China and Mitigating Climate Change

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Sustainable development is a tool in which the global society can mitigate the evolving global process of climate change. Developing a sustainable system is a multi-faceted framework, whereby civilizations can utilize energy resources in a renewable and efficient manner. More specifically, sustainable development is ”a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations." To implement an effective process of change, we must look to the fundamental basis of how our world currently works. Shifting from a system of environmental exploitation to one of stewardship and responsibility will be necessary to mitigate climate change. Without addressing our green house gas emissions, humans will suffer from food insecurity, water shortages, displaced populations, and an increase in violence over natural resources. How governments choose their present energy policy is indicative of their commitment to sustainable development and streamlining fossil fuel consumption.

The purpose of this paper is to analyze current issues surrounding energy policy, sustainable development, globalization, and climate change. I will present my preliminary findings along with my conclusion that a drastic shift in ideology and policy must occur to effectively thwart a serious climate catastrophe.

The Industrial Revolution, the introduction of neoliberal economic ideology, and the capitalist notion of maximizing efficiency and production, have subjugated the environment to the limitless growth potential of capitalism. The advent of free or near-free market resources produced a cycle of exploitation, thereby allowing industry to abandon the exploited sites to move on to other more efficient and exploitable sites without regarding long-term environmental effects. Professor Kutting from the State University of New York concluded, ”this liberalization and its supporting institutional framework have led to a new form of ecological imperialism that subjugates resource extraction and production to market ideology." At present, capitalism’s infinite potential for growth is incompatible with the finite natural resources available. The current ideology degrades environmental health as corporations fail to internalize the cost of environmental protection. A recent study commissioned by the United Nations Principles for Responsible Investment, concluded that in 20008, ”the top 3,000 companies had an environmental impact of $2.2 trillion dollars." ”Impact" is a euphemism for environmental degradation. This is accumulation by dispossession, the exploitation of a resource without reimbursement. The ultimate outcome of this market growth and environmental exploitation process is climate change. The global society’s re-creation of this relationship is essential to safeguard natural resources for future generations. Government’s role in this ideological shift will require strict regulations and a commitment to sustainable development.

The Intergovernmental Panel on Climate Change (IPCC) concluded that the ”human modification of climate is compelling." In other words, societies’ development and fossil fuel consumption has significantly altered the world’s ecosystem and atmosphere. The IPCC and the International Energy Agency (IEA) place emphasis on streamlining C02 emissions at 450 ppm (parts per million). This would increase the Earth’s temperature 2 degrees Celsius. The IPCC provides other scenarios for higher CO2 levels, but for this paper, 450ppm will be the overarching limit. Prior to the industrial revolution, the CO2 level was 280ppm, now the level is 385, the highest level ever experienced by the human species. To narrow the focus of a global CO2 emission scenario, I will present revealing statistics from the People’s Republic of China.

The People’s Republic of China is an excellent case study because of their pseudo-neoliberalized economic system, unique natural resources, their recent push for renewable energy, and their membership in the United Nations Framework Convention on Climate Change, which obligates each member to mitigate climate change. Through this analysis we will see what a world leader in clean energy production is emphasizing in their energy policy.

China’s energy sector, usage, and emissions recently expanded significantly. China is now the undisputed leader in CO2 emissions. ”In 2007, China’s emissions were up eight percent from the previous year, which would mean that Chinese emissions surpassed U.S. emissions that year by fourteen percent." In 1980, China’s CO2 emissions were 1460 million tones (Mt), in 2007, China’s emissions was 6499Mt. The IEA estimates China’s CO2 emissions will increase to 11.4Gt in 2030 in the scenario of business as usual. Coal provides for 70.4% of China’s energy use and accounts for 41% of the world total in 2007. Coal accounted for 83% of all power generated in 2007, and if that level were maintained, China would require two billion tons of coal power by 2020. China’s electricity sector accounted for almost 50% of coal consumption in 2006. If there are no substantial policy changes, then the electricity sector will increase from 24.9 quadrillion Btu in 2006 to 57.3 quadrillion Btu by 2030. The electric grid installed capacity grew from 380GW in 2003 to 793GW in 2008; of the 793GW, the installed capacity of coal-fired power amounted to 601GW, or 76% of the grid. A 26% increase in two years. To mitigate climate change, China must drastically reduce its CO2 emissions and its reliance on coal power. According to IEA’s World Energy Outlook, China would need to decrease their CO2 emissions by 23% to meet the 450ppm scenario. The electricity sector is the most important area for this policy change to happen. China’s

unprecedented growth must be concomitant with sustainability. Renewable energy solutions such as tidal, hydropower, photovoltaic (PV), and wind power, must be increased dramatically to meet China's energy usage and mitigate climate change. These renewable sources of electricity, and nuclear energy, will be the focus of the following statistics.

China's Renewable Energy Law (REL) that went into effect in January 2006 decreed that 15% of all energy would come from renewable sources by 2020. Articles 24-26 of the REL provides for: (1) a long term stable subsidy that requires the central government to create a public fund for renewable energy development; (2) preferential loans to eligible renewable energy development projects to encourages financial institutions; and, (3) tax benefits to eligible renewable energy projects. This law is the most significant step towards renewable energy in China's history. The incentives it provides will allow domestic producers of renewable technology to increase their output domestically and internationally and theoretically decrease CO2 emissions within the country.

Excluding Hydropower, renewable energy technology comprises less than one percent of China's energy use. This percentage is indicative of China's reliance on nonrenewable energy, and hydropower as the prime source of renewable energy. The total power generated by hydropower in 2007 comprised 14.79% of China's energy use. China produces the most power from hydro resources in the world. In a recent study, researchers concluded: By 2010, the total installed capacity of hydropower will reach 190GW, 120GW of which will be from the large and middle-scale conventional hydropower, 50GW from small hydropower, and 20 GW from the pumped-storage power stations. The installed capacity of conventional hydropower that will have been constructed by 2010 will account for 31% of the technically exploitable installed capacity of China's total.

China's renewable energy development policy heavily relies on hydropower to meet the REL goals of 15% renewable energy by 2020. According to China Daily, China is set to have a capacity of 300 GW by 2020. Ecologically, dams have detrimental effects by obstructing the water flow. Dams also create internally displaced peoples. The three gorges dam project displaced over 1.5 million people. Moreover, developing large dams is a fossil fuel heavy process. The creation of the materials, transportation, and construction rely on fossil fuels. China's expansive development of hydropower would create a renewable energy source, but the human and ecological costs are significant.

Wind power is the next substantial renewable source of energy available to China. In 2007 an estimated 24 billion Yuan ($2,050,922,453) was invested in the wind energy sector. China's National Development and Reform Commission opened the European Wind Energy Conference and Exhibition in 2008 by stating that China is endowed with 1TW of wind resources (250GW onshore and 750GW offshore). Of this possible exploitable wind power, China has an installed capacity in 2008 of 12.2GW placing it in fourth place internationally in wind power capacity. At the current growth rates, China is expected to reach 30GW by 2010 and 50GW by 2015. These are considerable steps, but 12.2GW is only .015% of China's energy use in 2008. Furthermore, there are significant feed-in issues to the power grids. Geographical location and technical grid issues decrease the use of wind power. Additionally, coal powered electricity is much cheaper than wind; however, government subsidies will have an affect in lowering the cost. At their current trajectory, China's CO2 emissions will not be curtailed by the use of wind energy. China would have to create an even more extensive wind power policy to play a substantial part in their current development.

Nuclear power is another non-CO2 emitting power source that China plans to acquire rapidly. Currently, China has eleven nuclear power plants with an output of 8.7GW. Twelve more reactors are planned or under construction. China plans on producing an output of 40GW by the year 2020 creating a four-fold increase that will account for only four percent of the total national electricity generation. Nuclear power, in itself, does not emit any CO2, but uranium is not a renewable resource. China's nuclear energy policy will eventually confront this finite resource. To fuel the 2020 goals, China would need a projected 9814 tons to 10,340 tons of uranium; the cumulative demand is expected to reach 89,992 to 91,364 tons by 2020. However, China's domestic natural reserve, in all cost categories, is 80,600 tons. Therefore, China is creating an innate reliance on uranium mining in countries like Niger and Australia. Depending on geopolitical issues in the future, Uranium may become highly sought after and expensive. Beyond the bottleneck supply of Uranium, there are other detrimental effects of a nuclear power plant. First, the carbon intensive process of building the power plant; Second, the issue of disposing of the spent fuel rods; and third, the illnesses caused by human proximity to plants, and possible nuclear catastrophes. China's nuclear policy is clearly not sustainable and could produce numerous negative results including armed conflict over the finite resource.

Two other renewable resources available to China's electrical energy grid are solar and tidal energy. According to recent research, "China's total yield in solar cell in 2007 was 1088MW, ranking it first in the world… by the end of 2007, the total installed capacity of photovoltaic power generation was about 105 MW." Solar energy is useful in China's rural areas and industry, but there isn't a large push to install photovoltaic systems on the grid as a significant renewable energy source for electricity. Tidal energy, according to the State Oceanic Administration of China, has

12.85 X 1010 W of wave energy technologically available in the near shore area of China, which could produce nearly half of China's electricity. However, China has only developed eight tidal power stations with a total installed capacity of 6120KW. Tidal energy, if appropriate R&D occurred, will be a great source of energy for China. Unfortunately, efficient and affordable technology has not yet been developed, so this energy source is not going to be utilized in the near future.

China's recent push for the development of renewable energy is markedly significant, but not enough, in my opinion, to meet the global 450ppm scenario. Coal will be the main source of energy in China for the foreseeable future. With their economic and development expansion, their energy use and CO2 emissions will continue to grow. According to the IEA, China would need to invest $400 billion over 2010-2020 and $1.7 trillion over 2021-2030 in clean energy technology to reach the 450ppm scenario.

Because of their governmental structure it is possible for such a drastic monetary policy to be implemented. The issue I see is whether it will be enough, and whether the global community can act in concert to reach the 450ppm goal. According to the newest research from the Pew environmental group, China leads globally in green energy markets, and private investments in the past five years was $34.6 billion almost doubling America. China's green energy policy is the most innovative in the world, but the statistics provided above paint a picture of heavy fossil fuel use. With the current rate of production and growth it is difficult to see how CO2 emissions can be decreased globally. Not all developing countries are like China who can invest and implement in clean energy technologies. And if they could, would it be as insignificant as China's less than one percent usage of clean energy? Would a 15% goal of clean energy from renewable sources be enough to avert to climate change?

As much as we would like to believe or rely on a technological fix to the issue of climate change, I believe it will take a significant shift on how we live and conduct business to avert disastrous results. For example, we could shift to a localized economy by de-globalizing the world economy. Mass production, mass consumption, and the exploitation of the environment are eroding the very substance of our existence. If we created a network centered upon local resources, a significant amount of fossil fuel usage would decrease. If agriculture production were shifted to a sustainable model not dependent on petroleum-based fertilizers, unchecked water consumption, and extensive fossil fuel use, there would be another significant shift in resources and CO2 emissions.

The age of mass production and consumption, and the distanciation of the production process from the resource extraction stage has obscured the link between production, consumption, and environmental degradation, thus making it difficult to create a directly observable link between the accumulation of capital and the Linking Environment and Society creation of environmental degradation.

The capitalist, free market business model can't continue to be supported by the diminishing resources of the planet. Free market solutions such as cap and trade and other environmental trading models obfuscate the real issue: environmental degradation. Moreover, the programs are re-creating ecological disasters: cutting down Brazilian rainforests to create eucalyptus plantations, which in turn, also affect the water supply of the nearby villagers. The attempt to recreate an ecological balance will always be flawed compared to the natural processes of the earth. The focus should be on a dramatic decrease of fossil fuel use, not on the continuation of current energy policy and hoping something miraculous happens.