

ROKEBY

FUSION NOW!

MORE LIGHT, MORE POWER, MORE PEOPLE

Curated by JJ Charlesworth

21.11.2007 - 20.12.2007

Sam Basu

JJ Charlesworth

Alasdair Duncan

Laura Oldfield Ford

Freee

Liam Gillick

Roger Hiorns

John Latham

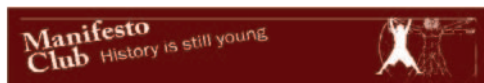
Andrew Rucklidge

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THE MANIFESTO CLUB
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The Manifesto Club is a new home for those who want to challenge today's downbeat, over-regulated culture – and to develop humanity's potential for creativity and knowledge. Our members are from all over the world, and from a variety of political and professional backgrounds; together we aim to set the agenda for a twenty-first century Enlightenment. The club has run campaigns and published reports on issues ranging from artist autonomy to overcautious safety signage, to celebrating the freedom of flight. We hold regular meetings and clubnights, for members to meet, chat and discuss ideas.

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FUSION NOW! Art and the politics of energy

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FUSION NOW! is an exhibition that takes as its starting point the revolutionary science of nuclear fusion, a science that has the potential to provide society with a source of energy that is abundant, indefinitely available and clean. FUSION NOW! is also an exhibition about art's relationship to the political world of the present. Starting from the science of nuclear fusion, FUSION NOW! asks how science becomes politics, and how politics becomes art.

There are many political issues that could be the subject for an art exhibition today; the war in Iraq, or the global experience of mass migration, or the supposed clash of cultures between the West and East, or the rise of China as a new global power. Or it could be the environment and climate change. FUSION NOW! begins with the science of nuclear fusion to argue that energy has become a political issue. It does so because the controversy over energy goes to the core of how we understand the nature of modern society, of how we might understand what progress is, and how abundance or scarcity are defining forces in our existence. And in different, often contradictory ways, art has always related to these questions. Energy might seem a purely scientific question, but the themes it touches on – the meaning of creativity and work, of aesthetic experience and its relation to pleasure and abundance, and our relationship to human history and to the future – forms the basis for art's drive to make sense of things.

So FUSION NOW! asks what art and society might look like if we thought positively about a world based on more energy, not less, and a reality oriented towards unlimited potential rather than pessimistic restraint; it explores how art might make sense of an aspect of reality which, while fundamental to our existence, is in many ways impossible to represent. And in parallel to the exhibition, this publication presents texts by writers who follow through the manifold questions that lead from pure science to the contemporary politics of energy: Professor Mike Dunne, the scientist leading the new European HiPER fusion reactor project, makes the case for the imminent viability of fusion-based power – the 'holy grail' in the quest for abundant, clean energy. Technology analysts Joe Kaplinsky and James Woudhuysen examine whether alternative energy sources really are the alternatives they are made out to be; and political writer James Heartfield presents 'The Cornucopian Manifesto', an account of how abundance and scarcity have always been defining questions in human history.

Energy is political. At a time when we are told that our excessive use of fossil fuels threatens the environment itself, environmentalism advocates that there is no solution other than to cut back and reduce our production and consumption of energy. From the oil that is refined to power cars, ships and air flight, to the gas and coal which heats our homes, lights our cities and drives our industry, it is our production and use of energy that leads to the catch-all problem of carbon emissions.

Over the last two centuries, humanity has built its development on fossil fuels, and it is clear that society cannot indefinitely rely on that source. So it is true that, even without the concerns over carbon emissions, our use of fossil fuels must give way to a new stage of energy use. We should be exploring the possibilities now, but there is a conspiracy of

silence around these questions. We are only told that we should reduce our consumption of fossil fuels and switch to renewable energy. But is this the only option?

Whatever position we take on the science of global warming, or about the possible consequences of climate change, the way in which contemporary society identifies carbon emissions as a problem touches on the founding basis of every material social development of the last 150 years. Because, while human society had developed and advanced for centuries before, it had always done so on the basis of what we today would recognise as 'renewable energy' – wind in the sails of ships and of windmills, in the biological energy of animals, or as fuels found in the burning of trees and of organic oils – all sources of energy closely tied to the immediate environment that produced them. But with the advent of the development of fossil fuels as a source of energy, many of the social advances we now take for granted were made possible.

By contrast, the approach to energy embedded in environmentalism's reliance on renewable energy becomes an implicit demand that we regress from a more advanced level of energy production to a more primitive one. If seventeenth-century Europe was built on the windmill, the watermill and the sailing ship, the best that new technology can hope for is to make the extraction of 'renewable' energy more efficient. Beyond direct environmental sources, contemporary environmentalism makes a case for carbon-neutral biofuels, a turn which also finds parallels in the energy base of society before the industrial revolution. But both renewable energy and biofuels suffer from the same shortcomings. Compared to fossil fuels, they are hopelessly low-intensity sources, requiring extensive inputs for proportionally little return. As Kaplinsky and Woudhuysen argue, to expand renewable energy to match even current energy use would require a technical transformation of the global environment on a scale the consequences of which would be unacceptable to today's environmentalists.

But the green agenda refuses to think of big solutions to problems standing in the way of human progress. Green repugnance to rolling out further conventional (carbon-neutral) fission nuclear capacity, for example, exposes a pessimistic prejudice towards expansive solutions. Green antagonism to new nuclear power is not so much an attempt to dismiss the particular shortcomings of any one technology, but is more profoundly a moral rejection of expansive solutions to the challenges facing human society, based on the notion that any form of human expansion is by definition a noxious incursion on the purity of an otherwise pristine planet. It reflects a culture in which we are uncomfortable with using energy – uncomfortable with our own energy use and uncomfortable with any idea of abundance. More fundamentally, it is an anxiety regarding our relationship to our own energies, a view of human productive activity as a negative force for harm and destruction. James Heartfield argues that, paradoxically, green antipathy to human expansion chimes with a wider political fear about abundance within contemporary capitalism itself. Scarcity, Heartfield suggests, has always formed the basis of social power. Yet capitalism has unwittingly replaced scarcity with abundance, undermining its power over social relations, and the green message of restraint and reduction offers capitalism a new moral justification for restraint and austerity.

Renewable energy, however extensively deployed, can only ever yield as much energy as the Sun inputs. The paradigmatic difference between pre- and post-industrial revolution society, in terms of energy, is the difference between energy captured in the here-and-now (wind and water), in contrast to the release of energy stored up over millions of years in the

form of fossil fuel; energy condensed, accreted, compressed and stored on a time-scale that stretches far beyond the timeframe of human history. It is this input, a release of stored energy (which is not 'contemporaneous' to the inputs of the present ecosphere) and the developing human ability to harness it through technology, which underpins the productive and social advances of the last two centuries.

If the earlier world of renewable energy has been left far behind through the development of the last two centuries, it is one which many contemporary environmentalists would wish us to return to. It means that we need to think through what might transcend the current paradigm of energy, not regress to an earlier one. The greatest potential is in the development of fusion power. As Professor Dunne argues, fusion technology is fast approaching the point where a net energy-producing reaction will be realised. It is a matter of years, he says, not decades.

If fusion power can be seen as both scientific fact and a political and cultural metaphor for abundance, art might also connect with this, even if it need not declare this explicitly. The artists in FUSION NOW! move in and out of the various points where energy touches on questions of science, history, industry, aesthetics and subjectivity.

It is present as a sort of symbolic creative core in Roger Hiorns's super-bright light source; the late John Latham's sculptures manifest the artist's lifelong philosophical concern with relating art to questions of cosmological totality; in the paintings of Andrew Rucklidge, energy appears as an aesthetic force where painting refracts human technology and architecture, while John Russell and Mark Titchner's computer-generated images and animations each explore how artworks can articulate questions of visual and subjective excess.

Elsewhere, the legacies and potentials of Utopian Modernism are addressed: Sam Basu's sculpture delves into a paradoxical future-history where work and industry are returned to a sort of neo-primitive collective ritual and Alasdair Duncan's banner makes a graphic celebration of the combination of human science and aspiration.

Energy's contemporary political dimensions – the way wealth, work and social division operate – are addressed in Liam Gillick's computer animation, which takes as its subject early experiments in the democratization of industrial work in the 1970s. And in directly polemical vein, the artist's group Freee makes a declaration about the terms of a real 'ecological politics', while WITH and Laura Oldfield Ford present satirical and poetic responses to how contemporary culture reproduces the orthodoxies and contradictions of green pessimism.

Art is inherently political regardless of whether it addresses any one particular event or situation. Eventually, contemporary art often takes a position on the generally important questions about human experience and society; the individual and social forms of desire, the potential of human subjectivity, and how we choose to act in our present. If FUSION NOW! asks a political question then, it is whether art and artists cannot fail to take sides in a politics that is only now becoming clear: a politics where lines are drawn between those who want austerity against those who want plenty, between those who counsel restraint and those who would explore potentials; between those who wish for less, and those who want more; More light, more power, more people. And more art.

Fusion Energy and the HiPER laser project

Prof. Mike Dunne

Director of the UK Central Laser Facility (Science and Technology Facilities Council), visiting Professor of Physics, Imperial College London

This is an exciting time for physics and its application to fusion energy production. Fusion is the holy grail of energy sources – combining abundant fuel with no greenhouse gas emissions, nor any long-lived radioactivity. It also provides international energy security and a scale that can meet mankind's long-term energy demands.

Fusion is Nature's solution to the energy problem. It works by combining light atoms together to form slightly heavier ones. This is how the Sun works. To make fusion work you need to recreate the staggeringly high temperatures and pressures found at the centre of the Sun. If you can do this, then you can force hydrogen-like atoms together to form helium gas and a neutron (this is a fundamental particle which can be captured to provide heat to drive a steam turbine).

Fortunately, it has long been recognised that there are a number of different ways in which these high temperatures and pressures can be created here on Earth. What is exciting is that we are now entering a period of huge investment in scientific facilities that have been designed to demonstrate the basis of this much-heralded source of energy.

It has taken many years (indeed, half a century) to get to the point where we can expect net energy production from fusion. But we are now reaching the culmination of all this research, with two highly complementary solutions being pursued. One uses magnetic fields to confine the hot gas, the other uses laser beams.

Recently the international community took the decision to fund the ITER project to the tune of around 10 billion Euros to demonstrate the 'magnetic fusion energy' route. It is expected that in the early 2020s this device will achieve the goal of releasing more energy than it consumes – to demonstrate fusion as a power source for the first time.

Alongside this, France and America are constructing multi-billion-Euro laser facilities to achieve net energy production from fusion using very high power lasers. Anticipated in the period 2010 to 2015, this will mark the culmination of over 40 years of research. This approach, known as Inertial Fusion Energy (IFE), was suggested within a year or so of the invention of the laser itself. It offers an attractive long-term energy solution, and provides the means for creating the most extreme conditions achievable anywhere on Earth.

In anticipation of this success, the European laser community has started planning the next step, to ensure we keep focused on our goal of a future energy source.

The physics underlying inertial fusion is already proven. This is the approach adopted by Nature – inertial fusion powers the stars. Far more importantly, the process of net energy production from inertial fusion has already been demonstrated on Earth in an offshoot of the US defense mission in the 1980s. Details of this work are still classified, but they have laid the foundations for the laser-based project. In consequence, demonstration of net energy production using a laser is now anticipated shortly after 2010 on a large American laser, the National Ignition Facility (NIF). This world-altering event will be very visible to the public and our politicians. In Europe we believe it is essential for us to plan ahead in anticipation of

this event – to understand the future path to an energy programme, and ensure we move as quickly as possible. This is because it takes many years to plan the next step – and this is a field where time is of the essence.

Our challenge is a profound example of how swords can indeed be turned into ploughshares, using the huge investment by the nuclear weapons industry to open up a solution to one of the world's most compelling problems – abundant clean energy.

The approach requires a high level of international cooperation over the next decade. The scientific community needs to build from the existing defence programmes to a future civilian programme in which the broadest possible assortment of international talent is assembled with common purpose.

The way that science (and scientists!) operate means that this effort needs to be centred on a step-change in scientific capability – that is, we need a next-generation laser facility, designed to allow academic and commercial exploitation into the energy and basic science sectors. This provides the capability for a civilian demonstration programme, and provides the focus for the widely distributed European scientific community.

Given this challenge, I undertook two years ago to pull together a team of leading scientists from twelve nations to design the next big step. The UK and Europe are ideally placed to lead the world in this journey. We designed a facility called HiPER (the High Power laser Energy Research facility), which we believe offers a compelling vision of how Europe can take a leadership position in this grand challenge. The facility has been developed to open up a credible route to inertial fusion energy for commercial purposes while offering an internationally unmatched capability in the science of extreme conditions.

As scientists in this field we are only too aware that the pursuit of fusion energy has suffered from some grossly optimistic claims in the early days. These turned out to underestimate the scale of the challenge by a factor of at least a thousand. Finally, many years on, we are at the point where the scientific demonstration of net energy production is now just around the corner (likely to be less than five years away). This fact has captured the imagination of the fusion community and instigated a level of international cooperation and integration that is wonderful to see. Similarly, the attitude of students now entering this field is fascinating to watch – they quite clearly 'own' this challenge and have the enthusiasm and commitment to drive it to completion.

Now, we must be aware that fusion is not a short term fix, nor will it address the immediate requirement to manage greenhouse gas emissions. It is a long-term, sustainable solution that will take a concentrated research and development effort across a range of options to realise its potential. So, we must continue to develop renewable energy, reduce wastage and improve our energy efficiency. But alongside this we must surely strive for the long-term. It is widely accepted that renewable energy will only be able to meet a fraction of the world's future energy demand. Given the likelihood that this demand will not drop substantially, we need to provide clean, abundant energy solutions that will last us for centuries.

We are just about to embark on the next phase of this journey. Nations from across the world are working with the European Commission to determine how we can succeed with the construction of HiPER. The project will start in early 2008, and is designed to ensure we move as quickly as possible towards this compelling goal.

For further information, please visit www.hiper-laser.org

Green Energy

Joe Kaplinsky & James Woudhuysen

What could a truly green, environmentally friendly, sustainable source of energy look like? At first the answer seems obvious. There is no end to the schemes we are offered.

Measured in conventional terms the classic renewable energies have yet to make a substantial contribution to world energy supply. The greatest green hopes – wind and solar – are grouped by International Energy Agency statistics together with geothermal and 'etc.' under the heading 'other'. World energy production rose by 86 per cent between 1973 and 2005, the contribution of 'other' technologies rose from 0.1 per cent of the total to 0.5 per cent.¹

So if green technologies have yet to make their mark then what of their potential? The question is more subtle than it appears. What counts as green energy? Hydroelectric dams were once seen as firmly in the green camp. The Itaipu dam on the Paraná River, forming the border between Brazil and Paraguay, has an installed capacity of 18 gigawatts, making it the largest power station in the world. Yet construction of large dams such as Itaipu or China's Three Gorges project is now more likely to be seen as an environmentally catastrophic practice.

Or what about 'traditional biomass' – that is firewood and dung – which while it supplies only a meagre amount of energy is none the less relied upon for cooking and heating by billions of the world's poor. In 2004 this was true of 480 million Chinese, 740 million Indians, and 579 million Africans.² Does this lifestyle not fulfil the green criteria of local, small scale energy independence?

'Alternative energy' turns out to have a similar relation to real energy as 'alternative medicine' has to medicine. Green energy is not so much alternative energy as an alternative to energy. The real message of environmentalism is that energy is itself the problem. Famed prophet of eco-doom Paul Erlich described the prospect of cheap abundant energy as "giving an idiot child a machine gun". Green energy guru Amory Lovins stated back in 1977 that "it'd be little short of disastrous for us to discover a source of clean, cheap, abundant energy because of what we would do with it", worrying that nuclear fusion in particular would "give us the excesses of concentrated energy with which we could do mischief to the Earth or to each other."³

There is in other words an anxiety about the over-abundance of energy. The only energy environmentalists are comfortable with is energy that is small-scale and limited. It is energy that helps humanity transform the way it works as a society, allowing it to do more than it could before. But that potential for transformation is what environmentalists describe negatively as humanity's 'impact' upon the world. This is why while many technologies have started out looking green they inevitably end up tarnished. Any technique – such as large scale hydroelectricity – that is effective enough to provide for the needs of humanity falls under a cloud of suspicion for that very reason.

Biofuels provide a clear example. Even more recently than hydroelectricity, biofuels were seen as a saviour of the environment. After all, what could be greener than a plant? But as

the EU and the US have got serious about biofuels the reality of large-scale production has hit home. Now, everyone from Fidel Castro to the Financial Times has decided that biofuels no longer qualify as environmentally friendly. The list of indictments against biofuels is long: it is claimed that biofuels, based on industrial agriculture, require more energy input from fossil fuels than could possibly be saved by their use. Biofuels, the story goes, are starving the poor of Mexico by pushing up the price of food; they are destroying the rain forests as European demand for palm oil leads to clear-cutting of plantations in Indonesia; and most recently, fertiliser has been linked to emissions of Nitrous Oxide – a greenhouse gas. And all this even before the prospect of genetically modified biofuels has been seriously raised in public debate.

No doubt it is irresistible to see the US government target of producing a billion tons of biomass a year as in part a boondoggle for the support of American farmers. Yet for all that, it has a practical edge that is lacking from Mayor Ken Livingstone's plan to collect up London's hedge clippings, or the hippie dream of running your car on chip-fat biodiesel.

So what of the present best hopes of the greens, solar and wind power?

Wind power is rapidly expanding. But practical wind power is not something that you can install on your roof. As the BBC's 'ethical man' Justin Rowlett put it "domestic wind turbines are little more than an eco-con." After investigating the physics he rightly concluded "The problem ... is that they are too small."⁴

Practical turbines are increasing in size. In the mid-1980s the average size of turbines was around 100 kilowatts. By 2000 this had risen to 1.5 megawatts. Today 3.6 megawatt turbines have a proven track record and larger turbines are in development. Offshore wind power is favourable not only because of the higher wind speeds available but because transport of the largest blades is more practical.

To make a significant contribution to the World's energy the number of turbines will have to rise from tens of thousands at present to millions of even larger systems. Expansion would have to continue well after the best sites are developed. Estimates suggest that there is plenty of wind available, but most likely, technology would have to develop to move turbines far out to sea. More than anything else such plans draw on the marine engineering used to construct oil rigs. Should we be surprised that this is what it would take to generate significant energy?

There are a variety of plans for making use of solar power. Photovoltaics are perhaps less green than 'passive solar' which simply builds around heat available from the Sun to make best use of it. On the other hand they offer the best prospect of a large scale source of energy.

Photovoltaic cells directly convert sunlight to electricity. Here technology has rapidly advanced since the first round of interest in the 1970s. Solar cells are built of the same semiconducting materials as microchips, and the technology has benefited immensely from advances in microchip manufacture. Photovoltaic cells are capable of extracting more energy from sunlight, and crucially, are cheaper to produce.

Cost is important because of the area that would need to be covered with solar panels. One estimate suggests that global electricity supply could be met with an area of solar panels 750 kilometers square, or an area just over 300 kilometres square on each of the

six inhabitable continents. The area would, of course, have to grow in line with demand for electricity. We would have to solve other problems, too, such as the vanishing of the Sun at night. But one can perhaps imagine the World's deserts converted to solar power stations. One can also imagine the response of environmentalists to the paving of the Earth with silicon.

But such ambitious visions for renewable energy technology expose the irresolvable contradiction in environmentalism's attitude to humanity's sourcing of energy; renewable energy on the scale required to match today's world use of energy, even if it does resolve the problems associated with fossil fuels, can only serve to further emphasise humanity's active and transforming presence in the world. Any energy technology that truly meets the needs of humanity will never make the environmental cut.

¹ International Energy Agency, Key World Energy Statistics 2007

² International Energy Agency, World Energy Outlook 2006, p422

³ <http://www.motherearthnews.com/DIY/1977-11-01/Plowboy-Interview.aspx>

⁴ http://www.bbc.co.uk/blogs/newsnight/2006/11/are_domestic_wind_turbines_an_ecocon.html

The Cornucopian Manifesto

James Heartfield

For thirty millennia mankind lived under the tyranny of scarcity. The struggle to survive dominated human experience. Perched on the edge of existence men were at the mercy of the elements. Droughts, famine, floods, and disease threatened extinction. We were slaves to the relentless cycles of night and day, high and low tide, summer and winter. The Earth only gave up the means by which we survived, food, shelter, warmth, very grudgingly. Backbreaking toil has been the lot of the small farmer since men first settled the land.

Hardship stunted the moral and intellectual growth of men. Dominated by nature in fact, they were in thrall to phantoms in their imaginations. Superstitious in beliefs, custom-bound in their social lives, ignorant intellectually – there was nothing virtuous about poverty.

Only by industry, by husbanding the soil, by honing the tools, by storing the grain, by re-routing the waters, gathering the wood, digging the coal, drilling the oil, smelting the iron and steel did men ever succeed in wresting more from the earth than they needed. The surplus, over and above bare existence, is what makes us human.

"Allow not more than nature needs, man's life's as cheap as beast's."

But the surplus was for so long, small: little more than a grain store, a salted ham, a barrel of apples for the winter. More than nature needs was hard to come by.

Without enough to go around, all communal bonds, until now, have been little more than systems for rationing the surplus. Monasteries and castles, temples and parliaments, long-halls and pyramids – these are the monuments left by the great class wars over the surplus product that has raged for the last five thousand years. The prize to the victors: a life of plenty, amid squalor. Their civilisation was not much more than an armed stockade around the food store.

Freedom from necessity was for so long a rare commodity that it was concentrated in the hands of the privileged few. The leisured classes, whether aristocratic or priestly, warlord or capitalist have had to fight hard to defend their privileges. Subjugation of the toiling masses was the condition of the freedom of the elite. Human civilisation, whether literary or scientific, has blossomed in the free time won by the few, on the backs of many. Scarcity made the human order into a bitter war over social product.

Throughout human history, the powers-that-be have stood on the solid authority of scarcity. Ever since Moses took control of the Pharaoh's grain store, authority has meant rationing. Doled out the rations is the first function of all authority. Whether it was wages, or benefits, homes or healthcare, the person in control of the rations has always been the one with the whip.

Capitalism was from the outset a system of rationing. It rations scarce goods through the market mechanism. It disperses the weekly ration to families as wages. It recovers its costs by limiting access to goods. It reduces us to wage slaves by controlling access to the means of subsistence. Capitalism cannot exist without scarcity. Scarcity is capitalism's means of social control.

But capitalism is also the system that has over time abolished scarcity. As well as a system of social control, capitalism is a system for producing goods. To create an ever-greater surplus, capitalism has revolutionised technology, so reducing costs. The profit system drove people to create abundance. In doing so capitalism has abolished the basis for its own control.

The Revolution in Technique

The industrial revolution turned the world upside down. Putting a premium on cutting wage costs, capitalism set in motion the single greatest transformation in human history. At last, here was a system that rewarded the abbreviation of working time: the factory system. Begun in 1721 at the Lombe Silk Works on the Derwent, the factory system has expanded to embrace the world. Rapacious in its consumption of labour power, the factory had to be forcibly restrained by labour militancy and the law.

The advantages of the factory system are straightforward. As it grew, output grew faster than the number of people. Result: happiness. In Britain between 1801 and 1911 the population grew from 10.5 million to 41.8 million, an annual increase of 1.25 per cent, while output grew by 2-2.25 per cent a year.¹ In the last century, world population grew more than it did in the previous 30 000 years. Happily, world output increased faster, so that output per head grew nearly ten times, from \$679 to \$6539 between 1900 and 2000.² Only because output grew faster is it possible that more than four billion new people are around.

The history of technology is a subject in itself (see Eco, *From the Plough to Polaris*, 1967, for a good introduction). To abbreviate: levers and then machines substituted for routine human tool-use; mills and dray animals, and then later engines substituted for human motive power; wood, coal, oil and gas substituted for dietary calories providing warmth, light and then, with machines, kinetic energy.

To do the same thing over and again, said Heraclitus, is not just boredom, it is slavery. Technology, substituting for routine work, can set us free. The division of labour made dull but efficient work out of mysterious craftsmanship. Once isolated, routine could be mechanised.

And because industry isolates the repetitive actions from the creative side of work, it is driven by standardisation. Modern technology levels, distilling the essence out in different circumstances.

It prefers purer energy sources like oil and electricity, because of their universality of application, to bulky and unpredictable wood, wind and coal.

Technology has tended to the development, not of the universal worker, the robot, but to the universal machine, the computer, which substitutes more effectively for routines that lay far beyond the calculating capacities of people.

But for the elite cultural reaction against it, today's era would be known as the Age of Plastics, the universal construction materials that have freed our goods from the constraints of natural forms (at least at the super-molecular level).

Cornucopia

The future is here. We are free from the domination of Nature. For most of us, absolute scarcity is a thing of the past – thanks to the revolution in technique.

The Worldwatch Institute estimated that 1.7 billion people earn enough to buy into the consumer society. It is true that in West Europe and America, the 'consumer class' is almost everyone. But still 29 per cent of the consumer class, 494 million are in East Asia, a tenth in East Europe and another tenth in Latin America.

Manufacturing Scarcity

In material terms there is no basis for scarcity today. Food output – despite the Reverend Malthus's fears – outstripped population. Good news for most of us. But for some, the end of scarcity is an outrage. They cannot believe that people can enjoy the good life. For them, the very sight of other people eating, drinking, enjoying themselves is disgusting. The puritan ethos was a great thing, when Britons were faced with real scarcity, but some people do not know how to let it go.

But the demand for rationing is not just a cultural reaction. Controlling access to the means of subsistence has been the way that society was organised since the dawn of human settlements. Scarcity was never just scarcity. It was also a weapon in the struggle to establish mastery. The bread-and-water diet, doling out the ship's biscuits, taxing peasants, land distribution, the ration-book, wage negotiations – these were the ways that the ruling class ruled.

The superabundance generated by modern industry calls the authority of the powers-that-be into question. Even modern capitalism – the system that developed industry – struggles to justify its profits in the face of superabundance.

That is what has happened to electronically reproduced music. Here are goods that you can take away, while leaving them there. Increasingly, profits can only be generated through the artificial imposition of a legal title to payment for licensed use, and the growing importance of intellectual property rights is a sign that the propertied elite is losing touch with the world of production. Western copyright lawyers are hunting China's cities for an unearned share of their industry.

More and more capital is tied up in unproductive speculation, independent of any kind of productive activity. Growth, whether in housing, dot.com companies or the fine art market, generally means asset inflation, without any corresponding increase in production. Indeed investors prefer goods whose supply is limited, rationed, like Britain's over-regulated housing market, or unique goods like fine art.

Such aversion to abundance affects the production of energy itself. Instead of profiting by making megawatts, the California electricity companies were rewarded for making savings, or 'negawatts':

"Around 1980, Pacific Gas and Electricity Company was planning to build some 10-20 power stations' read the Factor Four report. 'But by 1992, P&GE was planning to build no more power stations, and in 1993, it permanently dissolved its engineering and construction division. Instead as its 1992 Annual Report pronounced, it planned to get at least three quarters of its new power needs in the 1990s from more efficient use by its customers.'" (Earthscan, p160)

In practice, though, the reduction in electricity generation simply increased the price – by as much as 900 per cent in December 2000. With electricity prices to customers capped, utility companies could not afford to buy electricity elsewhere and P&GE ran up losses of \$12 billion before introducing the inevitable blackouts.

Smash Green Capitalism!

The old capitalist class rested on material scarcity, doling out the limited supplies to reward good behaviour. But at least they invested some of their surplus into new means of production. Today a new green capitalist class disdains to make its money out of industry. They prefer to see output restricted. They deal in imaginary goods like carbon futures and 'negawatts'. The carbon-offset business is worth \$34 billion and expected to double in size by 2010 – even though its products are about as useful for the environment as cryogenic suspension is for longevity.³ In fact the green capitalists have made restraint itself into a commodity. Green capitalism rests on the economic theory of 'externalities'; the hidden costs of pollution that are not represented in ordinary market prices. In the name of meeting the costs of 'externalities', green capitalists demand tribute from the productive economy. 'Externalities' are indeed external to the ordinary operation of the market, being the basis of claims on future revenue arising out of government regulation.

Zac Goldsmith buried the millions that his father robbed from pension funds in an organic farm. Peak-oil propagandist Jeremy Leggett sells people solar panels – the government footing half the bill. Al Gore jets round the planet, while Paramount pictures offset his carbon footprint making payments to a company that Al Gore owns, Generation Investment Management. Far from exercising any personal restraint, these individuals are living high on the hog. Their green lifestyles represent a greater spread of high value consumer goods. Their wealth comes from artificially reinventing scarcity in an age of industrially-driven superabundance.

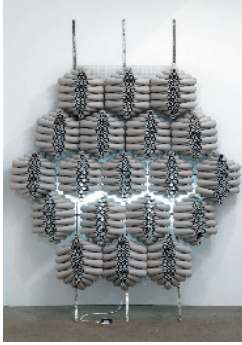
It is time to liberate industry from the hands of people who are hostile to its promises. It is time to let scarcity go, and embrace Cornucopia.

¹ Kennedy, Rise and Fall of the Great Powers, p.197

² 'Estimating World GDP' Brad DeLong, http://econ161.berkeley.edu/TCEH/1998_Draft/World_GDP/Estimating_World_GDP.html

³ Financial Times 25 April 2007

LIST OF WORKS AND EXHIBITION NOTES



SAM BASU, *Undecidability Meme Diffusion*, 2007
(cardboard bobbins, wire, aluminium, fluorescent light)
Image courtesy Kate MacGary, London

Basu's sculptures loop past and future forms of human labour into a complex of opposing meanings. The cardboard bobbins of industrial weaving machines become concentrated groups within an obscurely organised logical matrix, a totemic producer of informational experience, rather than physical goods, playing across how art might be useless or useful.



JJ CHARLESWORTH, *£50m x 10 = £500m = doh!!*, 2007
(digital print on photographic paper)
Image courtesy the artist

£50 million was the price of Damien Hirst's diamond-covered skull For the Love of God. £500 million is what HIPER, the laser fusion reactor, will cost to build. There's great art, and there's money that really doesn't need to be spent on great art. Could the world do without ten copies of For the Love of God? Could it do without one?



ALASDAIR DUNCAN, *our new mechanism releases new human potentials*, 2007
(stitched ripstop on rotating mechanism)
Image courtesy the artist

Duncan interprets great abstract themes through an invented ideographic language. Like a celebratory display of a human culture that has fused image and text into one common form of communication, Duncan's banners imagine a community that has not yet come into being, yet their verbal translation might make us part of it.



LAURA OLDFIELD FORD, *Your decadent sins will reap discipline*, 2007

(pencil on paper)
Image courtesy the artist

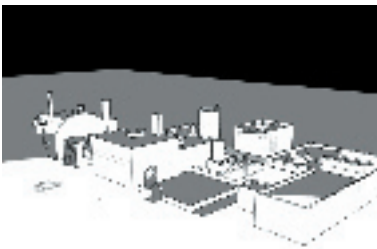
Ford is known for her anarchic punk-situationist urban 'zine Savage Messiah. Here she wanders through the backwaters of Heathrow Airport, where holidaymakers jet out, migrant workers jet in, and climate activists try to close down the drunken, debauched hedonism of it all.



FREEE, *The First Condition of an Ecological Politics is that it Halt the Commodification of the Planet by Putting All Landowners, Exploiters, Entrepreneurs and Bureaucrats Out of Business*, 2007

(billboard poster print)
Image courtesy the artists

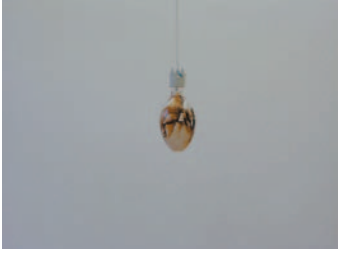
What is an 'ecological politics'? One where the powerful continue to rule over the rest of us? Or one where scarcity and poverty is imposed on others? Freee demands that any ecological politics first get rid of those who profit currently. The question then would be; what do we do then? How would we make more, or less, for ourselves?



LIAM GILLICK, *Kalmar Received a Great Deal of Attention (1974)*, 2007

(computer animation, edition of 5)
Image courtesy Covi-Mora, London

Gillick's animation shows a car driving at speed across a flat plain before crashing into the side of a factory. The work attempts to represent the moment of post-industrial reassessment within developed European social democracies in the 1970s, and points to a critique of eco-political manoeuvring, and its roots in ameliorated working practices in industry, in countries like Sweden.



ROGER HIORNS, *Untitled*, 2007

(light bulb and semen)

Image courtesy Covi-Mora, London

Hiorns's super-bright light source is covered with semen, and it cannot be looked at directly. It's an image of a completely self-producing entity, an object which doubles up two codes of generative potential, light energy filtered through a film of biological matter involved in human creation. One produces constantly, while the other waits forever for its opposite.



JOHN LATHAM, *God is Great (#1a)*, 1990

(glass, books, resin)

Image courtesy the Estate of John Latham and Lisson Gallery, London

Latham's God is Great and Proto-Universe give different forms to an understanding of how concepts of time, matter and human knowledge might be combined, to make an art that can address our broadest understanding of the universe – one in which God himself might in fact be an effect, rather than a cause.



ANDREW RUCKLIDGE, *Beam-Beam*, 2007

(oil and encaustic on wood panel)

Image courtesy Christopher Cutts, Toronto

Rucklidge's paintings condense and clash abstract gesture with landscape, a landscape of violent and ecstatic future worlds, into which humanity seems to have inscribed its presence into inhospitable topographies. It's an impulse mirrored by Rucklidge's inscription of form into chaos, a process that might exceed the limit of image making.

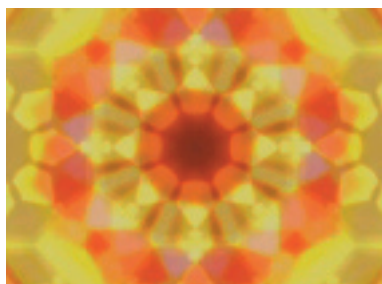


JOHN RUSSELL, *Elf Power*, 2007

(backlit digital print on vinyl)

Image courtesy the artist

Russell's computer-generated image-painting attempts to capture the multiple dimensions of aesthetic affirmation, through a collision of excesses; bodily forms exceeded in imaginary representation, and representation absorbed and transcended by the visual code of Jackson Pollock-like gestural abstraction. A fusion of opposites that are no longer opposed.



MARK TITCHNER, *My meet Mike*, 2007

(DVD loop)

Image courtesy the artist and Vilma Gold

Titchner's animation is a build-up of footage of atomic explosions – Hydrogen bomb explosions – accompanied by an accumulation of the word 'yes'. Nuclear fusion's earliest, most barbaric use becomes a challenge to what we might say 'yes' to; the choices we make about our science and the uses we put it to.



WITH (withyou.co.uk), *g – Part 1: Think-base Artefacts*, 2007

(mixed media)

Image courtesy the artists

Realizing the commercial benefits to be made from environmental anxieties, the life-solutions company WITH has commissioned a green advertising agency to relaunch its brand of bottled water, WITH water. Here, WITH presents the archive of that inspirational process. The result? Pure water sourced from melting icebergs – which you're not allowed to drink.



ALASDAIR DUNCAN &
JJ CHARLESWORTH

And then we will remake the Sun, 2007

(hard-enameled pin badge, 28mm diameter)
edition of 100

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In memory of John Latham

Published on the occasion of the exhibition Fusion Now!

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