Sustainability Overview

An introduction to sustainability concepts, accreditations and legislation for foundation contractors

EFFC sustainability working group 2019

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FOREWORD

Sustainability is an emerging priority for foundation contractors. Many companies are already instigating cost-saving or efficiency-based improvements. Even beyond these savings, some clients are asking for more sustainable solutions or sustainability reporting. Investors commonly require sustainability reporting, whilst a rise in 'green' investment funds has put increasing pressure on sustainability action. Legislation is also a large driver of sustainability, actively forcing sustainability improvements and reporting. In order to react to all these drivers, foundation contractors need a basic understanding of sustainability, as well as what sustainability means for their company activities.

This report provides an introduction to a number of key concepts, accreditations and areas of legislation relevant for foundation contractors in Europe. This document is intended as a technical reference point and does not make recommendations. It is not prescriptive, so other legislation / accreditations may prove relevant to specific contractors; nonetheless, this report forms a brief overview for foundation contractors to help understand sustainability.

Overall, sustainability for foundation contractors should be holistic, balancing environmental, social, economic and technical factors, both for the present and into the future. However, sustainability priorities and impacts vary by stakeholder, site and technique. Therefore, to have the greatest effect, companies must work with their stakeholders, mitigating their current sustainability impacts and ultimately aim to have a net positive impact on sustainability.

KEY TERMS & DEFINITIONS

In order to understand and communicate the sustainability demands of stakeholders, this report sets out some key terms and what they mean for foundation contractors. These terms also underlie many of the core concepts, assessment methods and accreditations in this report.

Absolute vs Relative Sustainability

The difference between absolute and relative sustainability has a considerable impact on sustainability assessment methods. Relative metrics, such as year on year or company vs company comparisons, do not show whether impacts are still severely large (and therefore need to be reduced rapidly) or are already minimal and so percentage reductions have little influence. Therefore, alongside relative metrics, absolute metrics are needed to show how the company performs against an appropriate normalised baseline, such as a science based target or proportion of the Sustainable Development Goals.

E.g. Relative sustainability: "emissions are now X per €1000, a reduction of Y% on the previous year"
Absolute sustainability: "emissions are now X per €1000, Y% above our science based target."

Burden Shifting

In sustainability, avoiding burden shifting means ensuring improvements to one area of sustainability do not result in negative impacts elsewhere. This requires a holistic approach, ensuring sustainability improvements do not just pass impacts onto another contractor, another part of the building construction, a later point in the foundation's life cycle, or another geographical location.

Life Cycle Thinking

Life cycle thinking (LCT) requires companies to look at the impacts of a product, from raw material extraction through its manufacture and installation, its use and then its eventual end of life. Using the stages of a product's life cycle, companies can then identify at what point the greatest impacts of their decisions are felt. Therefore, LCT is vital to avoid burden shifting throughout a product's lifecycle and underpins most sustainability assessments and approaches.

Circular Economy

The circular economy is increasing being incorporated in national legislation; for example the EU is already beginning to implement a Circular Economy Action Plan (EU commission, 2019). The circular economy aims for a fully closed loop, where products are made from recycled materials, have longer lifespans and, at the end of their life, are themselves repaired, reused or recycled. A practical application of life cycle thinking, the circular economy can theoretically reduce raw material extraction and waste generation, as well as potentially decreasing the energy used to make new products.

Industrial Symbiosis

Industrial symbiosis involves connecting companies, so that waste from one company can be used as a primary resource by the other. This reduces the volume of material going to landfill and reduces raw material extraction, as well as potentially saving money for both companies. This contributes to closing the loop of the circular economy, particularly where companies are co-located. Many government and government-aided organisations promote industrial symbiosis and organisations, such as International Synergies, provide tools to actively connect companies and calculate potential carbon, water, waste to landfill and cost savings.

Natural Capital

Natural capital is a way of attaching value to environmental resources. This value involves quantifying the cultural, recreational and ecosystem services a resource provides for humans. In allocating this price tag, companies can then factor the impact on these resources when making financial decisions for a site. The Natural Capital Committee, for example, advises on environmental law-making and provides guides for how natural capital can add value to companies.

Production & Consumption Approaches

Production-based approaches means the company manufacturing the resource, such as concrete manufacturers and suppliers, are solely responsible for its impacts. For countries, this is also known as a territorial approach, as each country is solely responsible for the emissions it produces. Alternatively, a consumption-based approach makes the company that specifies the use of a product responsible for the impacts, such as a geotechnical company that asks for X tonnes of concrete for a pile. These different approaches are sometimes used to shift responsibility for certain actions between geotechnical companies and their supply chain. Therefore, to prevent the exclusion or double counting of impacts, all companies should use the same production or consumption approach.

Scope 1, 2 & 3 Emissions

Carbon footprints are typically divided up into 3 ‘scopes’:
Scope 1 = Direct emissions from fuel usage
Scope 2 = Indirect emissions from electricity usage
Scope 3 = Indirect emissions throughout a product’s life cycle, from material extraction to disposal.
Scope 1 and 2 reporting is mandatory for large companies under the EU Transparency and Energy Efficiency directives. Given the time and cost requirements, scope 3 reporting remains optional for companies. However, scope 3 is almost always many times larger than scope 1 and 2 emissions, so can have a large influence on the overall embodied carbon of a business.

1. CORE CONCEPTS

1.1 Planetary Boundaries

The planetary boundaries help visualise a series of thresholds for different environmental indicators (Fig. 1); according to the model, if these thresholds are permanently exceeded, there will be massive global disruption, such as global flooding or crop failures (Rockström *et al.,* 2009; Steffen *et al.*, 2015). Therefore, it is possible to define a 'safe operating space', with planetary boundaries a safe distance from these thresholds (Figure 1). Raworth (2012) also integrated these boundaries with social indicators to form a 'social doughnut' model; this shows what minimum social standards have to be met in the 'safe operating space' for social sustainability.

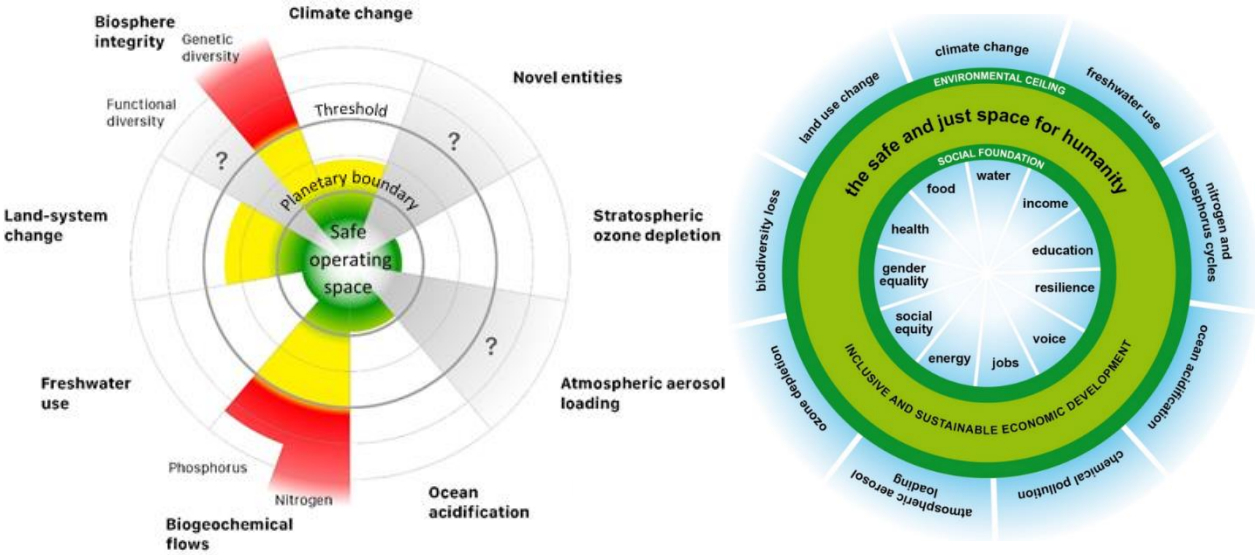

Figure 1: The planetary boundaries from Steffan et al. (2015) and the social doughnut model from Raworth (2012). The planetary boundaries are colour-coded according to Earth's current proximity to the thresholds. The social doughnut has a 'safe and just' space between a social foundation and an environmental ceiling.

The planetary boundaries therefore have the potential to be integrated within assessment tools, providing absolute boundaries for a range of environmental impact categories. They are a good visual communication tool, can help avoid burden shifting between environmental factors and provide an absolute sustainability target to keep impacts below. The planetary boundaries are not used for reporting, but this push for absolute boundaries has given rise to schemes like Science Based Targets.

1.2 UN Sustainable Development Goals

Many companies in the wider construction industry assess their sustainability relative to the UN Sustainable Development Goals (SDGs). There are 17 goals with 169 targets to meet by 2030 (Fig. 2); these targets are aimed at governments to meet various social, economic and environmental indicators. Since many of these targets are interconnected the SDGs are also intended to be addressed collectively.

Figure 2: The 17 Sustainable Development Goals (UN, 2015)

The SDGs are holistic, looking to avoid burden shifting and address all areas of sustainability. They are well used and communicated both in government, among companies and increasingly by investors, enabling corporate stakeholders to engage with these targets. All these goals, or more commonly the most relevant goals to a specific company, are often used as a framework to report company sustainability.

2. ASSESSMENT METHODS

2.1 Input-output

Input-output analysis is a tool to convert expenditure in different business areas into an approximated specific impact (e.g. price to volume of CO_2e). It means an approximate total impact can be generated from the company, or individual site, accounts.

As it utilises company accounts, it is relatively quick to carry out. It is also much more realistic to carry out for a whole company, rather than just for one product like a Life Cycle Assessment (LCA). Input-output is not as accurate or as detailed as an LCA, with whole areas of the business allocated the same conversion factor. Nonetheless, input-output analysis can still identify broad 'hotspots' of large impacts, which companies can then target when improving their sustainability.

The EFFC carbon calculator (2013) combines input-output analysis with aspects of an life cycle assessment, calculating carbon emissions from the foundation method, type and volume of concrete, volume of waste material, distance/ number of trucks in transport etc. This allows companies to explore the stages of operations that have the greatest carbon impact. However, being a single metric, companies should also be cautious to avoid burden shifting, so reductions in CO_2 are not made to the detriment of other sustainability areas.

2.2 Life Cycle Assessment

An LCA is a detailed methodology to collect and analyse data on multiple environmental impacts from a product, technique or service; this is typically from 'cradle to grave', from the extraction of raw materials for the product to the end of the product's life (ISO 14040, 2016). LCAs are also used to show the factors/ assumptions that most influence the overall lifecycle impacts.

Using measurements at each stage of the products lifecycle, an LCA can precisely identify environmental impact hotspots, even down to a specific process or machine level. They can be applied to a range of geotechnical products, particularly to compare which products are 'most sustainable'; two LCAs can be run alongside one another to compare the environmental impacts of the two products. Provided system boundaries, allocation approaches and data sources are comparable, two LCAS can help differentiate between processes that make the same product.

Although LCAs give a detailed understanding of a product's sustainability, their complexity means they are time consuming and costly to carry out. There are limitations around where companies decide to draw the extent of their responsibility and datasets for resource extraction and product disposal can be difficult to ascertain. Therefore, given the resources and knowledge required to complete an LCA, companies will typically approach universities or consultancies to carry one out. However, the greatest benefits of an LCA are often the knowledge gained from data collection and setting system boundaries, something that can be overlooked if the process is outsourced.

2.2.1 ISO 14040 Life cycle assessment

The ISO 14040 series is widely regarded as the best practice methodology for life cycle assessments. This standard sets out 4 key stages to an LCA: goal and scope definition, inventory analysis, impact assessment and interpretation. Although ultimately these stages happen consecutively, continual review and improvement is encouraged throughout the LCA. Since ISO 14040 requires extensive auditing, most LCAs are carried out to 'ISO 14040 specifications' rather than seeking the accreditation itself. For more on ISO standards see chapter 3.1.

2.3 Value-Chain Analysis

Value-chain analysis is a way of comparing the environmental impact of a process relative to the value added at each stage of production. This is a useful tool to compare different production methods for the same product; the ideal value-chain has the lowest environmental impact with the greatest added value (Fig. 3). It can also help identify who incurs the greatest costs across the value chain, helping with social equity target setting.

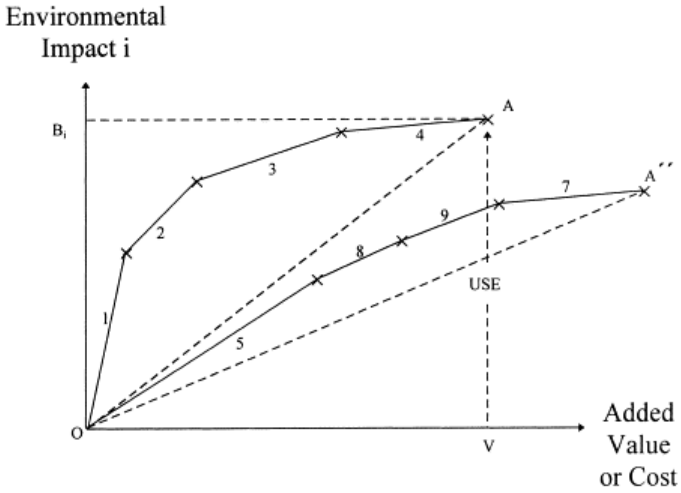

Figure 3: An example of comparative value-chain analysis from Clift & Wright (2000), showing product A that has a lower value and higher environmental impact compared to product A''. In reality, product A is also more likely to face higher environmental remediation costs, making product A even more expensive compared to A''.

As well as identifying broad environmental hotspots, value-chain analysis is a good way to show the direct cost implications of environmental improvements; this ensures companies can make informed decisions about the economic, as well as environmental, sustainability of production methods. They are relatively easy to produce, in collaboration with a company's supply chain, and are very useful for comparing different processes that make the same product. Value-chain analysis also underlies the 'polluter pays' principle, ensuring the cost of remediating impacts are transferred to the companies that caused them; in turn, the 'polluter pays' principle underlies much of current EU law (e.g. the EU Emissions Trading System).

However, since it only measures a single environmental impact, there is a potential for burden shifting; improvements to one environmental impact category could come at the expense of unmeasured environmental or social aspects. Equally, value-chain analysis does not consider whether clients and investors are willing to pay more for a process with less environmental impact. Therefore, companies should also consider the client demand and other benefits, such as to their reputation, for reducing their environmental impact when assessing / comparing processes.

3. COMPANY ACCREDITATIONS

The most common way for companies to demonstrate their sustainability credentials to their clients is through accreditation schemes. Whilst some clients request their subcontractors are members of professional sustainability bodies, such as the Supply Chain Sustainability School, most simply request subcontractors hold certain company accreditations.

3.1 ISO standards

The International Standards Organisation (ISO) produce an extensive range of different standards and accreditations. The voluntary standards require certain minimum standards to be maintained, particularly in terms of policy and reporting. As with any accreditation, these can require a large time investment to achieve and maintain; ISO requires audits by an external company every 3 years. Although voluntary, ISO 9001, 14001 and 45001 are increasingly requested by almost all clients and contractors in their pre-qualifications, as a guarantee of minimum standards.

3.1.1 ISO 9001 Quality management

ISO 9001 is a quality standard, based around centralised quality management; it requires companies to demonstrate continuous planning, review and improvement. It is split into 7 quality management principles: customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision making and relationship management (ISO, 2015). In 2017, over 1 million ISO 9001 certificates were issued globally.

3.1.2 ISO 14001 Environmental management

ISO 14001 is an environmental management system (EMS) standard, aiming to protect and improve the environment, as well as balancing it with social and economic sustainability. Alongside ensuring companies meet legal requirements, ISO 14001 requires a strong and continuously improving environmental policy. It is split into 10 sections including: the context of the organization, leadership, planning, support, operations, performance evaluation and EMS improvement. In 2017, over 360,000 ISO 14001 certificates were issued.

3.1.3 ISO 45001 Occupational health and safety

ISO 45001 is the best-recognised international health and safety standard. Building on the British Standard OHSAS 18001, ISO 45001 aims to strengthen and implement companies H&S policies. It is also readily integrated with the structures set up for ISO14001 and ISO 9001, utilising the same "plan-do-check-act cycle" for continuous improvement. Likewise, the standard has sections requiring details about the context of the organization, leadership, planning, support, operations, performance evaluation and improvement.

3.1.4 ISO 26000 Social responsibility

ISO 26000 encourages companies to address their social responsibility. Although not certifiable like the other 3 ISO standards, ISO 26000 sets best practice for many policies requested by clients in pre-qualifications, such as anti-corruption or equal-opportunities. It is designed to work alongside ISO 9001 and 14001, helping prevent burden shifting to social impacts when making other improvements.

3.2 EMAS

The Eco-Management and Audit Scheme (EMAS) was used by 3800 organisations in 2018 and is a legal requirement in some European countries. Effectively the European equivalent of ISO 14001, EMAS is also broadly geared towards environmental reporting and policy, using the same "plan-do-check-act cycle" and requiring auditing every 3 years. However, EMAS audits must be carried out by government auditors, rather than external company auditors like ISO. EMAS is also used for individual company entities in each country, unlike ISO which can be applied to company groups. It is also seen as slightly stricter than ISO 14001, actively requiring companies to implement environmental improvements on a yearly basis.

3.3 SA8000

This social accountability standard, from Social Accountability International (SAI), requires companies meet set obligations towards their employees. SA8000 was held by around 4000 companies in 2018; these are most commonly manufacturing companies. The accreditation is split into 8 key 'elements': child labour; forced labour; health and safety; freedom of association and right to collective bargaining; discrimination; disciplinary practices; working hours; remuneration; and management systems. As well as meeting these basic standards, SAI also provide resources for measuring social performance with stakeholders and companies supply chains.

4. FRAMEWORKS

4.1 Global Reporting Initiative

The GRI standards are used by 80% of the world's 250 largest companies, with around 14,000 organizations using them in 2018. The GRI Standards is used for sustainability reporting and represents best practice for sustainability disclosures. They provide a tool for companies to identify, understand and report their social, environmental and economic impact. They can be used to comply with all aspects of the EU Non-financial Reporting Directive.

Both GRI and the EU Directive highlight the importance of "materiality" in identifying the relevant issues (material topics) which the organization should focus and report on. Materiality refers to the environmental, social and economic impacts that are most significant to an organization and/or have the greatest influence on their stakeholders. The materiality principle is furthermore a good way of including stakeholders and improving stakeholder relations. GRI overall is also closely aligned with relevant UN, ILO and OECD sustainability / human rights frameworks and can be used to report on the Sustainable Development Goals. Also, its widespread use makes it an effective tool for benchmarking sustainability performance. Furthermore, it adds credibility to sustainability disclosures and report.

GRI allows certain topics to be omitted from reporting, where justified by the company. This flexibility may undermine the robustness of the sustainability disclosures and potentially permit 'greenwashing'. However, GRI standards facilitate company transparency, both around their sustainability impacts and the rationale for omitting certain topics; thus, this transparency generally is a strong driver of sustainability improvements.

4.2 Carbon Disclosure Programme

The Carbon Disclosure Programme (CDP) provides an open, searchable website for companies around the world. The CDP scores company disclosures from A to F based on their: governance, climate change, risks and opportunities, business strategy, targets / performance and scope 1 & 2 emissions. Although voluntary, CDP approaches companies to partake and gives them an F rating if they do not comply. It also provides a relative score for companies in the same sector and now measures performance in water security and forests. Over 7000 companies reported to CDP in 2018.

4.3 Science Based Targets

The Science Based Targets initiative provides support and resources to help companies set absolute greenhouse gas (GHG) emission targets. This is one of the only initiatives that provides an absolute sustainability targets, calculating what improvements in scope 1, 2 and 3 emissions are required to keep global temperatures well-below 2°C above pre-industrial levels; this 2°C threshold is based on the Paris Climate Conference global target. The initiative also provides a searchable database of the companies signed up to these targets, both to encourage companies to adopt targets, but also to hold them to account and ensure the targets are met. Over 700 companies have agreed to set Science Based Targets (2019).

5. PROJECT ACCREDITATIONS

Project accreditations are often stipulated by clients or contractors; this helps them ensure their overall building or infrastructure project meets certain sustainability standards. As most accreditations apply to whole structures, only a small part of each accreditation is actually relevant to foundations and ground engineering. Nonetheless, understanding how these accreditation systems work can help foundation contractors best position themselves to meet these standards.

5.1 BREEAM

The Building Research Establishment Environmental Assessment Method (BREEAM) by BRE is a widely used commercial tool, with over 2million registered buildings across the world (BRE, 2019). BREEAM has a number of assessments, from new construction to refurbishment, scoring projects on various environmental and social factors. Credits are allocated for improving various impacts under different headline impacts, with more credits awarded for innovation and mitigating more of the impact. These credits are used to award a project status, from outstanding to unclassified. Most clients, particularly government or local council funded projects, will specify a minimum standard the project must reach.

If a geotechnical company can contribute towards the sustainability credits for a project, it will help towards a better BREEAM score for the project. Therefore, realistically main contractors will use more sustainable foundations if it means they can save money elsewhere in the project, where sustainability improvements are more costly. Whilst this means that BREEAM actively allows for burden shifting, it does at least ensure that some sustainability improvements are made to new builds. The greatest influence of foundation contractors is through their design, sourcing materials, innovation and waste removal; without control over any of these processes, foundation contractors have minimal influence on the BREEAM score.

5.2 CEEQUAL

The Civil Engineering Environmental Quality Assessment and Award scheme (CEEQUAL) is a new BRE product targeted at infrastructure and civil engineering projects. Just like BREEAM, it rates projects from unclassified to outstanding. However, in addition to environmental and social sustainability, CEEQUAL also assesses areas such as management, resilience and stakeholder engagement. This means it can be used to assess office operations, such as design, separately from the construction of a project. Therefore, there are 5 CEEQUAL awards: whole project award, strategy & design award, design only award, design & construction award, and construction only award. These awards do not focus on subcontractors directly, focusing instead on the client, principle contractor and principle designer. Nonetheless, subcontractors are still considered in the management and supply chain sections of this assessment, as well as contributing towards the environmental and social impact categories.

Just like BREEAM, clients will typically set a minimum CEEQUAL score they want to achieve; this in turn encourages more sustainable behaviour, as well more sustainable design and development. Again, the impact rating system, plus the combination of these to a single score, means there is the potential for burden shifting between impacts. However, the incorporation of management and internal sustainability encourages more holistic sustainability beyond the products and installation.

5.3 LEED

Leadership in Energy and Environmental Design (LEED), is a commercial tool from the US Green Building Council, used by around 90,000 projects globally (LEED, 2019). It is used to assess the sustainability of new buildings, rating them from uncertified to platinum. It is split up into multiple credentials: building design & construction, interior design & construction, building operations & maintenance, neighbourhood development, homes and cities & communities. There is also a credential for recertification of old projects as well as a new accreditation for net zero resource use &/or carbon. Credits are awarded for more sustainable measures under various environmental and social impact categories; each category also has prerequisites required in all buildings.

Like CEEQUAL, the focus of LEED on the design, as well as the construction, phases helps ensure sustainability is continued throughout a building and the contractors / subcontractors. The inclusion of basic social and site sustainability also encourage a broader, more holistic sustainability approach. The use of prerequisites as well as credits also helps to prevent some burden shifting between impact categories. Foundation contractors working on these sites may experience closer monitoring and management, alongside any requests for more sustainable design, more sustainable materials or waste minimisation.

5.4 Company Specific Assessments

Some companies, particularly principle contractors, have developed their own sustainability assessments. This enables a company to present their project sustainability to clients and investors in a way that is most applicable to their business. These assessments are far more likely to include specific areas relevant to foundations and other geotechnical services. In order to properly develop such an assessment requires a good understanding of life cycle impacts and stakeholder priorities.

5.5 Government Specific Accreditations

Many national governments / ministries have their own, sector related, sustainability accreditations. This enables accreditations to better target the areas of sustainability most relevant to specific sectors. However, the uptake and scope of government accreditations can vary significantly; many tools only assess environmental sustainability, risking burden shifting without the social metrics of commercial assessments such as BREEAM and LEED. Nonetheless, as national and EU governments continue to prioritise sustainability, geotechnical companies should remain aware of any new government building accreditations, particularly in commonly assessed sectors such as housebuilding.

6. LEGISLATION

6.1 EU Emission Standards for New Non-Road Mobile Machinery Directive

This series of directives affect all on-site machinery and generators using petrol or diesel in the EU. It sets maximum gaseous and particulate emissions based on an engines power, incrementally decreasing these emissions caps over a series of years. This aims to improve air quality, reduce GHG emissions and increase engine efficiency. Currently, new rigs and engines are required to meet tier V, with some government requiring minimum tier engines. Some government-funded infrastructure projects stipulate a minimum tier standard that all engines on site must comply with. The rolling upgrade of engines to tier V has proven a massive capital expenditure for some foundation companies; nonetheless, in the long-term there is a fuel-efficiency saving associated with these improvements and the highest tier engines can allow contractors to work within low emission zones.

6.2 EU Energy Efficiency Directive

Also known as the Energy Savings Opportunity Scheme (ESOS) in the UK, this directive aims to help companies identify the commercial opportunities for energy savings. This directive is mandatory for companies with over 250 employees, or an annual turnover more than €50 million and an annual balance sheet in excess of €43 million. It requires companies to have an internal accredited assessor to calculate their total energy consumption, identify the largest areas of energy consumption and establish what improvements can be made to reduce these. This includes energy used in transport of staff and materials, manufacturing processes, office processes and facilities construction. The reporting partly duplicates areas of the EU Transparency Directive and EU Emissions Trading System, so emphasis is put on identifying the energy-saving opportunities.

6.3 EU Transparency Directive

This directive is required for quoted companies that have shares floated on a European stock exchange. Among various other criteria, it requires companies to report GHG scope 1 & 2 emissions. Emissions are reported in CO_2 equivalent (CO_2e), incorporating all greenhouse gasses by their global warming potential. Companies must also publish the methodology used to calculate these emissions in their annual report, as well as linking them to their income or business activities, such as CO_2e per € million, or CO_2e per 100 site hours worked.

6.4 EU Non-financial Reporting Directive

Just like the EU Transparency Directive, the EU Non-financial Reporting Directive covers quoted companies and has been translated into national laws. The directive covers a wide range of requirements and is intended to be flexible, in order to meet different companies corporate social responsibilities; the most relevant requirements for sustainability, however, are the social and environmental reporting obligations. The social obligations include reporting on: health and safety, respect for human rights, anti-corruption, diversity and bribery matters. The environmental reporting requires a broad assessment of the company's largest environmental impacts including: use of water, air pollution, energy sources and the carbon disclosures of the EU Transparency Directive. As well as having relevant policies, this directive requires companies to assess the risks and opportunities posed by these areas sustainability impacts, as well as setting key performance indicators to measure and improve these factors. Under this directive, companies also have obligations to ensure they identify and mitigate negative impacts on their stakeholders, supply chains and subcontracting chains.

6.5 Low Emission Zones

Low and ultra-low emission zones, common in cities across Europe, impose a daily charge on engines beyond a certain age or that exceed specified emission limits. The schemes aim to improve air quality in cities, as well as decreasing relative greenhouse gas emissions, decreasing fuel consumption and increasing engine efficiency. Any vehicles used to transport people and materials on to sites within these zones are directly affected by these zones. Increasingly, these low emission zones are also being applied to machinery and rigs. This is often achieved by linking zones to the EU Emission Standards for new non-road machinery, setting minimum engine tiers to which rigs and machinery must conform. This may render older, more polluting rigs unable to operate in the low emission zones, or incur large fines for their continued operation in these areas.

6.6 EU Waste Framework Directive and EU Emissions Trading System

The EU Waste Framework directive and Emissions Trading System (ETS) are both potentially applicable to foundation contractors. All suppliers of steel, concrete and fuel have to conform to the ETS. Likewise, all waste removal and disposal will be subject to the waste framework directive. Even if material supply and waste removal are the responsibility of the supply chain or clients, these directives will still indirectly affect foundation contractors through the price of goods and services.

ETS allocates an emissions cap on each company based on their sector. Companies that reduce their emissions can auction their remaining 'carbon credits' to more polluting businesses; if a company exceeds their emissions targets, they have to buy more carbon units or face heavy fines. This emissions trading scheme, based on the Kyoto protocol (1997) carbon trading scheme, it is designed to provide a financial incentive for carbon reduction. Therefore, supply chains are likely to pass any ETS carbon credit costs on to foundation contractors. If foundation contractors take a consumption approach, they will also benefit from decarbonisation of their supply chain, reducing their scope 3 emissions.

The actual application of the waste framework varies by country, but broadly looks to instigate a polluter pays principle. A common application is landfill tax, which increases the cost of waste disposal; in turn, this aims to provide a financial incentive to reduce waste, encouraging recycling and industrial symbiosis.

For more information on all EU directives, please visit the EU law search facility:
https://eur-lex.europa.eu/homepage.html

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