Sustainability in our Projects

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Sustainability Principles

Definitions – sustainability, emissions scopes, offsetting	Carbon Neutral vs Net Zero

Arcadis

Net Zero Targets	Supply Chain Carbon

Site Work

Sustainable Design and Procurement	Drop-in Alternatives	Case Study

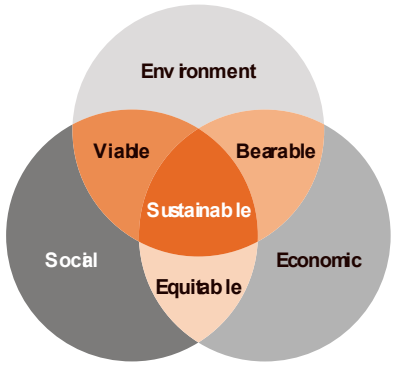
Conclusion and Next Steps

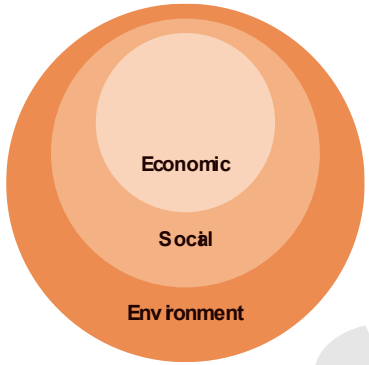
Sustainability Principles

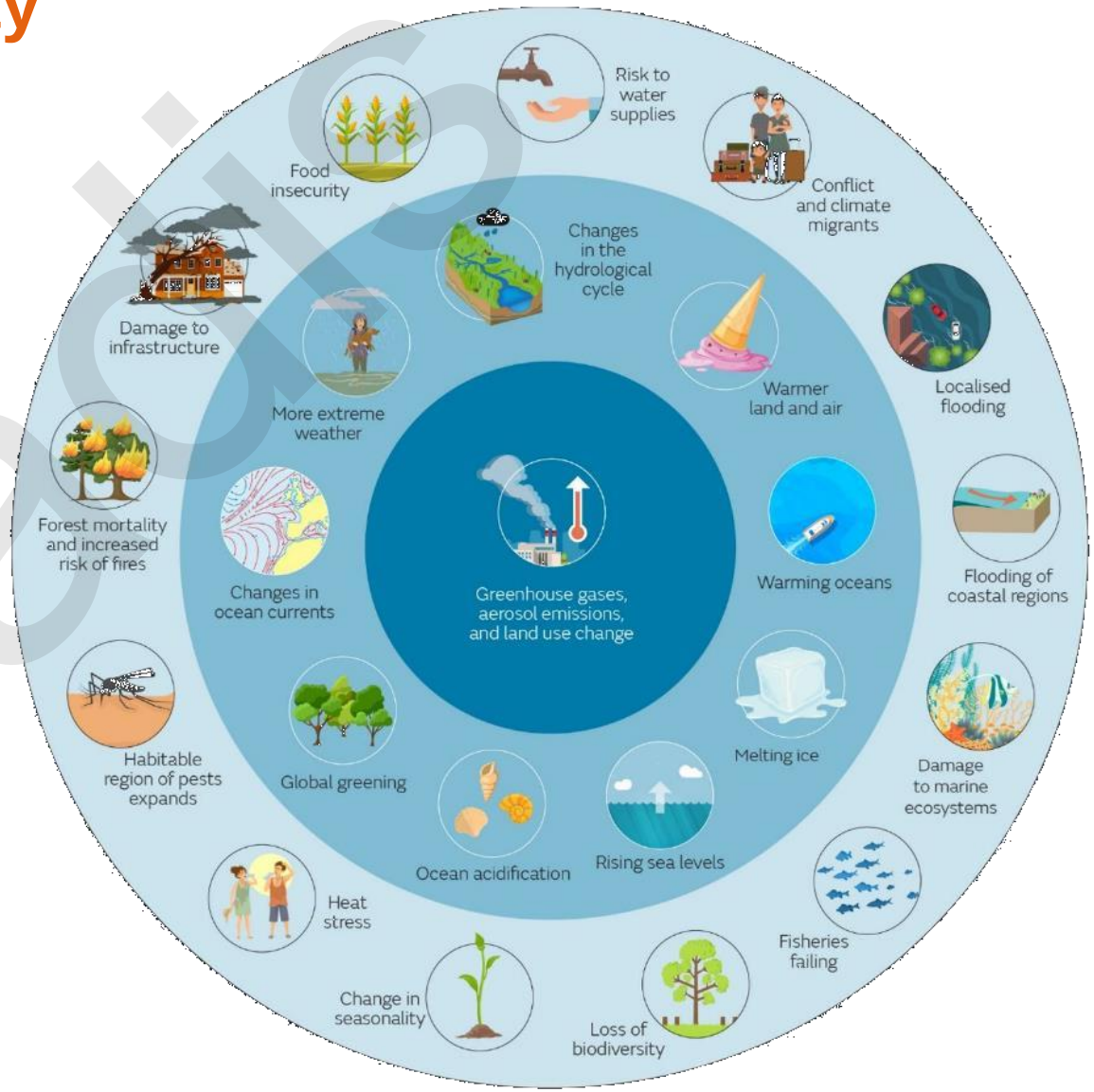
Carbon Emissions vs Sustainability

"Meeting the needs of the present without compromising the ability of future generations to meet their own needs"

United Nations Brundtland Commission, 1987

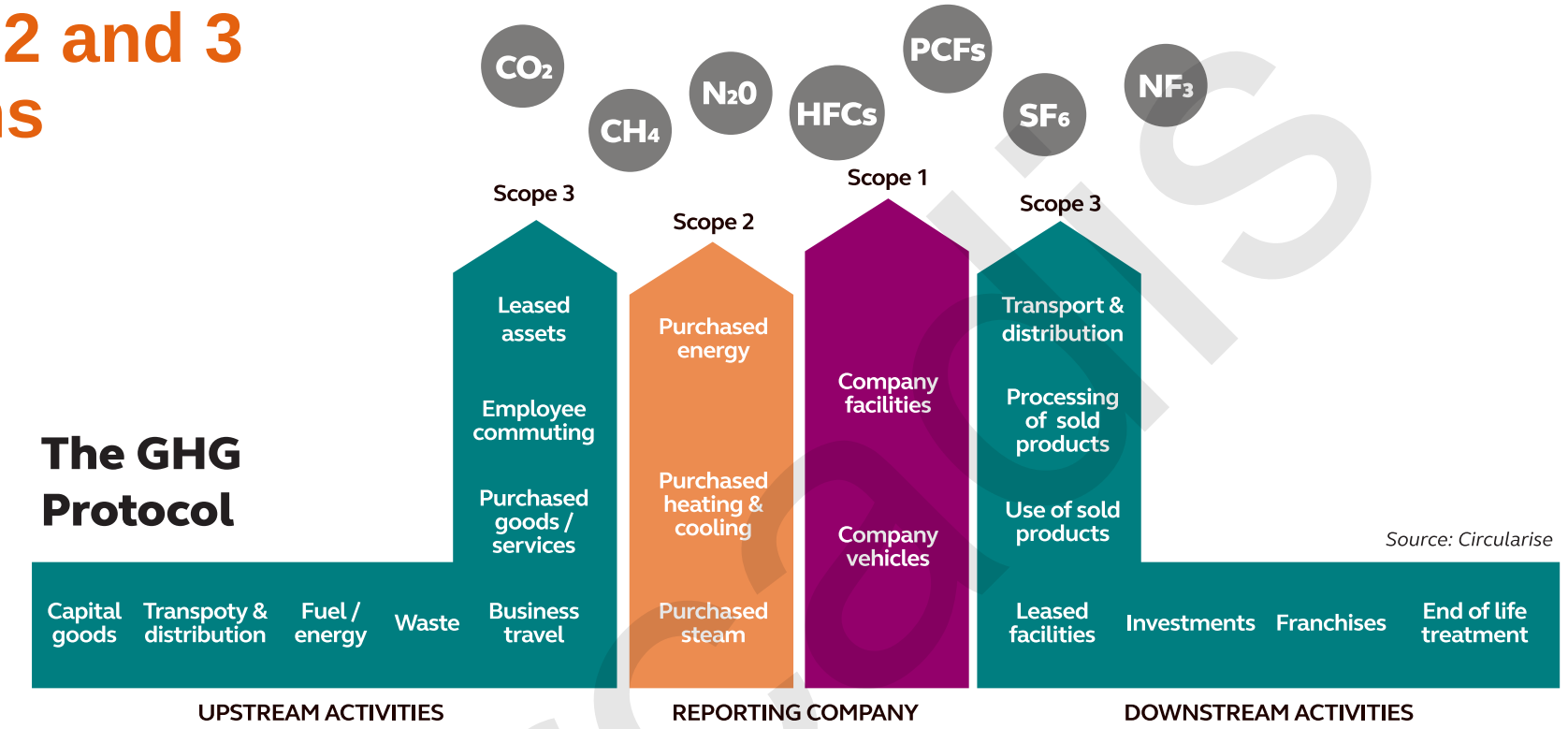






Source: UK Met Office

Scope 1, 2 and 3 Emissions

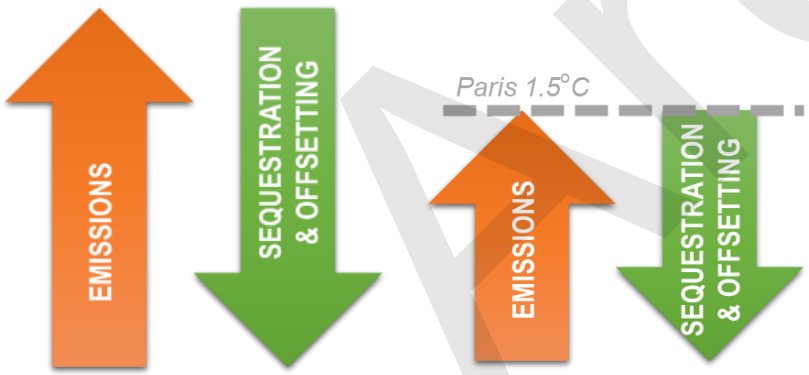


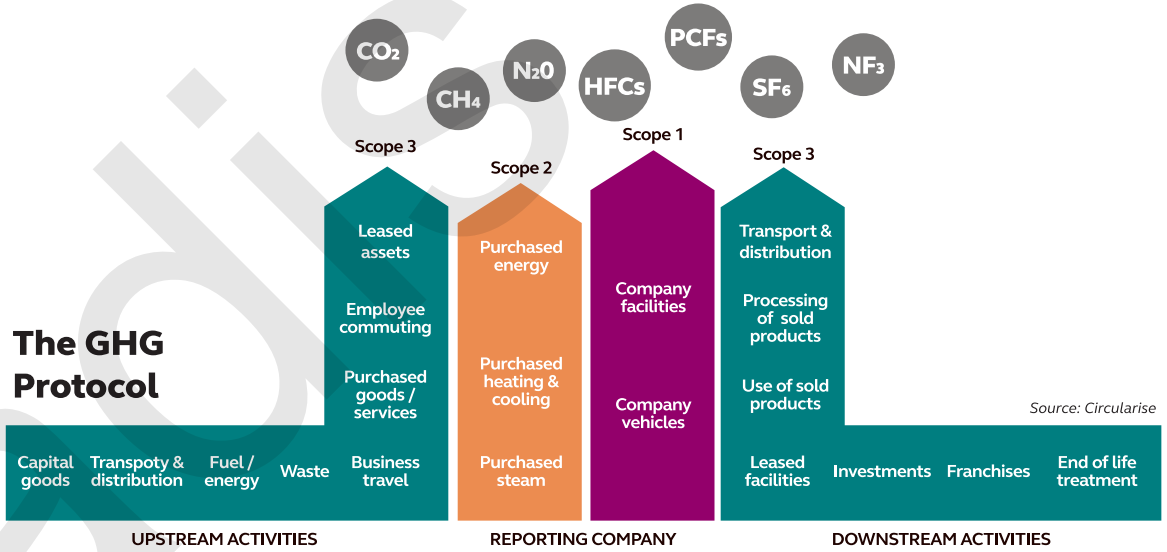
Source: Circularise

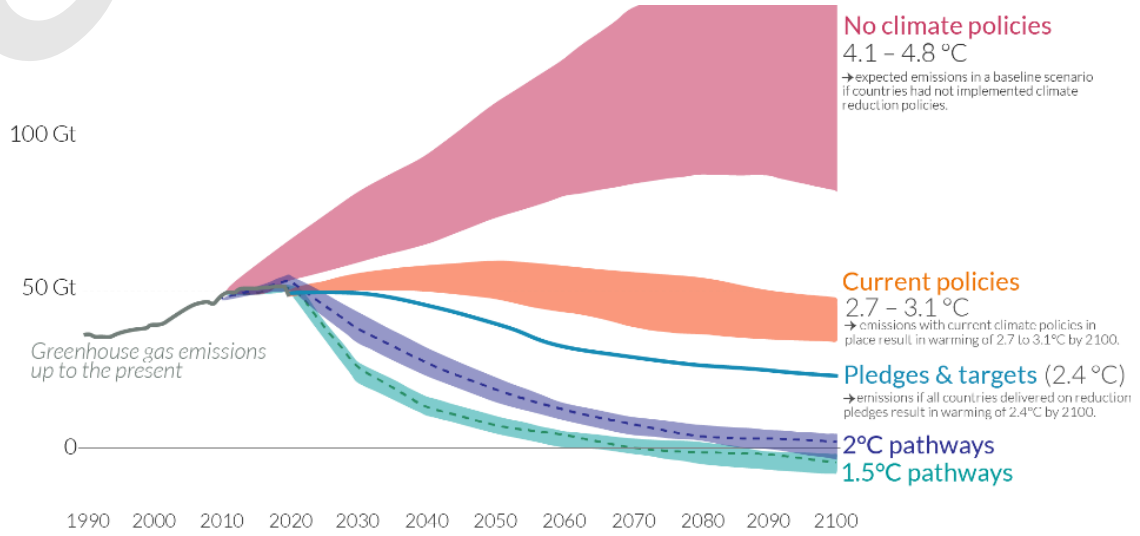
Scope 3 - Upstream	Scope 2	Scope 1	Scope 3 - Downstream
Indirect	Direct	Direct	Indirect
From **goods / services purchased** by company	From **energy purchased** by company	Emissions **owned / controlled** by company	From **goods / services sold** by company
Capital goods *Consumables* *Waste disposal*	*Electricity, heating, cooling*	*Fuel in company vehicles* *Spills and contamination events (fugitive emissions)*	*Transport of products* *Use of products*
Challenging to calculate	Easy to calculate	Easy to calculate	Very difficult to calculate
Need to collect data from supply chain Requires **collaboration and data sharing** across multiple entities	Typically has a standard grid value calculated annually per country/territory	Chemicals have a standard GHG emissions profile for combustion or degradation	May require assumptions and data from customers or market research to estimate emissions from use and disposal

Net Zero Targets

	Carbon Neutrality	Net Zero
Boundary	Minimum requirement of Scope 1 & 2 Scope 3 encouraged but not mandatory	Must cover Scope 1, 2 & **Upstream Scope 3**
Ambition	No requirement for a company to reduce emissions	Must be reducing emissions along a **1.5°C trajectory** across Scope 1, 2 & 3
Guidance	PAS 2060	No specific guidance (yet) Needs a combination of standards, frameworks, and best practices Incl. PAS 2060, **PAS 2080**, SBTi
Diagram	*Take out what you put in*	*Reduce then remove*



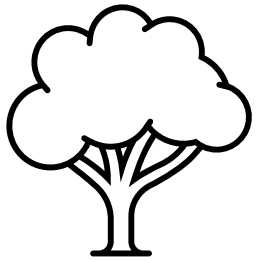




Carbon Literacy

<1 g

2 kg



~12 - 60 kg/yr

~1.4 - 1.8 T/yr

~13 T/yr

~1 kg	~10 kg	~100 kg	~1 T	~10 T	~100 T
1 full day streaming 4k Netflix	**A return Eurostar trip** (per passenger)	**one-way flight within Europe** (per passenger)	**A return flight from London to NY** (per passenger)	**Average UK / EU carbon footprint per person per year**	A commercial space flight (per billionaire)
carton of eggs	½ hour drive	Set of new car tires	A long-haul flight to Asia	Driving a car once around the world	Wildfires across 2-8 acres of land
½ camembert	1 steak or cheeseburger	Half a bitcoin transaction	Arcadis UK annual energy use per FTE	Powering a superyacht for 1 day	Building a typical 3-bed house (traditional construction)
	1 household waste bin to landfill				

Arcadis Sustainability Goals and Baselining

Sustainability

A Planet Positive Future

In our roots

Founded in 1888 for Wasteland Redevelopment.

In our logo

The fire salamander requires a balance between clean water, healthy air, and clean soil to survive.

In our name

Arcadis derived from Arcadia the finest place on earth to live

Our purpose

Arcadis. Improving quality of life

Our strategy

2019

Baseline year for corporate -wide carbon emissions

2020

Offsetting 100% of Material Scope 1, 2 & 3 emissions

2021

Sourcing 100% renewable electricity in offices globally

2022

Science Based Targets initiative has approved targets

2023-2024

Supply Chain engagement with **Carbon Disclosure Project** to track Scope 3 emissions

2025

Reduce Scope 1 & 2 emissions by 45%

Reduce Scope 3 travel emissions by 35% and flights by 50%

2027

Carbon removals covering 100% of Material Scope 1, 2 & 3 emissions

2028

Halve overall Scope 1, 2 & 3 emissions

2030

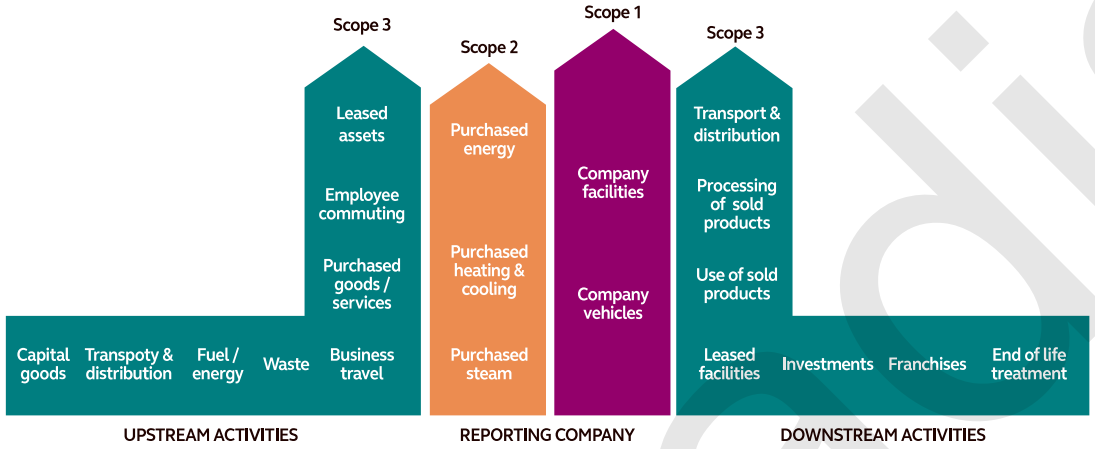
Transition fleet to electric vehicles

2035

Reach **net zero** emissions

Supply Chain Carbon – Scope 3 emissions per spend

Clients



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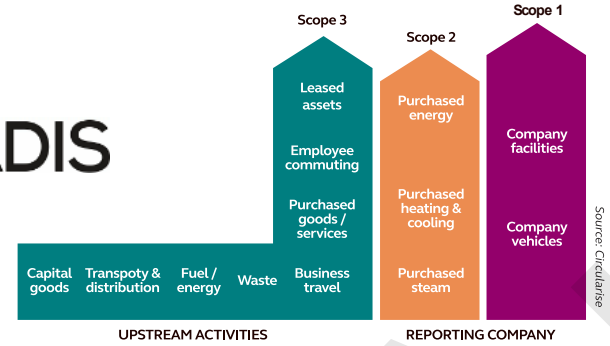
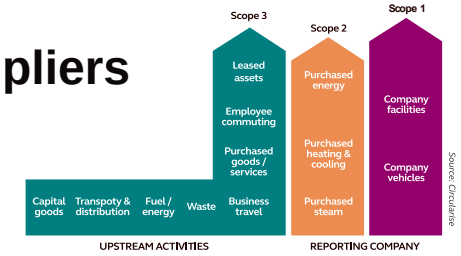
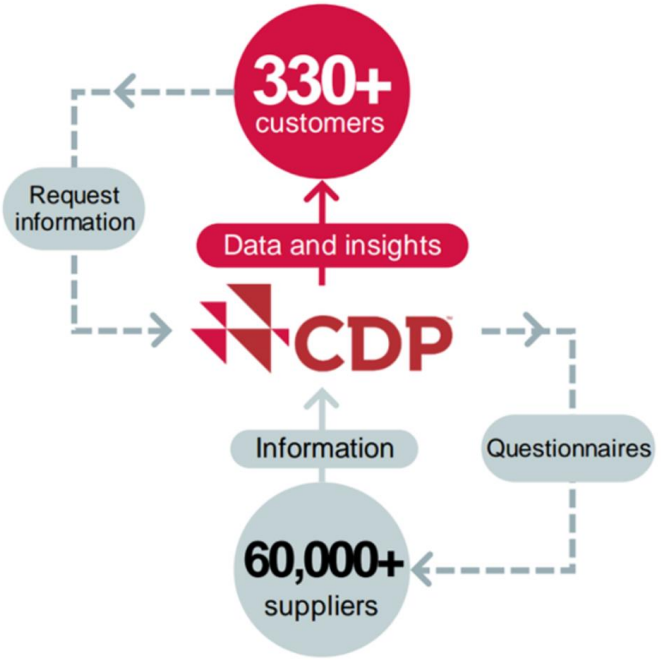


Suppliers



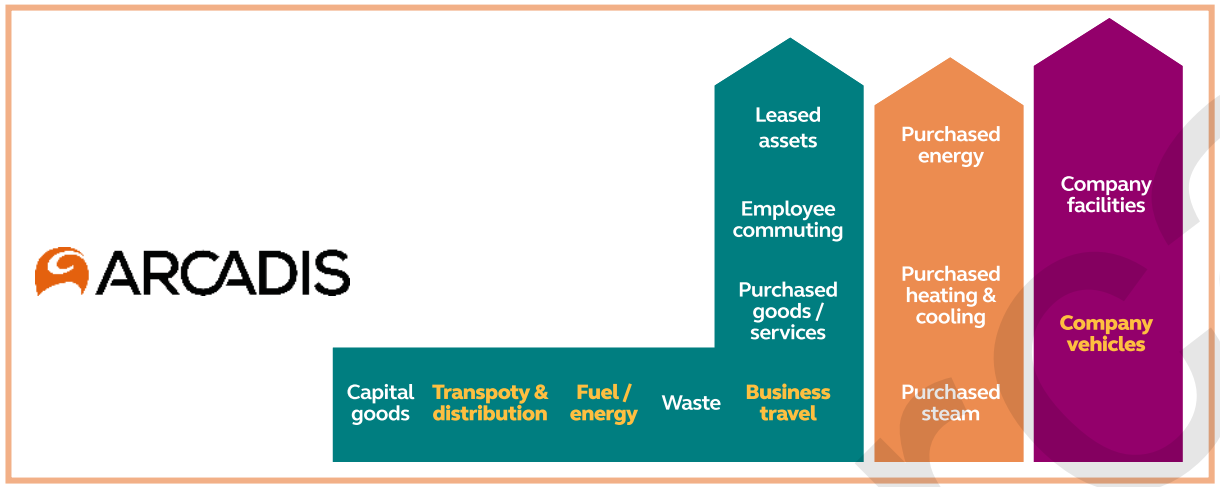
Carbon Disclosure Project



https://arcadiso365.sharepoint.com/sites/Intranet-Global-Procurement/SitePages/CDP.aspx

Supply Chain Carbon – Vehicles

- Company Vehicles
- Fuel / Energy to run vehicles and plant
- Data – Fuel Cards
- Widely available conversions (**1 litre of diesel ~> 2.7 kgCO_2 1 litre of petrol ~> 2.3 kgCO_2**)



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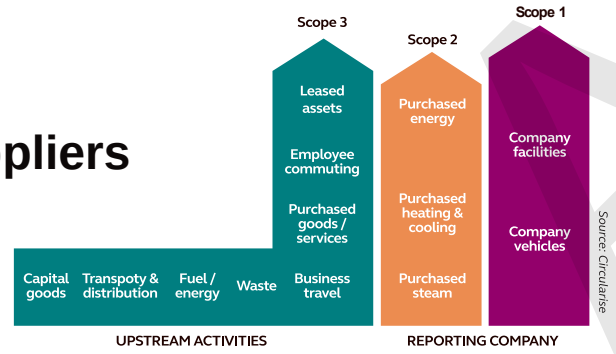

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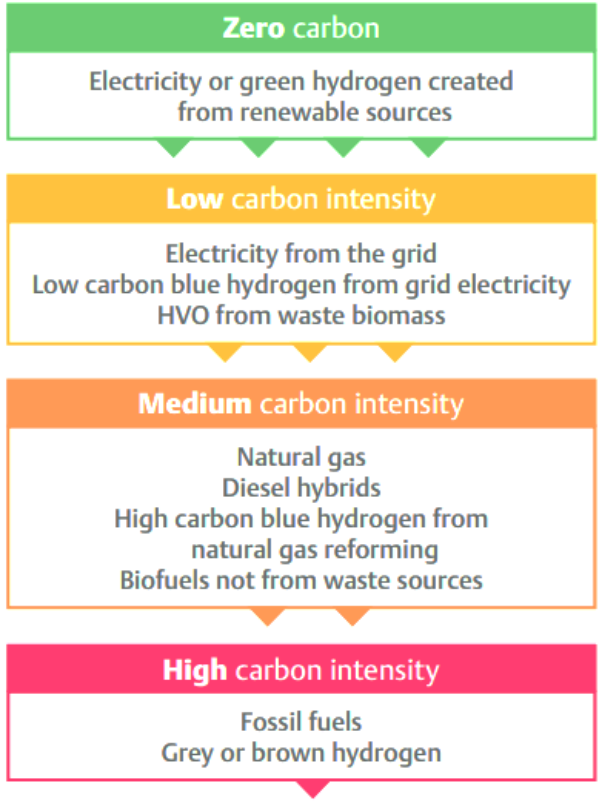
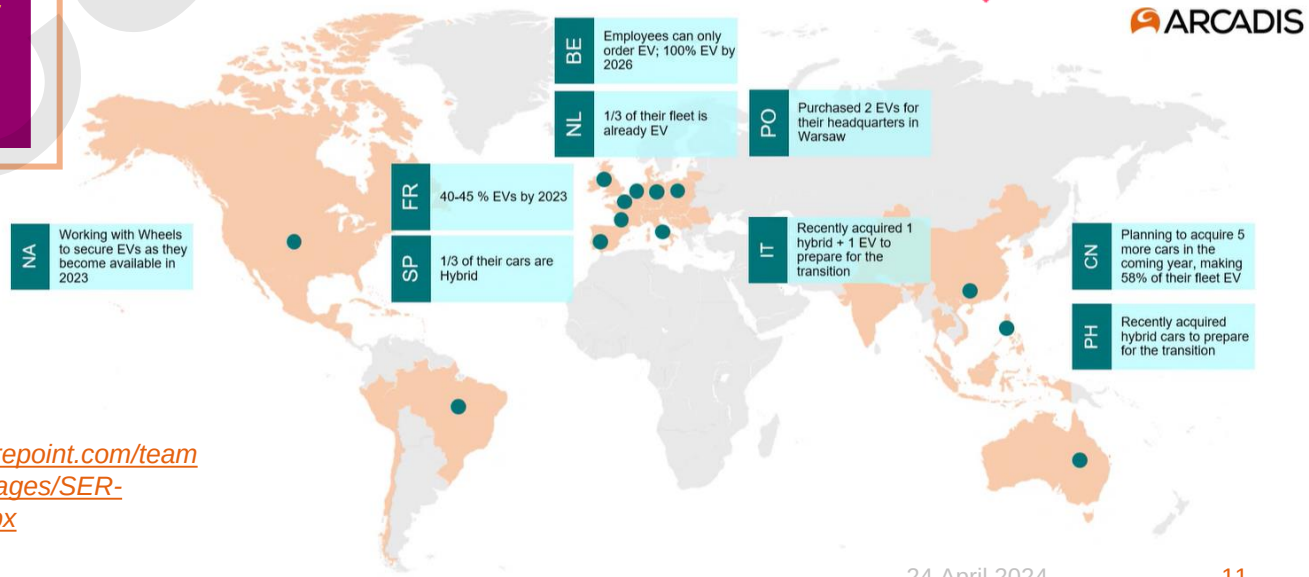
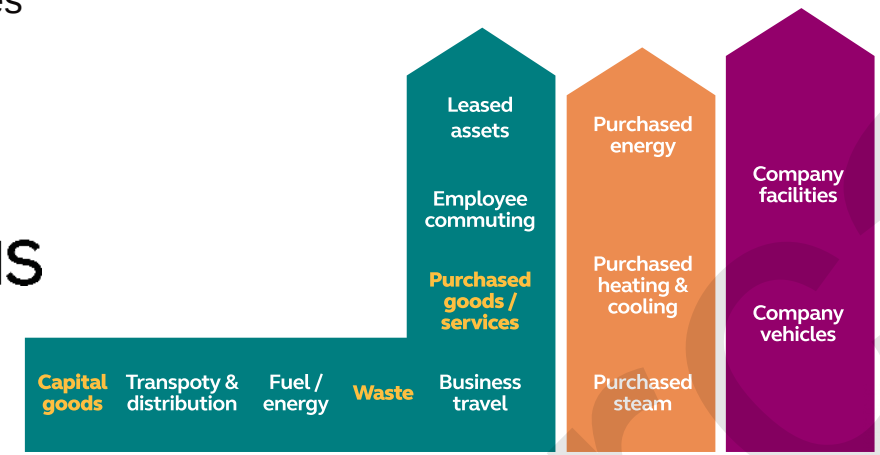
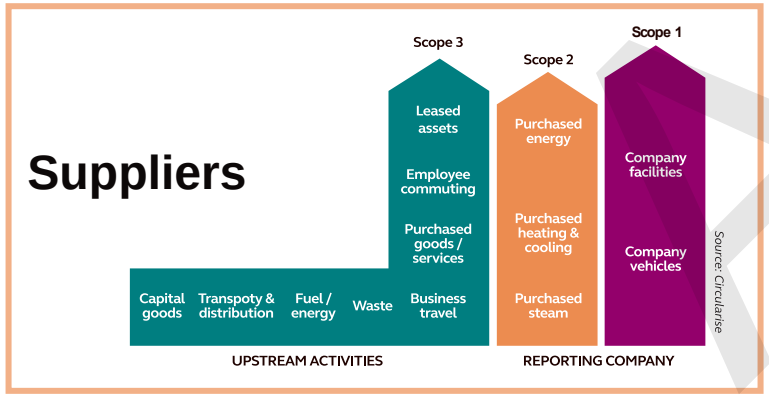


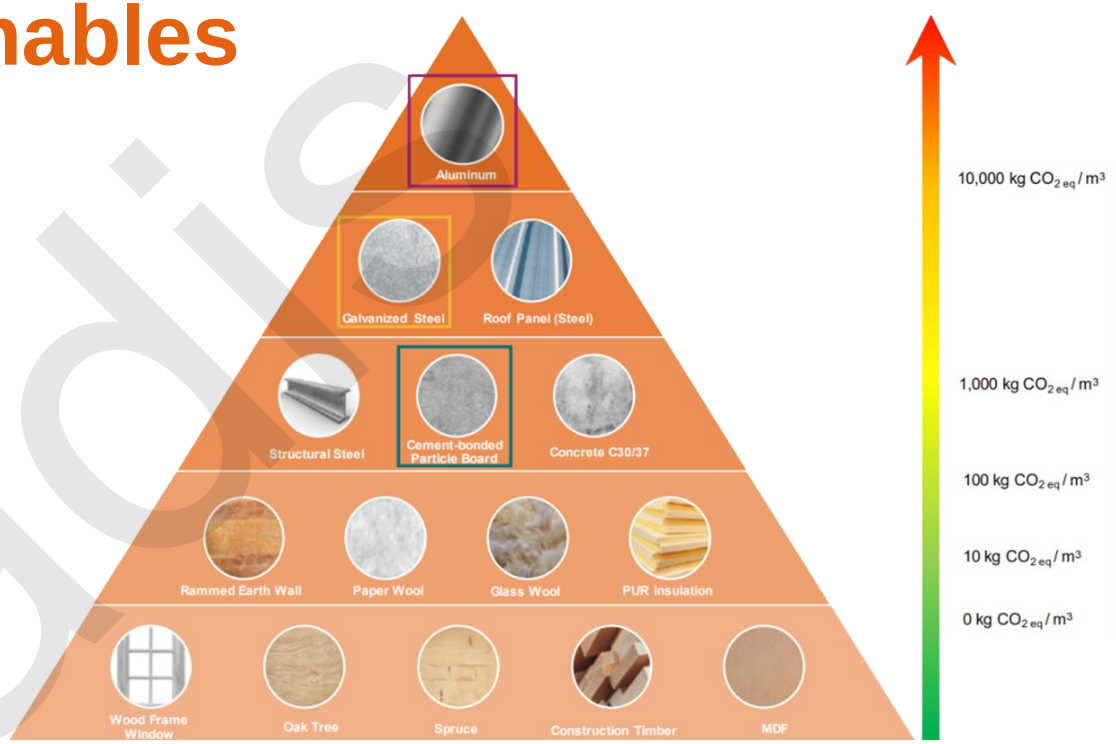


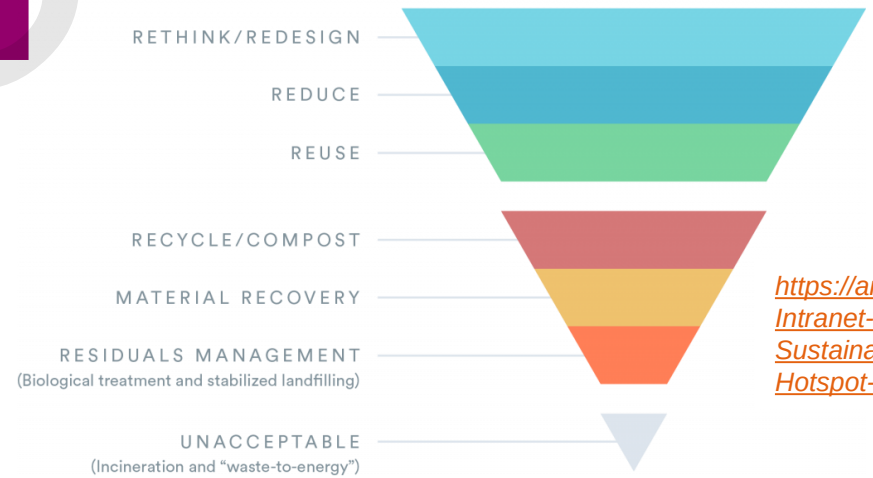
Supply Chain Carbon – Consumables

- Consumables and monitoring techniques
- Materials selection and materials lifecycle
- Need to collect data from supply chain
- Requires collaboration and data sharing across entities









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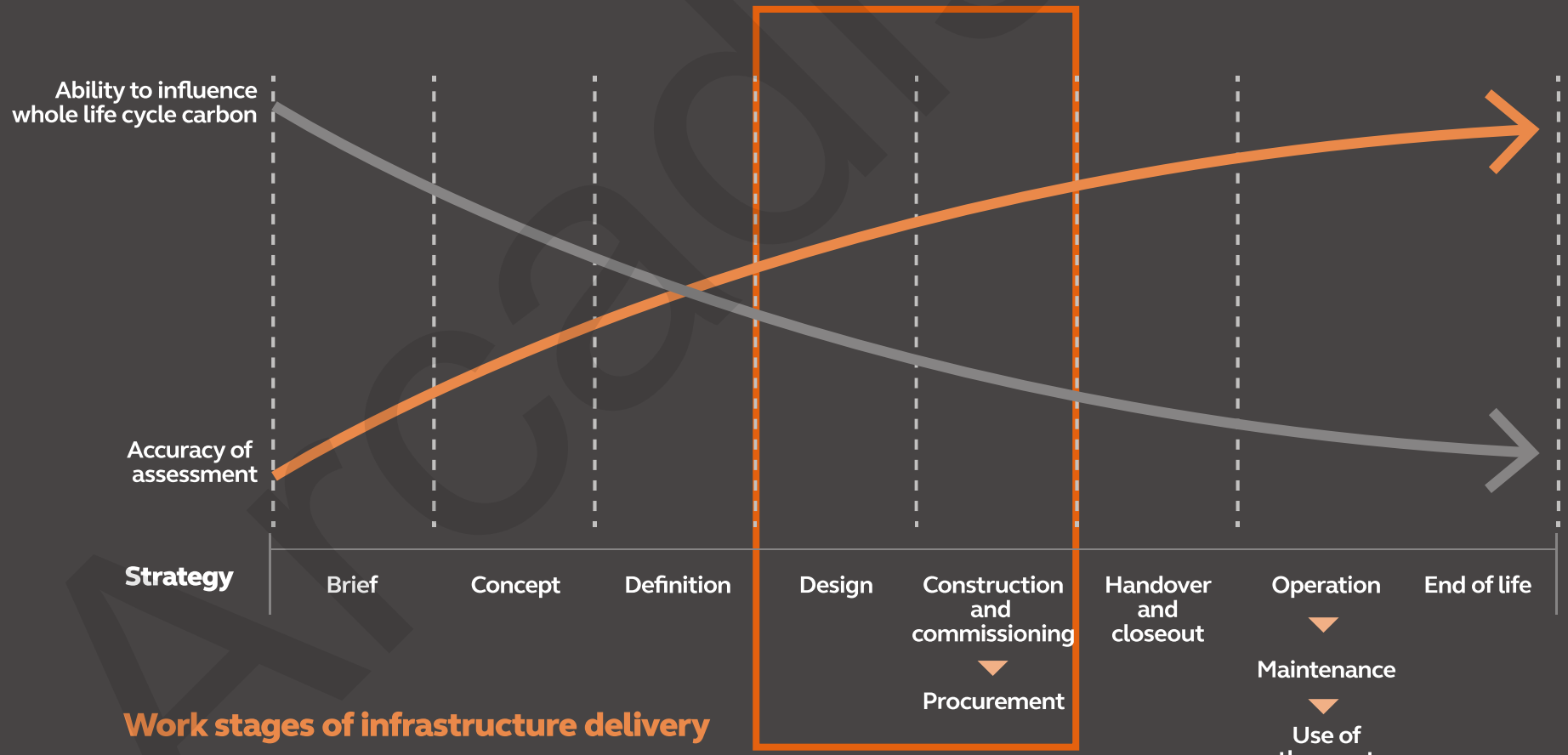
Sustainable Sitework

Sustainable Design and Procurement for Site Work

- Limited scope for sustainable changes
- Path is set based on previous design stages and end-goal requirements for project goals
- Still many improvements to be made to reduce carbon emissions



Work stages of infrastructure delivery

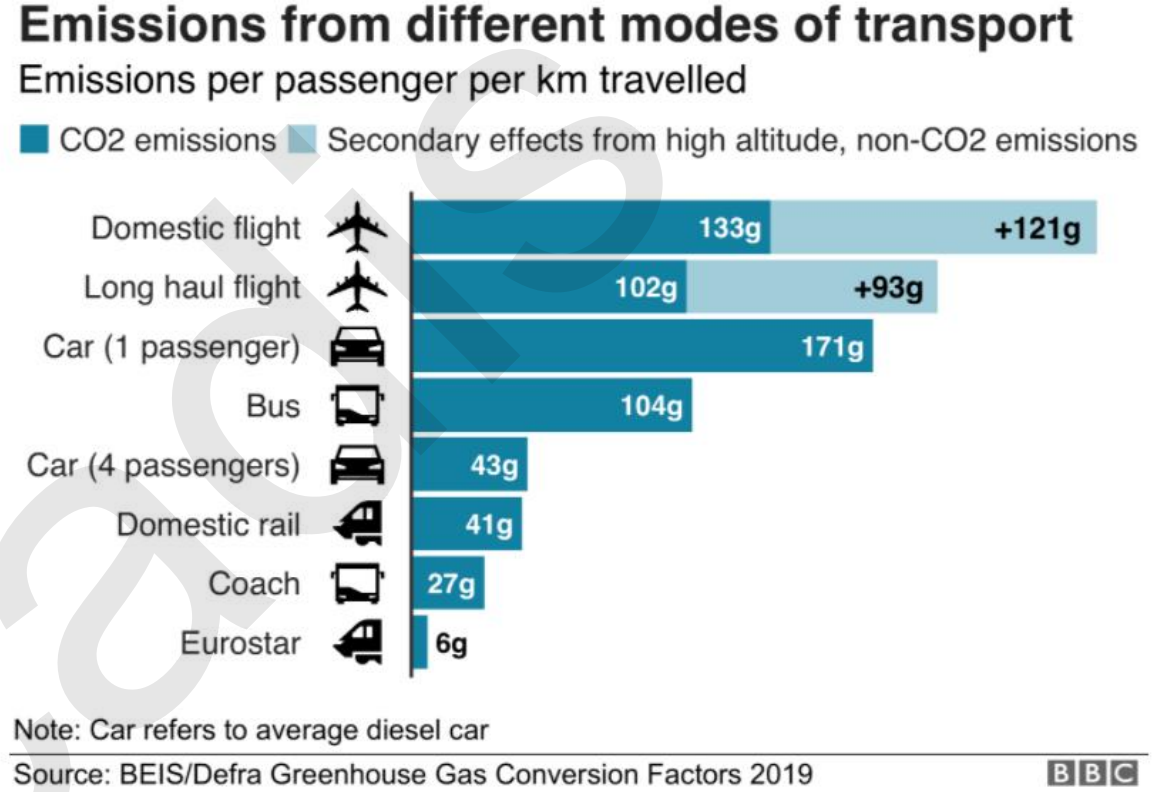
Source: PAS 2080

Design – Driving

Reduce Driving

- Efficient **Resourcing**
- Consider site worker home location as well as office location
- Overnight stays rather than repeated commutes

  Saves ~ 20 to 40 kgCO_2 per 60 mile trip (1.5 hour drive)
- Vehicle pooling
- Using public transport for equipment-light site visits (Walkovers, surveys, logging etc)
- Consider on-site facilities for overnight storage of samples/charging of equipment to enable **public transport commuting** or fewer courier collections

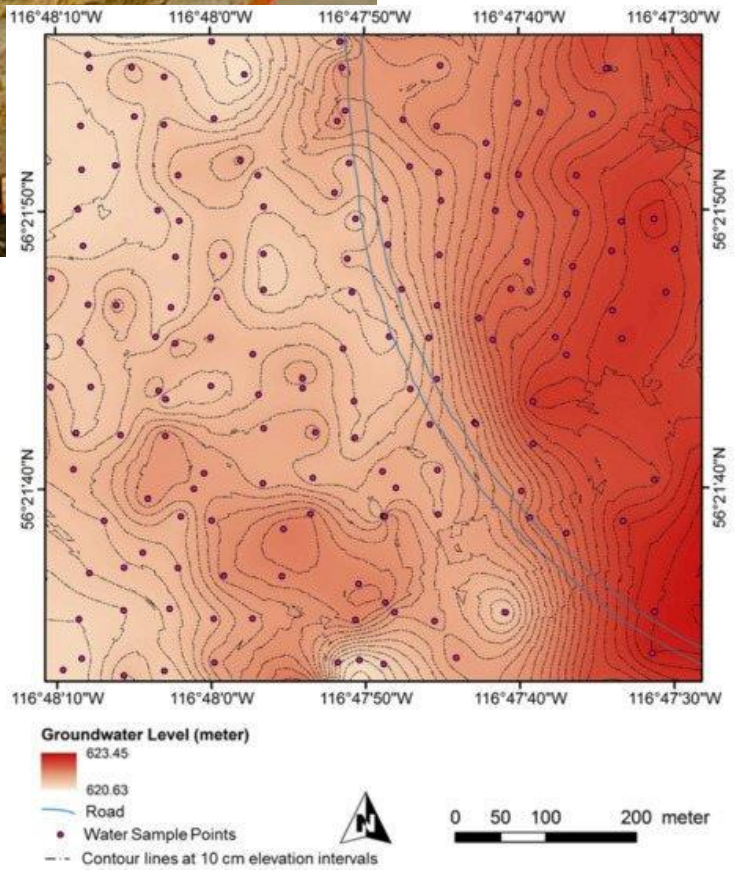


Design – Scope of Work

Reduce Intrusive Works:

1 m^3 of soil sent to landfill produces ~35 kg of CO_2 + the fuel to transport

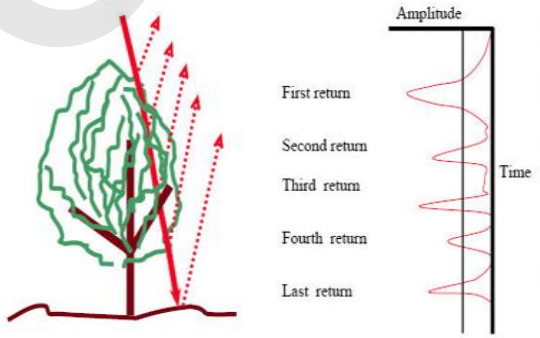
- Maximize the value of **existing and historical boreholes**
  - **FieldNow®** - digital borehole logging & predictive models
  - Digitized historical borehole records (**GeODin** <~ talk to Denny)
- Reducing intrusive works **(don't just drill)**
  - Co-ordinate with other teams – can scopes of works be combined?
  - Remote sensing / remote scanning
  - CPTs
  - Down-hole geophysics
- **Rail Freight** for soil transport

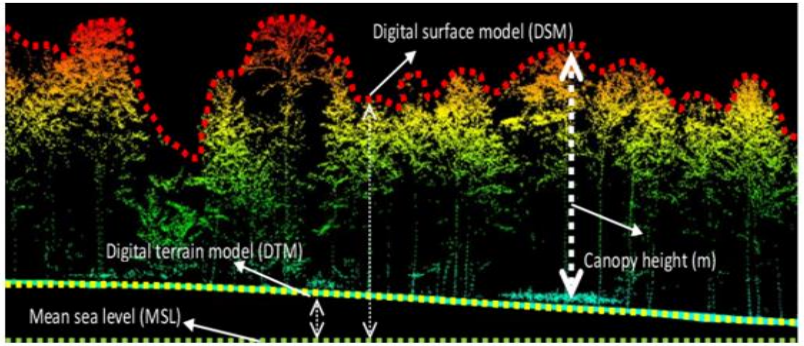


Design – Scope of Work

Reduce Veg Clearance:

- Assess ecological value of vegetation
- Minimise disturbance to sensitive habitats
- Remote Sensing
  - Using drones (air or waterborne)
  - Satellite data - next-gen LiDAR – penetrates vegetation
- Telemetry based monitoring and instrumentation
  - water levels, remote slope monitoring



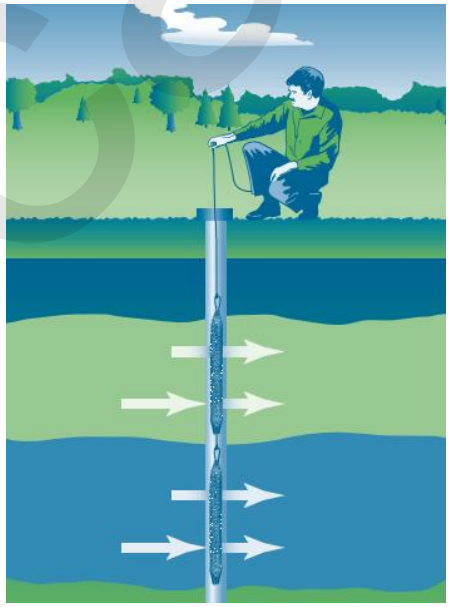


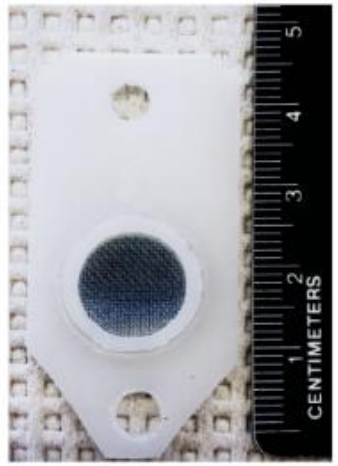
Design – Monitoring

Monitoring Techniques

- Continuous Monitoring & Telemetry
  - Divers/Loggers – can store months of groundwater level and baro readings
  - Reduces driving – fewer site visits

  One case study reduced driving by 60% per month
- No Purge techniques rather than Low Flow
  - E.g. passive diffusion bags or snap samplers left in monitoring wells (only certain CoC – good for PFAS)
    - **Talk to Wouter for more information**
  - Reduces well-purge volumes
  - Reduces plastic waste compared to LF tubing





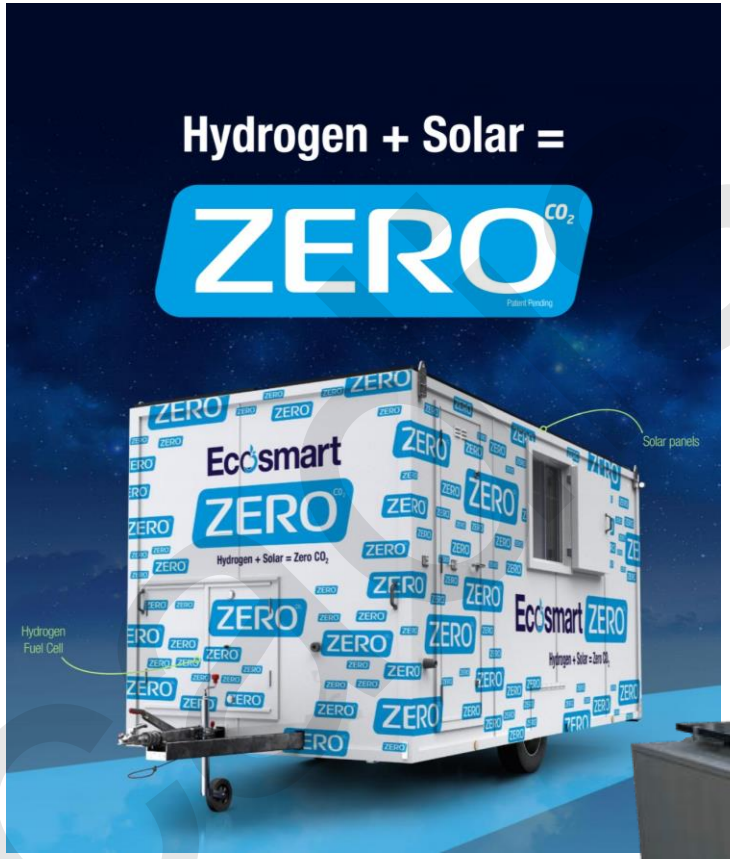
Procurement – Welfare

Eco Welfare Units

- Growing list of suppliers - different types available
- Not all are created equal
  - Solar + Hydrogen version is zero carbon
  - Solar + Diesel version is lower carbon (up to 75% less)

- Also address noise complaint issues – no generators running at night
- Long lead in and hard to book (not many units available)
- Addresses operational carbon (need to understand break-even point for manufacture)

1 Jerry can of diesel produces ~50 kgCO2 when burned



Procurement - Generators

Eco Generators

- **Solar + Diesel**
  - ~65 - 75% fuel reduction
- **Hydrogen**
  - Run on hydrogen cannisters – similar to camping gas
  - 75% cheaper to run than equivalent diesel generator
- **Hybrid Power**
  - Uses heat from diesel generators to charge internal batteries
  - 40 – 50% fuel reduction (compared to 24/7 running)

Diesel generators produce 0.7 – 1.1 kgCO_2 per kWh

~65 kg CO_2 per day for a typical welfare cabin

Can operate in ULEZ sites

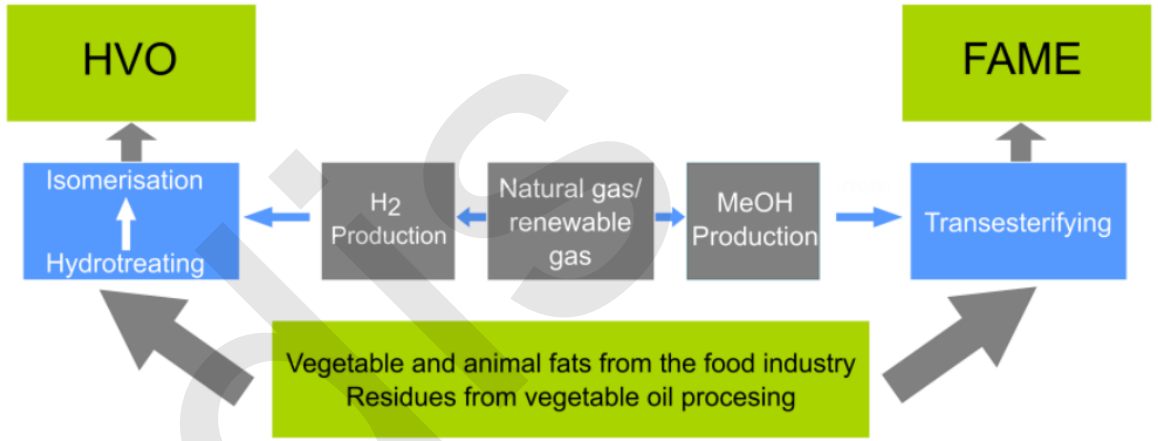
Can power static units or electric plant

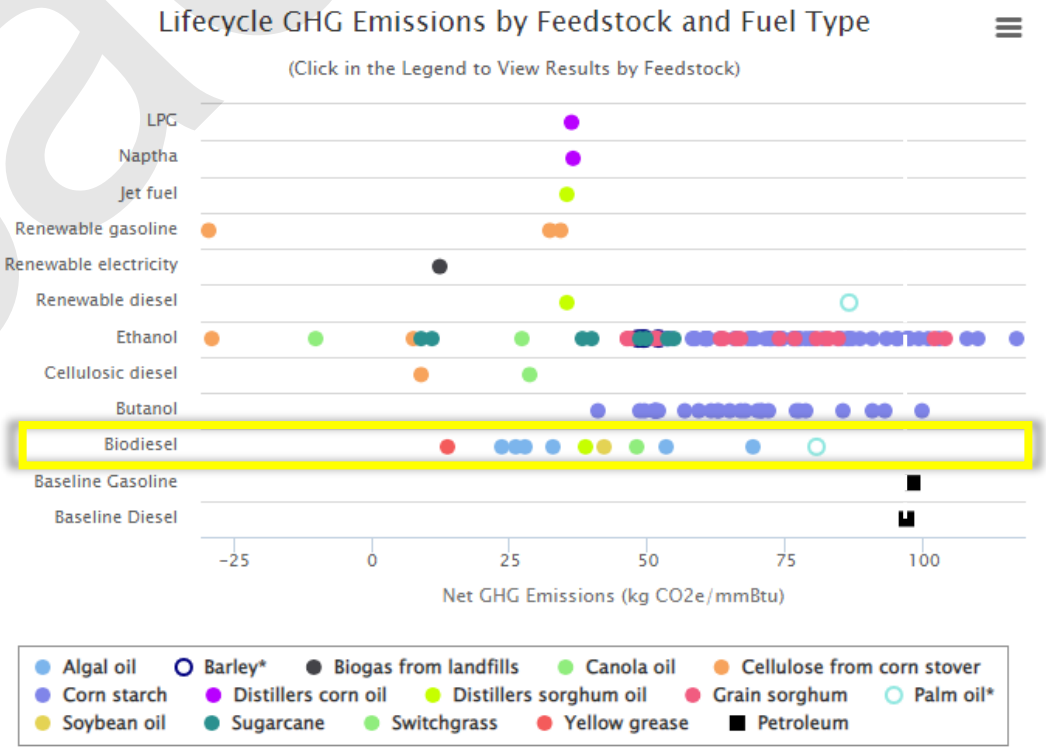
Lower noise (for compliance regulations

Procurement - Fuel

HVO and FAME Biofuels

- Replacement of mineral diesel in rigs and generators
- Drop-in diesel replacements
  - FAME = fatty acid methyl ester
    - Already comprises up to 7% of B7 diesel at the pump - can go up to 20% from specialist suppliers
    - Engine stalls at lower temperatures
  - HVO = hydrotreated vegetable oil
    - ~30% more expensive than diesel - specialist suppliers only
- Up to **90% lifecycle CO_2 reduction** vs mineral diesel
  - Exact reduction varies with feedstock source and transportation -
  - Issues around engine compatibility, suppliers and fuel storage





Source: EPA

Case Study

Award Winning Sustainable Ground Investigation

Shell Sceptre – Sustainable Solutions

Background:

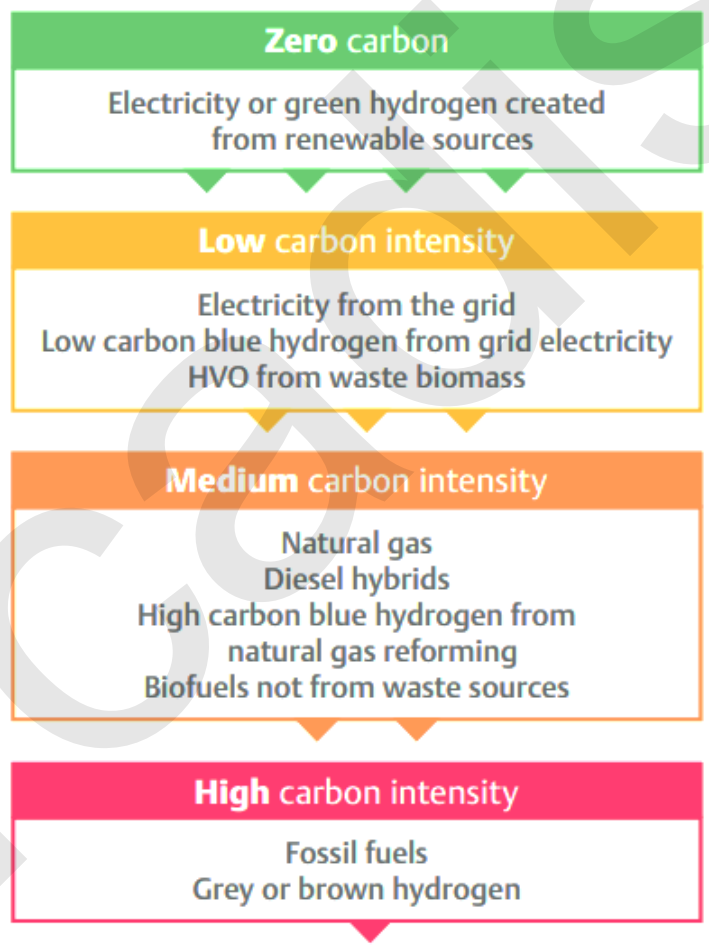
- Off-grid site (no power supply)
- Typically relies on diesel generators which are carbon intensive and cause noise and air pollution
- Is there a way to make this more sustainable?

Solution:

- Work with suppliers to understand sustainable options
- Rank options by carbon intensity
- Select the **least carbon intensive viable options**

Result:

- Approximately **26T CO_2** emissions saved by utilizing sustainable and lower-carbon intensive welfare and equipment provisions during the 12 week site drilling program.



Shell Sceptre – Sustainable Solutions

Welfare	CCTV\	Plant	Fuel
• Solar / diesel hybrid welfare • Welfare unit with roof-mounted photovoltaic panels which recharge an onboard battery to power lighting and plug sockets • saving **660kg CO_2** when compared to standard units	• Solar / methanol fuel cell CCTV • saving approximately **4,200kg CO_2** when compared with non solar powered CCTV requiring a diesel generator.	• Electric pallet mover • recharged using the welfare solar electric supply • negating the need for a telehandler • reducing potential emissions by approximately **20 TCO_2** • PLUS a significant cost saving	• Hydrotreated Vegetable Oil (HVO) used to refuel drilling rigs, remediation • generator and tracked dumper which saved up to **1,131 kg CO_2**

Conclusion and Next Steps

Conclusions

Sustainability in Projects

- Understand the basics – terminology and targets
- Lots of simple improvements to be made to reduce carbon emissions
- Start with the easy wins with the biggest impact
  - Travel
  - Welfare and fossil fuel generators
  - Switching to RECYCLED materials
  - Telemetry and remote sensing / surveying

Further Training:

- Expedition DNA Sustainability Basecamp
- Multilevel Whole of Life Carbon Training
  - Sustain Abilities (powered by the Lovinklaan Foundation)
  - Tier 2 Practitioner Level and Tier 3 Software training coming in Q3

https://arcadiso365.sharepoint.com/:u:/r/sites/Intranet-Global-Sustainability/SitePages/Whole-of-Life-Carbon-Multi-Level-Training.aspx?csf=1&web=1&e=Kg9x9P

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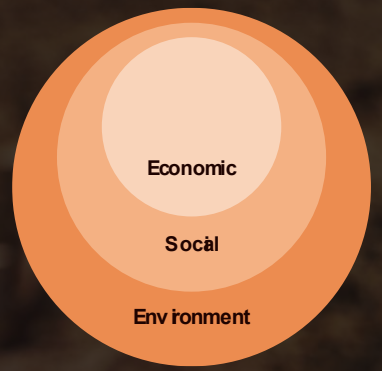
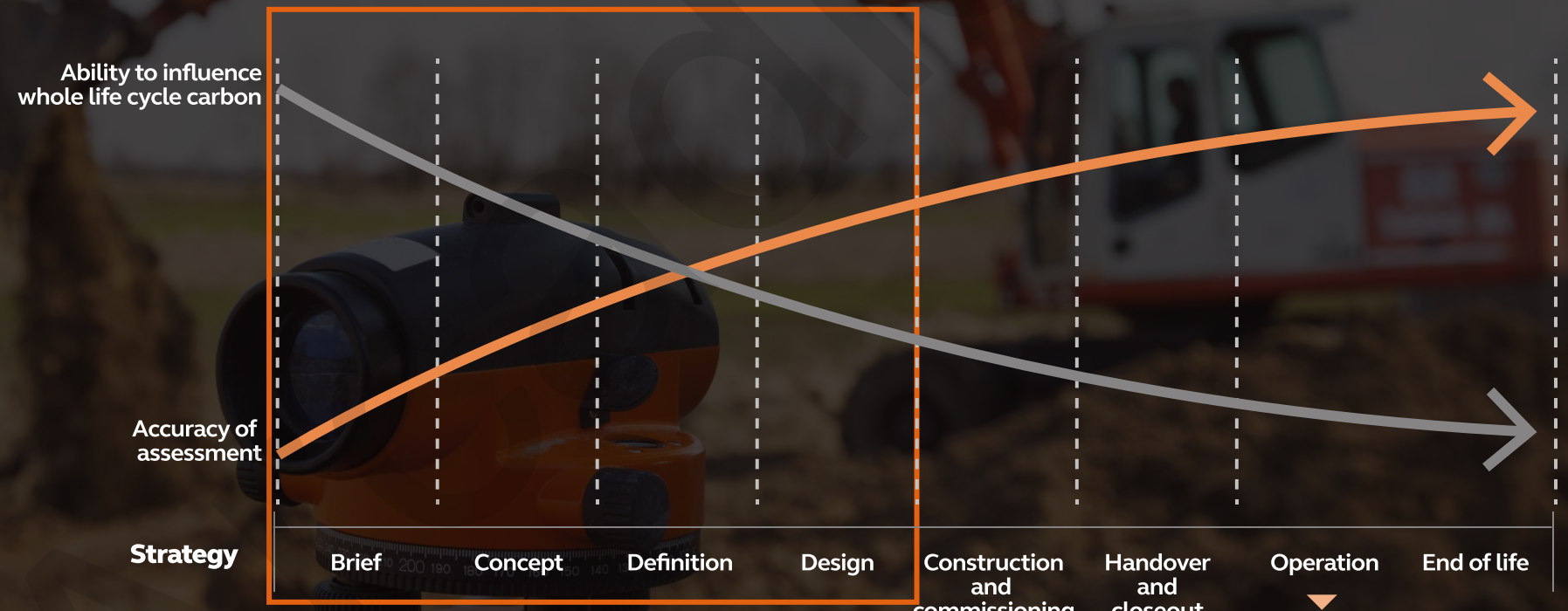
Greatest success through early adoption of sustainable principles

- Retrofitting a scope of works is always more challenging
- Involvement in **discussion with clients AND regulators** to provide sustainable solutions as early as possible
- Multicriteria analysis – e.g. **SuRF framework** to support decision making





Work stages of infrastructure delivery

Source: PAS 2080

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