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WWF for a living planet®

Background Brief

G8 Leaders meet in Gleneagles, Scotland, UK – 6 to 8 July 2005

TECHNOLOGY AND CLIMATE CHANGE

Climate change is caused primarily by the burning of fossil fuels – coal, oil and gas. The way the world currently uses energy and designs its energy production in the future is decisive for our future climate.

It is therefore crucial, when thinking about the drivers and solutions to climate change, to address the energy sector and understand its main drivers. Global primary energy demand is rising rapidly. It has doubled from 1971 to 2002 and increased by 18.7% from 1990 to 2002 and things are not slowing down. Demand increased by 4.3% in 2004, the biggest percentage rise since 1984 and the largest volume increase ever. The fuels that make up that demand are the following:

World **primary energy** demand by fuel in 2002:
in million tonnes of oil equivalent (mtoe)

Coal	2389	23.1%
Oil	3676	35.5%
Gas	2190	21.2%
Nuclear	692	6.7%
Hydro	224	2.2%
Biomass and waste	1119	10.8%
Other renewables	55	0.5%
Total	10345	

Source: *World Energy Outlook 2004,* IEA, p. *59*

WWF and a number of governments, such as the European Union, have stated that global average temperature must stay well below 2 degrees C in comparison with pre-industrial levels, if devastating impacts are to be avoided. If one translates that temperature threshold into emissions reductions, it becomes clear that industrialized countries must reduce their CO_2 emissions by approximately 60 to 80% by 2050, with global emissions reductions likely to be in the scale of 50% in the same time period. The challenge in front of those G8 countries, recognizing the scale and urgency of the climate change issue and the fact that they are mostly responsible for the problem, is how to achieve such reductions.

If one looks to the future, under current projections, the current projected increases in global energy supply will entail cumulative infrastructure investment of $16 trillion between now and 2030. When taking the threat of climate change into account, as well as energy security and energy poverty, the question then becomes how that $16 trillion will be spent and how, as soon as possible, can the trends of investing heavily in traditional fossil fuel technologies be changed.

There are many currently available technologies that if distributed and implemented now, would make a major dent in both the demand for energy and the CO_2 emissions associated with that energy demand. At the same time, countries must be thinking ahead for the type of "step-change" needed in the energy sector in order to meet environmental, economic and development goals.

While technology is very important, it alone cannot solve the problem. "Technology" must be coupled with strong policy frameworks such as emissions trading that put a price on carbon to help drive CO2 emissions down. Without such signals, it is not at all guaranteed that emissions will be reduced. In addition, the focus

on "technology" should be both on the long-term technologies such as hydrogen and the short-term already available technologies such as energy efficiency and renewables which need additional support to be commercialized. The Bush Administration policy, which focuses almost solely on long-term technologies and research and development, is a good example as U.S. emissions have steadily increased over the years.

Energy efficiency

The potential for energy efficiency around the world is tremendous and brings many benefits whether it is cost savings, reduction of imports and therefore greater energy security, local health and environmental benefits or curbing climate change. For instance, in Europe, the cost-effective potential is generally set between 20%[1] and 30% of current energy demand, with the technical being much higher. . The potential is likely to be similar in other industrialized countries. In fact, in the US alone, 145 GW (Giga Watt) of electricity could be supplied by new combined heat and power (CHP) plants by 2010, according to the Alliance for an Energy Efficient Economy. According to estimates by the World Alliance for Decentralised Energy, an increased use of CHP in the US could save up to 46% of CO_2 emissions. Something as simple as eliminating "stand-by" in electric appliances could avoid the construction of around 24 medium-sized coal power plants around the world (or more, given that the IEA estimates stand-by could become one of the biggest electricity end-uses within a few years). For the European Union, a 1% annual decrease in primary energy use should be the goal. This should happen through measures to be taken in the electricity, heating and transport sector.

Whether it is appliances, cars, trucks or electricity generation, energy efficiency is the key to tackling climate change and also brings economic savings. Due to low energy prices in some countries and specific barriers, it is not occurring on its own however. Governments must put in place the correct policy framework through policies such as:

- mandatory demand reduction targets for utilities and/or governments,
- public procurement of energy efficient products
- dynamic minimum efficiency standards for electrical equipment and cars,
- regularly updated and promoted energy labels for all energy using products
- fiscal and financial incentives to consumers for the purchase of the most efficient products
- growth targets for combined heat and power technologies (which need improved access to grids)
- minimum energy efficiency standards and labeling for buildings

Renewable Energy

Renewables (wind, solar, sustainable biomass, geothermal) currently make up a small share of global energy use but are growing very rapidly. In 2004 investment in renewables topped $28 billion, with another $3 to 5 billion investment by the photovoltaic (PV) industry in new plant and equipment. On-grid solar grew by 40%, biofuels 15% and off-grid PV 10%. Most of the investment has come from the private sector, including venture capital, major commercial banks, investment banks and local financing sources in developing countries. As far as public investment is concerned, the European Investment Bank is investing $600 to 700 million with the multi-lateral and bilateral institutions having approved around $500 million. However, in comparison to the $150 to 200 billion/year spent on fossil fuel subsidies, renewable energy development continues to receive far less funding and policy support than is warranted.

Renewable energy goals

Electricity from Biomass

Today: 30 GW or 1% of installed capacity **Goal:** by 2020 a share of 15% in OECD is feasible. With strong energy efficiency policy, 30% is achievable, powering 100 million homes.

[1] European Commission, "Green Paper – Towards a European Strategy for the Security of Energy Supply", 2001

Electricity from Wind:
Today: 40 GW globally in 2003 (But mainly focused in five countries) **Growth:** at least 30% by 2030 (IEA, 2004) or 52% per annum (IEA renewables, introduction) **Goal:** global supply potential of 12% by 2020 (EWEA, Windforce 12)

Electricity from the Sun:
Goal: Emphasis should be put on promotion of passive solar heating systems, which are the most cost-effective of solar technologies (electricity from solar power is expected to reach 119TWh by 2030, out of which 80% will be PV) – solar thermal: 21 TWh by 2030 (WOE 2004)

Electricity from Geothermal:
Today: In over 30 countries geothermal resources provide directly used heat capacity of 12,000 MW and electric power generation capacity of over 8,000 MW. Geothermal energy meets a significant portion of the electrical power demand in several developing countries. For example, in the Philippines geothermal provides 27% of that country's total electrical generation, from power plant complexes as large as 700 MW.d **Growth:** 8.8% per annum (IEA renewables report) **Goal:** Use the massive potential as early as possible.

Electricity from Hydropower
Today: 2610 TWh, 2002 (WEO, 2004) **Growth**: growth in mature markets very slow because of the shortage of suitable sites **Goal:** WWF only supports the development of sustainable hydropower that follows the recommendations of the World Commission of Dams

Policies

Correct policy frameworks and financing are needed in order to ensure that the commercialization of renewables occurs as quickly as possible. Especially effective are so-called "feed-in laws" in place in Germany and likely soon in China which guarantee a set price for a certain technology, thereby leveling the playing field so renewables can compete. While some technologies such as wind can currently be economically profitable, others such as solar require support.

Summary

By implementing effective policies and programmes in both energy efficiency and renewables, greenhouse gases can be cut significantly. Reductions of up to 50% by 2020 and higher are possible in OECD countries and developing countries as well. Up to this point in time, the G8 has not adopted any policy or partnership programmes on renewables or energy efficiency, but instead focused on long-term research and development of hydrogen, carbon capture and storage and methane initiatives. This year's G8 should focus on the commercialization of currently available uncontroversial technologies to bring emissions down.

For a range of reasons, WWF does not believe that nuclear power is a solution for climate change and therefore it should NOT be part of the G8 agenda.

Research and development of geological carbon capture and storage of CO_2 should be pursued, but not in a manner that competes for resources with energy efficiency and renewables.

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