

NOW IS THE TIME TO MOVE BEYOND PETROLEUM

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Today we stand at a crossroads in history. The warnings from our most respected scientists are loud and clear, yet government leaders continue to ignore the scale of the threat. According to many scientists, we have less than a decade left to address the issue of climate change before we reach the "tipping point", or the point of no return. The earth is perilously close to dramatic climate change that threatens to spiral way out of control. Scientists now generally accept that current pledges of 20% greenhouse gas emission reductions by 2020 are inadequate given the gravity of the current situation: we have already reached the threshold of dangerous climate change. The task now is to prevent catastrophic climate chaos. Failure to act effectively is likely to precipitate cataclysmic changes that may obliterate life on earth.

Our addiction to oil is dangerous and unsustainable. Our oil supply is finite, and the dwindling reserves simply cannot cope with our ever increasing demand. To compensate for the diminishing supply, oil companies have been attempting to reach reserves in deeper and more dangerous waters - often with environmentally catastrophic consequences.

If we remain locked into an inefficient, polluting, fossil-fuel based global economy, we will exhaust the Earth's natural resources, cause irreversible environmental destruction and we will accelerate climate change. This will have a disastrous impact on communities, livelihoods, ecosystems and economies across the globe; it will leave a legacy of devastation for future generations. We cannot maintain this status quo. Now is the time to decide if we are willing to die for fossil fuel, or if we have the courage and commitment to move beyond petroleum and shift from conventional to renewable energies, and embark upon what I call a new Copernican Revolution. It is vital if we are to bring the atmospheric concentration of CO² back down to safe levels.

350 ppm

Professor James Hansen, head of the NASA Goddard Institute for Space Studies observed in March 2009 that "eleven of the past twelve years rank among the twelve warmest years since records began." He is emphatic about the urgency of reducing CO² levels, stressing the fact that "the safe upper limit for atmospheric CO² is no more than 350 parts per million (ppm)." As of today the planet already has a concentration of around 387 ppm. This number is rising by around 2 ppm every year. Professor Hansen is unequivocal that: "If you leave us at 450ppm for long enough it will probably melt all the ice - that's a sea rise of 75 meters. What we have found is that the target we have all been aiming for is a disaster - a guaranteed disaster."

Time is running out. We must cut carbon emissions drastically, and immediately, to reduce the levels of CO² in the atmosphere to 350 ppm. The world situation is deteriorating faster than previously anticipated. In Professor Nicholas Stern's words "Global emissions of greenhouse gases are growing more quickly than projected; the ability of the planet to absorb those gases now appears lower than was assumed, the potential increases in temperatures due to rising gas concentrations seem higher, and the physical impacts of a warming planet are appearing at a faster rate than expected"... Professor Stern has revised his initial estimate of the cost of keeping greenhouse gases from rising to dangerous levels. His 2006 report said countries needed to spend 1% of their GDP to prevent catastrophic climate change. In June 2008 he admitted that he had underestimated the threat and

increased the cost to 2% of GDP. In 2009, Professor Stern endorsed the 350 ppm target as "a very sensible long-term target."

Never before has humanity been so overwhelmed by such massive and urgent concerns; climate chaos, economic crisis and explosive population growth. According to the UN, the world's population may reach 9 billion by 2050. As a result, the world's energy needs may increase by as much as 50% in the next fifteen years.

Already more volatile and destructive climatic effects are becoming apparent - as we can see from Pakistan floods and the extreme temperatures in Russia this summer. Some of the world's poorest, most vulnerable and least able to adapt are being worst affected, with small island states such as Kiribati and the Maldives and low-lying developing countries like Bangladesh already on the 'frontlines'. The economic costs of these have been estimated by the Global Humanitarian Forum already to be \$125 billion per annum and will nearly treble to \$340 billion per annum by 2030.

Climate change is not just an environmental threat but a critical human rights issue which touches every aspect of our lives: peace, security, poverty, hunger, health, mass migration and economics.

Peak Oil

Scientists have been predicting Peak Oil since 1956. Until recently, these prognostications have been perceived as distant threats or some sort of myth, rather than an immediate risk. The latest warning has come from the Joint Operating Environment report from the US Joint Forces command, released in April 2010, which warns, "By 2012, surplus oil production capacity could entirely disappear, and as early as 2015, the shortfall in output could reach nearly 10 million barrels (mb) per day." Some individual countries have already reached their peak oil moments - among them, the USA in 1970 if you exclude Alaska, the UK in 1999. But the issue is now a global one.

The International Energy Agency (IEA) has observed a decline rate of 5.1% per annum for 580 of the world's largest oilfields. On present trends, just to replace oil reserves that will be exhausted and to meet the growth in demand, we will need 64 mb/day of new capacity between now and 2030 - that is six Saudi Arabias, or roughly one Saudi Arabia coming on-stream every three years.

There are some less pessimistic voices on Peak Oil. The UK Energy Research Centre found that a peak in conventional oil production before 2030 appeared likely, but with a significant risk that it would occur in the current decade. The pessimists operate on the thesis that the peak has already occurred - Kenneth Deffreys, author of *Beyond Oil*, claims that oil production peaked in December 2005. The CEO of Brazilian oil giant Petrobras, Mr. Gabrielli, gave a gloomy forecast in December 2009 saying oil production would peak this year (2010) and that a new Saudi Arabia was needed every two years.

In order to maintain our current consumption rates, it will take vast amounts of oilfield discovery, investment and drilling. The Peak Oil debate often suggests a steep production decline will set in past the peak, but it may actually be more about how long the oil production 'plateau' will last. Regardless of the exact timing of the peak - past, present or future - the critical issue is growing demand. Chinese oil demand could double by 2030. Chinese car growth at 28% per annum over the last decade would, if it carried on, mean that their vehicle fleet will overtake the USA's by 2017. John Mitchell, Associate Fellow at Chatham House, notes an interesting 'tipping point' in 2015 when Asian oil import demand will exceed the Middle East's exportable oil surplus.

In a rather perverse way, Peak Oil may be good news. It may be good news because we are sleep-walking our way to climate disaster. Small annual increases in atmospheric CO² concentration do not give us enough of a wake-up call. Peak Oil will. Prices will spike and

become volatile, supply chains may be disrupted and our entire lifestyle based upon cheap and abundant fossil fuels will come under intense pressure. We have grown used to just-in-time global production, foodstuffs being flown all around the world and car-led suburbanization. We need to get ready for a more localized world.

However in our desperate scramble for new oil supplies, we are making dangerous moves - to ever deeper offshore drilling and to oil exploration in the Arctic. These activities contain not only immediate risks, but their long term consequences may threaten our survival and the survival of future generations.

Crimes against Present and Future Generations

In their irrational pursuit for our planet's natural resources, multinational corporations, especially oil companies, have destroyed ecosystems and marine habitats, wiped out precious biodiversity, fauna and flora, and endangered the livelihood of communities worldwide. They have caused some of the worst environmental disasters and human rights abuses happening in our world today, for the most part, with total impunity. Now, more than ever, we need to hold these companies to account and put an end to their reckless exploitation of the environment, which is threatening to destroy our way of life.

According to a study by the Vale Center at Columbia University, there are over 2,600 bilateral investment treaties and another 250 free trade agreements that protect multinational corporations' business interests. These treaties are supplemented by a number of other relevant multilateral agreements and customary international law, along with complementary principles applied by international financial institutions such as the World Bank and the International Monetary Fund.

In response to the lack of instruments which seek to protect local communities and the environment from the potentially harmful consequences of multinationals corporations' activities, I have been working with a number of academics and legal experts to develop a legal framework and definition of Crimes against Present and Future Generations. Such crimes are 'acts or conduct committed with the knowledge of their severe consequences to the health, safety, or means of survival of present and future generations of humans, and also to the survival of entire species or ecosystems.'

I would like to present to you five case studies of what could amount to Crimes against Present and Future Generations, committed by oil companies. If Crimes against Present and Future Generations were recognized, and if appropriate mechanisms had existed, these companies could have been answerable to an international court of law.

1. BP and the Gulf

The recent BP Oil Spill in the Gulf of Mexico is one such example. It was, to quote President Obama "the greatest environmental disaster of its kind in history."

The spill is, to date, the US's biggest accidental oil spill, and the long term ecological impact is still unknown. Every day, for 87 days, an estimated 53,000 to 62,000 barrels of oil gushed into the Gulf of Mexico waters. To put this number into some context, every five days of flow equaled the Exxon Valdez spill. By the time a containment cap was fitted on the leaking wellhead on 16 July, around 4.9 million barrels of oil had flowed into the ocean. The well was finally plugged, by drilling a relief well and pumping in cement, on 19th September. The BP oil spill has highlighted the US government's incestuous relationship with BP and other oil companies, and the wholly inadequate regulatory oversight of the oil industry. The BP 583-page disaster response document had been so shoddily put together that it included the telephone number of an expert on sea turtles who died in 2005 and identified saving walrus (which do not live in the Gulf!). The draft response plans prepared by Exxon, Chevron, Shell and ConocoPhillips in case of an oil spill in the Gulf, are much the same. BP was named by *Mother Jones* magazine as one of the "ten worst corporations" in both 2001 and 2005 based

on its environmental and human rights records. In 1991 BP was cited as the most polluting company in the US based on Environmental Protection Agency toxic release data. According to research conducted by the Public Interest Research Group, between January 1997 and March 1998, BP was responsible for 104 oil spills.

Throughout the incident, BP showed an appalling lack of transparency, withheld crucial data and conducted a relentless and costly PR campaign, spending \$93 million on advertising between April and June (three times their usual expenditure on PR), in an effort to mislead the public. Initially, BP released information which estimated the spill at just 1,000 barrels of oil per day." Only after the US government conducted its own investigation did the company grudgingly admit that a far greater amount of oil was leaking in to the ocean. The announced flow rate was increased to 5,000 barrels of oil per day at the end of April, to 12,000 by the end of May and to the eventual true range of 53,000 to 62,000 barrels per day.

The National Oceanic and Atmospheric Administration (NOAA) estimated that of the 4.9m barrels spilled, about 0.8m barrels were siphoned off directly from the well. The NOAA concluded that around a quarter of the oil remained, after deducting the oil that had been skimmed, chemically dispersed, evaporated, burned or naturally dispersed by helpful oil-eating bacteria. However there are considerable doubts about these estimates, which have given the public a false sense of confidence that three-quarters of the oil in the Gulf was gone. A case of "out of sight, out of mind". Concern still remains for the ecological damage to coastlines of the underwater oil - missing oil has been found in the form of large oil plumes, one the size of Manhattan, which do not appear to be biodegrading very fast. To put it into numbers we can all understand: one quarter of the oil spill represents over 50 million (US) gallons still in the sea - and some estimates go as high as 75 million gallons.

At the end of May, the Obama administration imposed a 6-month moratorium on deep water drilling projects. It was opposed by District Judge Martin Feldman who upheld the plaintiffs' argument that a moratorium would have a devastating effect on employment and livelihoods in the region. The US government appealed the decision. In the meantime, Interior Secretary Ken Salazar announced on 12 July a new 6 month moratorium on deep-water offshore drilling. It is expected to remain in place until the end of November but has been vigorously attacked by the oil industry giants, who have secured exemptions under special circumstances, i.e. if drillers show that safety concerns have been met. Worryingly, there are still about 400,000 'orphaned' and supposedly sealed oil and gas wells in the Gulf of Mexico. Many of these wellheads are old, made of steel and rusting: they too pose a long-term ecological threat.

In the wake of BP's Gulf of Mexico disaster, governments across the world are becoming increasingly concerned about deepwater drilling. The British government is currently investigating the safety of the regime in the North Sea. While this is encouraging, it is not enough. We need to establish a permanent, global moratorium on offshore drilling and have a legally binding mechanism that prohibits companies from engaging in hazardous platform oil and natural gas drilling. Yet despite this catastrophe, drilling is currently being undertaken off the coast of Greenland - an environmentally sensitive area - with Cairn Energy recently reporting oil at a depth of 500m.

Safety for BP does not seem to be a priority. The New Orleans Times-Picayune sums it up well: "Throughout the Gulf oil spill, BP's high-ranking officials have touted what they call the firm's culture of safety and responsibility. But that self-proclaimed culture of safety is not what's reflected in the shortcuts BP engineers took on the Deepwater Horizon rig, ignoring warnings and leading to the death of 11 workers and the worst oil spill in the nation's history."

2. Texaco/Chevron in Ecuador

Other oil giants have an equally poor human rights record. Between 1971 and 1992, Texaco embarked upon reckless oil exploration, pumping 1.5 billion barrels of oil from Ecuador. Texaco carved over 350 oil wells in a rainforest area roughly three times the size of Manhattan and dumped approximately 18.5 billion gallons of oil contaminated water into some 1,000 unlined open toxic waste pits some just a few feet from the homes of residents. Highly toxic wastewater by-products of oil extraction from these pits contaminated the entire groundwater and ecosystem in one of the world's most valuable rainforests. As there is no running water in the region 30,000 people, including thousands of children, have no alternative but to drink, bathe, and cook with poisoned water from streams, rivers, lagoons and swamps that have been contaminated by Texaco. Texaco saved an estimated \$3 per barrel of oil produced by handling its toxic waste in Ecuador in ways that were unthinkable and illegal in the US. The Cabrera Report found that Texaco's pollution caused 2,091 cases of cancer among residents and led to 1,401 deaths from 1985 to 1998. Ecosystems have been destroyed, crops have been damaged, farm animals killed, and diseases have proliferated. This is the toxic legacy left by Texaco for future generations. A billion dollar lawsuit has been moved from U.S. courts to Ecuador as Chevron (Texaco was acquired by Chevron in 2001) seeks to delay payment and avoid facing up to its responsibilities.

3. Nigeria

A similar example exists in the Niger delta in Nigeria where reckless oil exploitation by Shell, Chevron, Total, ExxonMobil and Eni has led to human rights abuses, death, disease, poverty and environmental destruction. Life expectancy in the region has fallen to just over 40 years of age. According to a May 2010 report by John Vidal, environment editor of the *Guardian*, "more oil is spilled from the Delta's network of terminals, pipes, pumping stations and oil platforms every year than has been lost in the Gulf of Mexico." On 1 May, a ruptured ExxonMobil pipeline spilled more than a million gallons into the Niger Delta. Local people demonstrated against the company but claim they were attacked by security guards.

Ben Ikari, a member of the Ogoni tribe from the Niger Delta states: "If this Gulf accident had happened in Nigeria, neither the government nor the company would have paid much attention. This kind of spill happens all the time in the delta. The oil companies just ignore it. The lawmakers do not care and people must live with pollution daily. The situation is now worse than it was 30 years ago. Nothing is changing. When I see the efforts that are being made in the US I feel a great sense of sadness at the double standards. What they do in the US or in Europe is very different."

The Nigerian government is directly involved with oil exploitation and over the years has shown no political will to regulate the oil sector. The results of a three year investigation into oil pollution in the area, by the UN environment program (UNEP) were released in August 2010. The report states only 10% of the oil pollution in Ogoniland has been caused by company negligence, and concludes that 90% of the spills area result of local people illegally stealing oil and sabotaging pipelines. Local environmental groups argued that the study, which was paid for by Shell and commissioned by the Nigerian government, who both have massive oil interests in the region, was unbalanced.

4. The Timor Sea

Further east, some 3,500 fishermen in Antralamor, Indonesia are preparing to migrate to Sumatra to find a new livelihood. Their fish catches from the Timor Sea have declined drastically since the waters were polluted by a major oil spill originating in Australian territory, after an explosion on an oil rig of Thai-based oil company PTTEP Australasia in the Montara oil field in the West Atlas Block in the Timor Sea in August 2009 which took 74 days to seal. The Indonesian government is now seeking compensation from PTTEP.

5. Canada

In Canada, the Athabasca oil sands are large deposits of bitumen, or extremely heavy crude oil, located in northeastern Alberta. These oil sand deposits lie under 141,000 square kilometers of sparsely populated boreal forest and peat bogs and contain about 170 billion barrels that are considered to be economically recoverable with modern unconventional oil production technology, making Canada's total oil reserves the second largest in the world, after Saudi Arabia's.

Critics, including the Pembina Institute and the University of Alberta, contend that government and industry measures taken to minimize environmental and health risks posed by large-scale mining operations are woefully inadequate, causing damage to the natural environment. In particular extracting the tar sands requires huge quantities of water and waste material left behind threatens the water ecosystem. According to a 2009 study by Argonne National Laboratory, it takes four to six gallons of water to produce one barrel of tar sands oil, which is four times more water than it takes to produce oil from conventional reserves. Moreover, producing tar sands oil, according to the Natural Resources Defense Council, generates as much as three times as many greenhouse gases per barrel as conventional oil production.

On 14 May 2008, the Beaver Lake Cree Nation, a small Indian community of 900 people in eastern Alberta, filed a lawsuit against the Canadian Federal and Alberta provincial governments, identifying more than 16,000 infringements that are contributing to the destruction of the environment, the loss of traditional areas, and the decline in wildlife populations and fish stocks within their territory. These infringements are making it impossible for the Cree Nation to exercise their Treaty Rights.

The Gulf of Mexico, Ecuador, Nigeria, the Timor Sea and Canada can all be used as case studies of what could constitute Crimes against Present and Future Generations. Damaged and polluted ecosystems and marine habitats may take many decades to recover. Safety standards and respect for the environment and communities have not been a priority for oil companies. They have failed to adopt even an adequate safety record - all in the single-minded pursuit of maximum profit. The mantra is "maximum production and minimum cost." In the USA, tougher environmental laws and a political backlash may force BP to pay for its clean-up and to cover for economic losses, but in other jurisdictions, the oil companies can successfully hide or limit their culpability for spills and dumping. As Amnesty International noted in a special report, "A lack of accountability and the inability of those affected to access justice or receive adequate reparations or remedies has perpetuated the context of human rights violations and encouraged them to occur again and again."

The new Arctic 'frontier'

Recent developments in the Arctic are also a cause for concern. The five Arctic coastal states (Canada, USA, Norway, Russia and Denmark, which is responsible for the external affairs of Greenland) are coveting the increasingly ice-free and pristine waters of the Arctic as the next oil bonanza. This also could be a potential flash point with Russia already making bold territorial claims. As climate changes lead to ice melting in this region, these states will seek to find ways of extracting the estimated 90 billion barrels of oil locked away, of which 84% is offshore. The US Geological Survey suggests that a quarter of the world's undiscovered oil and natural gas is in the Arctic.

However there is no equivalent to the Antarctic Treaty in place. The promised hydrocarbon bonanza is already manifesting itself in territorial claims - such as between Canada and Greenland over tiny Hans Island or Russia's act of planting a titanium flag underwater on the Lomonosov ridge to stake a claim on a huge exclusive economic zone. As previously ice-bound seaways open up through the Northwest passage and the Eurasian Northern Sea, disputes may rage over international navigation rights. Already countries are starting to

develop military capabilities to be able assert their claims. President Putin has recently declared that conflicts should be solved in partnership, but then the oil rush has not even started.

The other unintended consequence of the warming of the Arctic is the release of methane (CH⁴) at the surface, when the ice under the tundra melts as a result of reduced snow cover and a darkening landscape. Oil drilling will further increase the risk of methane being released, especially if drilling is done into methane hydrates below the sea bed. Methane gas was previously thought to be 21-23 times more potent than CO² but there are some scientists who now contend that the harm may be much worse. Recent data from the *International Journal of Climate Change* suggests methane is 100 times more powerful a greenhouse gas than CO² in the first five years.

David Wasdell, Director of the Apollo-Gaia Project notes: "Feedbacks are temperature driven, so the hotter the temperature, the more bacterial activity, more methane is emitted. Thawing of the tundra permafrosts releases methane, increases greenhouse gas and increases global heating. Finally, the warming of the shallow seas could start to release the methane held in frozen crystal form in the sea bed and that would be a long term but potentially very powerful dynamic feedback."

I was alarmed to read a recent report in the *Guardian* that, in a bid to shore up its precarious energy security, Japan is to start commercial test drilling for controversial frozen methane gas along its coast next year. The gas is a sherbet-like substance consisting of methane trapped in water ice and is sometimes called "fire ice". Concerns have been raised that digging for frozen methane would destabilize the methane beds, which contain enough gas worldwide to snuff out most complex life on earth. Any leakage from wells could be a major environmental problem.

Meanwhile, indigenous Arctic people with a reliance on the environment for hunting and fishing will find their traditional livelihood threatened, by warming, coastal erosion, oil spills and migration of species. If you think I am exaggerating, you need look no further than Alaska. The Alaska Inter-Tribal Council (representing 229 tribes) officially opposes any development of the Alaskan National Wildlife Reserve (ANWR.) In March 2005, Luci Beach, Executive Director of the steering committee for the Native Alaskan and Canadian Gwich'in tribe said "drilling in the ANWR is a human rights issue and it's a basic aboriginal human rights issue....60-70% of our diet comes from the land and caribou is one of the primary animals that we depend on for sustenance."

Other examples from Alaska include a 2006 resolution passed in Kaktovik which called Shell Oil "a hostile and dangerous force" for its lack of respect to the community and its failure to work with villagers on the protection of bowhead whales; and a \$400m public nuisance lawsuit against ExxonMobil, Shell, BP, Chevron and ConocoPhillips and Peabody Energy filed by Kivalina, a community threatened by rising sea levels.

Drilling in the Arctic is a serious threat - it would increase the risk of runaway climate change, and push us closer to the point of no return. As these formerly inaccessible areas are opened up, resource exploitation will in turn lead to additional greenhouse gas emissions, further accelerating climate change. If we want to avoid catastrophic climate change and avoid climate disaster, we need to instate a moratorium on drilling in the Arctic.

I will now address the options we have left.

The new Copernican Revolution

President Obama called the current crisis in the Gulf a "painful and powerful reminder," that "the time to embrace a clean energy future is now." Promoting renewable energy must now become a global and universal priority. Nothing is macro-economically more necessary, but ultimately cheaper than the conversion of our energy systems from conventional energy to

renewable energy. By investing in sustainable industrial development based on technological innovation and resource efficiency, nations, regions, cities, and communities can promote economic growth, improve their standard of living, and expand businesses, jobs, and incomes through green savings.

The arguments that renewable energy does not provide sufficient or affordable alternatives to traditional energy sources have been exposed as flawed and false. "If there is reason for optimism, amidst the dire warnings," states *The Economics of 350* report, "it is this: the costs of insuring the planet against climate disaster are not prohibitive. The best estimates of the costs of a vigorous, immediate effort to rebuild the world economy around carbon-free technologies are still in the range of one to three percent of world output (GDP) per year, even with the more stringent emissions reduction goals we are supporting." That equates to a total cost of about \$0.7 trillion to \$2 trillion which would then be spread over the years required to make the transition.

In order to achieve a renewable energy revolution we must democratize and decentralize energy production and consumption.

President Obama's New Energy for America originally called for a federal investment of \$150 billion over the next decade to help promote private efforts to build a clean energy future. Specifically, the plan targets renewable energy to supply 25% of the nation's electricity by 2025. The plan's other objectives include creating 5 million new jobs, saving more oil within the next decade than the United States currently imports from the Middle East and Venezuela and putting 1 million plug-in hybrid cars on the road by 2015. Regrettably this pledge, part of his first national budget proposal, has been removed from the White House website over the summer.

The US Energy Information Administration has renewable energy accounting for 10.8% of US domestically produced electricity in the first six months of 2010. Of this, hydroelectricity is the largest source of renewable power, producing 62% of the total renewable power in the US.

Wind power is a fast growing industry in the United States, where it is the world leader with a 22% world share. US capacity has doubled in the last three years, but worth noting that China's wind power capacity has doubled in each year for the last five years. American Wind Energy Association 2009 figures show that installed U.S. wind power capacity now is enough to serve 9.7 million average households. When the U.S. wind industry began in California in the early 1980s wind-generated electricity cost 38¢ per kilowatt-hour. Since then it has dropped to 4¢ or below at the best wind sites and some U.S. long-term supply contracts have been signed for 3¢ per kilowatt-hour. By 2010, wind farms at prime sites may be generating electricity at 2¢ per kilowatt-hour, making it one of the world's most economical sources of electricity.

California Governor Arnold Schwarzenegger said on 1st September that he would work to help push through an ambitious renewable-energy bill that the state legislature failed to pass. Schwarzenegger said he would work with lawmakers on the renewable energy bill while negotiating the state budget. On 30th September he signed a law requiring utilities to begin planning for ways to store electricity that could be dispatched as needed. The measure, opposed at various stages by many private and public electricity providers, is considered to be an important step in preparing for the future integration of large amounts of solar and wind energy into the state's electricity grid.

It is encouraging that some politicians can see beyond the present economic and budgetary difficulties to address pressing global issues.

According to the Renewable Energy Policy Network, at a global level, renewable energy supplies 19% of final energy consumption. Of this 19%, traditional biomass (used primarily

for cooking and heating) accounts for approximately two thirds. Hydropower represents 3.2% and is growing modestly while all other renewables account for 2.6% and are growing very rapidly. 85 countries have now set policy targets - and of these 45 are developing countries, determined to improve energy security and reduce reliance on fossil fuels, while also developing manufacturing leadership and generating jobs. While I will talk mostly about wind power and solar photovoltaic, it is also worth mentioning solar hot water heating (where China has 70% of global capacity), biomass (where Brazil and the US lead with ethanol) and geothermal power.

While US progress sounds encouraging, Europe is about twice as far ahead overall. The EU notes that 19.9% of electricity consumption in 2009 (or 608TWh) came from renewable sources. Hydro-electricity is at 11.6%, Wind at 4.2%, Biomass at 3.5% and Solar at 0.4%. Encouragingly 62% of new power installation in 2009 in the EU was in renewables. But electricity is only part of the issue - we need 20% efficiency to be achieved in industry and domestic heating and then, given that savings in transport will fall short, electricity from renewable sources will probably have to reach 40% if the overall share of renewables in the energy mix is to reach 20%. But of all these targets assume 450ppm of CO₂ which will not be low enough to prevent significant climate change.

Germany leads the way of bioelectricity (28TWh) and, by virtue of feed-in tariffs, in solar photovoltaic capacity, where it has about 47% of global capacity. This equates to 120KW of capacity per capita; only Greece (250KW), Austria (300KW) and Cyprus (650KW) have higher ratios. The USA has about a 6% global share in solar capacity, well behind Germany, Spain and Japan. We need to make solar technology a requirement for all new buildings. We also need to have feed-in tariffs available so that, for instance, individuals in the U.S. sunshine states can sell their surplus energy to utilities to sell to regions with energy deficits.

By 2020, 30% of the electricity consumed in Germany is set to be coming from renewable energy sources, with wind energy contributing the most at 15%, bio-energy second with 8%, and hydropower third with 4%. There are recently announced plans to have renewable energy supply 60% of the Germany's energy needs by 2050 and David Wortman, Director of Renewable Energy and Resources at Germany Trade and Invest, a government body supporting the country's renewable energy sector, is confident that if there is enough political will, Germany will be running completely on renewable energy by then.

Whilst Germany's commitment to renewable energy is commendable, German Chancellor Angela Merkel's announcement on 6 September that the working lives of nuclear reactors will be extended to 12 years is a cause for serious concern.

The United Kingdom possesses natural resources, especially in wind and tidal energies that, if harnessed, could yield important benefits and contribute significantly to the UK's economic growth; however, the great majority of offshore wind projects are owned by non-UK companies.

On 22 September, the UK opened the world's largest wind farm off Kent. The Thanet wind farm in the English Channel has 100 turbines, each measuring more than 300ft. It will increase the amount of energy generated from offshore wind in the UK by a third to 1.3GW, compared to 1.1GW in the whole of the rest of the world. With the added capacity of Thanet, the amount of electricity generated by wind in the UK is almost 5GW, enough to power 3 million homes. This means that wind will provide just over 4% of the UK's total electricity consumption, with other renewables providing around 5%. In 2002 the UK had just 2% of electricity from renewables, but with the new wind capacity it should reach 10% by the end of this financial year.

Nevertheless the UK's target remains modest, aiming only to generate 15% of its total energy through renewables by 2020. Sweden with a target of 49% demonstrates that with political will, it is possible to really push this issue. What are needed are feed-in tariffs -

which guarantee grid access to renewable energy producers and set a fixed guaranteed price at which power producers can sell renewable power into the electric power network to include a return on investment. Germany introduced feed-in tariffs in 2000, the UK has only begun this year. In the US, feed-in tariffs exist in only a few states (notably California and Vermont) and in some cities, but there is no national policy yet. To make the switch from fossil fuels happen faster, governments and states will need to assist with the significant up-front capital costs.

Let me be clear, nuclear power, coal power stations fitted with "carbon capture and storage", or CCS technology, are not renewable energies. Nuclear technology is not low-emission and cannot address the issues of climate change; is not a substitute for sustainable energy. Greenhouse gases are emitted at every stage of the nuclear fuel chain, from the mining, to uranium enrichment, through transportation and the construction of nuclear plants.

The uranium mining process is water intensive and causes the depletion and contamination of already scarce water resources. In addition, uranium is a finite fuel supply and its mining presents serious health risks. Uranium and its decay products are both radioactive and toxic and, as they remain radioactive for hundreds of thousands of years, can cause irreparable damage to the environment and to generations of local communities.

Conclusion

It is an intellectual illusion to believe that the crises that besieged our world today can be compartmentalized. Climate change will affect everyone, everywhere, in every nation and from every socio-economic group, in hundreds of ways: from the pollution of cities to erosion in rural areas; from contamination of the oceans and rivers to desertification; from mass migration to overcrowded cities and the security of individuals and states.

The time for further excuses, for procrastination and prevarication, has long passed. Now is the time for decision-makers in politics and economics to take concrete steps to avert climate catastrophe; the time for courage and leadership, and for positive and immediate action. The only long-term viable basis for economic activity is to replace fossil fuels with renewable energy. For that we need considerable investment and a stable policy framework. And it starts at home: many of you may recall President Carter spending \$30 000 to install 32 solar panels on the White House roof in 1979. President Reagan terminated the national tax credits and removed the panels in 1986. Next spring, President Obama will once again be making his morning toast at the White House using electricity from solar panels.

I hope that leaders, the business community, policy makers, NGOs and people throughout the world, will have the vision to embrace a new Copernican revolution in renewable energy. The delays in investment and adoption of renewable energies have been environmentally and economically inexcusable. Tackling climate change is the overriding moral imperative of the century. Our future and the fate of future generations depend on how decisively, courageously and responsibly we act now.

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