Foreword

The body of this document is in letter form, in large-part a previous interjection sent to S. Yorks and national bodies, highlighting a social housing parcel adjudication in Sheffield, as a case analogue. But more directly refers to „Pre-Ordinate Infrastructure' that supports „Base Units of Energy Autonomy' owned by householders. Frames a supporting policy to sit beneath The Code for Sustainable Homes, that bridges the margin / policy cost gap for Level 6 CfSH. And provides pre-mustered energy balance to the current flux state of (un)tenable CfSH astringents, for the improved harmony between building standard targets and market costs, pre and post 2016. Also highlighted in the overarching context of governance, is a pictographic strategic maxim.

The files and web resources, contained here, detail final development stage and pre-deployment Grid level Electric, Energy Storage and Re-Generation Systems, with market platform finance, that can provide mainstay to emissions reductions targets by 2030, 2050, are cumulatively forecast to out compete Coal fired CCS in UK unit-for-unit markets, and are designed to supply „surplus power regeneration' in refurbished perpetuity. Also included are files that compare „Embodied Reciprocity' (energy return) of various technologies and the financial, carbon and Embodied Reciprocity ratios of generation fleet in the USA (1998).

Web links for market leads on electric road fleet energy technologies, their storage technology recycle-abilities and international geo-resource / world fleet build capacities; the logistically far simpler road fleet energy technology currently being partnered by TATA Motors using compressed air engines; and resource peak alternatives to infrastructure related manufactured materials: are also supplied.
(As a note, research into „quantity' of Road Fleet Re-Energising Station, to support current local-inter-regional economies, is still at an early stage and hence not reported on here).

The additional Appendix V is an architectural allegory in pictures with a worded underpinning of socio-aegis evocation, designed for Town Planning and Local / Central Policy Leaders.

The last three pages contain; a rationale and socio-populate adjunct with ongoing economic bearing, causal to provisioning within built environment planning; an outline built massing limiter and gradation guideline; and, a 40yr post hence climate science briefing.

All information contained and linked in this paper are interwoven with the overarching rationale, and presented herein as a documented evidence. All main objective points are presented dialectically.

The paper can be read complete as „key point highlights', or, using the internal (and external) links, the paper and contained files can be drawn on as comparative evidence resource.

The 2050 Pathways consultation questions (below) addressed in this response are multiply detailed throughout, and for the sake of cogency have not been delineated. As the subject areas covered can be narrowed to Energy Infrastructure, Spatial Strategies and Transport.
But can be correlated to:

1. (a) **Scope of model:**
Are there any low carbon technologies or processes or major demand-side options which are not currently included within the scope of the model but that you consider should be in future?
3. (e) **Input assumptions and methodologies:**
Is there any evidence that would help build an understanding of the potential impact of long term spatial development on transport demand, and how could this be accounted for in the model?
4. (a) **Common implications and uncertainties:** and 5. (a) **Impact of pathways:**
These can subjectively be combined into:-
What „*new commonalities*' should be taken into account in understanding the „*key*' impact(*s*) and relative attractiveness of pathways?

20th August 2010
Dear Sheffield Signatories and UK Policy Designers

Please excuse the delay in finalising (March-June 2010) re: „Roof-Line Transversals' on Longley Ave West.

SCC Project Management and departments have adjudicated that the suggested design revision for that Code 4 parcel had too many late extra factors to put into budgetary process and have given assurance that future proofing will be expanded.

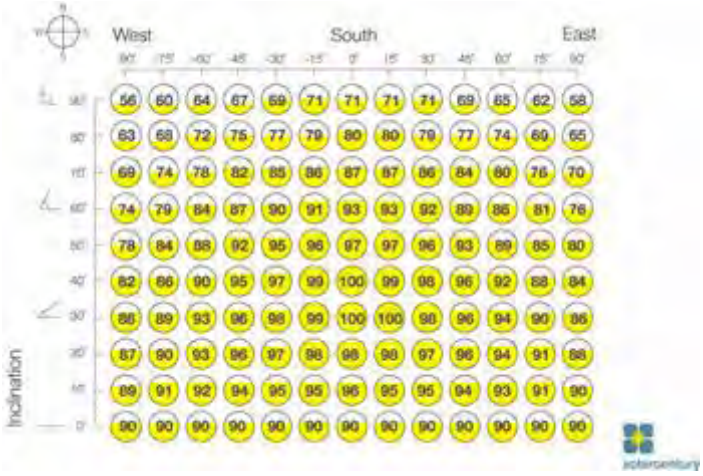
I would like to highlight against any future acceptance of East West roof faces, as the Stephenson Bell architects were granted by SCC planners. As even a 16%? drop (see architects' numbers? in Yellow) in PV efficiency, at our latitude, reduces a whole PV system 30yr lifetime unit-for-unit energy return ratio from 8.2 to 6.8.

Eastward roof or facia orientations (in off-season sun till noon) also extend the „financial payback period' for PV by a similar % (similarly Solar Hot Water). Which also diminishes Code 4-6 (fSH) private mortgage-ability and the margins for Affordable, Association and Local Authority Partnership residential developments (see Also). (40°tilt / ⊕East = 84%? (below); and = >77% at Scientific Grade)

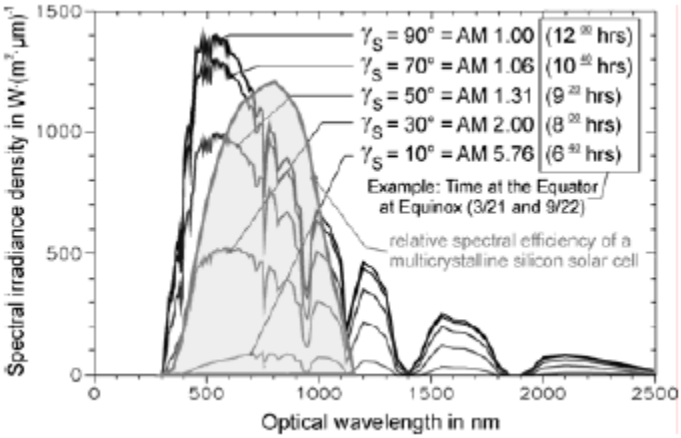
VERDANARCH

Note:
Central Policy Designers and LA Signatories please find an **Unattained Code 6 (fSH) Objective Forcing Pre-Ordinate Policy** at Also. (follow link)

You may also wish to view an EUC Renewable Energy Storage system in final stages, that out competes CCS in the UK in the EUC CAES TES paper & RWE Brochure.



? Annual Direct Sun Light Hour %?
No response from solar-century.



Solar Hot Water is a relative of yearly aggregated capture technology like PV. But more so, SHW is a seasonally extreme on demand energy „enhancement', with Summer-time „over-peak wastage'. SHW is efficient in its use of materials for domestic energy capture, but gives less than PV/kWh payback during the 4 Winter months before the Vernal equinox (Spring).

East facing roof arrays (Longley Ave West) receive even less day-time peak energy during seasons of no-waste before 12noon. Missing the largest capture period of a day, and massively reducing the reciprocal payback of financial investment and materials energy embodiment balances.

(Thermal Inertia of H_20 {+°C/-ti} varies with ±°C / ±kWh, and is based on Kinematic Viscosity and Thermal Conductivity)

Figure 1 above is from numbers! we agreed to compare at the request of the Longley Ave West project architect Nick Moss. This figure and its paper (2006) describe the performance of (cited) domestic retail PV cells at various incidences (tilt) to sunlight at different wave-lengths of visible and near visible frequencies. In the paper are temperature coefficients, sub-straight photon absorption density and mount plate (glass) refraction and reflection coefficients, ect.

The other papers I provided relate to;
The 25% energy capture gain from twin axis tracking PV. (EU 2008);
The test cased unit-for-unit „return' potential for fixed roof-mount PV (inc. wires & devices) in 41 OECD cities. (IEA 2006); and
The expanded priorities of EUC 2006 Framework 7 Theme 5 (2007-2013) for Distributed Energy and Grid Level Storage.

*SCC – Sheffield City Council

Additionally to the m^2 aperture 'tightening' and cover glass reflectance of tilt-angled SHW.
As direct (Beam) Sun light incidence increases, PV absorption 'efficiency' further decreases;
i.e. a negative cosine of less PV absorption at lowering angles of capture creates a significant -cos/PV°/kW/yr at Azimuth orientations greater than ±30° of 180°South (UK).
(see Figure 1 (p1), Figure 12 (p5) and Scientific Grade Solar Table (p7))

I heartily recommend the active encouragement of Solar Capture 'Fascia' (above passive grade) oriented no more than 160°SSE/210°SSW, and PV/Thermal capture 'enabling' new roof-faces oriented no greater than 145°SE/225°SW, to be appraised and adjudicated through SCC / LA's.

The opportunity for properties to gain full benefit from 'Base Units of Energy Autonomy' with Southerly or Tracking arrays, when integrated into all redevelopments, new structural plans, ground parcelling, road layouts, swale-line, and Heritage Applications, including Industrial Diversification.
Will improve with access to Peak Direct Sunlight and Optimised Solar Azimuth,

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Also.
Within the rising Code For Sustainable Homes and ongoing economic pathways, is the possibility that various fractions of housing may fall under a Code 6 compliant 1st buyer mortgage-ability.

Insuring that homes are built to ?reasonably expect? a Code 6 after future investment, enabling post build Solar Hot Water, PV, Solar Enclosures etc. to enhance 'Base Units of Energy Autonomy' in times of heaviest demand and throughout the year. And ensure a (re)joining with full market Code 6 when mortgagee economics have adequate margin. For the period before Code 6 to 2016, Southerly orientation (>¦<%) may be the nearest affordable guideline that can provide such proofing.
(Written in CLG/HCA planning guidance pro-visions to in part award par+ pre-ordinate infrastructure)

(Built Environment Energy Import Balance (Projected (Strategic) Index Over Time)

Decadal Energy Import Trajectory
Strategic Energy Import (De-)Factoring)

I'm currently working on a planning instrument for whole fraction guidance for this measure, to stand beneath the Code for Sustainable Homes. And have previously corresponded with HCA ASC on national criteria for RA Strategic Planning and LA Development Frameworks.

The counter-balancing demands of population limiters (inc. wage market saturation / stability) and housing market fluidity in the UK, mean that every new property built counts towards the reduction of a major import against GDP, industrial revenue and householder hours and income, i.e. energy expenditure. (see IEA PV Energy Return and Renewable Resource Reciprocity)

Gas and mineral/energy embodiments require a trajectory tangent with strategic perpetuity.
As UK oil / gas field depletion nears, fascia / roof array capture will part replace them as multipliers.

This reportage is sent to assist 'horizon formation' issues surrounding future surplus (Geo-store).

Kind regards.

[redacted]
verdanarch

[redacted]

[redacted]

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Transformation of Oversight

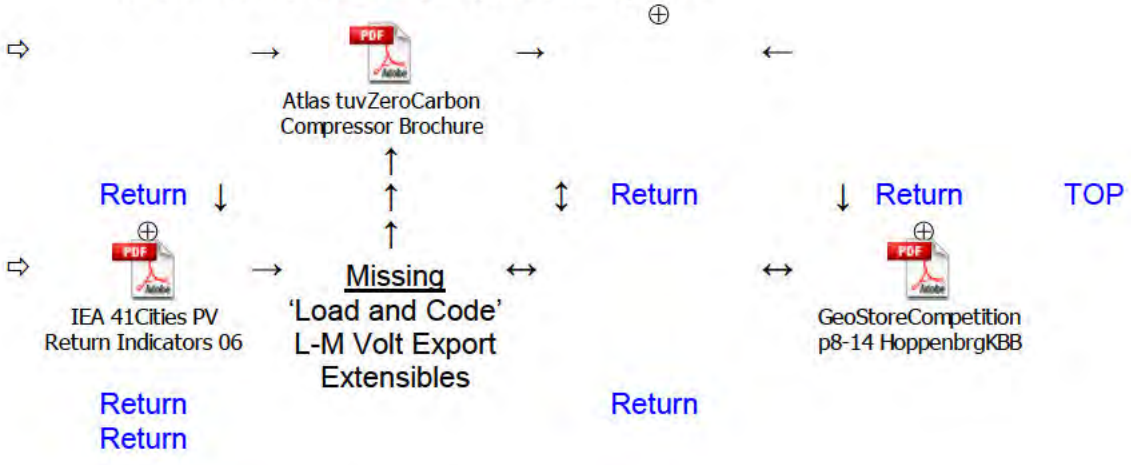
Further to economic and physical development is the founding of conscionable and intuited kinship that bequeaths cognitive elevation, satisfied distraction and engenders the sentient bond of social attuning necessary for enduring equalities to evolve our living experience.

Pictures that the turning tide of our 'living experience' is being provided with the support of Central Decision Making and Design Conventions for global balance of provident co-habitation, draws the minds-eye to 'connection in foresight' and becomes a shared commons on the horizon.

Appendix I

⇨ - Indirect Correlation ← - Direct Correlation

⊕ - Commended Viewing
Double Click Left Mouse (Pad) Button to Open File



Previous and continuing work of verdanarch includes;

Sub-Regional Excess Renewable Energy Storage Facilities – for Domestic & Fleet Exports etc. (inc. Geo AA-CAES TES in post extraction systems, gas field full depletion & reuse or Hydrogen; Geo / Coastal Pumped Hydro in post extraction systems and lagoons, etc (see Organic Power)) [Manned/Turn-Key Infrastructure, Marine/Geo-Tech Expertise, 'Hold-Water' & Energy Investiture]
Industrial Diversification CAES TES (process use). (PV⇒^{AC}⇐CAES⇔ (TES⇔) Thermal Store ⇔Use)
Industry Diversification:- Evaluation of Housing and Business Roof Stock Orientations.
Surface Transport CAES for public / private Road & Fleet Vehicles and Electricity Networks.
UK M-H Volt Electric Grid 'Load and Code and Export Signalling' and Supply Market Provenance.
Smart Meter Export/Safety Specifications, Export Provenance and Low Volt Phase Efficiency.
City Centre and District Centre Built Massing Limiter and Gradation Guidelines (ft$^{\%}$).
Dwelling Place 'Built-In Natural Amenity' Standards and Guidance, e.g. **Solar Enclosures**
Urban Hedging – Culinary and Medicinal Planting Initiatives for Social Arenas.
AD Land Banking, Longevity-By-Design, **Peak Plastics** & Cellulose Chemistry (CAB etc.) Return
Standard for Non-Potable Harvested Water – Industrial and Domestic.
'Ultra-Violet-Glass' Water Sterilisation Materials. (International Technology Transfer)

*Geo AA-CAES TES – Geological Advanced Adiabatic Compressed Air Energy Storage with Thermal Exchange Systems and Storage (see RWE CAES TES Brochure)

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For cost, carbon and energy return comparison of Fission, H_2O Fusion, Wind and Coal fleet, please double-click on the technical paper file (top left of page 8).

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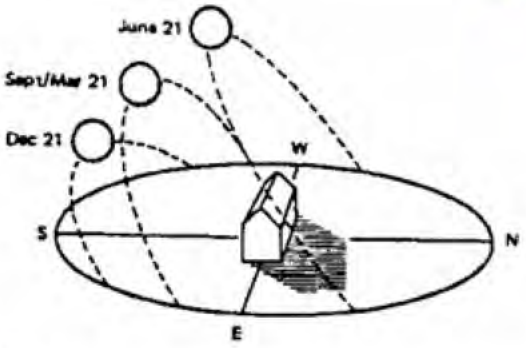
Heritage Planning – Penfold Review



At this juncture of planning review, we may find a useful restructuring of Heritage opt-ins for energy up-grades, in keeping with the function and design of quality preservation architecture.

More specifically aimed at Grade 2 and Heritage Area residential properties. A 'Points Based' system, as recommended in the Penfold Review, would allow Heritage 'owners' to asses application potential and Heritage Management Organisations to structure 'energy' refurbishments.
e.g. A Points System:-
Architectural Interest 0-10, Public Interest 0-10, Future Proofing Up-Grade 0-5,
Integrity De-Factoring 0-5, Extended Life-Span (A-J) / +Civil Visibility (1-10) A/1 to J/10, etc.

BIS report on Solar Hot Water Systems in Four UK Towns (2001)

Test cased Solar Hot Water capture results for Troon 1998 - „99

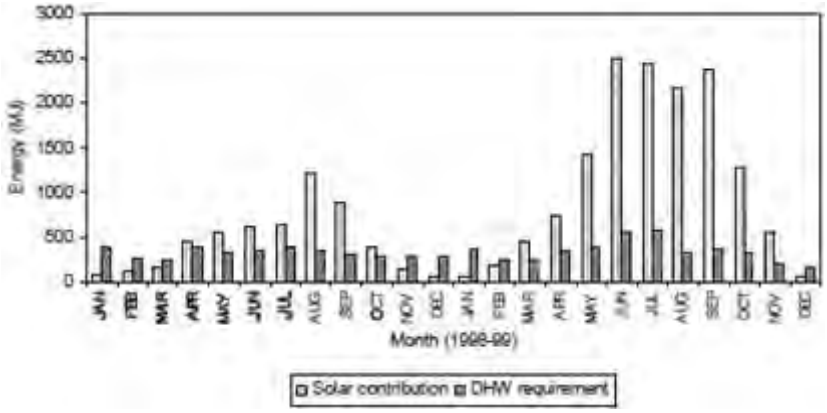


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Figure 5.8 Output from SHW collectors and domestic hot water requirement

The total output from the collectors is readily obtained by totalling the monthly outputs shown on Figure 5.8. However, to determine the net benefit from the solar system it is necessary to determine **what proportion of the collector output is actually 'useful'**. The excess energy is lost from the system - the hot water is stored and eventually cools due to tank losses.

To This File

Totalling the resulting useful solar contribution allows the overall energy delivered by the system to be found. Comparing this with the total domestic hot water energy requirement then allows the solar fraction to be determined. Figure 5.9 shows the '**useful**' solar fraction on a month by month basis.

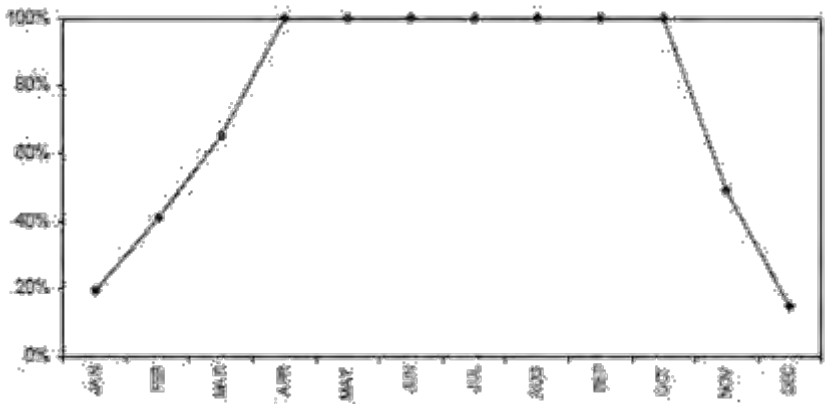

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Figure 5.9: Solar fraction

From Personal Experience of a Solar Hot Water System

"A South facing SHW preheat system consisting of four 1m^2 „pipe-fin' panels with twin, series linked, single coil 60litre storage tanks, raised water temperatures to 30°C+, as a minimum constant, during average to low (cloudy) Winter minima.
(This is from personal experience of a 7 year old South oriented system in Sheffield, 20 years ago. So successful was this system that 1 pair of panels alone were adequate to supply over 80% of Summer hot water demand for a family of 5 adults). "

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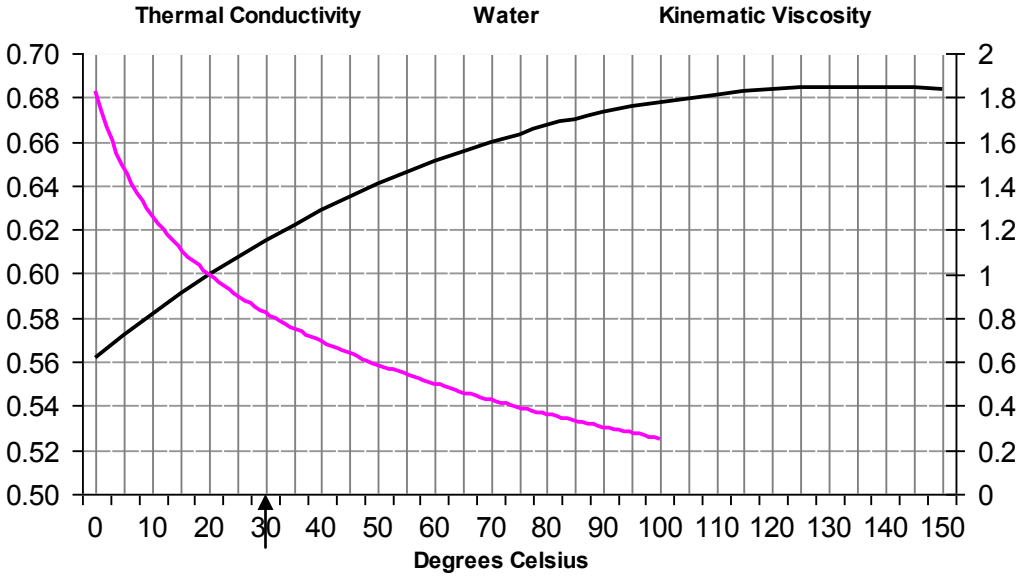

a) W/m² °C b) ν={m²/s} x 10⁻⁶ °C

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The chart above depicts the increasing efficiency of Water Heating, as the temperature of water rises.

a) Thermal Conductivity denotes the capacity of Water to propagate thermal energy (to itself) as a positive coefficient of +°C; and b) Kinematic Viscosity denotes the state of molecular agitation and the additional embodied °C energy requirement reducing as water temperature rises.

Experimental and CFD investigation of an ICS SWH at various inclinations
D. Henderson et al. / Renewable and Sustainable Energy Reviews 11 (2007) 1087–1116, WILEY

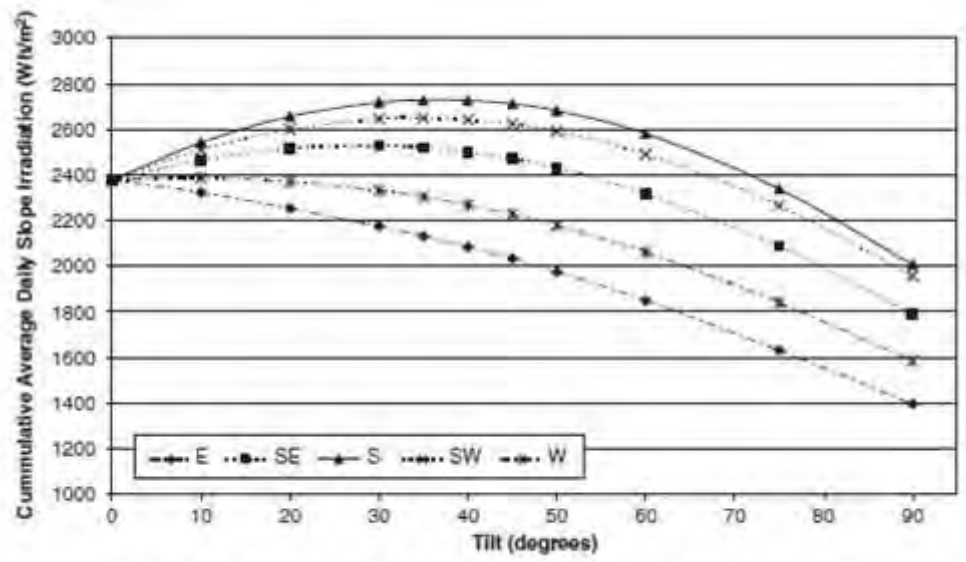

Fig. 12. The graph shows the slope irradiance with the tilt angle for Edinburgh. The plot was generated using 27-year data.

Return

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The chart above describes the Solar Hot Water Wh/m² daily capture from a 27year data set annual average in Edinburgh.

This chart denotes a fixed mount 40° inclined Solar Hot Water array and the **>32% East facing loss** compared to the same inclination facing South at Capture Peak.

(see next page)
(for scientific grade PV orientation efficiency table)

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Appendix IV

Scientific Grade: Photo-Voltaic Orientation Efficiency

(individual manufacturer -cos Beam incidence (<↕>°) PV efficiencies are deductible from figures below)

Angle of Inclination **Orientation**

Angle Above Horizontal %	-90° East	-45° South-E	0° South	45° South-W	90° West
90°	58	72	77	71	57
80°	62	79	85	78	61
60°	71	89	96	88	70
40°	77	94	100	93	76
20°	81	91	95	91	80
10°	82	88	90	87	82
0°	82	82	82	82	82

Return

Return

Produced from 22yr averaged scientific grade NASA Meteorological and Solar Data for Latitude 53.3 Longitude -1 West (UK).

This table represents the efficiency of a 1kW PV array at various inclined orientations to the Suns Arch (Azimuth) (40°/⊕South = 1,363 kWh/yr = 100%), including; meteorology; atmospheric absorption; beam and diffuse light and horizon brightening; Stella nearness; and neutral (5°C) operating temperature, in its calculation.

HOWEVER, the industrial grade software package used does NOT standardise for the varying manufacture efficiency of dwindling absorption at increased incidence to direct (beam) sunlight. Dwindling output from incidence -cos/kWh is not included in standard test data for PV, and therefore, due to wide variety, not incorporated. (see Figure 1)

77% efficient PV at Lat 53.3 **reduces the 30yr unit-for-unit life-time energy return from 8.2 to 6.3.** And reduces the surplus by 26.4% (more than 1/4) from 7.2 to 5.3.

As can be seen from Figure 1, the incidence efficiency of Photo-Voltaic capture reduces significantly at a 50° angle to direct sunlight. Such additional kWh reductions would undoubtedly lower PV reciprocal finance and materials embodiment ratios by a further large margin for obscure fixed mount angles and orientations.

By comparing the two similar-tables, and Figure 1 and Figure 12, the full PV / SHW energy availability decrease, from East-West roof-faces and facia, can be indicated.

To ensure energy dependant economic continuity, much of the current housing stock, business and industrial property stock, and ALL newly built stock, will have to be made ready for 'Base Units of Energy Autonomy', where possible.

To enable the use of weather dependant energy as electrical energy, Energy Storage infrastructure and investiture can be seen to as necessary at Grid level. Including export ready 'Load and Code Signalling' extensibles at the low-med volt DNO levels.

The two leading forms of Grid electric energy storage (& non-toxic) are Pumped Hydro, and Geo Compressed Air Energy Storage with Thermal Exchange Storage.

Please refer to the links for Electric Drive-Train Rare Earth ingredient global reserves. And MDI air engines, which are manufactured with current materials, tech and toolage.

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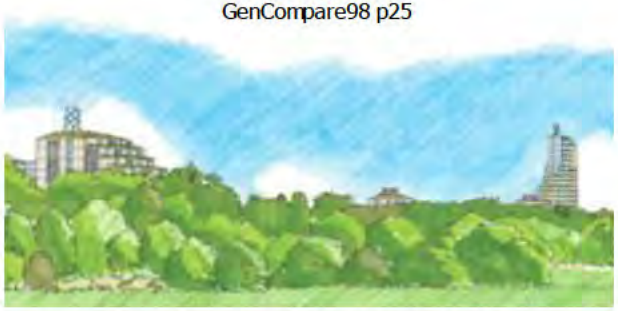
Net Energy Return
GenCompare98 p25

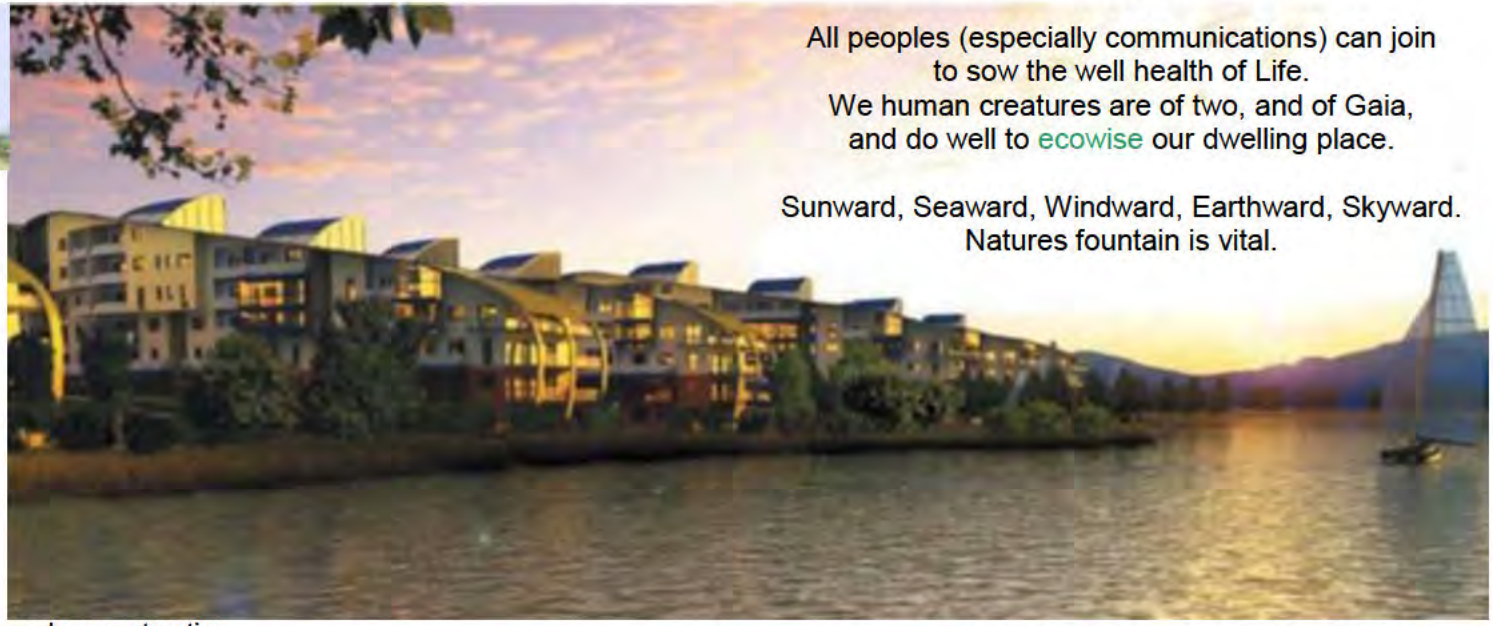


Remoulding Our Connection – ¦ – Standing With The World

Architectural elements of every day life are in the process of the inevitable move towards facing our planets bold attracter, as part of a long-term recollection of connection, residence and belonging.

Roof mount energy systems provide benefits (>[P]U235[9]) on many levels for multiple interleaved groups. Instilling visible aspects of community well being and re-linking neighbourhoods to the gifts of nature, gives return in health retention, aptitude to education, social demeanour and a more vivid sense of affinity with global life. Unison whilst the allusive nature of the earth we watch from turns towards the Sun to cast elemental light on our air filled cover.

Our fortune is to gain sanity from
the infusing velum of our natural surroundings,
during sleep and waking life.



All peoples (especially communications) can join
to sow the well health of Life.
We human creatures are of two, and of Gaia,
and do well to ecowise our dwelling place.

Sunward, Seaward, Windward, Earthward, Skyward.
Natures fountain is vital.

All developments. These are either built -or- under construction

Redesigning World View Socio Architecture – Rationale and Emphasis

The evidence and result in the UK from the changing financial priorities of an economically pressured population, the fiscal pressure towards economically productive age ranges and the increasing numbers of urban centre and sub-urban dwellers, has lowered the average birth rate per couple to 1.8 children. With variations between individual cultures and omni-culture.

To maintain „continuous economic growth', successive governments have coupled a broadened UK workforce, to fill employment gaps, with co-tenant „wages' created under „growth conditions'.

The rationale for an expanding or growth economy would therefore appear to be based on an expanding or growth in population and co-dwelling.

Although an island economy may have a level of indigenous food supply and internally manufactured living necessities, and have the current financial ability to import much of the demand gap food stuffs etc. needed for an islanded population. Continuing such an economic model would appear unpropitious in the long-term.

If an islanded population finds that the reliance for imported food stuffs and externally manufactured living necessities is increasingly supplied by financial ability in majority proportion. Then the demands of required populate finance and outside (international) fiscal economic connections, of the near and long-term future, must either have interim securitisation or long-term mitigation. As long-term securitisation appears capped by population growth, pro-rota of the widening import demand gap of that islanded nation.

The financial exchange „platform' in use; Fractional Reserve Banking; given „first riser' by materials transformation profits and given second riser „scaffold' by mercantile trade gains, are currently in a state of international transition and rebalance, and at the cusp of fiscal plateau.

That transitional fiscal cusp's fulcrum has a diplomatically extended margin, hinged on various upcoming fuel / geo-resource peaks, the progressive variegation of energy technology and global population ramp limiters. And delivers an overall international materials and financial exchange plateau, due to capacities for trade and import waste. That plateau horizon has been recognised, and the inefficiencies of developed and over developed nation states are beginning the process of industrial re-necessitation and international tax rationalisation, to credit nation state perpetuities.

Before transformation into merchandise and exchange, part of that transitional process is linked to International Banking Reserve re-ordination to bases of trade volume. Currently tethered to finite resource wastage, a narrowing technology gap and renewable / reciprocal synchronicity.

At this juncture of human history, due to economic growth systems in use globally to supply rising standards of living and a rising excess for those few that are overtly financially advantaged at the tip of current monetised pyramids, the resource adequacy of our islanded bio-planet is in question.

Supplying an irreducible affect on the financial lead of islanded / nation states that have historically relied on materials transformation export and elevated technological and agrarian advantage for adequate exchange to finance „import gap correcting' food stuffs and externally created living necessities. Twin elements of new and primary resource demand and a narrowing technology gap are splicing step change into financial, resource and strategic planning systems.

As transport dependant flexible skills economies continue with „populate centre densification', due to transport energy transition. The pressures on work and living habitation land footings should now be seen as in need of mitigation. 1. to decrease the inter-decadal constructed environment redevelopment quotient; 2. to expand the quality of inter-leaved and social benefits provided by improved architectural design and up-grades of underlying civil planning conventions; and 3. to depressurise the life / work experience, and give adequate populate „breathing space' to enable the rebalancing of procreation ratios and engender proficiency in UK town economies.
i.e. to near cap urban land price inflation and revitalise social habitation factors.
Without which an adherence to over-dense capital hive driven economies will continue to lapse.

These benefits are an intrinsic value to long-term governance and give exponential bolster toward social and socio-metric economies for the emollient provender's of societal quality and manna.

The current positioning of UK financial cycle is set to give a duration of opportunity for „design and construct' land-supply-chain linkage-revision. And a re-acclamation for modelling towards gradated sky-lining, naturalised galleries and the noble purpose of well world architecture.

Inflationary Land Price Capping – Massing Limits and Gradation Return

The following is an outline for a proposed Planning Guidance / Statement, edited from a response sent to the Transforming Places – Changing Lives DCLG consultation. And may need re-equating between regions, sub-regions and boroughs. It can also be expressed as a gradation „curve. And has the purpose of enabling energy reciprocity and social dwelling in ameliorated townscapes, during the next stages of urban strategy rationalisation.

Town, Borough & District Massing Potential – Residential, Mixed and Interspersed Business

Where clustered development potential for block or high-rise massing remains unprejudiced or foreshadowed by adjacent high-rise development of 5 storeys+, and from now on;
a gradated massing limit of 65% foot block potential (fbp) per 20m^2 footing and a limit of 7 storeys; and on developments of 3 storeys+ a gradated massing limit of 75% fbp per 20m^2 footing will be reserved by planning authorities for city centre and town centre districts. On footing 30m^2, or less, a limit of 4 storeys for block massing, with a preference for gradated development, will be reserved. For non city centre, equivalent districts and infill developments, a limit of 3 storeys and a gradated massing limit of 75% of fbp per 15m^2 footing. And a limit of 4 storeys and a gradated massing limit of 75% of fbp per 15m^2 footing, for new large-parcel sub-urban and localised developments, will be reserved by planning authorities. Geography and civil building allowances made per application.

Southerly maximised orientation, for vertical facia and gradated / inclined energy capture faces, is also a binding requirement.

- Vertical Capture „Fascia' (above passive grade) oriented no more than 160°SSE/210°SSW
- Inclined Capture Enablement (new roof-faces) oriented no greater than 145°SE/225°SW

Reasoning

The principle of this planning guidance / statement is to resource future development potential with the ability to build within appropriate human ergonomic, ecologic and amenity balances without unacceptable increase to land and national provision cost. Both for future developers (/ retail mortgagee) margins and Local Authority strategic planning departments.

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Explanation – Economic, Socio-Environmental and Vista Trajectories (see title paragraph)

To provide a socio-economic transition for our towns and city boroughs to a low-energy import perpetuity we must consider the contraction of urban sprawl to service and manufacturing centres with deep embedding of socio-economic and socio-environmental heed.
Manufacturing, industrial and services centres are the economic ply of every developed nation. The ability to house a low transit-energy society in buildings of a reciprocal nature, both energy-wise and socio-elementally, is seen to rely on future development affordability and therefore land price stability, for some time to come. Additionally, an incremental „mopping-up' of previously ill devised living standards is projected to better UK life-work bearing and assist margins of trade balance. To this end, introducing linkage between land price stability, distributed energy creation and emotive and populate momentum, measures are considered necessary.

Key Note: Governance Over-Sight
(In recent decades, at the cost of economic-populate balances, private and public funds have created incremental financial return from intensified services and dwelling habitation m^2 floor area per footing and land price inflation without ceiling. Both are now mandate to rebalance in tandem)
(This also gives rise to the guidance needed for pre-prejudiced city centre parcels and density re-evaluation of district centre hubs and surrounding dwelling houses)

Leucippus - Democritus -¦- Aristarchus - Sosigenes

To this day, the scientific Julian (Caesar) Calendar (Sosigenes) notates interstellar co-ordinates.

Long-term observatories have long recognised the influence of planetary alignments on seismic / tectonic activity, inter-decadal weather events and effects on arable harvests, across continents. From writings, records and libraries found around the world and correlated over more than 4000 years.

Sun Spot records from 1600's to the present day (tpd); global temperature records from 1750 tpd; Geo-Magnetic activity records from 1870 tpd; inner planet angular momentum and sinusoidal alignment correlations for the last 8000 years; ^{14}C and ^{10}Be geological, sedimentary and glacial records for the last 40,000 years; oceanographic and satellite data from 1980 tpd, stella coronal mass ejection parameters and lower level cloud averages from 2003 onwards;

These now point toward a mitigation of global warming for 2004 to 2045 approximately. From the planetary alignments correlated to a low sun-spot 'minima' now unfolding (NASA), coupled to the centennial shelf drop in stella geo-magnetic strength 1998 tpd. Totalling an approximate 0.3% to >4% negative forcing due to an affected average increase in lower level cloud cover.

verdanarch draws from this a speculative projection that stella forcing of Earthly meteorology will decline to a mid-minima sump, compact major weather events into tighter geographic modalities, affect weather related energy and provender calorie regeneration and human emotional elevation. And, during the minima lead-in and trough, create an unexpected elevation in tectonic activity 2008 - 32.

Post minima, and pending the rejoined level of stella geo-magnetic strength, coronal mass ejection plasma densities and a normalised Sun Spot cycle. Anthropogenic climate change may return world and inter-regional meteorology to pre 2006 levels of Ocean Engine. Which in turn depend on Axiomatic mitigation by diplomatic faculty and human activity over the interleaving decades.

The interleaving decades might also receive evidence of global temperature stabilisation that ignores the above, and should be highlighted as scientifically incomplete.

ofgem

Smart Metering Implementation Program:
Statement of Design Requirements

27 July 2010

Consultation Response

This response has been summarised to the related bullet points in the ofgem:
Smart Metering Implementation Program (July 2010) consultation document for ease of access.

Any queries about these responses should be viewed in light of that consultation document.
The opinion represented here is solely that of verdanarch and should not be used, excepting in connection with the titled consultation document, without prior consent.

Question 9: Are there any particular technical issues (e.g. associated with the HAN) that could add delay to the timescales?

Twin (or Combined) Domestic Island-Side (Switch-able) Import and Export Bus

Landlords, Housing Associations, ALMO's and Local Authority property owners will have a domestic metering requirement to export distributed generation from roof-top fixed capture technologies and other micro generation; whilst the import capability of single and multiple occupant property meters are remotely disconnected.

That functionality requirement also gives rise to the need for export disconnect provenance, protocol and interoperability considerations.

The Provenance of „export disconnect' is mainly a lines work safety and CUSC licensee response requirement.

The Protocol and Interoperability functionality is a technical issue that will require a cost analysis and time line.

This functionality requirement also avoids anti-quid-pro-quo or "catch 22" situations, where the metered property occupant/owners would otherwise be unable to „earn' import connection tariff price from export sales.

Funding of Cost and Tine-Line Analysis
The Functionality Requirement Analysis for this feature is eligible for funding under the Low Carbon Networks Fund: Projects and Partnerships.

Currently, distributed generation from domestic Photo-Voltaics, and other micro generation have two main limiting factors.

1.

District Network (DN) 11,000V↔415V 600-800kVA Transformer Capacity

Although not an immediate barrier, as Domestic PV uptake is at the foot of its sales ramp, the Export to Import over parity of Low-Med Volt District Network Transformers are a future analysis and investiture.

That 415V Export windings of most DN Ring-Main Transformers are ¼ the size of 11kV Import windings peak capacity. Upgrades might eventually become a Distributed Energy Market „exchange marker' between Distributed Energy Generators / Aggregating Agents / Operators and DN Operators / Electricity Suppliers / Grid UK.

Where Grid region suppliers are not the only in house „exchange floors' contracting with end user generators, the DN upgrade markets will be further diversified.

As current Domestic PV uptake is being applied in single property and block parcels, from Southerly roof face capture apertures, the orientation of current housing stock is important. Strategic Analysis of stock orientations, including Azimuth to aperture geography, is one way DNO/Suppliers, Ofgem and National Grid Plc can derive DN upgrade potentialities. As DN and 11kV Earthing / Neutral cable capacity is currently not rated for „Whole Hillside PV Reveal' Volt / Amp Dumping, to provide Tri-Phase DN to geo-electrostatic parity balancing.

Example
1,000 – 1,500W (@ 230V) = **4.3** – 6.5A Domestic Island Export x
(100 – **600** PV Homes ÷ 60% aggregation of 3 Phase Sinusoidal Power is)
60 – **360** Phase aggregated PV Homes (of 600 homes non-aggregated)
per 600-800VA 11kV Ring-Main transformer =
258-390VA – **1,550**-2340VA **REAL POWER** „DN PV Reveal' Export Potential
per 600-800VA 11kV Ring-Main node (>2x current capacity)

The present (2010) domestic uptake and penetration potential of fixed roof-top PV capture in the UK is largely dependant on current housing stock type, tenure and orientation, and the UK „Feed-in-Tariff'. This potential is the bench mark by which DN Operators (DNO) will draw the time-line for Ring Main up-grades i.e. over capacity / upgrade dates; and calculate how to grade levels of over-capacity though out
11kV node investiture-cycles.

After a certain stage of domestic PV penetration further distributed PV generation will rely on housing stock replacement by redevelopment / infill and new built properties. That future generation will be assessed as a coefficient against property stock replacement rates and upgrade capacity end-of-life 11kV market cycles, and in rare cases in situ MAX potential. As „Whole Hillside PV Reveal' over capacity and MAX will occur on localised time-lines. The current price of **2000**VA 11kV upgrade is tendered by DNO / Suppliers.

„Follow Phase' Metronomic Code could save distributed generation dissonant phase „blur' harmonics generated from non-Smart inverters and appliances.

2.
Ring Main, Primary and Grid Level Storage and Regeneration Capacity

„Whole Hillside' PV balancing across sub Grid supply networks will require centralised regional Grid level, sub Grid supply and Earthing „balance control' for aggregated PV and Industrially Diversified renewable export etc.

The diversification of energy supply, capture and storage; including Diversified Industrial „Base Units of Energy Autonomy', will create new nodes of daytime and weather related electricity generation and storage capacity. From vehicle charging and re-energising stations, industrial compressed air energy storage, distributed domestic island storage, energy from organic / agricultural AD fleet heat and power reserves, Tidal energy Grid region over parity, industrial park and on-shore wind flight export, to „card crediting' energy fitness centres. Black Start Variable Load Reserve Balancing Storage Fleet and distributed energy storage aggregation are up-coming considerations for Grid control.

CCS has a 40 – 70 year suitable geology resource within Europe and the Mediterranean Basin for „once through' infrastructure investiture.
And an un-mapped „once through' potential globally.

Present „demand follow' Mega Steam generation fleet are either „Spinning Reserve' fuel and import balance of trade inefficient and/or demand peak Ramp inefficient. And, to supply inter-Grid boundary and poly-localised balancing services for „Whole Hillside PV Reveal' and other distributed renewables, those technologies represent over-priced capital market investiture as whole Grid load parity fleet.

The only sub-Grid Supply Point and inter-Regional Grid „fleet scale' Black Start and Demand Follow technologies capable of control services within and beyond 2010 market fuel cost and Carbon limits, are Pumped Hydro and near market launch
CAES TES systems.

Both of these technologies are at above market efficiencies for Grid Region level deployment (and potential for sub-Grid deployment). And are the only reciprocal refurbish-able infrastructure investitures to provide decarbonisation and energy multipliers as bicentennial or „Hold Water' strategic adjustments.

Further, these technologies are currently the only Grid Level Fleet that provide
Off-Shore Wind Flights maximised decarbonisation and energy multiplier potential.

Wind Fleet with Energy Storage Fleet – Pumped Hydro and CAES TES

On/Off-Shore Wind Flight Name Plate Export efficiencies of 30-**60%**. Compared to 99% Wind Flight Name Plate Export, minus Storage / Regeneration Auto-Arbitrated Load and transmission losses.

Pumped Hydro		Efficiency
Coastal Lagoon and suitable post extraction systems	-	80-85%
CAES TES in suitable post extraction systems and industrial park / medium scale sub-Grid plant fleet	-	**65**-75%

Wind Flight Gain		Trans / Dist Loss		Regeneration Loss
40-70%	-	(5%	+	35%)

= 24% Wind Flight Name Plate 'Energy Return' Gain;
for the price of Carbon Neutral Grid „Parity Follow' near perpetual electricity infrastructure.

= The combined Wind Flight / Storage „Energy Return and Gross Multiplier' efficiency is roughly **79.5 –** 92**%**.
Minus refurbishments.

Ignoring pre-existing infrastructures, the „cradle-to-cradle' and fuel energy return ratio of coal fired generation fleet is 11 times energy inputs, and fission 16. Those technologies also present large fuel energy to Carbon electric inefficiencies (coal) and fuel market price-riser inefficiencies (fission).

The net „cradle-to-cradle' Energy Return Multiplier of on-shore and off-shore wind flight are upward of 50 times energy input in absolute terms.

Extra to the energy multiplier „efficiency gain' of wind flight „Full Name Plate' export in co-action with „Parity Follow' storage and regeneration fleet, are large long-term capital investiture and end consumer savings (GDP) (from the number of Carbon+ and maleficent toxic fission mega steam generation fleet market cycles being reduced), distributed and Industrially Diversified full renewable aggregation utility, and large efficiencies in all „Load Reserve' markets from „Parity Follow' variable load and supply fleet.

In conjunction with Wind and other renewables, CAES TES and Pumped Hydro electric energy storage and regeneration fleet have extra-long-term energy return ratios as renewable efficiency multipliers in near perpetuity (energy return ratios currently unknown). And replace old fleet technologies with cheaper Carbon Neutral market-cycle investiture and fleet revenue life-cycle elongation.

Set against those revenue cycles and savings, Smart Control „Parity Follow' upgrades of DN, Primary Relay, Grid & Supply Point and new Grid connection infrastructure can be reconciled within market adjustments to supply; property owner / house holder „Base Units of Energy Autonomy', decarbonisation of local and surface transport, efficiency of Industrial and Agricultural renewables aggregation utility and minimal toxicity Carbon Neutral electric transition.

Transport

I would also like to highlight some issues surrounding Public Transport Traction and Future Market Share of technologies currently vaunted and near market launch for the Hydro-Carbon to Electric Drive Train transition.

Industry Research on Global unit capacity, from proven Global resources of Rare Earth Elements involved in the production and manufacture of Nickel Hydride and Lithium Ion electric storage media and associated assemblages, show a total (2010) Global family car replacement capacity of roughly 2/3rds. That does not include other surface transport such as rail boggy assemblages, road freight or Public transport fleet or an expansion in demand for individualised auto-motive transport globally.

The third technology presented as a Hydro-Carbon energy substitute and transition is the Hydrogen Fuel-Cell Electric Drive Train family sized car. With a fuel to drive wheel efficiency similar to diesel, 20-25%. Using Hydrogen as a renewable fuel through Fuel-Cell technology, at current stages of development, is in its self highly inefficient at 35-42%.

One technology, MDI compressed air engines in partnership with TATA Motors, presents fewer re-energising and toolage issues and has a high plug to wheel (non-thermally conditioned) efficiency 18-40%. With no limit on market share. Current drive ranges for non-thermally conditioned air engine family units are in excess of 91-165km. And drive ranges for thermally conditioned family units of 270-670km+. Compared to transitional electric storage media, which at present have no infrastructure or capability for recycling, and „traditional' drive trains, this early stages technology is advancing. Non-thermally conditioned Compressed Air drive trains already have plug to wheel energy efficiency ratings up to 40% in urban use, and 60% as a short term objective.

Compressed Air Engine technology has the capability to power heavy loads at high reciprocal braking efficiency, re-energising station near-instant recharges, zero carbon emission urban and range travel and better than electric and conventional car unit assemblage perpetuity life-cycling costs.

Trunk route/district CAES TE'S' ('System') re-energising stations have the ability not only to supply economies of scale to transport nodes. But also to enable contiguous renewables balancing services as „at scale' DN & Primary level Renewable Energy Storage Reservoir and Uptake.

In economic terms, the current fractional reserve fiscal plateau cusp gives energy efficiency market and revenue cycles rising fractions in GDP terms.

Although electric drive train storage media technologies can provide end user electricity balancing, they are limited in unit life-cycle efficiency as „at scale' aggregated reciprocal balancing servers. Where as CAES TE'S' re-energising stations for large transport fleet and cars may approach decentralised scales of contiguous local balancing service. And at the high end of industrial park scale may also double as contiguous reciprocal reserve for regeneration to the sub-Grid level. i.e. supplying Primary Supply Nodes and DN Ring Main; where the largest transmission and distribution efficiency losses are encountered.

Electric Storage Media –

slow recharge	0.1	
skills range	0.5	
high energy cost efficiency	0.8	
recharge infrastructure	0.8	car / home
	+ 0.2	street (/ station)
	+ 0.4	Grid
	2.8	
energy & infrastructure balancing reciprocity	0.8	

Compressed Air –

swift recharge	0.9	
skills range	0.5	
med energy cost efficiency	0.4	
recharge infrastructure	0.6	car / home
	+ 0.7	station (/ street)
	+ 0.6	Grid
	3.7	
energy & infrastructure balancing reciprocity	0.6	

Hydro Carbon –

swift recharge	0.9	
skills range	0.8	
low energy cost efficiency	0.1	
recharge infrastructure n.a.	1	car / home
	+ 0.7	station (/ street)
recharge infrastructure n.a.	0	Grid
	3.6	
energy & infrastructure balancing reciprocity	– 0.7	

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The hedge line balance of advantage with indigenous resource has brought recognition for transit skills flow economies that a culture of partnership between neighbouring nations and peoples, with the assistance of the international community, can provide localised exchanges within a region that that surrounding region gains elevation.

Providing (gas) electricity generation for health and education establishments; solar and renewable air compressors and industrial air drive-trains. These can provide neighbouring nations (e.g. Pakistan and Afghanistan) with a shared hearth of food production, minerals refinement utility (wanted Globally for electric generation backup fleet, electric transport transition etc.), raising standards of living and benefiting the region as a whole.

For the duration of working time International Development engineers are in post, their interest and capitol mortgage endowments to be paid by banks (to a ceiling of €372 UK 2010) and as part of a banking bonus related tax code for DfID budget revenue. And salary revenues (to a ceiling of €5k UK 2010 per individual) funded through IMF/UN contract.