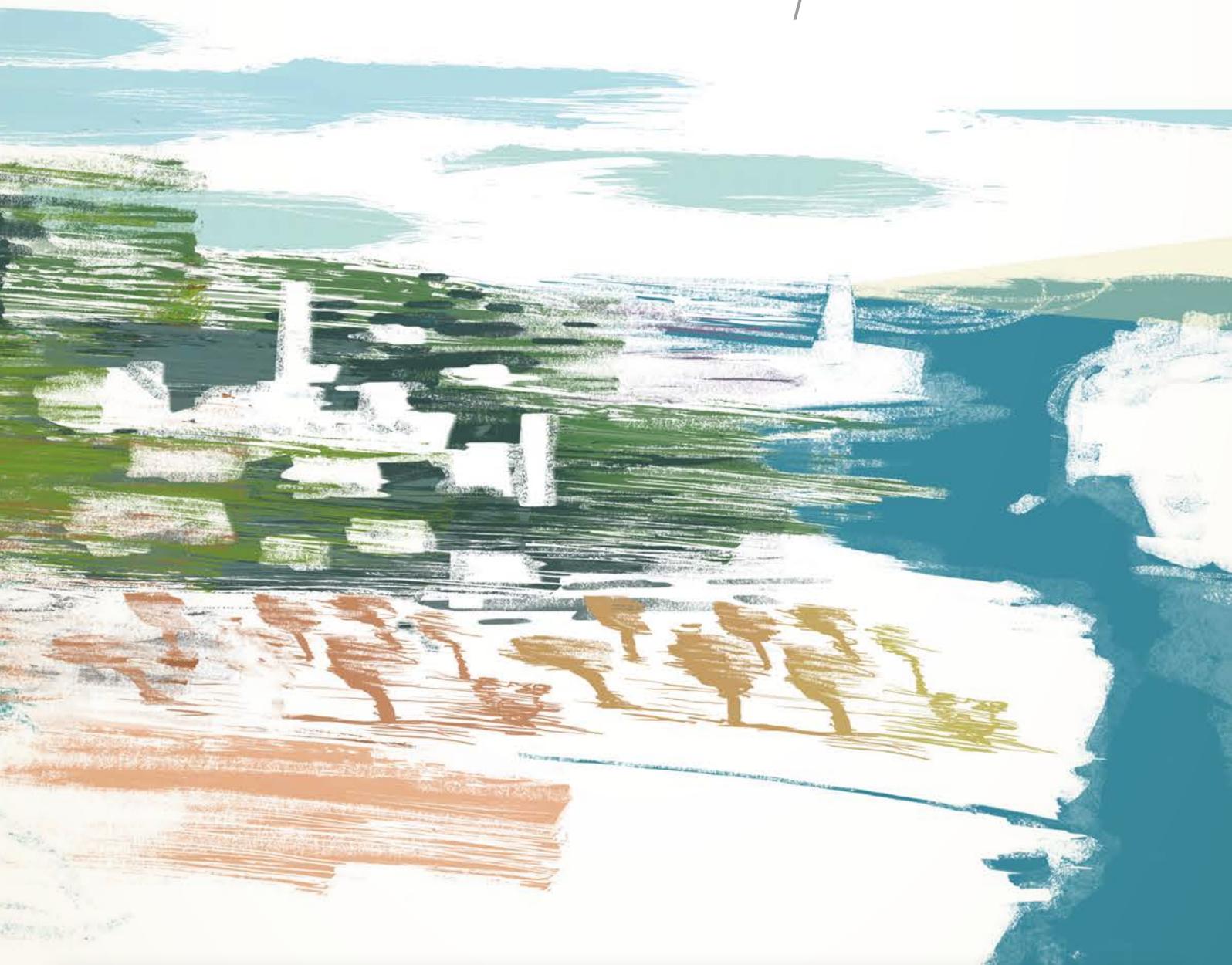


REPORT ON THE STATE OF THE GREEN ECONOMY

2019

EXECUTIVE SUMMARY

Focus on
climate change
impacts in **Italy**



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REPORT ON THE STATE OF THE GREEN ECONOMY - 2019

Presentation by **Edo Ronchi**

President of the Sustainable Development Foundation

The Report on the State of the Green Economy in 2019 opens with **a focus on the “Economic Impacts of Climate Change in Italy”**, a research that has been carried out by the European Institute on Economics and the Environment in collaboration with the Sustainable Development Foundation and Italy4Climate. 2019 is a year for reflection and restart: the Paris Agreement struggles to take off, global greenhouse gas emissions continue to rise, European and Italian commitments on climate change have weakened and youths have been taking to the streets to demand more commitment for the climate and their future together with Greta Thunberg, a girl that has been turning on a worldwide media attention. **The climate and environmental crisis are now topics that play a central role in the public debate and the media like never before. There has been a change in the majority and the new Government has set a Green New Deal as a programmatic priority: this is a proposal that the States General of the Green Economy have been supporting since a few years as a way to address at the same time both the climate crisis and the restart of a sustainable development in Italy that is based on green economy.**

1. The economic impacts of climate crisis

The study on the economic impacts of the climate crisis that we are to present aims at contributing to a better definition of the reasons to support the green economy for a Green New Deal. When considering the costs and investments that are needed for this historic green transition, we should not disregard the costs related to the climate crisis that we need to avoid, or at least reduce as much as possible. In Italy as well. On the contrary, it appears evident that, despite the great relevance, the economic impacts of the climate crisis in Italy are mostly overlooked, if not ignored. We urge that this kind of study is carried out also in Italy, because it is necessary not only for the public opinion to be well-informed and more aware, but also for decision makers to be solidly supported, in order to make decisions that are better aimed at real priorities and more solidly based on the evaluation (also in economic terms) of actual costs and benefits.

This study provides some relevant indications, even though it recognizes that the research in the field is still not at an optimal level. **With the worsening of the climate crisis, analyses show that its economic impacts have been generally underestimated, also in the recent past, while more updated analyses prospect a much more alarming scenario.** Warming is global, but it is intuited and shown to be greater in the hottest areas of the Planet, where countries and populations mostly live on an economy that is highly based on agriculture and farming, hence on the availability of water and other natural resources; these are also areas where the resilience appears lower, due to the scarcity of economic and technological resources. This is going to fuel new poverty, a new and stronger global instability and the growth of new conflicts and new consistent migratory flows.

Despite not belonging to these vulnerable and poor areas, but because of its Mediterranean location, among the European countries Italy is one of the most exposed areas to the climate crisis: if we follow the current trend, we might bear economic losses to the extent of a few percentage points of GDP until the middle of the century, and up to 10% of GDP in the second half of the century. Another relevant result of this analysis relates to the fact the climate crisis appears **to aggravate remarkably the economic inequalities between Southern Italy and the rest of the country.** The major economic damages in Italy would be caused by floods; in agriculture, impacts come from production shifts and crop yields reductions; tourism will be affected by heat waves, advancing of coastal erosion, lack of snow in the mountains and frequency of extreme atmospheric events. The costs from electricity consumption for cooling will keep rising, as well as the healthcare costs (even though difficult to quantify) due to the spread of high-temperature-related diseases.

2. Strategic topics for green economy in Italy

In order to comply with the Paris Agreement, Italy should commit more to reduce its greenhouse gas emissions. Indeed, in Italy they have not been decreasing since 2014: they established at **426 Mt of CO₂eq in 2018, they were 428 Mt in 2017 and around 426 Mt in 2014.** According to Eurostat, the European Union has reduced its greenhouse gas emissions by over 23% with respect to 1990: the United Kingdom has cut them by 40% and Germany by 28%; Italy, that had lower emissions per capita at the time, has registered a reduction of 17%, similar to the 15% of France. Nevertheless, in the last few years (2014-2017), the European commitment for climate change has been fading: in all countries but the United Kingdom the emission reduction has stopped, and European emissions have increased by 0.6%. Besides Poland, the highest

increases have been registered in France and Spain (+2% and 4% respectively), while Italy and Germany registered around +0.5%. What is also alarming about Italy is that the reduction of carbon intensity of GDP has been slowing down: it went from 360 tCO₂eq per million euros of GDP in 2005 to 286 in 2014; instead, carbon intensity of GDP in the following years has reduced at a much slower pace, as the estimate for 2018 registers a value of 265 tCO₂eq/M€2010. If no decisive interventions are put in place to reverse the modest performance of the last four years and to relaunch the decarbonization process in the country, it will not even be possible to comply with the mediocre target of reducing greenhouse gas emissions by 37% in 2030, as indicated in the draft of the National Climate and Energy Plan (NECP) as a contribution to the 40% target set at EU level. It is known that at both European and international level a reflection is taking place in order to improve national commitments for emissions reduction by 2030, so to adequate them to the Paris Agreement path, hence to limit the global temperature rise well below 2°C. **In order to get on track with the Paris path, emissions by 2030 should be cut at least by 50%, rather than by 37%. Given that, according to ISPRA, with current policies (including ETS) emissions in 2030 will reach 380 MtCO₂eq, in order to halve them to 260 Mt, extra measures would be needed so to cut emissions by another 120 Mt in 2030.**

High temperatures are the most urgent climate risk for cities in terms of risk for human life, according to the data provided by the European platform Climate Adapt. The Peseta III study shows that, without adaptation measures, in a high global warming scenario heat wave mortality in Europe might remarkably increase (by a factor of 50) compared to today's levels, with additional 132.000 deaths in the EU. The majority of this absolute increase might occur in Southern and Central European regions. According to the EEA, temperature increase in the Mediterranean area will be higher than the European average. In Europe, 66% of cities have a mitigation plan, but only 26% have an adaptation plan; 17% have realized a joint mitigation and adaptation plan while around 30% are missing any form of local climate-related plan. **In Italy, according to the data provided by the Covenant of Mayors, out of 376 total actions, 358 refer to mitigation while only 18 to adaptation.** In April 2013, the EU has formally adopted the Climate Change Adaptation Strategy, where principles, guidelines and targets of the EU policy in the field of climate adaptation are defined in order to promote plans and measures at national level in coordination with the national plans for natural and anthropic risk management. **It should be noted that Italian cities present a substantial delay in the adoption of measures for climate change adaptation.** 30 cities have signed the Declaration for Climate Adaptation of Green Cities, presented by the Green City Network promoted by the Sustainable Development Foundation, which aims at incentivising a stronger and more qualified commitment of Italian cities. The Declaration presents 10 proposals that provide updated directions for more resilient and less vulnerable cities, more able to face climate change with all necessary and feasible interventions in order to prevent and limit both risks and damages.

Energy efficiency measures are not sufficient to reach the target that has been set. According to the NECP draft, by the end of the next decade Italy should reduce its final energy consumption by 9.3 Mtoe, reaching 103.8 Mtoe in 2030. Since 2005 Italy has experienced a significant decoupling between energy consumption growth and GDP growth, significantly improving its energy intensity. On the contrary, in the last four years, given the concurrence of economic recovery (though modest), **gross inland energy consumption has been increasing again: from 166 to over 170 Mtoes between 2014 and 2017. Preliminary data provided by**

the Ministry for Economic Development (MISE) confirm the same trend also for 2018.

We are talking about the main driver that has led to the interruption of the decarbonization process that was mentioned above. In 2018 final energy consumption increased by 1.5%, driven by the transport sector, whose energy consumption grew by 3.2%: it is the highest rate in the last twenty years for the sector. The highest energy-consuming sector remains the civil (residential and tertiary) sector, which absorbs more than 40% of total consumption and is also slightly increasing (+0.7%). Industry is the economic sector that suffered most from the economic crisis, but in the last three years it has been registering a slight recovery in its energy consumption, which represents today 22% of the national total.

RENEWABLES

Renewable Energy Sources (RES), with about 22 Mtoe, supplied 18.3% of the energy demand in Italy in 2017, against an EU average of 17.5%, 17.5% in Spain, 16.3% in France, 15.5% in Germany and 10.2% in the United Kingdom. **The good performance of Italy has nevertheless slowed down in the last years, with a growth of only 300 ktoe between 2013 and 2016; the performance seems partially improved in 2017, which registered a growth of 900 ktoe.** However, preliminary data from GSE show a renewable energy consumption of 21.8 Mtoe in 2018, meaning a reduction of 200 ktoes compared to 2017. In the last five years, the renewable energy share on total national consumption has increased by only one percentage point: **this growth rate is too low and insufficient.** The 30% target of RES share in 2030 set by the NECP draft – even though insufficient to get on track with the Paris Agreement objectives – requires that, instead, a one percent growth should be achieved every year. In the transport sector, the renewable share was 7.5% in 2016, but decreased to 6.5% in 2017: we are talking about one of sectors where the penetration of renewable energy is more difficult, hence where **the NECP targets (21.6% of RES share in transports and more than 3,000 ktoe between biofuels and electric mobility by 2030) appear definitely distant.**

Renewable energy consumption for heating and cooling, with 11.2 Mtoe in 2017, represents half of the total renewable energy consumption; it increased by 6% compared to the previous year, reaching 20% of total energy consumption for heating and cooling. Biomass represents almost 75% of renewables in the sector, while the remaining share almost totally refers to heat pumps, which, according to the NECP, should double by 2030 and drive 85% of the renewable growth in the sector. On the contrary, the growth trend for heat pumps in the last years has been largely insufficient to reach the target: they have increased from 2,500 ktoe in 2013 to 2,650 ktoe in 2017 and remained stable in 2018 as well. Among the other renewables in the heating and cooling sector, it should be noted how thermal solar continues the struggle to growth: again between 2013 and 2017, it increased from 168 to around 210 ktoe and it appears stable also in 2018, while according to the NECP it should reach 800 ktoes in 2030. **Overall, also in the heating and cooling sector renewable energy trends are insufficient to reach the target set by the NECP draft, which is 14.7 Mtoe in 2030.**

While in 2017 the production of electricity by renewable energy sources reached the lowest peak in the last five years, preliminary estimates from MISE appear more positive for 2018: electricity production from renewable energy sources reached 115 TWh, providing 34.5% of total electricity demand (+3%). The turnaround was driven by the recovery of the hydropower sector, thanks to more favourable climate conditions (+10 TWh in real terms compared to the previous year). However, except for hydropower, 2018 registered a definite reduction in the electricity production from all other renewable sources, especially photovoltaics, which decreased by almost 7%. Hence, the preliminary normalized data from GSE project for 2018 an almost identical

situation with respect to 2017, with a 34% RES share in the power sector. Electricity production from renewable sources in Italy has more than doubled from 2007 to 2013, reaching over 110 TWh, however **since 2014 it has been interrupting its growth due to the remarkable reduction of hydropower production and to the slow growth of new renewable capacity** (from 2007 to 2013, almost 5 GW of new capacity were installed on average every year, while in the following four years the average decreased to 1 GW/year).

For what concerns circular economy, a few typical indicators shows good level for Italy at the EU level. As for resource productivity (measured by GDP per kg of consumed resource), Italy in 2017 ranked second among the main European countries, for the sixth year in a row: the country registered 3.5 euro/kg, after the United Kingdom but before France, Spain and Germany, and also above the EU average, which is 2.2 euros/kg. Domestic Material Consumption (GMC) per capita in Italy decreased from 9.5 tons per capita in 2012 to 8.3 in 2017, thus reducing by 12%: Italian GMC is lower than the European average, ranking after France and the United Kingdom, and before Germany and Spain.

In 2017, 14 million tons (Mt) of urban waste were recycled in Italy, 47.7% of total urban waste. With respect to the other main European countries, Italy ranked second after Germany, and shows two percentage points more than the EU average. In 2017, around 99 Mt of special waste were recycled in Italy (+8% compared to 2016), 68% of total waste production (+1 percentage points compared to 2014). However, these figures do not yet show the difficulties now faced by waste recycling in Italy, as a consequence of the sector arrest that has been caused by the well-known matters regarding the “end of waste” authorizations on a case by case basis, by Regions: a matter that should be fixed by an upcoming new law in October. As for Circular Material Use (CMU), which measures the degree of recycled material use as related to total primary material use, according to Eurostat Italy ranked third in 2016, performing better than the EU average and ranking after France and the United Kingdom, but before Germany and Spain.

Eco-innovation, measured using the indicator for public spending on research (eco-innovation input), has increased in Italy by 34% between 2000 and 2017 but shows a contraction between 2016 and 2017. In 2017, **Italy resulted below the European average, ranking 22nd with a 1.35% GDP value, as compared to a 2.06% EU28 average.** The patents indicator (eco-innovation output) shows a more positive result: Italy ranks 4th in EU28 in terms of number of patents, after Germany, France, and the United Kingdom.

A very important sector for eco-innovation is digitalization. According to the Digital Economy and Society Index (DESI), Italy ranks below the EU average and is one of the last countries in Europe. Ranking 24th among the 28 member States, Italy is below the average in connectivity and digital public services; fast broadband coverage and its use are spreading, but still below the average, while progress in super-fast connectivity is still very slow. Three citizens out of ten do not regularly use the internet and over half of Italians do not possess basic digital skills. Such a lack of digital skills also affects online services use, where slow progress can be seen.

Agriculture, silviculture, and fishing showed a light upswing in 2018, with an increase of 0.6% in production and of 0.9% in added value. With an added value of 32.2 billion euros at current prices, Italy is at the top of the European ranking, while according to the production value is only surpassed by France. The growing organic sector is clearly one of the most characteristic aspects of the national agriculture: **at the end of 2017, the organic agricultural area accounted for 1,908,653 hectares, increasing by 6.3% over the previous year and by 71% over 2010.** The

CIRCULAR ECONOMY

ECO-INNOVATION

AGRICULTURE

organic agricultural area accounts for 15.4% of the total (it was 8.7% in 2010), placing our country second in Europe, after Spain, in the total extension of the organic agricultural area.

Italy also ranks first in the world in the number of Protected Geographical Indications, an important component of quality food farming. In 2017 they were as much as 822, accounting for 27.3% of those registered in Europe, over France (22.7%) and Spain (10.9%). The Italian agriculture was also characterized by a remarkable and increasing diversification of productive activities, aimed at both a more efficient use of resources - as a response to climate change effects - and an improvement in its competitive positioning facing a new market demand.

TERRITORY AND NATURAL CAPITAL

Land use in Italy in 2018 is still high, though slowing down as compared to the previous year: according to the yearly ISPRA Report, 51 sq km of territory are being consumed, an average of 14 hectares per day. Land use affects both agriculture and natural capital, that has a significant value. In fact, Italy still is one of the richest countries in biodiversity, with a vascular flora of over 6,700 species and a fauna of over 58,000 species. 871 protected areas protect over 3 million hectares of land (slightly more than 10% of the total), and approximately 2,850 hectares of sea and 658 km of coast. Lastly, woods are increasing in Italy and represent a component of major importance of the natural capital. **According to the new CAP (Common Agricultural Policy), European agriculture should strengthen its role as key driver for biodiversity conservation and increasing the ecological quality of territories.**

TRANSPORT

The electrification of the Italian vehicle fleet from renewable sources, representing the future of a zero or low carbon emissions together with bio-fuels, is still very slow. Despite being one of the countries with the highest share (8.5%) of alternative fuel cars - LPG or natural gas, and, in the last years, an increase in hybrid cars - **Italy has a historical delay in the penetration of the electric cars market: less than 10,000 vehicles are sold every year, as compared to 68,000 in Germany.** However, thanks to recent incentives, 4,995 electric cars were registered from January to June 2019, increasing by 119.2% over the same semester of the previous year. **The number of electric mopeds and motorbikes grew to 6,211, accounting for as little as 0.07% of the total.** According to data published by the National Association of Public Transit Organizations (ASSTRA), the **public bus** fleet decreased over the last decade, from 58,000 units in 2005 to 51,000 in 2017. In 2018, the suburban bus fleets were composed by 99% of diesel vehicles and 1% by natural gas vehicles, while in urban fleets diesel vehicles accounted for 71%, natural gas vehicles accounted for 27%, and **electric and hybrid vehicles accounted for 2%.** **Some cities in Italy launched a transition towards an electric system:** the city of Milan employs 25 electric buses and the Milan public transport company (ATM) announced that by 2020 only electric buses will be bought and that the entire bus fleet, some 1,200 vehicles, will be 100% electric. Other cities as well - Turin, Bergamo, and Cagliari - are engaging in the electrification of the fleet and setting mid-term electrification targets.

3. The international framework

The Report lastly provides an international framework on the energy system transition and the global climate crisis.

ENERGY

The world energy system, based on fossil fuels, is changing too slowly. Primary energy consumption by source **from 1965 to 2018 shows a decrease in fossil fuels by only 12 percentage points, from 94% to little less than 82%.** Still, in 2018, **71% of the increase in energy consumption was provided by fossils.** Energy consumption increased in 2018 at

a 2.9% rate, the highest since 2010. China, the United States (with the highest increase rate in thirty years) and India accounted for two-thirds of the global increase in energy consumption. **Oil consumption increased by 1.5% in 2018**, with China and the United States contributing to such increase by 85%, mainly due to the transport sector. **Coal consumption, led by India (45%) and China (20%), increased by 1.4% in 2018**, the most rapid increase since 2013. Coal is still representing the highest share of electricity generation, accounting for 38%, and natural gas in second place accounts for 23%. The contribution from fossil fuels to electricity generation is unchanged, fluctuating around 64%. **Energy intensity has been decreasing by only 0.4% per year: according to global decarbonization targets, it should be decreasing by 4% to 10% per year.** The growth of renewable sources of energy is too slow: progress is concentrated in the electric sector and it is still modest in the heat and transport sectors. **Since 2017, renewable energy has been accounting for 18.1% of total final energy consumption.** In 2018, 181 GW of new power capacity from renewable sources was installed, with a constant increase compared to 2017: renewables are becoming increasingly competitive as compared to conventional thermal generation sources and **provided 26% of electricity at the global level in 2018.** The private sector plays a key role in promoting renewable energy: RES energy supply for business more than doubled in 2018. **The use of renewable energy in heating and cooling is still limited.** Modern renewable energy met 10% of the demand for heating and cooling worldwide in 2016 and **renewable energy penetration in the transport sector is still as low as 3.3% in 2018.**

In the years 1970 - 2017, biotic and abiotic materials extraction increased by over 240%, reaching a total mass of 92 Gt: the increase in material consumption, the main indicator of a low circularity of the economic system, also implicates a high energy consumption, and, due to prevailing fossil sources of energy, high greenhouse gas emissions.

The global climate crisis is getting worse. With current mitigation commitments declared by Governments, we are far from the Paris Agreement trajectory for keeping the global temperature rise well below 2°C, **we are rather moving toward 3°C, an extremely alarming global warming level, with disruptive consequences.** After three years of steady global emissions, CO₂ emissions grew by 1.6% reaching 36.2 Gt, with an additional 2.7% increase in 2018, reaching a 37.1 ±2 Gt record. Should we fail in taking a fast action with well more substantial greenhouse gas emissions reduction commitments, the climate crisis will get much worse.

In 2017, 712 extreme weather events were registered with estimated economic losses for and a 326 billion dollars, tripling the 2016 total. Solid research predicts an increase in extreme precipitations with a higher flooding risk, while the total amount of precipitations will decrease. **Desertification is one of the most relevant natural disasters**, affecting hundreds of millions of drylands inhabitants. Land is at the basis of food production and food safety, also providing other ecosystem services that are essential to environmental resilience. Recent research and publications show a **close interrelation between global warming and land degradation.** Loss in flora and land degradation increase ecosystems vulnerability to further erosion and desertification. **As a consequence of the worsening climate change, water resources will become unstable and uncertain, in both time and space.** Evaporation and evapotranspiration rates are subject to change, eventually exacerbating water scarcity and compromising its quality. Where resources depend on the basin snow cover, hydrological changes, that are already occurring, will be emphasized, though in some cases such systems could benefit from an increased rainwater share. **The long-term effects of the climate crisis will worsen the ongoing rise in ocean and marine sea level.** Half of the sea level rise is caused by the volumetric expansion of the water

MATERIAL CONSUMPTION

EMISSIONS

IMPACTS

mass, caused by global warming and the resulting increase in oceans heat content. Summer glacier melting and decreasing snowfall generate an imbalance between oceans outflow and evaporation. Increasing temperatures caused a reduction in the icecap in Greenland and the Antarctic. Such events are responsible for the other half of the average ocean level rise. Most world populations, when possible, tend to migrate toward coastal areas, which are now subject to sea-level rise, coastal storms, flooding, coastal erosion, and salinization of groundwater, due to climate change.

Climate change is having devastating consequences in the widespread of forest fires, with huge damages to both natural and human capital. Most forestry systems developed based on schemes where fires follow on natural fires cycles; in others forestry systems, including those in Italy, fires are only caused by only suffer arson. Many valuable services provided by woods, including timber, atmospheric carbon sequestration, oxygen production, as well as recreational areas and landscapes, are damaged by violent fires affecting Europe and North America.

The worsening of climate change impacts, exposure, and vulnerability implies high risks for the current and future health of populations worldwide. These are the effects of heat waves, impacts on work capacity, infectious diseases, and food safety. **Understanding that climate change is a problem affecting human health is a fundamental step.** The impact of heat waves constantly increased from 1990 in all regions, with an additional 157 million people exposed to extreme temperatures in 2017, as compared to 2000, and the average per person exposure increasing by 1-4 days per year over the same period. European and Mediterranean population is especially at risk, with 42% and 43%, respectively, of the over 65-year-old population subject to heat exposure and, thus, to morbidity or mortality factors, including heat stress, and cardiovascular and renal diseases. The victims of cardiovascular diseases, diabetes, chronic respiratory diseases, and those living in urban areas are especially vulnerable. In all regions worldwide, the share of the population subject to heat waves exposure is increasing.

According to a 2018 World Bank research, it is estimated that, without robust climate mitigation and sustainable development actions, over 143 million people, 2.8% of the population of the most affected areas (South East Asia, sub-Saharan Africa, and Latin America), might be forced to displacement to escape climate change impacts.



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