

# Climate Diplomacy to Attain Global Eco-Neutrality

Ashutosh Tiwari\* 

Climate neutrality has turned out to be crucial in policy and state relationships. In lines of green actions, many capitals have declared aspiring climate neutrality goals to establish their net-zero infrastructures and inhabitants. The increasing emission of greenhouse gases paves the way to enhance the earth temperature, which are resulting to endangering lives mainly due to dry up of water reserves. Thus, abrupt climate change is adversely affecting the world-wide ecosystems and biodiversity. The common effects of climate change are causing through droughts, forest fires, cloudbursts, cyclones, earthquakes, heavy rains, snow, cold and hot waves etc. From north to south America and from east to west Asia are experiencing frequently extreme weather events. This interns to fast moving of the global warming. The impact of extreme weather conditions needs to urgently normalise with adopting ecological practices, green scientific protocols, time bound government strategies and comprehensive climate actions.

## Climate neutrality goals

United Nations' Sustainable Development Goals (SDGs) and European Green Deal (EGD) are focused to achieve the climate goals with a committed timeline [1-3]. The Paris Agreement builds a bond between today's guidelines and

climate neutrality for setting long-term goals to lead all nations towards mitigating greenhouse gases and global warmth [2]. In **Fig. 1**, the summary of the European Green Deal can be outlined, which mainly focused on the Europe's economy transition via mobilising research and innovation to a sustainable future.



**Fig. 1.** European Green Deal to highlight the EU's climate ambition [3].

Institute of Advanced Materials, IAAM, Gammalkilsvägen 18, Ulrika 590 53, Sweden

\*Corresponding author: E-mail: [director@iaam.se](mailto:director@iaam.se), Tel.: (+46) 1313-2424; DOI: [10.5185/amlett.2022.031697](https://doi.org/10.5185/amlett.2022.031697)

## Political driven motive

Parliament of the European Union is aimed to opt on power plants and factories to utilize trees as low-carbon renewable energy [4]. The written advice of almost 800 scientists against this policy is one the major effort to take climate change as the serious immediate concern for global society [5]. European energy requirement is majorly mitigated with forest wood and based bioenergy for electricity and heat [5]. The Paris agreement defines the financial mechanism under its article 2.1(c) including national contribution for support and action to transform the global economy, however, consent among countries is one of the major concerns [6]. This agreement advocates equity, differentiation, initiatives, and adaptation of the ambition to achieve overall carbon neutrality by 2050. In general, the Paris agreement, and COP 26 are emphasised the climate responsibility and actions for emission control of greenhouse gases and earth temperature. Insight of international political relation could lead the essential requirements for execution of uniform climate policies [7]. Strategically, state green diplomacy will be playing a key role in attaining eco-neutrality and international organizations can make easier to achieve the climate goals through connecting links between the stakeholders.

## Climate diplomacy: A step ahead to restoring global biodiversity

The climate crisis is a universal question affecting distinct regions of global and overseas policy. The climate diplomacy comprises all political commitment to restoring global biodiversity. The climate diplomacy can be understood by the following factors:

- Universal climate policy, especially to the execution of the Paris Agreement
- Focusing consequences of climate change on harmony and safety
- Hastening national activity and boosting global spirit

- Increasing worldwide climate collaboration though promotion and outreach

Energy and climate are much related topics for the planning of green strategies. Replacement of energy resources such as coal with wind energy or fossil fuels with hydrogen energy resources is the best action plan for the green transition. Replacing polluting resources and methods including greenhouse gas and temperature production through clean and low-cost resources strives to achieve a climate neutral future. The transformation policies must emphasize equity, sustainable development, a clean environment, and socio-economic aspects. Clean, renewable, and net-zero waste energy production is required in line with global sustainability [8]. The aims and actions for research to business can be out lined under their contribution to global circular economy as described in **Fig. 2**.

Progressive replacement of fossil fuels by reorganization of industry and transformation of energy geopolitics is the best regional as well as global approach under the current scenario [9]. Adaptation of emerging green energy technologies and subsidies through policies make it a feasible for climate neutral agenda. Promoting economically detrimental policies for fossil fuel utilized systems such as automobiles, aviation, and transport, and establishing business models for green energy systems will configure a decarbonized environment. The pace of innovation through recognition of suitable technologies that support clean energy for humans is a must. An innovative ecosystem for sustainable energy targets will shape discovery invention towards commercialization to deployment, for climate neutrality [10]. Therefore, government-supported timelines for R&D and industrial production will ensure the earlier success of sustainability in the comprehensive arena. International Energy Agency suggests innovative energy technologies development for emissions reductions that meet SDGs levels [11-13]. Decisive renewable energy developments for climate change will certify positive social and environmental outcomes [12].



Fig. 2. The aims and actions from research to business in the direction of circular economy. Reproduced with permission from [13].

## Hydrogen as green energy transition

The universal presence of hydrogen in water, oil, and natural gases are established its utility as a clean and copious energy choice [13]. The net-zero objectives of world leading agencies such as European Union and the United Nations might be attained with clean hydrogen energy, which will ensure global sustainability [15]. Innovations in energy research facilitate cost-effective and the best electric charging in terms of durability and rapidness. The hydrogen vehicles are eco-friendly and yield only water in their exhaust [16]. Additionally, the finest public infrastructure for hydrogen vehicles revolutionaries the transport system towards a climate neutral moving. Various developed nations are establishing hydrogen fuelling stations to pace the climate neutral society [16,17].

Transition in several phases and sectors are turned priority for the green segments. A clean transition is evident by being carbon free and sustainable circular socio-economic evaluation. The strategy advocates energy utilization which ensures its renewability, additionally, it will facilitate the circular eco-business and trades [12].

Following effective agenda is useful for the green transition:

- Carbon free transportation
- Clean electricity
- Green energy
- Lower emissions industry
- Green chemistry utilisation
- Enhancement of process
- New innovative methods
- Digitalization of system
- New renewable resources
- Adopt green and circular materials

Thus, carbon neutrality goal is being promoted and there is continuing development to modernize national climate and energy policies [18]. There are eight actions which can be highlighted for a nation to achieve the carbon neutrality as proposed by the UN SDGs and EGD. The actions can be summarized as Fig. 3.

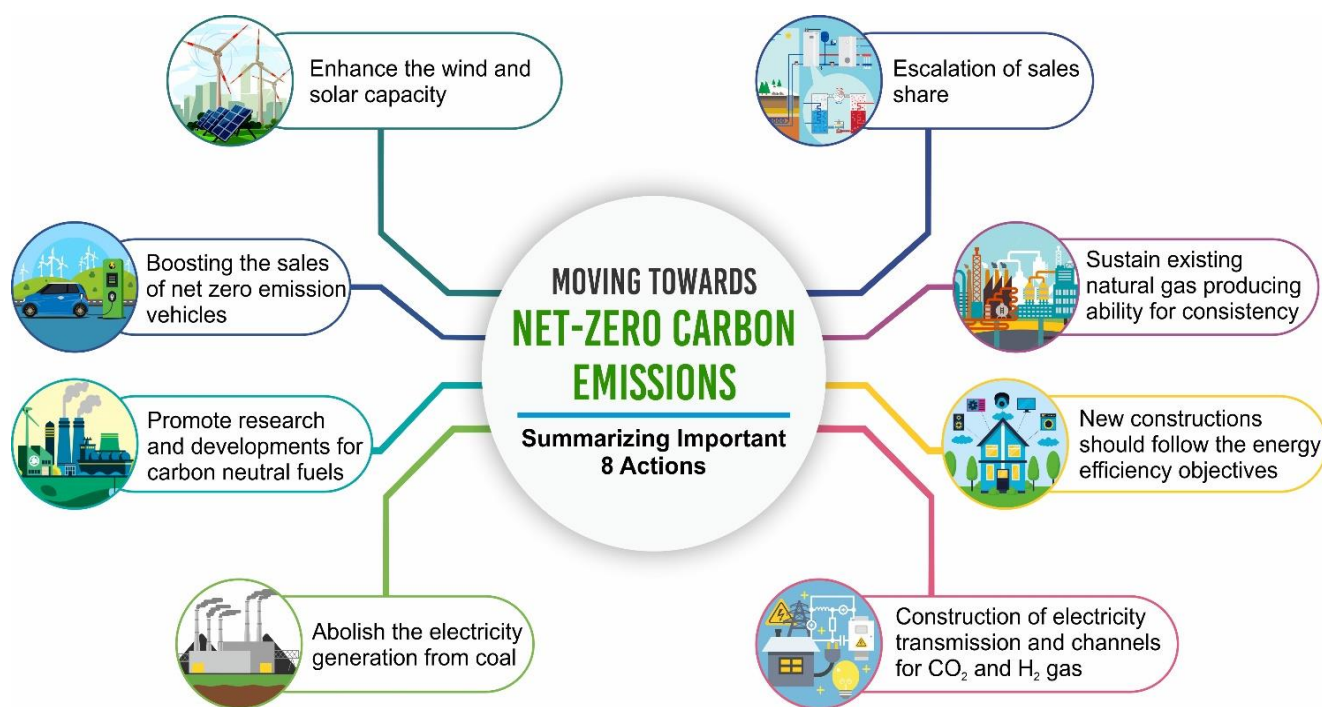


Fig. 3. Undertaking climate actions for net-zero carbon emissions by 2050 [18].

United Nations have summarized achieving a net-zero world as one of the biggest challenges civilizations to be encountered. It demands a full revolution of how we generate, spend, and move about. Thus, net-zero is the ultimate choice left over for us. The energy sector is reported to be the supplier of about three-quarters of greenhouse gas discharges these days and maintains the key

to deflecting the most terrible impacts of climate change. Substituting fossil fuels with renewable energy sources like wind or solar would significantly lower the carbon emissions. To transform into a net-zero world, we have to go through several stages. Five important stages can be determined to achieve net-zero by 2030 as described in Fig. 4.



## IMPORTANT STAGES

### AVOID

Avoid the present and upcoming carbon emissions

### REDUCE

Reduce the emission of greenhouse gases

### INVEST

Invest in eliminating the carbon from all chains

### INNOVATE

Innovate through cooperation in green economy, clean and sustainable technologies

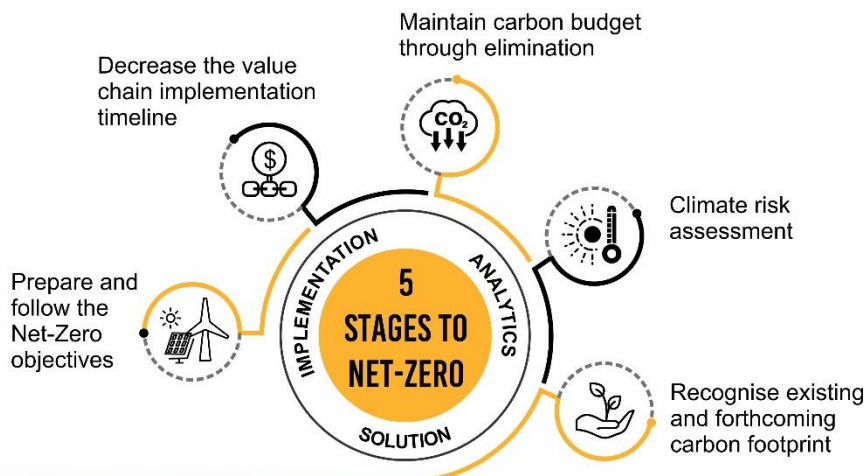


Fig. 4. The inclusive five stages to achieve the net-zero goals [19].

## Ambitious actions and prospects

The net-zero commitments are adopted through policies and adhered to the developing countries in a reasonable schedule [19]. The significant advancements are achieved through active participations of states aiming for ambitious climate actions and adopt net-zero technologies to different sectors [20]. Climate sustainability requires selective targets to achieve neutrality. Likewise, countries and regions for example, India, USA, Australia, and Europe are tackled it by adopting green transition strategies such as renewable energy targets that focus on energy sources [12]. Although the emergence of COVID-19 is slowed down their goals, but it lets us an urgent choice towards sustainable new technologies [21,22]. The international organisations make correct policies, frame models, motivate structure, generate information, provide consultancy, and transform the resources with strategies.

Science communication, training, education, meeting, consortium, and topical symposia explore the world R&D links initiatives, increases awareness about subject-specific innovations, and motivates the academic world, industry via research to business and policy makers to identify the priority of regional developments. The International Association of Advanced Materials (IAAM) is dedicated its decades for advancing materials to green and sustainable world [23] and promotes the translational research in health, energy and climate through its R&D activities, research to business initiatives, topical consortia, and educate youth for future green leaderships via pre-PhD and post-PhD programs [24,25]. Inspired by certain national initiatives and to achieve the net-zero world, Institute of Advanced Materials proposes to form a global net-zero and waste utility alliance with its certain key objectives as briefed in Fig. 5. We hope that this will become a landmark for our future green transition.



Fig. 5. The global net-zero and waste utility alliance: A proposal for the hand-on-hand eco-future of world [20].

Global ecological and climate diplomacy, joint ecological collaboration, as well as actions for eco-neutrality can stimulate dialogue, thereby promoting local green strength. To make this straight, we should align R&D, technology, business, and climate action with wider socioecological purposes. Thus, the constricted carbon-offset model is focused on the climate policy-based ecosystems that are sustainable and wide green range. Finally, understanding regional energy crises and available resources for example, biomass, wind, sun etc. is the most important part for green energy transition. Fully conversion towards net-zero or neutrality across the world is beyond boundary in coming decades, however adopting towards net-zero direction through partial efforts is ultimate reality. Continuous efforts and translational innovation will ensure the faster green transition, although it can pace up more with the government policy, education, research, industrial infrastructure, trade policy and long-term agenda of scientific associations.

#### References

1. Tiwari, A.; Advancing Materials towards Climate Neutrality by 2050. *Advanced Materials Letters*, **2021**, *12*(8), 1-3. DOI: 10.5185/amlett.2021.081650
2. Bjørn, A.; Lloyd, S.M.; Brander, M.; et al. Renewable energy certificates allow companies to overstate their emission reductions. *Nat. Clim. Chang.*, **2022**, *12*, 508-509.
3. "The European Green Deal", viewed 30 June 2022 <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52019DC0640&from=ET>
4. Beddington, J.; et al. Letter from scientists to the EU parliament regarding forest biomass. Viewed 30 June 2022 <http://empowerplants.files.wordpress.com/2018/01/scientist-letter-on-eu-forest-biomass-796-signatories-as-of-january-16-2018.pdf>
5. Searchinger, T.D.; Beringer, T.; Holtmark, B.; et al. Europe's renewable energy directive poised to harm global forests. *Nat Commun.*, **2018**, *9*, 3741. <https://doi.org/10.1038/s41467-018-06175-4>
6. Zamarioli, L.H.; Pauw, P.; König, M.; et al. The climate consistency goal and the transformation of global finance. *Nat. Clim. Chang.*, **2021**, *11*, 578-583. <https://doi.org/10.1038/s41558-021-01083-w>
7. Bayes, R.; et al. When and How Different Motives Can Drive Motivated Political Reasoning. First published: 24 April 2020, *41*(5), 1031-1052. <https://doi.org/10.1111/pops.12663>
8. Tiwari, A.; Transforming Energy Technologies for Climate Neutrality Goals. *Advanced Materials Letters*, **2021**, *12*(9). DOI: 10.5185/amlett.2021.091658
9. Mercure, J.F.; Salas, P.; Vercoulen, P.; et al. Reframing incentives for climate policy action. *Nat Energy*, **2021**, *6*, 1133-1143.
10. Energy innovation needs better targets. *Nat Energy*, **2020**, *5*, 731. <https://doi.org/10.1038/s41560-020-00718-0>
11. Energy Technology Perspectives 2020 (IEA, 2020); <https://www.iea.org/reports/energy-technology-perspectives-2020>
12. Spillias, S.; Kareiva, P.; Ruckelshaus, M.; et al. Renewable energy targets may undermine their sustainability. *Nat. Clim. Chang.*, **2020**, *10*, 974-976.
13. Tiwari, A.; Priority of Materials Research for Reaching Climate Neutrality Goals, *Advanced Materials Letters*, **2022**, *13*(1), 202201163.
14. "Hydrogen as a clean and flexible energy carrier", viewed 09 May 2022, <https://www.energy.gov/eere/articles/hydrogen-clean-flexible-energy-carrier>
15. Tiwari, A.; The Emerging Global Trends in Hydrogen Energy Research for Achieving the Net Zero Goals. *Advanced Materials Letters*, **2021**, *12*(10), 1-5. DOI: 10.5185/aml.2021.15697
16. Hydrogen on the rise. *Nat Energy*, **2016**, *1*, 16127. <https://doi.org/10.1038/nenergy.2016.127>
17. Germany: H2 MOBILITY targets 400 hydrogen fueling stations by 2023. Hydrogen Mobility Europe (5 May 2016) <http://go.nature.com/2alhFRa>
18. "Getting to Net Zero – and Even Net Negative – is Surprisingly Feasible, and Affordable", viewed 30 June 2022, <https://newscenter.lbl.gov/2021/01/27/getting-to-net-zero-and-even-net-negative-is-surprisingly-feasible-and-affordable/>
19. "Net Zero", viewed 30 June 2022, <https://www.anthesisgroup.com/net-zero/>
20. "Targeting Net Zero", viewed 30 June 2022, <<https://www.cisl.cam.ac.uk/system/files/documents/net-zero-a-strategic-framework-for-business-action.pdf>>.
21. Mishra A.; et al., Sustainable chemical preventive models in COVID-19: Understanding, innovation, adaptations, and impact, *Journal of Indian Chemical Society*, **2021**, *98*, 100164. <https://doi.org/10.1016/j.jics.2021.100164>
22. Mishra, A., et al., Current Scenario of Coronavirus Pandemic, *Advanced Materials Letters*, **2020**, *11*, 20041494. DOI: 10.5185/amlett.2020.041494.
23. "IAAM focused on betterment of society", viewed 30 June 2022, <https://www.iaamonline.org/about-iaam>
24. "IAAM focused on consortium", viewed 30 June 2022, <https://www.iaamonline.org/r-d-networking>
25. "IAAM focused on knowledge", viewed 30 June 2022, <https://iaam.se/projects-consortiums>