

Battelle 2024 Chlorinated Conference

Green Metrics Analytics: A New Approach to Sustainable Resilient Remediation

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Agenda

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Brief description if required

2 Challenge

Brief description if required

3 Introducing GMA

Brief description if required

4 Quantitative Analysis

Brief description if required

5 Qualitative Analysis

Brief description if required

6 Integration of Sustainability with Remediation

Brief description if required

7 Integrated Solutions

Brief description if required

8 Key Takeaways

Brief description if required

Context

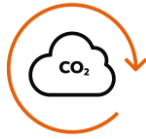
- Increasing frequency of extreme weather events.
- Rising greenhouse gas emissions from human activities.
- Need for sustainable solutions in contaminated site management.



The Challenge



Engage sustainable practices in operations



Quantify GHG emissions in remediation projects



Find references and do calculus to build our solution



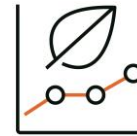
Support our teams with user-friendly data entry and outcomes



Integrate digital tools in the strategy



Associate sustainability to cost reduction



Improve our projects sustainability indicators

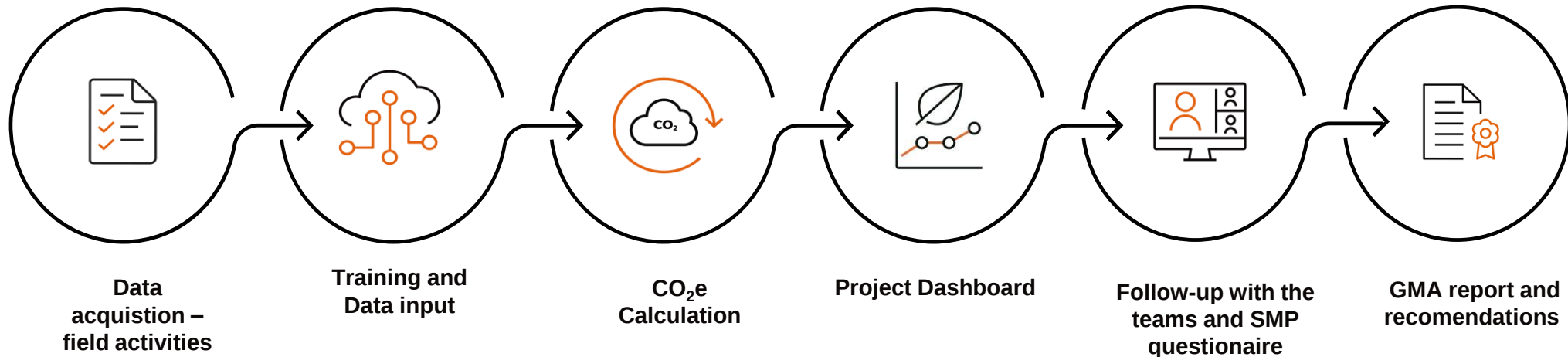


Support companies through their sustainability journey

Introducing Green Metrics Analytics (GMA)

Green Metrics Analytics - GMA, is an instrument created under the concept of Sustainable Resilient Remediation, which limits environmental impacts and maximizes social and economic benefits through indicators that prove that the benefit of undertaking remediation is greater than its impact, building resilience against the growing threat of extreme weather events (ITRC, 2022; SuRF-UK, 2018)

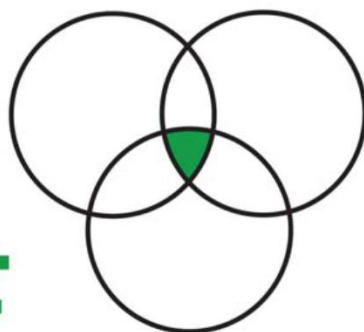
GMA Framework



Green Metrics Analytics – GMA - References



Abas gerais	Introdução	Resumo	Fatores de emissão	Fatores variáveis	Fugitivas - GEE não Quioto	Aeroportos	Fatores de conversão	
Escopo 1	Combustão estacionária	Combustão móvel	Emissões fugitivas	Processos industriais	Atividades agrícolas	Mudanças no uso do solo	Resíduos sólidos	Efluentes
Escopo 2	Eletricidade (localização)	Perdas T&D (localização)	Compra de Energ. Térmica	Eletricidade (esc. compra)	Perdas T&D (esc. compra)			
Escopo 3	Categorias de Escopo 3	Transp & Distr upstream	Resíduos sólidos gerados	Efluentes gerados	Viagens a negócios	Deslocamento casa-trabalho	Transp & Distr downstream	



SuRF
SUSTAINABLE REMEDIATION FORUM UK



One Click **LCA**

SUSTAINABLE DEVELOPMENT GOALS



Quantitative Analysis

Scope 2



Indirect GHG emissions from the consumption of purchased electricity

Scope 3



Category 1

Purchased Goods and Services



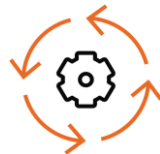
Category 4

Upstream Transportation and Distribution



Category 6

Business Travel



Category 3

Fuel- and Energy-Related Activities (not included in Scope 1 or 2)



Category 5

Waste Generated in Operations

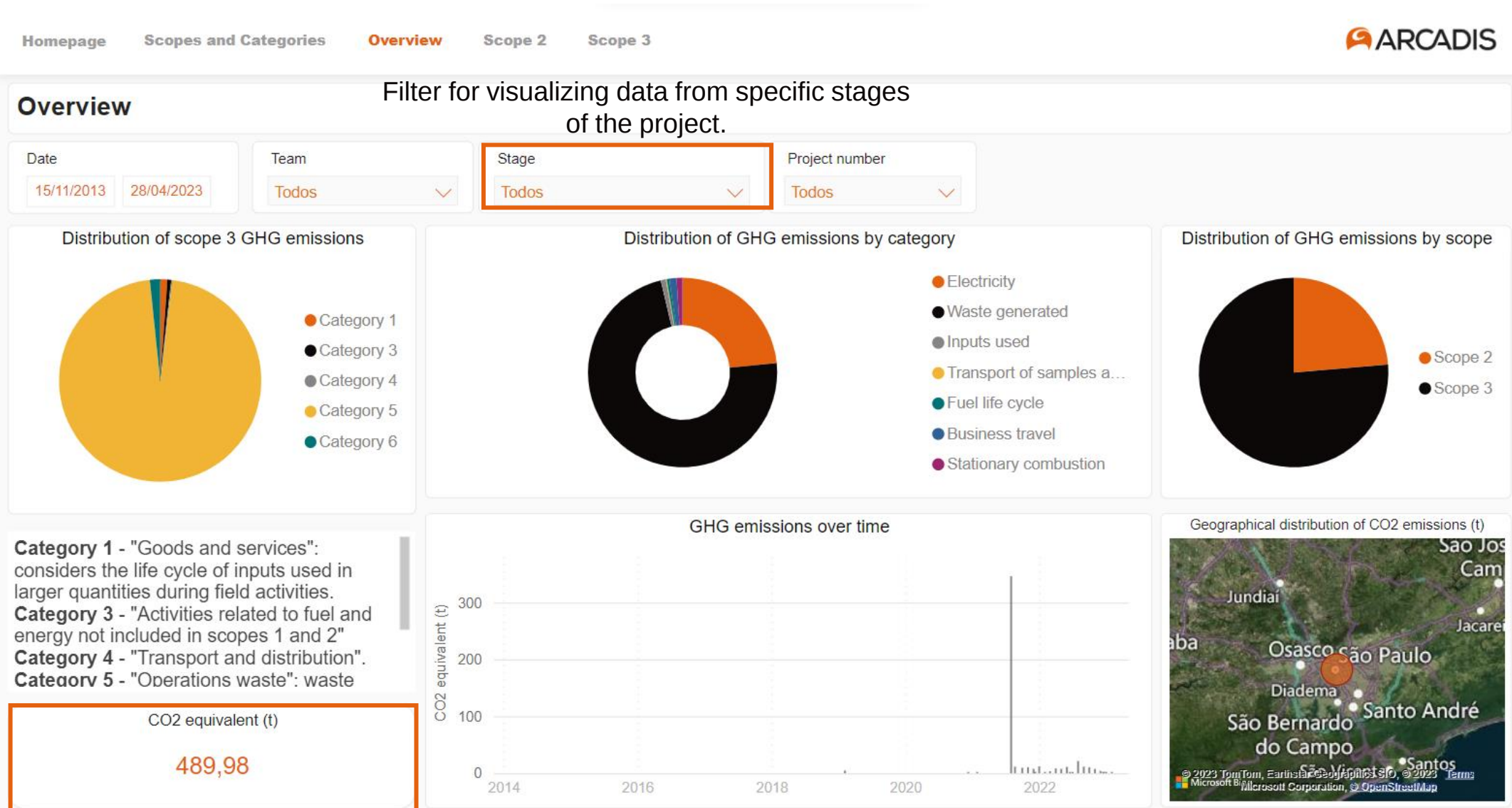


Category 8

Upstream Leased Assets

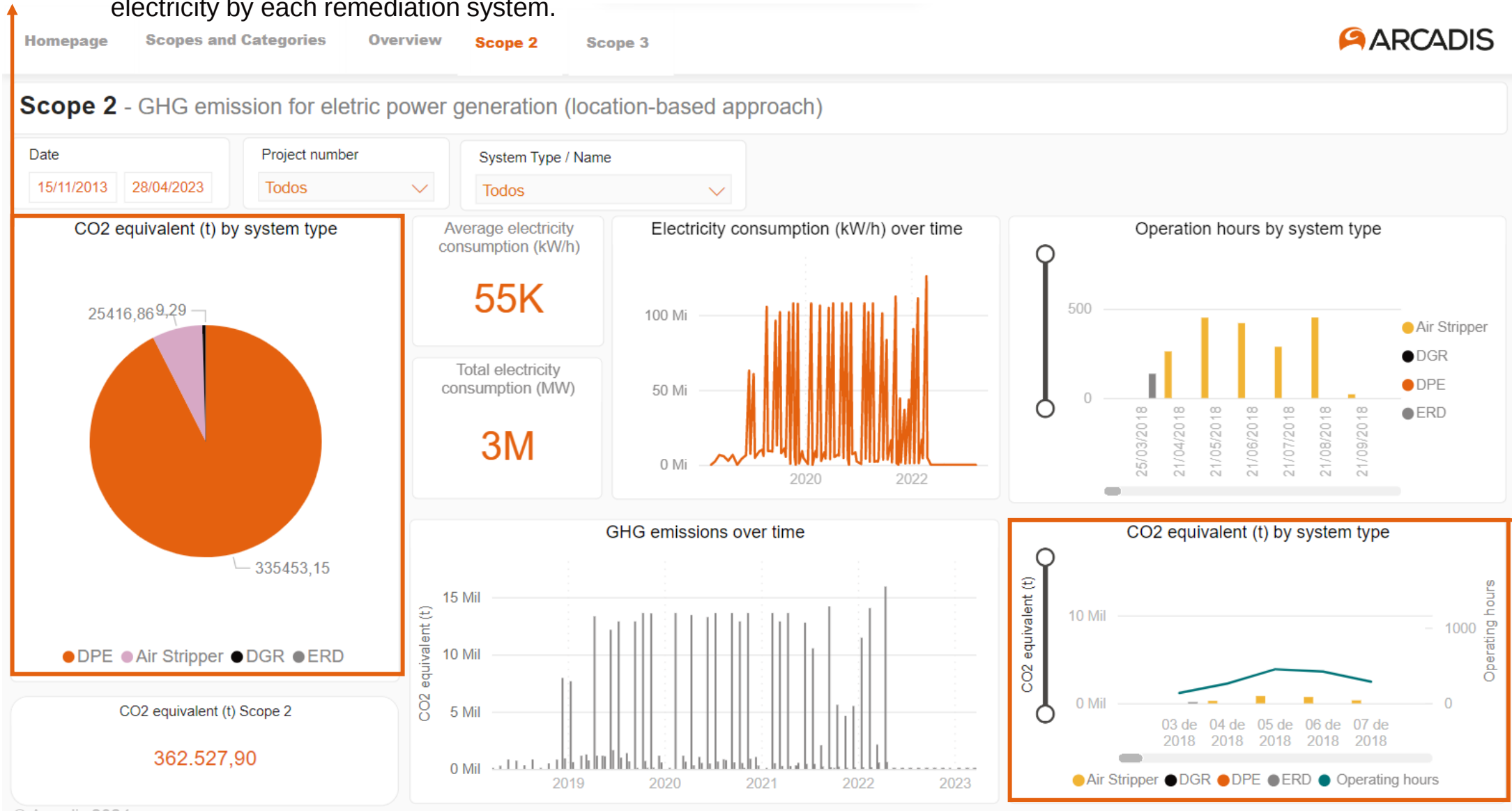
- Detailed calculations of Scope 2 and Scope 3 emissions.
- Identification of emission hotspots.
- Strategies to address identified bottlenecks.

GMA – Dashboard – Project Overview



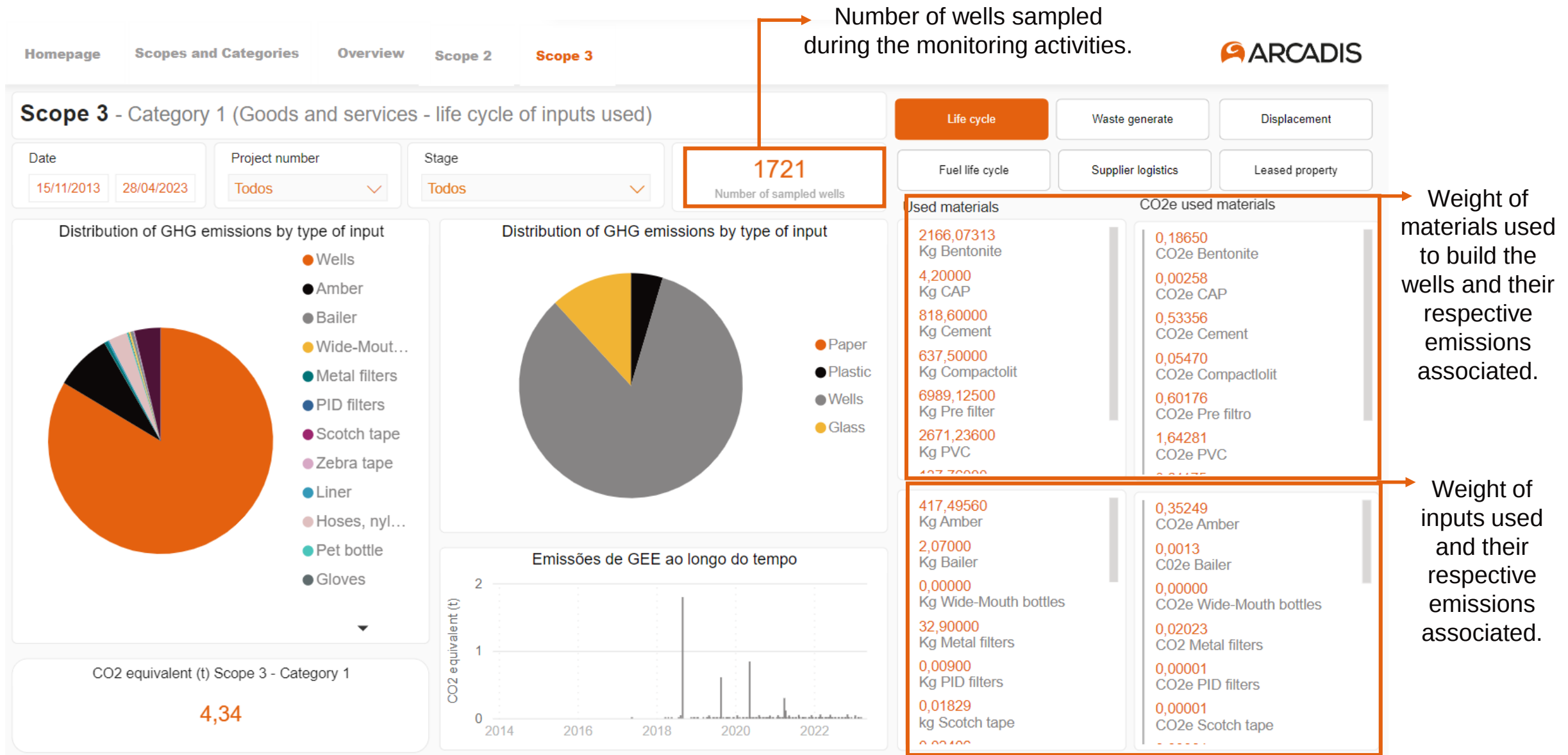
Scope 2 - GHG Emissions for Electricity Generation

Emissions generated through the consumption of electricity by each remediation system.



Relationship between hours of operation and emissions of each remediation system.

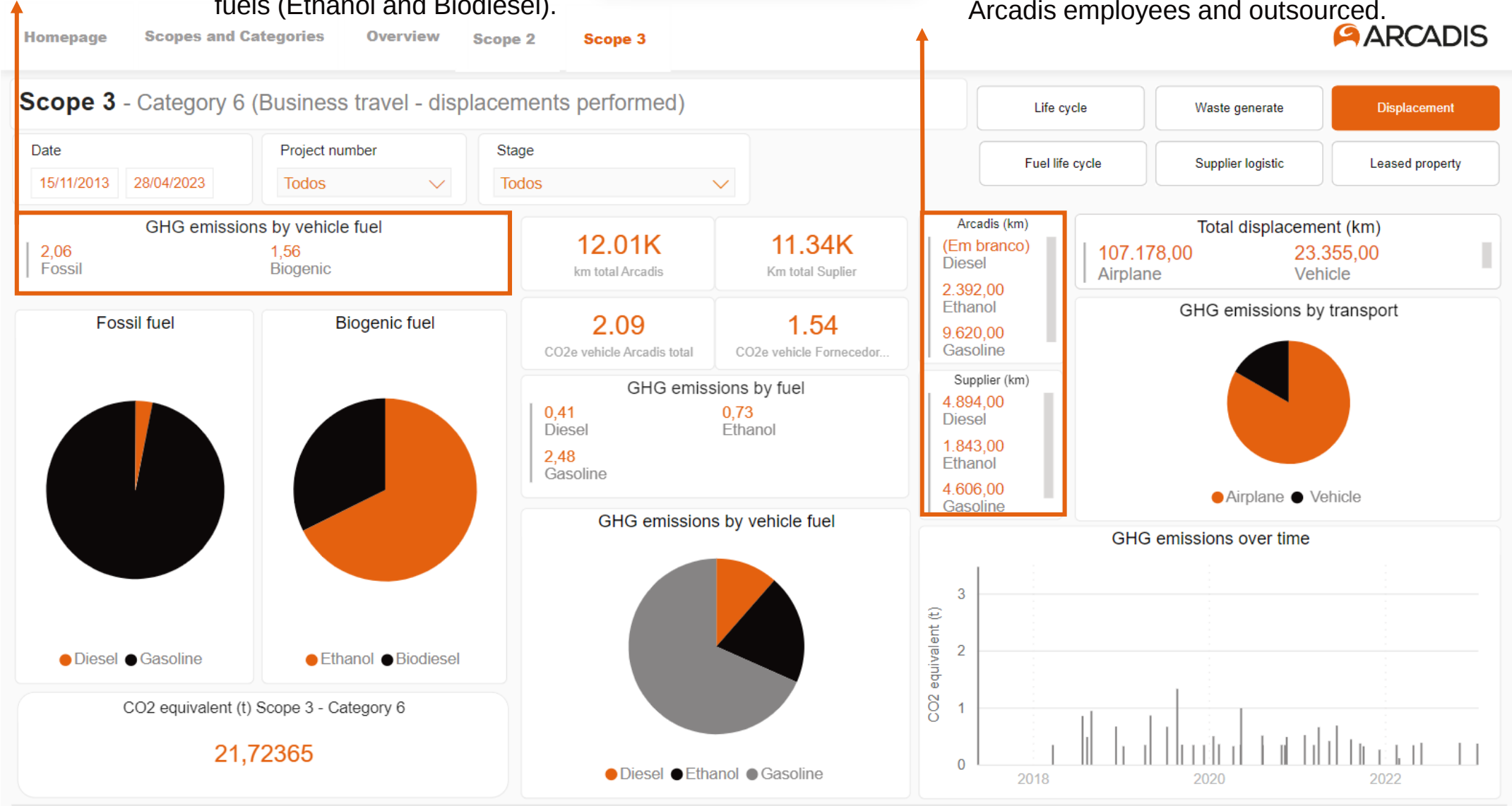
Scope 3 - Category 1 - Goods and services: life cycle of inputs



Category 6 – Business travels – displacements performed

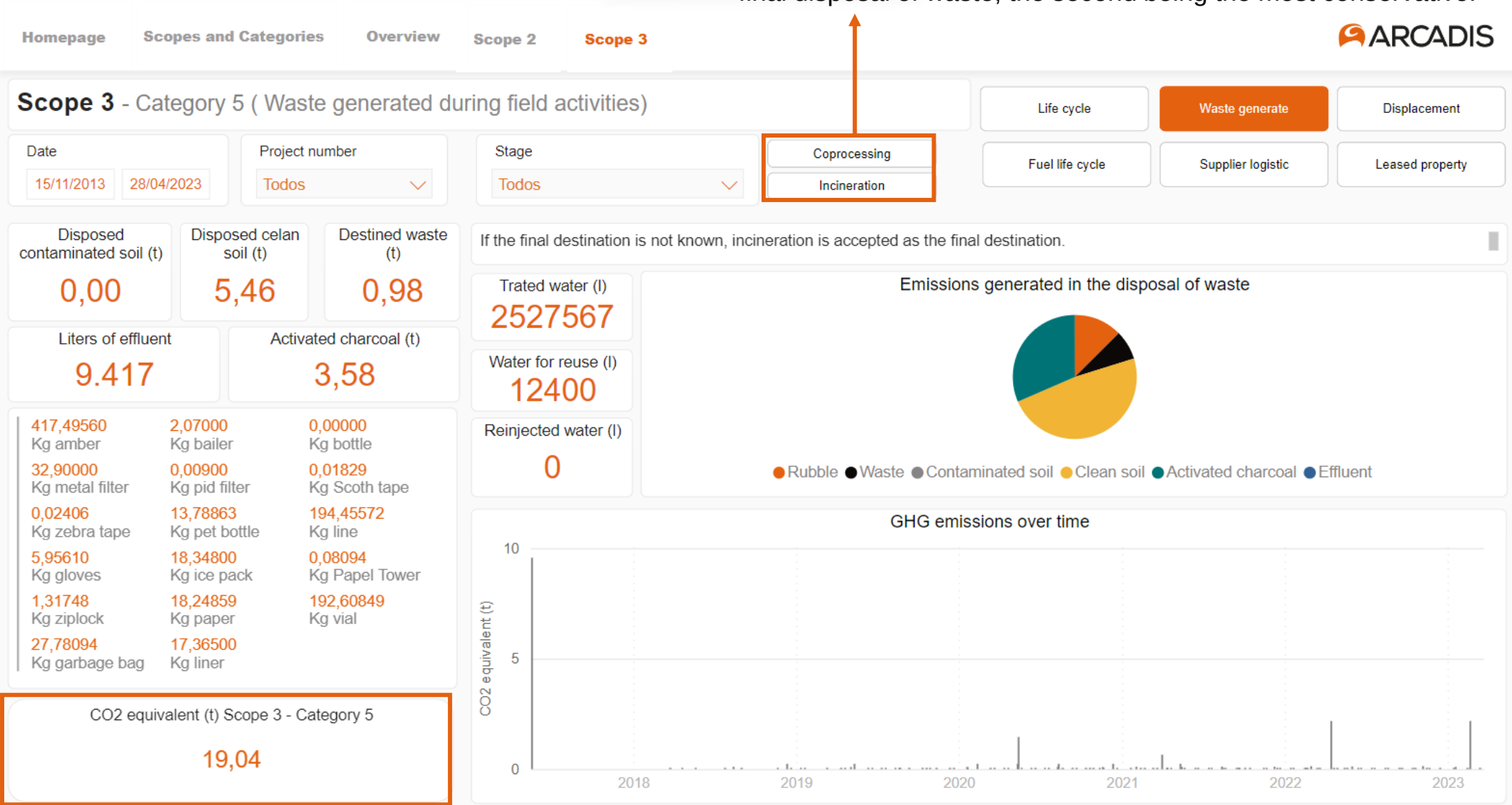
Emissions related to fossil fuels (Gasoline and Diesel) and biogenic fuels (Ethanol and Biodiesel).

Total land distance traveled with each fuel by Arcadis employees and outsourced.



Scope 3 - Category 5 - Waste generated

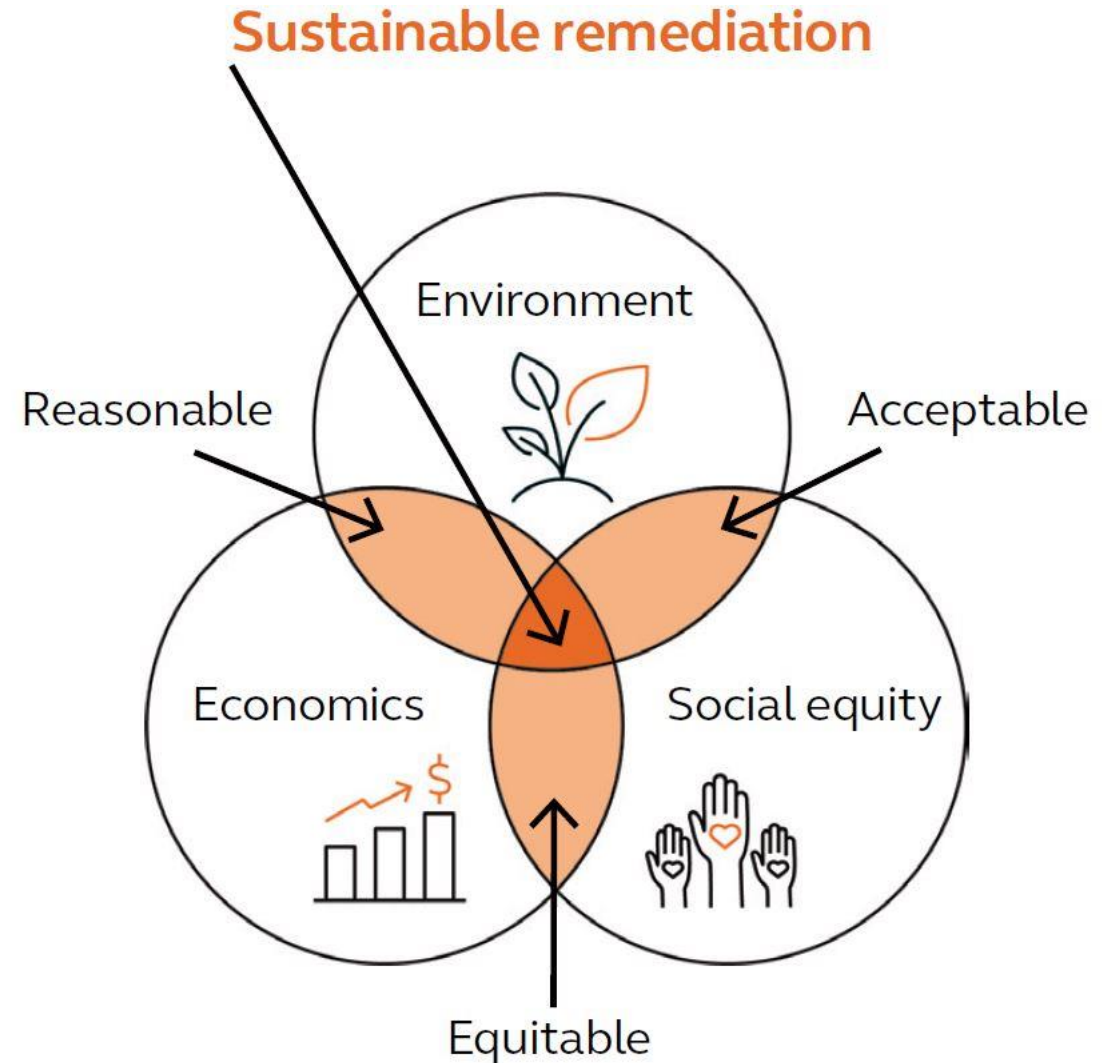
Co-processing and Incineration were considered as scenarios for the final disposal of waste, the second being the most conservative.



Total value of emissions, considering incineration as the final treatment, as it is the most conservative scenario.

Qualitative Analysis

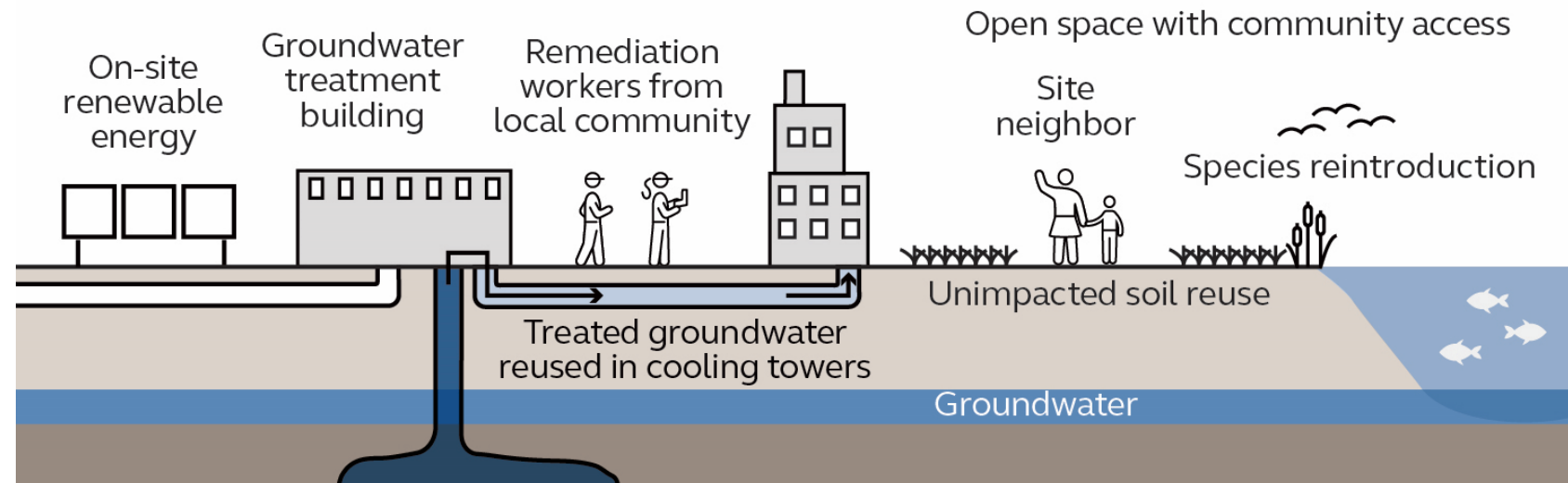
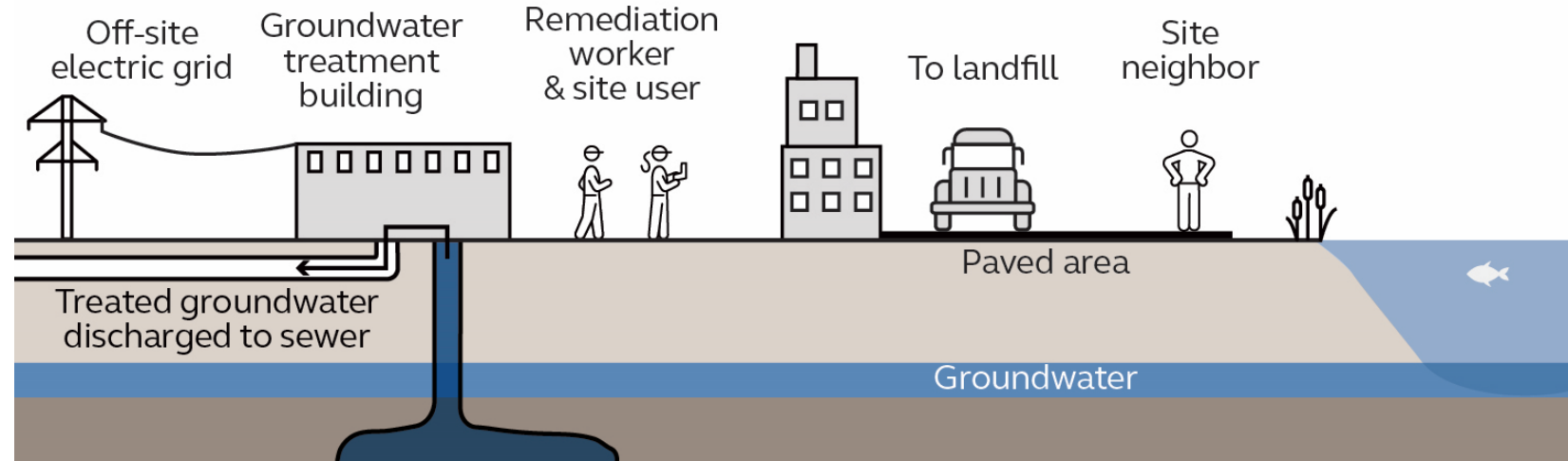
- Sustainable Resilient Remediation (SRR) principles.
- Triple bottom line: environmental, social, and economic benefits.
- Use of green remediation practices.
- Enhanced decision-making processes.



Environmental, Social, and Economic Benefits

- Lowered carbon emissions.
- Enhanced ecosystem protection.
- Reduced resource consumption.
- Improved community health and safety.
- Cost savings from efficient resource use.

Shift in Perspective to Whole Systems Approach

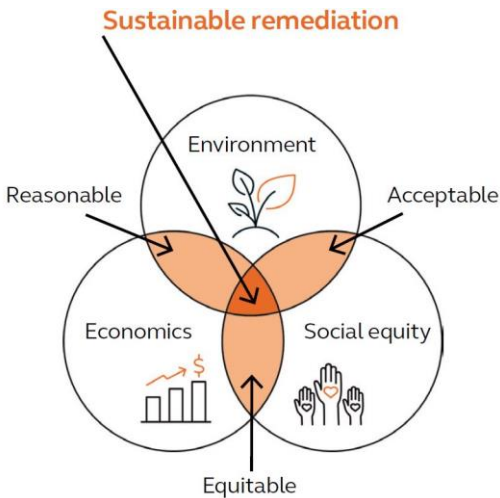


Integrated Solutions



UN SDG	SuRF-UK indicator	Arcadis at client's site
	Human health and safety (SOC1)	H&S Arcadis culture has spread among employees and subcontractors (TRACK, Stop Work and If not me, then who?), resulting in zero reported accidents during project execution.
	Ethics and equity (SOC2)	Promoting gender equity and empowering women resulted in teams made up of 50% or more women.
	Groundwater and surface water (ENV3)	Improvement of water resources by reducing risks of contamination.
	Indirect economic costs and benefits (ECON1)	Improvement of contaminated sites can positively impact surrounding land values.
	Uncertainty and evidence (SOC5)	Ensuring a strong science-based evidence for sustainable and risk-based management of contaminated lands to provide resilient solutions.
	Natural resources and waste (ENV5)	Use of remediation techniques that minimize the generation of solid waste and effluent.
	Emissions to air (ENV1)	Reduction of GHG emissions due to displacements using ethanol as fuel, and digital tours.

Emissions calculus during the execution of the contaminated area management stages - investigation, monitoring and remediation - allows greater assertiveness and control regarding sustainability indicators and sustainable management practices (SMPs).



The final product is an integrated report with a holistic view of the project's Sustainability KPI's.

Key Takeaways

- **The Time to Integrate Sustainable Strategies is Now**
- **Tracking Emissions is Crucial for Identifying Bottlenecks**
- **GMA Provides Comprehensive Emissions Analysis**
- **Sustainable Remediation Practices Deliver Long-Term Benefits**
- **Quantitative and Qualitative Benefits Drive Better Decisions**
- **Analytical Tools Enhance Project Outcomes**



Thank you for joining us!

Questions? please reach out to:

Session presenter



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