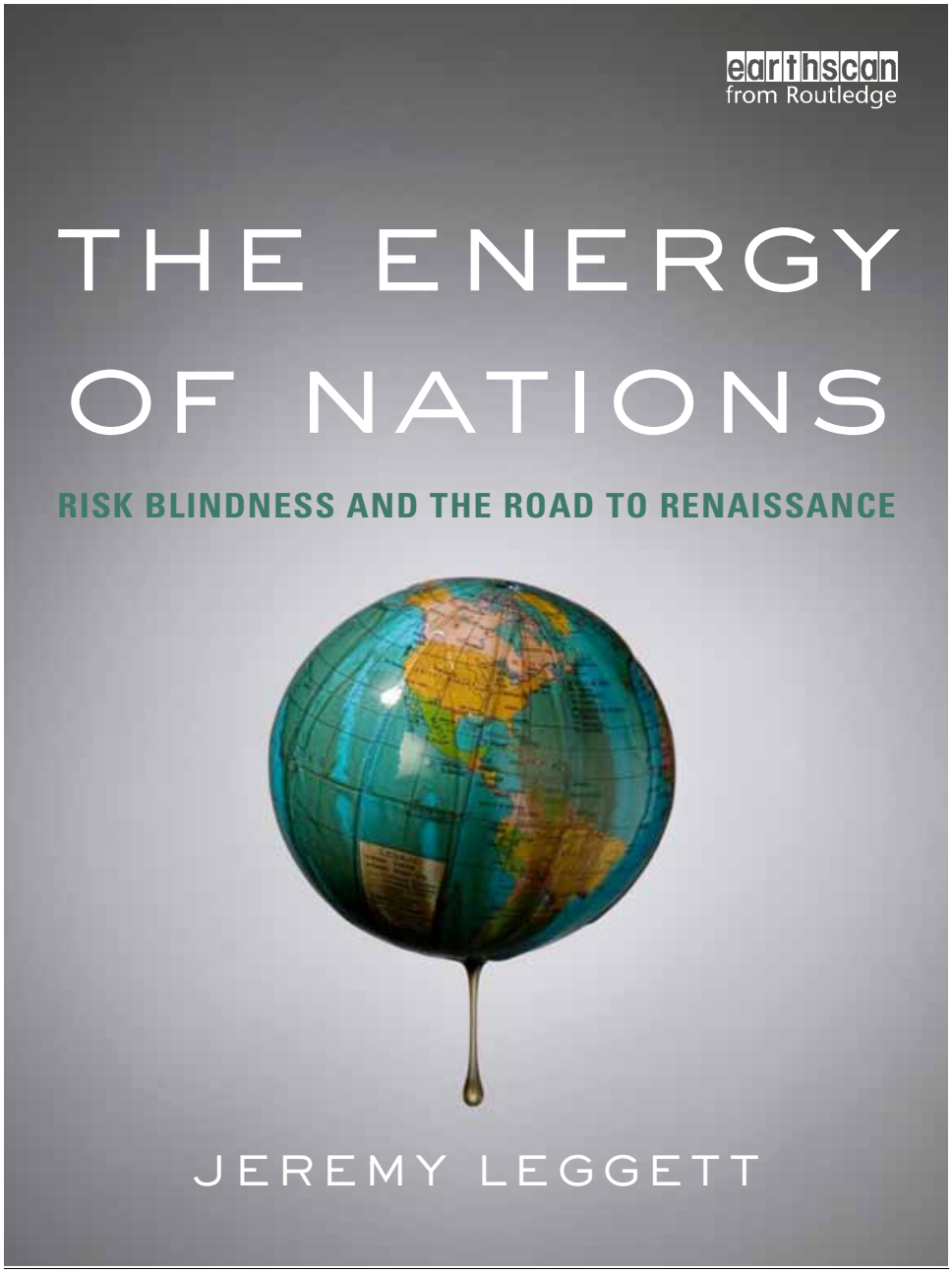

Five systemic risks threatening the global economy. One entrepreneur day to day in the guts of them all. His story is a voyage of discovery into the way the human mind works, the institutionalisation of denial, and the reasons civilisations fails. It is also one of tantalising hope. We have the means to escape the crashes awaiting us, or to soften their blows. Many in society realize this, and are acting, racing to find a road to renaissance before it is too late. This is their story too.

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About the author

Jeremy Leggett is a social entrepreneur and author of *The Carbon War*, *Half Gone,* and *The Solar Century.* Described by the Observer as 'Britain's most respected green energy boss,' he has been a CNN Principal Voice, and an Entrepreneur of the Year at the New Energy Awards. He is founder and chairman of Solarcentury, the UK's fastest growing renewable energy company since 2000, and founder and Chairman of SolarAid, an African solar lighting charity set up with five percent of Solarcentury's annual profit's, itself parent to a social venture, SunnyMoney, that is the top-selling retailer of solar lights in Africa. He was the first Hillary Laureate for International Leadership on Climate Change, chairs the financial-sector think tank Carbon Tracker, and is a consultant on systemic risk to large corporations. He writes and blogs on occasion for the Guardian and the Financial Times, lectures on short courses in business and society at the universities of Cambridge and St Gallen, and is an Associate Fellow at Oxford University's Environmental Change Institute.

Publisher's note about the author's credentials and motivations

In this book Jeremy Leggett warns of five global systemic risks in or connected with the energy sector, each of which he has deep experience of. The first involves the risk of an oil shock. He was a creature of the oil industry for the decade of the 1980s, teaching petroleum geologists and petroleum engineers in the Royal School of Mines at Imperial College, consulting widely in the industry around the world, and researching geological history, including work on shale - oil and gas source rock - funded by BP and Shell among others. In 2006, his concerns about the potential for mismatch between global oil supply and demand led him to convene the UK Industry Taskforce on Peak Oil and Energy Security.

The second risk Jeremy writes about involves climate shock: the potential for ruinous economic and environmental impacts of a rising global thermostat, driven by soaring greenhouse-gas emissions, mostly emanating from the energy sector. His research at Imperial College involved the geological history of the oceans, and hence ancient climates. He won major international awards for that work, and was appointed a Reader at the remarkably young age of 33. His discoveries drove him to a concern about global warming so great that he quit academia and industry in 1989 to become an environmental campaigner.

He won the US Climate Institute's Award for Advancing Understanding for his work in the 1990s, campaigning for action on climate change.

In 1997, his continuing concern motivated him to set up a solar energy company, to campaign directly in the markets. Solarcentury's purpose is to make as big a difference as possible in combating climate change. That purpose, around which the company's famously strong culture is built, was first pitched to investors in its initial capitalisation, in 2000. After four rounds of venture capital, the last in 2007, the company's purpose remains the same.

The third risk he writes about involves a further crash in the global financial system. One might think a social entrepreneur would have little to say here that would be rooted in experience. In fact, Jeremy has been a non-executive director of

a Swiss bank's private equity fund, investing in renewable energy, since 2000. He has witnessed the financial sector at work from inside a bank's boardroom in the run up to, during, and after the credit crunch and financial crash. He knows exactly how ruinous that episode was for many companies. His fund, New Energies Invest AG, was faring relatively well until 2007. As credit dried up, one by one the companies in the portfolio went under. New Energies Invest is now in liquidation.

The fourth risk he writes of is a carbon bubble in the capital markets. Companies and stock exchanges are currently being allowed to account coal, oil and gas reserves as assets at zero risk of stranding by climate policymaking. As a result, such is the enormity of carbon-fuel-based value on stock exchanges, risk of systemic financial failure builds with every new reserve of fossil-fuel discovered. Jeremy chairs Carbon Tracker, a small think-tank of analysts from within and around the City of London: experts having worked for institutions like Henderson Investors and PWC. Some foundation funders hold the view that Carbon Tracker's whistleblowing on the carbon bubble may be the single most promising route to progress in slowing the climatically ruinous flow of capital to fossil fuels.

The fifth risk he describes entails the shale-gas boom, now extending into oil from shale, what the industry calls tight oil. Notwithstanding all the PR from the oil industry about shale gas and tight and oil being gamechangers, great for the US economy and good for the world, this too is at risk of being another giant bubble waiting to burst, in Jeremy's view. As an award-winning research geologist, one of Jeremy's fields of expertise involved shale. He was a graduate student and faculty member at the same time as some of the current captains of the global oil industry, themselves also geologists. At the Financial Times Global Energy Summit in 2012, he debated two enthusiastic shale-gas and tight-oil proponents: Exxon's European boss, and former BP CEO Tony Hayward, who he has known since his youth. The video of that tense debate can be seen on the FT's website.

We commend this book. This author both knows what he is talking about, and is putting his money - not to mention his life's work - where his mouth is.

Prologue

No sooner had the 21st century opened for play than the global economy suffered it's first crash. Most of us watching the dot.com bubble burst in January 2000, and then sweating through the recession that followed it, probably thought it would be a long time before the players in the capital markets made such a mistake again. With the benefit of hindsight, the post-mortems on the crash seemed so clear. Sensible people had been investing vast sums in paper ideas for making money via internet sales and advertising, years after burning many millions in advertising-led scrambles to position their brands ahead of rivals. As the bubble in internet stocks inflated, many investors or advisors of investors had been gaming the system - buying stock in companies producing nothing, valued way higher than long-lived pillars of the stock exchanges who were delivering real goods and services - hoping to sell on to greater fools before the inevitable crash came. 'Such a piece of crap', one investment banker wrote of a stock in a famous e-mail. It didn't stop him advising clients to buy it.[1]

When that kind of behaviour reached it's natural endgame, giant corporations plunged in value by two thousand billion dollars overnight.

By 2006 the new craze involved financial products. Some of us may have tried to understand exactly what collateralised debt obligations and other such derivatives were. The vast majority, myself included, were prepared to believe the new doctrine. It held that clever investment bankers had found a way to limit or even excise risk from securities backed by 'sub-prime' mortgages: those extended to less well-off people. To the extent that many who otherwise might never have owned homes could now buy them, this was even a good thing. So the comforting narrative ran.

Some had an alternative narrative, when they could make their voices heard, and it was very uncomfortable. Dissident economists and financial journalists worried that the derivatives were actually compounding risk in the markets, that

borrowing the vast amounts of money needed to create sub-prime mortgages was unsustainable, and that securities based on these mortgages would ultimately prove toxic as ever-growing numbers of people found themselves unable to service their debts. But these people were few, and the incumbency was so very quick to pour scorn on them. Scaremongers, they were deemed. Even if they were distinguished economists, like Nouriel Roubini, or worked for the Financial Times, like Gillian Tett.

By August 2007, watching credit markets freeze in a wildfire outbreak of panic that another bubble had been created, we knew the scaremongers had if anything been insufficiently strident in their whistleblowing. By August 2008, as the financial markets crashed, we realised that the incumbency had assembled a time bomb primed for economic calamity.

Fortunately, world leaders proved capable, under the gun, of heading off the immediate worst of possibilities: complete meltdown of the global financial system.

Now the post-mortems began again. Once more, the mistakes seemed obvious in hindsight. CEOs of investment banks raised their hands in Congress to swear that they too had not understood what collateralised debt obligations were. They were just the CEOs, we were to understand, not the rocket scientists who had designed the 'products'. Ratings agency staff had been too busy going on ski holidays with bankers, and worse, to do anything other than give these products Triple-A ratings. And so on. Library shelves have already been filled with books on the lessons learned.

Political leaders and regulators have had four years since the great financial crash of 2008 to sift out further systemic risks to capital markets. How have they been faring?

Not well. At the time of writing in April 2013, systemic financial risk marches on almost unreconstructed in the financial services industry, despite everything we have learned about our collective ability to believe comforting narratives and ignore uncomfortable alternative views.

What about other sectors of the global economy?

Energy is the sector I work in. Since the dot.com crash, I have developed an ex-academic's passion for studying the patterns of play in energy markets, and in the financial markets where they pertain to energy. I have logged and analysed these

patterns in a 2005 book, *Half Gone,* and since 2006 on my website www.jeremyleggett.net. As a result, today I four global systemic risks directly connected to energy that threaten capital markets and hence the global economy. They involve oil depletion, carbon emissions, carbon assets, and shale gas. A market shock involving any one these would be capable of triggering a tsunami of economic and social problems, and of course, there is no law of economics that says only one can hit at one time.

There are other systemic risks in the energy sector, of course. Persistence with and proliferation of nuclear power risks spawning nuclear devices with which terrorists could take out cities, or weapons that could make nuclear war between nations more likely. The growing use of water in most forms of energy production could acccelerate an already grave global water crisis. And so on. But in this book I want to concentrate on the four systemic risks that I have most direct vocational experience of.

I also write about a fifth risk. Ongoing systemic risk in the financial sector may at first glance seem to have nothing to do with energy. But I share a common view, fashioned with the benefit of hindsight as are the views of so many interested in the 2007 credit crunch and the 2008 financial crash, that they were indirectly connected to energy. Peak panic about the toxicity of mortgage-backed securities followed shortly after the highest ever oil price in history: $147 per barrel in July 2008.[2] Could the high price of gasoline have had anything to do with all those owners of shiny new homes in American suburbs defaulting on their sub-prime mortgages? How could it not.

How best to describe the risks, and analyse the dangers? I have chosen to do this in the course of a historical account, rooted in my own experiences. I hope a chronological narrative approach will interest the reader more than a conventional format, while giving me the opportunity to recount how my own thinking has evolved over the years in the stoking of the serial crisis that faces society today. I tell that story in Part One, 'A History'. Along the way, and especially in the last chapter, I discuss why it is that so many people choose to go on believing comforting narratives, ignoring or downplaying uncomfortable alternative narratives like the five I warn of.

In Part Two, ‘A Future’, I set out my best-guess scenario for how this five-pronged set of dramas will play out in the years ahead, and analyse the implications. Amid the mega-risks, there are also opportunities for society. As the story unfolds, a potential good-news future scenario emerges that I think of as ‘renaissance’. In Part Two, I explain what I mean by that, and how I think it can be achieved. In the closing chapter, I assess our chances of achieving it, or some version of it, as opposed to the very bleak future scenarios that we risk by maintaining our present course.

Before starting my historical account, let me summarise each of the five risk issues quickly, aiming to provide the reader with a clear statement of the core contentions ahead of the narrative. I am hoping the unfolding of the story will then allow the reader a defensible judgment about the probabilities involved in each case.

The first risk I consider is a crash resulting from oil depletion. Growing numbers of people in and around the oil industry worry that global supply of oil will cease growing within just a few years - reach a peak of production, in other words - and then start to fall, becoming unable to meet global demand. If we are correct, and nothing is done to soften the landing, the twenty-first century is almost certainly heading for an early depression. But the dominant view, held in governments, boardrooms, and households alike - sometimes explicitly but mostly by default - is that peak oil is far off: that oil supply can continue to grow, fuelling the demands of a growing global economy, if necessary for decades to come.

The US shale gas boom, whereby huge volumes of gas have been produced by the process of fracking over the last decade, has done much to strengthen this comforting view. Fracking is now being applied to extract oil from shale, and is lifting domestic US production spectacularly, against many expectations. Some even hope to see ‘Saudi America’ emerge in the years ahead: a USA leading the world in productions and even self sufficient in hydrocarbons. The incumbency - by which I mean most of the oil and gas industries, their financiers, and their supporters and defenders in public service - do everything they can to advance this comforting narrative. They also profess that the phenomenon will be exported, in time, to the rest of the world. This, they tend to say, has confounded the ‘peakists’, and is even the death of peak oil as a idea.

The second risk involves a further financial shock. Growing numbers of financial experts are warning that failure to rein in the financial sector in the aftermath of the financial crash of 2008 makes a second crash almost inevitable. Others argue, however, that modern capitalism is cyclical and resilient, and that recovery can be expected if the regulatory touch remains light and austerity budgets are applied in a concerted way by governments.

The third risk involves a crash related to climate change. For many observers, climate change driven by the radiative forcing of greenhouse-gas emissions is progressing faster than even the gloomiest forecasts of climate scientists a few years ago, and emerging impacts of a destabilising climate foreshadow major future economic disaster potential, for example in global food and water supply. For others, climate changes are to be expected, are not driven by mankind's emissions, adaptation is possible, and there is little or no need for concern.

The fourth risk involves a carbon asset bubble in the capital markets. When analysts convert reserves of fossil fuels into carbon dioxide emission-equivalent, and compare the total to a global carbon budget for keeping global warming below a widely-acknowledged danger threshold of a two degrees Celsius rise in the global average temperature, a disturbing set of figures emerges. There is way more carbon in fossil fuels, in this way of looking at things, than society can afford to burn. Despite this overshoot of 'unburnable carbon' building on the capital markets, carbon-fuel companies go on turning resources into reserves, and investors continue to pile in. If governments do at some stage begin to panic about the emerging impacts of climate change, and summon the collective regulatory will to do something about cutting emissions, a lot of supposed assets are going to suffer an immediate erosion of value. And that is the stuff of potential financial shock.

The fossil-fuel incumbency relies on there continuing to be no restrictions. The massive part of the financial sector that is an enthusiastic player in this incumbency is effectively saying to governments 'we do not believe you will ever do anything to limit carbon emissions - not even a fraction of what you say you will do.' And so the bubble inflates and the danger builds.

The fifth risk involves a shale-gas crisis. For many, the explosive growth of shale-gas production in the USA - now extending into oil from shale, or 'tight oil' as it

is properly known - is a revolution, a game changer, and it even heralds a 'new era of fossil fuels'. For a minority, it shows all the signs of being the next bubble in the markets. In the incumbency's widely-held view, the US shale-gas phenomenon can be exported, opening the way to cheap gas in multiple countries. For others, even if there is no bubble, the phenomenon is not particularly exportable, for a range of environmental, economic and political reasons.

This risk too entails shock potential. Take a country like the UK. Its Treasury wishes actively to suppress renewables, so as to ensure that investors won't be deterred from bankrolling the conversion of the UK into a 'gas hub'. Picture the scene if most of the national energy eggs are put in that basket, infrastructure is capitalised, and then supplies of cheap gas fall far short of requirement, or even fail to materialise.

How do the odds stack up in these five inter-connected systemic global risk debates? How might they interplay in the unfolding events of the 2010s?

This book offers one person's view.

Acknowledgements

Many people read sections of this book to help me iron out glitches. You are too many to mention, but you know who you are, and you know you have my sincere appreciation. Those who read the whole book and gave me feedback include Roger Bentley, Peter Colville, Stephan Dolezalek, Colin Hines, Nick Robins, and Stephan Schmidheiny. I am especially grateful to them. However, hardly any two people agree on everything when it comes to energy and its wider systemic context, so it should not be assumed that they agree with me on every point. And of course, nobody but me has responsibility for any mistakes that might have slipped through.

Note on sources, style, and the life of the project beyond the book

I reference all direct quotes in the endnotes. Other sources can easily be located on my website, www.jeremyleggett.net using the word-search facility.

Aiming as I am for as wide a non-expert readership as possible, I have tried not to write a technical book. There are plenty of those in the energy field, and I reference some key ones as I go. As an ex-academic I was often tempted to go into further detail to help make my point, especially on the detail of oil supply. But as a writer I knew that would quickly make the book dense and easy to put down. In these places I use endnotes to refer the reader to entries on my website that go into more detail, or I give links to vital work by others that expands on the relevant technical arguments.

The diary extracts recount real events and conversations, but I made no tape recordings at them, so dialogue is from memory, usually written up in my diary immediately after the scenes described. I vouch completely for the sense of the dialogue, but cannot obviously vouch for the exact words. Hence I use no quotation marks. I also use extracts from conversations, not the whole. When I do that, I quote nothing out of context.

Where I quote from events filmed on TV or You-Tube and elsewhere in the media, I reference the link, so the reader can hear the whole.

Any book like this about fast-moving dramas is out of date as soon as it is written. But the dramas I chronicle and analyse in the book can be followed on my website, www.jeremyleggett.net, where I will be keeping them up to date. As for my analysis of events, I will keep writing about what I think the the unfolding history means, both on my website and in a monthly column in Recharge magazine.

Part One

A History

1

Lies, scaremongering, and affordable oil

Imagine you are the CEO of Shell, and you receive an e-mail from your Head of Exploration complaining that he is sick and tired of lying about the company's oil reserves. Would you fear your days as CEO were numbered? Would the prospect of a prison cell intrude on your comfortable life?

In November 2003, the then CEO of Shell, Phil Watts, did receive such an e-mail, from Shell's then exploration chief, Walter van de Vijver.

'I am becoming sick and tired of lying about the extent of our reserves issues and the downward revisions that need to be done because of far too aggressive / optimistic bookings', it read.[1]

In April 2004, that e-mail went public. Watts had admitted in January that Shell's reserves were overstated by 20%. In the months to come, he would have to revise them down a further three times. He was fired. But that was the least of his troubles. The US Justice Department were now conducting a criminal investigation and the British Financial Services Authority were after him too.[2]

2004 was a bad year to be caught telling lies about oil reserves. The oil price had wandered along at around $20 for the best part of two decades, but was now starting to climb, and fast. It hit $40 for the first time in May. Pain quickly spread around the world. American consumers found themselves paying an extra $44 billion at the pump during the first half of the year. They and their thinning wallets began staying out of the shopping malls, and so the misery spread to retailers. As one retail executive saw it: 'We are hurt by high oil prices because people are giving their extra dollars to Exxon.'[3]

Shell had created jitters in the market with its lies, but there were other reasons for the then-record prices. The war in Iraq was entering its second year. It was not going well. With insurgents attacking oil pipelines on a seemingly daily basis,

maintaining exports was proving impossible. The Abu Ghraib torture scandal broke in May, fanning the flames further. In June, terrorists attacked oil infrastructure within Saudi Arabia, the world's number one producer, the nation with the largest reserves by far, spreading the jitters to the main Saudi oil-export terminal at Ras Tanura. Said one analyst: 'If you can blow up the Pentagon in broad daylight, then it cannot be impossible to fly a plane into Ras Tanura - and then you are talking $100 [per barrel] oil.'[4]

Looking back from the vantage point of 2013, with an average oil price in 2012 of $111, we can only wonder what the price would be driven to if Ras Tanura blew up today.

2004 proved to be the beginning of a long wobbly climb in the oil price that, in the decade ahead, would change the world. There is a lot you can't do with $100 oil that you can do with $20 oil: like buy in a suburban house on a low salary, for example. Equally, there is a lot you can do with $100 oil that you can't do with $20 oil: like grow renewable energy markets, for example.

What is supposed to happen in situations of tight global oil supply like this is that OPEC, the Organisation of the Petroleum Exporting Countries, opens up its spare capacity - its ability to pump more oil, held in reserve - floods the market, and cools the oil price. In August 2004, OPEC announced that it no longer had any spare capacity left to tap. The price duly moved up to a new record near $45.

At that point headline writers began flagging a threat to the world economy.[5]

It seems incredible looking back. But such is the importance of affordable oil in our oil-overdependent global economy. A little panic about unaffordability goes a long way.

The markets themselves weren't helping. Hedge funds had begun betting on a high oil price. When this happens, the potential for self-fulfilling prophecy comes into play.

Investors grilled BP, fearing it might have been playing the same game as Shell. BP's CEO Lord John Browne gave a series of speeches aiming to reassure the financial world that BP was not Shell, and that both his company and the wider oil industry could be relied on to deliver growing supply from real reserves.

‘There isn't really a supply crunch at the moment’, he asserted. ‘We have the perception of the risk of a supply interruption, but that's all we've got.’[6] Indeed, he said, there is 40 years of supply.

This is a statement that BP have repeated many times since. They derive the figure by dividing the total global reserves reported by oil companies, more than 1,000 billion barrels, by the global demand. The mantra sows comfort while neatly sidestepping the underlying concern.

All through 2004, those concerned about the rate of oil depletion sought to warn about the risk of peak oil. Our oil-dependent global economy is at risk of a crash should it discover that oil supply cannot rise in line with demand. The persistently high oil price gave us a context, and hence the chance for a degree of unfamiliar exposure.

Oil reserves under the ground are not the same as oil flows from production pipes at the surface, we explained. Oil resources, deposits of oil extractable in theory, are not the same as oil reserves, deposits of oil mapped out and extractable economically. Peak oil is the point at which the depletion of existing oil reserves around the world can no longer be replaced by additions of new flow capacity. Oil production reaches the highest level it ever will, and drops. It can drop for what we can think of as below-ground reasons, or for above-ground reasons, or both. Below ground reasons involve the geology of depletion: how much oil there really is down there, and how fast we suck it out. Above ground reasons involve geopolitics: the behaviour of nations and their citizens, which can so easily mess up oil production. Most of us think that both below- and above-ground factors will define the peak, but the peak will be the peak: the most oil that can ever be produced in any one day. Perhaps production wobbles along on a plateau for a while before dropping, but it will never exceed that peak level. If we think of all the theoretically extractable oil under the ground as a tank, what we have to worry about is not so much the size of that tank, but the size of the taps: the actual global oil production capacity.

The oil industry usually doesn’t question the fact that someday there will be a peak in production: how can it, when oil deposits are finite. It simply says the peak will happen much later. In its overexuberant rhetoric, the industry constantly focuses attention on their estimates of the size of the tank: both the 40 years of supply in the

reserves, and the vastly higher figure in the resources, those deposits that they have yet to prove they can extract economically. Those who fear an early oil-production peak worry about the flow rates the industry can deliver from the actual taps in place today. If the taps start running slower, and the industry can't meet global oil demand, we have a crisis on our hands. We live in a system where markets are prone to panic. We live in a society where food supply needs lots of affordable oil all the way from the field to the plate.

There is also, as it happens, reason to be worried about the size of the tank. OPEC governments, including Saudi Arabia, have been less than transparent about the size of their national reserves since deciding to fix quotas based on the size of those reserves in the 1980s. Some experts, including within OPEC itself, profess that at least 300 billion barrels out of the 1.2 trillion barrels of supposed global proved reserves may have been overstated.

Sceptical oilmen refer to these barrels as 'political oil'. Others use less polite language to describe the situation.

Why don't people check, one might ask?

And there is the dilemma. A dozen good geologists *could* check, and set this nasty suspicion to rest – or not as the case may be – in a matter of months. But the OPEC governments do not allow them into their oilfields to do so. That was the case in the 2004. It remains so today.

In September 2004, the CEO of Total, Thierry Desmarest, called on the Saudis to let the oil majors in to help them boost output, so as to reduce the oil price. His offer went unheeded.

A revealing letter written by the First Secretary for Energy and Environment in the British Embassy in Washington found its way to me and others worried about peak oil at this time. The diplomat in question had attended a presentation on oil supply by the respected consultancy PFC. 'The presentation drew some gasps from the assembled energy cogniscenti', he reported back to London. 'They predict a peaking of global supply in the face of high demand by as early as 2015. This will lead to a more regionalized oil market, a key role for West African producers, and continued high and volatile prices.'

Let me emphasise this year, at this early point in my account of events: 2015.

We will find that it recurs in the story to come.

In October 2004, G7 finance ministers met in Washington for the annual meeting of the World Bank and the International Monetary Fund. They seemed as worried about oil supply as the diplomat. The closing statement by ministers and central bank governors read: 'Oil prices remain high and are a risk. So first, we call on oil producers to provide adequate supplies to ensure that prices remain moderate.'

As a veteran financial correspondent described it, 'my sense of [the] meetings is that there is an atmosphere of suppressed panic about the oil price, and about the danger of a serious crisis.'[7]

By the end of the month the oil price had crossed $55.

OPEC now called on the US to open its 670-million-barrel Strategic Petroleum Reserve to help suppress the prices. This reserve, stored in caverns in Louisiana salt mines, is meant to be on hold for major emergencies, not the cooling of price rises.

How was that for a signal that all may not be well in the Middle East, we early-peak worriers asked. If Saudi Arabia doesn't have the spare capacity to cool a price rise, how can we be sure of its reported reserves?

BP CEO Lord Browne upped his rhetoric to try and calm the jitters. 'It is not helpful for the world to believe that it is running out of oil', he said. 'We are evidently not.'[8]

The early peakers read this in exasperation. This risk debate is not about the oil 'running out'. It will never run out. Oil reserves under the ground, we tried to say, once again, are not the same as oil flows from production pipes at the surface.

Somehow, we didn't seem able to get our messages heard as readily as BP did theirs. Even in a world where Shell had been caught lying about its reserves.

*

St James Park, London, October 2004

Tony Blair's man is in relaxed mood as we walk by the lake in the park, a short walk from his office in Number Ten on a lovely autumn morning. He

has a smile on his face. I am more used to frowns from people such as he.

The visit worked really well, Jeremy, he says. We are all pleased.

And no doubt you are particularly pleased with yourself, I think but don't say, given that the whole thing was your idea.

The idea was this. The Prime Minister intends to top the agenda with climate change when he chairs next year's G8 Summit, in Scotland. On the day he announced this, he wanted an appropriately green and youthful photo-opportunity. His man suggested my company, just ten minutes away.

Blair is trying to persuade America to join Europe in efforts to cut greenhouse-gas emissions. He has sanctioned his Chief Scientific Adviser, Sir David King, to fire a test missile aimed at US opposition to cuts. Climate change is the most serious problem we are facing today, King has said: more serious even than the threat of terrorism.

That would make it more important than the war in Iraq then, I thought when I heard this. Because that is what the war on terror is about, supposedly.

On his visit to Solarcentury, Blair led a round table discussion with a handful of the younger staff, television cameras and radio microphones trained on them for the first time in their lives.

What shall we ask him, they demanded of me as The Anti-Terrorist Branch's sniffer dogs descended on the office ahead of the visit, scrabbling around under their desks with vibrating noses.

Anything you like, I said.

Then, succumbing to a corporate afterthought: OK, it's up to you, but actually, perhaps, er, today wouldn't be a great day to mention the war.

These days, in my chosen path, I am discovering what many an entrepreneur does. It is difficult indeed to wear your principles on your

sleeve.

After two hours in the office, I walked out onto the street with Blair, both of us expecting to see his motorcade there. But Lower Marsh is a busy market street. The cars were parked a hundred yards up the road. No security men were waiting. None had come out of the office with us. To my amazement, I walked alone along a crowded market with the Prime Minister as he nodded at flabbergasted people, his trademark beam full on.

Blair's man and I have lunch, talking climate politics and the prospects for success at the G-8 summit. He tells me he feels a certain optimism. Blair and Bush are getting on well. There may be a chance of the Americans exercising some quid pro quo over the British support in Iraq. It's game on.

This, I think, is as good a cue as I will get.

Yes, Iraq, I say. Where oil production is shot to pieces, what with all the Shock-and-Awe. If the west loses Iraqi production and access to their reserves long term, what happens if the others in OPEC don't prove able to plug the gap? Do you worry about global oil production peaking?

The oil companies don't, says the PM's man. But I know that you and a few others do.

Even if it is only a few, I say, which it isn't, it's such a high-consequence risk, isn't it?

We bat a little detail around for a while. He knows a lot more than the basics, I find. He doesn't tell me he agrees with me that there is a problem. Neither does he say he disagrees.

I ask him how concerned citizens like me can best register our concerns about peak oil in mainstream political debate. The issue languishes, as he knows, many miles behind the appreciation climate

change now has in the minds of publics and politicians.

He considers this a while, looking out of the window. I fancy that he is pondering how best to dissemble. He is a man who knows how to dissemble.

The problem you have, Jeremy, is that there is nothing in it for politicians.

I find his answer amazing. I ask him to explain.

If the early peak argument is right, and the peak and it's shock hit while you re in office, you're dead. The opposition lie machine will pin the oil crash on you, and there will be nothing you can do to persuade the tabloid-reading public otherwise. On the other hand, if you believe in the early peak while in opposition, and try to warn about it, then you will be accused of irresponsible scaremongering, both by the energy industry and the sitting government. The tabloid press will crucify you. Oh, and the voters will hate you for telling them an unhappy story about the future.

So, I say, if I've got this right, you just sit tight, and hope desperately that the likes of BP have got their story correct?

He shrugs, with that Latin use of the hands that says so hey, what can you do?

No dissembling today then.

I note that he seems to think it's all rather amusing.

I wonder if that is a requirement for survival in his world.

*

BP headquarters, St James Square, London, 11th November 2004.

Tony Hayward and me over croissants, coffee, and fruit, immaculately served on the vast table in BP's boardroom. What dramas have unfolded in this room, I am thinking. What dramas will.

Hayward and I wore our hair long and curly when we first met as young geologists in the 1980s, researching the same kinds of rocks, from different universities. Now he heads all BP's upstream operations, two thirds of the company, and is one of a handful of stars contending to succeed the current CEO.

I want to discuss my concerns about oil depletion with him. He is cool with that, and lounges now in a fabulous suit, his boyish smile in place. His aura is one of confidence edged with shyness, just like it was a quarter of a century ago.

I wonder why he decided we should have breakfast in this cavernous room, not his office.

We joke about our past, exchanging news of old student friends. But my purpose today is far from a joking matter. During the year, the biggest scandal in British corporate history has unfolded. I fear that if one company is in trouble in the oil reserves department, why not others? Why not the oil industry as a whole? I worry that the Shell fiasco foreshadows future bad news about the global peak of oil production. BP's view is that there is nothing to worry about. I want to look my old student friend in the eye and hear why they believe that, exactly.

BP has of late been pouring money into Russia. But President Putin's government has recently launched a deadly legal assault on Russian oil giant Yukos. It is a thinly disguised re-nationalisation of domestic oil. I elect to begin with that little piece of energy insecurity.

Aren't President Putin's antics a danger to BP's prospects, I ask?

No, says Hayward firmly. We have a great relationship with the man himself, and those around him. I fly to Russia once a month or so, specifically to keep the relationships there warm.

I marvel at this. If I, as a solar industry boss, had a potentially mission-critical relationship with a single key player in foreign parts, and I told my board of directors not to worry because I was pals with him and saw him regularly, they would scoff in my face.

I drop the oblique approach and ask him straight.

Tony, to what if any extent do you worry that the minority arguing peak oil will come sooner rather than later might in fact be correct? After all, this is about risk, not certainty, huh?

The peak oilers are scaremongers.

He looks me in the eye as he uses the big 'S' word. He knows I am one of them. His smile doesn't shift.

But where is all that extra supply going to come from, I ask. The reserves in existing oilfields are depleting fast. The peak of new-oilfield discovery was way back in the mid 1960s. The industry isn't finding anything like as many giant fields as it did. The existing giant fields are mostly ancient. And something is sure to go wrong above ground too. Maybe already has in Iraq.

There is plenty of oil, he says emphatically, trust me on this.

I hear what you say Tony, and you more than anyone should know. But where?

The Middle East and Siberia.

I note that he doesn't hesitate in answering, or add Africa, the Americas, or Asia to the list. Nor the tar sands in Canada.

When production peaks, he says, it will be because of global demand reduction, not the industry's inability to meet growing demand.

I wonder at the confidence he has in this too. He has been to China and India. He knows how fast those economies are growing, and the extent to which they have copied the West's oil dependency.

Questions jostle in a mental queue. I only have a small slot in Hayward's calendar. I'll never be able to ask them all, and I doubt I'll get another audience. I also want to see where his head is on global warming.

BP's oil is production is a tiny fraction of the global total, I say. What happens if others let you down, for whatever reason, and the industry as a whole can't lift its production?

Then a huge recession would be unavoidable, Hayward says. But that just isn't going to happen.

A huge recession is one way to put it, I reflect. When one considers that the energy locked into a single barrel of oil is equivalent to the energy expended by five labourers working 12 hour days non stop for a year, a recession is not the only problem that leaps onto the radar screen if supply is suddenly rationed.

Well, I guess we're going to find out, I say. One way or the other.

I move on, reluctantly. I tell him about my recent trip to Berlin, on a delegation of scientists and business leaders accompanying the Queen on a state visit, there to discuss climate change at her request with German counterparts. In those discussions, I heard government scientists express fears of horrible destabilisation of the climate system unless reductions of greenhouse-gas emissions from coal, oil and gas burning begin soon. Especially coal, of which there is so much more than oil and gas. Things are looking very serious.

On this threat, Hayward is not going to disagree with me. BP has long since elected to concede the reality of global warming and the climate change it causes.

Government needs to get on and govern, he says. They need to lead on this one.

This is what all the carbon-fuel bosses say, I object. And governments say the reverse – at least, those that are taking the threat seriously. If only the carbon-fuel companies would stop their infernal efforts to undermine our efforts at policymaking, I get told, if only they would act voluntarily in the face of the threat, maybe we could get somewhere. This blame transference is one of the main ways the greenhouse trap stays shut. How do we break the impasse?

Tony Hayward looks at his watch. I am clearly trying his patience now.

Maybe the corporate jet is waiting to ferry him to Moscow.

Notes

Prologue

[1] 'Wall Street e-mail trail overview', PBS.
http://www.pbs.org/now/politics/wallstreet.html

[2] When I talk of the oil price in this book, I refer to the benchmark known as Brent Crude. There are other benchmarks, wherein prices differ, usually only slightly, the most commonly used being West Texas Intermediate.

1 Lies, scaremongering, and affordable oil

[1] 'Shell admits it misled investors', Guardian, 20 April 2004.
http://www.guardian.co.uk/business/2004/apr/20/oilandpetrol.news1

[2] The Justice Department and the FSA both decided later not to proceed (July November respectively).

[3] 'Coping with sky high oil prices', Business Week, 30 August 2004.
http://www.businessweek.com/stories/2004-08-29/coping-with-sky-high-oil-prices

[4] 'Once seen as an alarmist fear, an attack on key Saudi oil terminal could destabilise west', Guardian, 3 June 2004.
http://www.guardian.co.uk/world/2004/jun/03/saudiarabia.oil

[5] 'Oil threat to world economy', Guardian, 5 August 2004.
http://www.guardian.co.uk/business/2004/aug/05/oilandpetrol.politics

[6] 'BP chiefs claims at odds with rivals', Financial Times, 17 September 2004. No url.

[7] 'Pouring oil on troubled economists', Observer, 10 October 2004.
http://www.guardian.co.uk/business/2004/oct/10/politics.oilandpetrol

[8] 'Browne calms oil supply fears', Guardian, 27 October 2004.
http://www.guardian.co.uk/business/2004/oct/27/oilandpetrol.news