AN INSIGHT INTO ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) REGULATION: HOW SHOULD CORPORATES RESPOND?

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AN INSIGHT INTO ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) REGULATION: HOW SHOULD CORPORATES RESPOND?

We are moving towards a world where corporates are addressing sustainability as a core element of their strategy and growth. This paper aims to look at this changing context and to set forth corporate frameworks and technology solutions as tools to help corporates develop a sustainability strategy.

Abstract

Environmental, Social and Governance (ESG) standards have been adopted by institutional investors at an increasing pace over the last 4-5 years. On the corporate side, this field is in the nascent and exploratory stages. The scope of this paper is to provide a macro view on the current ESG landscape, how corporates can adapt by implementing a strategy and action plan and where technology-enabled solutions can play a role.

Within the last 12-18 months, there has been a significant amount of regulatory activity in drafting legislation and guidance on sustainable practices, using research and best practices such as circular economy principles. Across industry segments too, there is much activity in response to consumer awareness and demands, further driven by shareholder attention to ESG standards, which is also driving overall investment decision-making.

There are, however, frameworks that can help corporates formulate their strategy. One such framework helps evaluate sustainability as a risk and cost factor, considering the broad scope of their organization and evaluating transformational changes to their business model. Waste-as-a-Resource is one of the main tenets of this sustainability strategy, both in terms of keeping abreast with regulatory guidance and also harvesting financial value across the end-to-end production cycle.

The second framework helps incorporate sustainability into the core business model, exploring transformational opportunities across infrastructure and operations, supported by the organization’s culture and RD&I investment. Finally, the paper references emerging technology trends and solutions that might support a transformative action plan.
1. What is the Problem?
Climate change has become an even more urgent problem in recent times, with the risk of more than 2 degree Celsius increase in global temperatures threatening food production, water availability, air quality, urban infrastructure (especially in coastal areas) and ultimately human existence. Biodiversity, habitats and soils are in decline; resource use is still unsustainable and inefficient; water and air quality are still problematic in many parts of the world and citizens remain exposed to hazardous substances affecting their health and well-being.

Focus on Sustainability
In 2015, the United Nations set forth 17 sustainable development goals for countries to adopt and implement by 2030. These goals evolved from a series of past initiatives that highlighted the need for action to tackle the problem of climate change. The UN has also included human rights and governance issues under the broad sustainability umbrella, thereby including goals on diversity and inclusion, reducing inequality, good health and wellbeing, and quality education.

In the past, large corporates would have sought to fulfill their sustainability agenda through a Corporate Social Responsibility function. Typically this function would have resided with the public affairs or marketing teams, and would have entailed a series of initiatives and activities related to supporting the community and giving back to society.

Though that remains important, corporates are also starting to look at overhauling their core strategy, owing to factors including regulation, consumer awareness and industry activity. As recently reported in the media, there are several examples of how a lack of focus on sustainable products and processes can result in bottom-line impact from regulatory penalties and costs. These, in turn, can lead corporates to commit large capital investment towards transforming their business models.
• Transportation: With EU regulations set to hit profits in the automotive sector by $7.4bn, several automotive manufacturers have taken multi-billion dollar charges related to the diesel scandal. As a result, VW for example, is evolving its strategy towards electric vehicles and is set to invest $1bn in battery cell production. Similarly, Bosch is now investing €1bn in clean energy over the next 10 years and another €1 bn on carbon offset programs.

• Mining: The bursting of an earth dam holding iron mining waste resulted in Vale posting $1.6 bn loss for the first quarter of 2019, driven by $4.5 bn in the disaster related expenses, including victim compensation. Over the next 5 years, Vale is set to invest $2.5 bn to adopt dry extraction instead of currently used wet extraction processes for mining iron ore.

• Utilities: Thames Water in the UK received regulatory fines of £21m after attracting parliamentary scrutiny over sewage release practices during rainwater overflow, with a large proportion of profits being used for shareholder dividend payout, rather than investing in improving sewage treatment facilities. National Grid underwent government investigation due to recent power blackouts in the UK, given that regulation requires switching to renewable energy sources for power generation.

In the financial services industry, ESG metrics have emerged as important factors influencing investment activity, in addition to the existing financial metrics. These factors have been driving investment activity on approximately $83 MM AUM, which is expected to grow further in scale and impact. Additionally, investors are also seeking more action from corporates to address and improve their ESG impact.

Simultaneously, regulators are also stepping up legislative activity, setting up directives for countries and corporates to adopt, with low tolerance for non-compliance and imposing financial penalties at a large-scale, thereby obligating corporates to take remedial and preventive action. For example, the IMO is mandating the shipping industry to reduce Sulphur emissions from 3.5% to 0.5% by Jan 2020, while power utilities companies in the UK are required to switch to renewable sources of energy in the near-term.

Finally, consumer awareness in this age of digital media and social networks is changing demand and consumption patterns of day-to-day products. This is driving corporates to start innovating with their design and production and revamping their operations and supply-chain processes. The awareness of single-use plastics and its harmful impact on the environment has led to series of responses, including the UK banning the use of single-use plastics, consumers opting to use reusable containers and retailers exploring alternative design and materials for food packaging.

The big question remains – what do corporates need to do next and how?
2. Existing and Emerging Regulatory context

EU Regulation has been leading the charge on driving focus and action on the challenges of climate change in Europe. Different Industries are at different stages along the regulatory disruption cycle, and Figure 1 summarizes our view on the extent of disruption across various stages of this cycle.

In summary:

2.1. 7th Environment Action Plan

The EU has launched a series of Environment Action Plans through the past decades. Here is the timeline of various policies adopted by the EU.

The 7th EAP is a binding decision adopted by the European Parliament and Council which covers the period 2014 - 2020. It sets 9 objectives with the premise that environmental protection and economic prosperity are interdependent. These objectives are grouped into three overarching goals, and described as follows:

Thematic goals:

- Natural Capital: Protect, conserve and enhance the Union’s natural capital. Specific objectives include reducing impact on fresh and marine waters and on ecosystems from air pollution.

- Green Growth: Turn the Union into a resource-efficient, green and competitive low-carbon economy. Specific objectives include meeting the 2020 EU goal of 20% reduction of greenhouse gas (GHG) emissions, reducing environmental impact of production and consumption, increasing resource efficiencies, managing waste as a resource and reducing stress on water resources.
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- Health and Wellbeing: Safeguard the Union’s citizens from environment-related pressures and risks to health and well-being. Specific objectives include bringing air quality up to WHO standards, ensuring high standards for drinking and bathing water and ensuring pesticides don’t have harmful health effects, because water, air and chemical pollution remains a major concern.

Enabling Goals:
- Maximise benefit of EU environment legislation by improving implementation.
- Improve knowledge and evidence base for EU environment policy.
- Secure investment for environment and climate policy.
- Improve environmental integration and policy coherence.

Horizontal Goals:
- Enhance sustainability of the EU’s cities in terms of air quality, noise levels, traffic congestion, GHG emissions, loss of biodiversity, water scarcity, natural disasters like floods and storms and waste and energy management.
- Increase the EU’s effectiveness in addressing international environmental and climate-related challenges.
2.2. Focus on adopting Circular Economy Principles

Since the Industrial Revolution, companies have been following the linear economy principles of make, use and dispose. Now with the sustainability lens, there is a realization to shift towards circular economy principles, to close the loop and minimize waste by redesigning products and reusing raw materials. With respect to the goal on Green Growth addressing environmental impact of production and consumption, the EU has also set-up various initiatives outlining recommended roadmaps and strategies, including two that are aligned to Circular Economy Principles.

2.2.1. EU Circular Economy Action Plan:
This consists of 54 measures to “close the loop” of product lifecycles, including circular design of products, turning waste into resources, closing the loop of recovered materials and strategy for plastics. These measures align to different stages of the manufacturing cycle, including:

Production
- In accordance with the Ecodesign work plan, product requirements related to circular economy have been included in most ecodesign regulations.
- Implementing regulation on electronic displays is part of the package of revised ecodesign and energy labelling measures proposed by the Commission.
Waste
• The revised legislation on organic products entered into force on 4 July 2018 and added further ambition to ensure the application of circular economy principles to waste management.

• In order to facilitate re-usability and the environmentally sound treatment of electronic waste, the Directive on Waste Electrical and Electronic Equipment (WEEE Directive) requires that producers of such equipment provide information free of charge about preparation for re-use and treatment in respect of new equipment placed for the first time on the Union market.


Market for Alternative and Reusable Raw Materials
• The EU is proposing new standards for sorted waste and new rules on waste management. These include clearer obligations for national authorities to step up separate collection, targets to encourage investment in recycling capacity and avoid infrastructural overcapacity for processing mixed waste (e.g. Incineration), and more closely harmonised rules on the use of extended producer responsibility.

• In May 2019, European Parliament reached a political agreement with the Council on a new regulation on fertilizers, to open the single market for organic fertilizers, to introduce limit values for toxic contaminants, and to maintain option for harmonization.

• Regulation on Minimum Requirements for Water Reuse was agreed upon on 28 May 2018 further from the guidelines on Integrating Water Reuse and Water Planning and Management 38 in the context of the Water Framework Directive issued previously in July 2016. These guidelines encourage Member States to systematically consider water reuse when implementing the EU water legislation.

2.2.2. European strategy for plastics in a Circular Economy:
This strategy is to lay a foundation where design and production of plastics respect recycling needs.

• Some key aspects include port reception facilities for the delivery of waste from ships, eco-design regulation measures, public consultation on single-use plastics and export of plastic waste in compliance with EU Waste Shipment Regulation.

• In Dec 2018 new EU-wide rules were agreed on 10 single-use plastic items most often found on Europe’s beaches and seas, on lost and abandoned fishing gear and on port reception facilities for the delivery of waste from ships, which should ensure that the waste is delivered to adequate facilities on shore, instead of being discharged at sea.

• The strategy is aimed at expanding and improving the collection of plastic waste to ensure quality inputs to recycling industry and also expanding and modernising the EU’s sorting and recycling capacity. Weak demand for recycled plastics due to comingling and contamination in collection processes, coupled with uncertainty concerning market outlets and profitability inhibit investment in recycling facilities.

2.2.3. Competitive Low Carbon Economy by 2050 Roadmap
This roadmap outlines the challenges, necessary milestones and sectoral perspectives of moving to a low-carbon economy. Furthermore, the 2030 climate and energy policy framework assumes the full implementation of the ‘20/20/20’ targets (20% increase in energy efficiency, 20% reduction of CO2 emissions, and 20% renewables by 2020) and its main focus for 2030 is a commitment to reduce greenhouse gas emissions in line with the 2050 roadmap, i.e. a 40% reduction compared to 1990. The framework also recognizes the need to simplify current processes for reporting on GHG emission reduction and renewable energy, and states that in order to achieve domestic GHG and renewable energy targets four main actions are necessary; delivery of EU policy objectives, coherence of Member State approaches, market integration, and investor certainty.
2.3. Industry and Consumer Impact

2.3.1. Consumer Focus: Plastic Waste

The media has played a big role in recent years in increasing consumer awareness and with the help of social media, consumers are increasingly demanding changes in products. Simultaneously, regulation is also keeping pace and drafting legislations and directives to drive corporate action in response to consumers’ changing demands and environmental concerns.

In May 2018, several amendments were made to the EU Waste Legislation as a result of EU Circular Economy Action Plan. Some of the salient directives launched in May 2018 are outlined below:

- The Waste Framework Directive to mandate separate collection for plastic, paper, metal and glass and increasing incineration and landfill charges in order to incentivize recycling as the preferred waste management option.
- The Landfilling Directive to mandate waste-to-landfill limits at 10% of all waste by 2030, and banning separately collected waste categorized by material type, going to landfill.
- The Packaging Waste Directive introducing new eco-design standards to support recyclability of packaging and consolidation of plastic streams. EU member states are required to ensure after-use infrastructure in place to meet packaging recovery targets, implementation of producer responsibility scheme for all packaging streams by 2025, and producers are obliged to provide for collection, sorting and recycling of produce.

2.3.2. Industry focus: Transport Industry

The Ambient Air Quality Directives and the National Emissions Ceilings Directive “2016/2284” provide the legal framework for the EU’s Air Policy. The latter mandates on the reduction of national emissions of certain atmospheric pollutants sets national level reduction commitments for the five pollutants namely, sulphur dioxide, nitrogen oxides, volatile organic compounds, ammonia and fine particulate matter.

Each EU Member State is in the process of producing a National Air Pollution Control Programme setting out measures to ensure compliance with the 2020 and 2030 reduction commitments. While the EC offers general guidance on national control programmes, it also has air pollution control legislation that relates to specific sources of pollution.

Figure 4. Pollutants covered by EU National Emission Ceilings legislation and 2030 targets

- Sulphur dioxide (-79%)
- Ammonia (-19%)
- Nitrogen oxides (-63%)
- Fine particulate matter (-49%)
- Volatile organic compounds (-40%)
Air Transport

The ICAO (International Civil Aviation Organization) is a specialized United Nations committee, whose role is to provide standards that aid regulation in the aviation industry by its Member States. ICAO is developing CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation), a global market-based measure to address CO2 emissions from international aviation as of 2021. In order to facilitate the ICAO’s ongoing development of CORSIA, the EU has limited the scope of their Aviation Industry Emission Trading Scheme to within the EEA from 2017 onwards.

CORSIA requires airlines to:

1. Monitor emissions on all international routes.
2. Offset emissions from routes included in the scheme by purchasing eligible emission units generated by projects that reduce emissions in other sectors (e.g. renewable energy).

It covers all aspects of aviation — market access, carrier capacity/tariffs/ownership, etc. and does not specifically mention environmental protection anywhere in the table of contents.

At national level, the ICAO is a specialized agency of the United Nations and its role is to provide standards that aid regulation in the aviation industry by its Member States. The ICAO publishes the ‘Manual on the Regulation of International Air Transport’, its most recent edition being in 2018, along with several other ‘guidance materials’, which are prepared in order to meet the needs of all ICAO Member States.

114 Member States have submitted their specific national Action Plan on reducing GHG emissions from aviation to the ICAO, as wider aviation industry regulation is developed and implemented on a national basis. Figure 5 serves as an example of a typical regulatory framework.

Water Transport

Shipping is an international industry and it can only operate effectively if the regulations and standards are agreed, adopted and implemented on an international basis. With this in mind, the United Nations established the IMO (International Maritime Organization), a specialized agency with responsibility for the safety and security of all shipping and the prevention of marine and atmospheric pollution by ships, regardless of a ship’s country of origin. IMO’s work supports the UN’s Sustainable Development Goals (SDGs).
The IMO has developed regulation which is intended to be adopted and implemented by its member states in the form of 52 conventions covering aspects such as safety, marine pollution and environment in a comprehensive manner.

Some of the key regulations are as follows:

- From 30 April 2019, companies must submit verified annual emissions report to the EC and by 30 June each year, the Commission must make this reported information available publicly. This transparency is intended to incentivize emission reductions by providing information on ships’ efficiency to relevant markets.

- From 1 January 2020, the limit for amount of sulphur in fuel oil used on ships has been reduced to 0.5% from the prevailing limit of 3.5%, and compliance is enforced by EU member states.

- From 2013 onwards, regulation exists to prevent and minimize accidents and negative effects on human health and the environment from the hazardous waste generated during the process of breaking down and recycling end-of-life ships. Recycling can only occur at EU listed and authorized facilities where environmental and safety standards are in place. Moreover, every new ship must carry an inventory of the hazardous materials it contains, and a ship recycling plan outlining the waste to be generated from recycling.

**Road Transport**

In 2016, road transport contributed nearly 21% of the EU’s total emissions of carbon dioxide (CO2), the main greenhouse gas. EU regulation specifies requirements from manufacturers on emission limits on light-duty vehicles (cars and vans) and heavy-duty vehicles (trucks, buses and coaches), and on providing relevant information on fuel efficiency and emissions to consumers, in order to help drivers choose news cars with low fuel consumption. It also mandates reductions in GHG intensity of vehicle fuels going forward.

**Target emissions levels from vehicles**

New EU fleet-wide CO2 emission reduction targets are set for the years 2025 and 2030, both for newly registered light-duty and heavy-duty vehicles. These targets are defined as a percentage reduction from the 2021 starting points and range between 30% - 37.5% by 2030.

Incentive mechanisms have been set to encourage zero- and low-emission vehicles (ZLEV):

- Cars and vans: A ZLEV is defined in the Regulation as a passenger car or a van with CO2 emissions between 0 and 50 g/km. To incentivise the uptake of ZLEV, a crediting system will be introduced from 2025.

- Heavy-duty vehicles: The Regulation includes an incentive mechanism for zero-emission vehicles (ZEV), lorries with no tailpipe CO2 emissions, and for low-emission vehicles (LEV), lorries with a technically permissible maximum laden mass of more than 16t, with CO2 emissions of less than half of the average CO2 emissions of all vehicles in its group registered in the 2019 reporting period. To incentivise the uptake of ZEV and reward early action, a super-credits system applies from 2019 until 2024, and can be used to comply with the target in 2025. A multiplier of 2 applies for ZEV, and a multiplier between 1 and 2 applies for LEV, depending on their CO2 emissions. An overall cap of 3% is set to preserve the environmental integrity of the system.

A new simulation tool VECTO (Vehicle Energy Consumption calculation tool) has been developed by the European Commission. It will be used for determining CO2 emissions and Fuel Consumption from Heavy Duty Vehicles with a Gross Vehicle Weight above 3500kg. From 1 January 2019 the tool has been mandatory for new trucks under certain vehicle categories in application to the certification legislation under type approval.
**Fuel Efficiency**

Fuels used for road transport in the EU have to meet strict quality requirements. Moreover, for biofuels to count towards GHG emission reduction targets, they must meet certain sustainability criteria to minimize the undesired impacts from their production. The Fuel Quality Directive, requires a reduction of the GHG intensity of transport fuels by a minimum of 6% by 2020 starting from 2010 as base year. It applies to petrol, diesel and biofuels used in road transport and to gasoil used in non-road-mobile machinery. Together with the Renewable Energy Directive, it also regulates the sustainability of biofuels, requiring that GHG emissions of biofuels must be lower than from the fossil fuel they replace - at least 50% (for installations older than 5 October 2015) and 60% for newer installations, and the raw materials for biofuels cannot be sourced from land with high biodiversity or high carbon stock.

In Europe, because road transport represents 72% of all transport’s GHG-emissions, and transport represents 27% of total GHG-emissions, EU-wide regulation on GHG-emissions from road transport exists two-fold:

- **Emissions Trading Scheme**: This is the cornerstone of the EU’s climate change policy. The EU’s ETS is the first and largest carbon market in the world with 31 countries, 11,000 installations and airlines, covering 45% of EU's GHG-emissions. A cap is set on the amount of GHG which can be emitted by each installation in the system and companies buy/receive emission allowances to cover its emissions, but can trade with one another as needed. The total number of allowances available is limited (ensuring value) and falls over time to ensure emissions fall. After each year, if a company's emissions exceed its allowances, heavy fines are imposed. The flexibility created by trading ensures emissions are cut where it costs least to do so. Higher carbon prices promote investment in clean, low carbon technologies. Future outlook: For the 2021 - 2030 period (‘Phase 4’), the pace by which annual reductions in allowances increases has risen to 2.2% as of 2021.

- **Effort Sharing**: In contrast to sectors in the EU ETS, which are regulated at the EU level, Member States are responsible for national regulation to limit emissions from the sectors covered by Effort Sharing legislation. There are certain EU-wide measures that will naturally help Member States to reduce emissions from these non-EU ETS sectors, including CO2 emission standards for new cars and vans that will help cut emissions from road transport. Typical national policies would also include encouraging public transport.

In the context of Vehicle production, there are separate standards and legislations:

- **Performance**
  - Cars & Light-Duty: In April 2019 setting CO2 emission performance standards for new passenger cars and for new light commercial vehicles
  - Heavy-Duty: In May 2018, the European Commission presented a legislative proposal setting the first ever CO2 emission standards for heavy-duty vehicles in the EU.

- **Labelling**
  - Heavy-Duty: Labelling of tyres with respect to fuel efficiency and other essential parameters.

- **Fuel Usage**
3. What is the way forward?

3.1. Framework 1: Quantifying Sustainability as a strategic risk and cost factor
With the regulatory focus very strong, clear roadmaps and action plans are starting to emerge across industries. There is need for a structured approach to a comprehensive response on this critical and urgent matter of environmental, social and governance impact.

Sustainability as a corporate strategic function, as a more evolved and more comprehensive approach compared to Corporate Social Responsibility activities is the answer to both regulatory compliance as well as discovering incremental financial value.

3.1.1. Regulatory Compliance
In recent times, the number of incidents of regulatory fines has grown manyfold, and so has the scale of financial penalties imposed in the aftermath of these regulatory breaches. This has resulted in direct bottomline impact to these companies, drawing shareholder attention to these fines which in turn has increased the demand for resolution of these issues and for attention to preventing them from recurring in future. Large funds are adapting their investment strategies to ESG standards, and are divesting from companies that are not seen to be improving their sustainability footprint. Therefore, keeping pace with regulatory changes and defining an action plan to comply with requirements within stated timelines becomes a primary activity and helps model the cost of ongoing compliance as a business necessity.

As the next step, and we are already seeing examples emerging across various industries, companies need to review their business and operational models end-to-end, and identify opportunities for applying circular economic principles. With emerging technology and development of innovative materials, companies need to invest in redesign and optimization of their core production lines and their supply-chain overall. And armed with this effort, companies can look to play a more proactive and collaborative role to help formulate appropriate and feasible legislation.
Corporates also need to anticipate how their ESG footprint might impact their future share price and therefore shareholder activity. Thus, sustainability strategy feeds into the overall corporate strategy and is driven by the finance function as a success factor for the company’s performance, similar to tracking other factors such as liquidity, foreign exchange exposure and supplier performance. Sustainability becomes tangible and measurable, with organizational KPIs defined to track progress and areas for improvement. For instance, defining a KPI for tracking comparable financial metrics and correlating their impact on stock performance of peer companies hit by unforeseen costs and for tracking changes in consumer demand due to increasing awareness and correlating it to the impact on sales growth.

3.1.2. Financial Value Generation
Leading on from quantifying the cost of regulatory compliance and impact on stock performance, by defining a clear roadmap and commitment to action, companies can move towards quantifying anticipated cost savings and incremental financial returns from investing into future-ready infrastructure and product lines. As we have seen in some of the examples, automobile companies are committing investment to electric vehicles, mining companies are committing investment towards more earth-friendly extraction and waste recovery processes, and utility companies are investing in switching to renewable sources of energy and improving their legacy distribution network infrastructure.

As the next step, and following the EU’s direction on adopting circular economy principles, corporate strategy also needs to evolve towards where waste is seen as a resource which can tapped into for potential savings throughout the supply-chain, from procurement to consumption. This aspect is also explored in further detail in the next section on business strategy framework.

The third piece finally, is to model the financial value generated by pursuing the sustainability strategy, in terms of expense savings, return on investments in future-ready infrastructure, products and processes, and incremental financial value of newly harvested resources from waste that was previously not captured, into a net present value equivalent metric. This NPVe then becomes a fully-fledged performance metric to be tracked in the company’s standard financial model, and/or as a success factor for adopting the transformation sustainability strategy, thereby demonstrating its benefits to the shareholder community.

3.2 Integrating Sustainability into Business Strategy: C.O.R.E. framework
What contributing factors does a corporate need to evaluate in order to reorient their corporate strategy with respect to ESG requirements?

This framework take a holistic approach on transforming the operating model of an organization, and is broken down into four factors:
• **Culture:** As the first step of any transformational activity, setting the vision is critical, as it mobilizes the workforce to align with the vision. The values of the company outlined in its mission and long-term strategy will then determine the scope for change and realignment of company goals, especially if a radical change is expected. For example, consumer retail companies are considering dropping product lines that cannot become compliant with their sustainability strategy, and the impact on sales and growth targets is not detrimental to the company taking this strategic direction. Next, measuring the financial impact of a company’s ESG footprint is essential to explore cost saving and potential revenue opportunities. And finally, identifying and defining the set of risks associated with not adapting to changing regulation, consumer demand and industry, is essential to mitigate impact to company’s future performance. Some of the questions that a company needs to consider in evaluating the culture and areas for change are as follows:

  » What is the corporate’s mission and vision and how does it align with ESG requirements?

  » How does sustainability feature in the long-term strategy of the corporate?

  » How is the corporate measuring the financial implication of its ESG footprint, e.g. operating cost, fixed cost and regulatory penalties?

  » How does the corporate quantify sustainability in the form of a risk metric, rather than as a qualitative aspect? Is the corporate addressing sustainability as a strategic function, or as a public affairs / marketing function?

• **Operations:** Most European corporates have been operating on the principle of make-use-dispose, a legacy of the industrial revolution and the advent of mass-production. Several decades on, the importance of recovery and reusability of products and underlying resources has been highlighted and the EU is driving a regulatory shift towards adopting Circular Economic Principles. This means that operating processes need to be remodelled and redefined in order to close the loop from linear to circular models. At the procurement stage, reusable raw materials need to be regenerated from recovered waste, potentially creating cost-savings by lowering procurement volume. Next, at the production stage, operational processes need to be redesigned to optimize usage of materials. Finally, throughout the supply-chain and distribution stages, relations with partners, and optimizing capacity and transportation networks are key focus areas from an ESG perspective. Some of the questions that a company needs to consider in evaluating the Operations processes are as follows:

  » What raw materials are used in production and what is the yield in terms of regenerating them from waste, both at the end of production cycle as well as post consumption and recovery?

  » How can operational processes be redesigned for optimal usage of resources?

  » Where are the opportunities along the supply-chain and distribution processes for optimal partner relations and distribution capacity and transportation networks?

• **Research:** Moving past incremental changes to operational processes, companies need to also start investing in research, design and innovation to adapt to the changing context. Partnering with research and innovation hubs, or investing in-house will be fundamental to explore new offerings, to ensure reusability of existing products and extending product lifecycles, while at the same time also exploring avenues for complementary products and accessories to mitigate impact to the company’s strategic growth plans. From a regulatory point of view, there is scope to work with regulators and contribute to the direction that the industry should take forward. This collaborative approach backed by goals to learn and create, will help drive changes in a comprehensive, productive and efficient manner. Some of the questions that a company needs to consider in evaluating the Research processes, are as follows:

  » How can ecodesign principles be applied to existing offerings? What alternative materials or features need to be incorporated into product design?
» What new innovative offerings can be created with reusable features and longer life-cycles? How does this impact sales targets, and how can accessories or complementary products be designed and built to achieve growth plans?

» What is the impact of regulatory direction and how to take a collaborative approach with regulators to future-proof the business?

**Emissions**: As regulators drive industry responsibility towards “Producer Pays”, away from the current “Consumer Pays” approach, corporates need to start measuring emissions - solid, liquid, and gaseous - throughout their operations. This would highlight pockets of opportunities to establish new and improved waste recovery processes at each step wherever waste is being generated. Then the next step would be to identify ways and resources to reduce this waste footprint to formulate an overall waste recovery and reduction roadmap, which would strategically align with the company’s ESG targets. Some of the questions that a company needs to consider in evaluating their Emissions footprint are as follows:

» What are the different types of waste materials being generated throughout the operational processes and how can these be measured?

» At each step where waste is being generated, what recovery processes exist and what new processes need to be introduced?

» To what extent can this waste footprint be reduced, and what resources would be required to reduce this waste footprint at each step? What challenges may inhibit this change and how to overcome them?

### 3.3. Emerging Technology Solutions

#### 3.3.1. Machine Learning to tackle climate change

From a Financial Services perspective, the broad idea is that Machine Learning (ML) could be applied to estimate corporate climate risk exposure. From an Industry perspective, ML could optimize logistics operations in order to reduce emissions of GHGs, enable smarter use of GHG-heavy production processes and more accurately predict demand to cut down on waste. Finally, from a Transportation perspective, ML could help to better understand aggregate traffic data and more accurately model transport demand.

Below are excerpts from the white paper “Tackling Climate Change with Machine Learning”, describing some of the industry use cases where machine learning applications could help address the environmental related challenges. Similarly, technology can enable solutions for Social and Governance related challenges too, within the ESG framework.

**A. Financial Services**

Climate Analytics is a predictive approach to addressing climate change from a financial perspective, where ML can potentially be used to identify direct and indirect climate risk exposure in annual company reports describing their financial performance. Investment portfolios can be analyzed to highlight areas with increased risk due to climate change, using techniques such as the following:

- NLP to identify climate risks and investment opportunities in disclosures made by companies.
- Evolution of media coverage of climate change to dynamically hedge climate change risk.
- Econometrics to develop arbitrage strategies that take advantage of the carbon risk factor in financial markets.
- Modelling different types of variables that constitute climate risk.
- Designing statistical climate factor to be used for projecting the variation of stock prices given a compound set of events.
B. Transportation
This sector accounts for about a quarter of global energy-related CO2 emissions. Passenger and freight transportation are each responsible for about half of transport GHG emissions.

ML can be used to optimize transport activity using data to better understand data and model demand to optimize usage of vehicles. ML algorithms using traffic data have made it easier to match roads that have similar traffic patterns. When one pattern is known, the patterns of similar roads can be established reducing costs associated with installation and maintenance of ground-based sensors. ML methods can help with inputting missing data for precise bottom-up estimations of GHG emissions and for simulating vehicle emissions models. ML makes it possible to estimate origin-destination demand from traffic counts, offers new methods for spatio-temporal road traffic forecasting, and is particularly relevant for learning about the behaviour of public transport users from their smart card data. In the aviation sector, ML can help reduce aircraft taxi time and congestion on the runway by improving runway scheduling processes. ML can be applied to autonomous vehicles to cut GHG emissions. Some examples include using delivery robots and drones for last-mile delivery and platooning trucks, i.e. driving them very close together to reduce air resistance.

The global industrial sector spends billions of dollars annually gathering data on factories and supply chains to reduce emissions arising from the logistics sector. ML methods to streamline supply chains by bundling shipments together or by optimizing truck routing can help reduce emissions. This can also be effective in complex interactions of shipment sizes, modes, origin-destination pairs, and service requirements, for example predicting arrival times or demand, identifying and planning around transportation disruptions, or clustering suppliers by location and shipping destinations.

C. Retail
Globally, society loses or wastes 1.3 billion metrics tons of food each year, which translates to one-third of all food produced for human consumption. Developing countries lose 40% of this food between harvest and processing or retail, while over 40% of food waste in industrialized nations occurs at the end of supply chains, in retail outlets, restaurants, and consumers’ homes. ML can help reduce food waste in all these contexts. Optimized supply chains, combined with improved heating and cooling systems, can also help reduce food waste and ultimately prevent and reduce emissions. The highest impacts will come from mitigating post-harvest losses through optimized delivery routes and more affordable climate control systems, as well as tackling retail and consumer losses through better demand forecasting at the point of sale. ML may also be able to mitigate issues of overproducing and/or overstocking goods by improving demand forecasting.

3.3.2. Transition to Product as a Service model
In the wider context, product based business models are transitioning to service based models as companies seek growth in demand volume to offset diminishing financial return on assets. The strategy to achieve this transition has three fundamental factors, i.e. creating a service proposition, designing the execution strategy and upskilling talent with appropriate tools and in the right organizational structure.

What does this mean in terms of creating a sustainability strategy? With digital disruption driving down costs in overall value-chains, companies can explore more cost-effective ways of offering innovative products with reusable features and a longer life-span. Consumers will expect products at average rather than premium pricing, while companies can ensure profitability by reducing cost base and shifting to asset-light business model to ensure continued scalability. Scale is essential to achieve this commercial viability, and the macro-trends of consumer awareness and regulatory action will help scale consumption from a captive customer-base who would also be interested in bundled products and accessories.

Product innovation through a design-thinking led approach that puts the customer at the core and focuses on solving for customer’s pain-points, also defined as a problem validation approach is a way forward for corporates to adopt a transformational sustainability strategy. Second, adapting the sales and product positioning to resonate with ESG values, thereby demonstrating that this approach is core to the organization’s vision and mission and not just a short-term experiment. Finally, using the data footprint to measure the progress and impact of this shift in dynamics, will pave the way for further replication.
4. Conclusion
The intangible and qualitative nature of evaluating sustainability has held back progress on this front, and now the focus on Environmental, Social, Governance factors is driving efforts to define various metrics that help quantify and measure the impact and correlate it to market activity. From a commercial viability point of view, ESG-conscious consumption still comes at a premium, whereas as the scale of awareness and action increases, economies of scale should help drive costs of sustainable products down and scale sustainable consumption further.

As the world changes around us, and challenges exacerbate especially in the environmental context, sustainability is being addressed not just as a Corporate Social Responsibility function, but very much as a key and transformational business activity for the sustainability of future populations with the backing of financial investment and technology solutions. Corporates across the world are increasingly facing costs related to their ESG footprint, and the timing couldn’t be better now to act and to invest in a sustainable future together, with the following guiding questions to formulate a roadmap:

- Is it circular: Where does it end up?
- Is it viable: What does it cost, save and return?
- Is it long-term: How does it solve the problem and not postpone it to the future generation?
5. References

Corporates Examples

- Transportation: https://www.ft.com/content/4017a69e-6cd9-11e9-a9a5-351eeae6d84 and https://www.ft.com/content/da91dabe-723d-11e9-bbf6-5c68069fbd15
- Mining: https://www.ft.com/content/b772a3fa-7b08-11e9-81d2-f785092ab560
- Utilities: https://www.ft.com/content/5c1a33e4-8939-11e9-97ea-05ac243f1453

7th Environment Action Plan

Circular Economy Action Plan

European strategy for plastics in circular economy

Competitive Low Carbon Economy by 2050 Roadmap

Consumer focus – Plastic Waste
- The Landfilling Directive (1999/31/EC)
- The Packaging Waste Directive (94/62/EC)

Industry focus – Transport Industry

- Ambient Air Quality Directives 2008/50/EC and 2004/107/EC
- National Emissions Ceilings Directive 2016/2284
- CORSIA: https://www.iata.org/policy/environment/Pages/corsia.aspx
- AVIATION ENVIRONMENTAL REGULATION: www.mcgill.ca
- Effort Sharing by Member States: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.156.01.0026.01.ENG

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Tackling climate change with machine learning