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For Sustainable Development of the Whole World by Renewable Energy

Koji Hashimoto[1*]

[1] Tohoku Institute of Technology, Japan

ABSTRACT

The atmospheric carbon dioxide concentration has been increasing at the rate of about 1.85 ppm/year since 1970, and exceeded 400 ppm corresponding to the level in 3.5 million years ago. No current all living things have the experience to live in such climate. Extrapolation of recent increase in the world primary energy consumption indicates that all reserves of fossil fuels and uranium will be completely exhausted until the middle of this century. In order to avoid the crisis of intolerable global warming and no fuels for combustion we have to establish and spread the technologies to use only renewable energy by which the whole world can keep sustainable development. There are superabundant renewable energy resources on our planet. We have been performing research and development for about 30 years to supply renewable energy to the world in the form of methane by electrolytic hydrogen generation and subsequent formation of methane from carbon dioxide and hydrogen. We created anodes and cathodes for water electrolysis and catalysts for carbon dioxide methanation. We constructed a prototype plant consisting of solar cell, water electrolyzer, carbon dioxide methanation unit, methane combustor with oxygen and piping connecting methane production and combustion units in 1995. We are recommending the construction of local energy supply system. The power generated from renewable energy will be used directly. The surplus electricity must be used for water electrolysis to form hydrogen and oxygen. Hydrogen will be used to form methane by the reaction with carbon dioxide. Methane will be used for regeneration of steady electricity at a natural gas power plant for covering shortage and leveling of intermittent and fluctuating power generated from renewable energy. For combustion of methane at the power plant oxygen formed by the water electrolysis will be used after dilution with carbon dioxide of exhaust gas, so that the it will be composed of only carbon dioxide after removal of water. Thus, carbon dioxide of the exhaust gas will be recycled for methane formation and oxygen dilution. Hot waste water of the power plant will be used in the local area for heating, farming and industries.

INTRODUCTION

Societies around the world are on the verge of a profound and urgently necessary transformation in the way they produce and use energy. This shift is moving the world away from the consumption of fossil fuels (which cause climate change and other environmental and social challenges) toward cleaner, renewable forms of energy. Millions of people around the world already use renewable energy to generate electricity, heat and cool buildings, cook and provide mobility. Renewable energy is market-ready and price competitive with conventional sources in many jurisdictions, and met about 19% of the world's final energy demand in 2014. Around the world, communities, islands, and cities have found that making the transition to 100% renewable energy is largely a matter of political will and that the required technologies already are at hand.

While such presumed benefits are widely cited as key drivers in political and energy debates, specific, documented evidence of such benefits remains rather limited for reasons including a lack of adequate conceptual frameworks, methodological challenges, and limited access to relevant data. The purpose of this paper is threefold. First, to identify the various drivers behind the push for the renewable energy transition and to document some of the sustainable development benefits experienced around the world. Second, to review some of the recent attempts to measure, quantify or project past and future benefits of increased renewable energy deployment, and the methodologies applied. Finally, to identify some of the remaining questions relating to the implications of aiming for 100% renewable energy, with the aim to provide a basis for subsequent development of a conceptual framework for future work on this topic.

Renewable energy technologies provide energy services, including lighting and electricity, heating and cooling, mechanical energy and mobility. Further, relative to other types of energy (from fossil fuels, nuclear power, and traditional biomass), moderns renewables provide a variety of additional socio-economic benefits. In most jurisdictions, these socio-economic benefits are a major force driving policymakers to adopt renewable energy targets and support policies.

ENVIRONMENTAL DRIVERS

The extraction, transport, refining and use of fossil and nuclear fuels result in a host of significant environmental impacts, including damage to land from mining; pollution of air and water; consumption of vast amounts of fresh water, particularly for cooling at power plants; loss of biodiversity; risk of nuclear accidents; global climate change; and associated impacts on human health. For example, the World Health Organization estimates that outdoor air pollution due largely to the burning of coal and road transport – killed 3.7 million people worldwide in 2012. Another account estimates that 5.5 million people die prematurely each year due to household and outdoor air pollution; of that total, 1.6 million people die of air pollution in China and 1.4 million in India. The single greatest contributor in China is pollution from coal burning (which causes an estimated 366,000 deaths annually), while in India the major contributor is burning of solid biomass for cooking and heating.10 Health problems, biodiversity loss, and other environmental challenges will only be exacerbated by climate change.

Renewable energy deployment has become an integral part of government strategies around the world to address these many

challenges. Examples include: Reduce pollution and improve public health. Around the world, governments at all levels have enacted policies to support renewables in order to reduce health impacts associated with energy production and use. In China, for example, the quest for cleaner air and water has become an important driver of renewable energy targets and policies, alongside carbon dioxide (CO2) emissions reductions, job creation and economic development. Concerns about the impacts of traditional use of biomass, and burning of kerosene and other fossil fuels for cooking and heating on indoor air quality, as well as the need to reduce local deforestation, also have driven policies to promote modern renewables.

CONCLUSION

Energy access for all will require making available basic and affordable energy services using a range of energy resources and innovative conversion technologies while minimizing GHG emissions, adverse effects on human health, and other local and regional environmental impacts in the country. To accomplish this would require governments, the global energy industry and society as a whole to collaborate on an unprecedented scale. The method used to achieve optimum integration of energy sustainability with more efficient energy systems should be made. Wide range of energy sources and carriers that provide energy services as a sustainable manner need to offer long-term security of supply, be affordable and have minimal impact on the environment. As a contributor of air pollution and deforestation, the share of biomass in the renewable energy share is expected to decrease with the 100 There is also significant potential for wind power development. On the other hand, renewable energy sources exception of large hydro are widely dispersed compared with fossil fuels, which are concentrated at individual locations and require distribution. Hence, renewable energy must either be used in a distributed manner or concentrated to meet the higher energy demands of cities and industries.