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## *Hubris*

*Climate Change is all about hubris. (hubris - overbearing pride or presumption; arrogance. <http://dictionary.reference.com/search?q=hubris>)*

*The positions we take on this catastrophe-in-the-making often smack of hubris.*

*So, right at the beginning, we bring you the words of Monbiot, speaking at one of the public gatherings at the time of the last Conference of Parties – COP 11. He challenges the hubris of the critics of destructive development; he challenges the partisan, blinkered approach that some of us – many of us – bring to the development and climate change debate; he challenges the simplistic solutions we often propagate in the face of the catastrophic events that many of us are prophesying. It is a call to live our religion.*

*We also continue to explore the various positions on nuclear energy in this issue of eco-ethic. It is an inescapable, right-there-in-your-face issue, producing a continuing stream of headlines, and reams of analysis, printed and audio-visual. It would smack of hubris on our part not to bring the nuances of this debate into the open. eco-ethic is not a propaganda outlet.*

*Similarly, on the issue of renewables, and the thrust that we have been giving it in our work, we need to temper our expectations, and look at the implications of the stances we take, - implications for the very communities we work along with. Yin Shao Loong brings a fascinating proposition in the debate on renewables and energy.*

*We need not say much more. The authors, and some of the illustrations, satirical and otherwise, are eloquent enough.*

  
editor

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*Living Religion*

## **The Struggle against Ourselves**

I want to take a moment to remind you of where we have come from.

For the first three million years of human history, we lived according to circumstance. Our lives were ruled by the happenstances of ecology. We existed, as all animals do, in fear of hunger, predation, weather and disease.

For the following few thousand years, after we had grasped the rudiments of agriculture and crop storage, we enjoyed greater food security, and soon destroyed most of our non-human predators. But our lives were ruled by the sword, the axe and the spear. The primary struggle was for land. We needed it not just to grow our crops but also to provide our sources of energy – grazing for our horses and bullocks, wood for our fires.

Then we discovered fossil fuels, and everything changed. No longer were we constrained by the

need to live on ambient energy; we could support ourselves by means of the sunlight stored over the preceding 350 million years. The new sources of energy permitted the economy to grow – to grow sufficiently to absorb some of the people expelled by the previous era's land disputes. Fossil fuels allowed both industry and cities to expand, which permitted the workers to organise and to force the despots to loosen their grip on power.

Fossil fuels helped us fight wars of a horror never contemplated before, but they also reduced the need for war. For the first time in human history, indeed for the first time in biological history, there was a surplus of available energy. We could keep body and soul together without having to fight someone else for the energy we needed. Agricultural productivity rose 10 or 20 fold. Economic productivity rose 100 fold. Most of us could live as no one had ever lived before.

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And everything you see around you results from that. We have been able to assemble here from all corners of the country because of fossil fuels. We have not been charged and cut down by the yeomanry – or not yet at any rate – because of fossil fuels. Our freedoms, our comforts, our prosperity are all the result of fossil fuels.

Ours are the most fortunate generations that have ever lived. Ours are the most fortunate generations that ever will. We inhabit the brief historical interlude between ecological constraint and ecological catastrophe.

I don't have to remind you of the two forces which are converging on our lives. We are faced with an impending shortage of the source of energy which is hardest to replace – liquid fossil fuels. And we are faced with the environmental consequences of the fossil fuel burning which has permitted us to be standing here now. The structure, the complexity, the diversity of our lives, everything we know, everything that we have taken for granted, that looked solid and non-negotiable, suddenly looks contingent. All this is a great tottering pile balanced on a ball, a ball that is about to start rolling downhill.

I hear people talking about the carbon cuts they would like to see. I am not interested in what people would like to see. I am interested in what the science says. And the science is clear. We need not a 20% cut by 2020; not a 60% cut by 2050, but a 90% cut by 2030. Only then do we stand a good chance of keeping carbon concentrations in the atmosphere below 430 parts per million, which means that only then do we stand a good chance of preventing some of the threatened positive feedbacks. If we let it get beyond that point there is nothing we can do. The biosphere takes over as the primary source of carbon. It is out of our hands.

The notion that we can achieve this by replacing fossil fuels with ambient energy is a fantasy. It is true that we have untapped sources of energy in wind, waves, tides and sunlight, but it is neither so concentrated nor so consistent that we can plug it in and carry on as before.

A cut like this requires massive reductions in our

energy use. There are some technofixes available, but they are unlikely to take us more than halfway there. If carbon emissions are to be capped at 10%, energy use will have to be capped at under 50%. The only fair means of doing this is national rationing accompanied by global contraction and convergence.

And we find ourselves in an extraordinary position. This is the first mass political movement to demand less, not more. The first to take to the streets in pursuit of austerity. The first to demand that our luxuries, even our comforts, are curtailed.

These are the greatest political challenges any movement has faced. But we are rising to it. We are rising. But let no one tell you it will be easy. If it were just a matter of slogging off George Bush, we would have won by now. But we must struggle not only against him, not only against our own government, not only against each other, but also against ourselves. The struggle against climate change is a struggle against much of what we have become. It is a struggle against some of our most fundamental urges.

We cannot call on others to stop flying if we still fly. We cannot ask the government to force us to change if we are not ready to change. The greatest fight of our lives will be fought not just out there, but also in here.

*George Monbiot, Speech to the Climate March, 3rd December 2005*  
<http://www.monbiot.com>



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## Panacea or Ploy?

### Sustainable Development and Rural Electrification in Climate Change

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#### Electricity, energy or development?

Four out of five people without electricity are in rural areas of the Third World. The chief benefit of electricity is acknowledged as lighting which is said to lengthen the working day and allow reading. This assumes a baseline of livelihood security which for many is not present. Electricity's usefulness is optimized in the context of sustainable and secure livelihoods. Approaching Third World rural poverty through *sustainable agriculture and rural development* is likely to be far more effective as it places energy in a proper demand context with land rights and landlessness (with no land how much use is electrification?),

ecological technology, food security, indigenous knowledge, community sovereignty and climate change resilience. Only then can this avenue be both mitigating and adaptive. Providing electricity for televisions, mobile phones and computers (which some PV promoters claim as major contributions) in Third World settlements is not a viable long-term basis for a sound development policy as many people do not have the basics of life. Additionally, unless rural development and livelihoods are made viable with sustainable agriculture then the predictions of massive urban migration *will* come true with all their attendant problems. In 2000 around 50% of the world population lived in cities. World = City.

#### Renewable Energy

Crucially, renewable energy-based electrification holds a powerful and legitimate appeal as a potentially cleaner energy path for developing countries to take. But more photos of smiling rural Third World people with solar PV should not suggest that we are making serious advances in solving the climate change and sustainable

development challenges. There is no guarantee that the developing world *as a whole* will ape the energy profligacy of the North. The odds are presently so stacked against the South as a whole from even pursuing the North's flawed development model, *let alone* having sufficient options for sustainable development. A handful of industrialized Southern countries are approaching significant emission levels (albeit relatively small per capita) but they are also at great economic risk due to unequal integration with Northern markets. Risk accrues in particular from substantial outflows of resources due to over-dependence on foreign investment, potentially

Lack of access should not be confused with sustainable use. Still, promoting cleaner energy options in the South does not escape the fact that the place where non-fossil fuel energy substitutes are most desperately needed is the North.

depressive effects of over-investment of FDI on many traditional Third World exports, and the push by Northern WTO members for a multilateral investment agreement that threatens

development and democracy. The need for energy shift is great in these countries and renewables have a role to play here, but consistent with Article 3 of the UNFCCC, they should prioritise sustainable development and increasing resilience to climate change, in particular addressing the above risks of globalisation which can worsen socio-economic climate change impacts and *vice versa*.

#### Sustainable use of Fossil Fuels

This should not preclude the sustainable use of fossil fuels by developing countries especially by so-called least developed countries. Small island developing states in particular are dependent on fossil fuels for safe and efficient transport. Many OPEC nations have high levels of poverty and sovereign debt, eradicating fossil fuels outright is not a fair or viable solution for them since many essential imports, such as food, are financed by oil earnings. Nonetheless, dependency on oil

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exports is proving increasingly risky from a political, military as well as environmental point of view. Therefore economic diversification is highly desirable for sustainable development. So, renewable electricity sources have their place in a broader energy family.

Lack of access should not be confused with sustainable use. Still, promoting cleaner energy options in the South does not escape the fact that the place where non-fossil fuel energy substitutes are most desperately needed is the North.

The structural and historical devastation visited upon the South by the North gave rise to famine problems but the blame was directed against the failure of Third World peoples to control their procreation (and the blame came to rest eventually on Third World women). Thus the Malthusian “population bomb” took its place in development mythology. There are now shades of the “energy bomb” replacing the population bomb. The conservatives of the US have been carping about the need for developing countries to take on mitigation commitments, ignoring the historical debt owed by the North to the South. Does the solar panel for rural Third World poor unintentionally reinforce this message? Good intentions surely, but the scope for radical simplification and hijacking are immense.

### **Energy Corporation - Figleaf for Big Oil**

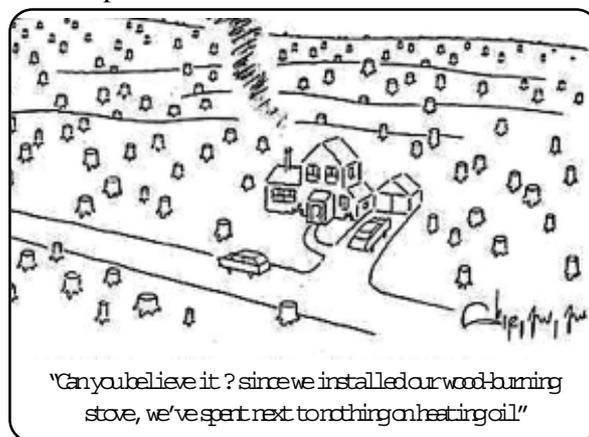
So we get development agents apparently dishing out solar panels when really dirty technology is still being sent to the Third World and over-consumption is sustained in the North. Recently re-branded “energy” corporations such as Shell and BP are holding out the fig leaf of renewable energy whilst vigorously expanding their conventional fossil fuel markets. BP, which claims to have gone “beyond petroleum”, is leading an oil pipeline consortium in Turkey, Azerbaijan and Georgia which is intended to operate for at least 40 years. BP’s rate of investment in renewable energy was recently predicted to outstrip its fossil fuel investment in 1,250 years. “Beyond petroleum” will be beyond many of our lifetimes let alone the onset

of unacceptably dangerous climate change.

The pipeline’s profitability is dependent on ‘free public money’ mostly from western sources, including the World Bank and export credit agencies. The pipeline consortium has secured from Turkey complete freedom from regulation for the pipeline including exemption from liability in event of an oil spill. The Turkish government is prevented from taking any actions that could disrupt its ‘economic equilibrium.’ The implications for any climate change policy framework, let alone sustainable development, are grim indeed. This pipeline could be effectively isolated from any present and future international climate change regime. The *World Energy Outlook 2002* predicts that ‘cross-border gas pipeline projects will multiply’ by 2030. Watch out.

### **Inadequate Northern Commitments**

What is being obfuscated is the inadequate commitments of Northern countries to reduce greenhouse gas emissions. The *World Energy Outlook 2002* projects energy-related increases of CO<sub>2</sub> of 1.8% per year from 2000 to 2030, reaching 38 billion tones in 2030. Even at their affluent economic status emissions from the Kyoto Parties will reach 12.5 billion tones by 2010, the middle of the first commitment period. Ignoring loopholes like ‘hot air’ this is 2.8 billion tones, or 29%, above target. Two-thirds of the aforementioned energy increase by 2030 will come from developing countries, approximately 10 billion tones. However, putting aside assumptions of conventional industrialization in



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the *WEO 2002* model, developing countries have both a *right to development* (reaffirmed in the 1992 Rio Declaration Principle 3) and furthermore are owed an immense historical *ecological debt* by the North, a debt which is often forgotten. In both the Rio Declaration and the UNFCCC States have common but differentiated responsibilities. The North is seriously remiss in its responsibilities with regards to both climate change and sustainable development. It needs to create an enabling environment for change in both itself and for the South. The global institutions established after the Second World War are desperately undemocratic with the North holding effective veto power in most. This must change or else it will be impossible to achieve an equitable solution to climate change.

Fossil fuel energy will remain relevant in the world's energy mix but the expansion must be curtailed. The Oilwatch network, whose members are from Southern countries, has called for a moratorium on new fossil fuel exploration as has the Climate Justice movement. This does not rule out use of present sources but acknowledges that for environmental and humanitarian reasons that things must change.

### **Renewable Energy Not a Solution, but an Alternative**

If Third World rural electrification through renewable technologies is being picked as the lead contender for the (moral) battle against the hold fossil fuel profligacy has in the North then it is a technological solution applied with the wrong emphasis. While renewable electrification is welcome in the South, we must be clear that it presents an energy alternative and not a solution to the climate change problem which must be addressed in the North. It's a case of energy rescue for the poor without adequate emission cuts for the rich. To bring it home, the rural poor of the Third World are the most vulnerable to adverse climate change. ***Simultaneously cutting Northern GHG emissions to safe levels and delivering sustainable development to the South must be the solution.*** The answer is in the whole and not the parts. This is the basic message of,

and rationale for the obligations of Parties, under the Framework Convention on Climate Change.

### **Proposals**

- 1) A concentration target should be set under the Convention that 'would prevent dangerous anthropogenic interference with climate system.' Commitments for Annex 1 countries should be made with this target in mind rather than through a voluntary system of self-selected targets based on gross emissions (as was the case in the past).
- 2) Non-Annex 1 parties should be provided adequate facilitation under the Convention to pursue sustainable development with the full integration of climate change concerns into policy. Sustainable development approaches should, as far as climate change is concerned, be ideally simultaneously mitigative, adaptive and contributing to resilience. This may be operationalised by adequate funding for, as a minimum, the following:
  - implementing strategies for disaster risk reduction (as per the WSSD Plan of Implementation, para. 35);
  - transferring from North to South environmentally-sound technology at concessional rates or free of intellectual property and royalty payments;
  - the promotion and recognition of Southern technologies and indigenous technologies that build both climate change resilience and sustainable development;
  - grants and loans at favourable rates to build the capacity of the Southern *public* sector in order to strengthen policy integration in national institutions and public awareness about climate change;
  - programmes in non-Annex 1 parties for building domestic capacity for climate change impacts including, *inter alia*, economic diversification, coastal zone management, meteorological capacity, sustainable agriculture and rural development (with linkages to FAO). ☹

by Yin Shao Loong  
<http://www.twinside.org.sg/title/cop8d.doc>

## Power Play, of the Rich - First meeting for 'Kyoto rival'



The Asia-Pacific Partnership on Clean Development and Climate aims to develop and promote technologies such as “clean coal”, nuclear and renewables. The meeting involves politicians and industrialists from Australia, China, India, Japan, South Korea and the US. The Asia-Pacific partnership was announced in July, but this is the first time that ministers from the six countries have come together.

Green groups say the body aims to emasculate the Kyoto Protocol.

### Clean development

The ideology behind the partnership is that emissions can be brought down effectively by developing and spreading new technologies. It is a voluntary body without international commitments such as those contained in the Kyoto Protocol.

Environmental groups believe the approach will achieve little. “Voluntary agreements have been tried before and have failed to affect significant change,” commented an NGO climate coalition in a joint statement co-ordinated by Climate

Action Network Australia (Cana). “Without targets, timetables nor market-based incentives to encourage the deployment of already developed clean energy technologies, the Asia-Pacific partnership is an empty and meaningless shell that will not help us avoid dangerous climate change.”

### Common ground

**Australia and the US have both withdrawn from the Kyoto Protocol**, claiming that meeting the commitments on greenhouse gas reductions that they agreed to at the Kyoto summit in 1997 would damage their economies. **They have found common ground with China, India and South Korea**, all developing nations that resist the idea of binding targets on reducing emissions; while Japan, which remains committed to its Kyoto Protocol target, now has a foot in both camps.

But environmental groups believe the opposite; that it aims to draw countries away from United Nations climate negotiations, and into a pact which dangles the golden carrot of climate relief with no international commitments.

Ben McNeil, a climate scientist at the University of New South Wales in Sydney, said “This pact only addresses technology transfer between developing and developed nations; but for effective climate change policy we really need strong domestic measures within the developed world, because that’s where most of the emissions are coming from.”

### Industry on board

The meeting brought together about 400 delegates from the six governments, public sector energy bodies and private industry. Some of the world’s biggest companies such as BHP Billiton, Rio Tinto and ExxonMobil were be represented. 

*By Richard Black, Environment Correspondent,  
BBC News, 11<sup>th</sup> Jan 2006, Sydney*

GRONDAHL  
STANDARD  
EXAMINER



**"Is that alternati**



**ive fuel ready yet?"**

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## The Renewal of Nuclear Energy

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*Nuclear Energy was dead and buried, and most developed countries were phasing out nuclear power generation. It was simply too expensive to make it safe today, and even more expensive – impossibly so - to make it safe for generations to come.*

*Climate Change has changed that. And the debate is getting one-sided – articles, such as the one in the box, are so partisan, that nuclear power comes out smelling of roses. They invoke the hubris of unlimited energy. (Does anyone mention any deadly drawbacks)?*



Nukepower

*Unlike the article below, which touches upon the seductive aspects of this energy, but takes us to another dimension of the politics of distribution; the politics of access to and local production and control of energy. Nuclear, then, may still not seem all that good a deal.*

### It's dark outside the Nuclear TV grab

In this day of television grabs, policies are about slugfests. The logic of the grab is that any discussion must be heated, with sharply divided positions - clear proponents and opponents. It is a caricature of the world; in it, for instance, if one is an environmentalist then s/he must be against nuclear energy, even without logic or rationale; the grab allows it so. But let's discuss India's nuclear option, not as an absolute given or the mother of all things evil but as a possible energy source in a growing and starved nation. What does the future hold?

Even if India uses all options - from investment in renewables, to improving efficiency and demand side management - it will still need the nuclear option: "Nuclear theoretically offers India the most potent means to long-term energy security." This when, after a 20-fold increase in nuclear power generation capacity, this source of energy will provide a mere 5-6 per cent of our needs, estimates the expert group.

Now let's dig a bit deeper. Fact is a large number of people in India can't afford energy at current rates. That's why we need to know if nuclear fits the bill.

Energy is a little like water. In the last 60-odd years, even as planners have focused on large sur-

face irrigation systems, Indian farmers have switched to private and decentralized sources of water: they use groundwater because it is more efficient, cheaper and timely. This source has been privately created (over 19 million wells, according to a recent government census) and supports 60-80 per cent of India's irrigated land.

The world is beginning to understand the force of micropower - decentralized energy sources, and negawatt - doing more with less megawatts. The World Alliance for Decentralized Energy (WADE), a grouping of industry and researchers, estimates that decentralized resources generated 52 per cent of energy in Denmark, 39 per cent in the Netherlands, 16 per cent in Japan and 14 per cent in China. This includes combined heat and power (co-generation) gas turbines of up to 120 mw, wind and solar photovoltaics, but not other sources like biomass and hydropower.

WADE data shows micropower has overtaken nuclear in the global market place. As in fact it has in India, where installed wind energy capacity is more than nuclear energy capacity.

Amory B Lovins, a highly respected energy expert, writes in the magazine Nuclear Engineering International that the most powerful force competing with nuclear may well be the legion of

small, fast and simple microgeneration and efficiency projects. Even in the us, central thermal stations are no longer the cheapest or most reliable sources of delivered energy, because generators now cost less than the grid. The cheapest, most reliable power is typically produced near customers. These disaggregated systems, says Lovin, are run by swarms of mighty ants busily re-building the energy security edifice.

It is here that I have a quibble with the nuclear grand plan. If money is no consideration, then our energy policy can afford to build nuclear plants

with safeguards for waste disposal. More importantly, the actual cost of putting in these safeguards as well as the cost of waste disposal can be crafted into the energy price. But if money is a consideration, this price has to be evaluated for our needs and our pocket. A careful choice has to be made.

This is exactly the point at which an issue such as the nuclear option refuses the tidy simplicity of the television grab. Choices such as these are too momentous to be aired in a polarised fashion. They require a greater attention span. ☹

*Sunita Narain < editor@downtoearth.org.in*

### Nuclear Power for India is Good for us All

Nuclear power emits no carbon dioxide, the leading cause of global warming. And India, like most developing countries, has not been anxious to spend money to control its emissions of this and other so-called greenhouse gases. India is embracing nuclear power for other reasons - because it can help the country solve its chronic failure to supply the electricity needed for a burgeoning economy. But in effect, the deal would marry their interest in power with ours in protecting the planet.

Over the past decade, about one third of India's new power supplies came from natural gas and hydro electricity. Both those sources have been good news for global warming - natural gas is the least carbon-intensive of all the fossil fuels, and most of India's hydroelectric dams probably emit almost no greenhouse gases.

However, the bloom is coming off those greenhouse-friendly roses. New supplies of natural gas cost about twice what Indians are used to paying, and environmental objections are likely to scupper the government's grand plans for new hydro dams.

That leaves coal - the most carbon-intensive of all fossil fuels. Already more than half of India's new power supplies come from coal, and that could grow rapidly.

So the deal struck with President George W. Bush matters. At the moment, India has just 3 gigawatts of nuclear plants connected to the grid. Government planners envision that nuclear supply will grow to 30 GW over the next generation, but that will remain a fantasy without access to advanced nuclear technologies and, especially, nuclear fuels - such as those offered under the deal with the Bush administration.

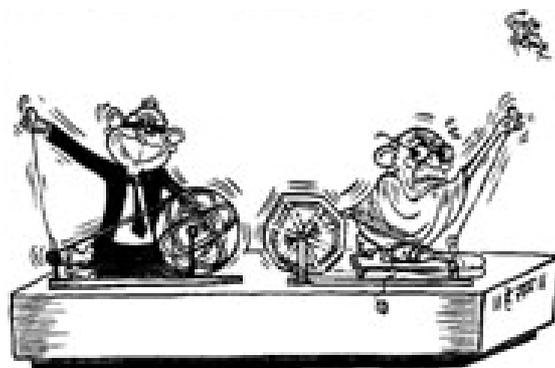
By 2020, even after discounting for the government's normal exuberance in its forecasts, a fresh start for nuclear power could increase nuclear

generating capacity nearly ten-fold. By displacing coal, that would avoid about 130 million tons of carbon dioxide per year (for comparison, the full range of emission cuts planned by the European Union under the Kyoto Protocol will total just 200 million tons per year).

The effort, if successful, would eclipse the scheme under the Kyoto Protocol, known as the Clean Development Mechanism, that was designed to reward developing countries that implement projects to reduce their emissions of greenhouse gases. The largest 100 of these CDM projects, in total, won't reduce emissions as much as a successful effort to help India embrace safe nuclear power.

Quite accidentally, it seems, the Bush administration has stumbled on part of an effective strategy to slow global warming. Now it should marry that clever scheme overseas with an effective plan here at home. ☹

*David G. Victor International Herald Tribune  
Thu, March 16<sup>th</sup>, 2006 <http://www.ihrt.com>*



Now & Then

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## Power-play, for the People

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*Chandrakant Pathak has invented power-generation gadgets tailored especially for rural energy needs. As Pathak's gadgets are gaining popularity in rural areas of Pune district and several neighbouring districts in Maharashtra, state energy development agencies are taking note, reports Aparna Pallavi.*

- "Free electricity for farmers is quite an easily achievable goal," remarks Chandrakant Pathak casually, "What is more, the costs too are nominal."

Coming from someone else, and at a time when the issue of free electricity is creating political ripples in Maharashtra, such a remark could only be called jaw-dropping. But for Pathak, electric power is everywhere. "Anything that moves can be used to generate power," says he, "The only thing needed is will, and creativity."

If you want proof, you have only to look at Pathak's work. He has invented power-generation gadgets that can be operated manually or by bullock power, and even installed into bullock-cart wheels. He has modified power-consuming gadgets of every-day use, like motor pumps, flour mills and even electric vegetable shredders to run on manual power.

Tailored especially to suit rural energy needs, Pathak's gadgets are gaining popularity in the rural areas of his native district of Pune, Maharashtra, and several neighbouring districts. His work has been recognised and subsidised by the Maharashtra Energy Development Agency, and he has received several awards for his work.

It all started in the year 1993. Then a mechanical engineer working with a private firm in Rajkot, Gujarat, Pathak volunteered for rehabilitation work with the Sakal Relief Fund. This work took him to some remote villages in the Ratnagiri district of Maharashtra.

In one of these 'on the other side of nowhere' places, the only source of water was a river running through a deep ravine. "There was no electricity or diesel to run a pump. We had to draw water by tying a child to the end of a rope and letting him down into the ravine." The memory still sends a shiver down his spine. It was this incident that set him thinking on the power crisis

in rural India.

### Bicycles and bullocks

One of the first things that suggested itself to Pathak's imagination as a solution was the presence of bicycles and bullocks in nearly every rural household. "When I returned home," says he, "I attached a motor pump to an old bicycle and ran it. After a few modifications, it worked. It was a real 'eureka' moment for me."

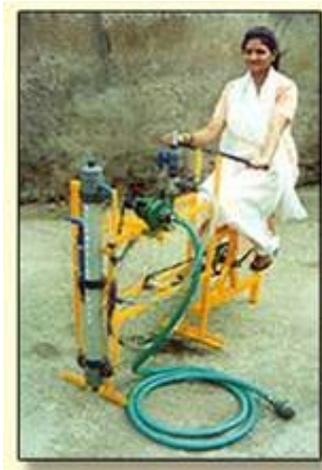
Bicycle - powered pump developed by Chandrakant Pathak.

In 1995, Pathak started his own institute, the Modern Technical Centre, in Pune, with the aim of devising gadgets for power self-sufficiency in rural areas.

Today, his first bicycle pump has

evolved into several varieties of bicycle-operated lift and spray pumps to suit different needs. Some of the pumps are powerful enough to draw water from a depth of fifty feet and pump it up to a height of 100 feet. Anything between 15-40 litres of water can be pumped per minute. Keeping in mind the requirements of crops like fruit trees that reach great heights, he also invented a bicycle-operated spray pump that can spray insecticide or water up to the height of 30 feet.

Shantaram Damse, a farmer in Wadgaon, Pune district has bought two bicycle powered pumps from Pathak, a spray pump and a water pump. He uses the water pump to get drinking water and to water his garden. The spray pump has a larger reach than the usual sprayer and involves less



Frame Mounted bicycle water lifting pump

exertion. “As the tank is mounted on the bicycle, I don’t have to carry it on my back,” says Damse.

Namdeo Shinde of Wadgaon uses Pathak’s bicycle-powered spray irrigation pump. “This pump serves a double purpose — it can be used to pump water for storage purposes as well as for spray irrigation,” he says, pointing to its convenience. “Before I had this pump I had to shell out exorbitant amounts in electricity bills. But the small one-time investment on this pump is now saving me all those bills,” he adds. Baban Dimle of Mawan concurs. “I use it to irrigate delicate crops like Methi (Fenugreek) and coriander. It has very good reach, and saves a lot of electricity,” he says.

After the bicycle, Pathak turned his attention to the other source of rural power, the bullock, and invented a bullock-cart-mounted and powered ‘Jaladhara pump’, a mechanical contraption which can be used to spray insecticide and to run four sprinklers simultaneously for spray irrigation. The pump is powered by the motion of the bullock cart, and is mounted on the cart itself, along with a barrel for water or insecticide

“The effectiveness of these gadgets told me that instead of free electricity, it is possible to develop electricity-free, self-sustaining irrigation systems for farmers,” he says.

### Generate power, don’t buy it

The rural power-crisis involves more than just irrigation, and very soon Pathak realised that without the means for actual power production, rural India can never be power-self-sufficient.

Animal Driven Modern Energy Machine with air Compressor & Water pump



Animal driven Modern energy machine with air compressor & water pump



Fream mounted bicycle water lifting pump

Process attachment for bullockcart

Pathak modified his Jaldhara pump by adding a pulley and dynamo on its wheel to generate electric current. The result was what he calls his ‘video-coach bullock cart’, because the power generated by it is sufficient to run a TV. At a serious level, this machine can be used to charge batteries, which can provide household power supply in a limited area.

Pathak dispensed with the cart and mounted the pump on the bullock, and invented what he calls his ‘video-coach bullock cart’ to be his greatest achievement yet — a ‘video-coach powered energy machine’. Run in the same manner as the oil-presses of old (*Kolhu* in Hindi, *karathi* in Marathi), this machine converts the 200 RPM input from a bullock into a 1500 RPM output with the help of a simple gear box. The machine is stationary (no cart is involved), with a long lever like the lever of a kolhu (oil press). A bullock is tied to this lever, and it runs the machine by walking in circles around the machine, like a bull operating an oil press. The circular motion

Process attachment for bullockcart

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generates electricity

This machine is extremely versatile — it can be used to run a five horse-power centrifugal pump, and all small machines like a 1 KV generator, a flour mill, an air compressor and so on. A single machine can run the entire water supply system of a small village. Run for two hours, it can keep ten street lights burning for the whole night.

About the power-generation potential of rural India, Pathak says that there are some 8,20,000 bullocks in Maharashtra. Even if just ten per cent of these bullocks are put to work on such power-generating machines for two hours a day, 4,000 MW of electricity can be produced per day. “So where is the power crisis, tell me?” he asks. “With the right kind of vision, our farmers don’t need free power — they can sell it to others instead.”

### **Power for women**

Another subject Pathak has devoted considerable attention to is electric power for rural women. In rural India, the entire agricultural and economic system is against women. Women don’t own bicycles and bullocks; and even though most of the bicycle-powered gadgets invented by Pathak can be run comfortably by women, cycling is still anathema for them in many parts of rural Maharashtra.

On a sudden inspiration, Mr Pathak landed on the swing — a traditional mode of amusement and play for women and children all over India — as a means of power generation. “The to and fro movement of the swing can be used to run a piston pump ten times as powerful as a hand-pump,” says he. The swing pump is Mr Pathak’s latest innovation, and can pump water from a depth of 10 metres and up to a height of 30 metres at the rate of 20 litres per minute. Some 10-12 schools in the Pune and Ratnagiri districts are using this pump effectively to pump their drinking water. The swing also has great potential in the area of air-compression and power generation, and Pathak is currently exploring these possibilities.

### **Knowledge to the people**

Pathak’s products cost much less than what most power-generation and advanced agricultural

gadgets cost. The bullock energy machine, for example, the most expensive of his gadgets, costs just Rs 20,000. The products further save the farmers a packet in electricity bills in the bargain, have found wide acceptance among the rural people of Western Maharashtra. Pathak says his products are popular in the Sangli, Satara, Solapur, Latur and Pune districts and also parts of Vidarbha. He also says he has sold 900 manual water pumps and spray pumps till date and 20 bullock energy machines, along with other products.

What distinguishes Pathak from other inventors is the fact that he has not drawn a patent on even a single one of his inventions. “These machines are all based on very simple principles. I want to spread this knowledge, not hoard it.” Pathak has propagated both his concepts and products through various craft, agricultural and technical fairs in the state. Only recently, at an agricultural fair in Latur, 100 bullock power machines were booked by farmers, personally as well as collectively by villages or communities.

### **Scaling up low-cost rural energy**

In his attempts to spread his knowledge, Pathak has held training camps for rural youth. A few groups are manufacturing a light steel bullock cart devised by Pathak. The Rural Technical Centre in Wardha will also start manufacturing the same this month. Other products are still being manufactured by Pathak alone, because the awareness and acceptance rate of these products are rising, but are still too low for profit-making ventures.

Pathak is dissatisfied with the scale of the work. “We need such training everywhere. How many gadgets can one organisation make and sell? Rural people must learn to manufacture, operate and improvise on such

*Chandrakant Pathak*

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gadgets and even invent their own gadgets to suit their special needs. And the government must invest in such training in a big way.”

His own institute, the Modern Technical Centre, employs 9 people. Earlier it was not very sustainable, but for the past two years, the Maharashtra Energy Development Agency has been forking out subsidies of 50 per cent on the products. This has caused the market to grow. Pathak says that last year, the institute sold products worth Rs 10-12 lakh, and this year they expect to cross the Rs 25 lakh mark. Other state level energy organisations are taking note of his work. The Karnataka Renewable Energy Development Agency and the Punjab Energy

Development Agency have just contacted him and shown interest in propagating his products in their states, says Pathak.

Pathak’s dissatisfaction with the country’s present power policy is evident. He points out that the entire accent of our power policy is on exorbitantly expensive, hopelessly centralised production methods coupled with slogans about saving and vigilance against theft which are never implemented. “Privatisation has made matters worse. If instead, it could place its accent on power production by the people, not only would the per unit cost of power come down dramatically, but the entire power problem would become non-existent in a few years.” ?

Aparna Pallavi, 21<sup>st</sup> January 2006  
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## Little Space for Grassroots Innovations

Be it endogenous or exogenous, technology has in many ways shaped lives and livelihoods in the rural areas. From the humble sickle to the mighty combine harvester, technology has come to symbolize the level of progress of a society. Yet, the access and acceptability of the technology per se has remained influenced by diverse socio-economic and cultural conditions.

### Limited reach

Though a host of state-sponsored research institutions, universities and IIT’s are engaged in appropriate technology development and dissemination, these haven’t been held accountable to the society. Is it because it concerns the poor and the underprivileged?

Statistics clearly indicate that despite the best of political will, investment environment and the media thrust, the benefits of modern technology have reached only about 200 million in the country. An estimated 800 million living in over 100 million households have neither the purchasing power nor the physical access to products of modern science and technology.

The role of technology in improving the lives of the poor has rather gone unnoticed. Neither has the research and development infrastructure in India invested in backstopping such concerns nor

has the mainstream media considered providing consistent space for voices from the margins. In the process, both the technology and the poor have stood to suffer. Unlike modern technology that has invaded cultures with impunity; appropriate technology has remained rooted to a context. Consequently, its penetration in terms of reach and impact has been countered by a variety of factors, varying from one set of social conditions to another.

*Although the National Innovations Foundation has already registered over 11,000 innovations and awarded quite a few, there is no mechanism yet in place linking ‘informal’ to the ‘formal’, i.e., where grassroots innovations are value added by research at the formal institutions.*

### Dangerous trend

A host of government institutions have set-up mechanisms to tap peoples’ knowledge, notable being the ill famous National Research Development Corporation, the National Innovation Foundation, the Indian Council of Agricultural Research (ICAR), and Technology Information Forecasting and Assessment Council (TIFAC).

As an autonomous institution NRDC is mandated to support innovations in science & technology.

In the process, the NRDC acknowledges innovation through its annual innovation awards. Earlier these awards were given out on Republic and Independence days but now the Technology Day (May 11) has been chosen for the annual awards. Though anyone can apply for these awards, majority of the awards are bagged by research institutions and private companies. Rarely, if ever grassroots innovators bag such awards. However, over the past decade or so the presence of 'grassroots' innovators has been acknowledged by the setting up of a National Innovation Foundation (NIF), an autonomous national innovation register that has been set-up under the auspices of the Department of Science and Technology (DST) and Council of Scientific and Industrial Research (CSIR). Although NIF has already registered over 11,000 innovations and awarded quite a few, there is no mechanism yet in place such that the 'informal' gets linked to 'formal', meaning that the grassroots innovations are value added by research at the formal institutions. Critics fear that this register will, in the long run, usurp the intellectual property rights of grassroots innovators.

Whether or not these programmes serve the

individual inventors and benefit the poor at large has yet to be seen. And ultimately, the market determines what is made of these innovations that are developed out of sheer necessity by citizens are the grassroots. If developments thus far are any indication, the poor have yet to benefit any degree from such innovations.

The beauty of smallness had spawned the appropriate technology movement. But in spite of its grassroots orientation, this movement has been largely dominated by tinkerers instead of entrepreneurs and mass marketers. The unfortunate result has been that hundreds of creative technologies that have simply not been marketed properly are now gathering dust.

There are several appropriate technologies that have proven their worth and yet such technologies do not win the hearts of the media and the minds of the politicians, because 'planners and politicians prefer big buildings and large dams - things you can put a plaque on and hold an inauguration ceremony - that media can then cover as events.

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## Consensus grows on climate change

*The global scientific body on climate change is expected to report soon that emissions from humankind are the only explanation for major changes on Earth.*

The Intergovernmental Panel on Climate Change (IPCC) formerly said greenhouse gases were “probably” to blame.

Its next draft report will be sent to governments next month. The BBC has learnt the report will state that greenhouse gas emissions are the only explanation for changing patterns of weather across the world. It will say rising concentrations of gases such as carbon dioxide in the atmosphere must be the cause of simultaneous freak patterns in sea ice, glaciers, droughts, floods, ecosystems, ocean acidification and wildlife migrations.

A source said: “The measurements from the natural world on all parts of the globe have been anomalous over the past decade. If a few were out of kilter we wouldn’t be too worried because the Earth changes naturally. But the fact that they are virtually all out of kilter makes us very concerned.”

He said the report would forecast that a doubling of greenhouse gas concentrations in the atmosphere would bring a temperature rise of 2C-4.5C or maybe higher. This would be a narrower range than contained in the last report, which suggested that the rise could be as little as 1.4C or as large as 5.8C.

### Uncertainties remain

The scientists will say there is still great uncertainty about the pace and scope of future change. The doubling of CO<sub>2</sub> from pre-industrial stable levels (270 parts per million) is expected to happen around the middle of the century. What really worries the scientists is that we are already seeing major disruptions despite having increased CO<sub>2</sub> by just 30%.

A recent scientific report commissioned by the UK government warned that the world may already be fixed on a path that would begin melting the Greenland ice cap. That in turn would start raising sea levels throughout the world.

There will be sceptics, predominantly in the US, who will accuse the IPCC of trying to scare policy-makers into action with their report. But the broad international expert consensus embodied in the IPCC will make it harder for the US administration to say that climate change is a problem for the future which can be solved by technological advances.

In a meeting with climate campaigners, the UK Prime Minister Tony Blair said the world needed to engage the Americans, Chinese and Indians in agreement over a figure for CO<sub>2</sub> stabilisation. But this is unlikely to happen while President Bush is in office; his representative told the December climate conference in Montreal that the US would not agree any targets for reducing CO<sub>2</sub>. President Bush’s chief adviser James Connaughton said recently that it was pointless discussing a safe CO<sub>2</sub> level as we could not be sure how resistant the world would be to greenhouse gases. Maybe we could double CO<sub>2</sub> with impunity, or maybe we could increase it threefold or fourfold; the issue was not worth discussing, he said.

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