A possible contribution of ethical science to the Industrial Strategy of the Labour Party

By Dr David Hookes, on behalf of Scientists for Global Responsibility (SGR)

Who we are: SGR is an independent UK-based membership organisation of hundreds of natural scientists, social scientists, engineers, IT professionals and architects. We promote science, design and technology that contribute to peace, social justice, and environmental sustainability.

SGR's work is focused on four main issues: security and disarmament, climate change and energy, including nuclear power; who controls science and technology?, and emerging technologies.

Introduction:

Our view is that science and technology can be used to help implement the transformation of the socio-economic system on a global basis to create a cooperative, pluralist commonwealth based on fairness, mutuality and equality. In this economy humanity lives within ecological limits, now more commonly known as planetary boundaries.

One key to the long-term survival of industrial society is to develop a low carbon energy supply to avoid catastrophic climate change. This will involve technologies which harness renewable energy in all its forms (including solar, wind, waves, hydro, bioenergy, tidal, geothermal). Energy storage technologies will also be essential to help deal with problems of variability and intermittency, and some contribution from digital systems, that is, computers and digital instrumentation will be important in integrating these various sources of energy into smart local and national grids.

A background to this renewable energy revolution is that about 10,000 times more solar energy falls on the earth than we at present require for all our energy uses. For instance, a small patch of the Sahara, 100x100 square kilometres could supply all of Europe's electrical energy needs. Capturing a small fraction of this energy and controlling its release are the vital scientific and engineering tasks necessary to avoid climate and environmental disaster.

An ethical science contribution to a Labour Party industrial strategy:

We believe that would place at least three interrelated issues at the centre of an ethical science contribution to Labour's industrial strategy:

1. Green New Deal-type proposals
2. Arms conversion or replacement program
3. Technology for sustainable development

Science tells us that the fossil fuel era must come to end shortly in order to prevent rapid, catastrophic climate change.

SGR is a strong supporter of most of the ideas contained in the Green New Deal.

1. **The Green New Deal:** This proposal has many aspects to it but we especially recommend the following:
    - Low-carbon energy systems, 'every building a power station', maximisation of energy efficiency, with renewable and low-carbon energy sources to generate electricity.
    - Creating a workforce for a large-scale environmental reconstruction program, including house insulation.
    - Rapid reductions in fossil fuel subsidies to reflect environmental costs and support a transition to a sustainable and low carbon economy
    - A range of financial innovations such as municipal green bonds and others to finance a green revolution.
    - Low interest rates offered to kick start low carbon developments consistent with democratic aims, social justice and financial stability.

The Green New Deal also proposes, with which we concur:

- Help developing countries by financing large-scale investment in climate change mitigation and adaptation using funds ($100Bn per annum) as first agreed under the 2009 Copenhagen Accord
- Support the free and unconstrained transfer of new, largely solar, renewable energy technologies to developing countries (see later)

There is now talk, especially in the US, of a Global Green New Deal in which a UK Green New Deal could be integrated- a kind of eco-internationalism. Since the climate and many environmental issues are intrinsically international in their essence this seems a sensible strategy.

2. Arms conversion or replacement:

There are many opportunities to carry a general program of arms conversion but we deal below with the most significant one, namely, the nuclear weapons program. For instance if a future Labour government decided to cancel the Trident renewal program it would have to find alternative employment for the several thousand workers involved in it. There have been a number of studies of alternatives, including 'Oceans of Work' by Steven Schofield, which was oriented to harnessing renewable energy from waves, wind, and tidal power. More recently, robust assessments of how skilled workers could be re-employed in the renewable and other industries have been published by organisations such as the Campaign for Nuclear Disarmament and the Campaign Against Arms Trade. There is particular potential in offshore wind and tidal lagoons projects.

In addition to these proposals we sketch out some ideas below on to how to re-employ the ship-building community in Barrow as well as workers in sub-contracting firms.

Solar eco-ships

The government could finance, from the cancelled funding for Trident renewal, the development of solar eco-ships that could run on, say, solar-derived hydrogen, or some another renewable low carbon fuel. Some designers have suggested the use of flexible solar cells as sails, for additional propulsion and solar electricity. Such ships could replace the present oil-based merchant shipping over time by being both more energy and economically efficient as well as eco-friendly. The transformation of shipping into solar eco-ships will create many jobs for workers at shipyards such as Barrow, and elsewhere to replace the nuclear submarine work and the sub-contracted employment.

Hybrid solar eco-ships:

We could also discuss the possibility of constructing a type of hybrid ship that has both cargo-carrying capacity, leisure facilities, workshops, and medical facilities. Such ships could provide largely self-funding retirement trips for workers, especially skilled ones. They could act as the link between communities in the developing world and the developed world exchanging goods, and services such as health and education, and skills, as well as promoting broader social and cultural interaction between the communities.

Specialist ships for implementing a program of tidal and wave energy around Britain's coasts and further into the North Atlantic: Britain used to have lead in wave energy until the Thatcher government withdrew funding, possibly under the influence of the nuclear and fossil fuel lobbies. There is scope for tapping into the

wave energy in the North Atlantic fetches so specialist ships could be built to implement this program. It would also create a large number of jobs in fabricating wave energy converters. The development of tidal lagoons would also create many jobs fabricating their structures as well as the turbines to generate electricity.

Technology for Sustainable Development

We suggest that this can be implemented in a network of R&D centres, each, perhaps, specialising in a specific area of technology for sustainable development. Such centres could incorporate the recently instituted catapult centres.

Centres of Technology for Sustainable Development (CTSDs)

These centres can eventually replace the many nuclear research, development and production plants such as Sellafield, Harwell, Capenhurst, Springfields, Aldermaston, etc. This will have to be a phased process since expertise in dealing with nuclear waste and dismantling of nuclear reactors and weapons will need to be retained for several decades or even longer.

It is important to point out that the research program to develop nuclear weapons and nuclear power was initiated in the late 1940s when UK was effectively bankrupt from the cost of the war and was deeply in debt to the US. Nevertheless, money was found to create the institutional structure for nuclear power and nuclear weapons R&D. We must also note this program did not have any significant economic multiplier effect. The energy produced from the nuclear power plants is very expensive and the plants themselves were very dirty producing long-lived radioactive waste, and are also very dangerous. We suggest that money can be found to fund the CTSDs at a fraction of the long term costs of the Trident renewal program (£200bn).

The CTSDs will work closely with University departments and private sector research labs which have existing research programs in similar or allied areas

But they will also have an economic multiplier effect. For instance, if the UK were, in the first instance, to give the small farmers of Africa and India and elsewhere, solar-based technologies as proposed in the Green New Deal, to increase their productivity they will, in the future, be in a position to exchange their products, such as healthy food and other agricultural products under fair trade agreements. They will also undergo development without taking the fossil fuel route to development, as we did. The funding for the CTSDs could, therefore, also partly come from the annual $100bn fund created under Copenhagen Accord for developing countries to mitigate and adapt to climate change.

The CTSDs will also create much spin-off work for SMEs throughout the country again replacing subcontracting work associated with the cancelled nuclear program. The high level technical skills possessed by the nuclear industry can be adapted to help solve the technological problems associated with the technology for sustainable development. Examples are solar- powered agroecological technology for small- and medium-size farms so that they can replace the highly polluting agribusiness monocultures. The latter have been a key contributor to the catastrophic loss of biodiversity and the poisoning of the land and the planetary water systems.

Possible International Alliances?

The technology developed by the CTSDs could support international alliances of precariat workers and small farmers. The precariat workers, those with insecure, temporary jobs sometimes on zero hours contracts and usually low paid, constitute at least 30% of the workers in the UK and in some countries, for example, South Korea, as much as 50% of the workforce. They are in a similar situation, in terms of security, to the small farmers especially in developing countries who are preyed upon by agribusiness corporations. Many are driven off the land, ending in the slums of cities, sometimes as a result of being unable to pay debts to these corporations who supplied them with seeds, fertilisers, and so on. In India many have committed suicide. Small farmers constitute at least 40% of humanity but there is, therefore, a possibility of international alliance of these two groups of the marginalised. With appropriate-scale renewable energy technology together with the improvements suggested by scientific understanding of agroecology, it has been shown that the small farmers could grow enough healthy food to feed the world. The development and production of this technology will provide steady income for both the farmers and previously precariously employed workers.

Some examples of solar-powered technology from CTSDs

- Solar-powered water pumping from depth for both irrigation and for drinking.
- Solar-powered health and education technologies
- Solar powered- shipping containers can also be developed. Already there are at least two institutions in Germany; one is a social enterprise, AfricaGreenTech in Hamburg, which has engineers and scientists from Africa working with German colleagues; the other is a government-funded R&D institute, the ILK, in Dresden; they both produce solar-powered shipping containers that can be adapted for the above range of functions for small farming communities [see attached figure below for ILK solar container]
- They can also be equipped as Agroecology research labs.

- They can even be used for the re-charging of non-military drones, for instance, to deliver medicines to remote communities.

Collaboration with German and African colleagues for promoting human and environmental well-being would also be a desirable possibility for historically resonant reasons.

It is possible to develop solar-powered small scale agricultural machinery for tillage, transport, and processing of the crops.

Environmental clean-up technologies
CTSDs can also develop technologies to clean up the environment, for instance, extracting CO2 from the atmosphere using artificial 'trees' and storing it underground. Techniques can possibly be developed to reuse the CO2 by converting it to carbon monoxide using a combination of catalysts and solar thermal energy. Carbon monoxide combined with hydrogen is called 'synthesis gas' which can then be used to create net low carbon hydrocarbon fuels through the Fischer-Tropsch process.

The damage done to the environment by pesticides, herbicides used by agribusiness can be remedied using agroecological methods combined with modern scientific input.

Techniques for removal and recycling of plastic waste that at present accumulate in the centre of the oceans need to be developed.

Solar-powered water distillation plants: There is an emerging water shortage on the planet caused by the logging of forests and many other reasons, such as its excess use by agribusinesses. Most current methods of desalinating water are energy intensive and can only afforded by rich countries. But there are possible ways that water desalination could be achieved using solar thermal energy.

An electric storage technology: This is a key part of operating a low-carbon economy. Primarily this means improved batteries but also using hydrogen, and pumped storage for hydropower. Already there are buses operating in London, Aberdeen, and elsewhere using fuel cells operating on hydrogen

Electric powered vehicles: The UK has fallen behind its competitors in developing this technology. But this is likely to be the key transport technology for a low carbon world.

Conclusion: We have suggested a number of ways in which ethical science can help provide alternatives to controversial and unsustainable industries such as the arms industry and fossil fuels industry. In a sense we have only scratched the surface of the manifold opportunities for creating a truly sustainable economy. With the increasing use of solar energy and digital technology we can anticipate that we can eventually reduce the working day if the work can be shared out fairly. That means an increase in social enterprises working with private companies to create the common good- what Gar Alperowitz has described as a 'pluralist commonwealth'.

References are available on request.

Contact: Dr David Hookes, davidh@sgr.org.uk

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Solar- Powered Shipping Container

for

- **Water pumping**
- **Internet-linked classroom**
- **Medical facility**
- **Agroecology Field Laboratory**
- **Hydrogen generation**
- **Civilian drone re-charging**