# Value Chain Analysis

## Arcadis Nederland B.V.

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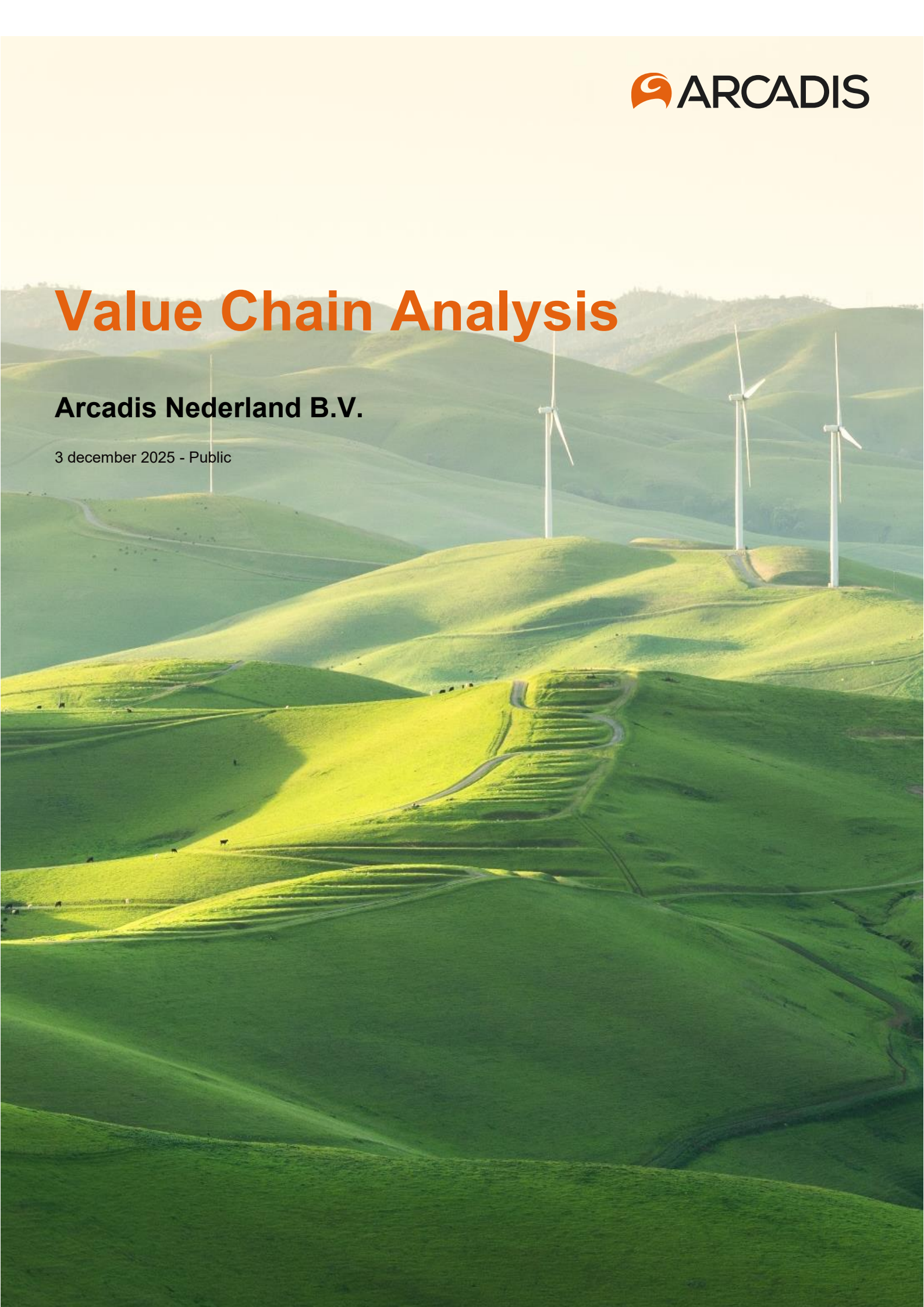

# ARCADIS NEDERLAND B.V.

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# 1 Summary

The primary objective of this value chain analysis is to gain a comprehensive understanding of all processes involved in delivering Arcadis' products and services—from sourcing raw materials to reaching end customers. This approach enables Arcadis to identify innovative solutions while highlighting the most significant environmental impacts. By mapping the value chain, Arcadis strengthens its competitive position and supports long-term strategic goals related to climate action and sustainability of itself and its relations.

In support of the $CO_2$ Performance Ladder and Arcadis' Climate Transition Plan (CTP), this analysis follows the steps outlined under section 3.A.5 of the ladder. It quantitatively and qualitatively allocates emissions across suppliers and customers, focusing on Scope 1 (direct emissions), Scope 2 (indirect emissions from purchased energy), Scope 3 (other indirect emissions from the value chain), and Other Influenceable Emissions (OIE). The analysis is designed to be dynamic, evolving as more data and reduction opportunities become available.

Arcadis' direct $CO_2$ emissions are relatively limited and predominantly linked to mobility, such as business travel. However, the indirect impact through the value chain—encompassing materials, transportation modes, construction, and deconstruction—far outweighs the firm's own footprint. This underscores the importance of including partners and stakeholders to drive system-wide change.

**Supplier Analysis**

Major suppliers analyzed include Arval & Alphabet, NS, ISS, Antea Group, Boskalis Environmental, and Equans Infra & Mobility. The analysis identifies that emissions from suppliers such as Arval, Alphabet, and NS are highly significant, especially in Scope 3, which covers indirect emissions from purchased goods and services. Arval and Alphabet contribute substantial emissions through vehicle use, while NS's rail services have high indirect emissions despite their relatively low direct footprint.

**Customer Analysis**

Key customers include ProRail, Rijkswaterstaat (RWS), and TenneT. The analysis reveals that RWS, in particular, has extensive emissions resulting primarily from ship operations—about 60% of the Ministry of Infrastructure and Water Management's footprint—and from large-scale construction projects. RWS aims to reduce emissions by increasing biofuel use and electrifying fleets, but further breakthroughs could be achieved by adopting climate-positive infrastructure, such as carbon-storing road materials and modular bridges. ProRail and TenneT also show substantial emissions linked to operations and maintenance, with opportunities for reduction through sustainable procurement and innovative engineering.

**Allocation and Reduction Opportunities**

Emissions are allocated to Arcadis based on a spend-based approach, estimating Arcadis' share of supplier and customer emissions proportionally to the revenue or costs associated with each relationship. This provides an initial but rough estimate, as actual impact may vary depending on the nature of services procured or delivered.

The analysis identifies key reduction opportunities across Scope 1, 2, and 3, prioritizing the most impactful and feasible options. These include electrification of fleets, adoption of renewable energy, standardization of circular and climate-positive construction methods, and closer collaboration with suppliers and customers to accelerate decarbonization. Many of these initiatives target our relation's Scope 3, which generally result in OIEs for Arcadis as we might be able to contribute to significant reductions in the value chain by the advice we deliver, leading to avoided emissions. The most impactful relationships—such as Arval, Alphabet, NS, ISS, ProRail, RWS, and TenneT—are prioritized for joint action, while partners with low emissions or missing data are noted as areas for future improvement.

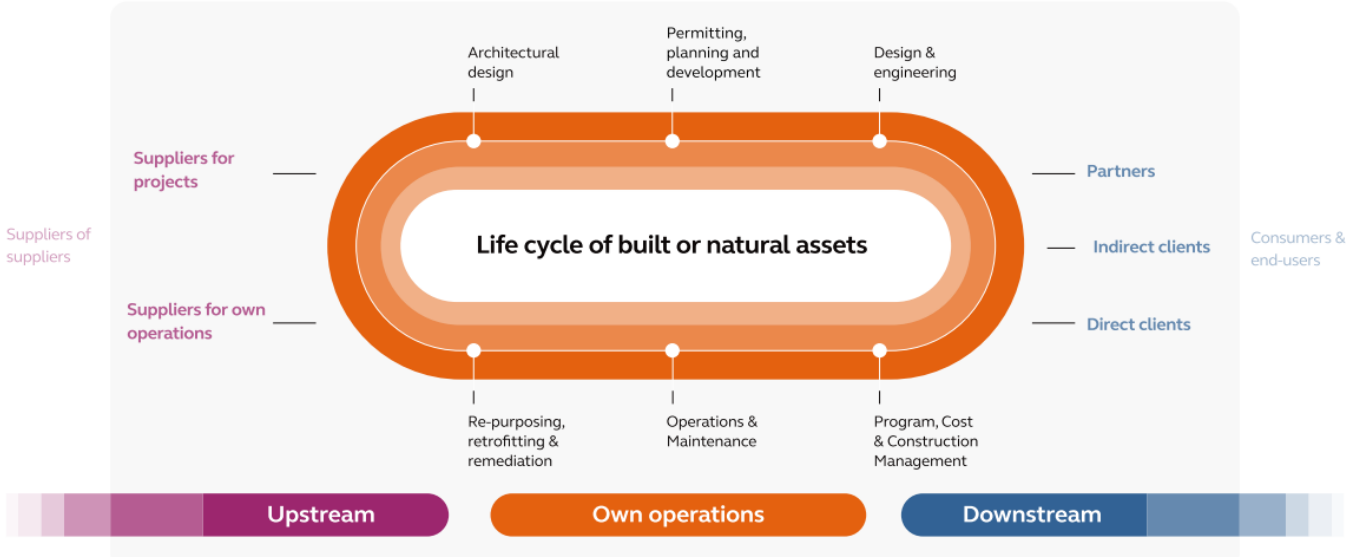
By engaging the entire value chain, Arcadis moves beyond traditional benchmarks of sustainable impact and enables its partners to reach shared climate goals. This holistic, collaborative approach allows Arcadis and its stakeholders to not only meet regulatory demands but also to innovate, reduce costs, and enhance resilience against climate risks. The ongoing assessment and updating of this analysis ensure that Arcadis remains at the forefront of sustainability in the natural and built environment, driving meaningful change both within its own operations and across the broader value chain.

# 2 Introduction

## 2.1 Arcadis and its value chain

Arcadis Nederland BV (Arcadis) is a global design and consultancy firm specializing in the natural and built environment. Its services primarily focus on buildings, infrastructure, hydraulic engineering, and the environment, where it focuses on design, consultancy, engineering, project, and management services. In our projects we work in a value chain with many different partners; upstream, as well as downstream. The whole value chain has a much larger impact on sustainability (specifically $CO_2$-emissions) than Arcadis alone. Arcadis fulfills an advisory role, where our own emissions are relatively limited and largely composed of mobility emissions. Looking at the whole value chain, we have a much larger impact; materials being used in construction, means of transport being used and methods of construction, as well as deconstruction.

As part of our commitment to sustainability and in support of our CTP, we conduct the following value chain analysis to identify where the most significant $CO_2$ emissions occur and to understand how we, together with our partners, can reduce them. This analysis helps us assess not only our own impact, but also the energy and $CO_2$ targets of our partners. It allows us to move the boundaries of sustainable impact beyond its traditional benchmarks and support each other in reaching share climate goals.




## 2.2 Why a value chain analysis

Arcadis was the first large consulting company that obtained level 5 of the $CO_2$-performance ladder, which required a chain analysis on a key product or service. Arcadis has conducted two chain analyses, most recently on mobility.

A value chain analysis is conducted to gain a comprehensive understanding of all the steps and processes involved in delivering our products and services, from sourcing raw materials to reaching our end customers. By systematically mapping and evaluating each link in the chain, we can identify areas of inefficiency, potential cost savings, and opportunities for innovation. Importantly, the analysis also highlights where the most significant environmental impacts occur, such as greenhouse gas emissions or resource consumption. This holistic perspective not only strengthens our competitive position and resilience but also ensures we can meet stakeholder expectations, comply with evolving regulations, and make informed decisions that support our long-term strategic goals.

## 2.3 Reading guide

This analysis covers identification of direct relationships including both suppliers and customers (§2.1); a deeper look into the supply chain beyond our direct partners (§2.2); allocation calculations to determine Arcadis's share of emissions of the relation (§2.3); suggestions on emission reduction actions for suppliers and customers (§2.4); and, finally, an overview of comprehensive scope 1, 2, 3, and OIE reduction opportunities (§2.5).

# 3 Value chain analysis

This section focuses on value chain analysis as a tool for identifying and reducing emissions across business operations following the steps described under 3.A.5 of the $CO_2$ performance ladder. By examining the direct relationships with suppliers and customers, we allocate emissions to understand each stakeholder's contribution to our overall environmental footprint. This analysis pinpoints key areas for improvement and highlights opportunities for collaboration to implement sustainable practices. By engaging the entire value chain, we can effectively reduce emissions and promote environmental responsibility.

## 3.1 Step 1: Direct relations

Step 1 is to identify our direct relationships in the value chain, we first create an overview of our upstream relationships suppliers or other parties who directly receive payments from us estimating each party's share (as a percentage) of our total expenditures, excluding labor costs and taxes, so that together these parties account for at least 80% of our spending. Similarly, we create an overview of our downstream relationships, customers or other parties from whom we directly receive income estimating each party's share of our total revenues again covering at least 80% in total. For both overviews, we then select the top relationships that together represent at least 50% of the financial value; these are identified as our most important direct relationships. An overview of these companies and their relevance is provided in table 1.

*Table 1: Direct relations overview: suppliers.*

| Supplier | Type of supplier | Organization activity |
|---|---|---|
| **Arcadis Global B.V.** | Arcadis supplier | Purchased goods & services |
| **Antea Group** | Engineering firm | Purchased goods & services (mobility, places, resilience) |
| **Arcadis GEC B.V.** | Arcadis Global Excellence Center supplier | Purchased goods & services |
| **Arcadis N.V.** | Arcadis supplier | Purchased goods & services |
| **Arval B.V.** | Lease cars | Fuel consumption lease cars, electricity consumption lease cars |
| **NS Reizigers B.V.** | Public transport costs | Commercial public transport |
| **Alphabet** | Lease cars | Fuel consumption lease cars, electricity consumption lease cars |
| **HEYDAY Integrated Facility Management B.V.*** | Facility management | Purchased goods & services (mobility, places, resilience) |
| **Boskalis Environmental B.V.** | Dredging company | Purchased goods & services (mobility, places, resilience) |
| **Equans Infra & Mobility B.V.** | Technical services provider | Purchased goods & services |

*As of 2025 Heyday Facility Management B.V. is no longer our facility management supplier. From now on we partner with ISS Facility Management for these services. Therefore, we only report ISS data.

*Table 2: Direction relations overview: customers.*

| Customer | Type of customer | Organization activity |
|---|---|---|
| **ProRail B.V.** | Rail infrastructure | Commercial public transport |
| **Rijkswaterstaat** | Government organization | Capital goods |
| **TenneT TSO B.V.** | Grid infrastructure | Electricity distributor/upstream transportation and distribution |
| **Nationaal Coördinator Groningen** | Provincial organization | Earthquake induced housing rehabilitation |
| **Nederlandse Aardolie Maatschappij B.V.** | Government organization | Capital goods |
| **Provincie Noord-Holland** | Provincial organization | Governing the province of Noord-Holland |

## 3.2 Step 2: Mapping

In step 2 we further map our value chain to a high level, building on the Insights & Interactions (I&I) analysis from step 3.A.4-1. This mapping includes a description of the value chain, the relevant direct relationships identified earlier, and where possible, the suppliers, customers, and end users of these direct relationships. Additionally, we identify the main emission sources, the associated (production) processes, and our own sphere of influence within the value chain.

### 3.2.1 Arcadis Entities

**Arcadis Netherlands** is a leading consultancy and engineering firm specializing in sustainable solutions for the built and natural environment. Arcadis NL's activities range from design and engineering to project management, to the creation of digital solutions and environmental consultancy. Arcadis NL is part of a broader organizational structure resulting in various cashflows between branches. Specifically, Arcadis Global B.V., Arcadis GEC B.V., and Arcadis N.V. play an important role.

**Arcadis Global B.V.** acts as a central management and coordination hub for global operations, facilitating the roll-out of strategic initiatives and ensuring consistency across regions.

**Arcadis GEC B.V.** provides specialized technical, engineering and digital services to Arcadis offices worldwide, supporting project delivery with centralized expertise and digital tools.

**Arcadis N.V.** functions as the publicly listed parent company, responsible for overall governance, strategic direction, and group financial reporting.

In our organizational boundary analysis, a more detailed analysis was done on the operational control of the entities. While these internal branches have a significant financial impact on Arcadis Netherlands, their direct operational activities remain limited. Most of the correspondence between these parties pertains to management, support, digital services, and internal contracts rather than large-scale field activities or material-intensive construction. Consequently, we decide not to incorporate these parts of Arcadis in our value chain analysis as they do not produce significant $CO_2$ emissions within Arcadis Netherlands.

### 3.2.2 Suppliers

**Antea Group** is a global engineering and environmental consulting firm that provides sustainable solutions across various industries. Their services typically include environmental management, health and safety consulting, sustainability strategy, remediation, and risk assessment. They work with clients to develop tailored solutions that address specific challenges, often focusing on areas like water management, energy efficiency, waste reduction, and regulatory compliance. Arcadis and Antea collaborate on a variety of initiatives, leveraging both Antea's and Arcadis' competencies in multidisciplinary projects.

Antea is expected to work with various parties like software suppliers, technology and IT suppliers, environmental monitoring equipment and sensors, construction and material companies, office supplies and facilities services. The most evident emissions sources are expected to be datacenters, machinery use, and transportation of equipment. Production processes like manufacturing of hardware components, cement and concrete production, highly intensive machinery, and fossil-fuel-based electricity generation are processes where Antea Group can have influence by demanding CO2-footprints of suppliers, selecting suppliers that use renewable energy, advising on sustainable alternatives for, among others, construction materials.

Examples of customers of Antea Group are Government Agencies, municipalities, private sector companies, utilities, real estate developers, industrial clients, NGOs, educational institutions. Emissions are most likely to come from public transportation, energy consumption and heating of public buildings, factories and production lines, transportation of goods, fossil-fuel-based electricity generation, water treatment and chemical manufacturing. Production processes around road construction, waste treatment, raw material processing, transport, smelting, energy use in buildings are processes where Antea Group can have influence by conducting energy audits, recommending and assisting in energy-efficient technologies, and advising on sustainable construction techniques.

**Arval B.V.** is a leading company specializing in full-service vehicle leasing and fleet management solutions. Part of the BNP Paribas Group, Arval offers a range of services to businesses, from leasing vehicles to managing entire fleets.

Their offerings typically include vehicle financing and leasing, maintenance and repair management, accident management, fuel management, insurance, and telematics services. They operate globally, serving clients across various industries. Various vehicles in Arcadis' fleet are managed and provided by Arval.

Suppliers of Arval B.V. include vehicle manufacturers, fuel and energy providers, maintenance and repair services, and parts and accessories suppliers. Emissions are likely to come from manufacturing plants, transportation of vehicles, extraction and refining fossil fuels, and waste from vehicle parts. Production processes include vehicle assembly and painting, drilling and refining fuel, repairs and parts replacement, and manufacturing of tires, electronics. Arval B.V. can influence emissions by collaborating with vehicle manufacturers to prioritize low-emission and electric vehicles, implementing digital tools to monitor and reduce fuel consumption and optimize routes.

Customers of Arval B.V. include large industries, small and medium enterprises and public sector organizations. Emissions come from business travel and logistics, fuel consumption, and the delivery and maintenance of vehicles. Production processes involve public transportation and fuel usage which Arval B.V. can help reduce by encouraging electric or hybrid vehicles, advising efficient route management and offering flexible leasing terms to switch to more fuel-efficient vehicles.

**NS Reizigers B.V.** is a division of Nederlandse Spoorwegen (NS), responsible for operating passenger train services in the Netherlands. They focus on providing efficient and reliable public transportation through domestic train operations, customer services, and station management. NS Reizigers also promotes sustainability, with all trains powered by renewable energy, and offers digital tools for travel planning and real-time updates. NS is considered both a supplier and a customer of Arcadis. NS Reizigers BV provides numerous Arcadis employees with a business travel card, allowing them easy access to public transport and reduces the reliance on personal vehicles. Arcadis plays a major role in improving, maintaining and future-proofing the Dutch railway system. Among other projects, it assists in station renovations, provides advice on infrastructure engineering, and improves digital asset management systems.

Suppliers of NS are train manufacturers, energy providers, rail infrastructure companies, maintenance and repair services. Emissions come from manufacturing and transportation of train units, power generation, construction machinery, and energy consumption in workshops. Production processes include the assembly of train components, electricity generation, track laying, and repairs. NS Reizigers BV can influence these emissions and processes by prioritizing suppliers that are committed to sustainable practices and setting strict emissions standards for suppliers, optimizing train schedules and routes to reduce energy consumption, and working with innovative programs.

NS delivers mostly to individual commuters, businesses (employee commuting), and public organizations. Emissions come from public service fleets, logistic operations, and event transportation. Connected production processes are corporate travel policies and transportation logistics that rely on less sustainable modes of transport. NS Reizigers BV can influence the emissions by offering discounts to promote rail usage, encourage businesses to adopt sustainable commuting policies, and collaborate with event organizers and governments to facilitate mass transport solutions.

**Alphabet Lease** is a division of Alphabet Inc. focused on providing business mobility solutions, specifically in vehicle leasing and fleet management. As part of the BMW Group, they offer services such as vehicle leasing, fleet management, sustainability solutions, telematics, and technology. Alphabet Lease is currently the main supplier of lease vehicles for Arcadis and provides the aforementioned services.

Suppliers of Alphabet Lease are vehicle manufacturers, energy suppliers, maintenance and repair services and technology and telematics providers. Emissions come from production, logistics and material extraction, energy generation, waste generation, data centers, extraction, and refining fossil fuels. Related production processes include vehicle assembly, battery production for EVs (Electrical Vehicles), energy generation, maintenance and repairs, and development of telematics devices and software. Alphabet Lease can influence these processes by prioritizing greener production processes and requiring carbon footprints of suppliers, help expand the network of green charging stations, promoting the use of recycled parts, and partnering with providers that use low-energy data centers.

Customers of Alphabet Lease are mostly large corporations, SMEs (local retailers, service-based businesses), public sector organizations (municipal governments, healthcare providers), delivery and logistics companies, and individual entrepreneurs and professionals. Emissions mostly come from logistics, fuel combustion, delivery and service vehicles, and inefficient driving. Related production processes are healthcare logistics, logistic operations for transporting goods and services, and vehicle production. Alphabet Lease can help reduce emissions by collaborating with municipalities to

introduce shared mobility options, driver training by promoting eco-driving techniques, and provide cost-effective leasing options for electric vehicles.

**ISS Facility Management** is starting the replacement of HEYDEY facility management, starting in 2025. It is a global leader in integrated facility services, providing solutions ranging from cleaning and catering to technical services and workplace management. ISS conducts Arcadis' facility management, including cleaning, catering, hospitality, and maintenance services.

Suppliers of ISS are cleaning product suppliers, catering and food suppliers, energy providers, equipment and machinery suppliers, technology and software suppliers, and waste management and recycling services. Emissions are generated through the production of cleaning materials and machinery, food production and processing, transportation, fossil fuel energy use, and through waste sorting and landfills. ISS can be of influence by encouraging suppliers to minimize plastic packaging or recyclable alternatives, by choosing eco-friendly products, promoting plant-based options and reduce food waste, partner with renewable energy providers, promote suppliers that adopt modular designs for equipment enabling easy repairs and preventing early replacement.

Customers of ISS include corporate offices, healthcare facilities, educational institutions, industrial and manufacturing sites, the public sector, and government organizations. Emissions come from energy consumption of office and educational buildings, waste and food waste generation, commuting, water usage for sanitation, and manufacturing operations. ISS can influence the customer's emissions by implementing energy-saving measures, promoting recycling and waste reduction, introducing water-saving technologies and practices in healthcare settings, and encouraging sustainable food sourcing.

**Boskalis Environmental B.V.** specializes in environmental services, focusing on soil and sediment treatment, water management, and remediation projects. They aim to manage and mitigate environmental impacts and enhance sustainability in infrastructure and construction projects. Arcadis utilizes Boskalis her expertise in executing the physical and technical aspects of marine, coastal and infrastructure projects. This collaboration combines Arcadis' expertise in engineering and consultancy, with the construction, dredging and marine operations of Boskalis.

Suppliers of Boskalis include equipment manufacturers, chemical suppliers, waste management services, construction material suppliers, and energy providers. Emissions come from manufacturing, transportation, cement production, energy generation, synthesis and production of chemicals, recycling, and extraction of raw materials. Boskalis can influence these emissions by sustainable procurement, supply chain transparency, recycling initiatives, and improving energy efficiency.

Customers of Boskalis are Government and public sector organizations, energy companies, port authorities, real estate developers (companies involved in the waterfront property development), industrial and manufacturing companies (mining companies, chemical manufacturing), tourism and recreational services (resort developers, coastal tourism projects). Emissions come from public infrastructure projects (harbor expansions, flood defenses), energy use during construction and maintenance, construction of offshore renewable energy infrastructure, transportation, port operations, land reclamation, industrial operations, and dredging or remediation activities. Connected production processes are subsea cable installation for renewable energy projects, cargo handling, coastal protection, and dredging and remediation. Boskalis can influence their customers by sustainable project design, nature-based solutions, carbon reduction goals, eco-friendly dredging, and remediation services.

**Equans Infra & Mobility B.V.** is a leading global technical services provider, specializing in designing, installing, maintaining, and optimizing technical and integrated systems for buildings, industry, infrastructure, and energy projects. Equans supports Arcadis in projects by delivering expertise and operational services in areas such as energy management, smart building solutions, climate control, electrical and mechanical installations, and digital infrastructure. This collaboration enables Arcadis to offer fully integrated and sustainable solutions to clients, combining consultancy and design with technical execution and operations.

Equans works with suppliers of HVAC and climate systems, electrical and mechanical components, building materials, automation, software, energy (including renewables), machinery, and waste services. Supply chain emissions mainly arise from the production and assembly of technical equipment, digital devices, material extraction, energy use, logistics, and end-of-life treatment of components. Key production processes include manufacturing and assembling systems (like HVAC units and control panels), software development, installation, maintenance, and recycling. Equans can influence

its supply chain by selecting low-carbon and transparent suppliers, sourcing green energy, promoting modular and circular designs, supporting local procurement, and integrating digital solutions for efficiency.

Equans' main customers include various public parties like governmental agencies, and members in the healthcare and education industry. Moreover, they also provide many services for real estate owners, infrastructure operators, and data centers. Customer emissions are expected to stem from operating and maintaining technical installations, energy use in buildings and industry, and digital systems. Equans helps reduce these emissions by providing energy management, installing efficient and renewable systems, implementing smart building technologies, and supporting sustainability certifications.

### 3.2.3 Customer

**ProRail B.V.** manages and maintains railway infrastructure in the Netherlands. Its key tasks include track maintenance, traffic control, infrastructure development, safety management, and promoting sustainability, ensuring efficient and reliable rail operations. ProRail is an important customer of Arcadis as a lot of projects revolve around infrastructural designs, inspection and evaluations of existing assets, sustainability focused advice, safety and risk studies, and digitalization.

Suppliers of ProRail include construction companies, energy providers, technology suppliers, materials suppliers, logistics providers. Emissions can come from mining and refining raw materials, producing concrete, steel and other construction materials, heavy machinery used in railway construction and maintenance, transportation of materials to project sites, and energy generation. Related production processes are construction of rail tracks, bridges and stations, distribution of energy through the grid, development and production of advanced signaling systems and automated control technologies, production of railway tracks, sleepers and ballast. ProRail can be of influence by choosing contractors that use recycled materials or low-carbon alternatives, encourage suppliers to switch to electric or hybrid construction machinery, support suppliers in developing renewable energy projects, and improve logistics of transportation.

Customers of ProRail are passenger train operating companies, freight operators, other public transport operators, companies that use rail freight for product transport. Emissions come, e.g., from train manufacturing, diesel trains, passenger services (energy use in station buildings, ticketing systems, etc.), logistic operations (loading, and transferring goods), and indirect emissions from passenger's use of cars. Production processes include but are not limited to manufacturing and maintenance processes. ProRail can play a part here by expanding electrification and renewable energy use, support low-emission technologies, and upgrading train stations with energy efficient technologies and green building materials.

**Rijkswaterstaat (RWS)** is the Dutch government agency responsible for managing and maintaining the country's infrastructure. Its key tasks include water management, road infrastructure, sustainable mobility, and environment. Arcadis assists RWS in numerous activities, like water safety and water management, design and maintenance of infrastructure, incorporation of sustainability and circularity in construction, and other guidance in complex projects.

Suppliers of RWS include construction companies, material suppliers, dredging and water management companies, energy providers, technology and monitoring equipment suppliers, and waste management and recycling services. Emissions come from diesel-powered machinery, production of construction materials, transportation, from mining and quarrying raw materials, cement and steel production, power generation, manufacturing of equipment, and waste sorting and landfills. RWS can influence the emissions by requiring suppliers to use low-emission or electric equipment, promote the use of recycling materials, implement policies to enforce zero-emission construction sites, requiring suppliers to report on emissions, collaborate with energy providers to improve efficiency in energy generation and reduce losses in the grid.

Customers of RWS consist of transport and logistics companies, passenger transport operators, ports and maritime users, farmers and industrial companies, recreational users, and emergency and crisis response organizations. These customers generate emissions primarily through transportation (road, rail, and waterway usage), energy consumption, industrial operations, and infrastructure development. RWS helps its customers reduce their environmental impact by promoting sustainable mobility, supporting the shift to low-emission transport options (e.g., rail and waterway freight), and facilitating the integration of renewable energy. By investing in green infrastructure, such as EV charging networks, energy-efficient traffic management systems, and circular construction practices, RWS encourages its customers to adopt more sustainable practices.

**TenneT TSO B.V.** operates the high-voltage electricity grid in the Netherlands and parts of Germany. It ensures a reliable power supply, develops infrastructure, facilitates cross-border electricity exchange, and integrates renewable energy sources. TenneT is an eminent customer as Arcadis delivers designs for high-voltage infrastructure, as well as grid modifications for renewables, asset management and digitalization. Moreover, Arcadis' sustainable focus provides valuable insights on environmental impact and permit management.

Suppliers of TenneT consist of construction and engineering companies, cable and component manufacturers, technology and IT providers, energy suppliers safety and maintenance services, professional services and consultancy. Emissions are generated through the use of construction equipment, material production, transportation, and the use of data centers, connected to, among others, the upgrading and expanding of grid capacity and manufacturing of high-voltage cables and transformers. TenneT can influence these emissions by encouraging the use of electric construction equipment, prioritizing the use of recycled steel and low-carbon concrete, and partnering with service providers that prioritize sustainability in their operations.

TenneT's customers are energy providers, distribution network operators, industrial consumers, renewable energy developers, indirectly residential consumers, government and regulatory bodies. Emissions come from maintaining and operating distribution networks, industrial processes such as manufacturing, operation of machinery and equipment. TenneT can be of influence by accelerating grid connections and capacity expansion, encouraging the development of community energy projects, and work with the government to shape policies that promote grid modernization.

**National Coordinator Groningen (NCG)** addresses issues from gas extraction-induced earthquakes in Groningen. It focuses on repairing earthquake damage, reinforcing buildings, providing compensation, and ensuring resident safety. Arcadis NL provides consultancy services related to the reinforcement of homes and buildings affected by earthquakes. It conducts structural assessments, designs reinforcement measures and oversees the implementation of safety and resilience of properties. Consequently, Arcadis aims to provide sustainable advice through active stakeholder engagement in the management of projects.

Suppliers include construction companies, engineering consultants, material suppliers, and technology providers. Key emission sources include construction activities (e.g., heavy machinery and material transport), energy-intensive production of building materials (e.g., concrete and steel), and logistics. NCG can influence its suppliers by prioritizing sustainable practices, such as the use of low-carbon and recycled materials, implementing electric or hybrid construction equipment, and encouraging energy-efficient processes. By setting strict sustainability requirements in procurement contracts and promoting innovation in seismic-resistant construction, NCG can drive its supply chain towards lower emissions.

The customers include homeowners, businesses, schools, public institutions, and housing corporations that require building reinforcements, structural assessments, and damage repairs. The main emissions associated with these activities stem from construction and renovation processes, including energy use in building operations and the production and transport of construction materials. NCG can influence these customers by promoting energy-efficient building practices, facilitating the adoption of sustainable materials, and providing guidance on minimizing environmental impact during construction and renovation. Additionally, by offering support and incentives for incorporating renewable energy solutions and efficient technologies in building projects, NCG can help reduce the carbon footprint of the reconstruction and strengthening efforts in the region.

**Nederlandse Aardolie Maatschappij B.V. (NAM)** is responsible for oil and gas extraction in the Netherlands. Its focus is on exploring, producing, and managing natural gas and oil resources, including handling the impacts of extraction, such as addressing earthquake-related issues in Groningen. The main connection between Arcadis NL and the NAM runs through the remediation and environmental consultancy that Arcadis delivers. Many projects deal with soil and ground investigations, remediation measures, or provide advice on compliance and risk management. In addition, the company supports the NAM with decommissioning infrastructure, restoration, and stakeholder engagement processes. In doing so, Arcadis assists the NAM in reducing its environmental impact.

Suppliers include drilling and equipment manufacturers, engineering and construction firms, and environmental service providers. Key emission sources from this supply chain include $CO_2$ and methane emissions from drilling operations, energy-intensive processes in equipment manufacturing, and transportation-related emissions from logistics. NAM can influence its suppliers by adopting stringent sustainability criteria in procurement practices, such as prioritizing suppliers with low-carbon technologies and efficient drilling equipment. Furthermore, NAM can drive innovation by collaborating with suppliers to develop and implement cleaner extraction technologies, enhance waste management practices, and integrate renewable energy solutions into operations.

Customers include energy companies, industrial manufacturers, utility providers, petrochemical companies, and fuel retailers who rely on their oil and gas products for energy production, manufacturing processes, and distribution to end-users. The primary emissions associated with NAM's customers stem from the combustion of fossil fuels, leading to $CO_2$ and other greenhouse gas emissions, as well as potential methane leaks during transportation and storage. These customers utilize NAM's hydrocarbons in power generation, heating, and as raw materials in industrial processes, which are energy-intensive and contribute significantly to their carbon footprints. NAM can influence its customers by promoting the use of cleaner technologies and offering products with a lower carbon intensity. Additionally, NAM can facilitate the transition to renewable energy by investing in and developing natural gas as bridge fuel, thus encouraging customers to reduce their reliance on higher-emission fuels like coal and oil.

**Provincie Noord-Holland** manages land use, infrastructure, and environmental protection in the region. It focuses on transportation, economic development, sustainability, and cultural heritage to improve residents' quality of life. Arcadis NL facilitates the activities of PNH through a wide range of consultancy services. Many of the infrastructure works, as well as water management, climate adaptation, and sustainable urban development are supported by Arcadis. This fosters the mobility, resilience, and quality of life for residents of the province.

Suppliers include construction firms, engineering and consultancy companies, public transport operators, and environmental service providers. Emissions associated with these suppliers primarily arise from construction activities, such as $CO_2$ emissions from heavy machinery and material production, as well as logistical emissions from transporting materials and equipment. The production processes involved often include energy-intensive activities like road building, bridge construction, and maintenance of public infrastructure. The Province of Noord-Holland can exert influence over its suppliers by incorporating sustainability criteria into its procurement policies, emphasizing the use of low-emission materials and technologies. By prioritizing suppliers that offer innovative, environmentally friendly solutions, the province can drive the adoption of greener practices.

Customers include local municipalities, businesses, public transport users, educational institutions, and residents. The emissions associated with these customers arise from transportation, energy consumption in buildings, and industrial operations. The Province of Noord-Holland can influence its customers by implementing policies and initiatives that promote sustainable practices, such as encouraging the use of public transportation, supporting the transition to renewable energy sources, and facilitating energy efficiency upgrades in buildings. By providing incentives for green business practices and infrastructure investments, such as subsidies for electric vehicles and grants for energy-efficient technologies, the province can drive behavioral changes that reduce emissions.

## 3.3 Step 3: Allocation

Allocating emissions of other organizations to Arcadis has been estimated as follows:

For each supplier and customer, we identified what their emissions are and attempted to analyze what our share in those emissions might be. Our possible share in their emissions was determined using a spent-based estimate, where we compare our cost of sales or revenue with the other organizations' total revenue or costs. This provides us with a very rough estimate of our share in their emissions but may not be accurate yet as this largely depends on the type of service or product we purchase or sell. This is not reflected in our analysis yet and is a point of improvement for the future.[1] Note, the emissions provided below are based on the location-based emissions, rather than the market-based emissions. Various companies compensate their location-based emissions by purchasing green energy, this reduces their market-based emissions. However, we advocate the importance of total energy reduction. Consequently, we argue that one should incorporate all produced emissions in this analysis.

*Table 3: Allocation of scope 1, 2, and 3 emissions (ton CO2-eq).*

| Supplier | Scope 1 (ton $CO_2$-eq) | Scope 2 (ton $CO_2$-eq) | Scope 3 (ton $CO_2$-eq) |
|---|---|---|---|
| **Antea Group** | 18,7 | 15,7 | 54,26 |
| **Arval B.V.** | 0,6 | 6,32 | 13015,04 |
| **NS Reizigers B.V.** | 12 | 326,97 | 496,44 |

[1] We are considering the same the allocation methodology as Arcadis global to ensure consistency and provide greater certainty in the future. This would be a spend-based approach.

| | | | |
|---|---|---|---|
| **Alphabet** | 17 | 4,16 | 3295,20 |
| **ISS** | N/A | N/A | N/A |
| **Boskalis Environmental B.V.** | 1,06 | N/A | N/A |
| **EQUANS Infra & Mobility B.V.** | 2,08 | 0,66 | N/A |

*Some of the relations either missed general emission figures or did not yet specify between separate scope emissions, resulting in empty cells. Also, the allocation of these emissions is a very rough estimate based on the annual (sustainability) reports of said organizations, and how much of the suppliers revenue is generated by Arcadis. In reality, these amounts may differ.

*Table 4: Allocation of scope 1, 2, and 3 emissions (ton CO2-eq).*

| Customer | Scope 1 (ton $CO_2$-eq) | Scope 2 (ton $CO_2$-eq) | Scope 3 (ton $CO_2$-eq) |
|---|---|---|---|
| **ProRail B.V.** | 154,69 | 12,64 | 9,53 |
| **Rijkswaterstaat** | 245,97 | 37,13 | 2877,38 |
| **TenneT TSO B.V.** | 43,11 | 1304,99 | 1991,60 |
| **Nationaal Coördinator Groningen** | N/A | N/A | N/A |
| **Nederlandse Aardolie Maatschappij B.V.** | N/A | N/A | N/A |
| **Provincie Noord-Holland** | 252,39 | 138,31 | N/A |

*Some of the relations either missed general emission figures or did not yet specify between separate scope emissions, resulting in empty cells. Also, the allocation of these emissions is a very rough estimate based on the annual (sustainability) reports of said organizations, and how much of the customers purchase value is generated by Arcadis. In reality, these amounts may differ.

## 3.4 Step 4: Analysis

Step 4 highlights the most relevant value chain partners and demonstrates how they can contribute to reducing the emissions identified in step 3. In any case, overtime, we will engage in dialogue with each direct relation to explore potential opportunities. Nevertheless, the current state and lack of accuracy of the emission data does not allow for specific targetization of sub-categories in the third scope of our suppliers and customers.

We focused our analysis on the relationships where sufficient data was available. Due to data limitations, an assessment of Boskalis, Nationaal Coordinator Groningen, and Nederlandse Aardolie Maatschappij is excluded. We also chose to exclude Antea Group and Equans Infra & Mobility from the analysis, as their practices closely mirror those of Arcadis, making a separate evaluation redundant. Provincie Noord-Holland is not included because emissions were not appropriately allocated to their related Scopes. Lastly, Arval and Alphabet have been grouped together for efficiency, as they provide similar services and are expected to have comparable value chains. This grouping streamlines the analysis and avoids unnecessary duplication.

### 3.4.1 Suppliers

Table 3 demonstrates ANL's set of suppliers. This table shows that most of the estimated emissions lie within the scope 3 category, and although our estimate is quite rough at the moment, it shows what we already know; scope 3 emissions are a significant portion and show us how important it is to look for reduction opportunities in the value chain. Specifically, Arval and Alphabet show relatively high Scope 3 emission levels. These numbers are likely skewed towards higher gradations as these numbers originate from Arval BNP Paribas Group and the BMW group. The exact national (Dutch) numbers are often missing, or distinct activities are not yet outlined within the different emission Scopes of said companies. Note, ISS and Boskalis do not yet differentiate and allocate their emissions to all 3 Scopes. Therefore, some cells of table 3 lack emission figures.

**NS**

Scope 1 emissions of the NS are already on the lower side. Most of these emissions come from their vehicles and buildings. The scope 2 emissions we have allocated are somewhat higher and are mostly produced by train electricity usage. The NS already tries to reduce its impact in this area as they cover this by purchasing renewable energy, making their market-based Scope 2 emissions zero. Scope 3 is comprised of purchased goods, services and capital goods, passenger transport before and after train journey, and the remainder originates from energy-related activities, and the energy consumption by external tenants at stations.

NS already invests large portions into sustainable purposes. However, it could still benefit from decarbonization in their mobility and reducing their energy demand. For example, increase the regenerative braking systems, and electrify their vehicle fleet. Specifically, greenify Green Wheels. All Arcadis employees receive a company business travel card from NS, which also allows them to use Green Wheels. Switching to electric Green Wheels cars could help with decarbonizing. Moreover, connections nationally and internationally could potentially be improved in collaboration with other rail operators. Sustainable procurement could help to reduce Scope 3 emissions by lowering the carbon footprint of production. Initiatives like HYBRIT steel, which aims at producing fossil-free steel using hydrogen technology, could massively reduce the $CO_2$ emissions per train. Moreover, designs for disassembly increase the possibility for recycling, and dismounting materials if ever needed.

**Arval + Alphabet**

As mentioned, the exact emissions for our mobility suppliers are difficult to pinpoint. Yet, both have relatively large Scope 3 emissions and similar business practices, according to our estimations. Specifically, Arval's Scope 3 is built-up by manufacturing and raw materials (23%), leasing (36%), and remarketing (41%).

Arval and Alphabet could invest in greener production options or deliveries. For example, suppliers who use green steel (HYBRIT, EAF, or hydrogen-based steelmaking), material passports that serve as proof of origin and track the $CO_2$ emissions of raw materials. Moreover, general circularity practices and material reuse are crucial in reducing $CO_2$ supply chain emissions. Encouraging suppliers to adopt circular economy principles could drastically benefit the Scope 3 emissions in the long-term. Leasing emissions could be reduced by incentivizing and creating smart shared-vehicle programs.

**ISS**

ISS has shared their emissions of 2024 per scope in their annual report. Scope 1 consists of 56.592 ton CO2-eq. Scope of 15.725 ton CO2-eq. The largest share of ISS's emissions come from scope 3, namely 1.613.854 ton CO2-eq. This scope 3 consists of mostly purchased goods and services (93%), employee commuting and the use of sold products. [2] However, these are international values by ISS, not yet specified to the Netherlands or allocated to Arcadis. This is not reported in this value chain analysis, since ISS was not under contract at Arcadis in 2024. The following reporting year, ISS will be covered in more detail in our reporting.

### 3.4.2 Customers

According to table 4, our main customers show relatively high emission levels in Scope 3, except for ProRail, who has 154,69 ton CO2-eq of its emissions attributed to the first Scope. RWS and Tennet have a greater share of emissions in the second or third scope. No exact emission has been identified for NCG and the NAM, resulting in empty cells in table 4. We intend to engage in further discussions to attain more insights into their emissions and the possible solutions to relief them.

**ProRail**

The main contribution to ProRail's emissions comes from scope 1. Their total current scope 1 emissions (5.423 ton) are assembled by four main categories, infra (57,4%), mobility (30,3%), stations (6,4%), and workplaces (5,8%). Infra emissions originate from point heating, which mostly occurs in colder winter months. Mobility corresponds with work-

[2] ISS-Annual-Report-2024.pdf

travel and gas usage is the main contributor for stations and workplaces. Scope 2 is relatively small and covers electrical usage and district heating. Likewise, scope 3 is relatively small and covers business travel with private vehicles and planes.

ProRail's two primary candidates for emission reduction are infra and mobility. Point heating is an important factor in the efficiency of the Dutch railway system yet also consumes large amounts of energy. Various technologies exist to further reduce emissions by upgrading legacy systems with low-energy heaters, or adopting smart weather-responsive controls. In addition, ProRail could benefit from an additional influx of electrically powered company vehicles to reduce the emission figure produced by its fleet operations.

**RWS**

Due to a lack of specified data, we used the figures from the ministry of Infrastructure and Water management (IenW) sustainability report, which includes Rijkswaterstaat (RWS) as a distinct branch in the IenW. RWS has relatively large $CO_2$ emissions as many of its operations include large constructions projects and the frequent use of ships. Roughly 60% of IenW's $CO_2$ emissions come from RWS ships, and 11% and 9% are attributed to the car fleet and governmental airplane respectively. Scope 2 has relevant emission, yet RWS considers her emissions 0 for this Scope, as all electricity is derived from wind energy. Contrary, scope 3 is relatively large and contains emissions related to infrastructural building projects, fairway and road maintenance.

As mentioned, most of the emissions stem from ship operations. RWS mentions the reduction of emissions from this group as a distinct strategy target. It aims to increase bio-fuel consumption yet does not mention the possibility of increasing the electrical consumption of its fleet. According to its current trajectory, RWS is unlikely to attain fleet neutrality by 2030. However, electrical fleet options have become increasingly standardized, like electrical tugboats produced by Damen. In addition, more emphasis could be placed on the electrification of company cars.

Moreover, scope 3 is strongly related to the built environment and breakthroughs in this area could reduce emissions drastically. Operations could become more eco-friendly by standardization of climate-positive and circular infrastructure, such as carbon-storing road materials, modular bridges, and energy-harvesting roads.

**Tennet**

Tennet has the bulk of its emission divided across scope 2 and 3. Scope 2 has relatively large location-based emissions (mainly grid losses), which are countered by the purchasing of renewable green energy, specifically Guarantees of Origin. In addition, Tennet actively invests in optimizations of their grid designs to reduce grid losses. However, the scope 3 emissions are quite significant as this covers the emissions produced by the construction, transport, installation of assets like cables, steel towers, and overhead lines. Moreover, most of these emissions are derived from upstream production for materials such as steel, aluminum, copper, plastics and concrete.

Especially scope 3 emissions could benefit from a reduction. Tennet made a program (Decarbonizing Supply Chain) that is aimed at developing and implementing sustainable sourcing across its chain. It's said that Tennet relies heavily on the innovations that suppliers offer, demonstrating a willingness to adopt new technologies. The outlined materials are emission intensive to produce and would surely benefit from technologies like the aforementioned HYBRIT-program, or other initiatives like hydrogen blast furnaces for steel production. However, specific materials require specific solutions, which should be mapped out and organized to effectively reduce emissions. Another measure that Tennet could adopt is the standardization of material passports, which require in-depth information about the origin and production of specific materials.

### 3.4.3 Collaboration

At Arcadis, we recognize that meaningful progress in reducing emissions across the value chain can only be achieved through close collaboration with both our suppliers and our customers. Our approach is rooted in partnership, actively working with our stakeholders to identify opportunities, sharing best practices and co-developing innovative solutions that drive decarbonization. Current emission data presents challenges in targeting specific sub-categories, yet our commitment remains to engage in constructive dialogue with each direct relation and map a clear path forward.

Three main beliefs underline our collaborative attitude. First, we regard data transparency and sharing crucial in the attainment of a deeper understanding of our emissions and those of our direct connections. Open communication and

transparent reporting allow for the development of joint mechanisms. Second, the path to Net-Zero is riddled with obstacles and requires the adoption of innovative technologies and circular principles. This includes the everlasting search for new technologies supporting the transition to low-carbon material, promoting design for disassembly, and encouraging the efficient reuse of resources. Through knowledge sharing and pilot projects, we can help suppliers and customers accelerate the uptake of sustainable practices and together reduce Scope 3 emissions. Third, we embed sustainability into procurement processes and collaborate on initiatives that drive collective impact. Whether through supporting sustainable sourcing, or co-developing low-carbon mobility solutions, Arcadis offers expertise in integrating sustainability into procurement and project delivery.

## 3.5 Step 5: Reduction

This step focuses on identifying opportunities for reduction across our value chain. It serves as an initial assessment to pinpoint where the greatest reduction potentials exist, the possibilities for making a meaningful impact, and their locations within scope 1, 2, 3, and OIE categories.

The analysis considers feasibility, expected timelines, and potential implications arising from these opportunities. The aim of this section is to provide a clear overview of reduction opportunities, which will be updated as more information becomes available.

Again, the most impactful relations are analyzed: our suppliers Arval & Alphabet, NS, and ISS. And our customers: ProRail, RWS, and Tennet. Equans are not considered as they have the lowest emissions of our suppliers already and are missing scope 3 emissions. They actively aim to reduce their emissions and participate in the $CO_2$-performance ladder themselves. Likewise, Antea is not included in the last section as their emissions are comparatively low, and their operations are quite similar to Arcadis in her practices. In addition, NCG, NAM, and Boskalis are excluded from the analysis due to data limitations.

#### 3.5.1.1 Arval and Alphabet

Scope 3 emissions are indirectly generated through the value chain. This is a critical area of concern for our mobility suppliers Arval and Alphabet. Although direct emissions (Scope 1 and 2) are generally easier to measure and manage, scope 3 emissions are more substantial. Encompassing activities like raw material extraction, vehicle manufacturing, leasing operations and remarketing. As mentioned before manufacturing (23%), leasing (36%), and remarketing (41%) are the biggest contributors to Arval's Scope 3 emissions. We intend to align reduction initiatives with this section of emissions.

**Material passports**

First, Scope 3 consideration for our mobility suppliers could include demanding material passports. Traceability and transparency of material origin and production methods allow for effective emission phaseouts. Passports can help certify specific parts and incentivize recycled contents and reduce dependency on virgin material extraction. Various academic entities have tested and advocated its potential when implemented appropriately.[3] Specifically, the use of carbon intensive materials like aluminum is expected to increase towards 2050.[4] EV's use more wrought aluminum leading to a surplus of alloys which can only be mitigated by sorting technologies and increasing vehicle lifetime. Current policies mostly address the use-phase emissions, instead of the production phase. Moreover, research estimates that cumulative global GHG emissions could be reduced by 13-26 Gt $CO_2$e-eq for passenger vehicles, depending on the

[3] 1. Berger, K., Schöggl, J. P., & Baumgartner, R. J. (2022). Digital battery passports to enable circular and sustainable value chains: Conceptualization and use cases. *Journal of Cleaner Production*, *353*, 131492.

2. Koppelaar, R. H., Pamidi, S., Hajósi, E., Herreras, L., Leroy, P., Jung, H. Y., ... & Fontana, A. (2023). A digital product passport for critical raw materials reuse and recycling. *Sustainability*, *15*(2), 1405.

3.. Zhang, A., & Seuring, S. (2024). Digital product passport for sustainable and circular supply chain management: a structured review of use cases. *International Journal of Logistics Research and Applications*, *27*(12), 2513-2540.

[4] Billy, R. G., & Müller, D. B. (2023). Aluminium use in passenger cars poses systemic challenges for recycling and GHG emissions. *Resources, Conservation and Recycling*, *190*, 106827.

scenario.[5] They suggest that the best options to reduce vehicle emissions are material substitution, efficient use of materials, ride-sharing, and lightweight builds.

Currently, Arcadis has 540 operational lease vehicles originating from Alphabet and Arval. Arcadis could potentially use her position as a substantial customer to request that a number of future cars is produced more sustainably. The exact number of cars, and the ability of Alphabet and Arval to incorporate such an initiative should be assessed in collaboration. Yet, this could incentivize both parties to reassess their value chain and implement material passports in the most critical parts. Due to the complexity of the measure, it is expected to be researched and potentially be implemented on medium to long term time horizon.

**Electrification of vehicles**

Second, where Arcadis already has acted and implemented policy on, is electrification of our lease vehicle fleet. Our policy ensures that every new lease car is an electric vehicle. In addition to that, we are currently exploring opportunities to purchase 100% green electricity for our vehicles. For more details on this, please see our climate transition plan. This reduces our mobility-related emissions as the initial production of electrical vehicles boosts early emissions, but use-emissions are lower, reducing the overall emissions in the long run.

**Ride sharing**

Third, another important initiative to consider is ride sharing. Ride sharing could reduce emissions through various corridors, like a reduction in vehicles required (production and use). Research even suggests that it alters driver's behavior, resulting in less fuel consumption due to lower driving speeds. According to their estimations, ride sharing could reduce fuel consumption between 15% and 23%.[6] In addition, others found similar results and suggest that miles traveled could be reduced by 33%.[7] Resulting in a substantial emission reduction. Some even claim that large-scale ride sharing could significantly assist in mitigating the dependence on bioenergy and $CO_2$ capture and storage.[8]

The potential impact of ride sharing is still difficult to assess for the specific situation of Arcadis. Namely, lease vehicles are already shareable by contract, yet the take-up of car sharing is still below par with the desired benchmark. Arcadis would have to internally assess which employees might benefit, and are willing, to ride- or car-share. It would then have to confer with its lease suppliers what specific options are available, and what additional incentives might need to be provided.

*Table 5: Reduction possibilities Arval & Alphabet*

| Scope 3 | Short | Medium | Long |
|---|---|---|---|
| **Material passports** | Converse with Arval and Alphabet about the possibility of sustainable procurement | Request 1-10 vehicles constructed in accordance with material passports | Only accept lease cars that incorporate material passports in their production |
| **EV Transition** | Move to 80% EV's | Move to 100% EV's | Reduce the number of lease cars and increase longevity |

[5] Pauliuk, S., Heeren, N., Berrill, P., Fishman, T., Nistad, A., Tu, Q., ... & Hertwich, E. G. (2021). Global scenarios of resource and emission savings from material efficiency in residential buildings and cars. *Nature communications*, *12*(1), 5097.

[6] Yan, L., Luo, X., Zhu, R., Santi, P., Wang, H., Wang, D., ... & Ratti, C. (2020). Quantifying and analyzing traffic emission reductions from ridesharing: A case study of Shanghai. *Transportation Research Part D: Transport and Environment*, *89*, 102629.

[7] Cai, H., Wang, X., Adriaens, P., & Xu, M. (2019). Environmental benefits of taxi ride sharing in Beijing. *Energy*, *174*, 503-508.

[8] Akimoto, K., Sano, F., & Oda, J. (2022). Impacts of ride and car-sharing associated with fully autonomous cars on global energy consumptions and carbon dioxide emissions. *Technological Forecasting and Social Change*, *174*, 121311.

| | | | |
|---|---|---|---|
| **Car sharing** | Increase car sharing among employees | Reduce the number of lease cars and further increase car sharing | Make car sharing the norm, relative to individual use |

**Potential negative effects**

Material passports were introduced with the intent to reduce emissions in the most critical areas of the supply chain. However, that is not to say that it cannot produce any negative effects. For example, it could induce additional complexity for suppliers as requirements of data collection and certification increase. In turn, this may increase operational costs, which is particularly challenging for suppliers with tight margins. Likewise, additional monitoring could incentivize suppliers to engage in greenwashing practices. Moreover, it could result in the exclusion of smaller suppliers that cannot meet passport requirements. And research suggests that overemphasis on production might inadvertently neglect other lifecycle phases.

The increase of EVs creates a higher demand for electricity on the grid. It requires additional charging stations and a more efficient infrastructure to sustain increased demand. In addition, necessary materials for the batteries need to be extracted and could have negative social and environmental effects locally.

Ride sharing also has negative effects. One must consider that car manufacturers and lease operators are likely to sell or lease less cars, due to the reduction in demand. It could also increase car use as ride sharing becomes a competing option with other types of commuting like public transport, walking, or biking. Moreover, the use and its effectiveness depend on the context in which this initiative operates. People living in rural areas might be disproportionately affected by ride sharing, as it might be an unappealing option for less population dense areas.

#### 3.5.1.2 NS

As discussed in step 4, NS is moving towards zero emission operations by 2040. To get there, emissions across all scopes need to be reduced. The scope 3 emissions make up the largest part of NS' emissions and are also difficult to reduce. These emissions consist of, among others, train manufacturing and transport around NS journeys. Therefore, creative actions need to be taken.

**Impact on OIEs**

Mobility

In the short term, NS can expand its loan bike program (OV fiets), making more bikes available at both smaller, remote stations and strategic locations beyond train stations, enabling greener first- and last-mile connections for passengers. This leads to a reduction in emissions caused by passenger transport to trainstations. In the medium term, NS can work on the electrification of GreenWheels, their car-sharing facility, further decarbonizing passenger mobility. Looking to the long term, NS could expand their mobility options to reduce the before and after train travel emissions of passengers. For example, it could invest in local mobility hubs, offering electrical vehicles, bikes and other forms of green transportation. This initiative would reduce their scope 3 emissions, by avoiding the emissions otherwise produced by polluting vehicles.

Arcadis can support NS across these initiatives by leveraging spatial data and mobility analysis to identify optimal locations for expanded bike services, advising on infrastructure planning for electric vehicle charging, assessing supplier sustainability, and leading environmental and feasibility studies for new train routes. This collaboration could have significant impacts on our OIEs.

Sustainable procurement

The manufacturing of trains also plays an important role in the scope 3 emissions. Reusing materials as much as possible helps reduce emissions in general. However, in the medium and long term, $CO_2$-reduction higher in the value chain of NS by sustainable procurement will have the most effect. NS is not only supplier of Arcadis, but also a customer. This gives Arcadis the opportunity to help directly with large projects. NS is focused on renewing their technical and building aspects. Arcadis can help NS by designing climate-adaptive new maintenance buildings, working with landscape architects who come up with creative solutions for water retainment. We can help reduce energy and water consumption

by looking at what and where the need is or reusing water by treating it on sight. Furthermore, they work on circularity and Arcadis advises them regarding this topic. For their stations and other buildings, they try to work with reused materials as much as possible. Arcadis' specialism in decarbonization strategies and management systems found in, for example, our Net zero team and Sustainability team, creates substantial opportunities. Using our knowledge and skills to be able to help NS reduce emissions, has a significant OIE impact.

*Table 6: Reduction possibilities NS*

| | Short | Medium | Long |
|---|---|---|---|
| **Mobility** | Make more bikes available, even outside of train stations. | Electrifying Green wheels | More sprinter trajectories |
| **Sustainable procurement** | Reuse as much possible | Improve sustainable train design | Improve sustainable train design |

**Potential negative effects**

Despite NS's ambitious sustainability targets, several challenges complicate the reduction of Scope 3 emissions. The transition to circular waste management and the use of recycled materials in manufacturing is constrained by ongoing material shortages and supply chain disruptions, making it difficult to maintain operational efficiency and product quality. The increase in train use, which is preferred over cars, leads to more emissions from manufacturing and maintenance. Resources at NS are limited and budgets are tight, necessitating difficult prioritization decisions. Personnel shortages further slow the pace of transformation, as expertise and capacity are stretched across parallel sustainability initiatives. Electrifying mobility and expanding green infrastructure, such as installing EV charging stations, can be hampered by regulatory bottlenecks, technical limitations, and the need for stakeholder buy-in. These factors mean that while NS's long-term vision is clear, the path to zero-emission operations will require overcoming significant logistical, financial, and organizational hurdles, underscoring the need for innovative solutions, strategic partnerships, and adaptive planning.

#### 3.5.1.3 ISS

ISS set ambitious net zero targets in 2022 committing to net zero for scopes 1 and 2 by 2030 and net zero for scopes 1-3 by 2040[9]. According to their annual report of 2024, they intend to reduce emissions from food by 25% in 2030 and reduce food waste by 50% by 2027 compared to 2019. However, scope 3 emissions from ISS currently only cover emissions of employees' travel. Information on cleaning supplies, food, etc. is still missing. We are looking forward to having conversations with ISS about the reporting on their scope 3 emissions, the offer of plant-based alternatives in the canteen, and opportunities like Too Good to Go.

**Impact on OIEs**

In general, there are several options for ISS to reduce their scope 3 emissions. In the short term, ISS can prioritize sourcing more sustainable cleaning products, minimize single-use plastics in facility operations, and implement waste separation programs at client sites to convert waste streams into reusable materials. Arcadis can assist by auditing waste flows, assessing opportunities for circular material use, and helping ISS engage with suppliers to improve the sustainability of purchased goods. This would reduce their scope 3 emissions and impact OIEs on our side. Over the medium term, ISS can focus on upgrading building management systems, rolling out energy efficiency measures (such as LED retrofits and smart controls) across managed properties, and facilitating the switch to green energy contracts for clients. Arcadis can provide expertise in energy audits, developing decarbonization roadmaps for complex facilities, supporting the installation of renewable energy and EV charging infrastructure, and data collection. In the long term, ISS can collaborate with building owners to pursue deep retrofits, implement advanced circular economy practices, and support clients' transitions to net-zero operations. Here, Arcadis can conduct lifecycle assessments, design and deliver large-scale renovation projects, and help ISS report and communicate progress to stakeholders. By leveraging Arcadis's technical expertise and strategic advisory services, ISS can overcome operational and resource challenges, accelerate innovation, and deliver more sustainable facility management solutions for clients.

[9] ISS-Annual-Report-2024.pdf

*Table 7: Reduction possibilities ISS*

| | Short | Medium | Long |
|---|---|---|---|
| **Initiatives** | Switching to more sustainable cleaning supplies | Upgrade building management systems | Collaborating with building owners |

**Potential negative effects**

Negative effects of these measures could be an increase in supply costs, as the sustainable product options are generally more expensive. Also, it might be possible that building owners do not want to cooperate. This could lead to a forced move to a different location.

## 3.5.2 Customers

### 3.5.2.1 ProRail

ProRail could achieve the most reduction of $CO_2$ emissions by reducing their scope 1. Of these scope 1 emissions, infra makes up 57.4 percent and mobility 30.3 percent. Therefore, the focus should be on reducing emissions from these categories.

**Impact on OIEs**

Infrastructure

As mentioned before, infra emissions mostly come from natural gas use for point heaters and the heating of offices and other buildings. As the use is dependent on the weather, it is possible that in colder years, more emissions occur. However, in the short term, ProRail is lowering the temperature at which the point heaters turn on[10]. This is done in close collaboration with the weather bureau Weerplaza, to have up to date information on the temperature. This not only decreases the necessity and the associated emissions of natural gas. During the use of gas for the point heaters, methane leaks out. Thus, a reduction of natural gas use lowers the scope 1 emissions of ProRail as well. Estimating the impact of lowering the start temperature is difficult; however, monitoring the energy use of the point heaters should provide insights into the impact of the measure for future analyses. Arcadis can help ProRail due to our specialism in decarbonization strategies and management systems so we can avoid emissions resulting in OIE impact.

On the medium term, the replacement of 2.700 gas operated point heaters could reduce the scope 1 emissions even further[11]. On the long term, ProRail can research which points heaters are less useful and remove any unnecessary ones. This takes a thorough investigation which might take several years to account for different weather conditions. Also, the current point heaters lose a considerable amount of heat to the ballast and the other surroundings[12]. Research into the development of more efficient point heaters can help reduce the energy required, directly reducing the emissions. Arcadis could possibly help with feasibility studies, examining which point heaters are least efficient and assessing possible heat retention technologies and insulation materials.

Mobility

Mobility emissions are mostly caused by using fossil fueled cars. Transitioning to an electrical fleet helps reduce the scope 1 emissions, since these are responsible for approximately 1.600-ton $CO_2$-eq (ProRail wide)[13]. This transition should be started as soon as possible and should be completed in the medium term. In the long term, an increase in efficient mobility hubs with shared electric vehicles, bikes, and other options, might reduce the need for less sustainable options of transportation.

[10] Wisselverwarming uit | ProRail accessed on 3-10-2025

[11] Stapt ProRail over op elektrische wisselverwarming | ProRail accessed on 3-10-2025

[12] Lotfi, A., Yousuf, A., & Virk, M. S. (2024). Study of Heat Distribution in Railway Switch Using Resistive Heater in Cold Climate Conditions. *Applied Sciences*, *14*(18), 8151.

[13] Voorlopige CO2 voetafdruk ProRail 2024 accessed on 3-10-2025

*Table 8: Reduction possibilities ProRail*

| | Short | Medium | Long |
|---|---|---|---|
| **Infra** | Turning of point heaters when weather is mild. | Transitioning to only electrical point heaters. | Removal of unnecessary point heaters and research to more efficient heaters. |
| **Mobility** | Start switching from fossil fueled cars to EVs | Complete switch from fossil fueled cars to EVs | Increase in efficient mobility hubs |

**Potential negative effects**

There should be a focus on the possible transition of emissions between scopes. Electrifying the fleet and point heathers lowers the scope 1 emissions, however, the electricity needs to come from renewable sources to prevent emissions being counted for scope 2.

Moreover, the transition to EV's has similar potential negative effects as mentioned in Arval's and Alphabet's "negative effects" section.

#### 3.5.2.2 Rijkswaterstaat

RWS reports emissions in scope 1, 2, and 3. However, the emissions they report are largely related to their mobility (vehicle fleet, ships, plane travel)[14] and not the GWW-projects they execute, which is where a large share of its emissions are located. These scope 3 emissions come from built environment projects they take on, such as: coastline care and channel maintenance, road paving, road, dike and rail equipment, and civil engineering structures like bridges and tunnels.

Regarding scope 1 and 2 emissions, in the short term, RWS can prioritize switching its ships to biofuels, which can rapidly lower direct emissions while maintaining operational flexibility. For the government's aviation activities, reducing the number of flights and optimizing routes for greater fuel efficiency are practical first steps.

**Impact on OIEs**

Materials and machinery

For scope 3, RWS emissions are not just related to mobility, but largely made up of (raw) materials used in construction works, and heavy machinery used in these projects. The two reduction pathways (short term) for this largely focus on reducing machine-related emissions by utilizing biofuels in heavy machinery, or more ideally using electrical machinery. Material-related emission reductions can best be accomplished by using less raw materials and improving circularity. It requires smart maintenance to be able to increase lifespan and re-use of materials to be able to use less materials. RWS is currently using these strategies to work towards their 2030 goals. This would significantly reduce their Scope 3 emissions, and would result in positive OIE impact for Arcadis as these initiatives avoid additional emissions. As Arcadis, we are working together with RWS on the replacement & renovation of civil engineering structures. Here lies a large potential to focus on circularity in our engineering services where possible, while still prioritizing the function and safety of these structures.

Mobility

In the medium term for scope 1 and 2, a strategic rollout of electric vehicles across the government fleet and a gradual transition to hybrid or electric ships will further decarbonize transport operations. For aviation, adopting newer, more efficient aircraft and exploring the possibility for alternative propulsion technologies will contribute to emissions reduction. Scope 3 should focus further on reducing machine emissions and circularity or reuse of materials.

[14] Rijksrederij Rijkswaterstaat accessed on 6-10-2025

Looking at the long term, deploying drones for certain monitoring and inspection tasks instead of ships could significantly reduce energy consumption and operational emissions, as drones are more efficient for specific tasks like surveying waterways or infrastructure. Arcadis can support RWS throughout these phases by advising on the permitting processes for drone deployment, helping assess the technical and regulatory feasibility of new transport technologies, and conducting emissions impact analyses. Additionally, Arcadis could provide strategic advice for sustainable mobility planning, ensuring that Rijkswaterstaat's transition towards low-carbon operations is both practical and aligned with regulatory requirements. This would result in significant impact on avoided emissions and thus OIEs.

*Table 9: Reduction possibilities RWS*

| | Short | Medium | Long |
|---|---|---|---|
| **Mobility** | Implement biofuels | Electric mobility | Different way of monitoring and inspecting |
| **Materials and machinery** | Advising on reuse of materials used in structures or circular.<br>Encouraging use of zero emission machines. | Similar to short term. | Similar to short term. |

**Potential negative effects**

While transitioning to biofuels and electrifying the fleet can significantly reduce Scope 1 emissions for Rijkswaterstaat, these solutions also present notable challenges and potential negative effects. The use of biofuels in shipping, for example, can lead to higher levels of OIEs. Additionally, the large-scale adoption of electric vehicle, ships and machines, while beneficial for direct emissions, could result in increased Scope 2 emissions if the electricity supply is not fully renewable potentially offsetting some of the intended carbon savings. The initial investment and infrastructure upgrades required for electrification can also strain budgets and operational resources. Regarding circularity of materials, it may require relatively large amounts of energy to make some materials suitable for reuse. Furthermore, the transition to drone-based monitoring, though energy-efficient, may face regulatory hurdles and require new skills and processes, which could slow implementation. These factors highlight the importance of careful planning, risk assessment, and ongoing evaluation to ensure that sustainability initiatives deliver real and lasting benefits without unintended consequences.

#### 3.5.2.3 TenneT

Tennet is the 3rd largest customer of Arcadis, and, just like ProRail, they are mostly busy with construction and expansion of the Dutch electricity grid. This explains the high scope 2 and 3 emissions. For this analysis we will focus on the scope 3 emissions, as we expect that Tennet is more involved in reducing their scope 2. Therefore, scope 3 shows the best potential for additional reduction of emissions.

**Impact on OIEs**

Construction

As mentioned before, the scope 3 emissions are mostly (80%) caused by construction, transport, installation of assets like cables, steel towers, and overhead lines[15]. The other 20% comes from upstream production for materials such as steel, aluminum, copper, plastics, and concrete.

On the short term, Tennet needs to continue the use of lower carbon concrete and recycled steel. This is essential since the production of concrete and steel are massive contributors to $CO_2$ emissions. Consequently, this would avoid a large number of emissions, potentially resulting in impact on OIEs for Arcadis if we advice on the use of these low carbon options. Also, during the realization phase of the projects, a contractor that uses the more sustainable options is

[15] Integrated Annual Report 2024 accessed on 3-10-2025

preferred. Arcadis can help here with the preconditions for contact management by selecting contractors that are willing to work with sustainable materials.

An initiative on the medium term can be to only use recycled copper for future power transformers and shunt reactors. This is already done in Germany but could also be implemented in the Netherlands. Arcadis can assist by helping find the locations of high copper presence and obtaining this copper when it becomes available.

The most difficult task for Tennet is the fact that they need to expand to cover the increasing demand. This is a long-term process, which does not help the reduction of their own footprint. Sustainable design is of the most important here. Arcadis can help with its broad knowledge of sustainability in projects, like route maps to net-zero, but also during the design phase of buildings.

Since Arcadis is involved with projects from the start, Arcadis could deliver impact on reducing emissions by taking it into account from the start. (Arcadis helps with the policy aspect).

Collaboration

The transport of materials that need to be installed is also a big share of the emissions. Since the number of construction activities will only increase due to the pressure on the grid/grid congestion, it is key that emissions from the transport are limited if possible. However, correspondence with an internal expert suggests that the possibilities of sustainable construction and transportation are often limited. Although sustainability is of great concern, efficient project finalization generally surmounts sustainability ambitions. Regulations, policies, and complex permitting processes make it a strenuous task to integrate environmental aspirations. Nevertheless, the conversation also indicated that sustainable construction depends on various parties. Specifically, the collaboration between regulators and contractors could yield additional benefits in terms of sustainable returns. For example, it is difficult to build electrical infrastructure or attain electrical equipment for construction by yourself. Joint investments make it easier to transition to sustainable construction.

On the short term, we would like to continue the open discussion on sustainable construction, thereby thinking in possibilities with Tennet. On the medium term, we want to explore the possibility of co-investing into equipment so Tennet can work more sustainably on projects simultaneously. Low-emission equipment is not widely available currently. On the long term this would transform into a steady base of green equipment for Tennet to work with.

*Table 10: Reduction possibilities Tennet*

| | Short | Medium | Long |
|---|---|---|---|
| **Construction and installation of assets** | Continue the use of lower carbon concrete and recycled steel and sustainable contract management | Switch to 100% recycled copper use. | Sustainable design |
| **Collaboration** | Continue open discussion | Co-investment into equipment | Create a steady base of green equipment to supplement construction |

**Potential negative effects**

Project costs could potentially increase as more sustainable contractors are hired, or more recycled materials are used in construction. Lower carbon concrete, recycled steel or copper often have higher upfront costs due to limited supply and additional processing requirements. In addition, the effectiveness of the project is highly dependent on the accessibility of resources, as some resources might not be attained locally. As mentioned, project delays are commonplace, it generally takes more time to move through the legislative landscape and procure the proper materials and expertise for projects. This is exacerbated by additional difficulty in stakeholder alignment between regulators, contractors and suppliers. Lastly, operational and technical risks could occur if proceeded without caution. Recycled materials have different properties when considering durability and maintenance cycles. Likewise, sustainable materials or new construction methods could be incompatible with existing assets, requiring additional retrofits or adaptations.

### 3.5.3 Feasibility

Feasibility is a critical factor when evaluating and implementing sustainability initiatives across the value chain. It determines whether an initiative can be practically realized. When we refer to feasibility, we consider multiple criteria: technical feasibility, which considers the availability and maturity of required technologies; financial feasibility, evaluating whether the initiative is cost-effective and if its economic benefits outweigh the costs; legal and regulatory feasibility, examining how easily the initiative complies with existing laws and regulations; and sustainability, ensuring alignment with environmental objectives and long-term viability.

The different initiatives mentioned all differ highly in context. Some are specific to mobility partners, others depend largely on technological innovations, and few could be highly reliant on collaboration between parties. Consequently, a thorough assessment of the initiatives is quite strenuous. In general, more knowledge is required to fully assess the effectiveness and ease of implementation. Therefore, we advocate the following approach:

First, it is important for every initiative to first assess whether other initiatives are more suitable for the specific situation. Second, we aim to further assess this in our stakeholder engagement. Specifically, the collaboration and interactions with suppliers and customers help us to understand the constraints and opportunities. After which, we aim to perform a more detailed feasibility study to attain a clearer perspective on the implementation, scope, and timeline of the initiative. Depending on that outcome, one can weigh the pros and cons, and decide on an implementation plan.

**OIE strategy**

Arcadis' vision is centered on delivering sustainable solutions for the built and natural environment. We combine digital innovation with technical expertise to address global challenges such as climate change, energy transition, and urban livability. This value chain assessment directly reinforces this ambition for improved quality of life for all. Moreover, it adds to the Climate Transition Plan by expanding our internal viewpoint on emissions by including an external perspective aimed at reducing our Scope 3 emissions.

The value chain extends beyond the firm's operations and touches upon our OIEs, eventually mapping the entire journey from raw material sourcing to end customer delivery. Arcadis is committed to maximizing her positive impact on the environment, thus, acknowledges that the greatest sustainability gains often lie up- and downstream in the value chain. Moreover, Arcadis is an active participant in local and global communities, trying to bring together various stakeholders to accomplish sustainable projects. This relates to the main ideology of the value chain assessment, which compels collaborative action between parties in order to reach the emission goals.

### 3.5.4 Conclusion

This value chain analysis provided comprehensive insights into Arcadis Netherlands' environmental impact by systematically mapping our direct relationships with key suppliers and customers. By allocating emissions across the value chain, we have identified the most significant emission scopes of our direct relations. After which we assessed possible opportunities for effective decarbonization. The nature and origin of our partner's emissions is highly dependent on the industry of the company. For example, our mobility suppliers (Arval, Alphabet, and NS) emit the most in vehicle manufacturing, leasing operations and fuel consumption. On the contrary, customers (RWS, Tennet, and ProRail) generate most of their emissions downstream, predominantly through infrastructure development and operational activities.

Arcadis can leverage its advisory expertise to collaborate on innovative solutions, like electrification of fleets, adoption of circular economy practices, or enhancing energy efficiency in buildings. Yet, engaging suppliers and customers in joint decarbonization initiatives will be critical to achieving meaningful reductions in Scope 3 emissions and advancing sustainability across our value chain.

### 3.5.5 Discussion

In conducting this value chain assessment of ANL, we encountered significant limitations regarding data availability and quality. A substantial portion of our suppliers and customers currently do not report emission data, or, where data is provided, it is often not disaggregated into Scope 1, 2, or 3 emissions. As a result, we were compelled to exclude some of our partners from this analysis. Moreover, the lack of information restricts our ability to perform an exact analysis of emissions across the entire value chain. We propose various technologies and initiatives aimed at reducing emissions across the different scopes of our suppliers and customers. However, due to the data gaps, it is challenging to accurately

assess both the scale and the potential effectiveness of these interventions. Furthermore, this makes the precise quantification of expectations and targets very difficult to realize. As such, the absence of distinct baselines makes it a strenuous task to quantify the precise impact that these initiatives could have on reducing emissions.

We acknowledge the significance of robust, transparent, and comprehensive emissions data for effective value chain management and climate action. As such, we actively pursue the improvement of the data collected. Specifically, we engage with our suppliers and partners to encourage greater reporting and disclosure, striving to enhance the reliability of future assessments. Yet, given the current limitations, the findings and projections formulated in this assessment should be regarded as estimations based on the best available information. While we make every effort to ensure the validity of our analysis, we acknowledge that the absence of complete data produces uncertainty in our conclusions. We are committed to the continuous improvement of both our data collection practices and our emissions reduction efforts.

# Colofon

VALUE CHAIN ANALYSIS

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DATUM
17 juli 2025

# About Arcadis

Arcadis is the global partner at the forefront of the most impactful projects of our time. We help our clients make sustainable choices by combining digital innovation, expertise, and future-oriented skills in areas such as environment, energy, water, buildings, transport, and infrastructure. We go the extra mile to provide our clients with tailor-made solutions for design, engineering, and consultancy. By leveraging data-driven insights, we help shape the natural and built environment together. With more than 35,000 people, we combine global expertise and jointly tackle challenges such as climate, affordable energy, and livable cities. We improve quality of life through our presence in more than 30 countries. In 2024, we achieved a gross revenue of €5.0 billion.

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