

Grünhaus Project, Liverpool

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Patron:- The Earl of Liverpool

[1]

Notes on "Green" Projects in UK & elsewhere May 2008

1/. Sustainable Communities

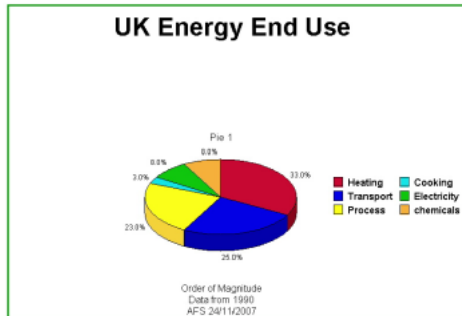
The Sustainable Communities Bill has been passed [see www.localworks.org]

There should be a recognition that Green Technology is best and most economically set on "locally". Sustainable Communities should develop their own energy supplies as far as possible. **Further as all Renewable Energy and Energy Conservation engenders an inflation proof tax free [energy] income, the benefits of this are almost more important than being "Green" and countering Climate Change. As other energy costs rise and taxes are imposed, energy "Harvested from the Heavens" – and the Oceans – rises in value in line. As do Energy Conservation cost savings.**

The SUSTENG.xls program disk is available on request for doing calculations on the above

2/. UK Energy End Use

Please see diagram below, and note the relative percentages of end uses for Heat and Electricity. These two types of Energy are "interchangeable" BUT electricity used for heating [unless through a Heat Pump] is very wasteful. As is heat used to generate Electricity unless a Combined Heat and Power [CHP] unit is involved.



In 1086 William I, King of England, conducted an "energy survey" of the renewable energy [all the energy there was then apart from a little coal in Durham] of beasts, men, mills, tillage and timber in his new kingdom, known today as the Domesday Book. So that he could exploit it for fiscal benefits to the Kingdom.

The same should be done now, for assessing the "energy potential" of each and every UK Local and Municipal Authority, so that by raising revenue from collecting and distributing energy locally they could remove the need for Council Tax [in time past the local gasworks was a good source of revenue], encourage the development of both renewable energy, CHP and conversion of waste to useful energy [see www.greenfinch.co.uk and www.woking.gov.uk for two good examples. Waste disposal energy producing sites are operational with Hampshire CC and the Isle of Wight]. see also <http://www.veoliaenvironmentalservices.co.uk/hampshire/pages/energyrecovery.asp>
One might consider Nuclear CHP, as used elsewhere in the World.

There should be no "cap" on such moves, Authorities in "energy surplus" should be able to do appropriate deals with those in deficit. Central energy provision in my view is wasteful, leading to a greater than necessary "Carbon Footprint". And my late father in law Eric Colbeck who invented the Boron Steel for Control Rods which made the Nuclear Power Industry feasible was never very impressed by it's thermal efficiency.

Way back in 1998 my cousin Lord Liverpool extracted from HM Government the information that Solar PV could potentially supply most of our electricity demands. [1994 ETSU report]. For a commercial concern Solar PV is often financially beneficial as it

16/10/2011

Notes on "Green" Projects in UK

provides an inflation proof tax free [energy] income from an investment that can be "amortised" against tax liabilities through standard depreciation allowances against tax.. see <http://www.eca.gov.uk/>

The CI Tower of the Co-op in Manchester I think benefits from this approach. Lord Liverpool also brought up the subject of CSP [Solar power from deserts] in a recent debate on the Energy White paper [HoL Report Vol 693, No.118] See item [7] below

[2]

3/. Crops and Resources

Energy and Food are two sides of the same coin. The more so as on average in UK about twice as much energy is required to be imported to the farms and food processing factories as compared to the food energy produced from them. In the case of farms the above does not include the input of labour and sunlight energy.

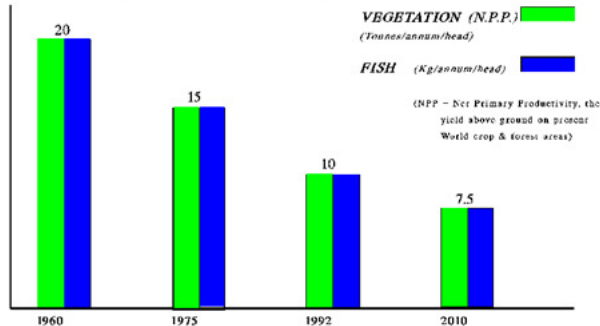
Further globally resources are declining both absolutely and per head of population. Emphasising the need for local resource development and economy to ensure reduced imports.

ESTIMATE OF WORLD RESOURCES PER HEAD

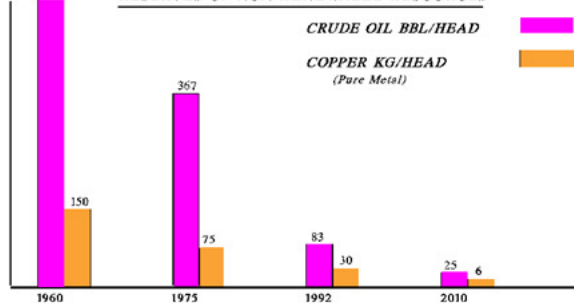
(Source: The Real Wealth of Nations, by Dr.S.R.Pyrc, Univ of Leeds, 1978, pub Arnold)

OR WHAT ARE WE ALL GOING TO LIVE ON AND WORK WITH ?

RENEWABLE RESOURCES



RESERVES OF NON-RENEWABLE RESOURCES



ESTIMATED WORLD POPULATION, MILLIONS

DRAWN BY A. STOBART (1981)

3000 4000 6000 8000

4/. "Non Crop" Biofuels

4a/. From sewage ponds to aviation fuel Secret Kiwi fuel ingredient is pond scum

Air New Zealand and airliner manufacturer Boeing are secretly working with New Zealand-based biofuel developer Aquaflo
 H:/.../Notes on renewables.htm

Bionomic Corporation to create the world's first environmentally friendly aviation fuel, made of wild algae.

If the project pans out the small and relatively new New Zealand company could lead the world in environmentally sustainable aviation fuel. The fuel is essentially derived from bacterial pond scum created through the photosynthesis of sunlight and carbon dioxide on nutrient-rich water sources such as sewage ponds.

Virgin Fuels announced in April it was working with Boeing to demonstrate biofuel in a 747-400. The focus is on testing algae-derived jet fuel, especially its freezing point. Boeing's Dave Daggett was reported this year as saying algae ponds totalling 34,000 square kilometres could produce enough fuel to reduce the net CO2 footprint for all of aviation to zero.

<http://www.smh.com.au/news/technology/secret-kiwi-fuel-ingredient-is-pond-scum/2007/07/19/1184559919499.html>

[3]

4b/. Algae Biofuels, work on using Algae to produce biofuels from Waste and Carbon Dioxide

There would seem to be no need, quantitatively or qualitatively to use food crops to make biofuels, see

<http://www.algaefuelmaking.com/> <http://algaeatwork.com/>

/ <http://www.valcent.net/s/Ecotech.asp?ReportID=182039> and www.youtube.com/watch?v=__ToojK_MJd0

<http://www.cnn.com/2008/TECH/science/04/01/algae.oil/index.html>

http://peswiki.com/index.php/Directory:Biodiesel_from_Algae_Oil

<http://www.smh.com.au/news/technology/secret-kiwi-fuel-ingredient-is-pond-scum/2007/07/19/1184559919499.html>

<http://www.earthtimes.org/articles/show/11116.html>

http://news.com.com/Want+alternative+energy+Try+pond+scum/2100-11386_3-6145197.html?tag=st.prev

<http://www.green-trust.org/2000/biofuel/biooils.htm>.

<http://www.i-sis.org.uk/GAFCCAB.php>

<http://news.nationalgeographic.com/news/2006/08/060818-ethanol.html>

<http://www.eastvalleytribune.com/story/89616>

<http://xldairygroup.com/pressrelease.cfm?ContentKey=610>

<http://www.petrosuninc.com/alternative-energy.html>

<http://gas2.org/2008/03/29/first-algae-biodiesel-plant-goes-online-april-1-2008/>

For Carbon Capture technology see

<http://www.freepatentsonline.com/3622267.html>

<http://digital-library.canterbury.ac.nz/data/collection3/etd/adt-NZCU20060404.080447/02whole.pdf>

www.netl.doe.gov/publications/proceedings/01/carbon_seq/2b3.pdf

In 1958 I designed and installed the bulk liquid CO₂ storage unit at Monsanto Ruabon, which took the gas from the boiler house stack for Aspirin production. The process used a triethanolamine scrubber.

Algae are prolific and can produce 15 000 gallons of biodiesel per acre, compared to just 60 gallons from soybean. [per annum I think] Berzin [MIT researcher] estimates that a 1 000 MW power plant using his system could produce more than 40 million gallons of biodiesel and 50 million gallons of ethanol a year. But that would require a 2 000 acre farm near the power plant <http://www.globalgreensolutionsinc.com/s/Home.asp> **are reporting a cost of \$36/barrel for Biodiesel, at present, with the probability of this going lower**

While a cheap alternative to gasoline may still be pie in the sky, ethanol producers in cattle country will soon be reaping the energy rewards of pies on the ground. ..Ethanol production plants fuelled by cow manure are under construction in Hereford, Texas and Mead, Nebraska.

5/. Waste disposal with power production:

<http://www.viridor-waste.co.uk/>

<http://www.veoliaenvironmentalservices.co.uk/hampshire/pages/energyrecovery.asp>

<http://www.startech.net/photoPages/art3.html>

http://www.startech.net/online_brochure.html

Food waste to power & heat see www.greenfinch.co.uk - the Ludlow Digester Project and GASREC digester Albury project.

Also start building 500kW CHP units at most local transformers actively managed with standby [waste] fuel.

Result for each one built and connected = gas consumption for area halved compared to supply from individual boiler and central electricity.

Doubles life of most valuable CO₂ displacement fuel natural gas.

Two interconnect individual units to build city wide heat network units back each other up through 11kV system and as each one is installed it releases capacity in the HV system of 500kVA plus 25% i.e. 625kVA of capacity.

Reason Marginal losses on electricity supply around 20 to 25% [comment from William@orchardpartners.co.uk]

Co-Production of Ethanol and Electricity from Waste

A gasification/biocatalytic process developed for BRI Energy by a team led by Dr. James L. Gaddy enables the co-production of electricity and ethanol (and/or hydrogen) from any carbon-based material, such as municipal solid waste; biosolids & animal wastes; biomass waste; used tires & plastics; and hydrocarbons (coal, natural gas, refinery tars & waste oils). [more detail on this last if

required]

http://peswiki.com/index.php/Directory:Green_Power_Inc%27s_NanoDiesel:Catalytic_Pressureless_Depolymerization_%28Oiling%27

6/. Plastics to Biofuels

<http://environment.newscientist.com/article/dn12141-giant-microwave-turns-plastic-back-to-oil.html>

Key to GRC's process is a machine that uses 1200 different frequencies within the microwave range, which act on specific hydrocarbon materials. As the material is zapped at the appropriate wavelength, part of the hydrocarbons that make up the plastic and rubber in the material are broken down into diesel oil and combustible gas.

GRC's machine is called the Hawk-10. Its smaller incarnations look just like an industrial microwave with bits of machinery attached to it. Larger versions resemble a concrete mixer.

"Anything that has a hydrocarbon base will be affected by our process," says Jerry Meddick, director of business development at GRC, based in New Jersey. "We release those hydrocarbon molecules from the material and it then becomes gas and oil."

[4]

7/. Economic Solar Electricity

Green and Gold Energy <http://www.greenandgoldenergy.com.au/>.

recently announced an order for 105 MW of Emcore's 37% efficiency photovoltaic concentrator chips <http://www.emcore.com/news/release.php?id=163> and setup a large manufacturing operation in China. They already have over 200 MW worth of orders and are about to place a 500 MW followup order to Emcore. The 105MW order is the largest ever for concentrating PV chips.

Their system is reportedly economic without any subsidies. **Current best price [May 2008] \$950 per 500 watt panel [£950/kW]**

<http://www.rega.com.au/Documents/Fact%20Sheets/6.%20Competitiveness%20and%20energy%20prices.pdf>

see also http://ec.europa.eu/energy/res/publications/doc/2007_concertrating_solar_power_en.pdf

Nano-technology is now in production, photo-voltaic foil providing electrical power at lower cost than coal burning plants. If true, the promise of energy independence for every household at around \$0.30/watt manufacturing cost

See:- <http://www.enr.com/energy/article/24430>

See also Nanosolar Ships First Panels <http://www.nanosolar.com/blog3/2007/12/18/nanosolar-ships-first-panels/>

\$0.99/watt as panels ex works is being quoted

For new batteries for this see Stanford's nanowire battery holds 10 times the charge of existing ones

<http://news-service.stanford.edu/news/2008/january9/nanowire-010908.html>

Solar PV data, see this table http://en.wikipedia.org/wiki/Photovoltaics#Power_costs

Data from USA unconfirmed cost \$1.0/watt <http://www.nanosolar.com/economic.htm>

similar process in uk at http://www.g24i.com/pages_manufacturing_11.html

Another Solar technology much in the news is Concentrated Solar Power – CSP.

see www.trec-uk.org.uk/press.htm#press_nov_2007 UK Contact: Gerry Wolff, TREC-UK, +44 (0) 1248 712962, www.trec-uk.org.uk

Clean Power from Deserts for Europe, the Middle East and North Africa

Prince Hassan bin Talal of Jordan presents White Paper to EU Parliament

On 28th of November 2007, His Royal Highness Prince Hassan bin Talal of Jordan, former President of The Club of Rome, presented the White Paper "Clean Power from Deserts - The DESERTEC Concept for Energy, Water and Climate Security" to the European Parliament in Brussels. It is based on studies by the German Aerospace Center on the potential of deserts to supply clean power to Europe, the Middle East and North Africa (EU-MENA).

<http://www.sciam.com/article.cfm?id=a-solar-grand-plan>

By 2050 solar power could end U.S. dependence on foreign oil and slash greenhouse gas emissions

8/. Solar Water Heating & Heat Pumps

See www.iea-shc.org/publications/downloads/IEA-SHC_Solar_Heat_Worldwide-2007.pdf

Chinese have over 52,000 MW_{Th} installed !! UK has 140 [2005 data] Full UK installation on all 25 million or so domestic premises would be the equivalent of 4-5 1000 MW power station's energy output. Much UK high energy rating electric power is currently used just for low energy heating & hot water.. Very few Heat Pumps in use which multiply High Energy electricity into 3 – 4 times the amount of low energy heating/hot water. See <http://www.heatpumpcentre.org/>

9/. Wind Energy

The current popular Renewable Technology with HM Government. However it's full costings/economics are being questioned, and should be reviewed. There is much resistance to on shore wind farms, and the proposed use of the wrong technology for offshore. Current offshore cost estimate about £2,500 /kW installed. About half that on land.

The basic mechanical principles of the currently popular three bladed large Wind Energy Collectors (they are not strictly turbines

having only one rotor) go back to 1185 or before when Nicholas rented the "milling by the wind" (Molendium venti) from the Knights Templars in E. Yorkshire. And possibly as far back as when the "slave skilled in the manufacture of windmills" slew the Sultan Omar of Baghdad in 644 AD.

A friend of Betz who is sometimes described as the "father of modern wind energy collection theory", Hans Honneff, wrote a book on the use of contra-rotation, using two rotors one behind the other, driving the two halves of an electrical generator. Thus creating a true "Wind Turbine". Development work was done in Germany 1935-45 and an actual machine produced in UK 1976-81 see

http://www.earthtoys.com/emagazine.php?issue_number=07.04.01&article=contra

<http://www.wipo.int/pctdb/en/wo.jsp?wo=1992012343&IA=WO1992012343&DISPLAY=DESC>***

www.osti.gov/energycitations/product.biblio.jsp?osti_id=5279087

www.osti.gov/energycitations/product.biblio.jsp?osti_id=7300750

The possibility exists of a major cost reduction in Wind Turbine technology, especially for offshore, and "on building" installations. Using "maximum economic diameter" rotors [probably about 25 kW @ 10m/sec wind – similar principle to CSP "dishes"] , grid linked as per this article Kloss M, Der direkte Antrieb von Synchrongeneratoren durch Grosse-Windkraftwerke in Parallelbetrieb mit einem taktgebenden Netz, Elektrotechnische Zeitschrift 63 Jahrg Heft 31/32 August 1942 More detail on this patent application ***

[5]

10/. Tidal Energy

A barrage across the Severn Estuary has been under investigation since before 1974. The Sustainable Development Commission's report 'Tidal Power in the UK' concludes the UK's outstanding tidal resources could provide at least 10pc of the country's electricity through a combination of technologies. A Severn barrage alone could potentially supply just under 5pc – the report covers barrages, tidal stream and tidal lagoons www.sd-commission.org.uk/presslist.php?id=72

For smaller projects BERR have recently announced that they will provide extra support under the Renewables Obligation to tidal lagoons and barrages under IGW in capacity.

The SDC's report on tidal power recommended that Government look to support the development of one or more tidal lagoon demonstration projects. The challenge now lies with the renewables industry and those involved with tidal lagoons to develop a viable tidal lagoon project that successfully demonstrates the concept at scale.

See also www.tidalelectric.com

11/. FEED IN TARIFFS

Solar PV now requires no more subsidies in Germany. Due to the provision of long term "Feed in Tariffs" See also <http://www.all-energy.co.uk/UserFiles/File/2007JeremyLeggett2.pdf>

12/. UK Government & Financial Support for Renewables

See www.lowcarbonbuildings.org.uk/about/ <http://www.eca.gov.uk/>
www.sunrisegf.com leasing finance for renewables

WHERE IS RENEWABLE ENERGY ?? SEE DIAGRAM

Renewable Energy, Sources & Applications

