Cool solutions for a feverish planet

Working towards a CO_2-free power sector

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Melting ice caps and catastrophic weather events, such as floods, droughts and storms are making headlines with increasing, and alarming, regularity. Unfortunately, these events are a consequence of climate change which has started to hit planet earth in earnest. The main cause of this is humanity's use of fossil fuels: burning coal, oil and gas emits carbon dioxide (CO_2) into the atmosphere where it builds up, blankets the earth, and traps it in heat, causing global warming. If our planet heats up too much, the overall impact will remain for a very long time.

Luckily, organisations like WWF together with governments and other environmental organisations have taken steps to ensure that solutions are within reach. Through its PowerSwitch! initiative, WWF is challenging electric utilities, financial institutions, politicians and consumers to clean up their act by making a rapid transition to clean power.

(Source: WWF-Canon/Schaefer)

Electricity generation is the biggest single source of man-made CO_2 emissions, a staggering 37% [1], worldwide. Many electric utilities are still operating power plants at low efficiencies, burning fossil fuels such as coal 1. In addition, utilities intend to build more of these plants in the future.

WWF, along with governments and other environmental organisations has called for the global temperature increase to be limited to less than two degrees celsius above pre-industrial levels [2] 2. This means that CO_2 concentrations in the global atmosphere must be kept below 450 ppm. An increase of more than one degree celsius already exists so keeping within the two-degree limit requires urgent and immediate action now and over the next two decades. Any delay is likely to result in severe environmental impacts that will remain for the long-term.

Therefore the need to quickly switch the energy sector from coal to clean power and on to a CO_2-free footing is imperative 3.

PowerSwitch! – focusing on the power sector

PowerSwitch!, a WWF initiative, was created to challenge electric utilities, financial institutions, politicians and consumers to make this rapid transition.

Research carried out by WWF indicates that it is possible for the power sector in industrialised countries to reduce CO_2 emissions by half by 2020 and achieve CO_2-free status by the middle of this century.

In developing countries, the challenge is much greater, as electricity demand will continue to rise for some time. An increase in CO_2 emissions, however, could be held at a relatively low level over the same time span by giving higher priority to energy efficiency and renewable energy while at the same time meeting development needs.

The good news is that practical solutions for dramatically cutting CO_2 emissions are available. The technologies and policies for putting them into practice are known. In fact, they have already been proven and are economically viable.

What is therefore required is:

- A clear shift away from fossil fuels in our energy system.
- Improved energy efficiency of production and of all electrical applications.
- A switch to lower carbon fossil fuels.
- The widespread adoption of zero carbon fuels such as renewable energy.

The PowerSwitch! potential

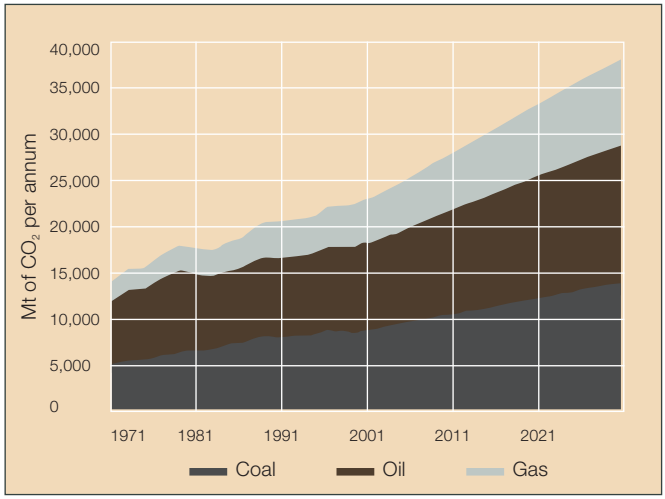
In collaboration with academic partners worldwide, the WWF has conducted *PowerSwitch!* scenarios that reveal huge opportunities for smart power solutions that can increase energy efficiency and power generation using renewable energy sources. It is therefore not a question of technical complexity that stands in the way of achieving a satisfactory reduction in CO_2 emissions in the power sector, but rather a question of political will.

In Japan, *PowerSwitch!* has shown that by 2020, greenhouse gas emissions could be slashed by 31% relative to Business as Usual. Energy efficiency measures could meet projected increases in energy needs without increasing demand. Savings of up to 4.4 trillion Yen (US$ 36 billion) in imported fuel would improve energy security. The price, compared with Business as Usual, is equivalent to a 0.3% electricity price rise.

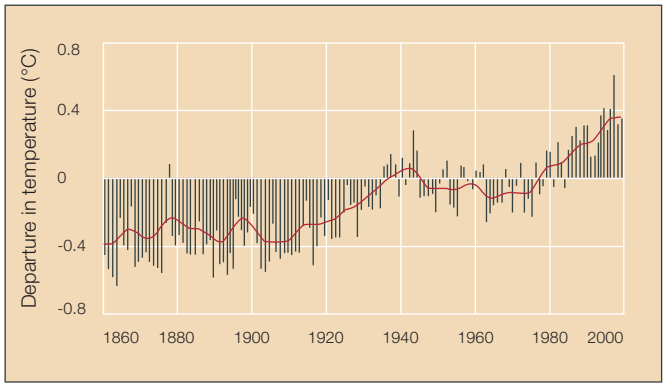
In the Philippines, *PowerSwitch!* has revealed that by 2012, renewables (including hydro energy) could make up 40% of the power market at no extra cost. Avoided fuel imports to the value of US$ 325 million and a reduction in related pollution costs of 21%, compared with Business as Usual, would simultaneously help the country meet its energy security and environmental goals.

PowerSwitch! has illustrated how improved energy efficiency could cut consumption by 27% compared with Business as Usual by 2020 in the European Union. Renewables would account for up to 60% of the total power production. This scenario would result in a 60% reduction in greenhouse

1 World energy related CO_2 emissions by fuel.
(Source: IEA Energy Outlook 2004)



2 Variations of the earth's surface temperature for the past 140 years (global)



gases compared with Business as Usual. The cost per person is a very affordable 30 Euros, spread over 20 years.

In the United States, *PowerSwitch!* has estimated an energy efficiency potential of 25% over Business as Usual by 2020. Co-generated power reaches 14% of the total electricity required in 2010 and 28% in 2020. A reduction of 70% in CO_2 emissions can be achieved. At the same time, average savings per annum in avoided fuel and infrastructure costs are around US$ 20 billion a year.

Fossil fuel alternatives

Energy efficiency and renewable energy sources are necessary first steps for any government approach towards a CO_2-free power sector.

Studies focusing on a low-carbon energy future highlight the critical role energy efficiency plays in stabilising and reducing energy demands while steering away from fossil fuels such as coal for the remaining energy needs.

Government policies such as:

- Setting minimum efficiency standards for appliances, buildings and industrial motors;
- Offering tax incentives for investments in higher efficiency equipment;
- Setting efficiency targets;
- Offering cash and other, more innovative incentives, to encourage consumers to opt for higher efficiency appliances;

can significantly help in accelerating efficiency trends.

The International Renewables 2004 conference in Bonn, Germany, demonstrated that political will does exist when countries and major actors come together with a clear goal. By agreeing, "…that renewable energies, combined with energy efficiency, will become a most important and widely available source of energy…" governments were able to outline a clear path forward.

The international action plan, while including a number of Business as Usual measures, also spurred some very significant new commitments, notably from developing countries. The Chinese government, for example, announced its targets of 10% renewable energy by 2010 and 12% by 2020 in its *National Renewable Energy Development Strategy and Plan*. If such targets are achieved, it will avoid approximately one billion tonnes of CO_2 emissions. The Philippine government is committed to doubling generating capacity using renewable energy sources by 2013. Both these commitments signal potential new leadership from Asia on renewable energy. In addition, the seriousness with which developing countries are viewing renewable energy sources is a highly significant development for both sustainable development and climate change mitigation.

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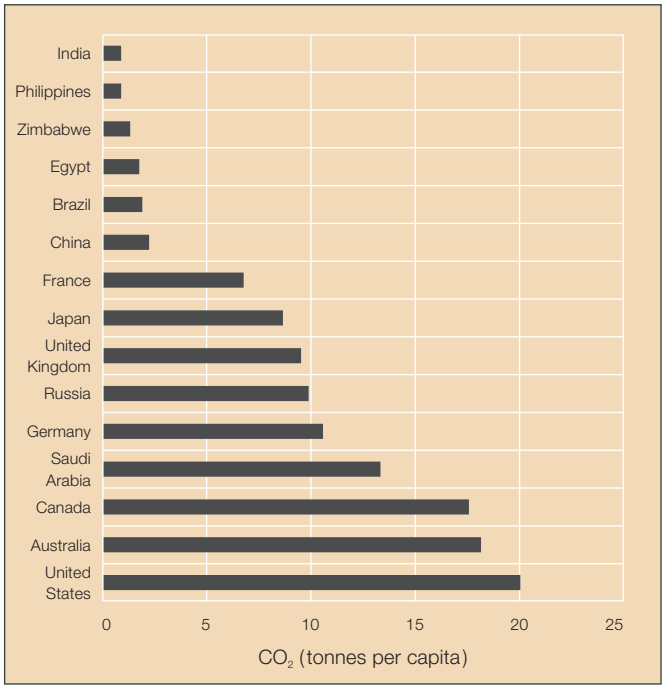
3 Per capita energy-related CO_2 emissions by region.



Wind power

Wind power is now in many instances more cost competitive than nuclear power. The fastest growing energy source at present, wind power has become a US$ 5 billion a year business, growing at an average of 25–30% per annum over the past five years. With a current capacity of 40,000 MW, significant future growth is predicted both onshore and offshore.

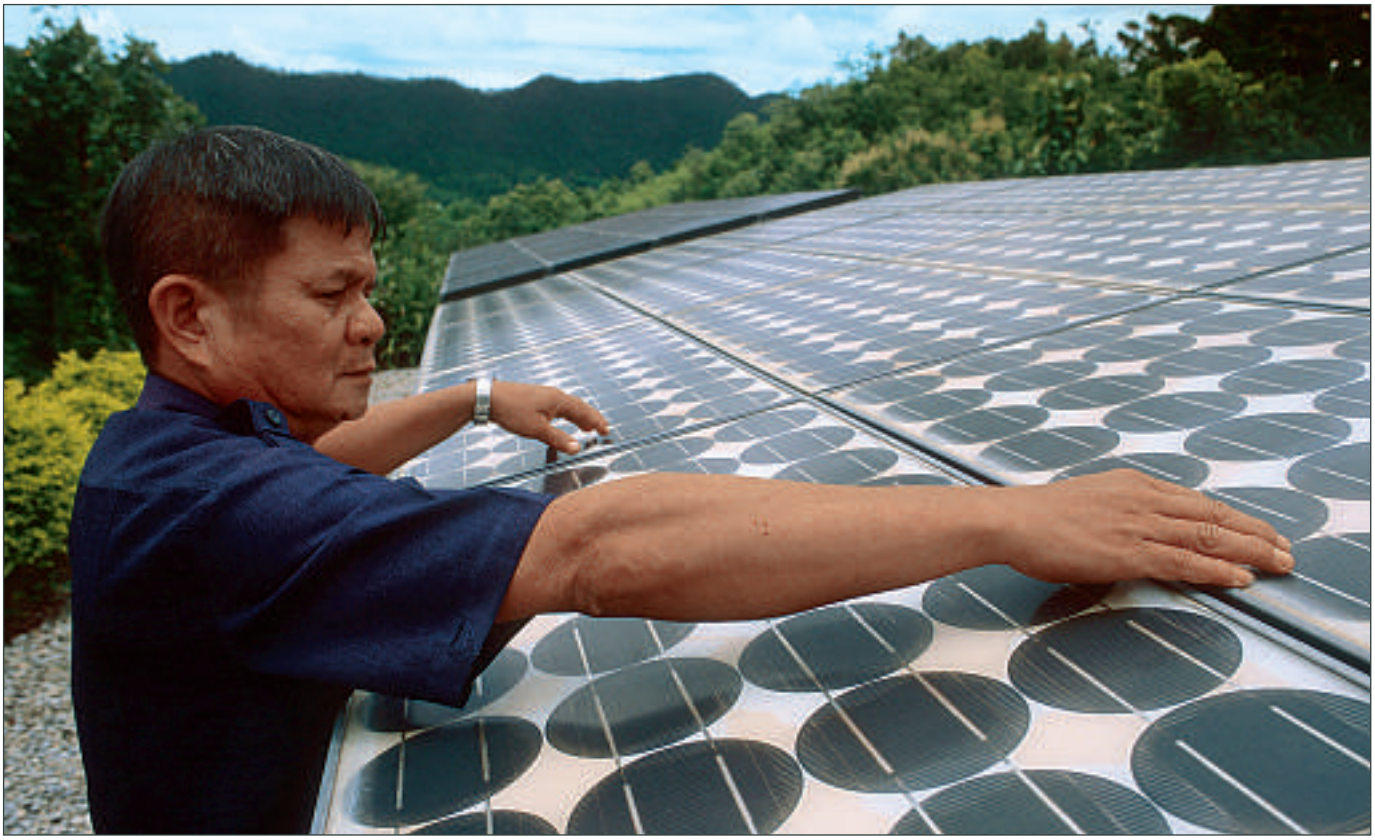
Biomass energy

Biomass energy covers a wide range of technologies including: burning organic wastes and wood for heat and power; turning organic material into a special oil; or biomass into gas which can be burned cleanly for heat and power. A total of 18.4 GW of biomass energy, representing 1% of total power generation, was installed in OECD countries in 2000. Assuming that about one quarter of all agricultural and forestry residues is used and 5% of agricultural and forestry areas are devoted to energy crop cultivation, biomass could deliver 15% of electricity production in OECD countries by 2020 (in particular countries where bioelectricity currently represents about 1% of production capacity [3]).

Solar photovoltaic

Solar photovoltaic (PV) has been described as the 'stuff of dreams' because by simply pointing a slice of silicon at the sky, electricity is generated, silently and with no moving parts 4. In theory the world's entire energy needs could be met if photovoltaic modules occupied an area of 700 km². Though currently the most expensive commercial renewable energy technology available, it has prob-

4	Solar installation in Thailand. (Source: WWF-Canon/Adam Oswell)



ably, in the long term, the biggest potential.

PowerSwitch! case studies

The following four examples illustrate how the switch from coal to clean energy is already in progress.

US: 'Community Choice' supports clean, independent energy

In some US states, 'Community Choice' provisions allow cities, towns and counties to form community-wide municipal buyers' cooperatives to purchase electric power. Whole cities, therefore, are viewed as single 'big consumers' that secure the best rates or buy the cleanest electricity for their residents and businesses. In Ohio, for example, 450,000 consumers switched onto a clean energy package. In San Francisco, over 3 million consumers are expected to participate in the city's *Energy Independence plan*, that switches to clean, independent energy sources without increases in electricity bills.

> With its high emissions and ready access to solutions, the power sector must play an immediate and substantial role in achieving emissions reductions.

The Netherlands: consumer demand drives new technologies.

In 1999, the WWF started a campaign with all Dutch energy retailers to expand the residential *Green Power* customer base, which highlights how global warming is threatening the survival of polar bears. The theme was *'The Week of the Polar Bear'*, and the main event was a successful Guinness Book of Records attempt to link 300 km of green ribbon along the Dutch coast. As a result of the campaign, the number of households buying *Green Power* doubled within a year.

India: scrutiny leads to accountability

In the late 1990s, Enron's 2000 MW Dabhol gas plant project in Maharashtra State was blocked by a coalition of NGOs and local communities. Enron was forced to release power purchase agreement details, revealing how projected tariffs had been underestimated by 50-100% and that the real cost of the plant could probably bankrupt the state. Further investigation proved that avoidable transmission losses and power theft were being hidden by deceptive power accounting at the Maharasthra State Electricity Board. This induced the State Regulatory Commission to reduce projected tariff increases by 12.5 billion rupees (about 222 million Euros) and im-

Here is the WWF's challenge to all PowerSwitch! players:

Utilities can adopt clear commitments to:
- Improve the energy efficiency of both power plants and how consumers use electricity by shifting to the co-generation of heat and power, retrofitting existing plants and investing in consumer's use of highly efficient residential and office appliances and industrial production equipment.
- Increase their share of 'new' renewables[1] such as wind, biomass and solar to at least 20 % by 2020.
- Support strong policies in their countries to cut CO_2 emissions and increase the share of renewable energy.
- Stop investing in new coal plants and coal mining.

Financial Institutions have a critical role to play by developing more appropriate financing packages for renewable energy projects and technologies. These packages could form part of a strategy that switches their investments as a whole to a much lower carbon-intense portfolio.

Politicians can significantly ease the path towards a low-carbon power sector by creating market conditions that encourage and financially reward low-carbon investments. This would include targets and obligations for: renewable energy; energy efficiency and combined heat and power (CHP); progressive energy efficiency standards for appliances; carbon taxes; the creation of an emissions trading regime with tough mandatory CO_2 reductions for the power sector; and incentives for research and development.

The wider business community also has a critical role to play by reducing energy use in their own processes, improving material efficiency, reducing energy use of their products and opting for green power. Moreover, they can support policies favouring low-carbon technologies.

Consumers can help this transition by:
- Opting for green power where it is available and demanding it where it is not.
- Using more energy efficient appliances and lights.
- Supporting big reductions in CO_2 emissions.

Consumers can also support legislation and effective policies, and encourage their local and regional governments to switch to cleaner power.

The way forward

With its *Power Switch!* challenge, the WWF calls for all strategic actors to be part of the solution to global warming by embracing its vision of a CO_2-free power sector by the middle of the century. This can be achieved if there is a conscious effort made by the 'powers that be' to switch from coal to clean power. See text box.

Making the PowerSwitch!

Moving away from an energy system dominated by fossil fuels and to a CO_2-free future will require political leadership of the highest order as well as substantial investment in new technologies and practices.

With its high emissions and ready access to solutions, the power sector must play an immediate and substantial role in achieving emissions reductions. Faced with the terrible consequences of inaction on climate change, responsible managers must act now. In doing so, they will not only safeguard the planet, but they will also safeguard shareholders by reducing risks to the company and stimulating a major technological revolution.

pose improved performance standards on the electricity board to increase efficiency.

Philippines: participation increases choice

Local communities, NGOs and provincial governments in the Visayas Islands have consistently rejected government-backed coal power as the solution to rising power demands. In fact, NGO analysis has:
- Revealed that power demand forecasts have exaggerated the need for new capacity.
- Unearthed a substantial renewables potential in the islands.

WWF in the Philippines is currently preparing to work with the Department of Energy on a multi-stakeholder, grid-wide planning process that will evaluate the full range of options and involve provincial decision makers in developing an optimal plan for the region.

Footnotes

1) 'New' renewables include wind energy, solar energy, marine energy, geothermal energy, highly efficient and sustainable use of biomass, and small hydropower (less than 10MW) complying with World Commission on Dams recommendations
(Source: IEA - World Energy Outlook 2004)

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References

[1] World Coal Institute, 2003; International Energy Agency, 2003
[2] 'Preventing Dangerous Climate Change', Climate Action Network, 2002
[3] WWF, 'Bioelectricity Vision: Achieving 15 % of Electricity from Biomass in OECD Countries by 2020', May 2004