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BIM-LCA Construction Project**Title: Sustainable Development Goals**

1 – Aims

The objectives of this Timber tutorial are as follows:

- Learning what the Sustainable Development Goals (SDGs) are.
- Knowing the history of the creation and development of the SDGs.
- Understanding the 17 Sustainable Development Goals and their current status worldwide.
- Knowing the various awareness campaigns about the SDGs.
- Comprehension the construction sector's contribution to the SDGs and the organizations and companies that actively participate.

2 - Learning methodology

The teacher will give an explanation about Sustainable Development Goals of about 1 hour. Students will read this tutorial and follow the steps shown in the tutorial, namely:

- Introduction: The Sustainable Development Goals (SDGs)
- History of SDGs
- The 17 Sustainable Development Goals
- SDG Awareness Campaigns
- Contribution of Construction to the SDGs
- Spain, Romania, and Norway's involvement in the SDGs
- Challenges

3 - Tutorial duration

The implementation described in this tutorial will be carried out through the BIM-LCA Project website by self-learning.

2 lesson hours are suitable for this training.

4 – Necessary teaching recourses

Computer room with PCs with internet access.

Required software: Microsoft Office.

5 – Contents & tutorial

5.1 – Introduction: The Sustainable Development Goals (SDGs)

The SDGs, or Sustainable Development Goals, are a set of 17 global objectives, adopted by all United Nations member states in September 2015, outlines a collective vision for global peace and prosperity. These goals establish ambitious and quantifiable targets to address the world's most pressing challenges, from eradicating poverty and hunger to taking climate action and promoting gender equality. The SDGs aim to achieve sustainable development worldwide by the year 2030.

Each of the 17 SDGs addresses specific areas for improvement and change, and they are interconnected, recognizing the complexity and interdependence of global issues. The SDGs provide a comprehensive framework that engages governments, the private sector, civil society, and citizens to work together in achieving a more just, equitable, and sustainable world.

5.2 – History

The SDGs are rooted in extensive efforts by countries and the United Nations, notably the UN Department of Economic and Social Affairs. The foundation for these goals was laid over several decades:

1. *Agenda 21 (1992)*: More than 178 countries adopted Agenda 21 at the Earth Summit in Rio de Janeiro, Brazil. This comprehensive plan aimed to establish a global partnership for sustainable development to enhance human lives and protect the environment.
2. *Millennium Development Goals (2000)*: The Millennium Summit in September 2000 led to the unanimous adoption of the Millennium Declaration. This resulted in the formulation of eight Millennium Development Goals (MDGs) focused on reducing extreme poverty by 2015.
3. *Johannesburg Declaration (2002)*: At the World Summit on Sustainable Development in South Africa, the Johannesburg Declaration and Plan of Implementation reinforced global commitments to poverty eradication and environmental protection, building on Agenda 21 and the Millennium Declaration with an emphasis on multilateral partnerships.
4. *Rio+20 (2012)*: The United Nations Conference on Sustainable Development in Rio de Janeiro saw the adoption of "The Future We Want." This outcome document initiated the process to develop a set of SDGs building upon the MDGs. It also established the UN High-level Political Forum on Sustainable Development, encompassing measures for sustainable development implementation.

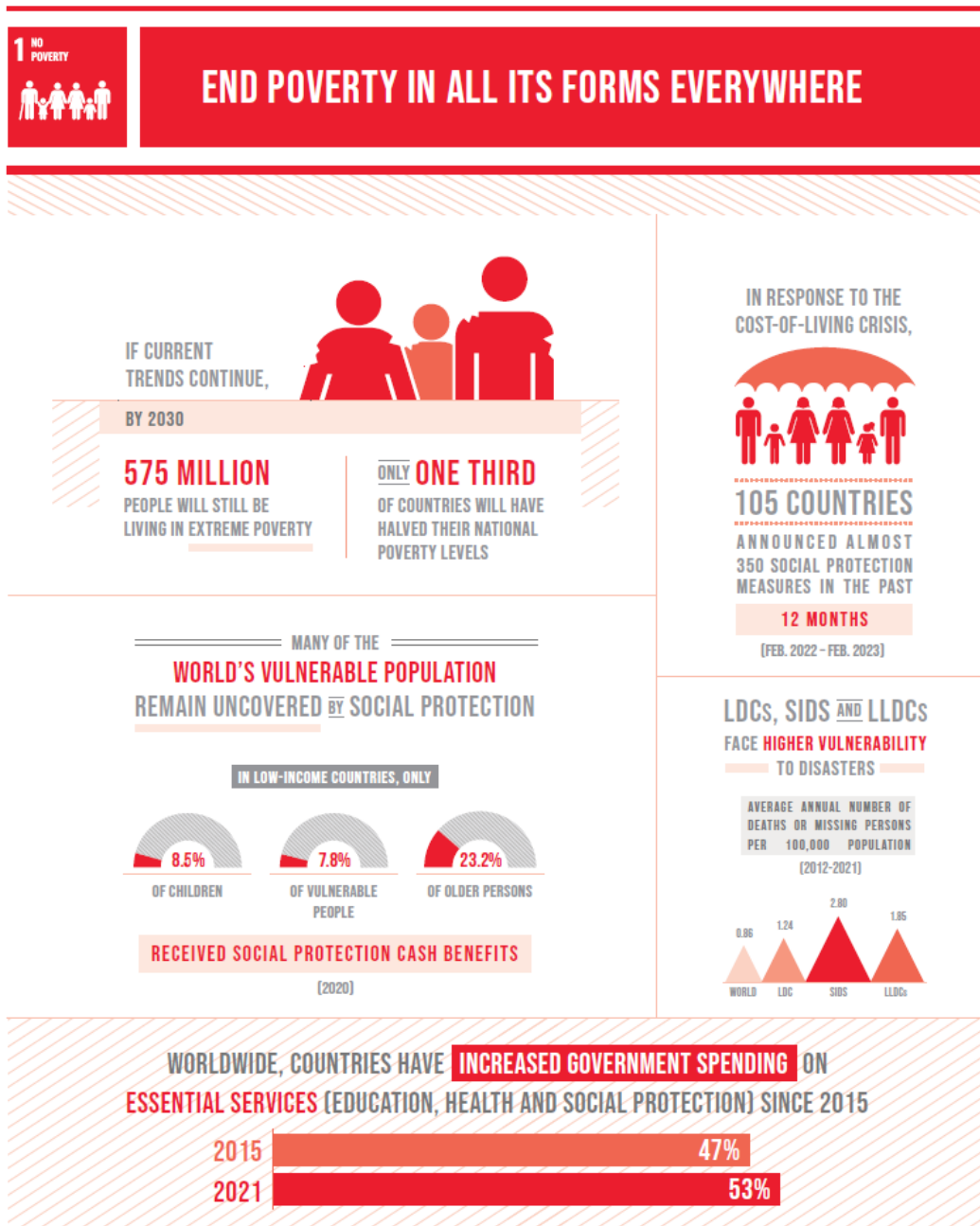
5. *Open Working Group (2013)*: The General Assembly set up a 30-member Open Working Group to develop a proposal on the SDGs.
6. *2030 Agenda (2015)*: The negotiation process for the post-2015 development agenda, initiated in January 2015, culminated in the adoption of the 2030 Agenda for Sustainable Development at the UN Sustainable Development Summit in September 2015, with 17 SDGs at its core.
7. The year 2015 witnessed the adoption of several major agreements, including the Sendai Framework for Disaster Risk Reduction (March), Addis Ababa Action Agenda on Financing for Development (July), the Paris Agreement on Climate Change (December), and the transformative "2030 Agenda for Sustainable Development."
8. *High-level Political Forum (Ongoing)*: The annual High-level Political Forum on Sustainable Development now serves as the central UN platform for the follow-up and review of the SDGs, ensuring ongoing commitment and progress assessment.

The Division for Sustainable Development Goals (DSDG) within the UN Department of Economic and Social Affairs provides crucial support, capacity-building, and evaluation for the SDGs and related thematic issues. Broad ownership and commitment from all stakeholders are essential for turning the 2030 Agenda into a reality, and DSDG aims to facilitate this engagement.

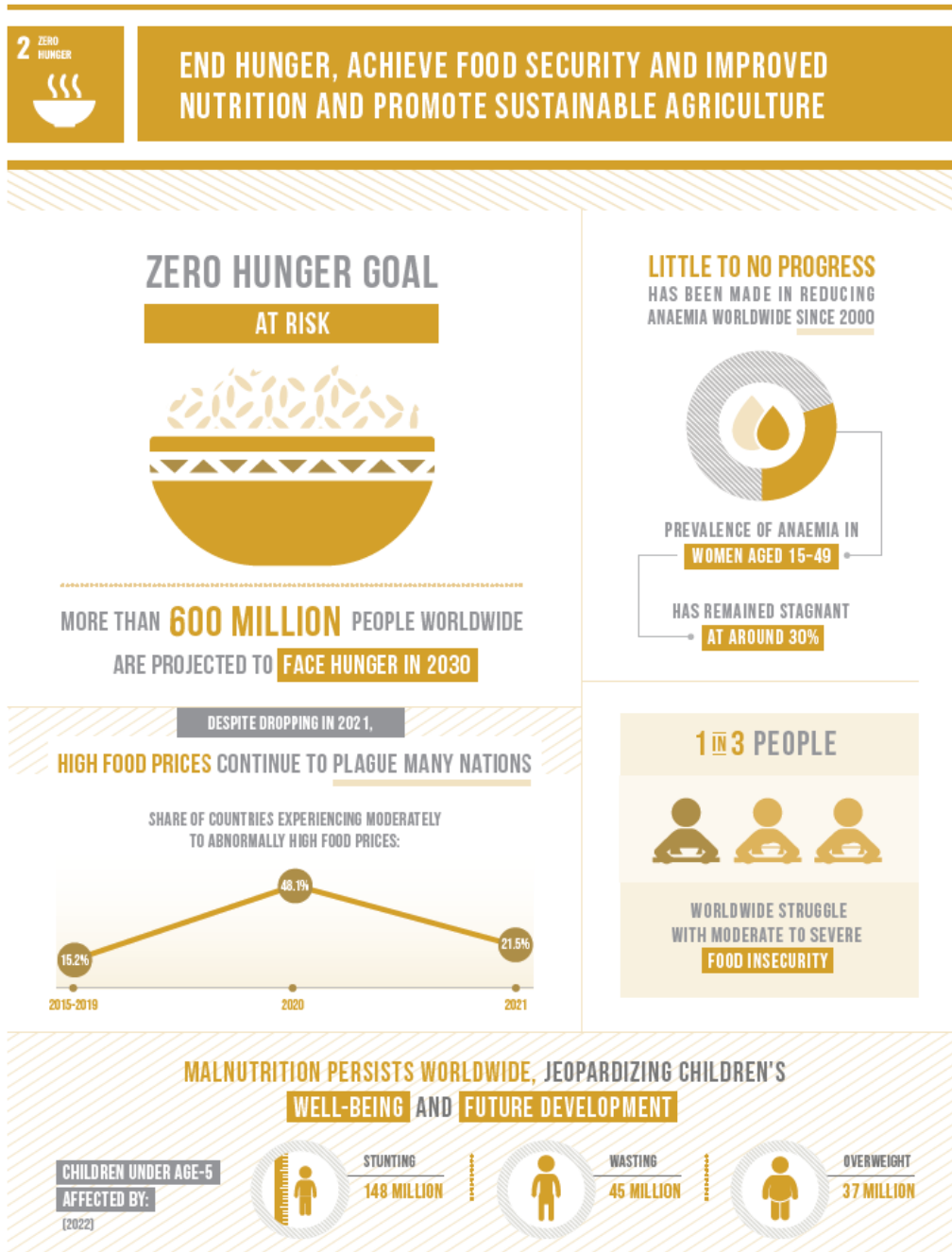
5.3 – The 17 Sustainable Development Goals



17 Sustainable Development Goals have been defined, with 169 associated targets, to be reached by 2030. The 17 SDGs and the 169 targets have been considered in multidisciplinary approaches worldwide. They are linked to the three pillars of sustainable development: the economic, social and the environment in an attempt to encourage action over the next years to transform Earth for a sustainable planet. Although the SDGs are delineated as distinct objectives, they are inherently interconnected within a cohesive framework. This interdependence provides nations and businesses with the opportunity to devise strategic policy interventions and solutions that concurrently address multiple goals. Each of the 17 sdgs is described below.

1. NO POVERTY


Extreme poverty is defined as surviving on less than \$2.15 per person per day, according to the purchasing power parity of 2017. Extreme poverty had seen significant declines in recent decades, but the emergence of COVID-19 marked a turning point, leading to an increase of nearly 90 million people compared to previous predictions. An alarming revelation is the resurgence of hunger levels to those last seen in 2005. Equally concerning is the persistent rise in food prices in a greater number of countries compared to the period from 2015 to 2019. This dual problem of poverty and food security poses a serious global concern. Therefore, eradicating extreme poverty for all people worldwide by 2030 is a key objective of the 2030 Agenda for Sustainable Development.

2. ZERO HUNGER


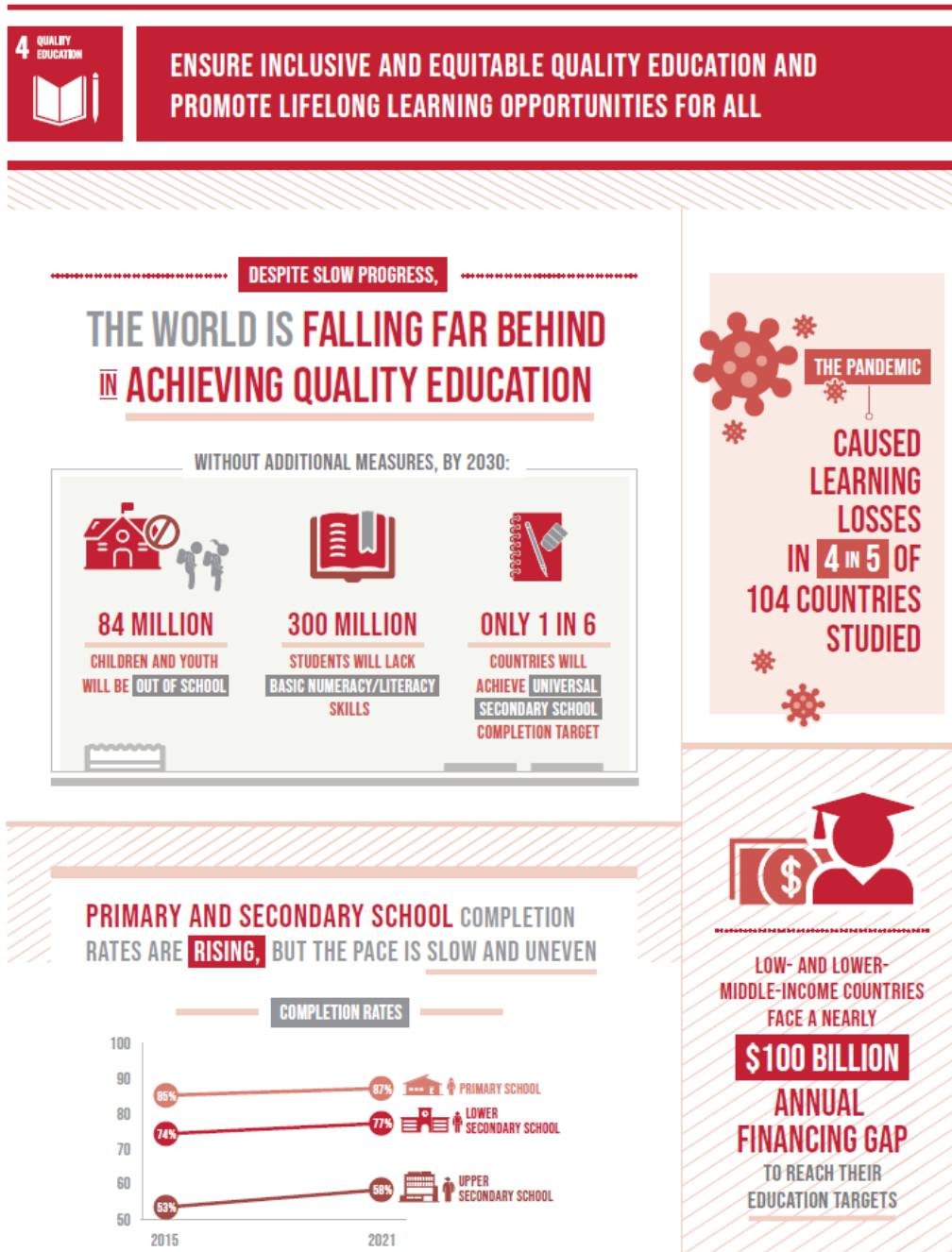
Goal 2 aims to eliminate hunger by 2030, but since 2015, global hunger and food insecurity have worsened due to factors like the pandemic, conflicts, and climate change. In 2022, approximately 735 million people experienced chronic hunger, and 2.4 billion faced moderate to severe food insecurity, representing significant increases from 2019. These trends underscore a pressing humanitarian crisis that demands immediate global action.

3. GOOD HEALTH AND WELL-BEING



Significant progress has been made in improving global health. 146 out of 200 countries or regions have already achieved or are on track to reach the SDG target on under-5 mortality. Despite this, inequalities in healthcare access persist, exacerbated by the COVID-19 pandemic. Childhood vaccination rates have declined, and deaths from tuberculosis and malaria have risen. The SDGs aim to end epidemics by 2030 and achieve universal health coverage, but increased investment in healthcare systems is needed to overcome current challenges and build resilience for the future.

4. QUALITY EDUCATION



Education helps reduce inequalities and achieve gender equality, promotes healthier and more sustainable living, and is crucial for fostering tolerance among people and contributing to the development of more peaceful societies. It is estimated that 84 million children and youth will not attend school by 2030, and approximately 300 million students will lack the basic arithmetic and literacy skills necessary for success in life. The goal is to provide equal access to affordable vocational training, eliminate gender and wealth disparities, and achieve universal access to quality higher education.

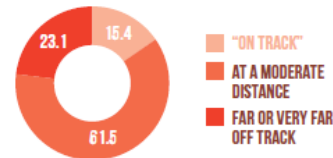
5. GENDER EQUALITY

5
GENDER
EQUALITY


ACHIEVE GENDER EQUALITY AND EMPOWER ALL WOMEN AND GIRLS

THE WORLD IS
NOT ON TRACK TO ACHIEVE
GENDER EQUALITY BY 2030

OUT OF GOAL 5 INDICATORS:



AT THE CURRENT RATE, IT WILL TAKE



300 YEARS
TO END CHILD
MARRIAGE



286 YEARS TO CLOSE GAPS
IN LEGAL PROTECTION AND
REMOVE DISCRIMINATORY LAWS



140 YEARS TO ACHIEVE
EQUAL REPRESENTATION IN
LEADERSHIP IN THE WORKPLACE

LEGISLATED GENDER QUOTAS
ARE **EFFECTIVE** TO ACHIEVE
EQUALITY IN POLITICS

WOMEN'S REPRESENTATION IN PARLIAMENT
(2022)



30.9%
COUNTRIES
APPLYING QUOTAS

21.2%
COUNTRIES
WITHOUT QUOTAS



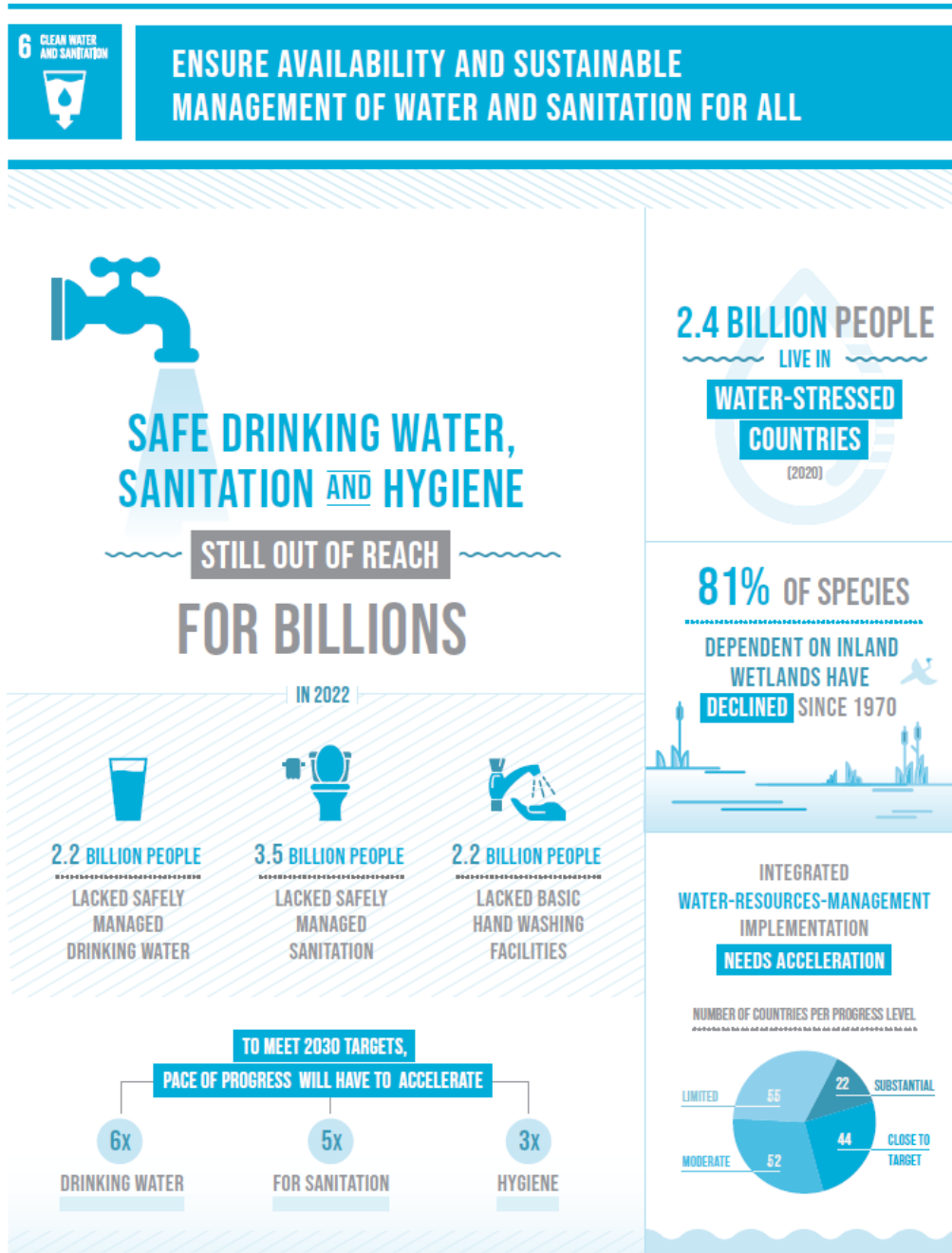
NEARLY HALF OF MARRIED WOMEN
LACK DECISION-MAKING POWER
OVER THEIR SEXUAL AND
REPRODUCTIVE HEALTH AND RIGHTS

1 IN 5 YOUNG WOMEN

ARE MARRIED
BEFORE THEIR 18TH BIRTHDAY

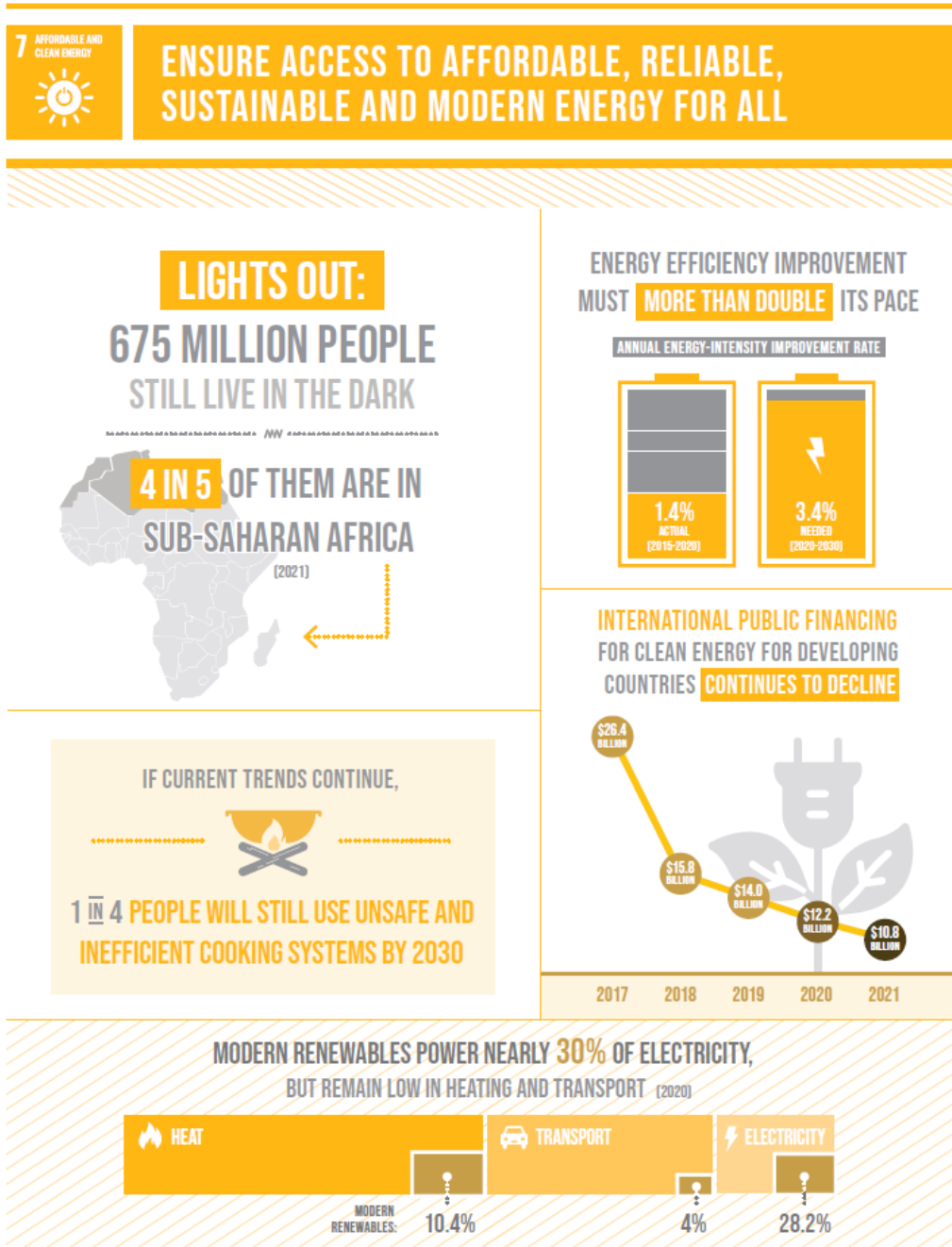


Gender equality is not only a fundamental human right but also a cornerstone for building a peaceful, prosperous, and sustainable world. On average, women earn 23% less than men in the global labor market and spend three times as many hours on unpaid domestic and caregiving work. Sexual violence and exploitation, unequal distribution of unpaid domestic and caregiving work, and discrimination in public office continue to pose significant barriers. At the current pace, it is estimated that it will take 300 years to end child marriage, 286 years to address legal gaps and eliminate discriminatory laws, 140 years for women to be equally represented in positions of power and leadership in the workplace, and 47 years to achieve equal representation in national parliaments.

6. CLEAN WATER AND SANITATION


Access to clean water, sanitation, and hygiene represents the most basic human need for health and well-being. The rapid population growth, urbanization, and increasing water needs in agricultural, industrial, and energy sectors are driving up water demand. Water demand has outpaced population growth, with half of the current world population currently experiencing severe water scarcity for at least one month per year. In many parts of the world, water availability is becoming increasingly unpredictable. In some regions, droughts worsen water scarcity and negatively impact people's health and productivity, threatening sustainable development and biodiversity worldwide.

7. AFFORDABLE AND CLEAN ENERGY

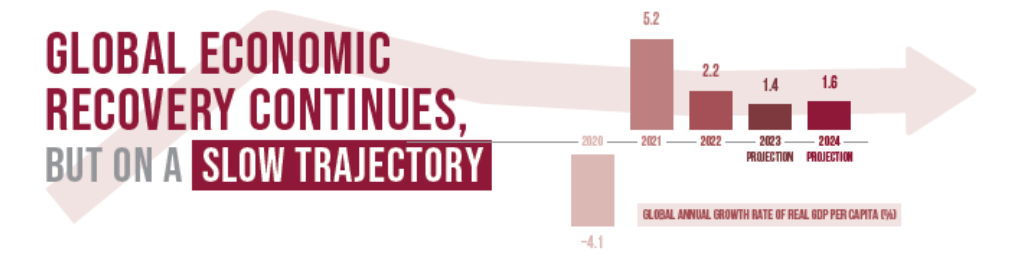


Goal 7 aims to ensure access to clean and affordable energy, which is crucial for the development of agriculture, businesses, communications, education, healthcare, and transportation. Our daily lives rely on secure and affordable energy. The global demand for electricity continues to rise rapidly, and countries cannot drive their economies without a stable electricity supply. However, energy consumption remains the leading cause of climate change, accounting for around 60% of global greenhouse gas emissions. For decades, fossil fuels such as coal, oil, or gas have been the primary sources of electricity, but their combustion produces significant amounts of greenhouse gases, harmful to both people and the environment.

8. DECENT WORK AND ECONOMIC GROWTH

8 DECENT WORK AND ECONOMIC GROWTH

PROMOTE SUSTAINED, INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, FULL AND PRODUCTIVE EMPLOYMENT AND DECENT WORK FOR ALL



2 BILLION WORKERS ARE IN PRECARIOUS INFORMAL JOBS WITHOUT SOCIAL PROTECTION
(2022)

GLOBAL UNEMPLOYMENT IS EXPECTED TO FALL BELOW PRE-PANDEMIC LEVELS, BUT NOT IN LOW-INCOME COUNTRIES

	2019	2020	2022	2023 PROJECTIONS
LOW-INCOME COUNTRIES	5.2	5.9	6.7	6.7
WORLD	5.5	6.5	5.4	5.3

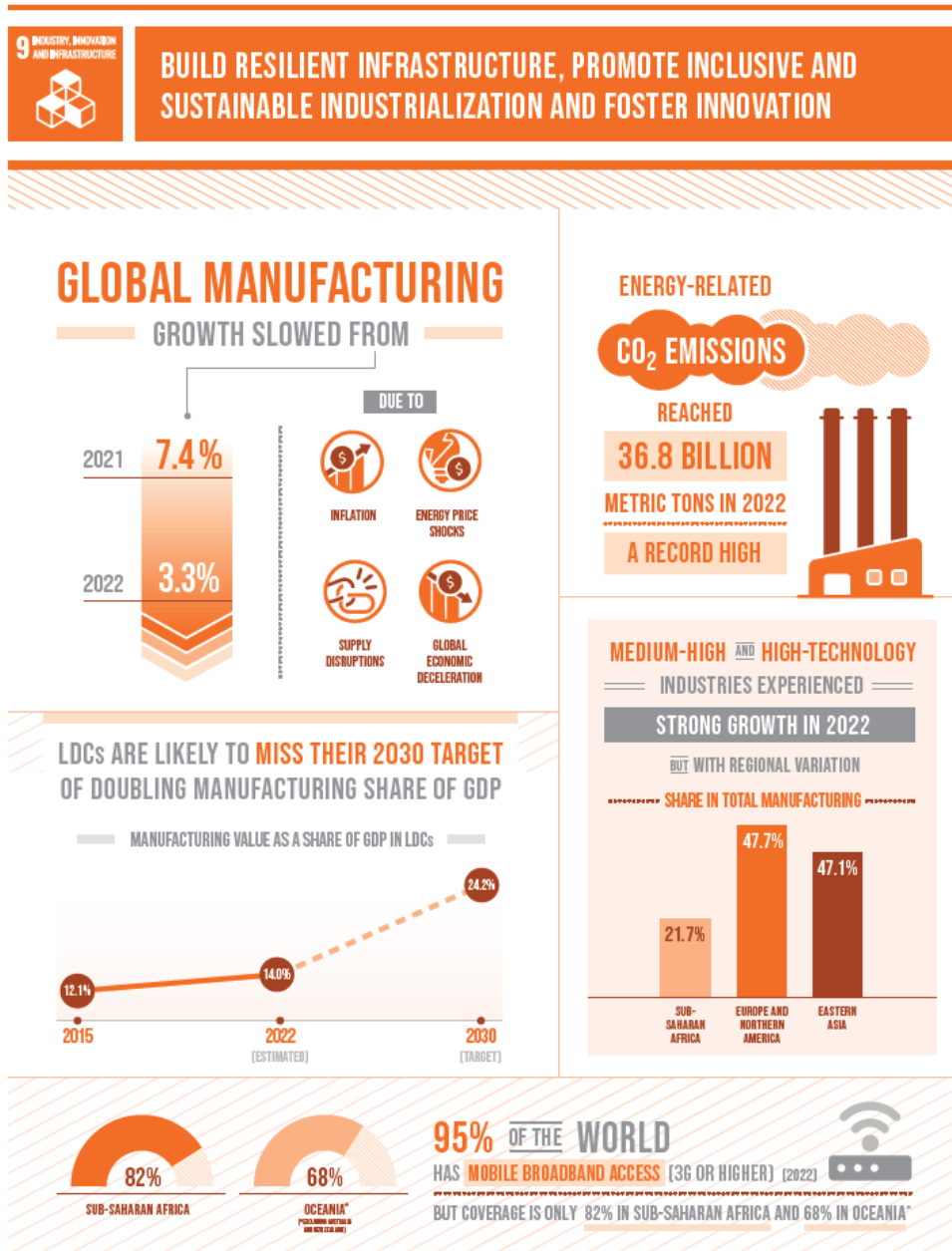
1 IN 4 YOUNG PEOPLE ARE NOT IN EDUCATION, EMPLOYMENT OR TRAINING,

WITH YOUNG WOMEN MORE THAN TWICE AS LIKELY AS YOUNG MEN TO BE IN THIS SITUATION
(2022)

DURING THE PANDEMIC, 4 IN 10 ADULTS IN LOW- AND MIDDLE-INCOME COUNTRIES OPENED THEIR FIRST BANK ACCOUNT

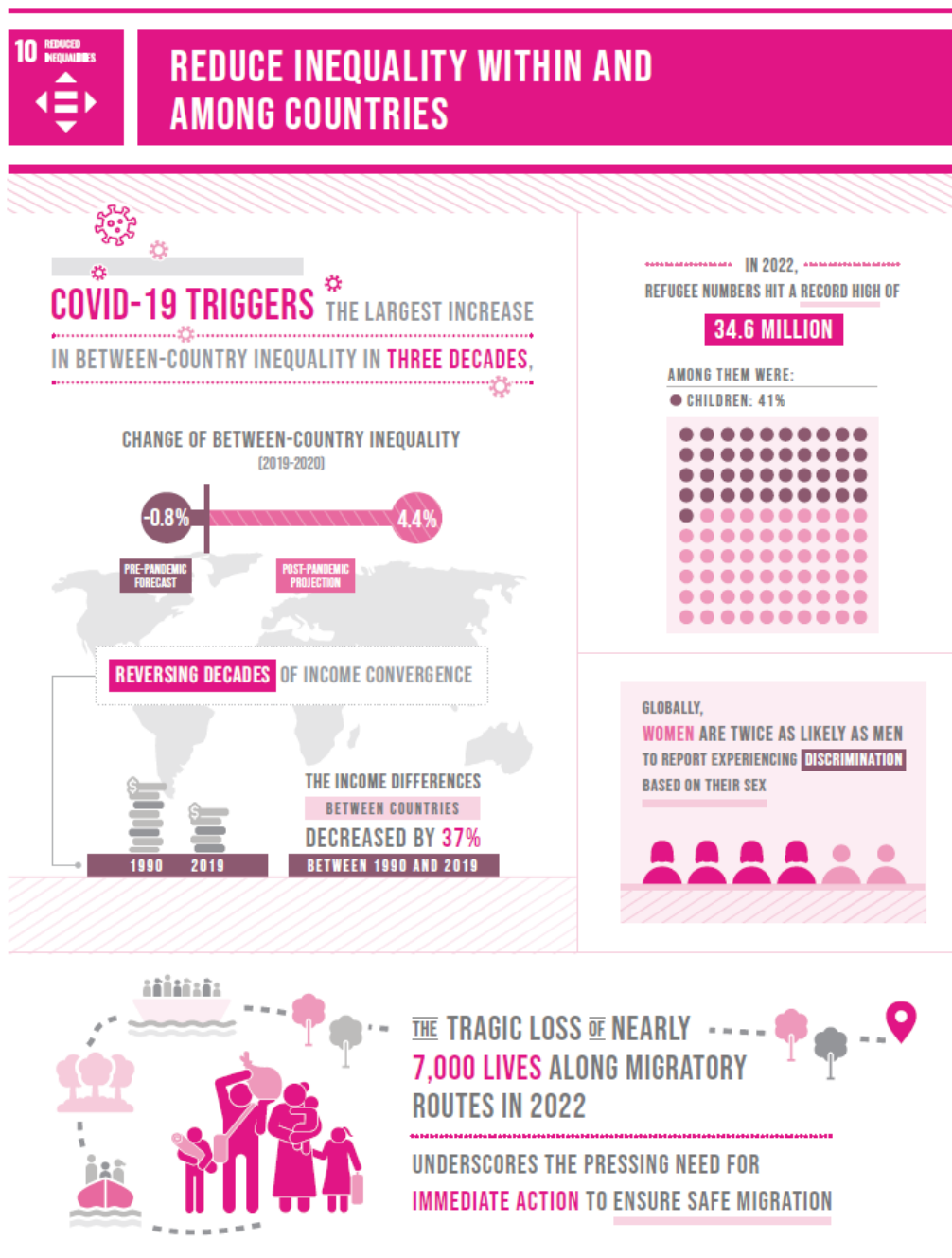
Goal 8 aims to promote inclusive and sustainable economic growth, employment, and decent work for all. Various crises have threatened the global economy in recent years, pushing more workers into informal employment. Decent work means providing everyone with opportunities to obtain productive employment that provides decent income, workplace security, and social protection for families, as well as better prospects for personal development and social integration. The ongoing lack of decent job opportunities, insufficient investment, and low consumption erode the basic social contract underlying democratic societies: the right of all to share in progress.

9. INDUSTRY, INNOVATION AND INFRASTRUCTURE



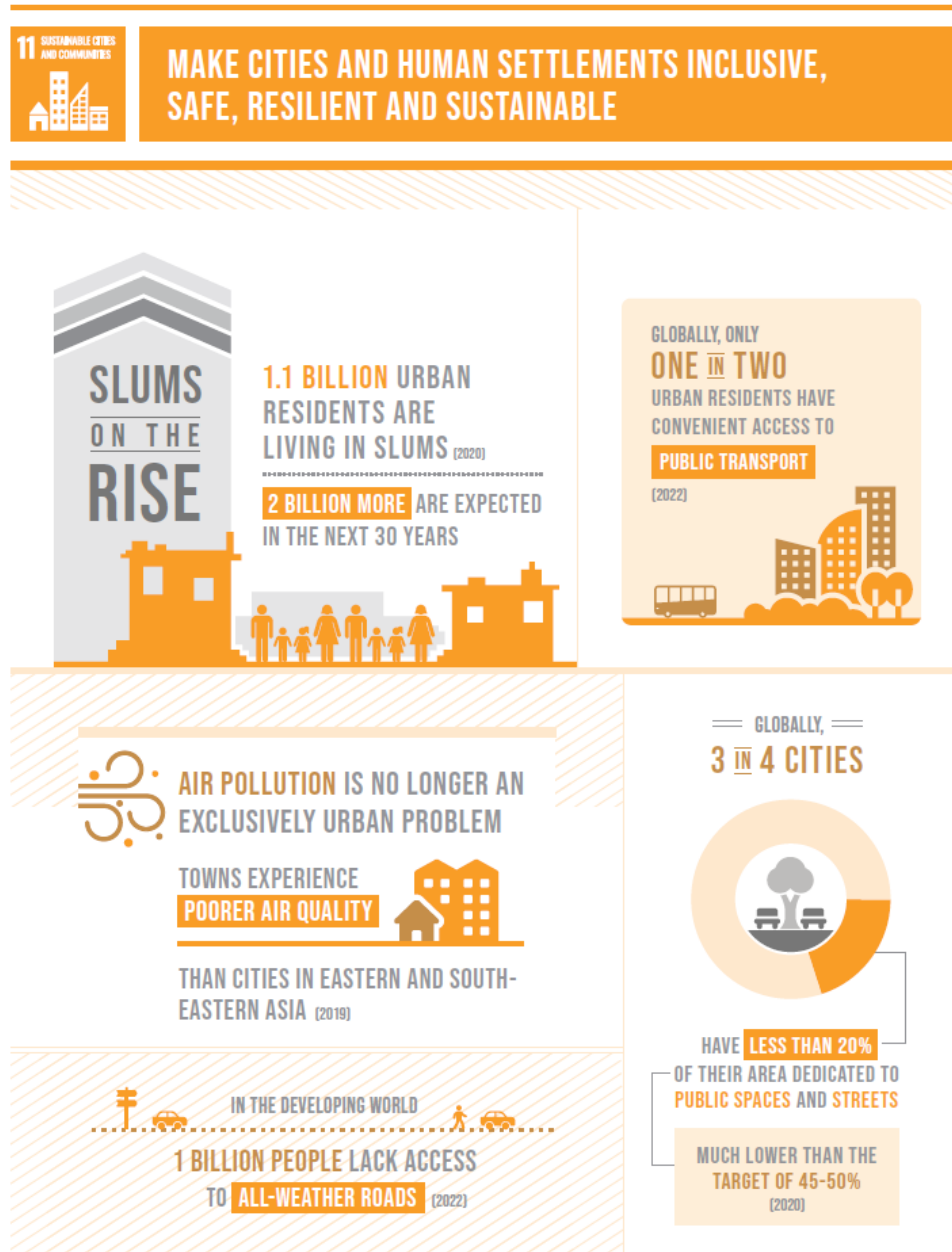
Economic growth, social development, and climate action largely depend on investments in infrastructure, sustainable industrial development, and technological progress. Given the rapidly evolving global economic landscape and increasing inequalities, sustained growth must involve industrialization that firstly makes opportunities accessible to all and secondly relies on innovation and resilient infrastructure. Inclusive and sustainable industrialization, along with innovation and infrastructure, can unleash dynamic and competitive economic forces that generate employment and income. These play a key role in introducing and promoting new technologies, facilitating international trade, and enabling efficient resource use. The expansion of new industries means an improvement in the quality of life for a significant portion of the population.

10. REDUCED INEQUALITIES



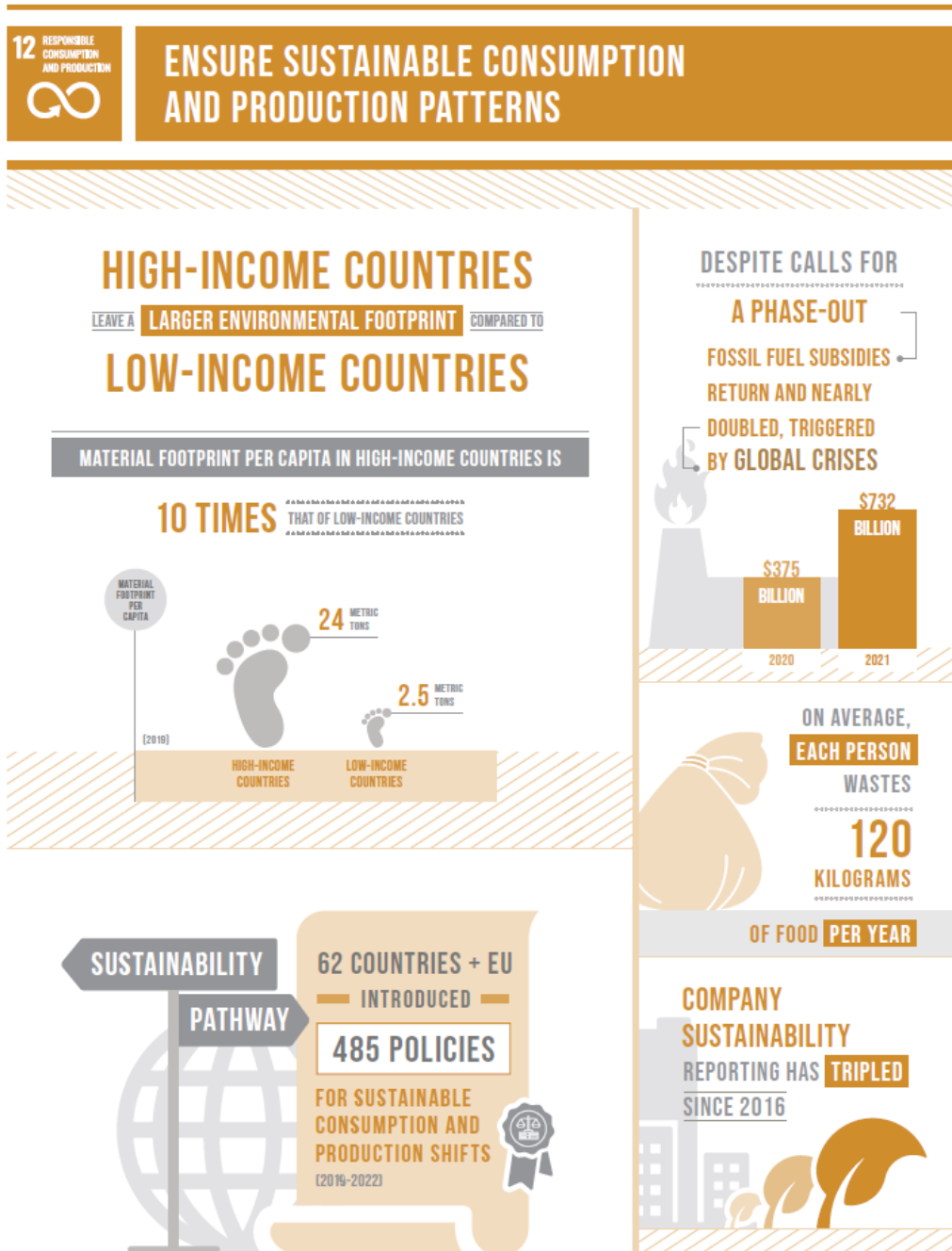
Income, gender, age, disability, sexual orientation, race, class, ethnicity, and religious inequality, as well as unequal opportunities, threaten long-term social and economic development, hinder poverty reduction, and undermine people's sense of fulfillment and self-esteem. This, in turn, can lead to crime, illness, and environmental degradation. To reduce inequality both within and among countries, it is necessary to equitably distribute resources, invest in education and skill development, implement social protection measures, combat discrimination, support marginalized groups, and promote international cooperation for fair trade and financial systems.

11. SUSTAINABLE CITIES AND COMMUNITIES



Cities represent the future of global living. Goal 11 aims to make cities and human settlements inclusive, safe, resilient, and sustainable. Many cities are not prepared for the rapid urbanization experienced, and the development of housing, infrastructure, and services is overwhelmed, leading to the growth of slums or similar conditions. Cities occupy only 3% of the Earth's surface but account for between 60% and 80% of energy consumption and 75% of carbon emissions. Additionally, many cities are more vulnerable to the effects of climate change and natural disasters due to their high population concentration and location. Therefore, improving urban resilience is crucial to prevent human, social, and economic losses. Achieving sustainable development is not possible without significantly transforming how urban spaces are built and managed.

12. RESPONSIBLE CONSUMPTION AND PRODUCTION

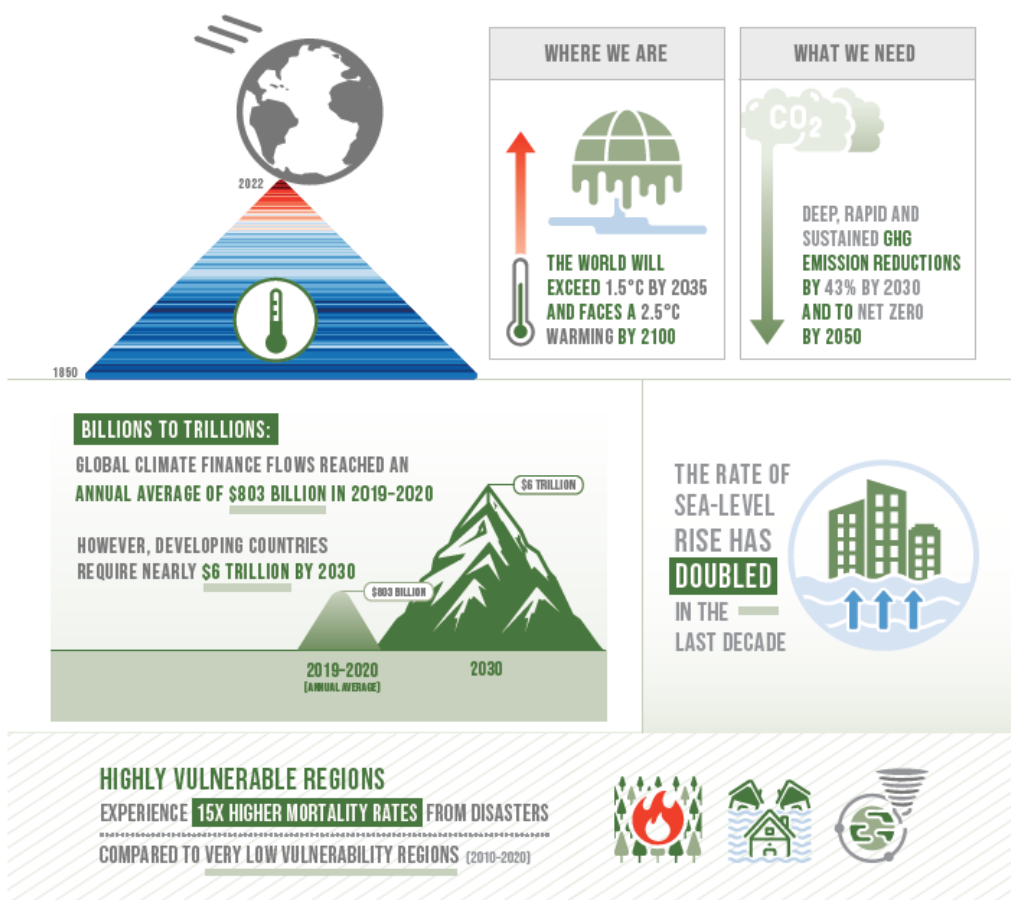


Our planet is running out of resources, yet the population index continues to grow. Goal 12 aims to ensure sustainable consumption and production patterns, crucial for sustaining the livelihoods of current and future generations. If the world's population reaches 9.8 billion people by 2050, it may require the equivalent of nearly three planets to provide the natural resources needed to maintain current lifestyles. For the transition to be successful, it is necessary to enhance the efficient use of resources, consider the entire life cycle of economic activities, and actively engage in multilateral agreements on the environment.

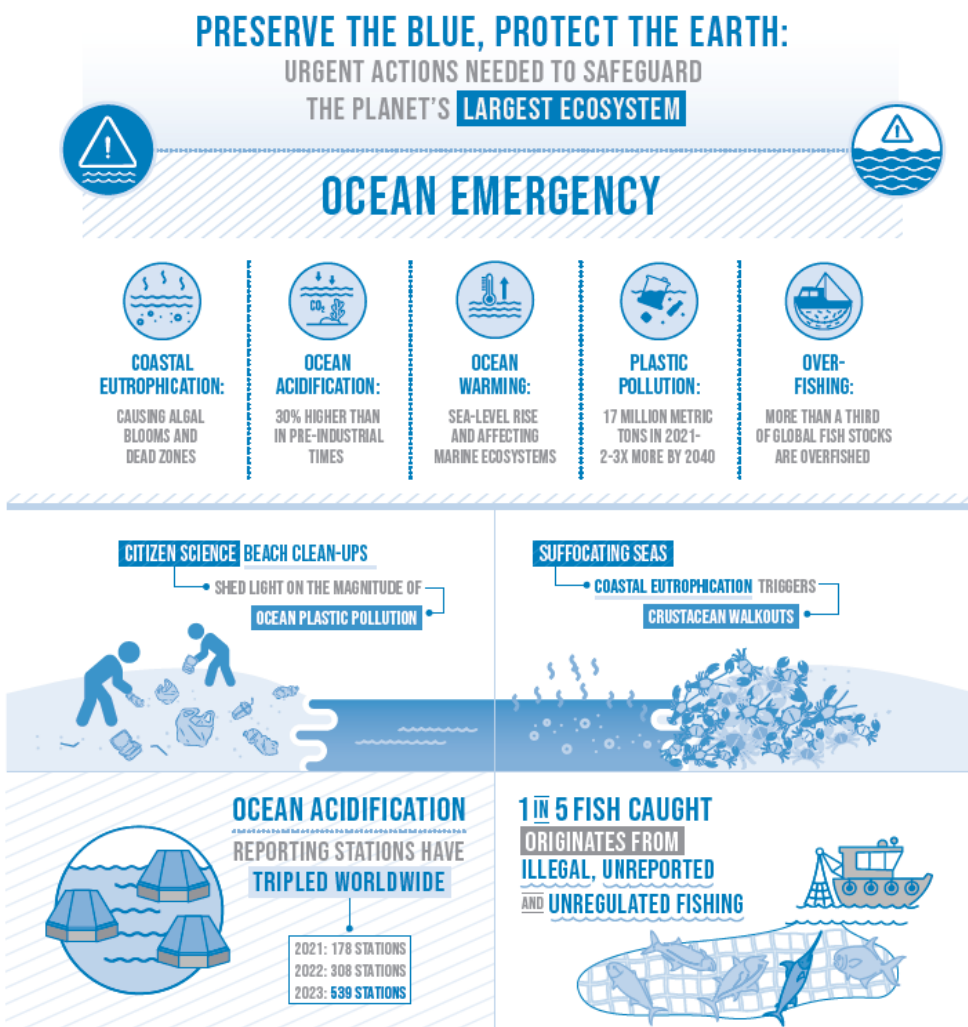
13. CLIMATE ACTION


EARTH'S TIPPING POINT

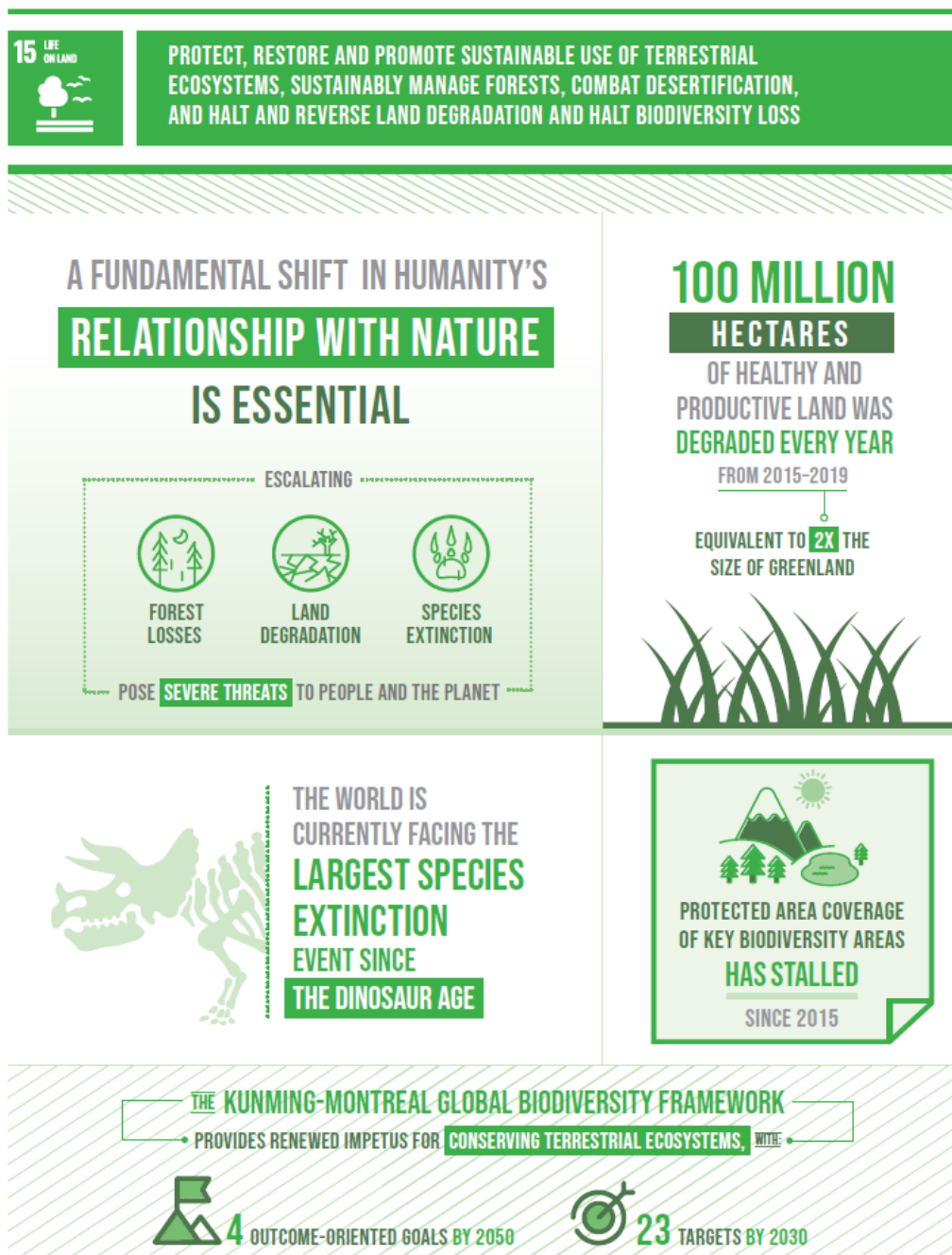
STANDING AT THE BRINK OF CLIMATE CALAMITY



Climate change is caused by human activities and threatens life on Earth as we know it. With the increase in greenhouse gas emissions, climate change is evolving at a much faster pace than anticipated. Its effects can be devastating, leading to extreme and erratic weather phenomena, as well as sea-level rise. Climate change is disrupting national economies and affecting the lives and livelihoods of many people, especially the most vulnerable. Taking urgent and transformative actions that go beyond mere plans and promises is crucial. This requires increasing ambitions, encompassing entire economies, and moving towards climate-resilient development, while charting a clear pathway to achieve net-zero emissions.

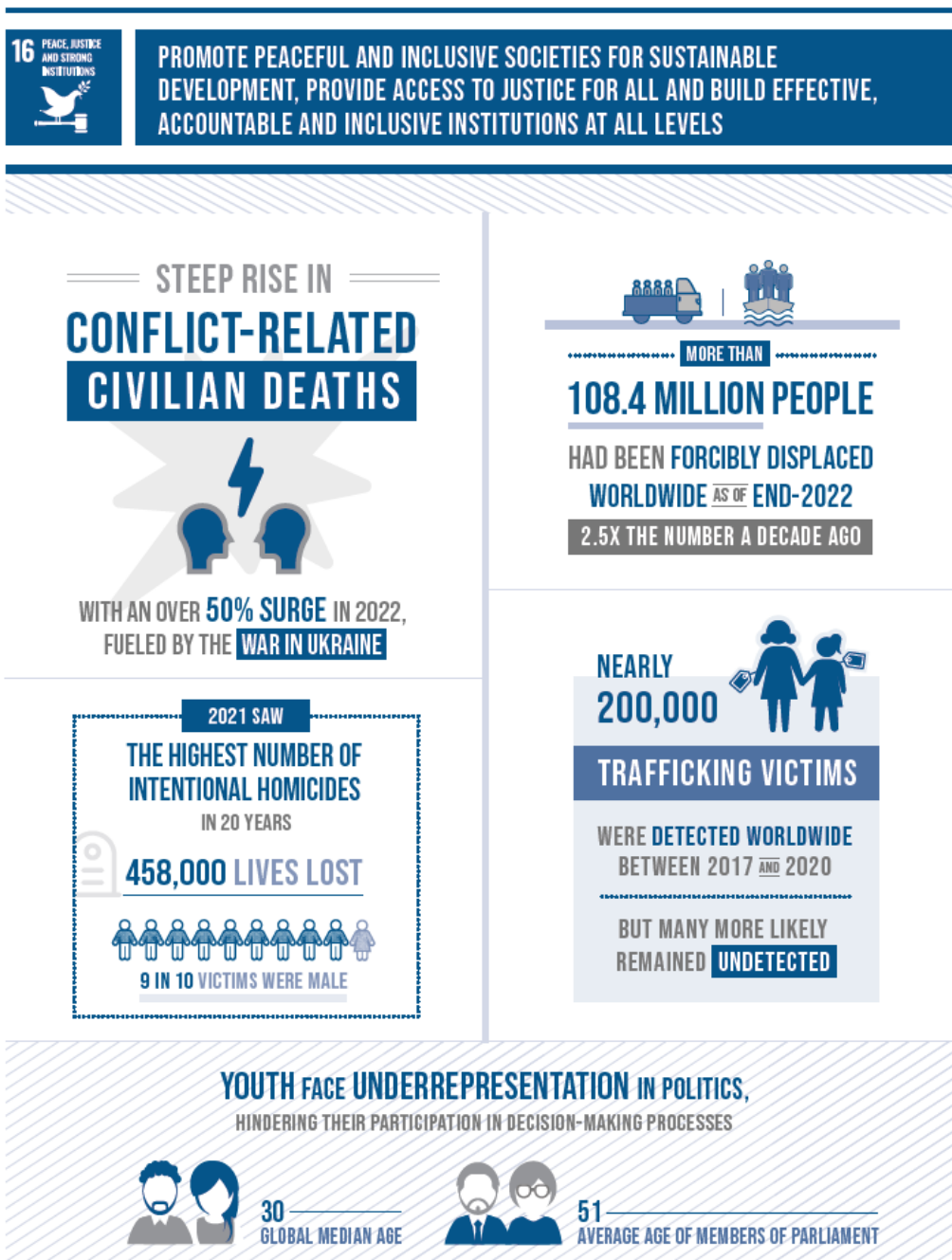
14. LIFE BELOW WATER


Objective 14 aims to conserve and sustainably use the oceans, seas, and marine resources as they provide key natural resources such as food, medicines, biofuels, and other products. They also help break down and remove waste, reduce pollution, and their coastal ecosystems contribute to reducing storm damage. Additionally, they are the planet's largest carbon sink. However, marine pollution is reaching extreme levels. Currently, the average ocean pH is 8.1, about 30% more acidic than in pre-industrial times. Ocean acidification threatens the survival of marine life, disrupts the food chain, and undermines both the vital services provided by the oceans and our own food security. Current efforts to protect the oceans do not yet meet the urgent need to safeguard this vast, albeit fragile, resource.

15. LIFE ON LAND


Terrestrial ecosystems are vital for sustaining human life, contributing to over half of the global GDP, and encompassing various cultural, spiritual, and economic values. Objective 15 seeks to protect and restore terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss. However, the world is facing a triple crisis of climate change, pollution, and biodiversity loss. Deforestation entails the loss of livelihoods for rural communities, increased carbon emissions, biodiversity degradation, and soil degradation.

16. PEACE, JUSTICE AND STRONG INSTITUTIONS



People worldwide should live free from fear of any form of violence and feel safe in their daily lives, regardless of their ethnic origin, religion, or sexual orientation. Objective 16 aims to promote peaceful and inclusive societies, ensure access to justice for all, and build effective, accountable, and inclusive institutions at all levels. High levels of armed violence and insecurity have destructive consequences for a country's development, while sexual violence, crimes, exploitation, and torture are widespread phenomena where there is conflict or no rule of law, so countries must take measures to protect the most vulnerable sectors.

17. PARTNERSHIPS FOR THE GOALS


STRENGTHEN THE MEANS OF IMPLEMENTATION AND REVITALIZE THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT

MANY DEVELOPING COUNTRIES ARE FACING A DEBT CRISIS



THE SHARE OF EXPORTS FROM
LDCs IN GLOBAL
MERCHANDISE TRADE



HAS STAGNATED
AT AROUND **1%**
— SINCE 2011 —



NET ODA REACHED **\$206 BILLION** IN 2022, UP 15.3% FROM 2021

MAINLY OWING TO SPENDING ON REFUGEES
IN DONOR COUNTRIES AND AID TO UKRAINE

NET ODA REACHED 0.37% OF GNI,
STILL BELOW THE TARGET OF 0.7%

2 IN 3 PEOPLE
USED THE INTERNET
IN 2022
259 MILLION MORE MALE THAN FEMALE USERS



ODA FUNDING FOR DATA



DROPPED
BY MORE THAN
20%
(2018-2020)

The Sustainable Development Goals can only be achieved through strong global partnerships and cooperation to ensure that no one is left behind on our path to development. Objective 17 aims to revitalize the global partnership for sustainable development. The 2030 Agenda is universal and demands the involvement of all countries to ensure that no one is left behind. It requires collaboration among governments, the private sector, and civil society.

5.4 – SDG Awareness Campaigns

For the dissemination of the Sustainable Development Goals (SDGs), there are numerous campaigns and initiatives that allow for raising awareness, educating, and mobilizing individuals and communities worldwide. These campaigns and activities are designed to promote understanding of the SDGs, as well as to inspire and facilitate action for their achievement. From social media awareness campaigns to community events and educational programs, these initiatives encompass a wide range of approaches and strategies to reach diverse audiences and promote active participation in the sustainable development agenda.

Initiatives that seek to promote awareness and action around these objectives are crucial components of efforts to address global challenges. By raising awareness and mobilizing individuals and communities to take action, these initiatives play a vital role in advancing the Sustainable Development Goals agenda. Their primary aim is to deepen understanding of the SDGs and inspire active engagement in their implementation.

Act Now



Act Now is an initiative related to the SDGs that urges immediate action to address global challenges and achieve the set goals by 2030. This campaign, launched by the United Nations, seeks to mobilize individuals, communities, businesses, and governments to take concrete actions and contribute to the attainment of the SDGs. The idea behind Act Now is to empower individuals to take everyday actions that, collectively, have a positive impact on the environment, society, and the economy. The campaign uses educational and awareness-building approaches to highlight how small daily actions can add up to create meaningful change.

The campaign has obtained support from influential figures on social media, well-known chefs who are sharing sustainable recipes and tips, and companies involving their employees and customers. Special collaborations with Angry Birds, Peter Rabbit, and the Trolls, along with the partnership with Baobab Studios, gave Act Now an even greater boost to our commitment. The chatbot on Facebook and Instagram, along with the mobile app launched in September 2020, continues to engage audiences

worldwide. Additionally, the children's version of Act Now, Climate Action Superheroes, brought the campaign to new audiences. In July 2021, Act Now reached 3 million registered individual actions.



SDG Book Club



The SDG Book Club features a list of books aimed at children and young adults that highlight the importance of the Sustainable Development Goals. Since the youth worldwide plays a crucial role in achieving the Goals, the SDG Book Club aims to encourage them to explore the SDGs in an engaging and enjoyable way. It also seeks to raise awareness about the actions they can take, empowering them and inspiring them to make a difference. The reading list of books from around the world related to each of the 17 SDGs in all six official UN languages—Arabic, Chinese, English, French, Russian, and Spanish.

Frieda



The story of Frieda was created to simplify the lessons of the Sustainable Development Goals, making them relatable and easily comprehensible for young children. The focus of Frieda's book is to follow her on her adventure through her home in Windhoek (Namibia) to learn about protecting life on land, the importance of water, the environment, and more.

170 Actions to Transform Our World



The book of 170 actions to transform our world is a very useful tool for parents, teachers, and children of all ages. It contains 10 suggestions for each of the sustainable development goals that you can implement daily to make progress with small changes.

Go Goals Game



Go Goals is a board game designed to help children understand and learn about the SDGs . The game, complete with all the necessary components, is available for download on the United Nations website.

The Sustainable Development Goals – by YAK



Elyx is the digital ambassador of the United Nations, devoid of race, gender, or nationality. Created by YAK, a French artist, Elyx serves as a universal character to promote the work of the United Nations and the Sustainable Development Goals (SDGs).

Through educational programs, advocacy campaigns, and community-based projects, these initiatives strive to empower people with the knowledge and tools needed to contribute effectively to sustainable development. By fostering a sense of ownership and responsibility, they encourage individuals to make meaningful changes in their daily lives and advocate for broader systemic transformations.

Moreover, these initiatives serve as platforms for dialogue, collaboration, and innovation, bringing together diverse stakeholders to exchange ideas, share best practices, and develop new solutions to complex challenges. By creating spaces for engagement and participation, they enable individuals and communities to have a voice in shaping the future they want to see.

In sum, initiatives aimed at promoting awareness and action on the SDGs are not only essential for achieving the goals themselves but also for fostering a culture of sustainability and collective responsibility. By working together to raise awareness, build capacity, and drive action, we can create a more equitable, resilient, and sustainable world for future generations.

5.5 – Contribution of Construction to the SDGs

The fight against climate change is an urgent topic on national, EU and global scenes recognizing the crucial role of higher education institutions in contributing to the changes needed to become climate neutral by 2050. Developing competencies and future-oriented curricula that meet the needs of the so-called quadruple helix are highly required as the construction industry holds great responsibility and potential for supporting this agenda. Developing green sectorial skills and future-oriented curricula are essential for preparing students, lecturers, and practitioners to become actual change factors. The construction industry is responsible for 40% of energy use, one-third of greenhouse gas emissions worldwide, and has one of the most significant waste streams generated within the EU. This underpins the urgency of addressing the environmental aspects, supported by the EU Green Deal strategy, the Paris Agreement, and the UN's 2030 Agenda for SDGs.

Depending on the author consulted, various classifications linking the SDGs with the construction industry can be found. According to (Ofori, 2016), the 17 SDGs are classified in relation to the construction industry as follows: (a) addressing basic human and national needs, including goals 1, 2, 3, 4, 5, and 8; (b) outlining what the construction industry must focus on, encompassing goals 9–11; (c) highlighting some of the results achieved by the construction industry, covering goals 6–7; and (d) emphasizing the inputs and methods used by the construction industry, which relate to goals 12, 13, 14, and 15. Throughout its lifecycle, the construction industry impacts the attainment of the SDGs through activities such as land development, resource utilization, waste generation, and labor practices. While the construction sector contributes to economic growth and job creation, it is also associated with negative practices such as modern slavery, which affect human and labor rights and are linked to the realization of SDGs 1, 8, 10, and 16. Additionally, corrupt practices within the construction industry, particularly in planning, procurement, and payments, have social, political, and economic implications that impact SDG 16.

The construction sector's impact spans across various pivotal SDGs, encompassing SDG 6-9, SDG 11-13, SDG 15, and SDG 17. SDG 6, with its focus on clean water and sanitation, witnesses the construction industry's influence through projects altering water resources and fostering water infrastructure. SDG 7, addressing affordable and clean energy, intersects with construction via energy consumption and sustainable methodologies. Meanwhile, SDG 8, which targets decent work and economic growth, is influenced by the sector's employment opportunities and labor standards. SDG 9, highlighting industry, innovation, and infrastructure, is closely entwined with construction's role in driving economic progress and infrastructure development. Additionally, SDGs 11 to 13, emphasizing sustainable cities and communities, responsible consumption and production, and climate action, bear the brunt of construction's impact. Notably, SDG 11 underscores the sector's crucial role in shaping urban landscapes and promoting resilient urban environments. Moreover, SDG 12

stresses the need for resource efficiency and waste reduction, championed through sustainable construction practices like recycling and circular economy principles. Similarly, SDG 13 underscores the urgency of adopting low-carbon construction materials and climate-resilient infrastructure. Furthermore, SDG 15, focusing on terrestrial ecosystems, is closely linked with construction practices, particularly in land management and biodiversity conservation. Lastly, SDG 17, emphasizing partnerships for all goals, highlights the collaborative efforts required between stakeholders within and beyond the construction sector to achieve sustainable development objectives (Regona et al., 2024).

(BDG, 2019) suggests that the construction and real estate sector are intricately linked to all 17 SDGs. However, (Opoku, 2016) argues that the construction industry significantly influences the attainment of various SDGs. These include SDG 2-4, SDG 6-11 and SDG 13.

Incorporating the principles of the SDGs into construction projects not only promotes environmental sustainability but also offers the industry a chance to expand its scope. Achieving the SDGs by 2030 requires concerted efforts from governments and all sectors of society to embed these goals into local planning frameworks. Local governments play a pivotal role in this process by embracing the inclusive ethos of the SDGs and pinpointing areas that may require additional assistance (Pizzi et al., 2020).

5.6– Spain, Romania, and Norway's involvement in the SDGs

In Spain, several non-profit organizations have published a considerable amount of resources regarding the SDGs and their implementation in the construction industry. Similarly, private companies are increasingly demonstrating a strong interest in the Sustainable Development Goals. Here are some examples of actions taken by these companies:

- AENOR has been accredited for the following SDGs: 7, 9, 11, 12, 13 and 15. In addition, AENOR has become the first Spanish organisation to be accredited by the international organisation Verra under the new standard "Sustainable Development Verified Impact Standard" (SDVISTA) to certify projects by public and private organisations related to the SDGs.
- SEOPAN is an association of construction companies and infrastructure concessionaires to actively promote investment in infrastructure and encourage public-private partnership projects as decisive elements for competitiveness and economic growth in Spain. They prioritize sustainable development objectives, focusing on improving public health systems, sewage treatment, water resource management, energy efficiency, and mobility. For example, they advocate for investments in hospital and road infrastructure (SDG 3), sewage treatment and water ecosystems (SDG 6), reliable infrastructure (SDG 9), energy efficiency (SDG

7), sustainable mobility and green infrastructure (SDG 11), and addressing droughts and floods (SDG 15) in Spain.

- The Green Building Council Spain (GBCe), part of the World Green Building Council (WorldGBC), promotes sustainable construction in Spain. It offers tools for certifying buildings, collaborates on research projects, and provides certification systems like VERDE and DGNB, which contribute to various Sustainable Development Goals (SDGs) such as health, clean water, clean energy, economic growth, and climate action.
- Iberdrola, a major energy company, has prioritized investments in renewable energy sources, such as wind and solar power, to reduce carbon emissions and combat climate change. This aligns with SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action).
- Inditex, the parent company of fashion retailer Zara, has implemented sustainable practices in its supply chain, including using organic cotton and reducing water consumption in production processes. These efforts contribute to SDG 12 (Responsible Consumption and Production) and SDG 6 (Clean Water and Sanitation).
- CETIM conducts innovative research projects focused on developing sustainable material solutions for the construction industry. By exploring the use of organic waste and collaborating with partners on initiatives like the LIFE DrainRain project, CETIM contributes to various Sustainable Development Goals. With these projects, they are committed to SDGs 6,9,11,12 and 13, among others. (10)
- Ferrovial is an innovative company dedicated to developing and operating sustainable infrastructure across various sectors. They focus on designing and constructing civil engineering projects, building and managing water treatment facilities, and providing solutions for electrical transmission networks. Their vision includes achieving net zero energy and promoting emission-free mobility while supporting vulnerable communities in adapting to climate change. To this end, they prioritize renewable energy use, emissions reduction, and water conservation efforts aligned with SDGs 6, 7, 8, 9, 12, 13, and 15. Additionally, Ferrovial emphasizes social responsibility by fostering diversity, creating safe work environments, and promoting inclusive collaboration, contributing to SDGs 3, 5, 8, 17. Their sustainability strategy integrates ESG criteria to ensure responsible governance practices in line with SDG (16).

In Romania, several companies and organizations are implementing the Sustainable Development Goals in their operations and activities. Here are some examples:

- Foundation for Civil Society Development (FDSC): This organization works on various projects addressing the SDGs, including promoting gender equality, quality education, and sustainable community development.

- NESTing Impact Hub: It is a collaborative workspace that promotes social innovation and sustainable entrepreneurship. It helps businesses develop business models that contribute to the SDGs, such as clean energy, waste reduction, and access to education.
- Dedeman, a prominent retailer in Romania, is actively advancing sustainability through various initiatives. By implementing energy-efficient measures like LED lighting and efficient HVAC systems, the company reduces energy consumption, aligning with SDG 7 (Affordable and Clean Energy). Additionally, Dedeman promotes sustainable construction materials in its stores, fostering responsible consumption and production in line with SDG 12. Furthermore, through participation in affordable housing projects with high sustainability standards, Dedeman contributes to creating inclusive and sustainable urban environments, supporting SDG 11.
- Trameco demonstrates a commitment to sustainable construction practices. By incorporating recycled materials and adopting construction methods that minimize resource waste, the company contributes to SDG 12 (Responsible Consumption and Production). Furthermore, Trameco's involvement in infrastructure projects promoting sustainable mobility, such as building bike lanes and efficient public transportation systems, aligns with SDG 9 (Industry, Innovation, and Infrastructure).
- Orange Romania: This telecommunications company has committed to addressing various SDGs, including climate action, gender equality, and technological innovation for sustainable development. They have implemented energy efficiency projects, digital inclusion programs, and awareness campaigns on climate change.
- Carrefour Romania: As a supermarket chain, Carrefour focuses on promoting sustainable production and consumption, as well as reducing food waste. They have implemented initiatives to reduce plastic usage, promote local products, and donate surplus food to charitable organizations.

In Norway, numerous initiatives are implementing the Sustainable Development Goals across various sectors. Some notable examples include:

- Norwegian Green Building Council (NGBC): This organization promotes sustainable construction and responsible urban planning. It works on certifying green buildings, advocating for sustainable construction practices, and raising awareness about the importance of eco-friendly buildings in achieving SDGs related to sustainable cities and responsible consumption.
- NORAD (Norwegian Agency for Development Cooperation) implements development projects worldwide, focusing on areas such as education, healthcare, gender equality, and environmental conservation. Its efforts align with several

SDGs, including those related to quality education, good health and well-being, gender equality, and partnerships for the goals.

- Veidekke focuses on sustainable building practices. They develop energy-efficient buildings with energy certification, utilizing sustainable materials and innovative construction technologies to reduce energy consumption and carbon emissions, aligning with SDG 7 (Affordable and Clean Energy) and SDG 13 (Climate Action). Additionally, Veidekke participates in green infrastructure projects such as wind farms and renewable energy systems, further contributing to SDGs 7 and 13.
- NCC, another construction company in Norway, embraces circular construction practices by recycling construction materials and minimizing waste on construction sites. They prioritize worker safety and well-being by implementing labor safety measures, ensuring fair and safe working conditions on all construction projects, in line with SDG 8 (Decent Work and Economic Growth). These initiatives demonstrate Veidekke and NCC's commitment to sustainability and their contributions to achieving the Sustainable Development Goals.
- Equinor, as a leading energy company, is committed to sustainable energy production and climate action. They invest in renewable energy projects, such as offshore wind farms, and work to reduce their carbon footprint through energy efficiency measures and carbon capture and storage initiatives.
- Telenor: Norway's largest telecommunications company, Telenor, is dedicated to promoting digital inclusion and connectivity while addressing environmental sustainability. They support SDGs related to affordable and clean energy, industry innovation, and sustainable cities through initiatives like energy-efficient network infrastructure and digital literacy programs.

These examples illustrate the diverse range of companies and organizations in Spain, Romania and Norway that are actively contributing to the achievement of the SDGs and advancing sustainable development both locally and globally. These are just a few companies and organizations that are applying the SDGs in their activities. Many other organizations are also working to contribute to sustainable development and achieve the goals set by the United Nations' 2030 Agenda.

5.7 – Challenges

Challenges abound for small and medium enterprises aiming to embrace sustainable development, including limited expertise, resource constraints, and the hefty upfront costs associated with sustainability measures. On a global scale, the lack of political resolve presents a significant hurdle to achieving sustainability goals. Addressing this challenge requires governments to forge strong social and political alliances, driving collective efforts to enact reforms and implement programs aimed at mitigating the adverse impacts of human activities, thus advancing both current and future environmental sustainability objectives.

Consider the construction industry, traditional construction practices often contribute to environmental degradation through high levels of waste generation, energy consumption, and carbon emissions. For instance, concrete production, a fundamental component of construction, is a significant source of carbon dioxide emissions due to the high-energy requirements of cement manufacturing. To address this challenge, alternative construction materials and techniques, such as the use of recycled materials, can be explored. Geopolymers are a prominent example of construction products that utilize recycled materials. These materials are composed of aluminosilicates and are produced through the alkaline activation of materials rich in silica and alumina, such as fly ash, blast furnace slag, metakaolin, and other industrial byproducts or waste. These recycled materials can be used as substitutes for Portland cement in the production of concrete and other construction products. Additionally, adopting innovative construction methods like prefabrication and modular construction can reduce construction waste and minimize environmental impact.

Furthermore, incorporating green building certifications and standards, such as LEED (Leadership in Energy and Environmental Design) or BREEAM (Building Research Establishment Environmental Assessment Method), can incentivize developers and builders to prioritize sustainability in their projects. By embracing these approaches, the construction industry can play a crucial role in advancing environmental sustainability goals while meeting the growing demand for infrastructure development.

However, the pursuit of sustainable development may encounter obstacles stemming from negative externalities associated with emerging technologies. For instance, despite the promising advantages offered by geopolymers, their widespread adoption in the construction industry is hindered by various challenges, such as regulations and standards. Current industry standards and regulations may not specifically address the use of geopolymers. This means that projects utilizing this material may face barriers to approval in areas where compliance with certain quality and safety standards is required. The lack of official recognition and acceptance may discourage investors and contractors from adopting this technology. Although studies and pilot applications have demonstrated the potential of geopolymers, there is still a need for continuous research and development to refine their performance and address potential long-term issues. This includes optimizing the formulation of geopolymers, identifying more cost-effective and sustainable raw materials, and enhancing their durability and resistance to different environmental conditions.

Furthermore, external events such as the Covid-19 pandemic and the conflict in Ukraine have significantly disrupted efforts toward sustainable development, slowing down essential actions and initiatives.

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6 - Deliverables

To evaluate the success of the application, students will have to answer an online questionnaire.

7- What we have learned

The 17 Sustainable Development Goals, their history, as well as their application in current companies and organizations, focusing on the construction sector and the present challenges.