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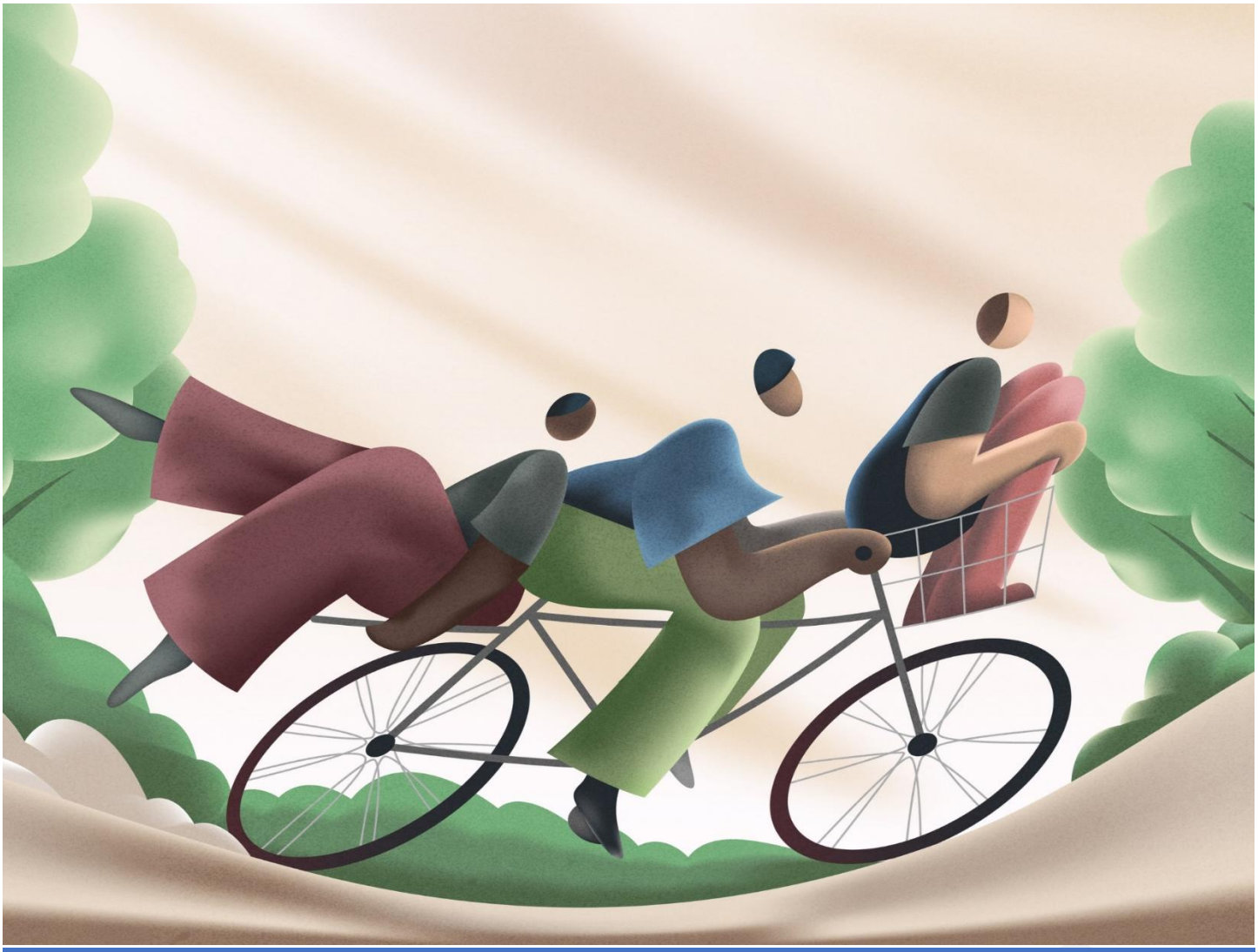

Analysis of Business Opportunities Related to Climate Change and Environmental Issues

ESG & Sustainability Transformation

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Growing awareness of climate change and its environmental impacts has led to an accelerated search for viable economic and social solutions to enable the transition to a low-carbon economy. Estimates for this transition range into the trillions of dollars, and the magnitude of the changes required will be widespread, across all aspects of life as we understand it today.

How can companies and investors benefit from opportunities related to climate change and environmental issues: circular economy, technological innovation and clean technology, green and ESG-related products and the blue economy?

A 2016 study by the Global Commission on the Economy and Climate found that the world is expected to invest around $90 trillion in infrastructure over the next 15 years, requiring an urgent shift to ensure that this capital is spent on low-carbon, energy-efficient projects. The report further describes that "transformative change is needed now in the way we build cities, produce and use energy, move people and goods, and manage our landscapes."

It is therefore no surprise that a growing number of investment strategies are focusing primarily on the opportunities of the low-carbon transition and green finance. Investments in areas such as technology and resource efficiency, waste management, the circular economy and sustainable agriculture and forestry are just some of the investment opportunities available in relation to climate change and environmental issues.

Now, the investment opportunities are becoming clear. FTSE Russell estimates that the green economy (the total market capitalisation of companies that generate revenue from activities that benefit the environment) was "equivalent to 5% of the total listed stock market in 2020. It has grown faster than the overall stock market since 2009 and is estimated to have surpassed the size of the oil and gas sector.

Some opportunities related to climate change and environmental issues:

- circular economy,
- clean technology and innovation,
- green and ESG-related products, and
- blue economy.

It also highlights how clean technology and innovation will play a key role and represent an investment opportunity in mitigating and adapting to the impacts of climate change and environmental degradation. We also look at some of the most popular financial products in supporting environmental (green) considerations in investing.

Circular Economy:

With only a small proportion of material inputs currently recycled (e.g. less than 12% in the EU in 2019), there are significant investment opportunities from innovations to encourage the transition to a circular economy. This shift is already underway: in September 2020, assets under management through public investment funds with the circular economy as their sole or partial focus were estimated to have increased sixfold since the beginning of the year, from $0.3 billion to $2 billion, with the number of such funds nearly doubling.

Companies that have a circular element in their business model can play a key role in protecting natural resources and changing the way we currently use natural resources and supporting the transition to a low-carbon economy.

In a circular economy, products and materials are repaired, reused and recycled rather than thrown away, ensuring that waste from one industrial process becomes a valuable input into another. The circular economy concept is now a core component of both the EU's 2050 Long-Term Strategy for a Climate-Neutral Europe, and China's five-year plans.

As the market expands investment opportunities, both in the private and public sectors, companies are working to bring circularity closer to the heart of their business models.

Case Study:

Jurong Island

Singapore's Jurong Island is one of the world's top 10 chemical parks. The proximity of industries on the island "provides an ecosystem where one company's products/waste can become another's raw material. For example, waste from some companies is incinerated to produce steam for industrial use. Similarly, wastewater is recovered and recycled for industrial use." Industrial developer JTC Corporation is working with local companies and regulators to explore further pathways to circularity, by mapping the flow of water, energy and waste.

Sợi Thế Kỷ

Since 2016, when hundreds of major fashion brands such as Nike, Adidas, Puma, H&M, Hugo Boss... committed to increasing the market share of recycled polyester to 45% by 2025, Century Fiber (STK) has forecasted that the demand for recycled fibers will explode in the future, so it decided to make this type of fiber a key product, a growth driver for the Company in the medium and long term.

It should be added that the garment and footwear industry accounts for about 8.1% of the impact on total global greenhouse gas emissions, in which all stages of making synthetic fiber products are responsible for 68% of the emissions of the entire industry. STK's increase in the use of recycled raw materials, increasing the proportion of recycled fibers in total revenue to more than 50% in 2021 and aiming for 100% by 2025 (for existing factories in Cu Chi and Trang Bang); dope dyed yarn… has a great significance. The company has indirectly recycled 3.04 billion used plastic bottles, contributing to reducing plastic waste.

In terms of revenue, the requirement of rules of origin under environmentally friendly FTAs increases the demand for recycled fibers, helping Century Fiber's business to benefit.

Heineken

As part of the Zero Waste Programme, 102 of Heineken's 165 production sites did not need to send waste to landfill in 2018. Instead, waste from these sites was recycled into animal feed, raw materials or compost or used for energy recovery.

Schneider Electric

The company specializes in energy management and automation. It uses recycled and recyclable materials in its products, extends product life through leasing and pay-per-use, and has introduced take-back programs into its supply chain. Circular activities now account for 12% of revenue and will save 100,000 tons of primary resources between 2018 and 2020.

Stora Enso

The company provides renewable solutions in packaging, bio-based materials, wood and paper construction. Reducing waste is at the heart of the "bioeconomy and contributing to a circular economy".

In 2019, the European Investment Bank launched an investment fund to support the circular bioeconomy.

Nestle Việt Nam

Coffee grounds are often considered waste in the linear economy, but Nestle Vietnam applies the circular economy, the processed coffee grounds are used as biomass energy pellets, replacing more than 74% of the energy source for boiler operation. In addition, the waste sand created during boiler operation is used as unburnt bricks; coffee sludge is used as biofertilizer. These unburnt bricks are used for commercial and civil works throughout the Central Highlands and South Central regions.

Close the Loop

This Australian company works to turn old printer cartridges and soft plastics into road surfaces by mixing them with asphalt and recycled glass, resulting in a road surface that is estimated to be up to 65% more durable than traditional asphalt. For one kilometre of road, that equates to 530,000 plastic bags, 168,000 glass bottles and the waste ink from 12,500 printer cartridges.

Tuyen Quang Forestry and Minerals Joint Stock Company

Not only large corporations with abundant resources, small and medium enterprises also contribute significantly to sustainable development in production and business activities, in accordance with their industry characteristics and capabilities. Tuyen Quang Forestry and Mineral Joint Stock Company, specializing in the production of high-tech Tuynel bricks, has pursued a green economic model since its inception. Traditional brick production uses raw materials such as clay, lean rice fields, and burns natural coal. As a result, farmers lose their rice fields and pollute the environment. To replace them, the factory has been proactive, creative, and sought other types of waste such as mine waste, solid waste such as broken bricks, demolished concrete, etc. and produced with circular technology. The finished products have competitive prices and meet all quality standards of materials in modern construction projects.

Technological Innovation and Clean Technology

Technological innovation and the development of new business ventures related to the environment have been around for a long time. However, the term cleantech as an umbrella term "encompassing investment asset classes, technologies and business sectors including clean energy, environmental and sustainable or green products and services" has become increasingly popular over the past 20 years or so.

As with many other technological innovations, such as the internet or GPS, government support and a favorable policy and regulatory environment were instrumental in driving the early development of technologies such as wind and solar. However, as the technologies have matured, unsubsidized wind and solar have become the cheapest source of new electricity in most regions of the world. Moreover, this dynamic is increasingly cutting the operating costs of some existing assets; research has shown that in 2020, on a levelized

cost basis, building new wind and solar capacity was cheaper than operating 60% of the world's existing coal plants.

For data on the costs and adoption rates of some clean energy technologies, please see: IPCC, "Climate Change 2022: Mitigation of Climate Change: Summary for Policymakers" (2022). https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf.

As a result, there has been growing interest from private investors in the sector. Over the past seven years – a period of intense digitisation and research into automation – it is estimated that venture capital investment in cleantech has grown three times faster than similar investments in artificial intelligence.

Next, we discuss some of the technologies that could play a role in decarbonizing sectors, making a significant contribution to reducing global emissions.

Energy is the "key driver" of the economy, and reducing emissions associated with energy production has knock-on effects across all sectors. Low-carbon electricity generation has been at the forefront of these developments, from sources such as solar photovoltaics, onshore and offshore wind, hydropower, nuclear power, tidal power and geothermal energy. Fuels derived from biomass (e.g. "biofuels", such as bioethanol) can also be considered renewable energy sources, although this depends on the sustainability of the source from which they are produced, with significant debate surrounding the environmental impacts of large-scale biofuel farming.

A full, global accounting of the agricultural sector shows that it accounts for around 40% of global emissions when heat, electricity and transport are included, so biofuels are hardly acceptable as a low-GHG source as some claim. Logging and burning wood for electricity is slowly renewable, but releases more carbon dioxide than burning coal or other fossil fuels, and reduces the amount of CO2 that can be removed (absorbed) by forests. Burning wood also releases large amounts of fine particles that are harmful to human health, leaves black carbon that absorbs sunlight on land, and darkens ice and snow, accelerating their melting.

Although important, electricity is only one component of the energy mix. The challenge is more difficult when it comes to decarbonising heat and cooling. For residential and commercial properties, ground and air source heat pumps, combined heat and power, and district heating are some potential heating solutions. More difficult is the decarbonisation of high-temperature processes. Using renewable energy to produce hydrogen – which burns at high temperatures – is increasingly central to the strategies of governments and investors, although the deployment of supporting green hydrogen infrastructure is currently lacking. Other technologies include research into nuclear fusion (very long-term) and next-generation battery storage.

Electrification of industrial processes—from clean sources of electricity—is an essential lever for decarbonizing industry. In steelmaking, which has significant carbon emissions, the use of electric arc furnaces, along with increased steel recycling and alternative reducing agents (e.g. hydrogen or gas instead of coal), are important pathways. The CO2 emitted from converting iron ore into finished iron can be captured and stored. In the chemical industry, the use of green hydrogen, synthetic fuels, new catalysts and alternative feedstocks (including the use of bio-based materials), as well as the development of lightweight materials and plastic alternatives, can make significant contributions.

The built environment sector contributes up to 40% of total greenhouse gases – GHGs – due to the entire lifecycle carbon of buildings – embodied carbon and carbon related to construction (building materials) and operations (energy used for heating, cooling and lighting). Embodied carbon is related to building materials, major refurbishments and waste

in manufacturing, the construction process, interiors and fittings, as well as from demolition and disposal at the end of a building's life.

In terms of technology driving this sector, CO2 is an inevitable by-product of the chemical reaction used to make the most widely used form of cement. Developing alternatives to "clinker" (one of the main ingredients of cement) will play a major role, as will capturing and storing the CO2 released. Several major cement manufacturers have already begun developing breakthrough technologies for cement production with lower emissions and greater energy efficiency.

In the transport sector, many of the world's major automakers have begun to shift their business models to battery electric vehicles (BEVs), with global EV sales more than doubling in 2021 and capturing the entire net growth in global auto demand. Nearly half of the 6.5 million BEVs sold worldwide in 2021 were in China, and just 535,000 were sold in the United States. In Norway, a much smaller but record 65% of car sales were BEVs; pricing and other incentives are rapidly changing this market. The extent to which batteries and electrification will play a significant role in decarbonizing heavy-duty transport, or whether other fuel sources (such as ammonia, hydrogen fuel cells, or biofuels) can be used to power trucks, aircraft, and ships, remains an open question and one that is being heavily researched and invested in.

Given the significant emissions associated with food production, packaging and consumption, innovation will be needed in the food industry. The development of protein alternatives (whether plant-based, including algae, or lab-grown meat, for example) is a rapidly growing market. Further innovation in agricultural techniques (for example, involving precision and regenerative agriculture, or the development of pest management (e.g. less toxic pesticides) and low-nitrogen oxide emitting nitrogen fertilizers) will also be needed.

Finally, given the interdependence of the global economic system, it is often the case that technologies have the potential to be used across multiple sectors, see link: LGIM; IEA, "ETP Clean Energy Technology Guide" (2020). www.iea.org/articles/etp-clean-energy-technology-guide.

The choice of technology and scenario assumptions remains an area of intense debate both in academia and in industry, and the reality of on-the-ground technology is evolving rapidly. For example, according to Bloomberg New Energy Finance, rising natural gas prices in early 2022 have led to the cost of green hydrogen falling below that of "gray" hydrogen (produced from non-depleting fossil gas) in Europe, the Middle East, and parts of Africa and China – a point of parity that is achieved a decade earlier than some previous estimates.

And as noted earlier, the development of clean technology often works in tandem with government standard setting and levels of policy support. A notable example of this is in the case of our built environment.

Case Study

Environmental standards in real estate

The real estate sector is currently undergoing significant change, with major property developers and managers stepping up sustainability practices in their role to tackle climate change.

In the UK, the Better Buildings Partnership (BBP), a coalition of some of the largest commercial property owners, has committed to achieving net zero carbon by 2050. This is a bold ambition and will require significant changes to current practice throughout the life of a building. BBP believes that the UK's energy efficiency standards and regulations, which aim

to achieve better energy performance, are not fit for purpose and will certainly not be sufficient to support BBP's net zero carbon target. These standards focus on design intent rather than how a building actually performs in use, creating a 'performance gap'.

As a result, BBP has embarked on an initiative called Design for Performance (DfP), based on the National Australian Built Environmental Rating System (NABERS), which measures and evaluates the performance of commercial offices. NABERS has proven to be very successful because of its focus on rating objectives, outcomes and transparency, and so it has recently published the "NABERS UK Guide to Design for Performance", aimed at the UK market.

In the near future, we can expect to see other governments that have committed to achieving carbon neutrality by 2050, such as Vietnam, begin to strengthen their existing energy efficiency standards and regulations in the real estate sector and adopt best practices like this.

According to BloombergNEF, in 2021, total investment in the low-carbon energy transition worldwide was $755 billion, with China being the largest investor, followed by the US. The largest funding sector in 2021 was renewable energy, followed by electrified transport and heat.

There has also been a surge in venture capital activity and investment by traditional fossil fuel-based corporations in clean and renewable technologies. These private sector efforts have been complemented by greater public sector and supranational support—for example, EIT InnoEnergy, which was established to invest in and promote sustainable energy innovation. Another initiative, still in the conceptual stage, is the World Economic Forum's Sustainable Energy Innovation Fund (SEIF), which combines private funding with public.

Green Related Products and ESG:

The risks and opportunities associated with environmental sustainability and climate change mitigation require a reconfiguration of financial products and services to facilitate the transition to a low-carbon economy. There are three attributes of energy and products: renewable, carbon (or greenhouse gas – GHG) intensity, and sustainability. For climate, low or zero carbon is the primary criterion for determining whether something is "green". Sustainability is the second criterion: is it "durable"? Renewable means that the energy or material is replaced in a short time compared to its use.

The overall assessment of these three factors determines what is green, but there is no universally agreed upon definition of "green". There have been some developments in this area, along with expectations of rapid expansion in the breadth and depth of these green products and services, over the next few years.

At the 2021 Glasgow Climate COP, the Glasgow Financial Alliance for Net Zero, a group of 450 financial institutions with $130 trillion in assets, announced a net zero carbon investment target by 2050. This target contradicts the large investments already being made in CO2-heavy industries by many of these institutions.

Some of the specific financial products that have emerged are:

- a range of green, sustainable and ESG indices,
- green bonds and loans, sustainable funds and ETFs,
- individual and institutional deposit and savings products, and
- crowdfunding.

Green bonds, loans and other labeled ESG-related products:

The first green bond issuance was announced by the European Investment Bank in 2007 to raise capital for climate-related projects. Green bonds are created to finance projects that have a positive environmental or climate benefit. The majority are green "use of proceeds" or asset-linked bonds.

Green bond issuance by banks and businesses has accelerated in recent years, with cumulative issuance surpassing the $1 trillion mark by the end of 2020, with annual issuance nearly doubling in 2021 compared to the previous year.

For the Climate Bonds Initiative, "Climate Bonds Interactive Data Platform" (2022), please refer to: www.climatebonds.net/market/data/.

While clean energy and low-carbon construction investment continue to dominate allocations, low-carbon transport financing has increased significantly and issuers from the information and communications technology (ICT) and manufacturing sectors have entered the green bond market.

For the Climate Bonds Initiative, "Climate Bonds Interactive Data Platform" (2022), please see: www.climatebonds.net/market/data/.

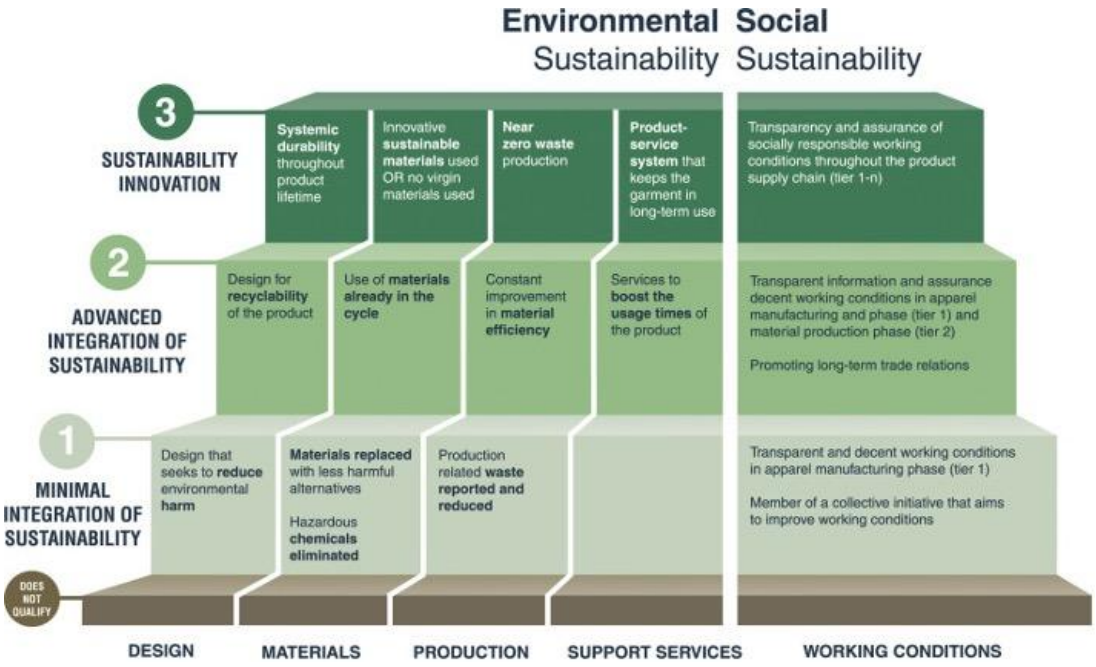
In addition to green bonds, which are closely focused on climate change solutions, there has been an increase in issuance in other labelled debt, primarily green and sustainable loans, where the financial terms are linked to climate or environmental performance metrics (for example, investors can receive an increase in the bond discount if the company fails to meet certain targets).

BloombergNEF, "Sustainable Debt Issuance Surpassed $1.6 Trillion in 2021" (2022), please refer to: https://about.bnef.com/blog/sustainable-debt-issuance-breezed-past-1-6-trillion-in-2021/.

From an investment perspective, as the supply of green or ESG-related products continues to grow, it is important to note that what may be considered green or sustainable to one investor may not be to another. Therefore, investors need a clear framework for evaluating these assets. Here are some considerations:

- asset eligibility and criteria for meeting green, ESG or SDG-related objectives,
- the use of proceeds allocated appropriately to eligible projects,
- transparency and reporting requirements and key measures of impact, and
- the issuer or borrower has a clear ESG and sustainability strategy.

An example of this is the "shades of green" methodology for classifying green projects developed by the Center for International Climate Research (CICERO) to provide a second-party opinion on how green or sustainable bonds fit into a low-carbon resilient future.



Dark Green: Solutions and projects that are currently realising a long-term vision of a low-carbon, climate-resilient future. Typically, this equates to zero-emissions solutions and government support that integrates environmental impacts into all governance structures. Examples include renewable energy projects such as wind or solar.

Medium Green: Solutions and projects that are making progress towards the long-term vision but are not yet fully implemented. Examples include sustainable buildings with good (but not excellent) energy efficiency ratings.

Light Green: Solutions and projects that are not long-term in nature but are still environmentally friendly. Projects should be careful not to lock into permanent fossil fuel systems. Examples include short-term improvements in fossil fuel efficiency that result in greenhouse gas reductions.

Brown: Solutions and projects that do not enable a long-term vision of a low-carbon, climate-resilient future. Examples include new coal infrastructure projects.

There will continue to be an increase in green financial products on the market. An important consideration to note is that the quality and transparency of environmental and climate-related data and reporting will need to improve to avoid "greenwashing". EU efforts to harmonise and create a common language would be a significant development for green financial products.

Case Study

What is 'Green'?

The International Capital Markets Association (ICMA) has developed voluntary guidelines called the Green Bond Principles (GBP), which were established in 2014 by a group of investment banks to promote the integrity of the green bond market by recommending transparency, disclosure and reporting. As part of ensuring the integrity of the use of proceeds. External reviews are obtained through second-party reviewers who monitor and report on whether the proceeds are used as promised.

The Climate Bonds Initiative regularly reports on the state of the green bond market. The climate bond taxonomy and sector-specific criteria have been scientifically developed to meet the Paris Agreement's objective of keeping global warming below 2°C (3.6°F), and the

range of sector criteria continues to expand. The organization has begun to focus on transitions and has published a framework for distinguishing green finance and transitions.

In 2018, Green Loan Principles (GLP) was established by the Loan Market Association (LMA) and the Asia Pacific Loan Market Association (APLMA). The four pillars of GLP are as follows:

- The loan proceeds are used with clear green objectives.
- The sustainability objectives of the project have been clearly assesses and communicated to the leader.
- The loan proceeds are strictly managed through the project account.
- Detailed and rigorous reporting must be mandatory.

In addition to GLP, in 2019, the LMA, APLMA and the Loan Syndication and Trading Association launched the Sustainability-Linked Lending Principles.

In addition to labelled debt, green and sustainable finance includes debt from companies operating in those sectors. The Climate Bonds Initiative provides regular information on the size of the unlabelled climate bond market relative to the green bond market. Defined as entities that generate 75% or more of their revenues from green businesses, climate-aligned issuers issued USD 913 billion of outstanding bonds as of 30 September 2020, up from USD 811 billion as of 30 June 2018. LGX, the Luxembourg Green Exchange, has launched a climate-aligned issuer segment to complement its existing green, sustainability and social bond segment.

Blue Economy

The World Bank defines the blue economy as "the sustainable use of ocean resources for economic growth, improved livelihoods and employment while protecting the health of ocean ecosystems." All other definitions of the term essentially refer to a broader perspective of sustainable economic and social activity linked to the world's oceans and coastal areas.

Examples of ocean-based industries that represent the blue economy:

- Aquaculture
- Fisheries
- Seafood processing industry
- Ports and warehousing
- Shipbuilding and repair
- Coastal tourism
- Marine exploitation
- Maritime transport
- Desalination
- Green bioeconomy and biotechnology
- Coastal and environmental protection
- Offshore wind energy
- Ocean energy

• Deep water cooling

The blue economy has recently begun to attract more attention and has moved up the policy agenda. As mentioned above, the ocean is a natural resource, and it is clear that the ocean is already under stress due to overexploitation, pollution, biodiversity loss and climate change.

Investors and policymakers are now beginning to realize:

- growth prospects for the ocean economy,
- future capacity for job creation and innovation, and
- its role in addressing global challenges.

There are growing opportunities for science and technology to responsibly manage the economic development of our seas and oceans. Marine ecosystems are at the heart of many of the world's global challenges, providing food and medicine, new sources of clean energy and natural cooling, climate regulation, job creation and inclusive growth. But protections are needed to improve the health of these ecosystems to support the growing use of marine resources.

As we have seen with biodiversity, natural capital accounting remains a promising but underdeveloped area; this is also true for the blue economy. The World Oceans Initiative has proposed bringing ocean accounting – adding ocean-related services and assets – onto national balance sheets.

Based on an OECD study, three priority areas for action are presented:

• approaches that create win-win outcomes for the ocean economy and the ocean environment across a range of maritime applications,

• the creation of ocean economy innovation networks, and

• initiatives to improve the measurement of the ocean economy through satellite accounts of national accounting systems.

The OECD believes that many ocean-based industries have the potential to outperform the growth of the global economy as a whole, both in terms of value added and employment. Projections suggest that the ocean economy could more than double its contribution to global value added to over US$3 trillion, alongside significant potential for job growth by 2030.

Case Study

Blue Economy Development Framework (BEDF)

The World Bank and the European Commission have launched the Blue Economy Development Framework, a new step forward in international ocean governance. It helps (and continues to develop) coastal states transition to diverse and sustainable blue economies while building resilience to climate change.

BEDF aims to create a roadmap to support governments in:

• preparing policy, fiscal and administrative reforms,

• identifying value creation opportunities from blue economy sectors, and

• Identifying strategic financial investments.

BEDF aims to help coastal countries and regions develop evidence-based policy and investment reform plans for their coastal and ocean resources.

To learn more about ESG and sustainability-related models, please contact **YTT Consulting**!