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ADDRESSING ENVIRONMENTAL CHALLENGES THROUGH FOSSIL FUEL ENERGY SUBSIDY REFORMS: A LEGAL EXAMINATION

Empire Hechime Nyekwere, PhD*, Uche Nnawulezi, PhD**, Omoleke Muslim, PhD***, Marry-Ann O. Ajayi, PhD**** and Ngozi Chinwa Ole, PhD*****

ABSTRACT

Environmental challenges, which are evident in every part of the world, are happening more rapidly than ever and currently escalating. The threat, posed by our degrading environment, is principally triggered by our sustained use and production of fossil fuel energy. Yet, the fossil fuel energy industry continues to receive massive support in the form of subsidies every year which is worsening our environmental problems. Although, fossil fuel energy is widely considered to be environmentally harmful, recent estimates of global fossil fuel energy subsidies stand at hundreds of billions of dollars annually. The aim of this article is to address environmental challenges by redirecting societal choice towards environmentally beneficial energy resources through fossil fuel energy subsidies reforms. The article adopted the doctrinal research methodology and generated its data through international treaties, policy documents, textbooks, journal articles, manuscripts, monographs, and internet websites. The article finds that fossil fuel energy subsidies harm and creates environmental challenges including causing over-extraction of fossil fuel energy resources, causing local air pollution, providing significant market barriers to investment in renewable energy, and escalating climate change through increased emissions of greenhouse gases (GHG). The article also finds that fossil fuel energy subsidies reforms benefits the environment by creating significant fossil fuel energy resource efficiency gains, generating revenue to finance investment in renewable energy, mitigating climate change through reduction in GHG emissions, and reducing local air pollution. The article concludes with a call on the international community to start addressing environmental challenges through fossil fuel energy subsidies reforms.

Keywords: Environmental challenges, fossil fuel, energy subsidy, subsidy reforms, energy efficiency.

1. INTRODUCTION

The case against fossil fuel energy subsidies is getting intense.[1] The World Bank defines fossil fuel subsidies as a deliberate policy action by the government that specifically targets fossil fuel, or electricity or heat generated from fossil fuel, and has one or more of the following effects: reducing the net cost of energy purchased; reducing the cost of production or delivery of fuels, electricity or heat; and increasing revenues retained by resource owners, or suppliers of fuel, electricity or heat.[2] In other words, fossil fuel energy subsidies consist of subsidies that encourage exploration, production, or use of fossil fuel energy.[3] Fossil fuel energy subsidies comprise both consumer subsidies and producer subsidies. Consumer subsidies are mostly designed to keep fossil fuel energy prices low, so as to stimulate certain sectors of the economy or alleviate poverty, by increasing the access of the populace to energy. Consumer subsidies generally take the form of price controls and can involve large price gaps. While producer subsidies principally keep costs of fossil fuel energy production lower or increase revenues, and their outcome is

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1 Harro van Asselt, 'The SDGs and fossil fuel subsidy reform' (2023) 23 Int Environ Agreements 191, 192; Couharde C and Mouhoud S, 'Fossil Fuel Subsidies, Income Inequality, and Poverty: Evidence from Developing Countries' (2020) 34(5) Journal of Economic Surveys 981-1006.

2 Kojima M and Koplow D, Fossil Fuel Subsidies Approaches and Valuation (Energy and Extractives Global Practice Group 2015).

3 Kasturi Das and Kaushik Ranjan Bandyopadhyay, Climate Change and Clean Energy in the 2030 Agenda: What Role for the Trade System? (ICTSD 2016) 2.

to sustain marginal producers in the business. Producer subsidies can also be inspired by the need to lessen import dependency. Producer subsidies are more widespread in developed countries whereas producer subsidies are rampant in developing and oil-producing countries.[4]

The relationship between fossil fuel energy subsidies and the environment has strong policy implications for government with regards to ensuring environmental sustainability globally. Fossil fuel energy subsidies represent a unique problem that unites economists and environmentalists. In the past few years, the reform of fossil fuel energy subsidies to improve the environment had been high on the international political agenda.[5]

Notwithstanding current calls to phase out inefficient fossil fuel energy subsidies at the international level, the costs of subsidies directed at fossil fuel energy keep escalating.[6] This is largely because many governments of developed and developing countries around the world provide subsidies for energy, either directly or indirectly, to producers, consumers, or both.[7] According to the International Institute for Sustainable Development (IISD) and the Organization for Economic Co-operation and Development (OECD), total global fossil fuel energy subsidies-for both production and consumption-were estimated by the Fossil Fuel Subsidy Tracker to be above $525 billion in 2020.[8] New OECD and International Energy Agency data indicate that the fiscal cost of global aid for fossil fuel energy nearly doubled

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4 Opeyemi Akinyemi and others, 'Fuel Subsidy Reform and Environmental Quality in Nigeria' (IISD and OECD 2015) 5(2) International Journal of Energy Economics and Policy 540-549; See Ieva Baršauskaitė, Background Note on Fossil Fuel Subsidy Reform (IISD 2022) 3; UNEP, Measuring fossil fuel subsidies in the context of the sustainable development goals (UNEP 2019).

5 Opeyemi Akinyemi and others ibid.

6 See Collin Zhuawu and Kartikeya Garg, 'Assessing the Impact of Fossil Fuel Subsidy Reforms in Commonwealth Developing Countries' Commonwealth Trade Hot Topics Series, Issue 189 (Commonwealth Secretariat 2023) 2.

7 Robert Bacon, Eduardo Ley and Masami Kojima, Subsidies in the Energy Sector: An Overview, Background Paper for the World Bank Group Energy Sector Strategy (World Bank 2010) 16; Simon Black and others, 'IMF Fossil Fuel Subsidies Data: 2023 Update' IMF Working Paper WP/23/169 (IMF 2023).

8 IISD and OECD, Fossil Fuel Subsidy Tracker, Global Estimates by Fuel Type (IISD and OECD 2021); Gençsü I and others, Nigeria's Energy Transition: Reforming Fossil Fuel Subsidies and other Financing Opportunities (London: Oversea Development Institute 2022) 16; See Asmelash Henok Birhanu, Phasing out Fossil Fuel Subsidies in the G20: Progress, Challenges, and Ways Forward (Geneva: ICTSD 2017) vii.

to USD 1 481.3 billion in 2022, up from USD 769.5 billion in 2021, as governments introduced strategies to offset extremely high energy costs, triggered partly by the Russia-Ukraine armed conflict.[9]

According to the World Economic Forum (WEF), fossil fuel energy subsidies reached a record high US$1 trillion in 2022,[10] while the International Monetary Fund (IMF) stated that the direct costs of energy subsidies rose to a record US$1.3 trillion in 2022,[11] largely due to higher fuel prices and an increase in subsidy measures, as no less than 65 countries initiated or increased fossil fuel energy subsidies in the previous two years.[12] For instance, quite a lot of European countries because of the energy crisis with increasing prices of natural gas aided consumer prices for fossil fuel energy in 2022 for the first time: Germany ($49 billion), France ($42 billion) and Italy ($15 billion).[13] Another report stated that global total fossil fuel energy subsidies amounted to $7 trillion or 7.1 percent of global GDP in 2022, indicating a 2 trillion rise since 2020 caused by government support from escalating energy prices.[14]

2. THE ADVERSE IMPACTS OF FOSSIL FUEL ENERGY SUBSIDIES ON THE ENVIRONMENT

Fossil fuel energy subsidies are categorized as an environmentally harmful subsidy that damages and reduces the quality of the environment.[15] This section highlights and discusses the adverse environmental impacts of fossil fuel energy subsidies.

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9 OECD Inventory of Support Measures for Fossil Fuels 2023 (OECD 2023) 3.

10 WEF, Fossil Fuel Consumption Subsidies Soared to Record Heights in 2022 (World Economic Forum 2023).

11 WBG, Building Public Support for Energy Subsidy Reforms: What Will it Take? (World Bank Group 2023).

12 ibid.

13 Seema Prasad, Governments worldwide spent $1.7 trillion of public money on fossil fuels, a new report finds, (DownToEarth, 23 November 2023) <https://www.downtoearth.org.in/energy/governments-worldwide-spent-1-7-trillion-of-public-money-on-fossil-fuels-a-new-report-finds-92966es> accessed 15th July 2024.

14 Fossil Fuel Subsidies, IMF <https://www.imf.org/en/Topics/climate-change/energy-subsidies> accessed 22 June 2024; Simon Black and others (n 7); Prasad ibid.

15 Opeyemi Akinyemi and others (n 4).

2.1. Fossil Fuel Energy Subsidies Reduces Incentives for Fossil Fuel Energy Efficiency by Encouraging Wasteful Fossil Fuel Energy Consumption and Over-Extraction of Fossil Fuel Energy Resources

Fossil fuel energy subsidies harm the environment by encouraging wasteful fossil fuel energy consumption, reduced incentives for fossil fuel energy efficiency, and over-extraction of fossil fuel energy resources.[16] Fossil fuel energy subsidies usually motivate higher amounts of consumption or production of fossil fuel energy products and services than would happen in their absence, aggravating the damaging impacts of fossil fuel energy use on the environment. Specifically, fossil fuel energy subsidies lead to the overuse and substantial increase of wasteful fossil fuel energy consumption and over (unsustainable) extraction of fossil fuel energy natural resources.[17] Fossil fuel energy subsidies reduces the prices for fossil fuels and do not provide any incentive for consumers to rationalize consumption. For example, in Saudi Arabia and Qatar, it is estimated that only 35 per cent of residents use energy-saving lamps. The environmental implications of this over-consumption are highly significant.[18]

Normally, subsidies on fossil fuel consumption reduce end-use prices which eventually boost higher use of energy and ultimately lower incentives for efficient fossil fuel energy use or conservation.[19] For instance, according to a 2007 report, fuel efficiency of private and public transport in the Middle East is remarkably low, with average fuel consumption per vehicle above double the average in countries without fuel subsidies. These large fuel subsidies for private and business transport remove incentives for efficiency.[20] Higher production and consumption of fossil fuel energy likewise entails higher inputs use with the results of escalating pollution and environmental degradation.[21]

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16 See Asmelash Henok Birhanu (n 8).

17 Low Carbon Green Growth Roadmap for Asia and the Pacific: Fact Sheet-Subsidy Reforms <https://www.unesca p.org/sites/default/files/58.%20FS-Subsidy-reforms.pdf> accessed 23 March 2024.

18 Souraya Zein, 'Subsidy Reform and Environmental Sustainability in the Arab Region' Economic and Social Commission for Western Asia (ESCWA) Working Paper (United Nations Beirut 2017) 14-15.

19 Ayadi Folorunso Sunday, 'Oil Subsidy, Economic Growth and Environmental Concerns in the BRICS Countries' (2022) 7(1) CJSMS 12; Zein ibid, 13.

20 Mohammed I Al Hammadi and others, Lessons Drawn from Reforms of Energy Subsidies (WEF 2013).

21 Sunday (n 19) 15.

A different way energy subsidies can adversely harm the environment is termed the 'lock-in effect'. This is as a result of subsidy encouraging old, environmentally harmful technologies that are not substituted with other more efficient and less environmentally harmful alternatives.[22] An illustration of this is that fossil fuel energy subsidies do not promote the procurement and use of energy efficient modern cars and vehicles.[23]

2.2. Fossil Fuel Energy Subsidies Escalates Local Air Pollution from Fossil Fuel Energy Consumption and Production

Fossil fuel energy subsidies escalate air pollution from fossil fuel energy consumption and production. Consumer subsidies that reduce the price paid for fossil fuel energy or the cost of using fossil fuel energy implies higher usage of fossil fuel energy, which can result to increased airborne discharges of harmful gases.[24] For example, artificially reducing petrol prices via fossil fuel energy subsidies promotes the use of fuel-inefficient vehicles and over use of private vehicles which results in greater release of carbon dioxide that contributes to higher global air pollution.[25] In many towns and cities of both developed and developing countries, the burning of oil, gas and coal in houses, factories, cars and power generation stations is a major cause of global air pollution with detrimental effects on human health. Concentrations of the key local air pollutants-particulates, sulphur dioxide (SO2) and nitrogen oxides (NOx) in the big cities of several developing countries are well above World Health Organization (WHO) maximum annual mean guideline levels for air quality, mainly for particulates and NOx.[26] Emissions of SO2 and NOx contribute to secondary pollutants, as well as ground-level ozone and particulate matter, whereas nitrogen compounds from NOx contribute to eutrophication in waterways and the wider ecosystem. Together they cause acid rain, which affects aquatic life and destroys crops and other vegetation.[27]

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22 ibid.

23 ibid.

24 UNEP and OECD/IEA, Reforming Energy Subsidies: An Explanatory Summary of the Uses and Challenges in Removing or Modifying Subsidies on Energy that Undermine the Pursuit of Sustainable Development (UNEP and OECD/IEA 2002) 15.

25 A A Yusuf and B P Resosudarmo, 'Mitigating Distributional Impact of Fuel Pricing Reform: The Indonesian Experience' (2008) 25(1) ASEAN Economic Bulletin 32-47.

26 UNEP and OECD/IEA (n 24) 6.

27 Hill S, 'Reforms for a Cleaner, Healthier Environment in China' OECD Economics Department Working Papers, No. 1045 (OECD Publishing 2013) 6-7.

In 2018, the global estimate of the economic effect of fossil fuel energy combustion-caused air pollution health impacts was approximately USD 2.9 trillion or 3.3% of global GDP in addition to causing the death of 4.5 million persons.[28] The WHO estimates attributes global annual 3 million premature deaths wholly to outdoor air pollution. Whereas the ascription of specific health effects to the sources of pollution is difficult, there is an obvious connection between air pollution from the burning of fossil fuel energy and health.[29] Additionally, household air pollution occasioned by the use of open fires and kerosene for cooking and lighting imposes substantial burden on women's health as they are responsible for cooking in several developing countries.[30] For example, in Bangladesh, households are largely dependent on kerosene for lighting purposes. Subsidizing kerosene escalates its usage, causes indoor air pollution, and can result to severe health and safety effects.[31] The WHO attributes 4.3 million annual deaths to solid fuel use for cooking.[32] Based on a 2021 study on global mortality and fossil fuel energy consumption, pollution from fossil fuel energy caused approximately 8.7 million annual deaths, almost one in five of every deaths worldwide.[33]

Further, the production of fossil fuel, such as crude oil, stimulates global air pollution through gas flaring. Gas flaring is the burning off of unwanted and unutilized associated gases that are extracted from the innards of the earth along with crude oil.[34] In petroleum-producing countries where there is inadequate infrastructure for natural gas utilization, flaring is engaged to get rid of the associated gas.[35] For example, a large amount of the natural gas

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28 Baršauskaitė (n 4) 8; Myllyvirta L, Quantifying the Economic Costs of Air Pollution from Fossil Fuels (Helsinki: Centre for Research on Energy and Clean Air 2020).

29 UNEP, Measuring Fossil Fuel Subsidies (n 4) 3; WHO, Ambient Air Pollution: A Global Assessment of Exposure and Burden of Disease (WHO 2016) 1-131.

30 UNEP, Measuring Fossil Fuel Subsidies ibid.

31 Zhuawu and Garg (n 6) 5; IISD, Gender and Fossil Fuel Subsidy Reform in Bangladesh: Findings and Recommendations (IISD 2020).

32 UNEP, Measuring Fossil Fuel Subsidies (n 4); WHO, Burning Opportunity: Clean Household Energy for Health, Sustainable Development, and Wellbeing of Women and Children (WHO 2016).

33 Zhuawu and Garg (n 6) 5; Vohra K and others, 'Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem' (2021) Environmental Research 195.

34 U E Nwaji, 'Gas Flaring: Legal and Environmental Perspective' (2009) 1(1) Nigerian Journal of Petroleum, Natural Recourses and Environmental Law 26.

35 Gas Flaring in Nigeria: An Overview, Justice in Nigeria Now [10 April 2010] <www.justiceinnigerianow.org. > accessed 19 May 2024; O A Anslem, 'Negative

extracted in oil wells in the Niger Delta region of Nigeria is instantly flared into the environment at an estimated amount of 70 million/m3/day contributing significantly to both local and global air pollution.[36] These flares contains high harmful chemical compounds like sulphur dioxide, methane, nitrogen oxide and other gases that pollutes the air with significant detrimental harmful impacts on human health and the environment. Thus, gas flaring presents one of the highest adverse problems connected with petroleum operations in oil producing countries and its effect has extensive implications on the environment through air pollution.[37]

2.3. Fossil Fuel Energy Subsidies Provide Significant Market Barriers to Investment in Renewable Energy

Fossil fuel energy subsidies provide substantial market barriers to investment in renewable energy, which cannot compete against artificially low prices for fossil fuel energy. The huge sums of money expended on fossil fuel energy subsidies swallow up capital that could have been invested in renewable energy.[38] The more governments spend on fossil fuel energy subsidies, the less budgetary and other government allocations that are possibly to be available for investment in low-carbon energy technologies such as renewable energy.[39] Therefore, subsidies targeted at fossil fuel energy hinder investment in renewable energy technologies. This has a tendency to lock in current environmental harmful technologies and limit investment in renewable energy such as wind and solar energy.[40] Thus, fossil fuel energy subsidies aid to sustain reliance on fossil fuel energy and weaken the competitiveness of renewable energy sources, which are bountiful in many countries around the world. By lowering the attractiveness of renewable energy technologies, fossil

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Effects of Gas Flaring: The Nigerian Experience' (2013) 1(1) Journal of Environment Pollution and Human Health 6-8.

36 See C C Tawari and J F N Abowei, 'Air Pollution in the Niger Delta Area of Nigeria' (2012) 1(2) International Journal of Fisheries and Aquatic Sciences 102.

37 Natural gas explained: Natural gas and the environment (US Energy Information Administration) <https://ww w.eia.gov/energyexplained/natural-gas/natural-gas-and-the-environment.php> accessed 23 March 2024.

38 Indra Overland, 'Subsidies for fossil fuels and climate change: A comparative perspective' (2010) 67(3) International Journal of Environmental Studies 303, 305; Maria van der Hoeven, Fossil fuel subsidy reform: recent trends, Keynote presentation at ECPA/CEM side event, Merida, Mexico – 26 May 2015 (OECD/IEA, 2015).

39 Temitope Tunbi Onifade, Fossil Fuel Subsidies in Canada: Governance Implications in the Net Zero Transition (Canada Climate Law Initiative 2022) 28.

40 Opeyemi Akinyemi and others (n 4).

fuel energy pose an impediment to the adoption of renewable energy in several countries[41] hence, inhibiting the transition to renewable and low-pollution source of energies.[42] At a global scale, today's fossil fuel energy subsidies dwarf support for renewable energy. The International Energy Agency has estimated that for every $1 of support for renewable energy in 2011, $6 was spent on fossil fuel energy subsidies. This maintains the status quo, with global fossil fuel energy investment in 2012 three times higher than investment in renewable energy.[43] Further, globally, it is estimated that US$ 548 billion was spent on state-funded fossil fuel energy consumption subsidies in 2013.[44]

2.4. Fossil Fuel Energy Subsidies Escalates Climate Change through Increased Emissions of Greenhouse Gases (GHG)

The energy sector accounts for 73% of global human emissions of GHG.[45] And, emissions of GHG, primarily caused by the burning of fossil fuel energy, are the main causes of climate change.[46] Therefore, fossil fuel energy subsidies worsen climate change by encouraging wasteful fossil fuel energy consumption and boosting emissions of GHG.[47] Subsidies that encourage the use of fossil fuel energy unavoidably damage the environment via higher emissions of GHG.[48] Currently, the world is experiencing an escalation of

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41 Whitley S and van der Burg L, Fossil Fuel Subsidy Reform in Sub-Saharan Africa: From Rhetoric to Reality (New Climate Economy, London and Washington DC 2015) 15; Sayeh A, Time for Change – Shifting Energy Spending in Africa (IMF 2014).

42 David Pearce, Environmentally Harmful Subsidies, Policy Issues and Challenges (OECD 2003) 14.

43 Shelagh Whitley, Time to Change the Game: Fossil Fuel Subsidies and Climate (Overseas Development Institute 2013) 2; IEA, World Energy Outlook 2012 (Paris: IEA 2012).

44 James Canonge, Social Protection and Climate Change: How has the Removal of Fuel Subsidies in Egypt Affected its People and the Climate? <https://www.ilo.org/media /433676/download> accessed 28 April 2024.

45 Zhuawu and Garg (n 6) 5-6; 'UNDP: More spent on fossil fuel subsidies than fighting poverty' (Africa Renewal 2021) <https://www.un.org/africarenewal/magazine/november-2021/undp-more-spent-fossil-fuel-subsidies-fighting-poverty > accessed 4 July 2024.

46 UNEP, Reforming Energy Subsidies: Opportunities to Contribute to the Climate Change Agenda (UNEP 2008) 4.

47 Varun Sivaram and Jennifer M Harris, 'Sustaining Fuel Subsidy Reform' Discussion Paper on Energy Security and Climate Change (Council on Foreign Relations 2016) 1.

48 UNEP and OECD/IEA (n 24) 9.

connected events in diverse regions of the world resulting to several destructive events happening as a result of climate change.[49] For instance, seven climate records were broken in 2016: Arctic ice melting; successive hottest months; India's hottest day ever; Alaska's highest temperature; uninterrupted and largest yearly rise in CO_2; in Australia's hottest Autumn ever; and utmost degree of damage in Australia's Great Barrier Reef.[50] The Intergovernmental Panel on Climate Change forecasts that except we reduce our emissions of GHG, especially, CO_2 from energy use, the increase in concentrations will result to a record rise in global temperatures of about 1.4–5.8°C by 2100. This is anticipated to result to rising sea levels and intense alterations in weather patterns.[51] A conservative estimation of approximately US$550 billion of International Energy Agency in key developing countries in 2008 was discovered to increase global emissions of GHG by 5-10 per cent.[52]

3. INTERNATIONAL LEGAL AND POLICY FRAMEWORKS ON FOSSIL FUEL ENERGY SUBSIDIES REFORMS

This section highlights and discusses the international legal and policy frameworks on fossil fuel energy subsidies reforms.

3.1. The Paris Agreement 2015

The Paris Agreement is a legally binding international treaty that commits all countries to lessen the emission of gases that contribute to global warming.[53] The principal objective of the Paris Agreement is to strengthen the global response to climate change threat by maintaining a global temperature rise this century lower than 2 degrees Celsius above pre-industrial levels and to pursue efforts to reduce the temperature rise even more to 1.5 degrees

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49 Darren McCauley and Raphael Heffron, 'Just transition: Integrating climate, energy and environmental justice' (2018) 119 Energy Policy 2.

50 Adam Vaughan, 'Seven Climate Records Set so Far in 2016' The Guardian (17 June 2016).

51 UNEP and OECD/IEA (n 24) 6.

52 Opeyemi Akinyemi and others (n 4).

53 The Paris Agreement <https://www.un.org/en/climatechange/paris-agreement> accessed 22 June 2024.

Celsius.[54] The Paris Agreement marks the beginning of a move to a net-zero emissions world.[55] The Paris Agreement emphasized the need for fossil fuel energy subsidies reforms and made fossil fuel energy subsidies the goal of its Article 2(1)(c), which has the objective of making finance flows consistent with a pathway towards low GHG emissions and climate-resilient development.[56]

3.2. Conference of Parties 26 (COP 26) Glasgow Climate Pact 2021, Conference of Parties 27 (COP27) Sharm el-Sheikh Implementation Plan 2022, and Conference of Parties 28 (COP28) First Global Stocktake 2023

The COP26 Glasgow Climate Pact 2021 is the outcome document of the 26th Conference of Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Glasgow, United Kingdom.[57] The COP27 Sharm el-Sheikh Implementation Plan 2022 is the outcome document of the 27th COP to the UNFCCC held in Sharm el-Sheikh, Egypt.[58] The COP28 First Global Stocktake 2023 is the outcome document of the 28th COP to the UNFCCC held in Dubai, United Arab Emirates.[59] At the UN Climate Change Conferences of 2021 (COP26), 2022 (COP27), and 2023 (COP28), countries emphasized the need for fossil fuel energy subsidies reforms and agreed to speed up efforts to phase-out inefficient fossil fuel energy subsidies. The outcome documents of COP26, COP27, and COP28, all calls on countries to expedite efforts to phasedown unabated coal power and phase-out of inefficient fossil fuel energy subsidies.[60]

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54 Key Aspects of the Paris Agreement <https://unfccc.int/most-requested/key-aspects-of-the-paris-agreement#:~:text=The%20Paris%20Agreement's%20central%20aim,further %20to%201.5%20degrees%20Celsius.> accessed 22 June 2024.

55 The Paris Agreement (n 53).

56 ibid, Article 2(1)(c).

57 Glasgow Climate Change Conference (UNFCCC COP26) <https://sdg.iisd.org/events/2020-un-climate-change-conference-unfccc-cop-26/> accessed 23 June 2024.

58 UN Conference on Climate Change: COP27 in Egypt <https://www.canada.ca/en/services/environment/weather/climatechange/canada-international-action/un-climate-change-conference/cop 27-summit.html> accessed 23 June 2024.

59 COP28 signals beginning of the end of the fossil fuel era <https://www.un.org/en/climatechange/cop28> accessed 23 June 2024.

60 Decision 1/CMA.3, Glasgow Climate Pact 2021, Part IV(36) <https://unfccc.int/sites/default/files/resource/c ma2021_10_add1_adv.pdf> accessed 23 June 2024; Decision -/CP.27, Sharmel-Sheikh Implementation Plan, Part IV(13) <https://unfccc.int/sites/default/files/resource/cop27_auv_2_cover%20decision.pdf> accessed 23 June 2024; Decision 1/CMA.5, Outcome of the First Global

3.3. The 2030 United Nations Agenda for Sustainable Development (UNASD)

The 2030 UNASD was adopted by world leaders on 25th September 2015 at a United Nations Summit. The 2030 UNASD which is based on 17 Sustainable Development Goals (SDGs)[61] is meant to tackle pressing global problems over the following 15 years.[62] SDG 12 which aims to ensure sustainable consumption and production patterns, in its Target 12.c, calls for fossil fuel energy subsidies reform and encourages countries to: "Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions … including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts ..."[63]

4. INTERNATIONAL COALITIONS ON FOSSIL FUEL ENERGY SUBSIDIES REFORMS

This section highlights and examines the three international coalitions-the Group of 20 (G20), the Asia-Pacific Economic Cooperation (APEC), and the Friends of Fossil Fuel Subsidy Reform, that are active in the area of fossil fuel energy subsidies reforms.

4.1. The Group of Twenty (G20) Countries Fossil Fuel Subsidy Initiative 2009

The G20 countries at their Pittsburgh Summit on 25 September 2009 committed themselves to a non-binding pledge to rationalize and phase out over the medium term inefficient fossil fuel energy subsidies, recognizing that these subsidies can stimulate wasteful consumption, hinder investment in clean energy sources, and destabilize efforts to fight the danger of climate change.[64] The G20 has reiterated their commitment at several successive

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Stocktake, Part II(A) (28)(b)(d)(h) <https://unfccc.int/sites/default/ files/resource/cma2023_L17E.pdf> accessed 23 June 2024.

61 On 1 January 2016, the world officially began implementation of the 2030 Agenda for Sustainable Development.

62 UN, Transforming our world: The 2030 Agenda for Sustainable Development (United Nations 2015).

63 ibid.

64 See Hoeven (n 38).

summits.[65] The Group of Twenty countries represent about three-quarters of total global energy supply and accounts for 81% of global annual GHG emissions. Resolute efforts by G20 countries to reform fossil fuel energy subsidies is vital to aid the global shift to a low-emissions energy system,[66] which will also help in addressing several fossil fuel energy subsidies-induced environmental problems.

4.2. The Asia-Pacific Economic Cooperation (APEC) Forum Fossil Fuel Subsidy Initiative 2009

The Leaders' Declaration from the APEC 17th Economic Leaders' Meeting, released on 15 November 2009, included a commitment to "rationalize and phase out over the medium term fossil fuel energy subsidies that stimulate wasteful consumption, while recognizing the value of providing the needy with necessary energy services."[67] The APEC recalled their 2009 commitment to "rationalize and phase out inefficient fossil fuel energy subsidies" both at the 2021 APEC Ministerial Meeting,[68] 2022 APEC Joint Ministerial Meeting,[69] and at the 2023 APEC Leaders' Golden Gate Declaration,[70] where the APEC pledged to continue their efforts in an accelerated manner to pursue a voluntary halt on inefficient fossil fuel energy subsidies.[71]

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65 OECD/IEA, Update on Recent Progress in Reform of Inefficient Fossil-Fuel Subsidies that Encourage Wasteful Consumption (OECD/IEA 2021) 7.

66 ibid.

67 APEC Speaks: how Asia-Pacific economies plan to address fossil-fuel subsidy reform, July 18, 2010 <https: //www.iisd.org/gsi/commentary/apec-speaks-how-asia-pacific-economies-plan-address-fossil-fuel-subsidy-reform> accessed 27 June 2024.

68 Paragraph 34, Decisions of the 2021 APEC Ministerial Meeting held in Wellington, New Zealand | 09 November 2021 <https://www.apec.org/meeting-papers/annual-ministerial-meetings/2021/2021-apec-ministerial-meeting> accessed 27 June 2024.

69 Paragraph 29 of the 2022 APEC Joint Ministerial Statement at their meeting held in Bangkok, Thailand, November 17-19, 2022 <https://www.apec.org/meeting-papers/annual-ministerial-meetings/2022/2022-apec-ministerialmeeting#:~:text=We%20will%20adopt%20more%20balanced,chains%20functioning%2C%20secure%20and%20resilient .> accessed 27 June 2024.

70 Paragraph 7 of the 2023 APEC Leaders' Golden Gate Declaration at their meeting held in San Francisco, California, on November 16-17, 2023 <https://www.whitehouse.gov/briefing-room/statements-releases/2023/11/17 /2023-apec-leaders-golden-gate-declaration/.> accessed 21 June 2024.

71 Paragraph 34, Decisions of the 2021 APEC Ministerial Meeting held in Wellington, New Zealand on 9 November 2021 <https://www.apec.org/meeting-papers/annual-ministerial-meetings/2021/2021-apec-ministerial-meeting> accessed 21 June 2024.

4.3. The Friends of Fossil Fuel Subsidy Reform (FFFSR) 2010

The FFFSR is an informal alliance of countries formed in June 2010 'to build political agreement on the value of fossil fuel energy subsidies reforms'. Current members of the coalition comprises ten countries comprising Costa Rica, Denmark, Ethiopia, Finland, Netherlands, New Zealand, Norway, Sweden, Switzerland, and Uruguay.[72] The FFFSR formation was directly motivated by the G20 and APEC leaders' 2009 commitment to phase out inefficient fossil fuel energy subsidies.[73] The FFFSR have as well promoted fossil fuel energy subsidies reforms within the UNFCCC system, promoting, among other things, the incorporation of reform plans by countries in their nationally determined contributions.[74] An additional major output of the fossil fuel energy subsidies reforms was the release of a Fossil Fuel Subsidy Reform Communiqué in April 2015, which requests all countries, companies, and civil society organizations to participate in promoting speeded effort to eradicate inefficient fossil fuel energy subsidies.[75] While it remains to be seen to what magnitude endorsement will result to significant stakeholder engagement, the document has expanded the scope of actors visibly devoted to the cause of fossil fuel energy subsidies reforms.[76]

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[72] What is the Friends of Fossil Fuel Subsidy Reform? <https://fffsr.org/> accessed 18 June 2024.

[73] Verkuijl C and van Asselt H, 'Fossil Fuel Subsidy Reform: Interactions between International Cooperative Institutions. The More, the Merrier?' in Zelli F and others (eds), Governing the Climate-Energy Nexus: Institutional Complexity and its Challenges to Effectiveness and Legitimacy (Cambridge University Press 2020) 131-155; Rive V, 'Fossil Fuel Subsidy Reform: A New Zealand Perspective on the International Law Framework' (2016) 27(1) New Zealand Universities Law Review 73-101.

[74] Verkuijl C and others, Learning from Leaders: Nordic and International Best Practice with Fossil Fuel Subsidy Reform (Copenhagen: Nordic Council of Ministers 2016).

[75] Verkuijl and van Asselt H. (n 73); Friends of Fossil Fuel Subsidy Reform Communique 2015 <https://www.regjeringen.no/globalassets/departementene/ud/vedlegg/utvikling/ fossile_fuel_pressrelease.pdf> accessed 18 June 2024.

[76] Verkuijl and van Asselt ibid.

5. THE ENVIRONMENTAL BENEFITS OF FOSSIL FUEL ENERGY SUBSIDIES REFORMS/REMOVAL

Fossil fuel energy subsidies reforms are beneficial to the environment in several ways. This section highlights and examines the environmental benefits of fossil fuel energy subsidies reforms.

5.1. Fossil Fuel Energy Subsidies Reforms Creates Significant Fossil Fuel Energy Resource Efficiency Gains

Fossil fuel energy subsidies reforms can help governments address environmental challenges by phasing out certain subsidies, especially the ones that lead to higher amounts of consumption or production of environmentally harmful fossil fuel energy products and services. The phase-out can sequentially increase fossil fuel energy resource efficiency in two ways. One, by redirecting societal behavior towards efficient use of fossil fuel energy resources, and secondly, by redirecting societal choice towards environmentally beneficial energy resources like renewable and other clean and efficient energies.[77] So long as fossil fuel energy prices remain artificially low, fossil fuel energy conservation will be unattractive to consumers and the consumption and production of fossil fuel energy will be unnecessarily high.[78] Removing fossil fuel energy subsidies, which lock countries into an over dependence on fossil fuel energy, that is environmentally harmful, for extended periods of time, would significantly minimize the consumption and production of fossil fuel energy and would create additional incentives for investments in energy efficiency.[79]

5.2. Fossil Fuel Energy Subsidies Reforms Generates Revenue to Finance Investment in Renewable Energy

Global unilateral removals of fossil fuel energy subsidies bring real income gains that can be channeled to investment in renewable energy,[80] which is environmentally beneficial. The prospective of carbon emission decrease via robust renewable energy subsidy policies are projected to be 3.4-3.5 Gt by the year 2035 compared with the average emission level in 2009, producing

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77 See Low Carbon Green Growth Roadmap (n 17).

78 See Overland (n 38) 304; OECD, Integrating Climate Change Adaptation into Development Co-operation, Policy Guidance (Paris, France: OECD 2009).

79 See Low Carbon Green Growth Roadmap (n 17).

80 See Helen Mountford, The Climate Change Challenge and Fossil Fuel Subsidies Reform (OECD, 2009-10) 14.

fossil fuel energy import savings of US$350 billion globally-[81] this fossil fuel energy import savings can be channeled to renewable energy investment. Thus, removing fossil fuel energy subsidies, which are environmentally harmful, can possibly create significant budgetary room for investments on renewable energy.[82] Eliminating fossil fuel energy subsidies will play a key role in national efforts to realize an enduring transition to a truly sustainable energy system such as renewable energy that is safe and clean for the environment.[83]

5.3. Fossil Fuel Energy Subsidies Reforms Mitigates Climate Change through Reduction in Greenhouse Gas (GHG) Emissions

Fossil fuel energy subsidies reforms can facilitate climate change mitigation through GHG emissions reductions. Several studies suggest that the removal of fossil fuel energy subsidies would result to significant decreases in GHG emissions.[84] It is estimated that the removal of both consumer and producer fossil fuel energy subsidies would result to a global reduction in carbon emissions of about a quarter of the joint emission reductions presently proposed by countries as part of the Paris Agreement (between 1 and 4 per cent globally by 2030).[85] Using 2015's global emissions and pollution levels as a reference, a recent IMF study established that, if there had been no subsidies in place at all throughout that year, emissions could have been decreased by 28 percent.[86] A 2009 study by the OECD established that phasing out subsidies for fossil fuel energy merely in the 20 key subsidizing countries would decrease global GHG emissions by 10% by 2050.[87]

A current 2023 report by the Intergovernmental Panel on Climate Change noted that fossil fuel energy subsidy removal can decrease global CO_2 emissions by 1–4%, and GHG emissions by about 10% by 2030, in addition to improving public revenue and macroeconomic performance and yielding

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81 Low Carbon Green Growth Roadmap (n 17).
82 UNEP and OECD/IEA (n 24) 9.
83 See Opeyemi Akinyemi and others (n 4).
84 Sean Sweeney, 'Weaponizing the Numbers: The Hidden Agenda Behind Fossil-Fuel Subsidy Reform' (2018) 29(1) New Labor Forum 87.
85 Richard Bridle and others, Fossil Fuel to Clean Energy Subsidy Swaps: How to Pay for an Energy Revolution (IISD 2019) 7.
86 Sweeney (n 84).
87 Overland (n 38) 304.

other environmental and sustainable development benefits.[88] The IMF predicts that reducing fossil fuel energy subsidies and raising fuel prices to their real market price would reduce estimated global fossil fuel energy CO_2 emissions to 36 percent below baseline levels in 2025 which would be in accord with the 2030 Paris climate goals of containing global warming to 1.5 to 2°C.[89] Similarly, the United Nations Environment Programme (UNEP) submits that the removal of fossil fuel energy subsidies would result to a global reduction in carbon emissions of 6.4 to 8.2 percent in 2050 relative to the baseline.[90] Therefore, the most apparent strategy to fight climate change through GHG emissions reduction is to eliminate the massive subsidies that stimulate higher fossil fuel energy consumption in over half of the nations in the world.[91] Transitioning from fossil fuel energy is definitely essential to mitigate climate change, and that requires global CO_2 emissions to peak by 2025 and reach net zero by 2050.[92] The key thrust for fossil fuel energy subsidies reforms is, thus, to disincentives fossil fuel energy production and consumption, which would have a direct effect on climate change mitigating.[93]

Another major factor for climate change mitigation through significant CO_2 decreases is to move from fossil fuel energy power generation to renewable energy supplies. Renewable energy, which comprises bioenergy, direct solar energy, geothermal energy, hydropower, ocean energy and wind energy, has an important role to play in combatting climate change. Wind, solar, hydropower, ocean and geothermal energy do not contain any fossil carbon atoms to form climate-damaging CO_2 during combustion. In principle,

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88 Steadman S and others, 'Towards Sustainable Fuel Subsidy Reform in Nigeria: Evaluating Progress and Pathways to Success' ODI Working Paper (London: Oversea Development Institute 2024) 3.

89 Zhuawu and Garg (n 6) 5-6; IMF, Fossil Fuel Subsidies (International Monetary Fund 2022).

90 UNEP, Measuring Fossil Fuel Subsidies (n 4) 3; Burniaux J M and Chateau J, 'Mitigation Potential of Removing Fossil Fuel Subsidies' OECD Economics Department Working Papers, Vol. 853 (OECD 2011).

91 Overland (N 38) 303; Coady D and others, 'Petroleum Product Subsidies: Costly, Inequitable, and Rising' IMF Staff Position Note, 25 February 2010 (Washington DC: IMF 2010).

92 Serhan Cevik, 'Climate Change and Energy Security: The Dilemma or Opportunity of the Century?' IMF Working Paper 22/174 (International Monetary Fund 2022) 4.

93 Zhuawu and Garg (n 6) 5-6.

biomass-stored solar energy-is CO_2-neutral as it absorbs equal quantity of CO_2 during its growth period as is emitted during its combustion. Therefore, renewable energy is not simply resource compatible, but likewise climate compatible.[94]

5.4. Fossil Fuel Energy Subsidies Reforms Reduces Local Air Pollution

Fossil fuel energy subsidies reforms will reduce fossil fuel energy consumption and production induced air pollution. Removal of consumer subsidies that increases the price paid for fossil fuel energy or the cost of using fossil fuel energy imply less fossil fuel energy gets used, which can result to lower airborne emissions of toxic gases.[95] For example, increasing petrol prices through removal of fossil fuel energy subsidies will discourage the use of fuel-inefficient vehicles and undue use of private vehicles which causes higher emission of carbon dioxide that contributes to higher local air pollution.[96] The removal or reform of fossil fuel energy will result in limited access to fossil fuel energy occasioned by higher prices, which will in turn reduce the burning of oil, gas and coal in houses, factories, cars and power generation stations, and ultimately result to local air pollution reduction in many towns and cities of both developed and developing countries.[97] Eliminating fossil fuel energy subsidies is believed to cut pre-mature air pollution-caused deaths by above half.[98] Another report has it that fuel price reform would prevent almost 1.6 million premature deaths annually caused by local air pollution by 2030.[99]

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94 Lucia Athenosy and Viorica Revenco, Addressing Environmental Challenges and their Social Implications in Europe (Council of Europe Development Bank 2015) 36-37.

95 See UNEP and OECD/IEA (n 24) 15.

96 See Yusuf and Resosudarmo (n 25) 32-47.

97 UNEP and OECD/IEA (n 24) 6.

98 UNEP, Measuring Fossil Fuel Subsidies (n 4) 3; Coady D, Flamini V and Sears L, 'The Unequal Benefits of Fuel Subsidies Revisited: Evidence for Developing Countries' IMF Working Papers, Vol. WP/15/250 (IMF 2015).

99 Simon Black and others (n 7) 4.

6. SOME SUGGESTED ENERGY SUBSIDIES REFORM FISCAL INSTRUMENTS THAT ADDRESSES ENVIRONMENTAL CHALLENGES

This section suggests and examines some key fossil fuel energy subsidies fiscal reform instruments that could make significant contributions towards addressing environmental challenges and promoting global environmental sustainability.

6.1. Phasing out Fossil Fuel Energy Subsidies that Encourage Inefficient Fossil Fuel Energy Consumption and Production that are Environmentally Harmful

One of the significant means of addressing environmental problems through fossil fuel energy subsidies reforms is by completely phasing out subsidies that encourage wasteful and higher amounts of consumption or production of environmentally harmful fossil fuel energy products and services. A complete removal of subsidies that encourage wasteful consumption or production of fossil fuel energy and its allied products and services, which are environmentally harmful, will result in increased fossil fuel energy resource efficiency. This is because fossil fuel energy subsidies removal will result in higher prices for fossil fuel energy which will serve as an incentive for societal shift towards efficient use of fossil fuel energy resources and environmentally beneficial energy sources such as renewable energies.[100]

Increasing fossil fuel energy efficiency of output to facilitate the production of goods and services with a lesser amount of energy and decarbonizing the energy sector is vital to combating several environmental problems. Enhanced end-use energy efficiency can play a central role in lessening energy demand. Energy efficiency can provide environmental benefits like improved air quality, decreased environmental pollution, and global climate change mitigation.[101] Policies should emphasis on decarbonizing the energy sector (lower CO_2 emissions) and enhancing energy efficiency (lower energy consumption) through transition to more energy-efficient production processes and higher energy efficiency of consumer goods and services.

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[100] See Low Carbon Green Growth Roadmap (n 17).

[101] ADB, 'Supporting Low-Carbon Transition in Asia and the Pacific' Energy Policy Paper (Asian Development Bank 2021) 3-4.

Enhancing energy efficiency remains a key factor to lessen CO_2 emissions and improve environmental sustainability.[102]

6.2. Introducing a Carbon Tax on Fossil Fuel Energy

Taxing carbon sources of energy such as fossil fuel energy is an efficient approach to curtail carbon emissions that damage the environment.[103] Through fossil fuel energy subsidies reforms, governments can increase taxes on fossil fuel energy to reduce over use of fossil fuel energy, generate fiscal resources for investments in renewable energy and other clean sources of energy, while simultaneously reducing CO_2 emissions.[104] Introducing a carbon tax on fossil fuel energy will result to rise in fuel prices and reduced fuel use which will contribute to reducing CO_2 emissions.[105] Taxing carbons presents an economically attractive and increasingly popular approach to help reduce carbon emissions largely caused by the over use of fossil fuel energy.[106] In addition, by taxing carbon, we could raise government revenue taxation. Some of the revenue raised through taxation could be focused back into the energy sector through investment in renewable energies and energy efficiency.[107]

Fiscal policy measures, such as a carbon tax on fossil fuel energy, are the most effective instrument for mitigating climate change. Even a little carbon price can mobilize revenue for investment in non-hydrocarbon sources of energy, promote higher energy efficiency, and thus encourage substantial reduction in CO_2 emissions. So long as CO_2 emissions remain free, no tangible

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102 Cevik (n 92) 9; See Marcel Alers and Benjamin Jones, A Guide to Carbon Pricing and Fossil Fuel Subsidy Reform: A Summary for Policymakers (UNDP 2021) 6.

103 OECD/IEA, Update on Recent Progress in Reform of Inefficient Fossil-Fuel Subsidies that Encourage Wasteful Consumption (OECD/IEA 2021) 66-67.

104 Richard Bridle and others (n 85) iv; See Alan Gelb and Anit Mukherjee, 'Fuel Subsidy Reform and Green Taxes: Can Digital Technologies Improve State Capacity and Effectiveness?' CGD Policy Paper 149 (Washington, DC: Center for Global Development 2019) 8.

105 Thijs Van De Graaf and Mathieu Blondeel, 'Fossil Fuel Subsidy Reform: An International Norm Perspective' in Jakob Skovgaard and Harro van Asselt (eds) The Politics of Fossil Fuel Subsidies and their Reform (Cambridge University Press 2018) 84.

106 Sam Hill, 'Reforms for a Cleaner, Healthier Environment in China' OECD Economics Department Working Paper No. 1045 (OECD 2013) 25.

107 Laura Merrill and others, Tackling Fossil Fuel Subsidies and Climate Change: Leveling the Energy Playing Field (Nordic Council of Ministers 2015) 34.

incentive is in place to change behavior. On the other hand, imposing a tax on CO_2 emissions sends a strong signal on the need to transit to low carbon energy sources all over the economy. Carbon-intensive goods and services would become more expensive and rebalance consumption patterns toward low-carbon options.[108] In other words, the level of taxation on fossil fuel energy will directly affect prices, and influence the decisions of both consumers and investors. Pricing carbon offers a technique to move consumers and investors to low-carbon energy options.[109]

As of 2018, some 70% of energy-associated CO_2 emissions from developed and emerging economies are totally untaxed, providing less incentive to shift to cleaner energy.[110] In January 2021, the OECD released Taxing Energy Use for Sustainable Development: Opportunities for Energy Tax and Subsidy Reform in Selected Developing and Emerging Economies. The report finds that developing countries could raise the required public revenues, while reducing emissions and air pollution, by improved utilization of energy taxes and lessening energy subsidies.[111] By raising the cost of polluting fuels and technologies, policies like carbon taxes stimulate households and firms to utilize energy more efficiently and to shift to less-polluting options, thus, cutting down on carbon emissions.[112]

6.3. Subsidy Swap: Swapping from Fossil Fuel Energy Subsidies to Investments in Low-Carbon Energy Technologies

Swapping from fossil fuel energy subsidies to investments in low carbon energy technologies like renewable energy and energy efficiency can help mitigate climate change through reduction in GHG emissions and also decrease both local and global air pollution. Internationally, more subsidies are still directed toward fossil fuel energy consumers and producers than toward renewable energy: presently about USD 372 billion is spent on producer and consumer fossil fuel energy subsidies, overriding the USD 100

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[108] Cevik (n 92) 9; Simon Black and others, 'Not on Track to Net-Zero: The Urgent Need for Greater Ambition and Policy Action to Achieve the Paris Agreement's Goals' IMF Staff Climate Note No. 21/5 (Washington, DC: IMF 2021).

[109] Tara Laan and Anna Geddes, Fanning the Flames: G20 Provides Record Financial Support for Fossil Fuels: Methodology Note and Reference List (IISD 2023) 7.

[110] OECD/IEA (n 103).

[111] ibid; OECD, Taxing Energy Use for Sustainable Development: Opportunities for Energy Tax and Subsidy Reform in Selected Developing and Emerging Economies (OECD Publishing 2021.

[112] See Alers and Jones (n 105) 12.

billion spent on renewable energy.[113] Financing renewable energy and energy efficiency, the two most viable low carbon energy technologies, do not attract as much subsidies as fossil fuel energy at the international level. Fossil fuel energy subsidies to consumers are estimated to be four times the level of subsidies going into renewable energy and four times the level of private investment into energy efficiency.[114]

The benefit of fossil fuel energy subsidies removal or reform is mostly evidently displayed when comparing finance needs for renewable energy and fossil fuel energy subsidies. While renewable energy investments over the next decade to reduce global warming to 1.5°C are projected at $2.4 trillion annually, the IMF estimated that fossil fuel energy in 2017 alone totaled $5.2 trillion or 6.5% of global GDP.[115] Channeling resources formerly allocated for fossil fuel energy subsidies towards renewable energy investment can aid reduce overall reliance on fossil fuel energy[116] which will limit GHG emissions and ultimately facilitate the environmental problems of climate change and local air pollution mitigation.

According to the International Renewable Energy Agency's World Energy Transitions Outlook 2023 and COP28 President, tripling global renewable energy capacity by 2030 is vital to reducing the global average temperature increase to below 1.5°C above pre-industrial levels.[117] A "subsidy swap" – reallocating some of the savings from fossil fuel energy subsidies reforms to fund investments in renewable energy and energy efficiency could contribute to long-lasting emission reductions.[118] It is obvious that one of the key

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[113] Richard Bridle and others (n 85) 2; IEA, World Energy Investment 2018 <https://www.iea.org/wei2018/> accessed 28 May 2024; Merrill L and others, Making the Switch: From Fossil Fuel Subsidies to Sustainable Energy (Nordic Council of Ministers 2017).

[114] Onifade (n 39) 32; Temitope Tunbi Onifade, 'Hybrid Renewable Energy Support Policy in the Power Sector: The Contracts for Difference and Capacity Market Case Study' (2016) 95 Energy Policy 390; Laura Merrill and others, Fossil-Fuel Subsidies and Climate Change (Winnipeg: IISD 2015).

[115] Steadman S and others (n 88) 3; Coady D and others, 'Global Fossil Fuel Subsidies Remain Large: An Update Based on Country-Level Estimates' Working Paper No. 2019/089 (Washington DC: IMF 2019).

[116] Zhuawu and Garg (n 6) 5.

[117] Prasad (n 13).

[118] See Richard Bridle and others (n 85) iv; See ADB, Fossil Fuel Subsidies in Asia: Trends, Impacts, and Reforms-Integrative Report (Asian Development Bank, 2016) 25.

challenges to investments in renewable energy and energy efficiency is how society finances the required activities.[119] There needs to be more supportive action for investments in renewable energy and a swap of financial capital from fossil fuel energy to renewable energy. To achieve a swap from fossil fuel energy to renewable energy, substantial investment is required. To realize a 2°C future limit global temperature increase, an estimated $208 billion investment in low carbon energy technologies sources like renewable energy will be required each year for the following 25 years.[120]

The most recent modeling exercise by International Institute for Sustainable Development estimates that fossil fuel energy subsidies reforms (removal) by the set of 32 economies, comprising key developed, emerging, and developing countries, by 2025 would limit CO_2 emissions by an average of 6% in 2030, and with regards to some countries, the emissions can be decreased by about 35%. The reinvestment of just a third of the savings from such reform into renewable energy and energy efficiency (a "subsidy swap") would add an extra 3% decrease in CO_2 emissions by 2030.[121]

7. CONCLUSION

The production and usage of energy has significant consequences for environmental sustainability. While energy is crucial to economic and social development, the consequences of certain forms of energy such as fossil fuel energy production and use globally are creating several environmental problems, thus, threatening the sustainability of the environment.[122] Protecting the environment demands that the production, supply and use of energy are as clean and as efficient as possible-this can only be achieved

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[119] Muller S and Robins N, Financing the Just Transition beyond Coal (Grantham Research Institute on Climate Change and the Environment 2021).

[120] Heffron R J, McCauley D and de Rubens G Z, 'Balancing the energy trilemma through the Energy Justice Metric' (2018) 229 Applied Energy 1191-1201; BNEF, Mapping the Gap: The Road from Paris (Finance Paths to a Two-Degree Future) (Bloomberg New Energy Finance 2016) <http://about.bnef.com/white-papers/mapping-the-gap-the-roadfrom-paris/> accessed 27 May 2024.

[121] Kuehl J and others, Cutting Emissions through Fossil Fuel Subsidy Reform and Taxation (Geneva: IISD Global Subsidies Initiative 2021); Monkelbaan and Steenblik (n 54).

[122] UNEP and OECD/IEA (n 24) 5-6.

through fossil fuel energy subsidies reforms.[123] Fossil fuel energy subsidies reforms can reduce over consumption and production of fossil fuel energy, promote fossil fuel energy efficiency and the development of renewable energy sources, reduce local and global air pollution, improve air quality, and mitigate climate change through GHG emissions reduction.[124] In many countries, fossil fuel energy subsidies reforms that completely phases out fossil fuel energy subsidies that encourage fossil fuel energy consumption and production-in combination with carbon taxation on fossil fuel energy, and swapping from fossil fuel energy subsidies to investments in low carbon energy technologies, could play a significant role in addressing environmental problems and steering their development onto a more environmental sustainable path.[125]

In the light of the above, there is an urgent need to start addressing environmental challenges through fossil fuel energy subsidies reforms. To successfully address environmental challenges through fossil fuel energy subsidies reforms, the authors recommend that:

1. The governments of every country should completely phase out fossil fuel energy subsidies, which encourage inefficient fossil fuel energy consumption and production that harm the environment.
2. The governments of every country should introduce a carbon tax on fossil fuel energy to discourage wasteful fossil fuel energy consumption and production.
3. The governments of every country should build a global awareness on the need for and the environmental benefits of low carbon energy technologies such as renewable energy and energy efficiency.
4. The governments of every country should promote and encourage the development of low carbon energy technologies like renewable energy and energy efficiency which are environmental friendly technologies.
5. The governments of every country should swap from fossil fuel energy subsidies to investments in low carbon energy technologies like renewable energy and energy efficiency.

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123 Ibid, 19.
124 See Zhuawu and Garg (n 6) 6.
125 See UNEP and OECD/IEA (n 24) 19.