CO_2-REDUCTION CHAIN ANALYSIS

GREEN CLOUD
2021 - 2025

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1 | INTRODUCTION

Accenture Netherlands is a level 5 certified company on the CO_2-Performanceladder. This is a certificate that is mainly used in the Netherlands. The CO_2-Performanceladder is a managementsystem that helps organisations to monitor, evaluate and reduce their CO_2-emissions. In this document you will find the plan of action for a new chain analysis. The main goal of this analysis is to initiate a chain cooporation and reduce CO_2-emissions that are caused by IT operations of clients. The method used complies with the guidelines of the GHG Protocol.

1.1 Accenture

Accenture is one of the world's largest independent providers of technology services. Our Technology professionals lead and implement highly complex technology projects. Working with clients, they design, develop and deliver a wide range of challenging and global IT projects. These professionals may build, test, install and maintain software across a variety of projects and industries working with leading enterprise applications such as SAP, Siebel, PeopleSoft and Oracle or with custom- built applications the field of Analytics, Mobile, Cloud / SaaS and Digital. Accenture NL is mainly focused on strategy, consulting, digital, technology and outsourcing/operations.

1.2 Chain analysis

A life cycle analysis is a way to visualize the whole chain of emissions that are the result of a product or service. Meaning the complete life cycle of that product or service.
The most important goals fort this life cycle analysis are identifying CO_2-reduction possibilities, defining the reduction goal and monitoring progress.

Based on the insight on scope 3 emissions and the life cycle analysis a reduction goal is defined. Within the energy management system, a clear focus is set on reducing scope 3 emissions. Spreading information to partners and other important players, part of a similar chain of activities, is an important part of this goal. Accenture will actively try to involve their most important partners within the sector in achieving its reduction goals.

1.3 CSR Statement

Accenture is ambitious and pro-active when it comes to corporate social responsibility. They are very active taking the lead role and initiating new ways to reduce emissions that are caused by their own operations, suppliers and other parties involved. This is a global policy and strategy of Accenture.

2 | SCOPE

2.1 Product Market Combinations

The ladder requires choosing a topic that has to do with the most material emissions. This concerns relevant emissions in the context of scope 3 for which criteria have been indicated in the GHG Protocol Scope 3 Standard. These are the following criteria:

- The scope of the emissions
- Influence of the company on the emissions
- Risks for the company
- Emissions of critical importance for stakeholders
- Outsources emissions
- Emissions identified by the sector as significant /relevant and others

Therefore Accenture has stated in the excel document 'Qualitative scope 3 analysis' what the most relevant PMC's are. Out of these combinations we selected the top two as a guidance for choosing the topic of the chain analysis.

The top two PMC's for Accenture are:

1. **Strategy & Consulting – Private Parties**
2. Interactive – Private Parties

Next to this Accenture has a couple of significant scope 3 emissions:

1. **Suppliers**
2. Waste

For this chain analysis we chose a subject that is also relevant when it comes to consulting clients, suppliers and other companies to reduce CO2 emissions. The core business of Accenture is to provide service, solutions, strategies and innovations when it comes to IT.
Accenture wants to lead by example and therefore this subject can make a great impact in the whole chain.

2.2 Primary & secondary data

In this chain analysis the used data was supplied by multiple organizations as shown in the table below.

	Primary and Secondary data
Primary data	Cloud Computing: Grijs of Groen? – TNO door: Bram Spitzer, Daniël Worm, Freek Bomhof, Mark Bastiaans The carbon benefits of cloud computing – Microsoft The green behind the cloud – Accenture https://www.dutchdatacenters.nl/thema-energie/
Secondary data	https://www.co2emissiefactoren.nl/lijst-emissiefactoren/

2.3 Allocated data

There is no data that has been allocated in this analysis.

3 | Green Cloud

Accenture advises multiple companies on their digital data storage facilities. Accenture has the goal to find the best option for the customer and always tries to go for the most sustainable solution. Accenture thinks that the most sustainable solution is often to transfer the data storage from local servers to more efficient datacenter. This results in more energy efficient storage and decreases the use of materials. Especially when the datacenter uses renewable energy, this will result in a form of data storage with a very low footprint.

Accenture would like to verify its assumption that the green datacenter is actually more sustainable than traditional storage at location. To do this, a life cycle assessment has to be done for both the traditional and the new situation. The following stages in the life cycle have to be assessed:

Local Storage	**Storage in 'green' cloud**
Raw Materials	Raw Materials
Production	Production
Transportation	Transportation
Usage	Usage
End-of-life	End-of-life

This year the focus will be on the energy consumption and emissions in the usage phase. The other stages will be further researched in the coming years. For the calculations an average case of a customer of Accenture has been used.

3.1 Chain Partners

There are several partners with whom Accenture has to work together to achieve the goals of this chain analysis:

- (Potential) Clients
- Digital Storage providers

3.2 Life cycle assessment

A life cycle assessment provides a full picture of the environmental impact of a product or service, from the raw material extraction for equipment manufacturing through the end-of-life treatment of equipment.

Raw Materials – includes the energy consumption and emissions associated with the use of the raw materials.
Production – represents the energy consumption and emissions associated with the assembly of servers, networking equipment and hard drives.
Transportation – includes the energy consumption and emissions associated with the transport of the servers and other IT equipment from the manufacturer to Accenture datacenters.
Usage – represents the energy consumption and emissions from electricity used to run the servers, networking equipment, hard drives, and datacenter infrastructure (lightning, cooling and power conditioning).
End-of-life - includes end-of-life energy consumption and carbon emissions associated with landfilling and recycling, based on conservative assumptions about recycling rates.

4 | Quantifying emissions

The number of large-scale data centers is increasing by 14% each year world-wide and public cloud spend will rise by 17% between 2019-2020. Some analysts estimate that 11,4% of the United States IT spend is dedicated to cloud, with China at 2,7% and catching up rapidly. This double-digit growth comes with a price. Global data center electricity consumption is nearly equivalent to the annual consumption of the country of Spain. However, by pursuing a green approach, our Accenture analysis suggests migrations to the public cloud can reduce global carbon (CO2) emissions by 59 million tons of CO2 per year. This represents a 5.9% reduction in total IT emissions and equates to taking 22 million cars off the road. (2021, Accenture)

A cloud provider is greener if:

- The servers are used to the maximum: the amount of servers that are on but not doing useful work is minimized (efficiency)
- The servers are efficient (virtualization, scheduling and provisioning, economical hardware)
- Most of the energy used by the data center goes to the servers; or vice versa: as little energy as possible is needed for cooling, lighting and other systems (using frameworks such as OpenDCME, BREEAM, LEED, Green Grid)
- The energy that is used leads to as few emissions as possible, so it is sustainably generated
- The data center is not too far away from the users so that the transport of the data costs less energy
- The energy is generated in a location close to the data center, so there are less transport losses (2012, Spitzer).

According to Accenture the journey toward a sustainable cloud involves three ambition levels: infrastructure as a service (IaaS also referred to as "lift and-shift") migrations (bronze level) without major redesign, application of sustainable software engineering practices (silver level), and application optimization for the "fabric of the cloud" (gold level).

IaaS migrations involve migrating applications from enterprise- owned to cloud without major redesigns of applications or workflows (2020, Accenture). In an IaaS cloud, the physical location, ownership and management of the IT resources, storage and processing shifted towards provider. The provider can if not only "pool" ICT resources in order to use them more effectively and efficiently of ICT resources, but can also act better towards suppliers by scaling. As a result, not only will there be less ICT resources in total required to meet the aggregated demand from customers, but also less energy is consumed to operate these resources to hold; the customers now need less or no (excess) capacity themselves to keep it operational (2012, Spitzer). These basic cloud-first journeys pave the way for significant carbon reduction opportunities. The main drivers of IaaS include better power and cooling improvements that allow for less energy per compute unit, newer and more efficient hardware optimized by cloud providers, and server utilization rates several times greater than typical enterprise-owned rates. In most cases, cloud providers also have greater renewable energy mixes than cloud users and minimize data center carbon footprints through renewable energy. Our analysis of the largest public cloud service providers shows average enterprise-owned-to-cloud migrations can lead to an impressive 65% energy reduction and 84% carbon reduction (2020, Accenture).

Sustainable software development approaches deliver even more improvements. Companies must make intentional choices to consider cost and performance in the context of sustainability outcomes. For example, our experiments indicate that selecting the right "fit-for-purpose" coding language can reduce energy consumption. Maintaining balance between accuracy of analytical models and cloud resource consumption can result in significant savings. Accenture Labs' research in sustainable software engineering revealed that for certain types of programming techniques, the choice of coding language can impact energy consumption by as much as 50 times. In dealing with AI, which is typically hosted on the cloud, choices related to accuracy can also make a big difference in energy use. Consider this: Accenture found that while training a simple AI model for identifying flowers,

increasing model accuracy from 96% to 98% resulted in a nearly 7X jump in energy consumption (2020, Accenture).

Companies drive even greater carbon reductions through cloud-native architectures and deployments. Our analysis shows that customizing applications to be cloud-native can stretch carbon emission reduction to 98%. Customization requires designing applications to take full advantage of on-demand computing, higher asset utilization rates, and dynamic allocation of computing resources. For applications that are not fully migrated, companies can use digital decoupling to take the core parts of legacy applications and build efficient cloud architecture around them. Microsoft study of 10,000 users found Exchange Online led to a 93% carbon emission reduction from energy savings and the company's renewable electricity purchases (2020, Accenture).

Transportation
Network consume energy; a report by the IEEE states that as storage and processing move all the way to the cloud shifts, the share of energy spent on transport is about 10% (private cloud) to 25% (public cloud) of the whole (2012, Spitzer).

Usage
Globally, according to the IEA, data centers will consume approximately 200 TWh in 2018, which is approximately 1% of global electricity consumption. Data center energy consumption has been stable since 2015, as global internet traffic tripled and data center "workloads" (a measure of service demand) more than doubled (Cisco, 2018). This was also previously seen by CE Delft in the Netherlands in their 2015 study. (2021, Dutchdatacenter).

In 2018, 200 TWh is equivalent to 130 million tons of CO_2.

End-of-life
The departure from traditional 'take, make, waste' production and consumption systems to a system whereby resources are kept in use for as long as possible, the maximum value is extracted from them whilst in use, then products and materials are recovered and regenerated at the end of each life-cycle. No specific numbers about the old and new situation are known about this topic.

5 | Reduction Potential

Based on results, Accenture wants to commit to reducing the CO_2 emissions that are caused in the chain. Since they can exert influence on the basis of their knowledge and specialisation, they can advise clients to use a more CO_2 friendly solution. For this reason, they have set themselves the following objectives:

Long term objective:

The long term objective is to be determined in 2022

Objective 2022:

"In 2022 Accenture will inventory the current projects on Green Cloud and use them to further deepen this chain analysis and quantify the reduction in carbon emissions"

Plan of approach

At the moment, only general information about the green cloud is available. Specific amounts of the energy consumption will be gathered in the old phase and in the new phase of one of Accentures 'average' clients for the whole life cycle assessment. Depending on this, we also have to come up with an objective for this chain analysis. It is very important that the progress made on this objective is easily measured every year. Above the concept of the objective is shown.

Unfortunately it took longer than expected to gather data for this new chain analysis. This is why we set up an action plan to finish the chain analysis:

First half of 2022: Further working out the scope of the project by the POC team. Contact with Accenture Global.

Second half of 2022: Communicate the new chain analysis and reduction goal in- and externally. Start inventory of relevant projects.

2023 – 2025: Monitor progress and take actions when necessary. Further investment in education of relevant employees and marketing of the green cloud.

6 | Source of data

Document	Characteristic
Handboek CO_2-prestatieladder 3.0, 10 juni 2015	*Stichting Klimaatvriendelijk Aanbesteden & Ondernemen*
Corporate Accounting & Reporting standard	*GHG-protocol, 2004*
Corporate Value Chain (Scope 3) Accounting and Reporting Standard	*GHG-protocol, 2010a*
Product Accounting & Reporting Standard	*GHG-protocol, 2010b*
Nederlandse norm Environmental management – Life Cycle assessment – Requirements and guidelines	*NEN-EN-ISO 14044*
Cloud Computing: Grijs of Groen? – TNO door: Bram Spitzer, Daniël Worm, Freek Bomhof, Mark Bastiaans	*(2012, Spitzer)*
The carbon benefits of cloud computing - Microsoft	*(2020, Microsoft)*
The green behind the cloud - Accenture	*(2021, Accenture)*
https://www.dutchdatacenters.nl/thema-energie/	*(2021, Dutchdatacenter)*
https://www.cisco.com/c/en/us/solutions/service-provider/index.html	*(2018, Cisco)*
www.ecoinvent.org	*Ecoinvent v2*
www.bamco2desk.nl	*BAM PPC-tool*
www.milieudatabase.nl	*Nationale Milieudatabase*
http://edepot.wur.nl/160737	Alterra-rapport 2064

The structure of this document is based on the Corporate Value Chain (Scope 3) Standard. In addition, where necessary, the methodology of the Product Accounting & Reporting Standard has been used (see the table below).

Corporate Value Chain (Scope 3) Standard	Product Accounting & Reporting Standard	Chain analysis:
H3. Business goals & Inventory design	*H3. Business Goals*	*Hoofdstuk 1*
H4. Overview of Scope 3 emissions	*-*	*Hoofdstuk 2*
H5. Setting the Boundary	*H7. Boundary Setting*	*Hoofdstuk 3*
H6. Collecting Data	*H9. Collecting Data & Assessing Data Quality*	*Hoofdstuk 4*
H7. Allocating Emissions	*H8. Allocation*	*Hoofdstuk 2*
H8. Accounting for Supplier Emissions	*-*	*Onderdeel van implementatie van CO_2-Prestatieladder niveau 5*
H9. Setting a reduction target	*-*	*Hoofdstuk 5*

7 | Declaration of intent

De Duurzame Adviseurs have ample experience with contracting Life cycle analysis, making them a Knowledge institute. We would like to refer to the Declaration of Expertise.

This life cycle analyses is composed by Sophie Wijnen. To ensure the accuracy and the quality of the work it has been checked by Eveline Prop. Eveline Prop has a controlling role with the portfolio of Accenture and has an unbiased view on the documents.

Signed:

	
Sophie Wijnen *Consultant*	**Eveline Prop** *Consultant*

de duurzame adviseurs

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