



World Energy Council
CONSEIL MONDIAL DE L'ENERGIE

**THE ENERGY INDUSTRY UNVEILS ITS
BLUEPRINT FOR TACKLING CLIMATE
CHANGE**

WEC STATEMENT 2007

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If we are to keep the world economy humming along and improve living standards for all, we face a triple challenge:

to provide every household with access to affordable modern energy services, to make energy services available to meet a sharply rising demand and to rein in greenhouse gas emissions at the same time.

Galloping population growth

Most of the growth in energy demand will come from the fast-growing economies of the developing world. Every three years, the world's population is increasing by 300 million - roughly the size of another United States, mainly in developing countries. For these countries, offering greater access to affordable commercial energy is a prerequisite to eliminate poverty.

By contrast, economic growth in OECD countries is expected to hover around 2% a year, half the rate of the developing world.

WEC expects demand for electricity and transportation to grow rapidly in all regions of the world until at least 2030. Fossil fuels will remain the largest energy source for the first half of the century, supplying 85% of the world's primary energy needs. Electricity and transportation will continue to depend on fossil fuels for many years to come.

Global CO₂ emissions poised to double if no action is taken

WEC takes note of the scientific assessments warning of environmental damage from man-made global warming. Unless action is taken now on a local level, the expected increase in energy demand will be accompanied by a huge rise in greenhouse gas emissions. Globally, for example, CO₂ emissions will double to 46 billion tonnes a year in 2050. In the developing world, CO₂ emissions will likely rise 200%. By the end of the decade, China will leapfrog over the US to become the largest emitter.

Already since 1971, CO₂ emissions have more than doubled in the transportation sector, mainly in road transportation. In the electricity sector, CO₂

emissions have risen by 80%. Electricity and transportation now account for 66% of total CO₂ emissions in the energy sector. As demand for these energy services ramps up, their share of greenhouse gas emissions is poised to rise considerably.

Power sector needs US\$10 trillion investment

To meet rising world energy demand, a massive US\$20 trillion is needed to invest in energy infrastructure through to 2030, according to the International Energy Agency. That works out to a total of US\$800 billion a year. Half of this amount will be needed for power generation alone. But only about 50% of this has been committed. In the developing countries, where the need is greatest, investment is very low.

Furthermore, spending on research and development (R&D) for promising clean energy sources is running well below R&D in other sectors at approximately US\$10 billion a year, and is concentrated in only a handful of countries. That is because R&D outlays are difficult to justify in a competitive and liberalised energy market. Governments must bear in mind that short-sighted and constantly changing policies create uncertainty and dampen investment by the capital-intensive energy sector, which has long investment timelines.

Bold and swift action on climate change is needed

WEC adds its voice to the emerging consensus, following recent publication of a number of official reports, that addressing climate change now will be less risky and costly to the world economy than postponing action. Taking bold, early steps to curb greenhouse gas emissions appears to be profitable for business, government and consumers. A recent UK report estimates an annual least cost to stabilise emissions at 1% of GDP by 2050 - although perhaps as much as 3.5% - if we act now. Holding off could reduce per capita GDP by 20%, the report suggests.

Ambitious government energy policies and regulations with an eye towards the long-term are needed to stabilise or reduce emissions locally and regionally, and to rein in the growth of greenhouse gas emissions globally. Curbing greenhouse emissions is not the sole responsibility of any single company or government. It requires global accord and cooperation.

The pace of technological change, the timescale for these investments and their costs to society must not be underestimated, and must be clearly explained to policymakers and the public alike.

According to a WEC report "Energy and Climate Change" to be published shortly, these policies are also needed to significantly boost investment in energy infrastructure; in research, development and large-scale application of clean technologies; and in energy efficiency.

A massive increase in public-private partnerships to develop these technologies is also required. But greater investment and more of these partnerships will only happen if there is a deeper commitment by governments and regulators, in tandem with energy companies.

The bad news is that policies are not generally in place that stanch the growth in emissions, even in the European Union (EU) where a cutting-edge, emissions trading scheme to fulfil Kyoto Protocol commitments is well underway, and in the US where voluntary agreements and technology partnerships are the norm.

The good news is that recognition is growing among governments of the need for such far-sighted policymaking, which is the necessary underpinning for greater investment by the energy sector.

On the energy production front, governments must remain broad-minded and not rule out any fuel source or technology option, if we are to remain steadfast in our goal of a low carbon world. Nuclear power, large-scale hydroelectricity, and carbon capture and storage must remain on the table along with affordable renewables technologies.

Whether we act now or later to put in place enlightened legal and policy frameworks will affect the cost and timetable for making the necessary energy investments, to transfer proven clean technologies and systems to the developing world, and to train and educate the local workforce to build, operate and maintain these facilities.

The form these policies take will vary according to the circumstances of each country or region. They include taxes, regulations, setting standards, removing subsidies on carbon sources, subsidising low-carbon technologies and introducing trading in carbon permits.

Global CO₂ costs will drive clean energy investment

The value for carbon will dictate the pace of investments in clean technologies. Already a CO₂ price near US\$25 per tonne is appearing in markets where a cap and trade system is in place, such as the EU. The global carbon price will be determined by the extent to which national and regional policies or emissions trading systems are linked. The costs of these global negotiations must be taken into consideration.

For carbon capture and storage to achieve widespread use in power generation, for example, or for synthetic liquids (with zero production emissions) to become a sustainable fuel for transportation, the cost per tonne of CO₂ captured and stored must fall to about US\$30. That price range is about two-thirds less than today's cost.

A WEC study published this year, "The Role of Nuclear Power in Europe", estimates that a carbon value of EUR20 per tonne of CO₂ in 2005 would have added EUR8 per megawatt-hour for gas-fired power generation and as much as EUR18 per megawatt-hour for coal-fired electricity, if the necessary carbon credits had been purchased at the time.

Cleaner technologies for vehicles may add another 10-15% to the sticker price in the next five years and up to 8% in the longer-term, experts say. But much higher fuel costs must also be taken into account.

Three-phase plan to reduce emissions

WEC estimates that, with the right policies and technologies in place, the rise in greenhouse gas emissions can be tempered in the short-term, their absolute level can be stabilised in the medium-term and reduced in the longer-term.

Slowing growth in greenhouse gas emissions by 2015

Most of the large, capital-intensive investments in clean energy technologies that help reduce emissions by 2015 have already been made. Efficiency measures have begun to bite and will gather momentum at the end of the period from a variety of sources, with gains between 25% and 40% eventually achievable from: boosting power plant productivity; improving building methods, such as better insulation and energy-efficient lighting; tackling gas and electric transmission and distribution leaks or losses; district heating and cooling; heat pumps; solar water heating; and bringing online combined heat and power plants. Extending nuclear power plant operating licences and increased energy production from biomass and other green energy sources, especially geothermal, wind and hydropower, are already playing a role to curb the growth of greenhouse gas emissions in this timeframe.

More natural gas can be captured and sold rather than flared. Alternative fuels for the internal combustion engine can be encouraged on a larger scale.

Starting today, developing countries can through sound policy and better financing, use more carbon-neutral technologies. To step up much-needed investments in energy infrastructure and to accelerate the transfer to clean technologies, governments in these countries must develop legal policies on copyright, intellectual property and dispute settlement and provide new incentives for private investment.

Investment funds are becoming an increasingly important source of financing for these technologies, in addition to export credit agencies, commercial lenders, multilateral institutions and bond markets.

Policies such as regional energy market integration, an important driver of competition and

greater efficiency, and for connecting national and regional emissions trading systems, will also help stem the rise in CO₂ emissions.

A short-term measure that will speed up technology transfer would be to extend the Clean Development Mechanism (CDM) of the Kyoto Protocol to cover energy efficiency projects. Rules for the Mechanism could also be changed to cover carbon-reducing technologies, such as carbon capture, large hydroelectric and nuclear power plants. At the very least such mechanisms need a life beyond Kyoto.

Holding greenhouse gas emissions constant by 2030

To stabilise the level of global greenhouse emissions, a wide array of new technologies currently on the drawing board will need to be commonly deployed, especially in the rapidly growing economies of the developing world. Research and development is key. A number of ambitious R&D initiatives that may turn profitable during this phase include:

- zero emissions power plants in Europe and the US, which show promise in driving down the cost of carbon capture and storage to around EUR20 per tonne of CO₂;
- the Carbon Sequestration Leadership Forum, spearheaded by the US in 2002, designed to coordinate R&D globally;
- 2nd generation biofuels to avoid disruptions in the food chain on the basis of full fuel cost accounting.

Other emissions-stabilising strategies that must come into play include: energy generated from biomass for electric heating and as liquid fuels for transport; third-generation nuclear power; micro combined-heat and power plants; advanced heat pumps; and active and passive solar heating.

Energy storage technologies applied to renewable sources of energy will help to balance the flow of electricity between periods of low and high demand. A number of these promising storage technologies include the use of hydrogen, compressed air, pumped water for generating hydroelectricity, next-generation batteries, flywheels and ultra-capacitors.

More energy-efficient building technologies showing promise for large-scale use include vacuum insulation, light-emitting diodes and advanced energy management systems.

For transportation, fuels now under development that may become ready for worldwide use by 2030 are ethanol and methanol, coal and biomass converted to liquids; and di-methyl ether and fatty acid methyl esters. New engines and new vehicles, including plug-in hybrids will enter the market.

Reducing emissions from 2030 onwards

If we are to achieve a decoupling of economic growth from the rise in greenhouse gas emissions in the next quarter century, new public-private partnerships must be established today. These arrangements will help to coordinate investment internationally and lower the costs of promising technologies. Cleaner fuels, more efficient transportation and greener power generation will usher in the new dynamic of a low carbon world with adequate and sustainable economic growth.

By this time, the share of nuclear power will increase, as fourth generation and fast-spectrum reactors come on-stream. Carbon capture and storage will be applied to the gasification and combustion of coal and to the production of synthetic fuels, and to combined-cycle gas turbines. Fuel-cell vehicles and fuels made from compressed or liquid hydrogen could start to play a major role towards the middle of the century.

New solar photovoltaic technology, plus technology that converts waves and ocean tides into energy, would still account for a relatively small share of the total energy mix but could help reduce emissions. The potential of nuclear fusion and hydrogen-based economies will also become better known by this time.

Higher energy prices will lead to greater environmental efficiency

The significant investments required to meet future demand for cleaner energy will inevitably lead to higher energy prices throughout the world. But higher prices will serve as a powerful motivating force for greater environmental efficiency.

One of the principal drivers of higher energy prices, in addition to the cost of clean technologies and their deployment throughout the world, will be the degree to which full fuel cycle costs are built into final energy prices. Government policy and regulation are the key factors here.

However, higher energy prices pose a challenge in countries where offering the poor affordable access to a minimum amount of commercial energy is top priority.

Governments and consumers at large need to see that higher energy prices bring higher quality and more sustainable energy services that help to reduce environmental and social costs in a measurable way.

Price is not the only driver. Informed consumer action will also be a major contributor to more effective environmental management.

WEC is spearheading an effort to raise awareness of policies that curb excessive energy use, cut greenhouse gas emissions and promote sustainable living.

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