

Energy sector at the crossroads

As pressure to de-carbonise grows, the industry faces a stark choice



AT THE turn of the 21st century, the fossil fuels business would have been hard pushed to imagine the International Energy Agency (IEA) emerging as a voice leading calls for arresting climate change and curbing carbon emissions.

Yet the Paris-based agency is increasingly putting it at the top of the agenda as the weight of scientific evidence tells us that we should expect more frequent and intense extreme weather patterns, and extreme weather events. The majority of scientists believe that ecological damage – and the collateral economic damage that it will bring – will become unmanageable if long-term average global temperatures rise beyond two degrees Celsius from pre-industrial levels.

The energy sector is at the heart of this debate. It is

the single largest source of greenhouse-gas emissions – responsible for two-thirds – as more than 80% of global energy consumption is based on fossil fuels.

Global reliance on a fossil fuel based energy system is contributing to change that is unprecedented in the geologic history of the planet, Jeffrey Sachs, director of the United Nations (UN) Sustainable Development Network said, adding that this change threatens the fundamental survival of millions of people.

Against this backdrop, Fatih Birol, the IEA's chief economist, has become a vocal proponent for change within the industry.

At every opportunity he reminds the energy business that governments will eventually be forced to impose aggressive carbon taxes or emissions trading systems if the sector

Under pressure:
The energy
faces calls to
curb emissions

Carbon arithmetic at a glance

TO KEEP the average rise in global temperatures below two degrees Celsius – a target that could still result in vast ecological and economic damage – would need yearly emissions today of around 36 Gt to decline by mid-century to around 15 Gt, and perhaps even less.

Put another way, there is broad international acceptance that stabilising the atmospheric concentration of greenhouse gases at below 450 parts per million (ppm) of CO₂ equivalent is consistent with a near 50% chance of achieving the two-degree target, and help avoid the worst effects of climate change. The level recently surpassed 400, and at present growth rates will be above 500 within a few decades.

The world economy could expand threefold by 2050, from today's \$90 trillion to around \$280 trillion, as the world's population surges from 7.2 billion people to 9.3 billion. Yet, that expansion in the world economy needs to be combined with a cut in global emissions by more than half.

Two basic dimensions of change can make this possible. The first is a massive rise in energy efficiency, meaning a sharp decline in primary energy use per unit of economic output. The world uses around 170 kgs of oil equivalent to make \$1,000 of output. That needs to be reduced by around five times, to about 30-35 kg of oil equivalent per \$1,000 of output.

The second is a shift to lower CO₂ emissions per unit of energy. Today's energy mix leads to 2.4 tonnes of CO₂ for each tonne of oil equivalent (toe). That could be cut to around 1.5 tonnes of CO₂ for each toe by shifting the global energy mix towards low-carbon or zero-carbon energy sources. With a world economy of \$280 trillion, burning 31 kgs of oil equivalent per \$1,000 of output and emitting 1.4 tonnes of CO₂ for each toe of primary energy, the result will be global yearly emissions of around 13 billion tonnes of CO₂ as of 2050, within the boundaries needed to keep the rise of temperatures under two degrees. ●

Source: Jeffrey Sachs, director of Earth Institute at Columbia University in the US and director of UN Sustainable Development Solutions Network

does not, of its own volition, take a major role in the decarbonisation process.

And leading economists have backed Birol, warning that if the fossil fuels business does not take the right steps, many of its assets will be at risk – potentially triggering write-downs to the tune of trillions of dollars.

Some analysts warn of a “carbon bubble” arising because of the over-valuation of oil, gas and coal reserves held by fossil fuel companies. London-based think-tank Carbon Tracker believes at least two-thirds of proven reserves will have to remain underground if the world is to meet existing international agreements to limit global warming by no more than two degrees Celsius.

Carbon capture and storage technology, which buries emissions underground, could play a role in future. But data collated by Carbon Tracker indicates that even an optimistic scenario – which sees 3,800 commercial projects globally – would allow only an extra 4% of fossil-fuel reserves to be burned.

High emissions

The Intergovernmental Panel on Climate Change (IPCC), a UN panel of climate experts, says that the potential carbon dioxide (CO₂) emissions from consuming all known fossil fuel reserves (as of 2012) would amount to 2,860 gigatonnes (Gt) of carbon emissions – two-and-a-half times the amount of CO₂ emissions that can be safely released from 2012 onwards if the world is to keep a 50% chance of meeting the two-degree target in the long run.

That’s even before considering the remaining recoverable fossil-fuel resources, which are much larger than proven reserves.

Yet, says Sachs, if today’s patterns of energy use continue, the resulting high rates of CO₂ emissions will likely lead to a temperature increase nearer to four degrees this century. Such a rise could unleash physical feedback processes that could cause “runaway warming”, even beyond five degrees. This would be catastrophic, Sachs adds.

Based on the panel’s estimate and the IEA’s baseline new policies energy outlook, 74% of the available CO₂ emissions budget will be consumed by the energy sector alone by 2035.

The budget is finite – once it is exceeded, the problem will be virtually impossible to solve with today’s technology, forcing future generations to find some way of sucking greenhouse gases out of the atmosphere and storing them underground to preserve the planet’s livability, the UN has said.

If governments continue to permit high emissions growth – in 2012 energy-related emissions grew 1.4% year-on-year to a record high of 31.6 Gt – keeping global warming within the two-degree trajectory will most likely be impossible by 2030, at least without a hugely expensive crash programme to rebuild the energy system. Even that might not work, says the IPCC.

Delaying stronger climate action until 2020, when a new global climate agreement is set to come into force, will come at a substantial cost to the energy sector. While inaction would avoid \$1.5 trillion in low-carbon investments by the end of the decade, it would prove costly for the energy sector in the longer run, as an additional \$5 trillion in spending would be needed thereafter to hit the two degree goal. Putting off action also raises the risk that

Hitting climate goals at no extra cost

THE IEA’s report *Redrawing The Energy-Climate Map* proposes four policy measures in its 4-for-2 degrees Celsius scenario that could help keep the door open to limiting global warming by no more than two degrees through to 2020. It sees no net economic cost to these measures, which would provide an essential bridge to further action, when a new international climate agreement is due to come into force that same year.

These policies, which rely on existing proven technologies, would cut greenhouse-gas emissions by 3.1 Gt CO₂ equivalent in 2020 – or 80% of the emissions reduction required under the two-degree Celsius trajectory, a target most scientists agree will make the vast ecological and economic damage to the world more manageable.

The four policies include: adopting specific energy efficiency measures (49% of the emissions savings); restricting the construction and use of the least-efficient coal-fired power plants (21%); minimising methane emissions from upstream oil and gas production (18%); and accelerating the partial phase-out of subsidies to fossil-fuel consumption (12%).

Global investment on energy efficiency would hit \$200 billion in 2020, but would be more than offset by lower spending on fuel bills. Arresting the construction of new subcritical coal-fired power would see the share of renewable power generation ramp up, as well as less carbon-intense natural gas plants.

Around 1.1 Gt CO₂ equivalent of methane, a potent greenhouse-gas, was released in 2010 by the upstream industry. These emissions, through venting and flaring, equal twice the total natural gas output of Nigeria. This could be halved by targeted performance standards with readily available technology at relatively low cost, says the IEA.

Today, 15% of global CO₂ emissions get an incentive of \$110 per tonne in the form of direct fossil-fuel subsidies – which stood at \$523 billion in 2011 or six times the level of support to renewable energy – while only 8% are hit with a carbon price. Increasing budgetary pressures are strengthening the case for subsidy reforms. In fact, G20 and Asia-Pacific Economic Cooperation (Apec) member countries are already starting to phase out inefficient subsidies. ●

the use of energy assets is halted before the end of their economic life.

Nevertheless, even after allowing for policies being pursued today, global energy related emissions in 2020 are projected to be nearly 4 Gt CO₂ equivalent higher than the level needed to meet the two-degree target, underlining the scale of the challenge still to be tackled this decade alone.

Yet financial markets appear to be betting on governments’ inaction to combat climate change, even though governments have pledged to strike a global deal – which could be fully implemented by the end of the decade – when they meet in Paris in 2015.

But it’s not just the IEA and Carbon Tracker saying this kind of thing. Organisations including investment bank HSBC and ratings agency Standard and Poor’s, as well as the Bank of England, have all recognised that a collapse in the value of oil, gas and coal assets is a systematic risk to economies.

The energy business is not immune to the physical effects of climate change either. Extreme weather, such as severe flooding, poses risks to power plants and grids, as well as oil and gas installations. More gradual effects, such as changes to heating and cooling demand, rising seas on coastal infrastructure, as well as water scarcity for power plants, will take its toll too. **DE ●**