GREENING AMERICA TO GREEN THE WORLD

Professor Satish Desai OBE
Visiting professor
Kingston University London

1. INTRODUCTION

The world has experienced many unfortunate events, e.g. the World War II (WWII) that was perhaps the last serious event. WWII was the result of many circumstances, e.g. surging nationalism, protectionist policies and inability of the League of Nations to foster stability. After the war was over, various leading countries had to come together and provide a framework for peace and security, economic development and human rights. The second half of the twentieth century has seen the world economies grow and move forward after removal of some symbolic roadblocks like the Berlin Wall and the Iron Curtain. However, there was a kind of blindness about environmentalism until the 1980s, apart from some developed countries paying limited attention to avoid air pollution, water pollution and wastage of water.

The world is facing serious problems resulting from global increase in population, increasing demand on scarcer energy supplies and natural resources, and global warming caused by increasing emission of greenhouse gases (mainly CO_2). These developments are relentless and inter-related. Their joint influence could bring about abrupt, serious and irreversible effects on air, oceans, glaciers, land, coastlines and survival of various species of animals. Furthermore, excessive demand on oil and gas and increase in their prices give rise to politics of energy. Some oil-exporting states have gained extraordinary powers created by the oil wealth, which may have a warping effect on democracy in the world. All these ill effects could be pushed well past the tipping points into such disastrous realms as the world has never known before.

Awareness of the green issues has come to the fore since the 1980s and it is reflected in the form of conferences, notably one in Kyoto (Japan, March 2001), resulting in action plans on sustainable development and binding limits for the greenhouse gas emissions in developed counties. The treaties resulted in options and not imperatives. Most European Union (EU) countries supported the Kyoto Protocol climate-change treaty. The USA did not accept Kyoto Protocol at that time, under the leadership of George W Bush. However, President-elect Obama would accept the Kyoto Protocol, as reported in the Press on 20 November 2008. The European Member states are committed to "green issues" such as energy saving and reduction in greenhouse gas emissions. Influence of the EU Countries in the industrial world and their ability to green the world could be significantly enhanced with effective collaboration with the USA led by Barack Obama.

The USA still sits at the boundary of technological excellence and it has arguably the best system for producing clean power and energy efficiency, coupled with vast resources of agriculture and a sound manufacturing base. Additionally, the USA has a proven record of leading the world in all manners of things, including the post war success in confronting Nazism, Fascism and Communism. For this purpose, the USA had to build up military and industrial base and scientific capabilities during the period 1950-60. At that time, the USA had adopted policies that could be summed up as "Code Red". Now the USA needs "Code Green", which means clean power, energy-efficiency systems and inspiring an ethic of conservation towards the natural world that is severely imperilled at present. Adoption of "Code Green" requires rise in the level of leadership, innovation and collaboration. Otherwise, everybody will lose badly.

President-elect Obama should provide strong and effective leadership in steering America in the right direction to tackle climate change in a serious and sustainable manner, and to address the country's dependence on foreign oil, not only on moral and environmental grounds but also in the interest of national economy and security. Obama needs all the luck, courage and decisiveness in overcoming the immediate financial problems and addressing the long-term green issues. He must succeed, not just for the sake of America but also for the sake of rest of the world!

The foregoing sections are based broadly on the book "Hot, Flat and Crowded" (Allen Lane, Penguin Group, ISBN 978-1-846-14129-4). The author, Thomas Friedman, is a Pulitzer prize-winning author of the No. 1 international bestseller "The World is Flat".

2. PRE-2009 SITUATION IN THE USA

Developments regarding environmental issues

During the time of George W Bush, America has been known to pay scant attention to environmental issues and practise protectionist policies through tariffs around its products and through trade barriers to protect American business, mainly car-manufacturing. After the attack on the World Trade Centre on 11 September 2001 (generally known as 9/11), the USA has put up more walls around the country and emotionally disconnected itself from its natural allies. This is like building walls when the wind changes directions. To quote a Chinese proverb, America should build windmills when the wind blows, and not walls, which indicates the need to find a cleaner way to power the future and a better way to protect the natural world.

Between 1975 and 1985, the Congress passed an act to establish a corporate average fuel economy (CAFÉ), under the leadership of Presidents Ford and Carter. The intention was to improve passenger vehicle mileage from 13.5 miles per gallon (mpg) to 27.5 mpg. President Carter was an intelligent person but he was not so decisive in implementing the proposal fully. As a consequence, President Reagan could roll the proposal back to 26 mpg and slash some budgets of the alternative energy program started by President Carter, mainly in the field of Solar Energy. Reagan administration was indeed an environmental turning point, which disregarded many problems such as air pollution, water pollution, toxic waste, etc.

In 1989, President Bush (Senior) moved the fuel economy standard back to the consumption level of 27.5 mpg and sought to reintroduce research in renewable energy. Clinton administration tried to take further steps but the Congress went against it. Apparently, the Congress move was prompted by the Michigan Congressional Delegation, comprising a group of lobbyists supported by car manufacturers and a wholly owned subsidiary of the three big automobile manufacturers (Ford, Chrysler and General Motors) and the United Auto Workers.

President George W Bush tried to push the fuel economy standard marginally in 2003. In late 2007, the government moved to make a plan to improve fuel economy to 35 mpg by 2020, a level that existed roughly in Europe and Japan. In the meantime, the country would continue to be more addicted to oil and large cars. The General Motors motto said it all, "We build cars as the market wants." Lobbyists supported by car manufacturers would keep pressure on politicians through political donations according to their needs and not those of the nation. Groups representing any broad national interests were marginalised and derided as "eco-fringe".

The US governments have not shown so far any political will to change, compared to that of the Denmark authorities. Denmark considered becoming less dependent on oil by going for nuclear power. However, in the end, they opted for energy efficiency and renewable energy. They created an incentive for promoting this option by making oil more expensive through taxation. This step did not have any adverse effect on the economy as feared by some experts. On the contrary, Danish economy has grown by 70% since 1981 and energy consumption has remained almost without increase. Furthermore, jobs have been created in wind energy industry, which did not exist in 1970. In 1973, Denmark got 99% of its energy from the Middle East; today it is zero!

The Denmark example could not have worked with the policies of George W Bush. After all, he became the President, bound and determined not to ask the American people to do anything hard on energy issues. According to the statement made in 2001 by the then White House spokesman Ari Fleischer, the President believed the American way of life to be a "blessed" one and that it must be protected. Furthermore, the administration believed that the use of energy reflected the strength of American economy, which the Americans had come to enjoy! Shifting to the clean energy system is a challenge like introducing a new order of things, as defined by Machiavelli in "*The Prince".* A leader or an innovator has for enemies all those who have done well under the old conditions and lukewarm defenders in those who may do well under the new. People have disbelief about new things until they have had a long experience of them!

After 9/11, many analysts had argued in favour of an introduction of a gasoline tax, $1 per gallon, called the "Patriot Tax", to assist in rebuilding the USA transport and energy infrastructure. Such tax could have stimulated the economy to move forward, with fuel-efficient vehicles and renewable energy, and could have reduced exposure to the massive rise in oil prices in 2008. Instead, President George W Bush introduced a massive tax cut, which meant increased dependence on Saudi Arabia for oil and on China for finances (i.e.

investments in the USA by the Chinese). 9/11 could have led to nation- building but the opportunity was missed owing to the age-old but misjudged assumption of continuing wellbeing of the USA in the future, regardless of the changing circumstances. Such misconception is summed up in what the French poet Paul Vale'ry has said, "The trouble with our times is that the future is not what it used to be!"

3. THE NEW ENERGY CLIMATE-ERA

The world today has to face the impact of three powerful forces that are interconnected:

a. Global increase in population
b. Global "flattening" that results in increasing demand on scarcer energy supplies and natural resources, through higher standards of life (cars, refrigerators, televisions, etc.) demanded by the growing middle class in all parts of the world, particularly the developing countries.
c. Global warming caused by increasing emission of greenhouse gases, mainly Carbon Dioxide (CO_2)

The present times should be described, therefore, as a new “Energy-Climate Era” instead of using such terms as the post-war and post-colonial times. Countries have to be inspired and inventive in looking for new solutions to resist the impact of these powerful forces, if they are to avoid falling by the wayside in this Era.

i. Global increase in population

The world population has increased from 2.68 billion in 1953 to 6.7 billion in 2007 and it is expected to rise to 9.2 billion in 2050. Megacities, or cities with more than 10 million inhabitants, are increasing in numbers; 5 in 1975, 14 in 1995 and expected to be 26 in 2015. Such population increase would result in overwhelming of the infrastructure and it would cripple the environment with loss of arable land, deforestation, over-fishing, water shortages, and air and water pollution.

ii. Flattening of the planet

At the end of the twentieth century, there was a combination of events, i.e. geopolitical events and technological events. This combination has resulted in levelling of global economic playing field, whereby more people from more places are able to take part in the global economy and enter the middle class.

Geopolitical events

Levelling of global economic playing field has come about as a by-product of the major geopolitical events, i.e. the demise Soviet Union, collapse of Communism and removal of the Iron Curtain. Both Communism and the Iron Curtain had acted like physical and political roadblocks for many decades. In the wake of collapse of these blocks, market economies have developed in many countries in various forms.

Technological events

The technological events are marked by the invention and proliferation of personal computers, which have enabled a large number of people to create in digital form photos, designs, videos, drawings and music, and then reshape the content. Internet and the worldwide webs have allowed people to distribute the content to many more places, virtually free of charge. This has been assisted by a quiet revolution in software and transmission protocols, whereby so many people in different places can work together on so many different things. For example, Dell computers can design computers in Austin (Kansas, USA) and Taiwan, get them built in China and have them serviced by technicians in South India. Boeing can hire Russian airplane designers and integrate them with aircraft builders in Wichita, Kansas.

Examples of flattening of the Planet: India and China

Levelling of the global economic playing field has helped to lift 200 million people out of poverty in India and China alone and moved tens of million up the economic ladder into middle class. Unfortunately, such change means less people in agriculture and more people consuming energy-demanding things such as cars, homes, air conditioners, computers, etc.

India had socialist-style planned economy until 1980, with a dose of free-market capitalism added on the side. Growth was kept to a level of 3.5% per year, a so-called "Hindu rate of growth" that barely kept up with the rise in population of 2.5% per year. This changed with opening up of markets and the rate of growth in

the economy rose to around 9% per year. In 2006, India's income rose by an amount higher than the total income of Portugal ($194 billion) or Norway ($183 billion) or Denmark ($178 billion).

Chinese economy was boosted as a result of the restoration of order after the "cultural revolution" in 1969-70. After the first year boost to some 17%, the rate dropped to some 7% and it was sustained until 1976. In 1976, China had earthquakes that hit industrial centres and agricultural output was hit by drought. There were other factors inducing recession, e.g. policy paralysis resulting from Mao's death, anti-Deng campaign, and the arrest of the Gang of Four. This meant a temporary recession and the growth in GDP (Gross Domestic Product) fell below zero (-1.8%). During 1978-1982, family farming was restored and agricultural output increased, pushing the rate of growth to some 8%. During 1989-91, the growth slowed after the government applied brakes to the overheating economy following an aborted effort at wholesale price reform in 1988. At the beginning of 1992, Deng Xiaoping's Southern Tour massively boosted foreign direct investment inflows into coastal areas and started a wave of government investment in Shanghai. Record trade and GDP growth and inflation followed. Barring such variations, the rate of growth has been maintained at 6% or more all the time, in spite of some doubts about the Chinese statistical system, which tends to overestimate output at the trough of the cycle and underestimate output at the peak. China needs sustained growth at a rate of more than 6-7%, to keep up with the national developments, e.g. construction of the roads and buildings, which are essential for coping with the aspirations of the people.

iii. Heating of the planet

The greenhouse gases, primarily Carbon Dioxide (CO_2), emit from industrial, residential and transportation sources and accumulate in the atmosphere. The atmosphere acts like a blanket keeping the earth normally warm by trapping the sun's heat near the surface of the earth. However, increasing CO_2 accumulation has the effect of thickening this blanket and accelerating the rate of warming of the earth. The planet Earth is experiencing speedy warming up, a trend that is well above the natural and normal variations.

Position before 1750

The average temperature has varied by some 6^o C, based on ice core data measurement of the average temperature year by year on the earth, which goes back some 670,000 years. However, the temperature change is a compounding effect of all CO_2 changes and not just due to small changes in the amount of sun's radiation, resulting from natural causes such as small variations in the earth's orbit. For example, when the oceans warm up, they bubble out or release absorbed CO_2 and this, in turn, warms up the atmosphere by enhancing the blanket that retains heat near the earth's surface. As a result, the oceans warm up further and release more CO_2 and so on. Furthermore, warming causes melting of ice and there is less ice to reflect the rays of the sun back and, hence, additional warming effect results.

The measurements from ice core data also include the corresponding average CO_2 concentration. The figures show that the CO_2 level fluctuated between 180 parts per million by volume (ppm) and 300 ppm. Before 1750, the level had remained at 280 ppm for some 10,000 years.

Post-1750 acceleration of global warming and its effects

Global warming is believed to have accelerated as a result of the post-1750 industrial revolution, This revolution is associated with developments in such human activities as large-scale manufacturing, which meant use of large machines, either to replace or to enhance the earlier sources of power, e.g. manual labour, horse power and water power.

People use energy in the form of light and heat, and power in the form of mechanical power for static machines and motive power for cars, trains and aeroplanes. Electricity can be the first step in providing some of these forms of power, as well as for providing electronic communication and information processing. Electricity is mostly, but not exclusively, produced with the use of fossil fuels that emit CO_2.

Coal, oil and natural gas are fossil fuels, which come from below the ground and are exhaustible. They produce CO_2 and other pollutants when they are burned for heating, transportation and industrial use. Coal has powered America's growth for almost two centuries. It may be necessary for the USA to burn coal for the next two decades at least, unless some astonishing breakthrough comes about. In the meantime, it is imperative to develop clean coal technology to use it more efficiently and reduce emissions of harmful gases. However, it is a more preferable option to turn to other sources of energy, which come from above the ground, i.e. wind, hydroelectric, tidal, biomass and solar power. These sources are endlessly available and produce no harmful emissions.

Internal combustion engines transformed commerce and made oil hugely valuable for powering automobiles, and greatly increased demand for iron and steel for their bodies and for rubber for their tyres. As the name suggests, these engines use oil or gas burned internally, causing emission of greenhouse gases.

Industrialisation resulted in urbanisation and urbanisation gave birth eventually to suburbanisation. This development meant increase in numbers of cars, buildings and highways. Ultimately, there were concerns about the visible air pollution and pollution of lakes and rivers because of emission of industrial waste. However, a scientific understanding emerged in the 1950s about excessive emission of largely invisible pollutants, i.e. the greenhouse gases.

Seriousness of the problems caused by global warming

With each mile of a normal car journey, some 450 grams of CO_2 could be thrown in the atmosphere and the larger cars could throw out twice as much. In addition, burning of oil and gas in power plants and burning of forests release CO_2 into the atmosphere. Recently, increase in CO_2 is alarmingly accelerating. In 2007, the CO_2 level stood at 384 ppm and appeared to increase at a rate of 2 ppm per year.

The earth has already warmed on average by 0.8 degrees Celsius above its level in 1750, the rise being most rapid at the end of the twentieth century. Although an increase of 0.8 degrees Celsius may seem small, it means that something is not right in the state of the climate, just as a small increase in one's body temperature means that something is amiss with the body. The immediate reaction is to act, find the cause and not allow any further rise in the body temperature. In case of the earth, temperature rise is accelerating, because of a rapid increase in population demanding such products as cars and buildings, which require increased energy production resulting in increased use of fossil fuel and emission of CO_2. Unless some effective measures are taken, the result will be catastrophic and irreversible.

For example, with some stern mitigation measures, we could manage to cap the changes in the atmosphere to the equivalent of 450 ppm of CO_2 and this would probably mean 2^o C rise in the average global temperature. However, many climatologists argue that the target should be 550 ppm of CO_2 level that would relate to 3^o C temperature rise, not because it will not cause much harm but because it is pretty much impossible to do any better. However, the environmentalists believe that 3^o C temperature rise will not be tolerable, since it will expose the earth to risks that could be disastrous.

a. Agriculture could suffer if there is no freezing in the winter and if the harmful pests could survive.
b. The Greenland and West Antarctic ice sheets will melt faster.
c. Acidification of oceans will occur due to CO_2 dissolving in water to produce carbonic acid, imperilling sea food chains, coral reefs and seashell-forming organisms.

In addition, there are unpredictable, non-linear and disruptive changes that could produce amplifying interaction. For example, rising sea level could interact with melting ice sheets and compound the risks. Even with the prediction disregarding compound actions, the sea ice might be disappearing during the Arctic summer by 2040! Some forms of CO_2 emission are not even contemplated. For example, there is some 500 billion tonnes of carbon trapped in frozen peat bogs in stretches of tundra in the Arctic in Western Siberia. This amounts to 33% of the carbon in the soils on the planet and its release due to any thawing effect could spell disaster.

In many parts of the world, farmers, hunters, and fishermen are already facing the truth. Rivers are drying out, fish stock is depleting and wildlife is suffering. One wonders as to how much adaptation can help. Building dams to store water has its limits. Changing vocations, e.g. abandoning farming or fishing would mean shortage of food. Any warning system or defence measure can help only in a limited way for saving lives, if the global warming were to give rise to regular hurricanes and tsunamis or a series of waves created when a body of water, such as an ocean, is rapidly displaced.

4. COMBINED EFFECT OF POPULATION GROWTH, FLATTENING AND GLOBAL WARMING

i. Growing demand on scarcer energy supplies and natural resources.

Americans consume resources nearly 32 times the lowest rate in the world and 11 times the rate of consumption per capita in China. Sustenance of human life needs energy input of some 2000 to 3000

kilocalories per day. An American consumes, on an average, nearly 100 times this amount, about 230,000 kilocalories per day. In rest of the developed world, the ratio is 50. In China and India, the ratio could be of the order of 3.5 to 11.

The worldwide consumption of energy was doubled between 1971 and 2004. It is expected to at least double between now (2008) and 2050, because of population growth and greater wealth driven by globalisation of markets. The resulting rise in prices of oil and raw materials (e.g. steel and aluminium) could lead to increased prices of food and other commodities. Scarcity of oil may lead to allocation of land for bio-fuels such as ethanol, with undesirable reduction in land for food crops. Governments in emerging countries, like China and India, may distort the market in the short-term by subsidising oil prices and keeping the costs artificially low for manufacturing products. Such distortions could not remain sustainable in the long-term and may result at some point in bursting through the surface like a volcano blowing its top.

In China and India, people work long hours, presenting a stiff competition for European countries arising from such low-wage and high aspiration work practices, and further problems to the welfare state culture in Europe. Such work practices in China and India place staggeringly high demands on natural resources.

If the world population increases by another billion people during the next ten years and a billion more people wish to use a 60 watt light bulb for four hours a day, it will mean having some extra twenty 500 megawatt coal-fired power stations! Such increase will exponentially give rise to pollution, CO_2 emission and rest of the environmental difficulties.

ii. Transfer of wealth to countries producing oil and gas

Scale of the problem

The big geopolitical redline is being crossed as we enter the Energy-Climate Era, involving a massive transfer of wealth from energy-consuming countries to oil-producing countries or OPEC (The Organization of the Petroleum Exporting Countries). With high oil prices, there will be a shift in the balance of economic power from the West to OPEC countries, often termed as *Petropolitics*. For instance, with the oil price rising to $200 per barrel, OPEC could potentially have enough cash from oil production to buy the Bank of America in a month or Apple in a week or General Motors in two days! OPEC comprises 13 oil-producing countries. In 1998, they earned $110 billions from oil exports. In 2006, this figure was $506 billions and it rose to $535 billion in 2007, expecting to rise to $600 billion in 2008. Saudi Arabia alone earns some 33% of the total OPEC income and its share is expected to be $200 billion in 2008.

Oil addiction of the developed world, particularly America, is not only having undesirable effects on climatic system but also on the international systems in many ways, for example:

a. The Saudis provide funds for spreading extreme Muslim opinions through schools and educational establishments, which promotes animosity towards the West, particularly America. (Fifteen out of the nineteen men responsible for the 9/11 event were Saudis.) The oil money is helping to strengthen the most intolerant, anti-modern, anti-western, anti-pluralist, and anti-women's-rights strain of Islam.
b. The USA expenditure on oil appears to simultaneously fund the two opposite sides of war on terror. The first is, of course, its own armed forces. The second is through enriching the Islamic Governments of the Middle East, who donate money to charities that pass a part of the wealth on to the preachers, suicide bombers and anti-American terrorist groups. It seems ironic that the USA is funding indirectly, with its purchase of energy, such organisations as al-Qaeda, Hamas, Hezbollah and Islamic Jihad. Even Osama bin Laden's wealth comes from the family construction business that made its fortune from government contracts financed by oil revenue.
c. Ugly global energy scramble results from growing dependence on oil. This appears in the form of the British abandoning corruption in Saudi business deals, USA turning a blind eye to the women's repression in Saudi Arabia and China going in partnership with the murderous dictatorship in Sudan.

Nature of Petropolitics related to low oil prices during 1950s and 1960s

Petropolitics has become noticeable in 1980s, following a rapid increase in world population, global information revolution and global democracy revival after the fall of Communism. Before this period, say during 1950s and 1960s, oil prices were low but there were dictators ruling the Arab world all the same. This was perhaps due to the Cold War between the Soviet Russia and the USA, whereby the USA was more interested in whether a country had pro-American or pro-Soviet foreign policy than whether its regime was

democratic or otherwise. Nevertheless, there was some moderating influence of lower oil prices during the period before oil wealth. Some Arab countries, like Egypt and Syria, were more politically liberal than the present times. There has been military rule in these countries, resulting in economic and political stagnation for some twenty-five years. President Mubarak has held office in Egypt, with the help of aid and real estate investment from the oil-rich Gulf States, and foreign aid from Moscow and Washington.

Specific examples of Petropolitics

a. Soviet Union experience

Soviet Union economy was quite inefficient during the Communist regime and the status of Soviet Union as a superpower was sustained through cheap agricultural products grown by peasants forced into collective farming, and cheap prison labour used to erect state industries. The third source was "oil and gas", Soviet Union being the second largest oil producer after Saudi Arabia. In 1960s, even the cheap agriculture labour input became insufficient and Soviet Union had to start importing grain instead of exporting it, and the Communist regime was in serious trouble. However, the Arab oil embargo in 1973-74 and a sharp upsurge in oil price lifted the economy, as Soviet Union could export oil, some 40% of its total exports. The oil sale windfall sustained the Soviet economy for the next fifteen years. Brezhnev government had money to import goods and buy the support of internal interest groups.

The picture changed in the 1980s, when the oil price began to drop globally, presenting problems for Russia once more. Reason was the new Saudi policy announced in 1985 by their Oil Minister Sheikh Yamani, to stop protecting oil price and increase oil production four-fold. Consequently, oil prices dropped from $70 per barrel to $17 or so, and Soviet Union began to lose some $20 billion per year, a sum that would endanger survival of the economy and jeopardise its continuation of economic subsidies at home and military activities abroad, e.g. Afghanistan. The Soviets tried a solution to borrow money for a while but, in December 1991, the ailing empire started yielding during Gorbachev's times and its collapse started subsequently during Yeltsin's time.

b. Iran

Shah of Iran was in a situation similar to that experienced by the Soviet Union in 1973-74,allowing him to introduce reforms with the help of oil sale windfall to modernise the traditional Iranian society. However, a social backlash against Shah’s forced modernisation brought in the Ayatollahs who used the oil revenue internally to subsidise into all areas of life and lock themselves in power. However, control on internal expenditure allowed them to carry on up to the post-1990 period and benefit again with the subsequent rise of oil prices. In 2005, Iran earned some $45 billion from oil exports and spent $25 billion on subsidies. In spite of such subsidies, there is unemployment and unrest in the minds of Iranian people.

If the oil price were to drop sharply again and the subsidies were to become untenable, people's unrest could bring out an "Ayatollah Gorbachev" and Iran could change direction away from religious dictatorship to some form of real democracy.

c. Bahrain

Bahrain was beginning to run out of oil reserves. It was the first Gulf State, a constitutional monarchy, which held elections where women could vote and be candidates as well. Its government decided to go for productivity using its own people (instead of importing South Asian workers), had labour laws introduced and formed trade agreements with the West. However, with the steep rise in oil price since 2006, the authorities had to slow down the process of parliamentary reform, i.e. approving laws that required more open competition and less government intervention.

iii. Disruptive climate change causing disasters like hurricanes and flooding.

Hurricane Katrina smashed New Orleans with ferocity and it was like a flashing red light that gave us a sample of what unmanageable climate change could look like. Climatologists believe that the strength of the hurricane was fed by the warmer waters in the Gulf of Mexico attributable to global warming. Insurance people and the Media like to call such disasters "acts of God". This is only a part truth, since human beings are responsible for such excessive introduction of CO_2 in the nature's operating system that gives rise to global warming.

Intergovernmental Panel on Climate Change (IPCC) has concluded that human-introduced CO_2 emissions must undergo dramatic reduction and actions should start before 2012 as the next two or three years could

determine our future. Otherwise, it could be too late and the climate change could bring abrupt and irreversible effects on air, oceans, glaciers, land, coastlines and survival of various species of animals.

A report produced by an international group of climate scientists (Sigma Xi) notes that even the relatively small rise in temperature since 1750, 0.8^{o} C, has been accompanied by significant increase in the incidence of floods, droughts, heat waves and wild fires. Furthermore, there are large increases in summer melting on Greenland Ice Sheets and signs of instability in the West Atlantic Ice Sheet. The report adds that CO_2 growth cannot be totally arrested. However, with growth in CO_2 emissions at mid-range projections, cumulative warming by 2100 will be between 3^{o} and 5^{o} C over the pre-industrial stage. This could trigger sea level rises, droughts and floods that could make many areas unfit for human life. Many climatologists go even a step further and believe that the mid-range projections are optimistic and that the real of growth in CO_2 emissions can be higher and results can be far more catastrophic.

iv. Energy poverty

Energy poverty divides the world into people who have electricity and those who do not have it. The divide is shown clearly in satellite pictures of the earth at night. Flickering lights shine across Asia, Europe and America, while large parts of Africa are simply pitch black. The Netherlands, a very small country compared with the sub-Saharan Africa, produces as much electrical power annually (20 gigawatts), as produced by all the 47 countries of sub-Saharan Africa excluding South Africa. These 47 countries add every year some 1 gigawatt of electrical power, nearly the same as what China adds every two weeks or so.

Energy poverty is the result of some specific circumstances or their combinations in different regions. High demands caused by economic growth and population explosions in urban areas tend to overwhelm power supply, starving rural regions of power. High prices of oil and natural gas mean rationing of power in poorer countries. Some countries suffer from prolonged droughts that cripple power supply afforded by hydraulic power stations.

Energy poverty inhibits access to knowledge and development of business links. Without continuous and reliable electricity supply, one cannot have Internet, or any other forms of email and e-commerce. Such advanced communications allow people to combine localisation with globalisation, i.e. people can work from remote rural places without having to move to the cities. This is in evidence in South India and it could help in a small way to arrest uncontrolled growth of big cities and help to create sustainable villages. Here again, a form of energy poverty can hit a business, where people could work profitably in three shifts a day but for the enforced power cut of six hours every day!

Energy poverty poses a problem with unevenness in ability of people to cope with the climate change. Lowering water levels and rising temperatures have devastating effect on crops like the giant white corn in Peruvian valleys, where networking of electricity is not adequate enough to get water supply from elsewhere or from underground sources. Those having access to electric or similar power and tools will be better able to cope with environmental difficulties, e.g. build higher wall protection against flooding or alleviate problems such as shortage of water by drilling deeper wells or using desalinated seawater, etc.

Loss of power supply, caused by climatic conditions or overloading of the system, can have disastrous effect on lives of people and their economic progress, if it becomes a recurring problem. However, problems generated by energy poverty are rarely discussed at international level.

v. Loss of biodiversity

Biodiversity means existence of various species as complementing each other, i.e. all the life on Earth (marine, terrestrial and freshwater creatures) and ecosystems, and the species that live in them (plants, fungi, animals and micro-organisms). Biodiversity also concerns behaviour of ecosystems and the species, and their interactions and ecological processes. Biodiversity is also linked with non-living components on the earth, i.e. the oceans, atmosphere, freshwater systems, geological formations and soils. All these components form one great interdependent system called the biosphere. Scientists have discovered and described some 1.7 or 1.8 million species of plants, fungi, animals and microorganisms in the biosphere. Estimates of unidentified species could add and make the number of species as large as 100 million.

Historical events

The planet earth is four billion years old and the life on earth is two billion years old. During these two billion years, there has been natural extinction of species at a very, very slow rate, whereby a species might have

lived for a million years on average. However, it is believed that there have been five massive and catastrophic events over the centuries, resulting in extinction of an extremely high proportion of species at different times. The most recent one of these events took place some 65 million years ago, when dinosaurs were wiped out from the earth. An asteroid apparently smashed into the area (which is now Mexico) and the impact produced a large and thick dust cloud, which brought about global cooling, as low as freezing level, and starved a large proportion of the earth's plants and animals. As opposed to this mass extinction event, there have been localised and wide-scaled extinctions of species during the tens of thousands of years of human existence, mainly because the human groups moved from place to place for seeking sustenance. Some 12,000 years ago, ancient human beings entered North America and wiped out many local species including sabre-toothed tigers and woolly mammoths.

Scale of the recent loss of biodiversity

The modern age has witnessed a severe impact of globalisation and human activities, amounting to "earth's sixth great mass extinction". Environmentalists believe that it is unfolding at a scale equal to the asteroid impact or any of the disasters that might have caused the five mass extinctions. For some forty years, the International Union for the Conservation of Nature (IUCN) has been assessing the reasons for extinction of the known plants and animal species. The IUCN Red List shows that mass extinctions, driven by human beings, have occurred in many places, e.g. in Hawaii islands after arrival of the Polynesians in 400 AD. These were terrible events but they were local in nature at certain times. We are now witnessing extinction of species happening all over the world at the same time. While it may perhaps be possible to clean rivers and even reverse the climate change, loss of species is irreversible. Perhaps one could dream that the new techniques such as cloning may help in a very small way for regeneration of a few species!

Rapidly accelerating loss of biodiversity, i.e. irreversible extinction of plants and wild life, is the outcome of factors associated with global flattening and crowding, for example:

a. Loss of land due to urbanisation and road-building
b. Extraction of natural resources and over-fishing
c. Adverse effect of pollution on rivers, coral reefs and tropical forests
d. Disrupting of ecosystems by intervention of human activities

The natural world has paid heavy price attributable to our quest for betterment of human life, e.g. efforts for making economic progress and avoidance of disease and destitution. Half the world's tropical and temperate forests have disappeared, with deforestation continuing at a rate of one acre per second. Half of wetlands and third of the mangroves are gone. Species are disappearing at a rate of about thousand times faster than normal. 90% large predator fish are gone and 20% of corals are gone, with further 20% severely threatened. In China, the Yangtze River Dolphin has been officially declared as extinct in 2007.

In places like Papua in Indochina, many trees are failed and sold for less than $100 each. These trees reach China to make furniture that is sold for thousands of dollar in the West. If the people in Indochina can be educated, they could gain value-added skills that could lead to making furniture and produce wealth some 100 times more, which could lead to reduction in the rate of cutting down the trees.

Importance of biodiversity to human existence

Various creatures, rivers and mountains have many values in different places, including aesthetic, nostalgic, religious and spiritual values. However, the ecosystems afforded by biodiversity have a very important role in providing practical benefits for human beings. For example, lakes provide water and breeding places for fish. Forests provide flora and fauna, as well as protection against erosion of land, habitat for insects that pollinate plants or attack crop pests, and plants that take CO_2 naturally out of the atmosphere. (Deforestation accounts for some 20% of all CO_2 emissions.)

All these tasks will be impossible for the human beings to do, even with advanced mechanisation and even if some choose to live in a world without plants and animals, or to live in cities built with stainless steel buildings. We are degrading and destabilising nature through digging up soils, flattening hills and burning forests or cutting down trees indiscriminately for cultivating crops and building houses.

vi Combined influence of the problems, illustrated by the situation in China

China is developing fast today but it may have to cope with serious problems resulting from industrial pollution. In 2020, the population could rise to 1.5 billion people. The cities will grow while the desert areas

will be expanding. According to Pan Yue, the Deputy Minister of China's State Environmental Protection Agency, pollution causes a loss of between 8 and 15% of the gross domestic product. 33% of the population is breathing polluted air, and only 20% of the refuse in cities is treated in an environmentally acceptable manner. Five out of the world's most polluted cities are in China. Some 25% of the people have no access to clean drinking water. About 80% of the deadly cases of cancer result from pollution. Acid rain falls on some 33% of the land. Nearly half of the water flowing in the seven major rivers has become polluted, so much that any heroic act like Mao Zedong's legendary swim in Yangtze River would now amount to a suicide attempt!

Taking development in China alone, the environment has to cope with some staggering challenges coming out of phenomenal statistics:

a. Laying of 52,700 miles of new roads
b. 14000 new cars on roads each day; 130 million cars by 2040 or 2050 (It is probable that the number of cars in China could exceed that in the USA by 2040 or 2050.)
c. Relocation of 400 million people to newly developed urban centres between 2000 and 2030, leading to erection of half the number of new buildings expected to be built in rest of the world.

(Chinese buildings are expected to be less energy efficient, some three times less efficient than the German building. The whole of the growth will represent, therefore, a sizeable increase in CO_2 emission.)

Chinese travel a lot and, by 2020, 10 to15 million Chinese are expected to have vacations overseas. This places demands on aeroplanes, runways and airports, and, in the end, increase in traffic problems and emission of greenhouse gases.

For a long time in the past, Chinese administration has not been paying attention to environmental issues, as shown by the construction of the Five Gorges dam where a large area of forest and natural habitat of animals was sacrificed. Chinese often say that the West had industrial revolution based on coal and oil. People in the West should not preach environmental principles to China, since the West has been polluting the atmosphere for over150 years. The answer lies in the simple fact that, in the long-term, the growth in domestic product will be offset disproportionately by the disadvantages of greenhouse gas emissions or, put in a plain language, choking with pollution. Furthermore, America is likely to invent all the clean power and energy efficiency tools, called the next great global industry. If China does not change its course, it may end up buying these tools from the USA and being dominated by the USA in such great new industries.

5. EXPECTATIONS FROM THE FUTURE

i. Planned changes China

It is encouraging to see that the 11th Five Year Plan in China has set ambitious targets for reducing energy intensity (energy consumption per unit of GDP) by 20% below 2005 level across the country by 2010. This will mean avoiding about 1.5 billion tons of CO_2 emission. This is five times as ambitious as that announced by European nations under the Kyoto Protocol and it is viewed with scepticism by experts.

It is encouraging that there are some entrepreneurs like Shi Zhengong, a Chinese billionaire and a leading maker of silicon photovoltaic cells in a factory near Shanghai, which convert sunlight into electricity. His market is largely abroad but the China market will soon open up as the prices of solar cells come down. China is also developing wind energy capacity. During 2005 and 2007, there was 100% growth and the wind development target of 5000 megawatts, set for 2010, was met well in advance.

Rob Watson, a leading energy consultant has commented on China's clean energy technology and said, "China is just beginning to move from copying to creating. The last time they were in full creative mode, they invented paper, the compass and the gunpowder!"

ii. Recent developments in America

Initiatives in some States and efforts of some individuals

America is witnessing some local developments in the field of energy conservation, in spite of the USA policy under George W Bush. Such developments are destined to undergo nationwide applications during the presidency of Mr Obama.

For example, California would have needed high-energy efficiency standards after the 1973-74 oil price shock. This resulted in keeping the energy demand level almost level for some thirty tears, in spite of the vast expansion in the economy that might otherwise have required some fifty large 550-megawatt power plants. California greenhouse gas emission is half that of the rest of the USA. Saving in electricity bill has been some $1000 per person per year and the economy has grown an extra $30 billion, an extra 3% over that of the USA. Another example is that of the design development by Texas instruments, which has proved that designing green can save money. They successfully built a microprocessor factory in the Dallas area in 2005 for a cost less than $180 million compared with the cost estimated in 1998. They saved cost by designing just a two-storey building, resulting in savings in square footage and all the mass and energy needed to support it, including such measures as efficient air circulation and recovery of heat, affording huge savings on chillers. Additionally, the efficient design will bring benefits to the running costs, through reduced fuel bills.

Reinventing America and the West

America has excelled as an industrial power in the nineteenth century, as a global industrial power in the twentieth century and as a global information technology society in the twenty-first century. The USA must reinvent itself as the world's greenest country now, not to serve a moral or charitable cause but in the interest of its national and economic security. Green does not only mean a new form of generating electric power but it is a new form of generating national power. It is not just about lighting up our homes – it is about lighting up the future.

The future may seem to bring dangerous times but, simultaneously, there could be opportunities that a country can take and a country must be at its best to take these opportunities. On an optimistic note, some young people in Western developed countries seem to be ready for such opportunities. Common people as well as soldiers, e.g. from the UK and USA, are serving in conflicts in Iraq and Afghanistan. These people believe that their efforts and sacrifices could rebuild those countries. The same people, together with people of similar courage and character, could surely enlist vigorously in nation-building at home and assist in reviving and reinvigorating their countries to realise their full potentials. In the USA, such Americans, have elected Obama in record-breaking numbers. Obama's election is a victory against heavy odds, a victory for the people seeking change.

It is refreshing to learn from the front page of “The Independent” (20 November issue, London), that Obama has given a speech, on the verge of becoming the President, making a clear pledge that America will play a full part in renewing the Kyoto Protocol climate-change treaty. His speech contains many points from his pre-election policy. Obama has indeed paved the way to eradicate USA isolation from rest of the environmentalist world! He will have serious financial problems to deal with at the beginning of his Presidency, most notably the survival of car manufacturing jobs in Detroit. Lobbyists from the big three car manufacturers (Ford, Chrysler and General Motors) had influenced George W Bush in the past to adopt his non-green policies. It must seem ironical, therefore, that Obama, a champion of green policies, should face the prospects of bailing the car industry out through funds of the order of $25 billion.

Barack Obama has described the country's dependence on oil as " one of the greatest challenges faced by the USA". He also believes that the doubling of oil prices in year 2007 was a crisis for millions of Americans and that the transfer of wealth to oil producing countries can present a threat to the national security, since many of these countries are hostile to the USA interests. Obama's administration will seek to crack down on excessive energy speculation, which has contributed to the skyrocketing price of oil on world markets. Obama will make an effort to have a simple legislation to increase transparency of the market to help bring oil prices down and prevent speculators and traders from unfairly lining their pockets at the expense of the American people.

For decades in the past, American politicians have been under undue influence of the automobile industry and they have shown more interest in getting through elections than pursuing long-term solutions for getting America closer to energy independence. Obama, however, would wish to act quickly and boldly to transform the entire US economy into a new economy that is powered by clean and secure energy.

According to Obama, the USA should achieve a reduction of national greenhouse gas emissions of 80% by the year 2050. To attain these tough targets, Mr. Obama would like to see a national cap-and-trade system, similar to the one recently announced in Ontario and Quebec. The government would auction off all of the emissions permits, forcing companies to pay for all of the carbon they emit. The revenue generated from these permits is expected to be between $30 billion and $50 billion. This amount could be used to develop green technology and to scale up its use across the country, which could create new jobs in the USA.

6. GREENING AMERICA TO GREEN THE WORLD

In the end, there is some hope if, under the stewardship of Barack Obama as the President, America becomes green and helps the world to become green as well. The world needs massive breakthroughs in clean power and a deeper respect for the world's basic resources, i.e. the forests, oceans and biodiversity hot spots. If all we ever do is what we have ever done, then all we will get is all we already have, which will mean continued worsening of world's resources. Things will have to change and change fast, if we want things to stay as they are, i.e. to maintain our habitable planet with its flora and fauna, and growth of human communities in a sustainable manner.

The right way must be for the USA to make big front-end investments in the new clean and green technologies, just as they did with personal computers, digital videodiscs and i-Pods. It should then be possible for the low-cost service economy in India and manufacturing platform of China to get the costs of new technologies down to levels affordable for the less well-off parts of the world. If America could not grasp this opportunity, perhaps India and China would go ahead and work out solutions that could be slow to start with but far better than none at all. However, it remains a fact that a green America is essential for making the rest of the world green. Greening does not necessarily mean just using the American strength to save the tropical forests, weaken the hurricanes or make the Petro-dictators poorer. It really means using American power, so that the world’s disadvantaged populations can improve their lives and realise their aspirations as well.

The way forward must include a new clean energy system to drive all economies forward and bring more people out of poverty without despoiling the environment. According to John Dernbach, an environmental law expert, decisions about sustainable development are not just technical decisions about the environment or peripheral matters. These decisions are about the kind of world we wish to live in now and how we wish to be remembered by the future generations.

We are the first generation of the Energy-Climate Era and we must see to it that the future generations are able to meet their needs, just as we have managed to meet our needs. The future depends upon our ability to think strategically about how to mitigate what we can and adapt to what we cannot mitigate. If we do not make a start and progress rapidly, the human race could soon be forced to pay severe and punitive true costs of climate change, energy poverty, biodiversity loss and ill effects of nurturing petro-dictatorships with transfer of wealth. We have to innovate our way through new possibilities that may seem unimaginable at present. However, the longer we wait to set out on such strategic path, the deeper the pail out of which we will have to climb!