NET ZERO EMISSIONS IN HVACR INDUSTRY

Abstract

Carbon neutrality or net zero emissions of carbon dioxide (CO2) or other greenhouse gases, refers to limiting emissions and eliminating greenhouse gases, thereby preventing their upsurge in the stratosphere that causes worldwide warming. Acute climate changes that could threaten the species' existence on earth. It is estimated that the sea level has augmented by 0.24 m and will be in the range of 0.3-1.5 m by 2100 due to global warming. The only way we can stop sustained and long-term sea level rise is to reduce atmospheric carbon dioxide to levels close to pre-industrial levels. This requires more than maintaining carbon levels. The carbon reduction would be the first big step for humanity to prevent the rapid destruction of the environment. The paper presents the issue of global warming due to greenhouse gases and necessary actions by Heating Ventilation Air-conditioning and Refrigeration (HVACR) industries for net zero emissions, which is the demand of the future and is a must for business growth without any harm to the environment.

Keywords: Carbon neutrality, net zero, greenhouse gases, global warming, HVACR

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I. INTRODUCTION

Global warming is responsible for the climate change, which give rise a serious threat to life on earth in the forms of universal flooding and extreme weather. Scientists continue to study global warming and its impact on Earth. Global warming is caused by the greenhouse gases. Net zero emissions can be achieved by limiting emissions and eliminating greenhouse gases, thereby preventing their increase in the atmosphere that causes global warming. As of February 2021, 124 countries have pledged to be carbon neutral by 2050 or 2060. This is an important development after the annual meeting of the United Nations countries.

By 2020, the world's average carbon dioxide concentration reached 415 ppm; this is an increase from the pre-industrial level of 285 ppm around 1850. As a result, the global average temperature increased by 1.2 °C between 1850 and 2020 [1]. As more carbon dioxide in the atmosphere continues to contribute to the greenhouse effect, the world will continue to warm even if the world immediately stops carbon emissions. The goal of being carbon neutral by 2050 is to limit the rise in temperature to 1.5-2 °C from pre-industrial levels by 2100 [2]. Achieving this goal will require a lot of effort from all countries. These can be seen as motivation in the face of dangerous climate change that could threaten the species' existence on earth. Climate change has recently damaged our habitats and the list is long: insects, droughts, floods, deforestation, species extinction, loss of biodiversity, ocean acidification, retreat of glaciers, melting Arctic and Antarctic glaciers, sea level rise is a major problem. Threatening more than 100 million people this century and more in the long run.

Globally, sea level has changed by about 200 m, while the temperature has changed by about 10 °C, i.e. 20 m precision per °C [3]. During the Eocene about 40 million years ago, the earth's surface was about 3.5 °C warmer than now and sea level was about 75 m higher than now; The decline occurred about 20,000 years ago. While the global temperature has increased by 1.2 °C since the pre-industrial period, it is estimated that the sea level has risen by 0.24 m and will be in the range of 0.3-1.5 m by 2100, depending on fuel emissions [4].

It will take thousands of years for seawater to rise to a high temperature because warming seawater at an average depth of 3,600 m is a slow process. Therefore, even if the increase in atmospheric CO2 is expected to stop by 2050, sea levels will continue to rise. The only way we can stop sustained and long-term sea level rise is to reduce atmospheric carbon dioxide to levels close to pre-industrial levels. This requires more than achieving carbon neutrality; this means that we not only have to balance carbon emissions with removals (such as carbon in ecosystems), but also remove more of already exhausted gas. However, carbon neutrality will be the first big step for humanity to prevent the rapid destruction of the environment.

The international community working together to achieve carbon neutrality will be the largest global agreement in human history. This is a good sign for global improvement, but it can also be seen as an attempt to protect oneself from one's own injuries. Since the Climate Change Committee's first assessment report in 1992, which showed the consensus of scientists from many countries, a great deal of time has been spent on recognizing a big problem like Global warming. Now the world need to take actions not only about limiting

carbon emissions, but also about finding solutions for the energy requirements. In a short period of time since 1850, the world has consumed nearly half of the fossil fuels[5] that took hundreds of millions of years to produce throughout world history.

Obviously, current fossil energy consumption is not sustainable. Therefore, we urgently need to find a solution to the energy problem. Carbon neutrality will be the ultimate solution to this problem. To achieve carbon neutrality, first; replace fossil fuels with carbon-free renewable energy, hydroelectric and nuclear energy; second; capture, removal, storage and use of carbon dioxide; third; recycling of waste materials; fourth; reduce energy consumption and increase energy efficiency. At the same time, we must strengthen land and ocean carbon sinks.

Renewable energy sources such as wind energy, solar energy, biomass energy, geothermal energy, tidal energy, hydrogen energy have great potential and can be used as our energy source. As technology advances, these energy products are expected to become as cheap. If the international community agrees that global warming is a serious problem and uses a high carbon price target as an assessment of the damage carbon emissions do to the earth's environment, it will provide incentives for the development of renewable energy, due to this economic momentum, the world will move towards a carbon-free future. Soil carbon remediation will initially be a low-cost option for decarburization, because planting trees and forest management can remove less carbon than clean up carbon monoxide emissions. Therefore, maximizing soil drainage should be an important part of our agenda to achieve a carbon neutral future, especially while the potential still exists.

However, absorption in soil is limited, and the biomass and carbon retained in the soil is not stable and safe to return to the atmosphere, so it is necessary to consider ghost soil water as an option to buy time to limit carbon emissions. There is also great potential for using land to "bread" carbon from the atmosphere, that is, to grow biomass and use it as energy to replace fossil fuels. Bio energy can play an ongoing and important role in this journey to become carbon neutral.

Net zero cannot be achieved without commercial carbon capture, removal and storage, as the world will continue to rely on fossil fuels to some extent in the future. When carbon markets are created with high carbon prices, the development of technologies and infrastructure that use these markets to reduce emissions can be encouraged and ultimately play an important role in achieving net zero.Net zero will accelerate global warming and solve the energy problem, while also benefiting air quality, shelter and infrastructure. Therefore, it can be considered an economic revolution as an important symbol in human development.Net zero may be the fifth revolution after the previous four revolutions. The earlier revolutions have improved our standard of living, but at the expense of many natural resources, many of which are non-renewable. Central to the problem of man's relationship with nature is our consumption of fossil fuels, which contributes not only to global warming but also to environmental degradation. The Fifth Industrial Revolution can solve these important problems, so Net zero will be the first step towards a future where people live in harmony with nature.

II. SMART TECHNOLOGIES IN HVACR SYSTEMS

As smart technology continues to grow and expand in the HVACR industry, systems are becoming more efficient. Smart HVACR uses sensors that integrate with building automation systems. These sensors then collect information about the state of the entire building. It is important that HVACR equipment does not increase emissions. This is one of the areas where skills matter. It is clear to many scientists that heat is causing more emissions and that European temperature records are expected to be broken more often, so facilities need to be equipped to handle the no-nos. As wireless systems are becoming more common now, the temperature can be easily controlled using a smart system, with this new technology, operators can also benefit from remote monitoring and control, reducing the need to travel to other places to support the environment. To complement the smart systems, devices such as smart thermostats can be installed to make the HVACR run more efficiently.

1 **Reduce Unnecessary Ventilation:** As the global temperature rises, the use of air conditioning increases, resulting in increased energy consumption. Many unnecessary emissions are created due to improper ventilation, resulting in heat loss and a waste of electricity.

Re circulated air has always been a low-cost way to save energy and keep emissions low, but we must be aware of the risks associated with re circulated air. The use of heat recovery ventilation not only eliminates the risk of contamination, but also improves energy efficiency, which eliminates the risk of contamination to some extent.

2 **Energy Efficiency of Air Conditioning System:** As temperatures rise each year, the world's energy demand for air conditioning is expected to triple by 2050.The efficiency of new air conditioning systems will play significant role to cater the increased demand. Another problem that the manufacturers have to solve is the difference in prices of air conditioning units in different countries; products sold in Japan and the EU generally outperform those sold in China and the US.

3 **Modular HVACR:** Modular HVACR has also become more popular in recent years. Modular HVACR is responsible for the heating, cooling and distribution of air throughout the building and the main reasons for its growth are various levels of higher energy efficiency, quality of performance, convenience and ease of installation and maintenance. Modular HVACR is especially good for offices and allows the system to run without disturbing workers, which is often done by placing it on the roof. Commercial offices are larger than residential properties and often have different needs. It can meet the various needs of business.

4 **Reducing Carbon Footprint:** As we work to reduce the carbon footprint, this trend is likely to continue and is an important area for reducing emissions produced by conventional HVACR.As the world continues to be a more environmentally friendly than ever before, it is important for companies, governments and citizens to consider ways to reduce carbon monoxide. Smart devices are clearly at the forefront of this, eliminating many unnecessary trips by solving problems remotely.

III. CARBON NEUTRAL CERTIFICATION

Carbon neutral refers to individuals, organizations, businesses, etc. by measuring carbon emissions and preventing the same emissions occurring elsewhere, or by buying enough carbon credits. For example, a company may plant trees in many places to conserve the electricity it uses. Carbon neutral aims to achieve zero carbon footprint. All net zero seeking organizations and individuals must first reduce and/or avoid carbon emissions. Carbon Neutral Certification gives organizations the confidence to demonstrate their mitigation efforts. It helps to communicate the capabilities of the products, increase sales, build a good brand name and most importantly reduce costs. The National Carbon Management Association (NCMA) issues carbon neutral certification to the organizations. With this recognition, the NCMA acknowledges that the organization for the actions on climate change issues and is committed to reducing emissions.

NCMA assists and supports Indian entities to become "Carbon Neutral Companies" as per the Carbon Offset Standard. Carbon offset systems are recognized and operating in 187 countries, including India. Since 70% of people have "self-awareness" about global warming and businesses copy or buy products and services from carbon-neutral companies for climate protection, they want to adopt a carbon-neutral (eco-friendly) lifestyle.

1 BENEFITS OF CERTIFICATION

- Companies can now be considered "Carbon Neutral Companies" by the National Institute of Carbon Management.
- Improve business image and public relations.
- Earn income and increase the market share by differentiating the products and services by recognition.
- Tax benefits under 80G
- Motivation to those organizations who haven’t started actions for carbon neutrality.

IV. CONCLUSION

Global warming leads to extreme climate changes which could threaten the species' existence on earth. The only way to stop global warming is to reduce atmospheric carbon dioxide to levels close to pre-industrial levels. This requires more than achieving net zero,however, net zero is the first big step for humanity to prevent the rapid destruction of the environment. To achieve net zero, first replace fossil fuels with carbon-free renewable energy, hydroelectric and nuclear energy; two, capture, removal, storage and use of carbon dioxide; three, recycling of waste materials; four, Reduce energy consumption and increase energy efficiency. The certification by NMCA is going to be very useful for the business growth without any harm to the environment.

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