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SOME ASPECTS OF CLIMATE CHANGE WITH EMPHASISING ON REDUCING GREENHOUSE GAS EMISSIONS

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Abstract

In recent decades, changes in climate have caused impacts on human and natural systems, such as human diseases and environmental problems. The aim of the present paper is to give an overview, over the past decades and up-to-date in the climate change and its impacts as well as global warming in general, it serves as an introduction assessing atmospheric concentrations of greenhouse gases (GHGs) and gives general background reviews on the environmental policies of reducing GHG emissions at international levels for the climatic and environmental changes. Influences of human on the climate and environmental systems are clearly and recently man-made GHG emissions globally are the largest in history. So, the earth's average temperature has been increasing since the industrial revolution. Therefore, meeting the Paris Agreement's climate objectives will require and needed drastic reductions in global GHG emissions and global transition towards decarbonisation of human activities, as well as moving towards a low-carbon economy of the future. At the same time, evidence of climate change impacts is clear and the problem will become more and more urgent as the GHG accumulation continues and the costs of damages and adaptation to climate change arise. So, an effective response to the climate change problem at global level requires both a concerted international response and national efforts to reduce GHG emissions as well as much more robust and effective action than it was before. Nevertheless, the EU and its Member States have decreased their emissions by 21% between 1990 and 2013, while Gross Domestic Product (GDP) has increased by 45% over the same period and thus contributed to the overall positive EU performance as well as the EU has a range of policies to reduce emissions, promote clean energy and energy efficiency, and stimulate Europe's transition to a low-carbon economy.

Keywords: *Climate Change, GHG Emissions, Environmental Policy, Global Warming, CO_2*

1. INTRODUCTION

The Earth System provides the basis for all human societies and their economic activities. Nevertheless, the 7 billion humans alive today is collectively exploiting the Earth's resources at accelerating rates and intensities that surpass the capacity of its systems to absorb the adverse effects on the environment [1]. There is unequivocal evidence that the Earth's climate is warming. Nowadays, the atmospheric concentration of carbon dioxide (CO_2), the most important and threatening GHG, is at its highest level for at least 800 000 years [2]. Scientific evidence suggests that man-made GHG emissions, especially CO_2 emissions, are a factor contributing to global climate change. This global climate change negatively impacts our Earth planet [3]. Therefore, by 2012, the average global surface temperature was 0.85 degree Celsius (°C) higher than in 1880, according to the UN Intergovernmental Panel on Climate Change (IPCC), which brings together thousands of the world's leading climate scientists. Each of the past three decades has been warmer than any preceding decade since records began in 1850 [2]. According to three different observational records of global average annual near-surface (land and ocean) temperature, the last decade (2006-2015) was 0.83 to 0.89 °C warmer than the pre-industrial

average, which makes it the warmest decade on record. Of the 16 warmest years on record, 15 have occurred since 2000. The year 2015 was the warmest on record, around 1 °C warmer than the pre-industrial level, followed by 2014 [4]. In fact, over the past century, releases of gases and particulates derived from industrial processes and other human activities have led to significant changes in the composition of the atmosphere, many of which have been linked to detrimental effects on human health, ecosystems and the built environment [5].

Climate change is a global problem that people are faced with in this century. Nowadays scientists mostly agree on the fact that climate change really occurs. Every country in the world will be affected in some way by climate change [6]. The consensus among climate experts is that it is extremely likely that the main cause of recent warming is the 'GHG's emitted by human activities, in particular the burning of fossil fuels - coal, oil and gas - and the destruction of forests [2]. Therefore, the main sources of man-made GHG emissions globally are the burning of fossil fuels for electricity generation, transport, industry and households - which together account for about two-thirds of total global emissions [7]. Finally, there is a need to reduce global GHG emissions substantially to avoid the most adverse impacts of climate change. However, even with substantial reductions in GHG emissions, the climate will continue to change, and the impacts will be felt across the world, including in Europe [4]. Overall, climate change continues to be a significant threat for the future of humanity, and mitigation is needed to avert those threats as much as possible [8].

2. MATERIALS AND METHODS

The global atmosphere is at a critical stage, particularly in relation to climate change. There is considerable scientific evidence of the causes and solutions that could protect human health and ecosystems, and effective action has resulted in the achievement of some internationally agreed goals. The phase-out of ozone-depleting substances and lead in petrol by implementing relatively simple and cost-effective solutions demonstrates that, when most major stakeholders agree, significant progress is possible [1]. And also, there are significant improvements in existing fossil alternatives as well as the penetration of a number of new advanced fossil technologies, thus increasing their efficiency and performance in the longer-term [9]. Moreover, a coal phase-out would lead to a devaluation of existing coal assets, which go beyond mitigation of climate change as well as improve air quality and benefits for human health. However, a gradual phase-out of coal is needed, recognising that coal-based power generation will remain significant for a number of both developing and industrialised countries until at least 2030 [10]. Hence, to mitigate climate change, we must reduce or prevent GHG emissions [11], and policymakers must implement climate change policies in an effort to decrease carbon emission and mitigate its negative impacts. As such, several countries have implemented carbon taxes in an effort to curb the potential destruction from increasing carbon in our atmosphere [3].

In general, failure to deal with potential tax obstacles could make the desired reductions in GHG emissions excessively costly and impede the global integration of carbon markets [12]. Nevertheless, a first proposal about a CO_2 tax was drafted in 1992; although it was withdrawn five years later. Despite this failure, the same year was the inception of a global commitment on climate change: The United Nations Organisation under the Framework Convention on Climate Change (UNFCCC) involved 160 parties endorsing to adopt global agreements on climate issues. The Convention is composed of the Conference of the Parties (COP) which includes all the countries that are Parties to the Convention. The third COP adopted the Kyoto Protocol in the year 1997, which became the most important document ever drafted on climate change and are still the baseline for future negotiations [13]. So, the Kyoto Protocol is an international agreement linked to the UNFCCC and has the objective of curbing global warming [14].

Currently, the Paris Agreement on Climate Change of the UNFCCC, at the 21st COP in December 2015, is the first universal, legally binding global deal to combat climate change, mainly by reducing GHG emissions to keep the global temperature rise well below 2°C and

pursuing efforts to limit the temperature increase to 1.5°C, compared with pre-industrial levels. Having met the ratification threshold, it entered into force on the 4th of November 2016 and will be operative from 2020 [15]. Generally, to meet the Paris Agreement's goal to limit global temperature to no more than 2°C, and aim to hold warming to 1.5°C, global emissions must peak around 2020 and then rapidly decline in the following three decades, approaching zero by 2050 [16]. The magnitude of future climate change and its impacts from the middle of the century onwards depend on the effectiveness of global climate mitigation efforts [4]. In addition, Put on equal footing, the adaptation goal focuses on ability to adapt to the adverse impacts of climate change and on climate resilience, so contributing to sustainable development (Articles 2 and 7). The Paris Agreement also comprises commitments on finance flows consistent with a pathway towards low GHG emissions and climate-resilient development. Beyond that, emphasis is placed on averting, minimising and addressing loss and damage associated with the adverse effects of climate change (Article 8) and on the need to cooperate and enhance understanding, action and support in various areas such as early warning systems, emergency preparedness, comprehensive risk assessment and management, and risk insurance [15].

3. CLIMATE CHANGE AND ITS IMPACTS

The climate is changing globally and in Europe [4]. So, as mentioned by EEA climate change is already happening: temperatures are increasing, rainfall patterns are shifting, glaciers and snow are melting, the global mean sea level is increasing [11], as well as increased flood risk for urban areas and ecosystems, ocean acidification, and extreme climatic events including heat waves [7]. Hence, the Earth's climate is changing, these abnormal changing weather conditions are having an increasing impact and causing serious damage [17]. Therefore, in the longer term these changes threaten to cause serious damage to our economies and the environment we depend on, putting the lives of millions of people in danger and causing the extinction of many animal and plant species [2]. And also, in future, GHG emission and global warming will be key issues for society [18]. Generally, most of the warming is very likely due to the observed increase in atmospheric GHG concentrations as a result of emissions from human activities [11].

Moreover, one of the main issues of this century is the climate change; nowadays the scientists mostly agree on the fact that this climate change really occurs and that is a problem we need to solve [19]. And also, climate change is the most important atmospheric issue. While there is considerable concern about this complex problem, progress has been slow due to varying levels of motivation and because some low-carbon technological solutions are considered expensive. Despite attempts to develop low-carbon economies in a number of countries, atmospheric concentrations of GHGs continue to increase to levels likely to push global temperatures beyond the internationally agreed limit of 2°C above the pre-industrial average temperature [1]. Additionally, EU climate change mitigation policy aims to put the EU on track towards a low-carbon economy and to reduce EU GHG emissions by 80 to 95% by 2050. The EU is on track towards its 2020 climate targets [20, 4], but to achieve the longer term goals of the EU for 2030 and 2050 new policies and a more fundamental change are needed in the way the EU produces and uses energy, goods and services [4].

The burning of fossil fuels such as coal, oil and natural gas has a negative effect on the climate. The combustion of these fuels generates CO_2 and other GHGs. The two primary sources of GHGs are the energy and transport sectors. So, as people burn more fossil fuel they add more CO_2 to the atmosphere [21]. In general, the biggest share in the structure of final energy consumption in EU-28 in 2015 was for petroleum products (39.6%), followed by gas (21.8%) and electricity (21.7%). Solid fossil fuels contributed only 4.3% to the final energy consumption at the end-use level [22: p. 53]. Nearly 80% of the EU's emissions come from the production and use of energy, including in transport [2]. Further, global CO_2 emissions from fossil fuel combustion, cement production and other industrial processes account for about 70% of total global GHG emissions, and were estimated at a total of 35.8 Gigatonne of CO_2 ($GtCO_2$) for the year 2016. Generally, there is increasing evidence that these emissions have remained more or

less stable for the past three years, reversing the previous tendency of increases each year. This may indicate a decoupling of energy- and industry-related CO_2 emissions from economic growth during these years, in which global GDP increased by between 2 and 3% annually. The main drivers have been reduced growth in coal use since 2011, especially in China and in the United States [10].

Furthermore, changes in the atmospheric concentration of GHGs, aerosols, solar radiation and land surface properties alter the energy balance of the climate system. These changes result in the greenhouse effect. The six GHGs, groups of gases or gas compounds, are namely: CO_2, methane (CH_4), nitrous oxide (N_2O) and the three fluorinated gases (F-gases); hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) [21]. In General, at global, the combined share of CH_4, N_2O and F-gas emissions is around 28% in total GHG emissions in 2016, therefore, most of the emissions consist around 72% of CO_2, while CH_4, N_2O and F-gases make up substantial shares of 19%, 6% and 3%, respectively in 2016 [23: p. 4; p. 8]. Each type of GHG has a different warming capacity, referred to as the global warming potential of the gas. CH_4 has 25 times the global warming potential of CO_2 and HFCs have more than 1 000 times the potential of CO_2 [21]. In addition, CO_2 has the lowest global warming potential of the six GHGs. However, emissions of CO_2 were far greater in the EU-28 than for any of the other GHGs even when adjusted for global warming potential [14].

Generally, human activities release large amounts of GHGs, increasing the atmospheric concentrations of these gases, which in turn enhances the greenhouse effect and warms the climate. The main sources of man-made GHGs in general are the: burning of fossil fuels (coal, oil and gas) in electricity generation, transport, industry and households (CO_2); agriculture (CH_4), agricultural soils (N_2O) and land-use changes, e.g., deforestation (CO_2); land filling of waste (CH_4); and use of industrial F-gases [11].

Recently, in 2016 [23: p. 5]; the five largest emitting countries (China, the United States, India, the Russian Federation, and Japan) and the EU, which together account for 51% of the world population, 65% of global GDP, 68% of total global CO_2 emissions and about 63% of total global GHG emissions. Furthermore, most of the large countries showed a decrease in CO_2 emissions in 2016; most notably the United States (-2.0%), the Russian Federation (-2.1%), Brazil (-6.1%), China (-0.3%), and, within the EU, the United Kingdom (-6.4%). The CO_2 emissions in the EU as a whole remained flat. While, the largest increase in CO_2 emissions in 2016 were in India (+4.7%) and Indonesia (+6.4%). In addition, emissions from international transport (aviation and shipping) constitute about 3% of global total GHG emissions in 2016 [23: p. 5].

In general, the EU has been at the forefront of introducing ambitious mitigation-related policies, and the results can already be witnessed in terms of a decline in emissions by 21% between 1990 and 2013, with an absolute decoupling from GDP that increased by 45% over the same period [5]. More recently, between 1990 and 2016, the EU reduced its net GHG emissions by 22.4% (and by 24% if emissions from international aviation are excluded). This decrease was a combined result of policies (e.g., increasing renewable energy sources and improvements in energy efficiency), economic factors (e.g., structural changes in the economy and economic crisis) and climatic conditions in general [24]. Additionally, the economic impacts depend on the levels of international energy prices, the mechanism used to recycle revenues, and country specifics such as carbon and energy intensity and the structure of energy consumption [25].

In the EU both CO_2 and non-CO_2 GHG emissions have decreased considerably since 1990 [23]. So, almost all EU Member States reduced their emissions over the past 26 years (1990-2016) and thus contributed to the overall positive EU performance [24]. Since the 1970s, the level of environmental protection in most parts of Europe has improved measurably. Emissions of specific pollutants to the air, water and soil have generally been reduced significantly. These improvements are to a substantial degree a result of the comprehensive environment legislation established across Europe, and they are delivering a range of environmental, economic and societal benefits [20]. And also, this is mainly the result of lower coal consumption from fuel switches to natural gas and increased renewable power generation. Further, coal power in the EU is replaced by increasing wind and solar power, in particular in the United Kingdom,

Germany and Italy. In addition, Table (1) shows emissions of CO_2 and other GHGs in the EU in 2016 [23: p. 32]. Overall, EEA [24] stated that emissions decreased and are expected to decrease further as GDP increases. This confirms that GHG emissions can decrease alongside an increase in GDP and that attempts to mitigate climate change do not necessarily conflict with a growing economy. GDP over the 2015-2030 period is projected to grow significantly faster than during the 2005-2015 period. Projections by Member States suggest a continued decoupling of GHG emissions alongside higher economic growth [24].
The average concentration of CO_2 in the atmosphere in 2016 reached 400 ppm, which is the highest level for at least the last 800 000 years and about 40% higher than the pre-industrial levels [4].

Table 1: Emissions of CO_2 and other GHGs in the European Union in 2016

European Union	**CO_2**	**Non-CO_2**	**CH_4**	**N_2O**	**F-gas**
Total sectors (Mt CO_2-eq)	3432	1018	553	269	196
Energy	3232	160	131	29	0
Industrial processes	189	208	1	12	196
Agriculture	7	459	254	205	0
Waste	4	179	167	12	0
Indirect and other	0	1	0	11	0

Source: Olivier J.G.J. et al. (2017): Trends in global CO_2 and total greenhouse gas emissions: 2017 report. PBL Netherlands Environmental Assessment Agency, The Hague [23: p. 32]. Retrieved from: https://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2017-trends-in-global-CO_2-and-total-greenhouse-gas-emissons-2017-report_2674.pdf; [Accessed at: October 2018].

Further, the average surface temperature has risen by around 0.8 °C since 1880 globally, but Europe's land area has warmed more, by around 1.3-1.4°C - Europe is warming faster than many other parts of the world [17, 26]. Furthermore, overwhelming scientific evidence has demonstrated the link between increasing atmospheric concentrations of GHGs and increasing global temperatures. Average temperatures have increased over the past 50 years at a rate of 0.2°C per decade, largely as a result of human activity [21]. As well as, scientific evidence suggests that an average world temperature rise of more than 2°C above the pre-industrial level - equivalent to around 1.2°C above today's temperature - will greatly increase the risk of large-scale, irreversible changes in the global environment. The international community has therefore agreed on the need to keep global warming below 2°C [2, 17]. So, the climate imperative is clear: we must act now and with ambition to decarbonise human activities in order to meet global climate goals [16].

Moreover, Climate scenarios produced by the world's leading international scientific bodies show that our window to prevent dangerous global warming is rapidly narrowing as humanity's carbon budget - the total amount of CO_2 that can be emitted for a likely chance of limiting global temperature increase - diminishes year on year [16]. As reported by IPCC's [27], without additional efforts to mitigate and reduce GHG emissions (baseline scenarios), CO_2-equivalent (CO_2-eq) concentration levels are likely to exceed 450 parts per million (ppm) CO_2-eq by 2030 and reach CO_2-eq concentration levels between 750 ppm CO_2-eq and more than 1300 ppm CO_2-eq by 2100. If this happens, than the global mean surface temperature increases of 3.7°C to 4.8°C in 2100. However, if the CO_2-eq concentrations in 2100 reaching about 450 ppm or below are likely to maintain warming below 2°C over the 21st century relative to pre-industrial levels. Therefore, mitigation leading to approximately 450 ppm CO_2-eq in 2100 are also likely to keep warming below 2°C relative to pre-industrial level [27]. So, as mentioned above, the IPCC [27] stated that the world will warm by between 3.7°C to 4.8°C by 2100 if humanity pursues a "Business-as-usual (BAU)" pathway. This level of warming, scientists agree, would be disastrous for human civilisation. To give us a better than 66% chance to limit global warming below 2°C - the scientific community's agreed upon threshold for what societies could reasonably manage - the IPCC reports that atmospheric CO_2 concentrations cannot exceed 450 ppm by 2100. This limit means that the world's carbon budget through the year 2100 is less than 1.000 $GtCO_2$-eq [27, 16]. On one hand, the latest IPCC assessment's Representative

Concentration Pathways scenario RCP8.5 (representing the highest radiative forcing) is frequently adopted as a proxy for a BAU scenario [9, 28, 5]. Based on this, emissions of GHGs will continue to increase until the end of the 21st century [5]. On the other hand, RCP2.6 is representative of a scenario that aims to keep global warming likely below 2°C above pre-industrial temperatures [27]. Additionally, climate models project further increases in global average temperature over the 21st century (for the period 2081-2100 relative to 1986-2005) of between 0.3 and 1.7°C for the lowest emissions scenario (RCP2.6) and between 2.6 and 4.8 °C for the highest emissions scenario (RCP8.5) [4].

In their report EEA's [15] mentioned that the impacts of weather- and climate-related hazards on the economy, human health and ecosystems are amplified by socio-economic changes and environmental changes (e.g., land use change and climate change). In general, impacts represent the effects on natural systems (e.g., ecosystems and biodiversity) and human systems (e.g., lives, livelihoods, health, societies, services and infrastructures) [15]. So, harmful environmental changes are taking place in an increasingly globalised, industrialised and interconnected world, with a growing global population and unsustainable production and consumption patterns [1]. Therefore, efforts to reduce disaster risk and at the same time adapt to a changing climate have become a global and European priority. The total reported economic losses caused by weather- and climate-related extremes in the European Environment Agency member countries over the 1980-2015 period amounted to over EUR 433 billion. Weather- and climate-related, hydrological, and geophysical natural hazards (Table 2) cause sizeable and growing financial and economic losses. Generally, the largest share of the economic impacts are caused by floods (38%) followed by storms (25%), droughts (9%) and heat waves (6%). On one hand, increase in the frequency and intensity of extreme weather- and climate-related events may lead to greater impacts on ecosystems and their services. On the other hand, climate change has caused noticeable effects on human health in Europe, mainly as a result of extreme events (e.g., heat waves), an increase in climate-sensitive diseases, and deterioration of environmental and social conditions [15]. Generally, changing climate patterns, population growth, rapid urbanisation, economic development and increasing use of natural resources are putting pressure on terrestrial ecosystems as never before, and virtually all of them are under stress [1]. Hence, global climate change has substantially increased the probability of various recent extreme weather and climate events in Europe [4]. Over the past decades, Europe has experienced many summer heat waves, droughts and forest fires characterised by lasting conditions of high temperatures and low precipitation. While, heavy precipitation events leading to floods and landslides, have increased and also, are projected to increase in the future.

*Table 2: Classification of 10 selected natural hazards**

Category of hazards	**Specific natural hazard**
Hydrological	River flood
	Landslide
	Avalanche
Meteorological	Heat wave
	Heavy precipitation
	Windstorm
	Storm surge
	Hail
Climatological	Drought
	Forest fire

Note**:** *some natural hazards can be allocated to more than one category (e.g. heat waves are both meteorological and climatological).
Source**:** European Environment Agency (2017): Climate change adaptation and disaster risk reduction in Europe - Enhancing coherence of the knowledge base, policies and practices. EEA Report No 15/2017, Luxembourg: Publications Office of the EU, 2017 [15: p. 25]; based on Integrated Research on Disaster Risk classifications [29]. Retrieved from: https://www.reteclima.it/wp-content/uploads/Climate-change-adaptation-and-disaster-risk-reduction-in-Europe.pdf; [Accessed at: October 2018].

Therefore, heavy precipitation events are projected to become more frequent in most parts of Europe [15]. Overall, GHGs emitted by human activities are warming the Earth and

causing changes in the global climate. These changes are having increasingly severe human, economic and environmental impacts and will continue to do so over the coming decades [2], so, if not addressed, these impacts could prove very costly, in terms of ill health, adverse effects on the environment and damaged property and infrastructure. As mitigation cannot prevent all of the impacts of climate change, there is also a need to adapt to our changing climate [4]. The cost of not adapting to climate change is estimated to reach at least €100 billion a year by 2020 for the EU as a whole [17]. In addition, large-scale reductions of GHG emissions can only be achieved, however, through a tightly coordinated and coherent combination of different policies targeting different economic sectors and sources of emissions [1, 30].

Due to the diversity of production processes and energy end-uses, there are numerous mitigation options for the industrial sector. Some options are generic and sector wide (e.g. improvements in electric motor driven systems) and some are specific to a certain production process (e.g. for iron and steel or cement). Therefore, GHG emissions can be reduced by: increasing renewable energy sources and improvements in energy efficiency; fuel switching to energy sources with lower emissions (e.g., natural gas, biomass, low carbon electricity); power recovery through co-generation, pressure recovery turbines, gasification, etc.; waste minimisation, recycling and recovery; product change and substitution; and, CO_2 sequestration. Further, more fundamental technical changes will be needed in the long term after 2020, when energy efficiency and fuel switching are exhausted. Such long-term technical options include, e.g., new types of cements/concretes, and hydrogen from renewable sources for reducing iron ore or for producing nitrogen fertilisers [31]. Generally, there are different basic ways to reduce emissions, for example, changing the structure of economic growth; increasing energy efficiency through technology or lifestyle changes; and, changing energy supply including using zero-carbon energy options [1].

Furthermore, CO_2 removal remains an important set of undertakings following the Paris Agreement, to supplement immediate and aggressive mitigation action. In order to achieve the goals of the Paris Agreement, to keep the global mean temperature increase well below 2°C (or even below 1.5°C), CO_2 removal is likely a necessary step. So, CO_2 removal from the atmosphere can provide an additional mitigation element to conventional emission abatement strategies. Biological CO_2 removal through afforestation, reforestation, forest management, restoration of degraded lands, soil carbon enhancement and biochar application in agriculture can play an immediate role, and can also significantly contribute to achieving several other Sustainable Development Goals [10]. Moreover, the inherent limitations of “end of-pipe” solutions such as carbon capture and storage re-enforce the need to reduce GHG and exploit alternative management options for CO_2, especially in the circular economy. Additionally, the world is on a new course to combat climate change and unleash actions and investment towards a low carbon, resource-efficient, resilient and sustainable future. At the same time, the 2030 Agenda for Sustainable Development provides a clear pathway to a world in which everyone can enjoy prosperity within the ecological limits of the Earth planet [5].

In general, from the above mentioned, climate changes are a latent issue which has to be addressed in a correct way in order to mitigate it; to have a climate policy is important to work against the effects of climate change which have been caused by human activities [19]. On one hand, six specific categories of measures have the potential to reduce emissions between 15 to 22 $GtCO_2$-eq/year in 2030, which is more than half of the total emission reduction potential. These categories include solar and wind energy (renewable energy sources), efficient appliances, efficient passenger cars, afforestation and stopping deforestation [10]. On the other hand, for economists, the obvious choice is to move toward market-based environmental mechanisms that put a price on GHG emissions. The two main approaches are a carbon tax and a cap-and-trade system of marketable permits for emissions [32]. The use of market-based policy instruments at national and international levels can support environmental objectives at least cost to the economy, as well as to control GHG emissions. Therefore, climate policy is important to combat the effects of climate change caused by mankind [6]. An important policy principle suggests that it is more efficient to promote practices that do not damage the environment rather than spending on cleaning up after a problem has been created [33]. Overall, the prospect

for improving human well-being in general is critically dependent on the capacity of individuals and countries as well as the global community to respond – through mitigation and adaptation – to climatic and environmental changes [1, 34]. In addition, responses to climate change mitigation and adaptation have both direct and indirect health benefits; for example, burning fewer fossil fuels reduces respiratory diseases and active transport, while walking and cycling cut pollution and road traffic accidents and reduces rates of diabetes, heart disease and stroke as well as reduces rates of obesity [35, 5].

Ultimately, climate change is one of the key drivers of global environmental change and has far-reaching consequences [36]. So, climate change impacts are projected to increase in future years, which may result in major environmental changes as well as economic and social difficulties. The scientists mostly agree that further increase in the emission of harmful GHGs will result in global warming and would cause more damage than ever before in the climate system and that is a problem we need to solve. Finally, reaching climate stabilisation of the world economy must be totally transformed in a climate friendly and sustainable manner, as well as people should have much more aware of and concerned with environmental issues and more willing to act in environmentally responsible and friendly ways.

CONCLUSION

Anthropogenic GHG emissions have increased since the pre-industrial era, driven widely by increasing numbers of the population, economic structure, human activities and economic growth and causes of the environmental pressures, influences and challenges. Influences of human on the climate and environmental systems are clearly and recently man-made GHG emissions globally are the largest in history. Recently, CO_2 concentrations in the atmosphere reached 400 ppm, which representing the highest levels in 800 thousands of years. Further, as included in the IPCC reports if the atmospheric CO_2 concentrations in 2100 reaching approximately 450 ppm or below are likely to maintain warming below 2 degrees Celsius over the 21st century relative to pre-industrial levels. This limiting will require significant and sustained reductions in GHG emissions at global levels. And also, there is an urgent need to address the underlying drivers of the human pressures and influences on the climate and environmental systems. At the same time, scientists from all over the world are realising that the Earth is becoming warmer than ever before. Nowadays, the almost share of these scientists is concerned that rising temperatures are closely related to the use of fossil fuels and anthropocentric GHGs, particularly CO_2. Nevertheless, in the EU GHG emissions have decreased considerably since 1990. So, almost all EU Member States reduced their emissions compared with 1990 and thus contributed to the overall positive EU performance.

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