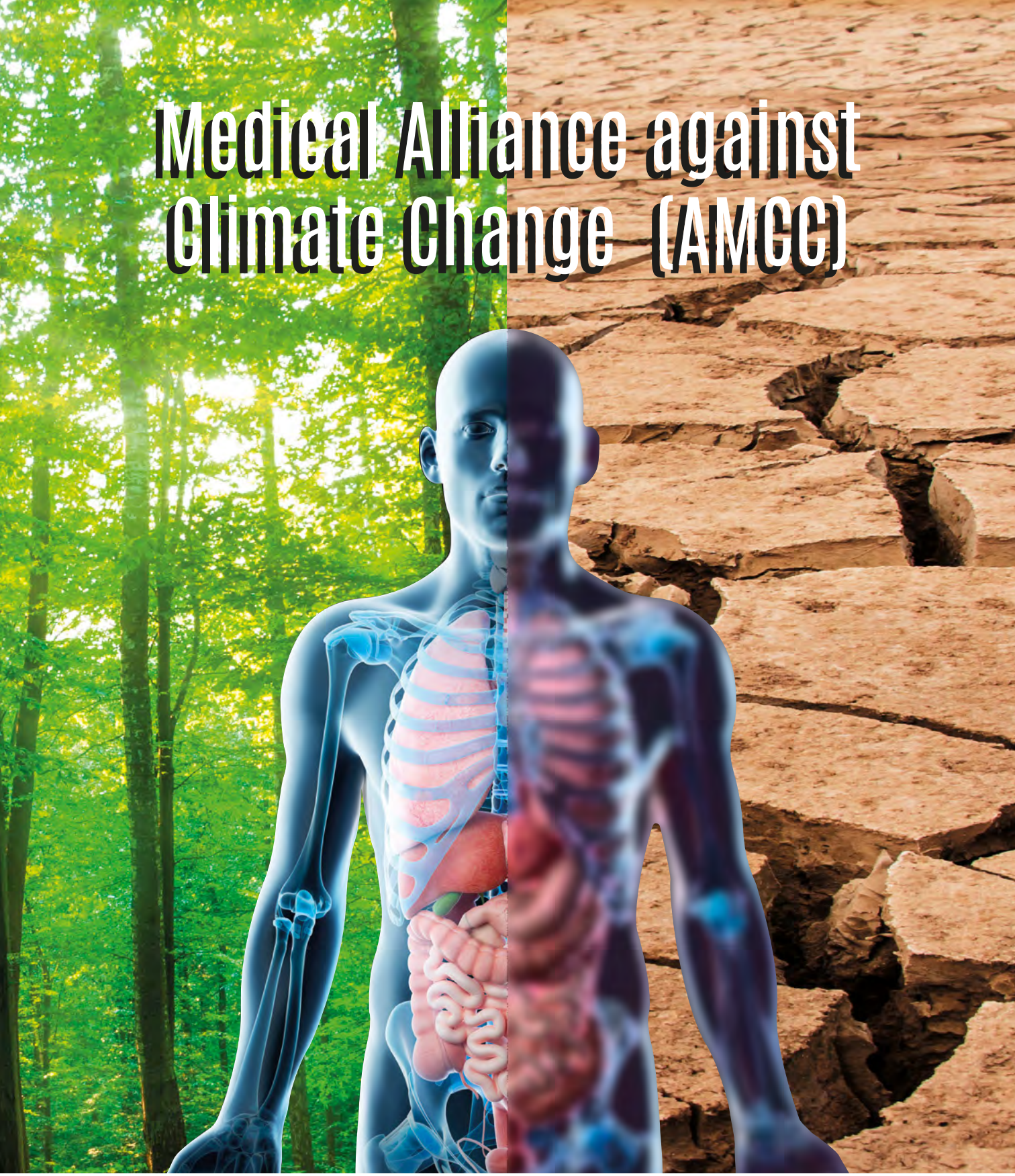
Medical Alliance against Climate Change (AMCC)



OMC

ORGANIZACIÓN MÉDICA COLEGIAL DE ESPAÑA

CONSEJO GENERAL DE COLEGIOS OFICIALES DE MÉDICOS

ALIANZA MÉDICA
CONTRA EL CAMBIO CLIMÁTICO

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ABBREVIATIONS

AMCC	Alianza Médica contra el Cambio Climático *(Medical Alliance against Climate Change)*
BAI	Breath Actuated Inhalers
CGCOM	Spanish General Medical Council
CMCCC	Medical Commitment to Climate Change
COM	Official Medical Colleges
CONAMA	National Environmental Congress
HC	Public Health Centre
DPI	Dry Powder Inhaler
CVE	Cardiovascular Event
COLD	Cronic Obstructive Lung Disease
GHG	Greenhouse Gases
GIRFT	Getting It Right First Time
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
$ktCO_2eq$	Kilotonne CO_2 equivalent
MAC	Minimum Alveolar Concentration
MITERD	Ministry for the Ecological Transition and the Demographic Challenge
MSAN	Ministry of Health
NHS	National Health Service
NICE	National institute for Health and Care Excellence
NIHR	National Institute for Health Research
OECC	Spanish Office for Climate Change
WHO	World Health Organization
OSCC	Observatory on Health and Climate Change
PESMA	Strategic Health and Environment Action Plan
GHGP	Greenhouse Gas Protocol
$PM_{2.5}$	Particulate matter with a diameter less than 2,5 microns
PM_{10}	Particulate matter with a diameter less than 10 microns
pMDI	Pressure Metered Dose Inhaler
PNACC	National Climate Change Adaptation Plan
APA	American Psychiatric Association
SCM	Medical Scientific Societies
SMI	Soft Mist Inhaler
NHS	National Health System

INTRODUCTION

This document is signed by the Spanish General Medical Council (CGCOM), as a public-law corporation and the legitimate representative of Spanish medical practice and by a large number of national Medical Scientific Society representatives (SCM), who forward it to the Ministry of Health and to the Ministry for the Ecological Transition and the Demographic Challenge (MITERD) for their consideration.

International agreements such as the 2030 Agenda and the Sustainable Development Goals (SDG) make a special reference to global health, putting it in third place. For its part, the EU has published a large number of regulations in this respect. In Spain, pursuant to Law 7/2021 on Climate Change and Energy Transition, an entire network of institutions has been set up for the study, evaluation and control of climate change.

The MITERD has thus created:

- The Spanish Office for Climate Change (OECC).
- The National Climate Change Adaptation Plan (PNACC) which includes:
  - The Impact and Adaptation Work Group (GTIA).
  - The Impact, Risk and Adaptation Committee (CIRA).

For its part, the MSAN has set up:

- The Observatory on Health and Climate Change (OSCC).
- The Strategic Health and Environmental Action Plan, which includes:
  - The National Health and Environmental Council.
  - The Permanent Strategic Plant Monitoring and Evaluation Commission.
  - Permanent Commission support groups.

The majority of these institutions and the World Health Organization (WHO) have generated many documents on climate change as a factor that gives rise to different diseases and health risks. Without neglecting such an effect, this document also deals with this relationship in reverse, analysing the aggressive actions committed by the healthcare sector on the environment and its role in climate change, and paying special attention to the generation of greenhouse gases and waste. Likewise, it indicates the possibilities of the healthcare sector in contributing to the decarbonisation of the planet by promoting biodegradable products, a circular economy and above all, the commitment of physicians to reducing climate aggression in their daily tasks and in offering medical guidance to the population.

The beneficial role of the healthcare sector that is recognised by society has masked its role as an environmental aggressor. There are two examples that serve to describe this threat: 1) When considering the healthcare sector would be ranked fifth in terms of climate aggression1 and 2) Within the sector, only the pharmaceutical industry emits more greenhouse gases (GHG) into the atmosphere than the automotive industry.[2]

The recent Climate Change Law,[3] in article 17.1, defined the PNACC as a basic planning instrument and makes it responsible for coordinating the effects of climate change among the different local governments and social institutions. In this respect, the CGCOM, as a public-law corporation, and the SCM offer to cooperate with the PNACC in aspects related to the healthcare sector pursuant to the terms of article 35 of the aforementioned Law.

The relevance of climate change for the healthcare sector is shown in the MITERD document: PNACC 2021-2030. It places human health as the second of the 18 work areas.[4]

Furthermore, the PNACC promotes the integration of other health plans such as the National Health and Environmental Plan[5] and the National Plan of Preventive Actions to combat the Adverse Effects of Hot Weather on Health.[6]

Although the PNACC entrusts the analysis, evaluation and control of compliance therewith to the OSCC, it was the OECC[7] which, in 2019, published the document "Assessments and proposals of agents and sectors interested in the PNACC".[8] A series of conclusions can be drawn from this report:

- The chapter of shortcomings and aspects to be improved of the sector assessment study highlights the healthcare sector and warns that its development has been quite insufficient.

- Of the 18 sectors analysed, the healthcare sector is considered the sixth sector that is the most threatened by climate change, after the water, coastal areas, desertification, biodiversity, agriculture and fisheries sectors.

- Attention is drawn to the considerable lack of knowledge of the PNACC in relation to the healthcare sector, and it is advisable to offer encourage to its key agents to become involved in the implementation of measures.

- The lack participation of the healthcare sector in the OSCC is considered a negative factor.

- Of the 18 sectors analysed in relation to the perception of the usefulness of the PNACC, it places the healthcare sector in 16th place.

- It also occupies 16th place in terms of adaptation to state regulations.

- The persons consulted perceive that the healthcare sector is the sector that is the least known and on which the least work has been done in the PNACC.

- The study concludes that when the OSCC stopped functioning: "very little progress has been made by the healthcare sector in general".

- The proposals and recommendations include the following:

    - "It would be essential to draft a health risk map for the population affected by climate change, locating the zones or population segments that are the most vulnerable and presenting it from the health standpoint. In other words, generate a vulnerability map of effects on health caused by climate change".

    - "It is necessary to perform an in-depth study of health, more indicators, greater coordination with the responsible institutions of the National Heath System and the key agents of the sectors in order to determine clear roadmaps."

    - "Make the PNACC known in special congresses on different topics and/or in different sectors that work on the adaptation aspect. For example, work on or present the PNACC at city planning and other congresses, not only the National Environmental Congress (CONAMA) and attend specific technical congresses. Use different health forums, as these are interesting spaces for the communication and diffusion of the PNACC (for instance, the family medicine congress, which is interested in knowing the effects of climate change). Another proposal could be to organise a National Congress on Climate Change and Health."

    - "Recover the OSCC as a very important tool for working on health and climate change. Or find a route, a platform or an official organisation to officially take charge of matters related to climate change and health."

    - In the healthcare sector, scientific societies are an important element as they are in direct contact with society and can carry out work related to diffusion and raising awareness about health and climate change.

- From the standpoint of health, it would be necessary to involve society as a whole, as health is an issue that affects it as a whole. Incorporating the social sector into health is crucial.

- Within the key recommendations for the future of the PNACC, it puts it in 7th place: "There are key emerging issues such as health".

All these recommendations point to the urgent need for health authorities to receive support from medical organisations in order to face the many interrelations between health and climate change.

In this respect, the Spanish General Medical Council in Spain, together with the SCM, guided by sheer professionalism and acting under their responsibility, offer their joint and altruistic cooperation to the MSAN through the commitment set out in this document and with the intention of their integration with the OSCC or any other institution that the MSAN deems necessary.

Both the Spanish General Medical Council and the main SCM constitute a national network with maximum social capillarity that encompasses both medical advice to the population in general and the regulations and guidelines of action of all the professionals who practise medicine in Spain. It is difficult to find another professional sector with an organisation such as this, which has such enormous possibilities of reaching the general public and so it would not be correct to keep it on the sidelines.[9]

Our organisations are committed to advising and cooperating in matters related not only to the impact of climate change on health, but on reducing the carbon footprint generated by the healthcare sector. This is the objective of this document, which is divided into three main chapters:

I. Repercussions of climate change on human health.
II. Repercussions of healthcare activities on climate change.
III. Commitment of Spanish physicians to decarbonisation.

This document was written at the same time as the MSAN's Strategic Health and Environmental Plan (PESMA). Although its fundamentals are the same, its objectives are somewhat different. While the PESMA is basically aimed at interventions on health with respect to climate change, the AMCC is targeted basically at promoting the decarbonisation of the NHS. The complementary nature of both projects requires close cooperation within the channels established by the MSAN, such as the OSCC.[10]

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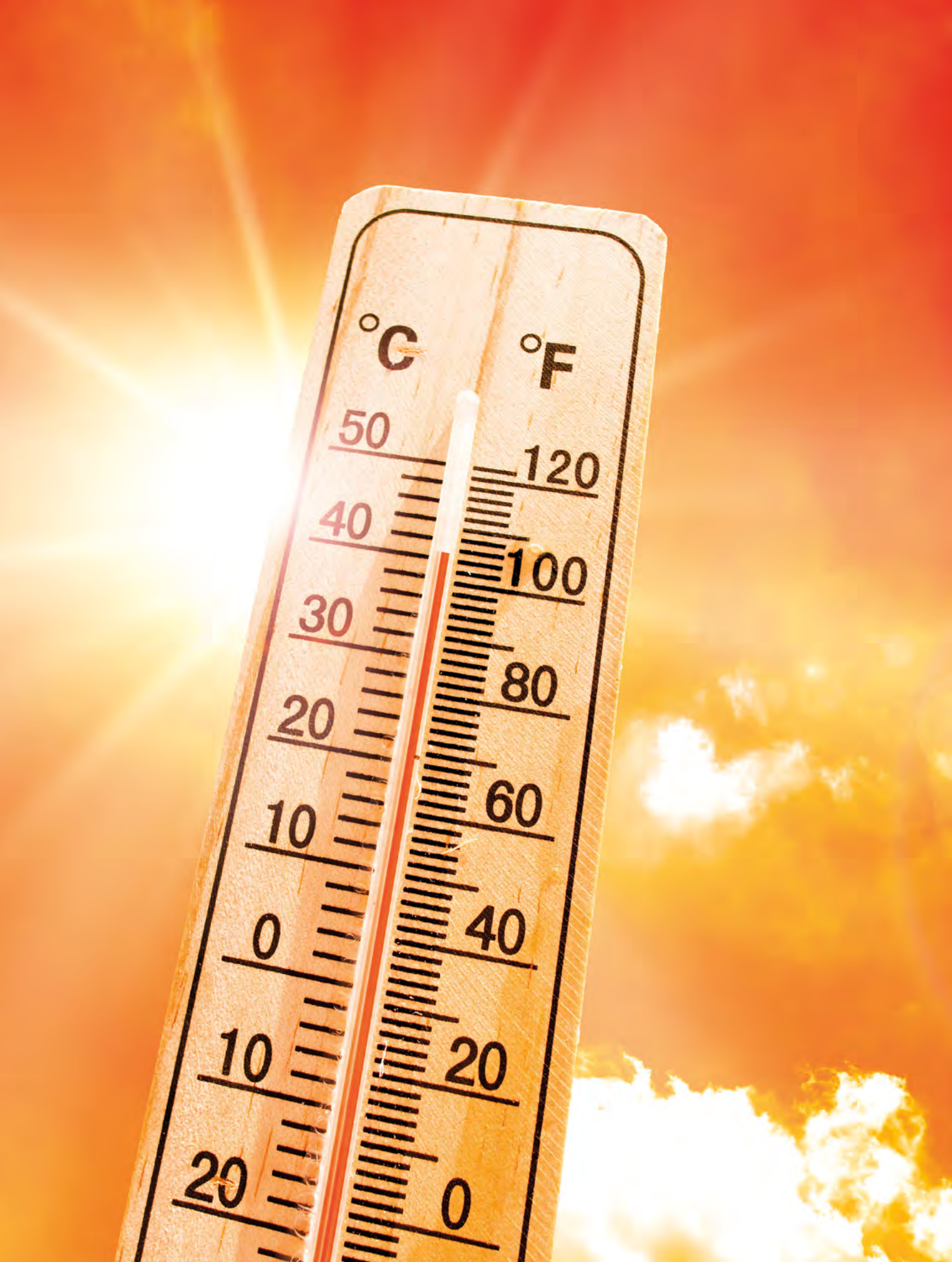
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CHAPTER 1
REPERCUSSIONS OF CLIMATE CHANGE ON HUMAN HEALTH

Introduction

Climate change is threatening the lives of the population in many ways. The anthropogenic creation of greenhouse gases has led to the gradual warming of the planet, altering ecosystems and generating heatwaves that beat records year after year.[1] The consequences of global warming are quite varied, and the way in which they affect health will depend on the geographical location and the affected population's capacity to adapt. The impact of climate change is far from being homogeneous; it usually affects more vulnerable populations, the elderly and children and above all, countries with low-income levels. This phenomenon has been referred to as environmental racism.[2]

As the temperatures of the planet increase, the number of deaths related to cold falls. However, this reduction is exceeded by the number of deaths caused by extreme heat. This World Health Organization has estimated that 250,000 additional direct deaths will occur due to climate change from 2030.[3] Nonetheless, the number of deaths due to indirect causes is much higher. The medical journal "The Lancet" has defined climate change as the greatest health challenge of the 21st century.[4]

Vector-borne infections, damage caused by water pollution after extremely heavy rainfalls, the increase in respiratory infections due to changes in temperature, the increase in allergic and asthmatic diseases due to pollination, instability and death due to extreme heat, lung and cardiovascular damage due to pollution in cities, psychiatric disorders and malnutrition in countries with low-income levels are just some of the effects of climate change.[5]

This review of damage caused to health by global warming is not intended to be exhaustive, but to give a general idea of its impact on health, to allow us to understand why there is a need for decarbonisation as a preventive measure to reduce disease among the general population and not destabilise patients who already suffer from respiratory and cardiovascular disorders.

I.1 Climate change and respiratory diseases

Climate change is a clear threat to respiratory health, promoting the development of respiratory pathologies or aggravating existing ones. The disease that are the most affected are asthma, rhinosinusitis, COLD and respiratory infections. The impact of global warming on the respiratory system is such that there has currently been a reversal in the seasonal pattern of deaths due to respiratory causes, with the number of deaths in summer being higher than those of the winter months.[6] There is evidence that in the summer, for every degree Celsius above 29 °C, mortality and hospitalisations due to respiratory causes increase

by 7% and 4% respectively. These figures are higher than those caused by low temperatures.[6]

The relationship between climate change and environmental pollution has been widely studied. The formation rate of ground level ozone (O_3) depend on temperature and is thus directly related to global warming.[7] O_3 is linked to the reduction of the pulmonary function and increase in mortality (particularly in children and adults). Moreover, O_3 worsens COLD and asthma.[8, 9]

Pollution, a contributing factor to climate change, also has negative effects on respiratory health. Particular matter with a diameter less than 2.5 µm ($PM_{2.5}$) is responsible for death by COLD and for lung cancer.[10] Lung cancer in persons who have never smoked has led to an increase of between 15% and 27% for each increment of 10 mcg/m^3 in $PM_{2.5}$.[11]

Another effect of climate change on respiratory pathologies is the alteration of pollination patterns. There is evidence that climate change affects the distribution of pollen on a global scale.[12] The effects on pollination of higher temperatures along with increased CO_2 levels give rise to an increase in plant growth, with more pollen being produced by plants, an increase in allergenic proteins found in the pollen and an early pollination season with a longer duration.[13] The hypothesis exists that the increase in respiratory allergic diseases related to pollen may be due to the effect of global warming. The link between storms and asthmatic morbidity is clearly demonstrated, with a clear relationship between the start of the storm and the concentration peak of airborne pollen.[14] The impact of pollution (particularly diesel particles) and pollen has also been studied. Diesel particles increase the concentration and biological activity of allergens, contributing to the triggering of asthma attacks.[15]

I.2. Climate change and cardiovascular events

Climate change directly affects cardiovascular events (CVEs). The effects of heat are shown in the number of hospitalisations due to CVEs. There is evidence that on extremely hot days, there is a 7% increase in the risk of suffering a heart attack.[16] This risk continues for several days, leading to a 4% increase in hypertensive crises and 6% in heart arrythmias. Broad studies have shown that for every degree Celsius increment in the temperature, the risk of hospitalisation due to heart attack increases by 1.6%. The link between heatwaves and heart attack is even greater.[17, 18] This link is also present in episodes of extremely low temperatures and occurs most often in the elderly.[19] With the continuing rise in temperatures, it is expected that there will be an increase in death due to CVEs of up to 10.2% depending on the different scenarios studied.[20]

Pollution also affects mortality in CVEs. Chronic exposure to $PM_{2.5}$ affects the vascular function, which may give rise to heart attacks, high blood pressure, cerebrovascular episodes and heart failure.[21]

Recent studies have shown that excess deaths due to air pollution in Europe amount to around 790,000, of which between 40 and 80% are due to cardiovascular causes, with a reduction in life expectancy in Europe of about 2.2 years.[22] Apart from $PM_{2.5}$ and PM_{10}, Nitrogen oxide (NO_2), a chemical compound that is usually found in urban contamination, also has an effect on excess mortality due to CVE (1.23% of excess deaths due to cardiovascular episodes).[23]

I.3. Infection

I.3.1. Respiratory infections

The link between respiratory infections and climate change is complex.[24] Global warming reduces the number of infections in the winter, but increases the total count due to instability in temperature. Evidence shows that the intraday temperature or variation in temperature during 2 consecutive days may give rise to an increase in the relative risk of developing pneumonia in children and the elderly. This variation in temperature may occur in both summer and winter, and the greater the variation, the higher the relative risk for pneumonia.[25] It is known that an increase in intraday temperature or the temperature during 2 consecutive days is directly linked to global warming1. The incidence of pneumonia also increases in relation to rainfall.[26]

Another complex interaction related to climate change is annual flu epidemics. There are studies that show how, following winters that are warmer than usual, influenza A and B epidemics appear earlier and with more pronounced infection peaks.[27] This is likely due to a higher number of susceptible persons after a winter with high UV radiation and few infections.

Extreme natural phenomena, also linked to climate change, also play a role in lung infections. There is evidence that storms are able to remove fungi from the soil and scatter them over large areas. Important outbreaks of coccidioidomycosis have been reported after storms and earthquakes,[28, 29] and a seasonality in the outbreaks that is dependent on unseasonal weather.[30]

Pollution also has an impact on infectious respiratory patterns. There is clear evidence of the link between high PM_{10} and O_3 levels and hospitalisations due to pneumonia.[31, 32]

I.3.2 Vector-borne infections

Climate change affects the distribution of vectors that spread disease, mainly mosquitoes (dengue, Chikunguya, Hantavirus, malaria, Rift Valley Fever, West Nile Virus or Zika).[5] From the nineteen-nineties, five types of *Aedes* mosquito have been introduced into Europe.[33] It is expected that this species will expand throughout the continent as the temperatures rise due to global warming.[34, 35] One example of this was the dengue outbreaks in France and Croatia in 2010[36] and Zikunguya in France.[37] Studies have shown the implications of climate change in this phenomenon, by observing how, based on different weather scenarios, the coasts of the Mediterranean and the Adriatic are those with the highest probability of dengue outbreaks due to global warming.[38]

The West Nile Virus is another vector-borne disease whose expansion is dependent on global warming.[39] Since 1999, outbreaks of this virus in the USA have caused more than 39,000 infections in humans and more than 1,600 deaths.[40] In Spain, in the summer of 2020, an unprecedented outbreak occurred in Seville,[41] with at least 8 deaths.

Malaria is another disease whose epidemiological characteristics have been modified by climate change. The high summer temperatures increase the opportunity of infection by shortening the development required by the parasite inside the mosquito.[42] For instance, in the nineteen-nineties, after an extremely strong El Niño climate phenomenon that caused torrential rain in the Horn of Africa, an increase in deaths due to malaria was detected in Kenya y Uganda.[43, 44] Special emphasis is placed on *Plasmodium vivax*, which has recently returned to Europe, with local transmission in Greece.[42]

Other vector to be considered are ticks, which transmit Lyme's disease. Climate-related factors and land use are responsible for the expansion and geographical distribution of *I. ricinus* and there is evidence of its expansion in Scandinavia and at unusual altitudes.[45, 46] Climate models in Europe suggest that the expansion of this vector could double in the future.[47]

I.3.3 Digestive infections

The digestive infections are led by those caused by the *Vibrio* family. It is known that these infections have a marked seasonal nature, with a predominance during the hotter months.[48] In fact, infections caused by *Vibrio* bacteria are the only ones that are increasing in the USA.[49] They have produced outbreaks in areas that were previously free of disease in the north-western region of the USA, and also in northern and western Europe and in Israel.[50-52] These outbreaks appear to be closely linked to climate change.[53] Changes in the surface temperature of the sea are considered to be the cause of the greater impact on coastal ecosystems around the world.[54] There is evidence that the warming of the sea's surface is also accompanied by an increase in *Vibrio* bacteria concentration.[55] This warming is the cause of the outbreaks of *V. parahaemolyticus* in Alaska,[56] and also in northern Spain.[57] Heatwaves are also clearly linked to an increase in infections by this family of micro-organisms.[51]

I.4 Climate change and mental disorders

The threat of climate change is an emotional and psychological stress factor. It affects both people and communities, directly due to experiencing local phenomena, and due to exposure to information about global warming and its effects.[58] In 2017 the American Psychiatric Association (ASA) published its positioning in which it clearly explains the threat of climate change to mental health. Patients with mental disorders are susceptible to being affected in a disproportionate way by the consequences of climate change.[59]

The most common symptoms vary from minimum stress to depression, anxiety, post-traumatic stress and suicidal thoughts.[60-62] As usually occurs with the consequences of climate change, vulnerable populations (children, elderly persons with chronic ailments, persons with low incomes, immigrants, etc.) are the ones most affected and they have a higher risk of developing psychiatric and psychological symptoms.[63-67]

It should be said that extreme heat episodes are particularly relevant in patients who take anti-psychotic drugs. These drugs reduce the physiological heat regulation capacity and fluid homeostasis and is an established risk factor for emergency hospitalisation due to pathologies related to days of extreme heat.[68]

I.5. Miscellaneous considerations

Climate change has indirect effects on health that are difficult to estimate. For instance, it has been shown that fires due to global warming, such as those that occurred in the north-west region of the USA in 2016,[69] could give rise to

a tenfold increase in pollution levels, with the harmful respiratory effects that this entails.[70]

One very important effect of climate change can be observed in the nutritional quality of grain crops such as rice or oat. A reduction in protein levels has been observed as well as in the range of micronutrients and vitamins.[71-73] In fact, it is estimated that by 2050, as a consequence of global warming, there will be a net worldwide increase of 529,00 deaths among adults resulting from a reduction in access to food (mainly fruit and vegetables).[74] In this respect, the World Bank has estimated that without sustainable development, climate change could expose 100 million people to extreme poverty by 2030.[75]

Climate change also affects migratory flows. For example, applications for asylum in the European Union from more than 100 countries are increasing when, temperature deviation from optimum values during the corn growing season, especially if the deviation constitutes an increase in those values. It is estimated that with the current projections of increases in temperature, there will be an increase in applications for asylum of 175% by the end of this century.[76] We should also consider the migrations that accompany periods of drought. These migratory flows lead to violence, malnutrition and the spreading of infectious diseases (respiratory and digestive).

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CHAPTER II
REPERCUSSIONS OF HEALTHCARE ACTIVITY ON CLIMATE CHANGE

The beneficial role that society and the National Health System (NHS) attribute to the healthcare sector has unfortunately led to it to adopt the role of an environmental aggressor. Few healthcare centres have been concerned about their carbon footprint, measuring their emissions or the quality and quantity of the waste they generate.

II.1. Determining the NHS carbon footprint

It is recommended that the engineering firms of every healthcare centre determine, within their Management plans, the carbon footprint of the entity, by taking a series of steps: analysis of the starting point, contribution of each emission source, timelines for reducing emissions and financing.

They should also draft a chronogram and a deadline for reaching zero emissions in the most relevant scenarios. All the above must be done based on the conviction that reducing emissions costs money and the financing thereof must be assured.

The Greenhouse Gas Protocol (GHGP)[1] deals with the standardisation of the measures to facilitate the comparison of different entities in order to ensure international transparency.

In accordance with their origin the GHGP classifies the emissions of all institutions into three main scopes:

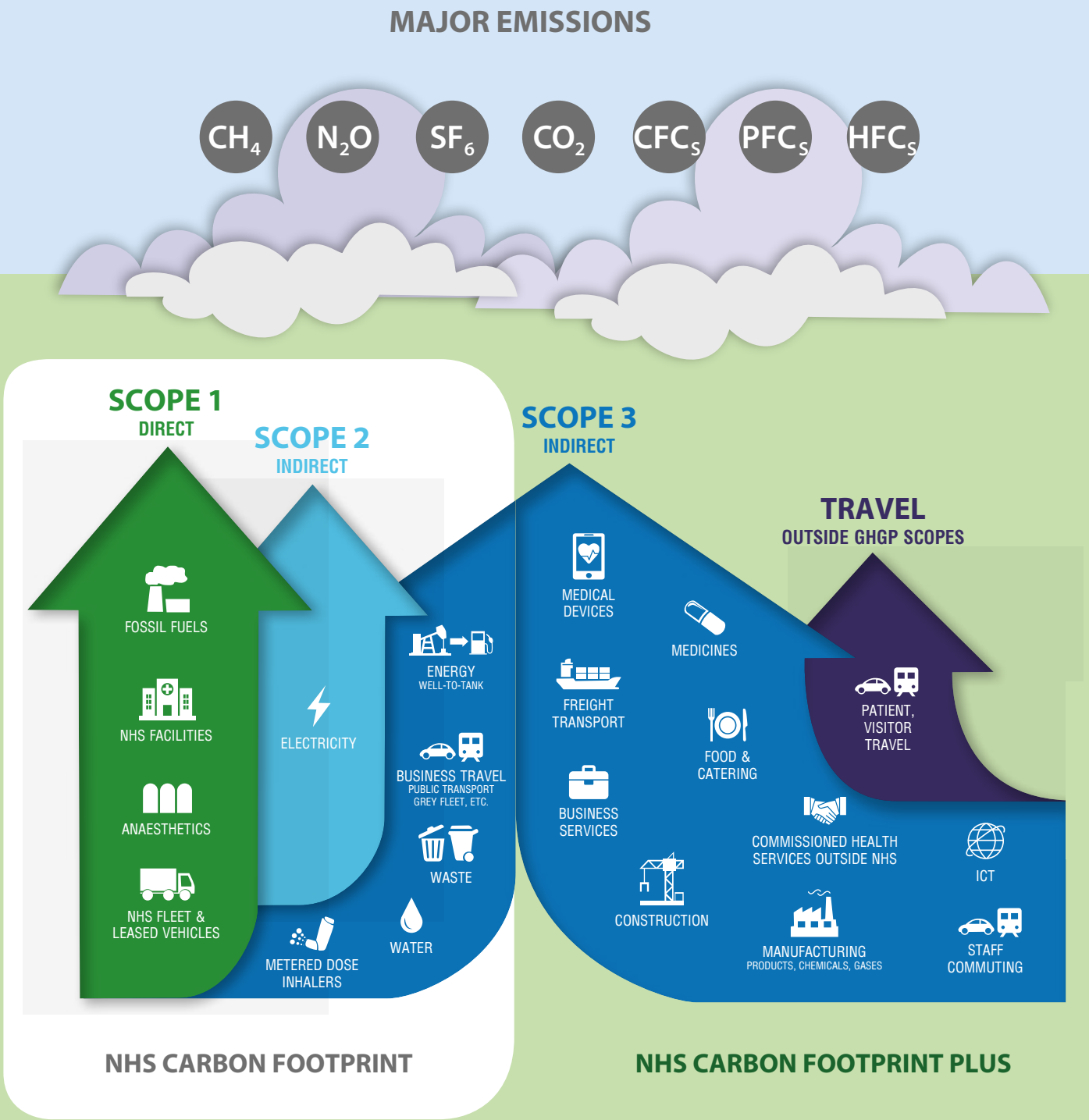
- GHGP scope 1: own emissions under the direct control of the entity.
- GHGP scope 2: emissions derived from energy consumption provided by third parties, paying special attention to electricity consumption.
- GHGP scope 3: emissions derived from all external activities in the transportation of goods or services.

Although emissions derived from other companies or users outside the entity but related to their activity are not included in GHGP scope 3, it is advisable to include them in said scope or count them separately.

Within the latter group, it will be necessary to include the proportional part of emissions that corresponds to the entity in the manufacture of equipment and drugs included in public tenders must have a certificate of their environmental impact, assigning a bonus in relation to the same.

II.2. The route to decarbonising the NHS

The actions taken in this sense must meet a series of criteria that permit a commitment to zero emissions on a determined date, as imposed by the UK National Health Service (NHS) for 2040. To that end, it is advisable to establish a plan of periodic two-weekly reductions based on the premises of the Paris Agreement for Climate Change.[2]



Delivering a 'Net Zero' National Health Service.
(https://www.england.nhs.uk/greenernhs/wp-content/uploads/sites/51/2020/10/delivering-a-net-zero-national-health-service.pdf)

The programmed objectives must be: urgent, ambitious, feasible and be adapted to innovations and to governmental directives.

II.2.1 Reduction of emissions in hospitals

Newly-built hospitals must have a design that enables them to reach zero emissions within the foreseen period. The design must include its ability to adapt new technologies currently being developed and their future feasibility.

But today, the greatest effort must be made in reducing emissions in existing hospitals. Reducing the carbon footprint of the institution must be considered in the management plans of each entity, through specific actions financed and developed within established timeframes. It is recommended to create or assign functions to a technical body to plan a common hospital policy strategy in matters related to energy efficiency, such as:

- 100% LED lighting.
- Efficient HVAC systems.
- Replacement work with energy efficient materials.
- Ventilation.
- Policy for the centralisation of fridges and freezers.
- Hot water.
- Use of artificial intelligence for energy control and monitoring.
- Use of free space (courtyards and rooftops) to install renewable energy resources.
- Contracting 100% renewable energy with electricity supply companies.

These actions must be implemented in a short timeframe of no more than 3 years in a number of hospitals before extending them to other centres.

II.2.2 Reduction of emissions in Primary Care centres

The new Healthcare Centres (HCs) must be planned with the objective of zero emissions as soon as possible and adapted to the needs required by new future technologies in the process of being developed.

The greatest challenge is to condition the existing national Public Healthcare Centre network to improve their energy isolation, lighting and air conditioning systems. Apart from this structural work, the installation of photovoltaic panels and aerothermal pumps brings an important reduction in GHG emissions.

It is necessary to set up a HC unit as soon as possible, as a pilot project to monitor the evolution of its carbon footprint.

On the other hand, each HC must monitor its own carbon footprint and the annual evolution thereof.

II.2.3 Mobility and transport

It has been considered that up to 14% of healthcare sector emissions are generated by transport.[3] For this reason, we recommend a series of actions in relation to:

- The NHS's own or jointly-arranged transport means must be 100% electric within a period of no more than 10 years, with the commitment to a gradual introduction in a chronogram.
- Assigning a high score in public tenders to partner companies that use vehicles with ultra-low emissions
- Promoting electric charge points for vehicles in healthcare facilities.
- Reducing unnecessary travel by patients and suppliers by increasing online activities.
- Encourage employees to use non-contaminant transport means.
- If possible, declare the healthcare facilities free of emissions generated by transport through blocking access by high-emission vehicles.
- Facilitate access to healthcare centres by public transport or healthy means such as bikes and parking stands for bikes, or pedestrian routes.

To promote these activities, a mobility plan must be established as part of the strategic development and coordinated management plants.

II.2.4 Supply chain

The NHS must be aware that it is empowered to modulate the carbon footprint of its suppliers through public ten-

ders, promoting innovation among them and the acquisition of products that reduce the carbon footprint in terms of production, transport and waste generation. This policy means asking suppliers to:

- Be transparent in certifying their carbon footprint reduction programmes.
- Reduction of single-use plastics.
- Promote the use of biodegradable polymers.
- Reduction in the use of paper.
- Reduction in water consumption.
- Recycling of metal.
- Reuse of material.
- Electric transport.

II.2.5 Food and catering

Fresh food and local, seasonal produce brings important savings in transport emissions, refrigerated storage and packaging. This entails reaching agreements with local producers to ensure supplies with the engagement of hospital dietary services.

II.3 Medicines

Due to the curative role assigned to medicines, there is the false impression that the pharmaceutical industry is green activity. For this reason, many people are surprised to know that the pharmaceutical activity produces more greenhouse gas emissions than the automotive industry.[4]

In the UK, medicines account for up to 25% of all NHS emissions.[5] It is to be expected that this percentage is similar in Spain. The emissions include their industrial production, transportation, release into the atmosphere and the waste they generate.

II.3.1 Industrial production of medicines

Two of the countries with the highest medicine production, China and India, are among the most contaminant countries in the world. Moreover, since they have a minimum percentage of renewable energies, their greenhouse gas emissions are higher than those generated in Europe.

Although the quality of the medicines imported into Spain is endorsed by the European Commission, through the Good Manufacturing Practice Guide6, the guide considers quality control in the manufacturing and traceability of the medicines but not the environmental impact of the process. What is more, many of these plants produce chemicals in general and their sensitivity to public health may not be sufficient. The intensity of the emissions of the different pharmaceutical companies varies widely. In 2015, the most contaminating multiplied the CO_2 equivalent emissions of the cleanest by seven.

II.3.2 Transport and supply

The distance of the manufacturers conditions the transport of a large number of drug substances by air or sea, and they are often dosed and packaged in Spain. To add up all the emissions, it would be necessary to estimate the carbon footprint of this entire process, from the time the products leave the plant to their subsequent handling and transfer to the final destination, the pharmacies. In the UK, it has been estimated that medicines account for 25% of all NHS emissions. Of that 25%, 20% is attributed to their manufacture and to their transport and supply chain.[5]

In this respect it would be advisable to promote, if possible, the production of medicines in Spain or in an adjacent territory and their transportation by ultra-low emission vehicles.

Likewise, it is recommended to issue a green passport for medicines that takes into account their carbon footprint similar to an energy efficiency colour code and encourage those that generate fewer emissions in public tenders.

II.3.3 Pressured inhalers

Various respiratory diseases, particularly asthma and COLD, are treated with medication inhaled every day, and in most cases, for life. There are four types of devices for its administration: 1) Pressured metered dose inhalers (pMDIs). Some pressured inhalers have the peculiarity of being actuated with the patient's breath [breath actuated inhalers (BAI)] and their role in GHG emissions is the same as that of the pMDIs and so they are similar to them. 2) Dry powder inhalers (DPIs), 3) Soft mist inhalers (SMIs) and 4) Medication inhaled by means of an electric compressor or by compressed air or oxygen.

pMDIs transport the drug in a liquid state by compressed gases from the hydrofluoralkane (HFA) family. In particular, HFA 134a and HFA 227. They both have an excellent profile in terms of human safety. However, GHG have a high po-


MA
CO 2
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tential for global warming, and they remain in the atmosphere for 14.6 and 36.5 years respectively.[7, 8] Their long life as GHG gives them high accumulative power.

In the case of HFA 227, it has been estimated that one dose (two puffs) has a global warming potential 1,300 times the equivalent mass of CO_2.[9] It is estimated that 3.5% of the carbon footprint of the NHS is due to pMDIs and that replacing 10% of pMDIs with DPIs would bring savings of 68.6 ktCO_2eq.[10, 11] On the other hand, a study comparing the carbon footprint of pMDIs to that of DPIs, including the contribution of its footprint in terms of production and distribution, found that the former was 30 times the footprint of the latter.[12]

According to the NHS, a pMDI cartridge contains as many GHGs as those produced by a conventional care after travelling 300 km.

Current sales of pMDIs in Spain amount to around 14 million units, which represents GHG emissions equivalent to 378,000 tonnes of CO_2.

At present, almost all medicines transported in pMDI format can be replaced by the same drug substances in DPI or a fine most format, free of GHGs.

Physicians are advised to maintain a proactive attitude and change their pMDI prescribing habits to devices without HFC, in all cases in accordance with the circumstances of each patient. Nonetheless, with a training programme in the use of inhalers, there are very few cases that require treatment with pMDIs. Physicians should try to ensure that their first inhaler prescriptions are DPIs or SMIs and change their previous pMDI prescriptions to these devices, in all cases through dialogue and consensus with their patients.[13]

On the other hand, once used up, the pMDIs continue to contain HFC and they must not be disposed of as household waste but left in pharmacies for their treatment through the SIGRE programme.

II.3.4 Anaesthetic gases

Halogenated anaesthetics and nitrogen oxide (N_2O) are powerful greenhouse gases with a high global warming potential (GWPs). Since they are considered essential medicines, they have not been subject to the specific legislation governing environmental emissions. As they are not metabolised, they are emitted into the atmosphere after use, where the halogens remain for between 1 and 14 years and the N_2O, 114 years.[14]

The GWP scale compares the contribution to global warming of a gas determined with the same mass of CO_2 (CO_2eq) and is related to different periods of time, with 100 years being the normal benchmark of the international body that evaluates scientific knowledge about climate change [Intergovernmental Panel on Climate Change (IPCC)]. Desflurane has the highest GWP_{100} (2,540), followed by isoflurane (510) and sevoflurane (130).[14] This means that the carbon footprint of the first is 15 times greater than that of the second and 20 times greater than that of the third.

To make this easier to understand, one hour of anaesthesia with desflurane is equivalent to the emissions of a car on a journey of 643 km, with that of isoflurane being 29 km and that of sevoflurane, 13 km.

Anaesthetists, for their part, must: a) Avoid using desflurane and N_2O, if possible. b) Use low-flow anaesthesia. c) Use intravenous or local anaesthesia if possible.[15, 16]

In turn, healthcare institutions must try to incorporate technological innovations that are capable of capturing anaesthetic gases after their use for their absorption and subsequent destruction or reuse.[17] In addition to studying the use of new anaesthetic gases such as xenon, which has no environmental impact.

II.4 Innovation and research

The NHS must be connected to industry and research centres of excellence, directly or through mixed commissions with the MITERD. All the above is for the purpose of incorporating innovations with a view to:

- Replacing discarded equipment with other reusable equipment.
- Reducing the consumption of plastics and other products that could harm the environment.
- Making progress in technology for the capture of carbon emissions.
- Reducing the water footprint.
- Being self-reliant in clean energy sources.

On the other hand, the research carried out by the NHS must also be in line with decarbonization legislation. It has been estimated that the 350,000 clinical trials record-

ed in ClinicalTrials.gov will emit 27.5 million tonnes of CO_2eq, and that half of them are trials for drugs which, in the UK, are considered to represent one-fifth[18] of all NHS CO_2 emissions. In this regard, the National Institute for Health Research (NIHR) has published a guide for the reduction of CO_2.[19]

From this standpoint, the projects must be prioritized by Ethical Committees and funders.

II.5 Strategy and commitment in the decarbonisation of the healthcare sector

The basic line in the fight against climate change must be an inclusive stance by all committed persons and institutions.

The Spanish healthcare sector must be aware of the lines of action in the decarbonisation thereof which must include a zero CO_2 emissions chronogram based on three basic premises: new healthcare models, efficient professional staff with a capacity for leadership and budgetary and financial resources.

II.5.1 New healthcare models

Outpatient care must be encouraged in all services that can be provided close to the homes of the patients. According to UK estimates, this approach has saved 8,5 million km in unnecessary travel and 1.7 ktCO_2eq every year.[20, 21]

To achieve these objectives, it will be necessary to:

- Consolidate healthcare education among the population, particularly in relation to what is urgent, what is not urgent and the methods for accessing face-to-face care.
- Reduce hospital outpatient visits.
- Create rapid diagnostic centres outside hospitals.
- Implement digital access of patients to their administrative documents, test results and clinical reports.
- Set up digital consultation channels to deal with patient queries.
- Consolidate local emergency services and telephone triage.

II.5.2 Efficient professional staff with a capacity for leadership

The standardisation of diagnostic decisions through the evaluation of results not only improves medical care and prevents the squandering of economic resources, it leads to a considerable reduction in CO_2 emissions.[22]

To achieve this goal, it will be necessary to set up or consolidate national agencies for the assessment of technologies and common care processes based on benchmarking and clinical evidence in order to banish inefficient practices, alike the British National Institute for Health and Care Excellence (NICE)[23] and the programme Getting It Right First Time (GIRFT).[24]

Although awareness of climate change exists among most Spanish physicians, clinical inertia usually generates hesitancy in the face of new diagnostic and therapeutic approaches which are sometimes interpreted as purely bureaucratic. Such disinclinations must be accepted, dealt with and channelled. In this sense, institutions must set up bodies with personal leadership, training and preferential dedication to planning and ensuring the adoption of new habits. These bodies would be obliged to draft an annual report on the monitoring of indicators and achieving of objectives.

Such objectives will be difficult to achieve with the mere intervention of healthcare authorities and without the active participation of professionals, represented by the Medial Colleges and Scientific Societies. Administrative and professional areas must be interrelated through smooth channels that ensure that each person understands their role.

II.5.3 Budgetary and financial resources

In the commitment to the decarbonisation of the healthcare sector it will be necessary to make large investments in specific objectives that affect the construction of new hospitals and HCs or the conditioning of existing ones and the replacement of equipment to improve energy efficiency.

On the other hand, the investment goes beyond work and equipment. It will be necessary to provide finance for the agencies and groups responsible for making important decisions to promote a change in the behaviour of professionals.

In addition, it will be necessary to explore and innovate in alternative investments through other investors and funds.

In relation to public tenders, opt for those bidders who have the lowest carbon footprint.

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CHAPTER III
THE DECARBONISATION COMMITMENT OF SPANISH PHYSICIANS

The Official Medical Colleges (COMs) and hence, the CGCOM, are public-law corporations as set out in the Spanish Constitution and are the sole and legitimate representatives of professional medical practice Their legal personality enables the public administration to delegate their functions and participation in representative bodies.

On the other hand, SCMs include physicians dedicated to specific branches of professional practice and are responsible for scientific advances, special training and promoting knowledge.

This document was initially developed by the CGCOM, the COM of Las Palmas and an SCM group. Adhesion to and reforming of the initial project by the majority of the COMs and SCMs entails endorsement by a large majority of Spanish physicians.

Although the final recipient of the actions promoted in this document is the same, namely the physician, the CGCOM addresses all Spanish physicians while the SCMs promote the fight against climate change from the standpoint of each medical specialty.

In Spain, millions of pieces of medical advice are given every day and there is no other advice with a better compliance rate. On the other hand, no community group has the social capillarity that the healthcare sector has. For this reason, we attach particular importance to medical advice and we are of the opinion that in ethical terms, it must be used for the fight against climate change.

III.1 The commitment of the Spanish General Medical Council

The CGCOM, a reference for the 250,000 medical professionals who practice in Spain, undertakes, through the COMs, to raise awareness among Spanish physicians in order to fight climate change and adopt a proactive approach in the decarbonization of the healthcare sector and compliance with the 2030 Agenda and the Sustainable Development Goals. To that end it promises to take a series of actions that will be carried out over the next four years. They include:[1-4]

- Promoting medical advice related to the threats of climate change to health.
- Promoting medical advice on consuming local, seasonal foods to avoid long journeys that generate contamination, as well as refrigeration and plastics.
- To disseminate among physicians the messages and actions promoted in this respect by the MSAN and MITERD, establishing protocols of joint action.
- To promote events, courts and symposiums to disseminate the threat of climate change among physicians.

- To organise continued and accredited education on climate change and health.
- To finance scholarships for research into climate change and the decarbonisation of the NHS.
- To cooperate and accept the functions delegated by public authorities responsible for regulating climate change.
- To reduce the GHG in the prescription of pressured medical aerosols and anaesthetic gases.
- To reduce GHG and spend less on resources in the labour environment (transport, energy consumption and water savings).
- To evolve towards prescribing green medicines that reduce environmental aggression.
- To strive to ensure the correct handling of medical waste and sanitary materials.
- To cooperate in the reuse of medical materials and promote a circular economy in this area.
- To reduce the carbon footprint of the COMs.

III.2 The commitment of Medical Scientific Societies

SCMs are a priority communication channel in the medical sector, as they represent the majority of medical professionals in multisectoral terms.

The SCMs that sign this document undertake to:

- Promote a session dedicated to climate change in their annual congresses.
- Include in their clinical guides and protocols a section on climate change and the environment.
- To issue calls for grants and aid for projects related climate change.
- To train their professionals in each field about the impact of extreme temperatures on health.
- To promote the prescribing of medicines with a lower impact on the environment: "green medicines".
- To promote policies related to energy savings, the circular economy and the correct handling of waste in their labour environments.
- To cooperate in their workplaces by setting up interdisciplinary committees or groups dedicated to fighting climate change.
- To disseminate among patients their commitment to the planet and the repercussions of climate change on their health.
- To promote the correct handling of waste generated by medicines among their patients.

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