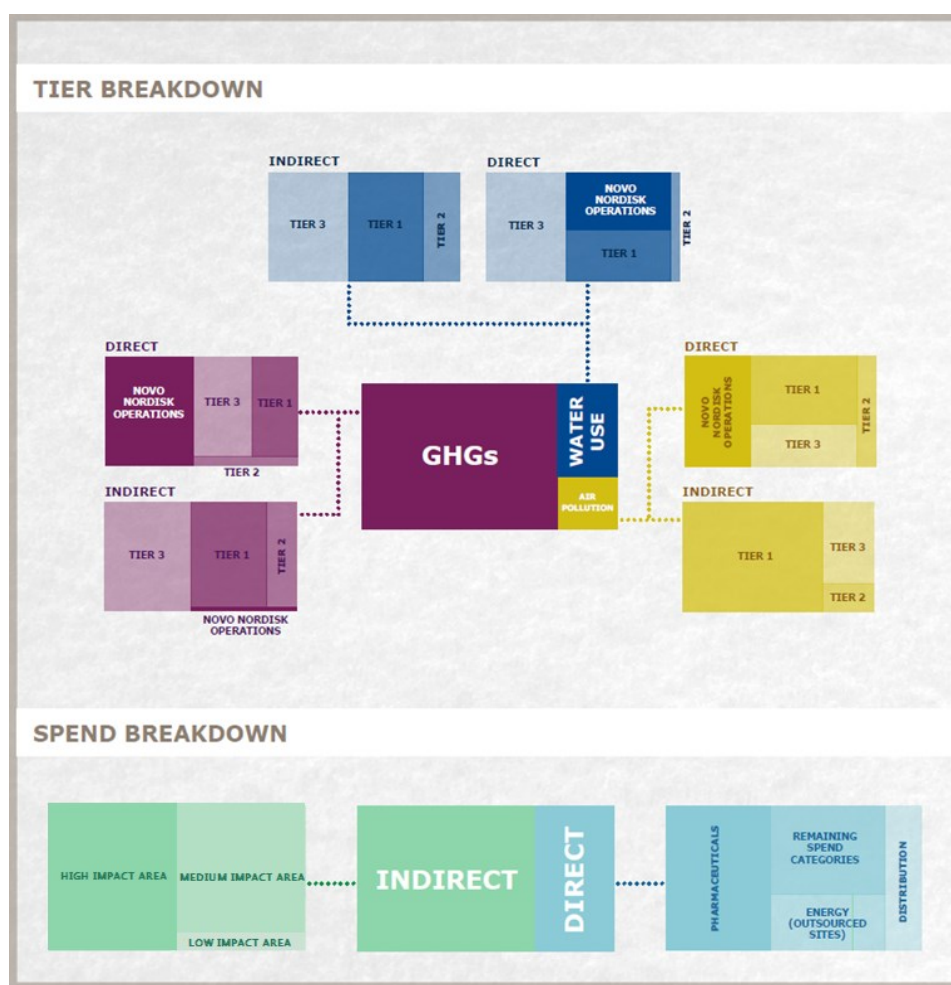


Figure 8.1: A Visual Summary of Results – Relative Environmental Costs

The E P&L can assist in validating current reduction strategies and identify whether there are areas which could be included in the strategies.

Next steps for Novo Nordisk will be, first, to dive into areas identified as material through the E P&L whether the data quality can be improved. Following this assessment, Novo Nordisk will have to look at whether any of the current reduction strategies should be revisited and how we can optimise the use of resources.

Novo Nordisk will also have to consider whether the Profit & Loss Account for the remaining bottom line – social impacts – should be assessed in order to complete an all-encompassing profit and loss account of Novo Nordisk.

# 9. Recommendations

Based on the initial E P&L analysis a number of recommendations are suggested for future work by the consultants. The suggestions are indicative and should be aligned to the environmental strategy at Novo Nordisk.

## 9.1 Improving Novo Nordisk data

To improve results the first step is to improve primary data quality. The direct spend data provided in kg is an example of good data. Physical units are always preferable to spend data. This helps avoid uncertainties related to monetary assumptions and calculations in the EIO model.

Product distribution, travel and general transport are areas where the data quality could be improved from monetary value to mileages. Novo Nordisk already track mileages for certain transportation processes, and in the future through logistics management systems, it could be possible to gather data for all distribution and transportation activities.

## 9.2 Detailing

Like glucose, it would be advised to identify other spend categories that could be hybridised using LCA data.

Besides using pre-existing LCA data, the detailing could include supplier specific data like energy consumption, process information, etc. This data could improve already known LCA processes, that might be outdated or misfit the actual production processes applied by Novo Nordisk suppliers. Country of origin of the supplier is also important knowledge in detailing processes.

## 9.3 Altering scope

Scoping of the analysis is another area where modifications could be made. As mentioned in section 6.1 *Scope and boundary*, usage and disposal is not included in this E P&L. Disposal and end-of-life impacts in general could be interesting in relation to identifying profits in the E P&L when activities like material recycling can generate energy and be used as a secondary raw material in the life cycle of the next product.

Other relevant eKPIs could also be included in the analysis, e.g. waste. Land Use Change is only quantified and valued for glucose and could advantageously be analysed and valued for all products.

New sites and the organisational units that have not been included could also be part of a future E P&L.

### **Novo Nordisk's environmental profit and loss account**

The Novo Nordisk Environmental Profit and Loss Account (E P&L) is a response to PUMA's call for contributions to the E P&L methodology and the expert review of PUMA's E P&L.

The Novo Nordisk E P&L is reported in two parts; the main report, which focuses on the results and the application of these in a Novo Nordisk context, and the methodology report which focuses on the methodology applied for establishing the E P&L results.

The results of the main report reveal Novo Nordisk's most material impacts on environment occur within the first and third tiers of the supply chain. If environmental costs relating to water consumption, greenhouse gas (GHG) emissions, and air pollution were to be internalised, Novo Nordisk would have to pay 29 million EUR in 2011 for operational activities (core activities) alone. Looking further down the value chain, the costs increase substantially. Environmental costs across tiers 1, 2 and 3 amount to 194 million EUR or 87% of the total cost.

In 2012, PUMA was the first global corporation to publish an E P&L. This study of Novo Nordisk both adopts the



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