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The meat of the matter



Most environmentalists begrudgingly admit that it took an economist, (then Sir, now Lord) Nicholas Stern, to finally give climate change the international attention it desperately needed.

Whether you agree with the Stern Review's methods for putting a price on the economic impact of climate change - and let's not forget it did involve costing out the value of human lives - few can doubt

that that the previously little-known, grey-suited economist translated the threat of global warming into the mother tongue of the corridors of power with great success.

So I was hoping that Stern's comments on meat eating during a recent interview with *The Times* would receive similarly serious attention:

'Meat is a wasteful use of water and creates a lot of greenhouse gases. It puts enormous pressure on the world's resources. A vegetarian diet is better.'

Predictably, after a backlash by the right-wing press (which had fair choked on its claret to read of anyone daring to challenge the sovereignty of the Sunday Roast), Stern was forced to beat a retreat.

'I did not, as your front-page headline (Oct 27) suggested, tell people to "give up meat to save the planet". Nor did I, as your leading article (Oct 28) asserted, make a "demand for behavioural change"', Stern was forced to capitulate in *The Times*' letters pages.

He continued: 'It would be extremely counter-productive to try to dictate the choices that consumers can make. A sound democracy requires information on key issues, the availability of choice and strong public discussion.'

The thing is, Nick, we've had all three of those for about the last decade, and we're no closer to solving the methane-from-livestock issue. In fact, according to a controversial report released by the WorldWatch Institute this month (available at <http://bit.ly/40VZkw>), emissions from livestock may account for a staggering 51 per cent of anthropogenic greenhouse gas emissions. Its methodology is up for debate, but what it does quite rightly point out is that the livestock industry has continued to balloon in size since the data were collected on which the last study into the matter - the FAO's 'Livestock's Long Shadow' report - was based.

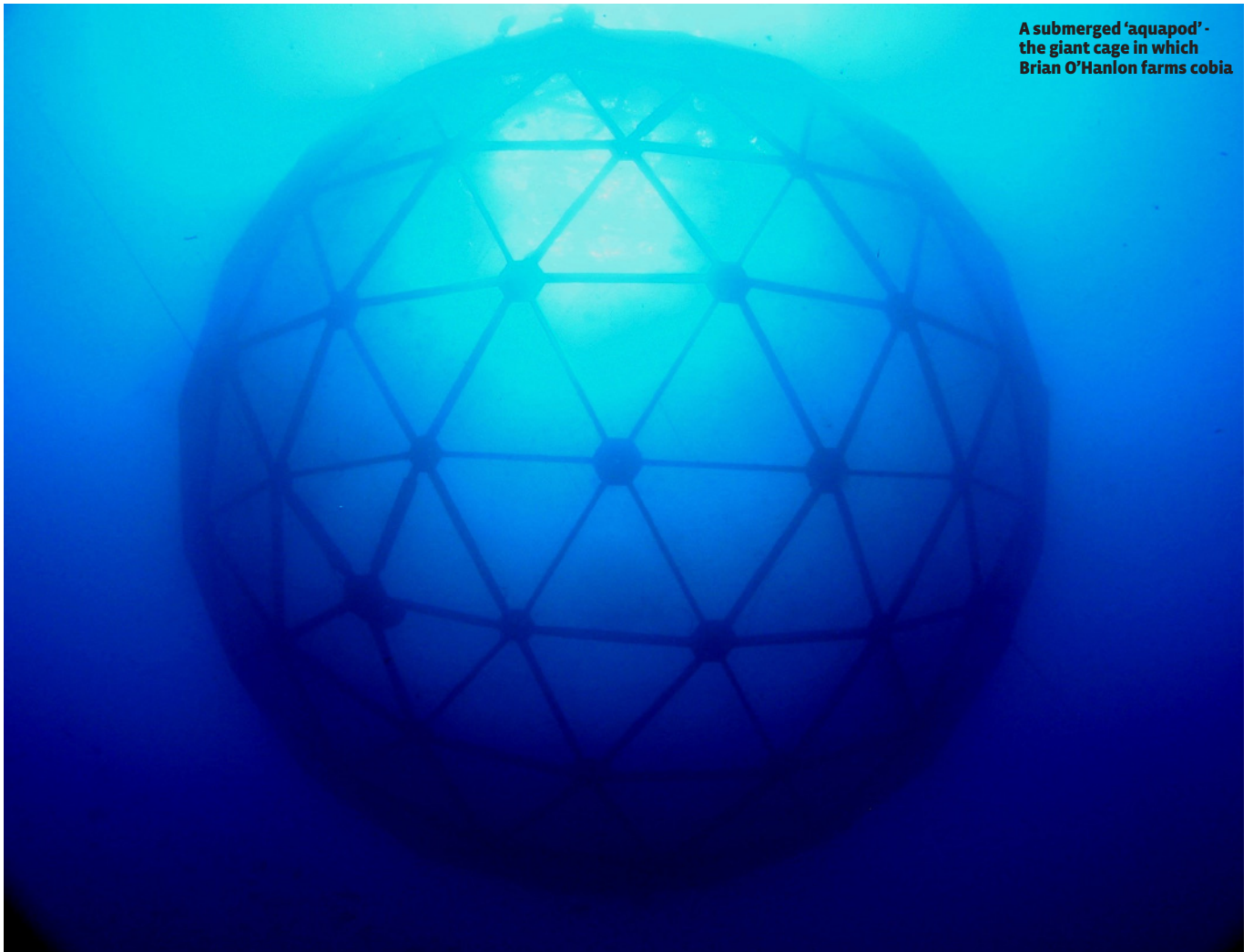
In many ways, the 'food crisis' with which the world will be faced over the next century will be, at root, a 'protein crisis': a war that will have to see long-standing habits and tastes for meat and dairy products brutally addressed.

Whatever the exact climate impact of intensive livestock farming, anyone in any doubt as to the human- and ecosystem costs of this system should turn straight to Andrew Wasley's report on the effects of soya cultivation in Paraguay (page 5). Based on a Friends of the Earth investigation into animal feedstocks, his article - and the accompanying film on our website - show that even if we could magically decarbonise cheap meat and dairy production tomorrow, its effects are still chilling.

Stern, this was the wrong issue on which to back down.

Mark Anslow, Editor

A submerged 'aquapod' - the giant cage in which Brian O'Hanlon farms cobia



Is this the future of fish farming?

Inside vast, 360-sided, 7000 cubic metre underwater cages off the coast of Panama, marine biologist Brian O'Hanlon is trying to solve some of the problems with large-scale aquaculture. **Edward Helmore** reports

Eight miles from the Caribbean coast of Panama, bobbing on several hundred feet of pristine ocean, 29-year-old Brian O'Hanlon surveys the grand expanse of his opportunity. 'This is the future,' he says with the confidence and, in this heavy swell, the enviable sea-legs of a man with two generations of New York's Fulton Street fishmongering business in his blood.

O'Hanlon, a marine biologist by training, is preparing to embark on a project that promises a revolution in the troubled fish farming business and, with it, the chance to begin to curb the critical over-exploitation of the world's ocean fisheries.

Reconciling the dual instincts of the fish trader and the ecologist is not simple. As a fish-trader, O'Hanlon has watched the

collapse of stocks of salmon, snapper, cod, grouper, halibut, skate and Chilean sea bass; as an ecologist, he's watching as species like tuna and swordfish are pushed close to extinction, and industrial fleets fish ever farther down the trophic scale toward jellyfish and plankton in the search for protein.

As global demand for fish increases and

wild stocks decline, a production shortfall conservatively estimated at 35 million tons a year over the coming decades will have to be met – if it can – from aquaculture and mariculture.

But fin-fish farming is itself highly problematic and, like industrial fishing itself, intricately linked to wildlife destruction. Densely stocked farm fish populations, highly prone to disease, can decimate wild stocks with contagion, interbreeding and parasites.

But O'Hanlon is a man with vision, a vision that was publicly recognised earlier this year when his company, Open Blue Sea Farms, was nominated as a finalist at the Earth Awards in New York.

What lies beneath

His plan, simply put, is to place vast sea cages in deep water and fill them with cobia, a pelagic, fast-growing, semi-vegetarian fish common to the Caribbean, akin in taste and consistency to halibut.

In this water, and with careful control of the life-cycle from broodstock to maturity, O'Hanlon hopes to pioneer a new era in aquaculture. 'The fishing industry cannot grow at its current pace without exploring new frontiers – and the open ocean is a vast, untapped resource,' O'Hanlon says. 'There's nothing but opportunity in this water. It's the perfect location with the perfect combination of depth and current.'

'We think we're farming fish in a more natural way by moving farms into an

'If there's a good source of protein that's being waste we need to put it to good use creating more protein. Protein is a limited resource in the world, and the ultimate goal is to produce more of it'

environment that is better for the fish, with cleaner water and more natural exchange, and in an environment that can handle that operation without wider impact.'

But it's a highly controversial plan. Environmental groups are implicitly opposed to fish farming, often arguing that intensive farming is intrinsically damaging to natural fish stocks.

Trials raising snapper off the coast of Puerto Rico over the last seven years suggest deep water farming can work. But a combination of US Government regulations, hurricanes, the relative slow growth of that species and market price persuaded O'Hanlon that commercial viability can only be achieved with a different species, farmed on a larger scale and in less highly-regulated waters. Panama, with its long coastline, infrastructure and international transport, seems an ideal choice.

Compared to salmon, which take three



O'Hanlon inside the pod. As a semi-vegetarian species, cobia can be fed a more sustainable diet

years to reach market size or halibut (which take five), cobia take around 15 months to reach 14 lbs. While not perfect (cobia's bone structure lowers the yield on the filet), the firm hopes a new market will emerge. The effort has already begun in earnest, with Jamie Oliver recently presenting a recipe for Cobia a la Tony Blair on US TV. 'There's very little work being done in tropical marine fish species and we need a product

'Even if you're farming in deep water there's still a problem with escapes, with pollution and with contamination,' says Willie Mackenzie at Greenpeace. 'And you're still taking fish out of the ocean to make into fish. At some point we run out of fish to feed the fish. We think fish farming for carnivorous species is part of the problem, not part of the solution.'

But the environmental impact of aquaculture is clearly farm – and species – dependent. A recent report from Kona Blue, a leading producer of amberjack, published in *The Earth Times* claimed that maricultured fish have some 60 percent less impact on fish stocks at the base of the food chain compared to the impact of wild-caught predatory fish like swordfish or tuna.

O'Hanlon, who grew up on Long Island and worked first in his father's seafood distribution business, recognises the problem. Cobia, he says, do well on diets that contain very little fish meal and more vegetable matter. His company, Open Blue Water Farms, proposes to source feed from well-managed fisheries while seeking sources of protein, including off-cuts and by-catch, that could ultimately drive the price of cobia and other farmed species down to widely affordable levels.

'If there's a good source of protein that's being wasted we need to put it to good use creating more protein,' he says. 'Protein is a limited resource in the world and the ultimate goal is to produce more.'

Of course, that is one side of an argument that speaks to the split perception over how to manage oceans that are falling barren to over-fishing, acidification and climate change. To Mackenzie at Greenpeace, the goal is not to seek solutions to problems caused by

that's considered a premium quality fish,' says O'Hanlon. 'Cobia is a good place to start.'

Problems at depth

But the outcome of the program is by no means certain. While deep sea farming may help to minimize the spread of disease within caged fish populations and has been shown to benefit sea life downstream from the site, environmental groups consider fish-farming a net drain on the world's seafood supply.

Reduction fisheries catch millions of tons of sardines and whiting to produce fishmeal – a situation exacerbated by western consumer preference for pelagic, predatory fish like salmon and cod. In the Far East, where vegetarian fish like catfish and tilapia are popular and extensively farmed, there is concern that land-produced fishmeal represents a growing nutrient imbalance between the land and sea.



The aquapod surfaced for maintenance. Cages in open water should reduce local pollution levels

over-fishing but to carefully manage wild stocks. 'The better thing to do would be to try to achieve some balance in the oceans and help fish stocks to recover,' he says.

Drowned out?

Like many producers, O'Hanlon senses that the voice of even environmentally conscientious farmed fishers is drowned out by the chorus of disapproval from the environmental lobby. In an effort to gain new environmental credibility, the business is rapidly moving toward a system of certification managed by a group of organisations including WWF.

Under that system, well-managed fisheries are a given seal of approval that's helping to create a business of branded products (Loch Duart for salmon and Kona Blue being two industry stars.) If the Panama site performs as anticipated, cobia will be delivered to market free of methylmercury (a common problem, especially in large wild fish like tuna), antibiotics, steroids or colourants at approximately three dollars per pound.

Backed by a New York venture capital fund, Open Blue Sea Farms has attracted the attention of governments looking to move toward sustainable fish-farming.

'We are on the periphery of a whole new economy where sustainable practices are the priority,' says HRH Tunku Naquiyddin of Malaysia who underwrote the Earth Awards in New York earlier this year. He says that finding ways for humans to progress in harmony with the planet is now 'an economic issue as much as an environmental one'.

Lone voyager

With the exception of a deep water pilot scheme in Ireland, Open Blue Water Farms is

a pioneer. US fish producers are keenly waiting for new guidelines from the Obama administration's National Oceanic and Atmospheric Administration (NOAA) appointee Jane Lubchenco.

Lubchenco, an expert in inshore mussel and bivalve production, may not be so kindly disposed to fin-fish farmers: wild salmon populations in her home state of Oregon have been afflicted by inter-breeding with escaped fish as well as sea lice flushed from farm populations.

But the fact remains that the world is going to need more fish protein to support its population. If commercial fishing is no longer sustainable – 30 per cent of world fisheries have collapsed, 70 per cent are fully exploited or worse, and it is forecast that all world

fisheries will collapse by 2048 – then the problems associated with fish farming will have to be solved.

O'Hanlon points out that aquaculture on a large scale has only been practised for a quarter of a century, and there is still much to learn. So far, the output from the big farming areas – the Far East for shrimp and tilapia; sea bream and sea bass in Turkey and Greece; salmon in Scotland and Norway – has done little to relieve the pressure on wild species.

Cobia, O'Hanlon believes, could substitute for snapper, grouper, halibut, cod and Chilean sea bass, otherwise known as the Patagonian toothfish and a species that was heavily fished throughout the 90s before stocks abruptly crashed.

For O'Hanlon, who spent part of his adolescence trying to get snapper to breed in tanks in the basement of his parents' Long Island home, the challenge of ocean farming is compelling. 'We're doing what we think is right, practical and responsible,' he says.

Edward Helmore is a freelance journalist

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<http://bit.ly/37OCXB>

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» **Greed of Feed: the impact of cheap farmed salmon**
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» **Seven tips for buying sustainable fish**
<http://bit.ly/40QrRS>



O'Hanlon's fish should contain lower levels of antibiotics and methyl mercury, common in wild fish

KILLING FIELDS:

The true cost of Europe's cheap meat



Cheap meat has become a way of life in much of Europe, but the full price is being paid across Latin America as vast soya plantations and agrichemicals lead to poisoning and violence. **Andrew Wasley** reports

Much of the cheap meat and dairy produce sold in supermarkets across Europe is arriving as a result of serious human rights abuses and environmental damage in one of Latin America's most impoverished countries, according to a new film launched in conjunction with the *Ecologist Film Unit*.

An investigation in Paraguay has discovered that vast plantations of soy, principally grown for use in intensively-farmed animal feed, are responsible for a catalogue of social and ecological problems, including the forced eviction of rural communities, landlessness,

poverty, excessive use of pesticides, deforestation and rising food insecurity.

The film, *Killing Fields: the battle to feed factory farms* – produced by a coalition of pressure groups including Friends of the Earth, Food and Water Watch and with European coordination by Via Campesina, – documents the experiences of some of those caught up in Paraguay's growing conflict over soy farming and reveals, for the first time, how intensive livestock farming across the EU, including the UK, is fuelling the problem.

Campaigners plan to use the film to

highlight the 'unsustainable' nature of modern food production, and to spearhead efforts to raise awareness of the largely hidden cost of the factory farming systems supplying much of Europe's cheap meat.

The moves come as international concern over global food insecurity grows, and amid fresh warnings that millions of the world's poorest people face acute hunger in the coming months and years because of the twin threats of climate change – impacting farming in large parts of the developing world – and the ongoing credit crunch which has

WHAT PRICE CHEAP MEAT?



Top: vast swathes of rainforest are removed to make way for soya plantations

Right: watercourses have been polluted by run-off containing pesticides and herbicides

Below right: members of the Kaiowa tribe say that their traditional way of life is being eroded by intensive soya farming

Bottom: Those who protest against soya plantations have met with a heavy-handed response



seen global food aid budgets slashed.

Protein king

Soy is prized for use in animal feed as it provides a cheap source of protein for poultry, pigs and other intensively reared animals that require fast growth in order to produce large meat, egg and milk yields. The EU ban on the use of bonemeal and other animal by-products in agricultural feed following the BSE crisis has further driven demand for soy as a principal feedstuff.

Globally it has been estimated that as much as 97 per cent of soymeal produced is now used for animal feed.

Attracted by cheap land prices, poor environmental regulations and monitoring, widespread corruption and low taxation on agricultural export commodities, agribusinesses have long viewed Paraguay as an ideal country in which to do business. In recent decades increasing chunks of rural land have been bought up and turned over to export-orientated soy cultivation.

Paraguay is now the world's sixth largest producer of soy, with over 2.6 million hectares of land given over to cultivating the crop, and the fourth largest exporter. Vast quantities are exported to neighbouring Argentina, from where much of the crop is shipped to China to supply the country's growing demand for animal feed.

The EU is the second largest importer of Paraguayan soy, with Germany, Italy and the Netherlands among the biggest customers.

Food supplies shrink

The arrival of export-orientated soy production in Paraguay has led to significant swathes of forest being destroyed to make way for crops, according to critics, threatening biodiversity and depleting resources vital for many rural communities.

In testimonies collected by investigators from villages adjacent to soy plantations – and featured in the film – local people complain that there is no longer an abundance of food and other produce:

'We indigenous people used to live from the forests, [from] animals, fruits... now we cannot do that any more because we are surrounded by ranches,' Jose Dolores Berraro, from the Yrbucua community, says. 'It's an invasion because instead of reforesting they come to deplete natural resources and these forests.'

Although new laws have been introduced to protect forested areas following the decimation of the world renowned and ecologically important 'Atlantic Forest' region, campaigners say the rate at which forests elsewhere in Paraguay are being devastated to make way for soy plantations is increasing, with some 500 hectares per day still being lost, according to some estimates.

WHAT PRICE CHEAP MEAT?



Left: displaced indigenous people live in makeshift dwellings by the roadside

Chemical fix

Industrial scale soy production, particularly for genetically modified (GM) crops – some 90 per cent of Paraguay's soy is now thought to be GM – is dependent on the frequent application of powerful pesticides and other agri-chemicals which have been linked to environmental degradation and a host of negative health impacts on people living near to soy farms.

Crop spraying has polluted important water sources in many rural regions, say campaigners, poisoning animals, threatening plant life, and resulting in a number of health problems in people, including diarrhoea, vomiting, genetic malformations, headaches, loss of sight and even death.

The film contains harrowing testimony from Petrona Villaboa, who lives in Pirapey, whose son Silvano died after being sprayed with toxic chemicals on a soy plantation.

Statistics compiled by pressure groups suggest that as much as 23 million litres of pesticides and herbicides are sprayed in Paraguay each year, including several that have been classified by the World Health Organisation as being 'extremely hazardous'.

Armed response

Paraguay has a long history of land conflict, and the arrival of large scale soy farming has been met with significant resistance from many rural communities. Protest groups have repeatedly protested against encroachment upon their land – organising protests, blockades, land occupations and actions to prevent pesticide spraying.

But the response from soy farmers, often



» To see an extended version of the film available in 15 languages, and to find out more, visit www.feedingfactoryfarms.org

USEFUL LINKS

» www.fixthefoodchain.com
www.eurovia.org
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SEE ALSO

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<http://bit.ly/JguND>

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backed up by police and paramilitary units acting on the orders of the authorities, has been brutal, according to peasant leaders, with violent evictions, frequent shootings and beatings – resulting in numerous injuries and several deaths – as well as arbitrary detentions and frequent disappearances.

In one of the worst incidents to date, during the forced eviction of the peasant community at Tekojaja, in Caaguaza, soy farmers – reportedly under the protection of police and soldiers – forcibly removed some 270 people from the village, including children, arrested 130, set fire to crops and bulldozed houses, before shooting dead two inhabitants, Angel Cristaldo and Leopoldo Torres.

In another incident reported by the peasant's movement MCP, in Canindeyu, activist Esteban Hermosilla disappeared from his house and was discovered dead and half buried on a nearby agricultural estate. His assassins reportedly cut off Hermosillas' ear as proof he had been killed, before sending it to the man who it was later claimed had ordered the murder.

Such cases are far from unique – peasant organisations have compiled a detailed dossier of violent repression linked to the soy industry in Paraguay – and pressure groups are keen to highlight this seldom-reported human cost of intensive farming.

Since the beginning of the soy boom in Paraguay in 1990, it has been estimated that as many as 100,000 small-scale farmers have been forced to migrate to cities – with about 9000 rural families evicted because of soy production annually.

Upon arrival in urban areas, many families are forced into slums and struggle to adapt. With few employment opportunities and little state assistance, many face a life of poverty.

'Since the beginning of the soy boom in Paraguay in 1990, it has been estimated that as many as 100,000 small-scale farmers have been forced to migrate'

Andrew Wasley is a journalist with the investigative agency, Eco-Storm

As an ethically conscious consumer – whether that means the odd jar of Rainforest Alliance certified coffee or the latest bamboo bicycle – the chances are that your products arrive in your home only at the end of a very long sea journey in a rather large container ship.

These vessels predominantly run on the dregs of refined crude oil, fuel oil; the heaviest, dirtiest liquid fuel type, containing 2000 times the amount of sulphur compounds as that found in road petrol or diesel. The sulphur emissions alone are thought to be responsible for around 60,000 deaths a year across coastal parts of Europe and Asia, and although measures have been taken to reduce sulphur emissions, without further intervention that figure could rise to around 87,000.

The carbon footprint of marine fuel fares little better: shipping's CO₂ emissions are pegged at around 1 billion tonnes per year, contributing between 2-5 per cent of world greenhouse gas emissions.

Although shipping is widely recognised as the most 'carbon efficient' mode of commercial transport – a fair argument for preference over air or road freight – this shouldn't be taken to mean that shipping is 'green' business.

The industry itself has suffered severe criticism over its attitude towards environmental responsibility, and for good reason. With high profile environmental disasters such as the Exxon Valdez oil spill, and the less well-publicised but similarly harmful distribution of invasive species through the disposal of ballast water, it is viewed by many as a sector content to sit in the wings until a crisis manifests itself.

Change of course

Things have begun to change, however. In 2006 the global regulatory body, the International Maritime Organisation (IMO), began discussing what measures it might take in response to climate change.

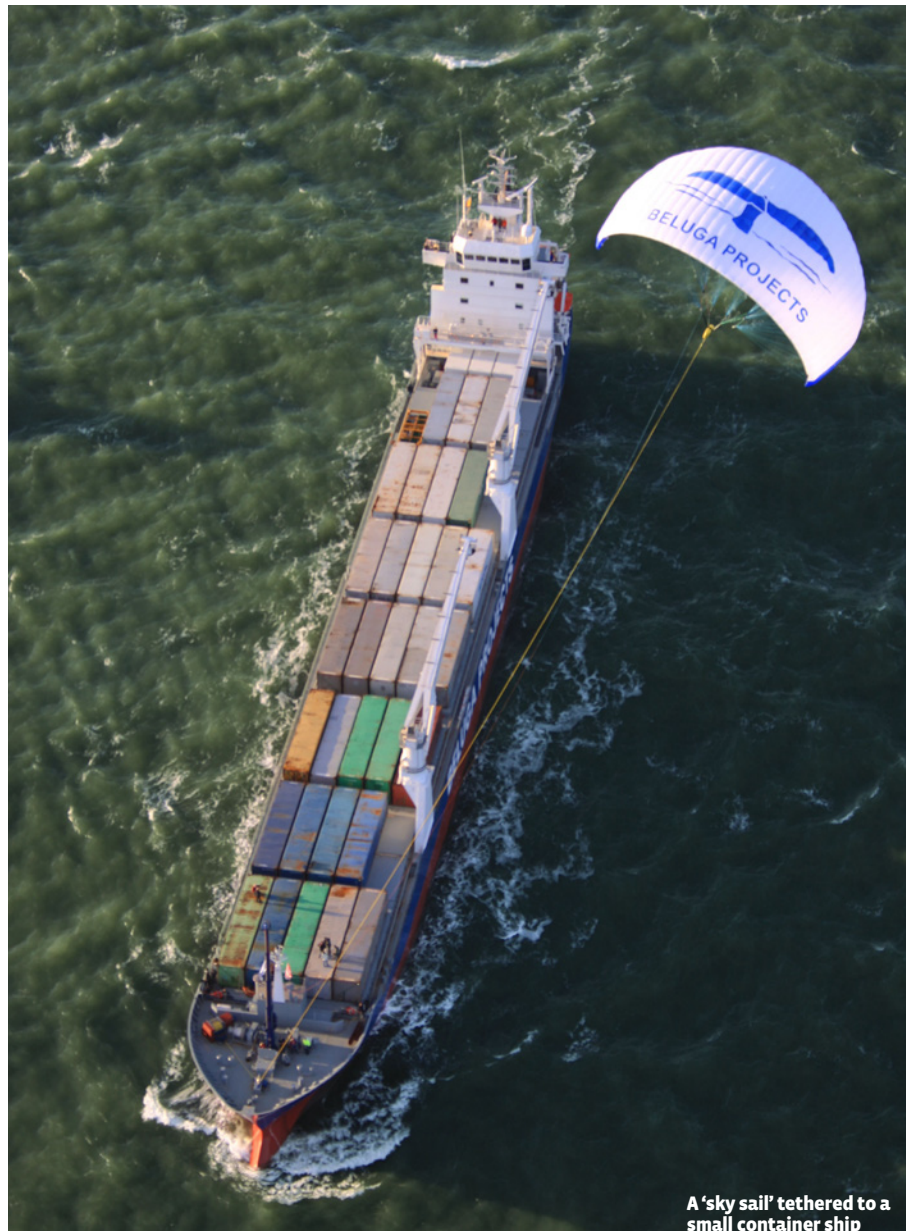
Progress has been slow: to this day there are still no mandatory regulations or even voluntary standards in place to reduce carbon emissions from shipping, partly due to the discord between developed and developing countries over emissions trading and carbon taxation.

Many in the industry now hope that an array of technological solutions will give shipping the tools with which to reduce its environmental impact. Indeed, the IMO suggests carbon emissions could be reduced by as much as 75 per cent through technological and operational measures alone.

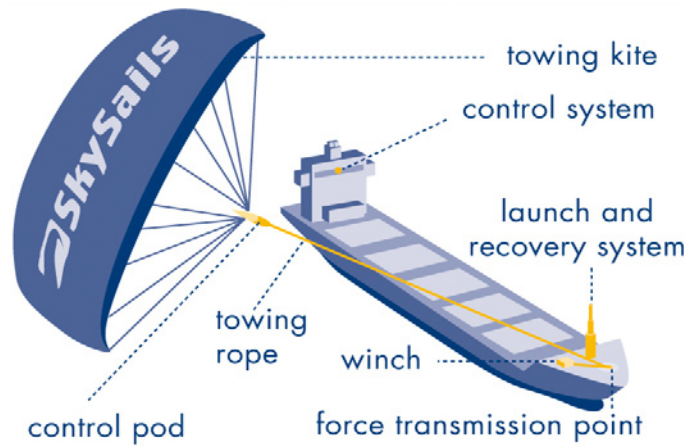
Notable innovations include a novel way to harness wind power from kites, an air-cavity system that would reduce a ship's drag and a host of operational measures such as 'slow-steaming' that would mean for lower speeds and thus lower fuel consumption (see boxes). There are also scrubbing techniques that aim

Does shipping have a green future?

It's the transport mode that delivers 90 per cent of our goods, so what are the shipping industry's plans to lighten its footprint, asks **Chris Carroll**



A 'sky sail' tethered to a small container ship



SYSTEM COMPONENTS

TECHNOLOGY: GIANT KITES

PROMOTER: SKYSAILS

» **How does it work?:** Known officially as a 'towing kite propulsion system', SkySails' huge parasails are tethered to the front of a cargo ship and can pull the vessel forward with a force equivalent to between eight and 16 tons. This equates, the manufacturers say, to an annual average fuel saving of between 10 and 35 per cent, rising to 50 per cent under 'optimal wind conditions'. Sophisticated machinery controls the kite, although some worry that the level of operator skill required may be beyond most commercial shipping crews.

to clean up shipping exhaust, siphoning off carbon dioxide and nitrogen compounds from smokestacks, as well as more conventional measures being pursued such as improved hull design.

One of the most remarkable alternative power supplies again utilises wind, but not as you might expect. Greenwave, a not-for-profit organisation set up in 2006 and based in the UK, has re-examined a phenomenon known as the Magnus Effect. Although first tested on a ship in the 1920s, the technique was soon dismissed in favour of the simplicity of cheap diesel.

Today, the idea is gaining new currency. It involves thrust being generated from a rotating vertical cylinder positioned on a ship's deck, a sort of mechanical sail. As air passes around the cylinder, opposing areas of high and low pressure are created on either side, generating forward movement. The developers claim that the additional thrust can account for 13 per cent of the energy needed to move the ship forward, and allows for the ship's engines to be 'throttled back', saving an average ship – and not all ships will work with the technology – some 900 tonnes of fuel a year.

Water resistance

Major industry players have been moving in the right direction: Maersk Line, one of the world's largest container line operators, has been performing a range of tests on carbon reducing measures and was rewarded for its endeavours at the recent Sustainable Shipping Awards ceremony in London.

But there is a sense that the industry has been enjoying such awards and conferences for several years without making much real progress. In 2006, I sat through a presentation at a shipping conference on the use of large kites to reduce fuel demand. At one point, the speaker made what was seen as an audacious prediction: that oil prices would 'one day in our life time' rise to over \$100/barrel, making this technology eminently

TECHNOLOGY: AIR CAVITY SYSTEM/AIR LUBRICATION

PROMOTER: (VARIOUS)

» **How does it work?:** A more established technology with which engineers have experimented since 1970s, air cavity mechanisms aim to create layers of air under ship hulls to form a cushion on which ships can 'ride' with less resistance, reducing fuel consumption. The system is already used on certain vessels, but only works with specific hull designs, and new propellers are required to cope with the additional air in the water. An alternative system involves injecting air through thousands of tiny holes in the ship's hull to create a thin 'skin' of bubbles between the metal and water. This could again help to reduce drag, but the behaviour of air bubbles is surprisingly complicated, and under some circumstances they could actually make drag worse. Keeping the tiny holes free of algae and barnacles has also proved a problem.

TECHNOLOGY: IMPROVED AERODYNAMICS

PROMOTER: GREENWAVE

» **How does it work?:** Greenwave's 'DRACS' project (Drag Reducing Aerodynamic Components for Shipping) has analysed which parts of a cargo ship's structure cause the most air resistance as it sails forward. The researchers discovered that the bridge and crew accommodation area (the large structure built at the stern of the ship) was a major problem, as were onboard cranes that remain on the deck at all times. The project suggests 'easy-to-fit' aerodynamic improvements to guide wind around the structures.

affordable. You could almost hear the biting of lips. And yet, fast forward a couple of years, and despite oil prices rising to almost \$150/barrel, fuel saving technologies are still yet to find commercial success.

Of course there might be fair reason to assume that ship owners, like any business-people, would be cautious over investing in something new. However, those close to the industry believe that a principle of 'let's-wait-and-see' is stifling the employment of new technologies.

'The shipping industry is extremely conservative,' Eelco Leemans of the North Sea Foundation (an affiliate of Friends of the Earth International) and one-time chief officer aboard the Rainbow Warrior II, said. 'They have this system; it's a boat, it's made out of steel, it has a nose and stern, it has got a bridge where people live, it has a big cargo hold and it has a diesel engine; that's the ship.'

'When I ask people in the maritime industry that maybe we have to think about different forms of propulsion like wind. They say: "Forget about it, we closed that book in the 1920's, it's never going to happen again." So that's the conservatism, they're not open to different concepts.'

This aversion to risk means that proper, binding regulations are even more sorely needed. But these are bogged down in the minutiae of international agreements and fears over the consequences of carbon trading or levies.

A global business

At the 59th IMO Marine Environment Protection Committee (MEPC) meeting held in July this year, the last before the UNFCCC Copenhagen climate talks, there was an obvious divide between developed and developing nations over ways to put a price on carbon. The disagreement however was less concerned with the suitability of one mechanism over another, but rather more to do with the implications of what a carbon cost

might mean for world trade.

This situation is of course nothing new, but environmental campaigners believe that any fears developing countries might have about a loss of trade resulting from pricing carbon simply don't add up. They point out that even if a fixed carbon price of \$30 per tonne was levied on all shipping emissions, the price of goods carried by sea would only rise by 1 per cent.

Shortly before that final MEPC meeting Peter Lockley, head of transport for WWF-UK said: 'One way out of the current deadlock is for every country to participate in a global shipping scheme, but for the revenues generated by a levy on fuel, or by auctioning emissions permits, to go exclusively towards helping developing countries fight climate change. That way, poorer nations will ultimately receive more than they pay in.'

'For such an offer to be credible,' he continued, 'rich countries must show that they are willing to transfer this money and not keep it to plug budget deficits at home. Developed countries have long argued that the emissions belong to no individual country - they can't now lay claim to the proceeds of any levy on those emissions.'

Track My Ship?

Another option being pursued by the IMO is



TECHNOLOGY: SOLAR SAILS

PROMOTER: SOLAR SAILS

» **How does it work?:** Combining the two most abundant renewable resources – sunlight and wind – the solar sails are rigid aerofoils clad with photovoltaic cells. Computer software developed by Solar Sailor helps the sails track both the wind (for direct propulsion), and the sun, which provides power to drive an electric propeller. Based on fuel savings observed in other hybrid systems – and on a prototype ship, above – the company claims fuel savings of between 50 and 90 per cent. This includes the savings using an all-electric drive system. The technology has yet to be tried on large ships, and is currently only feasible for ships that sail at speeds below 6 knots.

TECHNOLOGY: HARNESSING THE WIND

PROMOTER: GREENWAVE

» **How does it work?:** WASP (Wind Assisted Ship Propulsion) is Greenwave's attempt to harness a principle observed by 19th century German physicist Heinrich Magnus - that wind hitting a rotating cylinder creates areas of high and low pressure around its circumference, exerting a useful force. The principle was successfully tested in 1925 by German engineer Anton Flettner, although the design was found to be less efficient than conventional engines. Greenwave hopes that its re-envisioning of Flettner's rotors can provide some 13 per cent of the thrust needed by a cargo vessel, saving around 900 tonnes of fuel each year.

TECHNOLOGY: IMPROVED HYDRODYNAMICS

PROMOTER: GREENWAVE

» **How does it work?:** Another Greenwave proposal, the HYDRIS project (Hull Drag Reduction in Sail Assisted Shipping) has experimented with redesigning the bulbous underwater 'nose' of cargo ships, although fuel savings are thought to be limited. The company is now looking at air lubrication (see page 9).

the CO₂ 'indexing' of ships - creating a catalogue of individual vessels and their fuel efficiency figures, much as we have for cars. A host of environmental NGOs are backing such a measure on the assumption that having standards in place will lead to improved ship design and operational performance. And, at the beginning of October, the recently formed Carbon War Room, a global initiative founded by Richard Branson amongst others, weighed into this specific issue demanding an accelerated 'global adoption of efficiency standards'.

The need for mandatory measures is of course essential, but perhaps the big question is who will implement such measures? There is a fear amongst industry insiders that fallout from the Copenhagen talks will decide whether it is a global organisation, such as the IMO, that will continue to pave the way for carbon regulations, or whether it will be left to likes of regional bodies such as the EU. A binding, global agreement at Copenhagen would probably see the former. A weak, or non-binding, deal could see the latter scenario arise, whereby ships entering the waters around Europe would have to pay a carbon levy.

Wherever the responsibility finally rests, there is no doubt that actions are needed urgently. 'People can't seem to get their head around the bigger picture,' said Colin Whybrow of Greenwave. 'It is very difficult and it is complicated, but that's not an excuse for doing nothing.'

'One of the reasons why we set up as a charity is so that price does not become a barrier to adoption. Usually, as soon as you mention anything environmental the price goes off the screen. What we're trying to do is actually make it pay for itself. If, along the way, ship owners make money out of it, frankly, so what? The bigger picture is the most important thing.'

Indeed, environmentalists and regulators alike seem prepared to forgive the industry its dirty past.

Jonathon Porritt, founder of Forum for the Future and senior adviser to the Carbon War Room's 'battle' on shipping said last week: 'The shipping industry has the opportunity to transform its impact on climate change and become the benchmark for environmental efficiency amongst the transport industries. Central to this is utilising tried and tested innovations in conjunction with a willingness to change.'

'Success will be based on widespread collaboration and dialogue throughout the entire industry, working together to achieve a common objective that will provide environmental, social and economic benefits for all.'

The door is open; whether the industry chooses to step through it remains to be seen.

Chris Carroll is a freelance journalist

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How can we tell which companies are really green?



Green claims are everywhere: surely there must be some simple way of measuring exactly what impact a company is having on the climate? David Ord takes a look at benchmarking 'green-ness'

While the past months may have seen fears of financial apocalypse push climate change out of the headlines, the impact of business on the environment remains firmly embedded in both government regulation and customer and shareholder awareness.

In short, companies that can demonstrate genuine action in improving the sustainability of their products and processes will be more successful in the future.

They will, however, have to be able to convince increasingly knowledgeable and sceptical observers. Specialist sustainability PR firm Futerra has felt the need to issue its own greenwash guide, aimed at curbing the over-enthusiastic eco-friendliness of communications officers.

Futerra believes that confidence in companies' sustainability claims is at an all-time low: only 10 per cent of consumers say that they trust green claims from business and government. Comprehensible, trustworthy metrics have never been more in demand.

What gets measured...

Basic principles are simple – a business wanting to reassure its customers and

shareholders needs to understand the contribution of its activities to climate change by measuring its carbon footprint. Complication sets in almost immediately, however.

There are a number of ways that a carbon footprint can be calculated, using different tools and methodologies. One company might include in its calculations only those things for which it is directly responsible, such as energy used during the manufacturing process, while another may decide to consider the impact of indirect emissions – sourcing raw materials, transport, or waste disposal. This can make it difficult to make useful comparisons between businesses, even within the same sector.

Despite sustainability's prominent position in many companies' business plans and mission statements, robust methodologies for carbon footprinting are still not yet fully

driven by regulation – it's up to you if you choose to count your carbon. Mechanisms for monitoring and coordination are still lacking, and the debate continues as to whether the scope of such mechanisms should be global, regional or domestic.

In October, the UK Government released guidance on how a firm should measure its greenhouse gas emissions – a long awaited clarification. But even this was greeted with furrowed brows:

'To avoid confusion, the Government needs to ensure businesses understand how this latest guidance will fit in with other low-carbon reporting regulations, including the EU Emissions Trading Scheme and the forthcoming Carbon Reduction Commitment,' said Neil Bentley, the CBI's director of business environment.

Right: The Carbon Disclosure Project website, where companies are encouraged to upload their emissions data. But the project doesn't reward or penalise performance - only the 'disclosure', or reporting, of emissions



Why bother?

The need to 'go it alone' not only places a heavy cost burden on individual businesses, it also creates the risk that some businesses will not publish measurements, whether intentionally or otherwise. Without support and clear guidelines, the complexity of the process can be a disincentive for companies to embrace voluntary initiatives, particularly in times when budgets are under pressure.

Although we're still a long way from standardised global measurement, the last

remain unchanged, while 33 were added and 33 deleted. The list of those added included Johnson and Johnson, Coca-Cola and Samsung Electronics. The biggest deletions were National Grid, Mitsubishi Estate and SABMiller.

According to the DJSI, the last ten years has seen a shift in attitude of participating businesses. In the 1990s, companies' efforts to integrate sustainability into their processes was driven largely by regulation, and a significant number of even the best performers had only vague processes in place to hit sustainability targets. The DJSI believes that,

energy perspective it gives them a framework to address the areas where there is scope for energy efficiency.'

The Carbon Disclosure Project was established in 2000 in an attempt to help set up a standardised process of benchmarking – it now holds the world's largest database of corporate climate change information. The CDP represents institutional investors, purchasing organisations and governmental bodies. Participating businesses – and the CDP now polls around 5000 companies annually, including the Global 500 and FTSE 350 – are asked to complete a comprehensive questionnaire on their end-to-end greenhouse gas measurement and accounting systems.

'For many companies the first time they've ever thought about climate change is when the questionnaire lands on the desk of the CEO or the chairman,' says Lee. She believes that the process of having to ask and answer the right questions helps to raise awareness and drive change within participating companies. 'It helps to identify areas where there's scope for emissions reduction and to develop strategies to manage them,' she says.

The CDP's questionnaires are comprehensive and complex, but the data are ultimately consolidated into a single 'score'. The response rate is high – around 90 per cent of FTSE 100 companies take part, but, inevitably some businesses – in CDP parlance 'decline to participate'. This can be either because of inability to collect the data or because they feel climate change is not a high priority.

Understandably, larger companies have a

ten years has seen the development of a number of systems designed to compare and highlight businesses' green performance. The Dow Jones Sustainability Index (DJSI) was launched in 1999, and was the first attempt to provide worldwide sustainability benchmarking – its scope goes beyond merely calculating a carbon footprint, however. For a business to become part of the DJSI it has to withstand scrutiny against three criteria – economic performance, what the DJSI calls 'relationship with the environment', and social impact.

This year's results, released in September, saw the number of companies on the index

over time, companies have grasped the fact that corporate sustainability brings with it real competitive advantage – being green is, quite simply, good for business.

Green is good

There's little doubt also that businesses have begun to realise that good practice when it comes to sustainability can lead to improved efficiency. Joanna Lee, director of communications and corporate partnership at the Carbon Disclosure Project, (CDP) says: 'A lot of companies tell us that once they've started measuring areas where there's waste from an

'In general, the carbon-intensive sector, with a need to have a good grip on processes, out-performs the non-intensive. Overall, financial services underperforms'

better response rate. 'It does fall away when you get to the FTSE 350 because you've got smaller companies who may not be as advanced in their understanding of the issues,' Lee says. The global response rate for 2008 was 77 per cent. As well as geographical differences there are significant variations in the quality of disclosure between industry sectors, but there are few surprises.

In general, the carbon-intensive sector, with a need to have a good grip on its processes, out-performs the non-intensive. The energy-hungry sectors, such as utilities, mining, paper and packaging all perform well. Overall, financial services underperforms, and was the lowest scoring non-intensive sector, as well as having the lowest response rate – not a good move for a sector recently condemned by Lord Adair Turner, chair of the Government's Climate Change Committee, as 'socially useless'.

The CDP's annual reports – and the organisation now slices and dices the data in over 20 different ways – accentuate the positive. 'We don't do sinners,' Lee says. 'We score companies within what we call the Carbon Disclosure Leadership Index (CDLI), which assesses the quality of the response. What it demonstrates in a clear and simple way is how well companies have responded to us.'

While gaps in participation remain in what the organisation calls 'the carbon disclosure journey' the CDP's assessment is that progress is being made. Lee cites increased consumer awareness and a growing perception of opportunities that better carbon strategies can present to business as key drivers.

The troublesome third scope...

While different methodologies are still in use, processes are beginning to coalesce around the Greenhouse Gas (GHG) Protocol Corporate Reporting and Accounting Standard developed by the environmental think tank the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). In 2006, the International Organization for Standardization (ISO) adopted the Corporate Standard as the basis for its ISO 14064-1 specification. It has formed the basis of the recently announced UK Government emissions reporting guide.

But as the drive to get an accurate measurement of businesses' environmental impact gathers momentum, so the issues involved grow more complex. While legislation is pushing companies to get to

grips with direct emissions (Scope 1 under the GHG protocol), and the more easily measurable indirect emissions (Scope 2), the WRI and WBCSD are still working on developing a standardised methodology for the diverse and difficult to measure Scope 3, which is still optional.

Environmental consultant Emma Stewart describes Scope 3 emissions as 'the elephant in the room'. Reporting is still optional, yet Scope 3 emissions can be as significant as Scope 1 and 2. Covering a range of indirect GHG emissions, Scope 3 can include the impact of waste-water treatment, business travel, sourcing raw materials, product use and end-of-life disposal. Stewart believes that companies can cherry-pick the activities which are either easiest to measure or give the result which looks most attractive to the outside world.

Peverse carbon?

Including product use in the calculation can lead to unexpected results. Along with others in the sector, German chemical giant BASF campaigned vigorously – 'corrosively', according to Greenpeace – against much of

'Whether driven by customers, shareholders, genuine corporate social responsibility or just self-interest – there are usually cost savings which stem from energy efficiency – real progress has been made'

the legislation proposed during the period leading up to the introduction of the 'REACH' chemicals legislation. In terms of carbon emissions, however, the company has been keen to table its eco-friendliness, or at least try to show that there was a silver lining to the environmental impacts of its products.

In early 2008 an extensive end-to-end review of BASF's 2006 operations led to the claim, checked and largely substantiated by Freiburg's independent green think-tank the Öko-Institut, that favourable environmental impact stemming from the use of BASF insulation and other products could 'offset' the company's hefty 87 million tonnes of CO₂(e) emissions by a factor of three to one.

Such a comprehensive exercise in data collection is neither quick nor easy. BASF's analysis of the entire life cycle of 90 products took over a year to complete. The company intends to keep the information up to date, but it will not become an annual report.

NGO response to the claim was guardedly positive, but general consensus was that the

calculation was too complex to verify easily, if at all. Without a standardised protocol for Scope 3 reporting, companies can ignore, or manipulate, a highly significant portion of their total impact on the environment.

Businesses, their customers, governments and NGOs alike, see the need for standardised green metrics, and, developed over the last ten years, the basic machinery is available, though its uptake would appear to be slowed by a combination of the time and costs involved, and the massive complexity of the data feeds needed to assess accurately the end-to-end operation of a large company.

Give us your data

There is no doubt that the DJSI and the CDP are highly influential benchmarking systems, and that the last decade has seen huge advances in companies' awareness of their carbon footprint. Whether driven by the demands of customers and shareholders, genuine corporate social responsibility or self-interest – there are usually cost savings which stem from a business becoming more energy-efficient – real progress has been made.

There is also little doubt that there is still a long way to go. The cost in time and resources needed to carry out a total carbon balance calculation mean that, without legislation, reporting of Scope 3 emissions will remain an option that many companies will choose to

avoid. Without the adoption of a system that forces companies to measure the total environmental impact of their business, top to bottom, it will continue to be impossible to assess accurately just how green a business is.

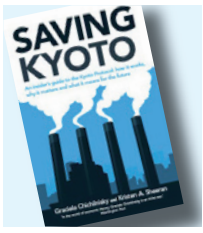
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Nothing will happen at Copenhagen until the 11½ hour

Copenhagen was always going to be a nail-biting experience, but if we abandon Kyoto and try to reinvent the wheel, it could be even worse, says **Graciela Chichilnisky**

As the world prepares for Copenhagen, China and the US are locked into a titanic confrontation reminiscent of last century's Cold War – all about warming.

Neither wants to reduce carbon emissions first, and each can produce catastrophic risks as they are the two largest emitters. The times are different, the weapons are different, but the situation is the same. The stakes are really high and yet in the recent Bangkok climate change discussions, the US looked set to scrap completely the Kyoto Protocol and negotiate a new treaty. Is this a major set-back or a good move?

The move reflects internal US politics. Kyoto has not been ratified yet by US Congress, and it is a point of national pride that the world should not be making international law without the US. But at the end of the day, the Kyoto Protocol is an American creation and follows US market ideas and the 2009 Energy Bill voted by the House goes in the right direction.

The opposition to Kyoto has geopolitical roots. Some in the US fear that the Protocol is a global redistribution plot towards poor nations. There is some truth in that, as the Protocol transferred over US\$23 billion to developing nations for clean technology projects decreasing the equivalent of about 20 per cent of EU emissions. Kyoto can redistribute global wealth. Through its carbon market, the bad guys who are over-emitters have to pay to the good guys that are under-emitters. This should be considered a great achievement of the Kyoto Protocol. Its carbon market changes economic values by making emitting expensive and cleaning profitable, and helps redistribute global wealth to the nations whose resources are over-utilised. This major change in values is exactly what is needed to resolve global warming and stop our suicidal overuse of the earth's resources.

Has Kyoto worked?

The Kyoto treaty was faulted because greenhouse gas emissions rose under its auspices. But the rising emissions of the last 13 years came mostly from nations that never ratified the Protocol. The Protocol is not at fault for those who refused to obey its limits.

Yet the Kyoto Protocol is only a start and requires improvements. Copenhagen must cut global emissions by 60-80 per cent by 2020 to avert the worst risks of global warming. The world emits 33 gigatons of carbon per year. The US emits about 8 gigatons, even though it houses only 5 per cent of the world's population. This has to change. Many nations will agree to substantial cuts by 2050. This sets a good scene on the world's stage – but we need action now. That is more difficult.

Why keep the Kyoto Protocol? We must bound global emissions and decrease carbon in the atmosphere – no matter what. Most people agree on this. But this is the first thing the Protocol does. So if we scrap the Kyoto Protocol we will have to start in the same place and do more of the same – so at the end we would have a Kyoto Protocol by another name. It took 13 years to negotiate the Kyoto Protocol. Why spend precious time reordering the chairs in the Titanic?

The US Energy Bill must still go through Senate and the fear is that at the end it will

be very weak. It could impair a deal in Copenhagen... but I think it will be the other way around: Copenhagen will determine what happens in the US Senate. The Senate's main gripe is that China will not limit its emissions. Unless a satisfactory solution is reached between China and the US, no serious climate change regulation, no carbon limits and no carbon trading can emerge in the US.

The ticking clock

My prediction for Copenhagen is that nothing will happen until the 11½ hour. This is because the stakes are so high – involving the use of energy and the economic growth of nations – that no nation wants to move first.

At the end, reaching a deal will focus everybody's attention. Copenhagen has a mandate, the same way that Kyoto had the Berlin Mandate to achieve the Protocol – and it worked. The same will happen here. The US promised to participate in this process. The stakes are high because we procrastinated too long. Hundreds of millions of people in the Small Island States – 43 of them could drown or be displaced – an enormous cost to the political stability of the planet. President Naheen of the Maldives is already purchasing land in India. 50 million climate refugees are expected in 2010, and 200 million by 2012...

A deal will be reached in Copenhagen. The world cannot afford another failure. From my experience of 25 years, I read the smoke signals positively. It will be an agreement in principle – the details worked out over a year or so and a process agreed for this. I have made two simple proposals that involve technical and financial solutions – both win-win solutions for industrial and developing nations – modest extensions of existing law. They can diffuse the China-US impasse that is the major diplomatic confrontation.

We probably also need to suck carbon from the atmosphere now – what I call Negative Carbon. Reducing emissions does not suffice – we need to literally reduce carbon already in the atmosphere to avert climate change risks. Negative carbon technologies can do that. A small extension of the Protocol's Clean Development Mechanism can fund the building of thousands of power plants in developing nations

that clean the atmosphere. All this is possible through Kyoto. If no deal is reached, a new Copenhagen will have to be created, but it will waste yet more valuable time if we are forced to re-invent the wheel.

Professor Graciela Chichilnisky was the architect of the Carbon Market, and lead author on the Intergovernmental Panel for Climate Change which won the 2007 Nobel Prize. She is UNESCO professor of mathematics and economics, director of Columbia Consortium for Risk Management and professor of economics statistics at Columbia University, NY
To buy a copy of Professor Chichilnisky's new book, *Saving Kyoto*, co-authored by Kristen A Sheeran, with a 25 per cent discount, go to <http://bit.ly/37ixkl> to order the book. At the checkout, enter the promotional code 'ecologist', and your discount will be applied

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