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Introduction

This exploration is an approach to detecting dimensions of understandings of "energy" that may be highly relevant to reflection on the sustainability of a European society of the future -- especially if access to conventional sources of energy becomes highly problematic.

The currently advocated term of "energy footprint" is a measure of the "energy consumption in producing energy, water, food, material and urban" [more]. At issue is whether the current framing of "energy", and the strategies in relation to it, may be inhibiting reflection on forms of energy which are vital to the life of a society -- now and in the future, and notably under turbulent conditions.

The radical nature of the approach taken here is consistent with the call by the European Commission, in a Green Paper on the "new energy realities facing Europe" for radical changes in energy policy if the 25-nation bloc is to meet the challenges of climate change, security of supply and rising prices (A European Strategy for Sustainable, Competitive and Secure Energy, COM-2006, 8 March 2006) [more] [more]. This contrasts with the conventional focus of International Energy Agency (Delhi Sustainable Development Summit, February 2006), and the International Conference on Energy Security (Moscow) immediately prior to the G8 Energy Ministerial Meeting (March 2006, Moscow), and followed by the Spring Summit of the European Council (Brussels, 23-24 March 2006) focusing on energy security issues [more]. All the events had a particular emphasis on energy security that fails to take account of catastrophic failure in energy distribution and the forms of energy on which populations would then be forced to rely. The EU Summit based on the Green Paper focused on common energy policy amid national sovereignty concerns [more]

The focus here in what follows is however on psychosocial forms of energy that may substitute for more conventional forms, or reduce the demand for such conventional forms. The emphasis however is on the recognition of these alternatives as form of energy in their own right rather than as arising from changes in consumption patterns. In this sense energy is understood to be variously locked into and released by behaviour patterns.
**Definitional preamble**

"Energy" is typically derived from non-renewable material resources such as oil, gas and coal. Energy has traditionally been derived from renewable resources such as wood, water and wind, and their potentials continue to be developed. Considerable attention has been devoted to nuclear energy, whether through fission or fusion technology. The exploration of "alternative" forms of energy has highlighted the potential of sources such as biomass, wave power, solar power, and the like. But all these call for a particular focus on inherently measurable resources and the possibility of extracting energy using developments of particular forms of technology, guided by particular disciplines.

On the occasion of any reflection on the future, through a call for foresight, there is a case for asking whether this framing of "energy" and the associated technologies, does not preclude recognition of other forms of energy potentially vital to the sustainability of society.

Somewhat ironically, major social unrest on the part of students and labour unions in France occurred in parallel with the summit discussions on a sustainable EU energy policy in Brussels (March 2006). Both students and trade unionists were articulate about the need to sustain the "energy" of their protest movement. It might be said that the annual investment in defence and security, notably by EU countries, is a measure of the social "energy" that it is considered necessary to contain.

For the purposes of the following discussion, three types of energy are distinguished. Their nature and relationship is clarified in Table 1 below. The table suggests a distinction between "tangible" and "intangible" forms of energy. "Energy" is however always "intangible", although in some cases it is considered more "measurable" than in others because its relation to the effects on material objects is more measurable. Conventional understandings of energy are generalized across the categories of the table in recognition of the manner in which "energy" is:

- stored in "bonch" of many different kinds (from chemical, through interpersonal, to creative associations),
- characteristic in "kinetic" form of any dynamic, notably momentum (whether physical, social, group or personal)
- a consequence of juxtaposition of contrasts and differences of potential (whether physical, chemical, social or personal)

More generally, and especially relevant to the emerging knowledge society, it is widely argued that "energy is information" and "information is energy", notably in relation to change and the potential to change -- and especially in learning organizations. Kakali Mukhopadhyay (An Input-Output Study of the Relationship between Information Setor, Energy Use and CO2 Emission in the Indian Economy during 1973-4 to 1996-7) prefaces his study with the comment:

> "Knowledge is energy that resides in individuals, groups, practices, technologies, organizations, and nations".

This understanding is absolutely distinct from that implied by the EU ‘Intelligent Energy - Europe’ Programme as implemented since 2005 by the EU Intelligent Energy Executive Agency (IEEA) and through EFTA (Intelligent Energy for Europe: 2003-2006). (This is designed to contribute to achievement of the European Union’s energy policy targets within the fields of "renewable energy sources, energy efficiency, clean transport and alternative fuels" [more].

**Tabular presentation of forms of "energy"**

<table>
<thead>
<tr>
<th></th>
<th>Large-scale, Depersonalized (&quot;Systemic&quot;, &quot;Macro&quot;)</th>
<th>Local, Small-scale (&quot;Community&quot;, &quot;Meso&quot;)</th>
<th>Individual, Personalized (&quot;Asystemic&quot;, &quot;Micro&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>III: Intangible</strong> (embodied, symbolized but untokenized)</td>
<td>&quot;Social energy&quot;: collective engagement (and identification); democratic participation; &quot;people power&quot;</td>
<td>&quot;Group energy&quot;: participation in voluntary organization; team energy; cultural life; community projects; collective &quot;animation&quot;; group motivation and enthusiasm</td>
<td>&quot;Psychic energy&quot;: self-motivation; creativity; personal engagement and identification (ideological, team, cultural); charisma, love, spiritual devotion</td>
</tr>
<tr>
<td><strong>II: Intangible</strong> (tokenized trust)</td>
<td>Monetary systems; voting systems; information systems</td>
<td>Local Exchange Trading System (LETS); cooperatives and mutual societies; fidelity systems (air-miles, etc); certified / qualified workforce</td>
<td>Markers, &quot;brownie points&quot;, giri, credits (academic, etc), medals, awards, prizes</td>
</tr>
<tr>
<td><strong>I: Tangible</strong> (measurable)</td>
<td>&quot;Non-renewable&quot;: oil, coal, gas, nuclear, (wood)</td>
<td>&quot;Renewable&quot;: Biofuel, solar, wind, hydro, geothermal, wave; manpower (community, labour camps, slave labour), animal power</td>
<td>Individual physical effort; nourishment (food, &quot;energy drinks&quot;)</td>
</tr>
</tbody>
</table>
Table 1 is coloured into zones. The blue cell at the bottom left is the zone of most probable discourse about energy policy. The green cells around it are those of increasingly probable discourse -- when thinking "out-of-the-box" about energy. The brown cells beyond correspond to zones of improbable conventional discourse about energy -- however relevant those dimensions may prove to be in practice. The yellow cell is the zone of "inconceivable" policy discourse in relation to energy. The political challenge is that each of the cells corresponds to the priorities of a particular constituency. Those centered therein tend to consider the priorities of neighboring cells to be progressively more irrelevant to their own "energy" concerns -- and will adjust their commitments accordingly.

**Group I: Tangible (measurable) energy.** These varieties of energy are those most clearly recognized in understandings of what ensures the viability of an economy and of what undergirds the monetary system.

- **Group I (a) Conventional energy:** Typically the focus of political debate on "energy"
- **Group I (b) Alternative energy:** Typically the focus of potential new sources of "alternative" energy -- which do not extend to "energy" in its Group II or Group III forms. Many "community energy" initiatives have this focus (cf Smart Communities Network -- Creating Energy Smart Communities; California Energy Commission, *Models for Community Energy Planning*).

The role of collective manpower, as "human resources", has been a prime source of energy in major construction projects from Chinese dams and roads to the pyramids; it remains a prime source of energy in agriculture, construction and industry. This may include both the energy supplied by slavery and forced labour (associated with labour camps) as well as that by voluntary labour forces, as in pioneer groups (eg the young pioneers in Soviet Russia, other communist countries, and Israel). Many community projects depend on this form of energy, with or without the use traditional use of animal power.

- **Group I (c) Individual ("Personal") energy:** This is the energy of individual "manpower" on which most people are primarily dependent in their daily lives, most obviously in the case of peasant farmers in developing countries -- echoed by the place of gardening and DIY in modern societies. Efforts are made to recognize such individual productivity in corporate settings of industrialized societies through "worker of the year" awards (Stakhanovites in Soviet Russia). It is indeed the case that conventional energy systems (Group Ia) are dependent to a high degree on this form of energy -- in terms of labour/manpower -- for their construction and maintenance. The vital role of such personal physical energy in major road and dam construction was made strikingly evident in various communist countries (eg China, Soviet Union, Cuba). It has been evident in all pioneer settings, including the Americas. The use of bicycles for personal transportation is evident in many countries. The role of pedal power was notably recognized in the 2006 "Green Oscar" (Ashden Award for Sustainable Energy) to an Indian firm for developing foot-operated treadle pumps that use human power to pump water out of the ground. Half a million such pumps have been sold, allowing farmers to circumvent dependence on monsoons by being able to pump water throughout the year (Sanjay Suri, *We Are Renewable Energy, Too, Other News: Information that Markets Eliminate*, 16 June 2006).

The history of the debate, as to whether homeworkers (typically women) and carers were "gainfully employed", is an illustration of the challenge of recognizing the role of such energy in psychosocial systems focused on economic measures. The lack of such energy -- measured in calories -- is a prime symptom of ill-health. It is largely derived from nourishment through the necessary dietary attributes of food (proteins, carbohydrates, vitamins, etc) -- exemplified by "energy drinks" and "energy foods". It could be argued that current widespread concern regarding obesity, notably in children, could be seen in terms of energy mismanagement -- whether from as excessive caloric input or lack of physical exercise. So-called "substance abuse" might also be related to energy abuse.

**Group II: Intangible (tokenized trust) energy.** Especially significant in this case is any disparity in the relationship between any tokens and the value or "energy" they represent. The face value of tokens in any system may become "inflated" such that the tokens effectively lose value. Tokens may however be recognized as corresponding only very inadequately to the "energy" they represent -- which may then be considered as "undervalued".


The energy associated with social commitment is notably given very precise token form through democratic voting systems that establish confidence in a pattern of governance. Information is energy, that is, a quantity or pure number, measured in arbitrary units, as statistical theory demonstrates. Expressed in morphogenetic terms, it is the amount of energy transmitted and received to assure the species’ survival and multiplication.

Otherwise to be associated with Group IIIa, as distributed, information is increasingly acquiring a form that lends itself to tokenization (cf Hazel Henderson, *Information: the world's new currency isn't scarce*. *World Business Academy Perspectives*, 8,
• **Group II (b):** LETS are local, non-profit exchange networks in which all kinds of goods and services can be traded without the need for money. Individuals can opt in or out as they choose. A LETS network uses an interest-free local credit or currency so direct swaps do not need to be made. A LETS member may earn local credit by doing childcare or computer work for one person, and spend it later on food, hiring equipment, plumbing, or carpentry with another person on the same network. A LETS is sometimes also referred to as a mutual credit system. It can be understood as building up, and sustaining, mutual confidence in a community. It offers an complementary form of tokenization of trust. Increasingly transient, temporary and mobile lifestyles have greatly damaged any sense of belonging to a meaningful community. Because a LETS system builds local relationships, it is a powerful means of regenerating a sense of trust among members, a necessary component to the health of any community. As communities become more self-aware and self-reliant as the result of a LETS system, community isolation, fear and loneliness diminishes and everyone benefits.

Aside from such particular initiatives, other modes of tokenized non-monetary exchange exist, notably in the form of "air-miles" and similar arrangements designed to reinforce "fidelity". Institutions (especially academia) may use tokenized forms of evaluation of the quality and quantity of their respective energy contributions to society in terms of the number of patents or PPPs (published peer-reviewed papers).

• **Group II (c) Personal obligation:** The "energy" stored in these obligations is recognized through a variety of expressions of debt and "owing" to an individual. Brownie points are a hypothetical currency, which can be accrued by doing good deeds or earning favour in the eyes of another, often a superior. "Pulling in markers" is a mode through which obligations of this kind are transacted. This may take an even less tangible form in situations where a person feels free to request the help of anyone whom they have helped in the past, with some expectation that it may be reciprocated. The Japanese concept of girī is a fundamental, moral, long-term, "honorable" obligation -- encompassing chivalry, loyalty, courage and "doing what is right" -- a debt of gratitude implying a commitment to the self-sacrificing pursuit of the well-being of another, notably a superior. Girī is initiated by a special favour which is borne by the beneficiary until he has satisfied it by a definite but unspecified act of gratitude. A variant is associated with the significance of "respect" -- its acquisition and its loss -- in certain cultures, whether gang cultures or elite cultures.

In industrialized societies a range of symbolic tokens are used to acknowledged such obligations, including a wide variety of awards and prizes. They also serve to acknowledge the debt of a society to those persons, exemplified by the designation of a person as a (living) "national treasure" -- a shared cultural asset. The Right Livelihood Award exemplifies recognition of the personal energy of an individual over an extended period in energizing a local community. Medals may be awarded for a variety of widely appreciated achievements in sport and war -- a token recognition of the individual energy associated with heroism in any form. Value and expertise may be recognized through "qualifications", possibly achieved through the accumulation of "credits". In the academic context, the number of PPPs (published peer-reviewed papers) may be used as a measure of worth to society. In a religious context a focus may be on the accumulation of merit through ritual and other acts, notably on the occasion of pilgrimages.

**Group III:** Intangible (embodied, symbolized but untokenized) energy. In this case energy is in some way embodied in the bonds and dynamics between people. This may be inferred by observers but is an experiential reality for those involved. By analogy with molecular bonds, how much such "energy" is stored in the social bonds between people -- or in the memetic bonds of the "intelligent associations" characterizing any culture? Its existence may be symbolized by works of art or cultural processes, but it cannot be associated with exchangeable tokens.

• **Group III (a) Social energy:** As a general category, the energy of the associated phenomena is poorly recognized although typically it is extremely well recognized through particular cases. This is best seen in the ways in which individuals and groups engage in larger society (cf Alexis de Tocqueville, *Democracy in America*, 1835-1840). Societies may be appreciated for being "on the move". References may be made to the "spirit" or "energy" of a society -- whether in a positive or a negative sense. A society as a whole may notably be described as "vibrant" (cf Sara E. Meléndez, *Towards a More Vibrant Society: strengthening the role of nonprofits*, 2000; Craig Emerson, *Vital Signs, Vibrant Society: securing Australia's Economic and Social Wellbeing*, UNSW Press, 2006 ). Such social energy is recognized by historians in describing the excitement of the "golden age" of various societies and cultures. Efforts to symbolize and catalyze such energy are evident in national flags and anthems -- with equivalent flags for the European Union and for the United Nations, and with Beethoven's *Ode to Joy* formally accepted as a European anthem. The seriousness with which "flag burning" is viewed is an indication of the "energy" associated with such symbols.

There is an extensive literature on "social capital" that endeavour to define and extract useful ideas from the concept [more | more | more | more]. A summary by the Middlesex Institute of Social Science Research (*The Contribution of Social Capital in the Social Economy to Local Economic Development in Western Europe*, 2003) notes:

…Hirschman [Albert O., *Against Parsimony: three easy ways of complicating some categories of economic discourse.* *American Economic Review*; 74, 1984, 2], uses the term "social energy" and suggests that it is made up of three components - "friendship" emphasising the personal impact of social capital; "ideals" which may lead to a shared vision based on values; and "ideas" which enables groups and individuals to present new solutions to their problems. Clearly, different approaches to social capital lead to varying hypotheses. But there is general consensus that it is 'something' that
exists between individuals and organisations. This "something" emerges from connections (relationships) and is further developed through growing trust, through mutual understanding and through reciprocal actions based on shared norms and values. Most people can recognize social capital as being those connections and trusting contacts that people make while going about their daily business. These contacts may lead to mutual and reciprocal actions which further the development of a community. Similar to other forms of capital, it is productive and exists as a "stock" or "fund" or "resource" that can be used - but in some communities it may not exist to any great extent. However, it differs from other forms of capital in that the more social capital is used, the more social capital is generated. The more organisations or individual trust and develop relationships between themselves and others - the more those relationships, and thus social capital, is strengthened.

Such terms may of course be appropriated to promote economic investment and development (dependent on Group Ia energy), but popular engagement in social and community life is also (measurably) evident in participation in sports, political life, and other forms of collective activity. This is also true of the reverse, namely the apathy and disengagement that is notably characteristic of European citizens’ attitudes towards Europe. The collective “psychic energy” is however obvious in more problematic mass phenomena, such as concerts (eg pop concerts, LiveAid, etc) and mass demonstrations (eg pro-peace, anti-cartoons, etc).

Energy of this category may also be associated with the term "social energy" used in a cultural sense (cf Stephen Jay Greenblatt, Shakespearean Negotiations: the circulation of social energy in Renaissance England, The New Historicism: Studies in Cultural Poetics, No 84, 1989) [more]. A contemporary challenge relating to social energy has been described by Jane A. Sansom (Appropriating Social Energy: the generation, accumulation, and conversion of capital in the performance of the Anastenaria, Journal of Modern Greek Studies, 19, 1, May 2001). It has also been used in a more behavioural sense (Alejandro Betancur, Energy Made Visible: Behavioral Effects of Social Energy, 2005; Caitlin Teresa Christie, Social Energy in Imagined Relationships, 2004)

Imangali Tasmagambetov, in an official press release of the Kazakhstan acknowledges that "The implosion of the Soviet Union released an enormous amount of social energy, some with a destructive charge and some with a creative charge" [more]. Garry Jacobs, et al (Comprehensive Theory of Social Development, 1997) argue that:

Democracy raises human aspirations. It encourages individuals to take active initiative for their own advancement. It facilitates freer and wider social interactions. It releases greater social energy.... Development theory needs to explain the dynamics of the process by which political and social conditions impact economic performance.

It might be assumed that any implementation involving a "social audit" would identify some form of "social energy" -- the energy associated with the "community bonds" (by analogy to molecular bonds with which several sources of conventional energy are associated). This tends not to be the case. As noted by Ivan Illich (Vernacular Values, 1980): "social energy accounts are only approximate and at best allow us to identify the orders of magnitude within which the relative values are found". A social audit process is more concerned with negative impacts (notably of corporate initiatives) on measurable social conditions. It is a way of measuring, understanding, reporting and ultimately improving an organization’s social and ethical performance. The key difference between a development and a social audit is that a social audit focuses on the neglected issue of social impacts, while a development audit has a broader focus including environment and economic issues, such as the efficiency of a project or programme.

A review of the conclusions of a 1997 conference of the leaders of the 30 largest nonprofit organizations in the United States (Bert Nanus and Stephen M. Dobbs, Leaders Who Make a Difference: essential strategies for meeting the nonprofit challenge, 1999) concludes:

'Social energy' must be generated by non-profits for them to be successful. Energy powers non-profits. Non-profit organizations have mandates and must meet a need for particular change in the social order that is either currently widely supported or capable of being supported if the issues addressed by the organization were more broadly known by the public. Leadership effectiveness is defined by the authors as the production of a greater social good through increasing organizational capital, harnessing social energy and producing real work/real value/real change.

Concern about "social energy" may also be reflected in debates about the "soullessness" of a society, notably in Europe (cf Challenge of "soullessness" -- beyond the "pillar-ization of Europe", 2004) on the occasion of referenda about the European Constitution (cf Joschka Fischer, Pan Fortuny, Michel Rocard, John Lonergan). It has been argued that it was the "dark energy of the soul" that gave rise to the horrific crimes against humanity in the 20th century.

- **Group III (b) Group energy** : May apply to geographically dispersed groups sharing a sense of community (eg birdwatchers, Mormons, fan clubs). From the perspective of Group Ic, group energy may be recognized through what is termed "human resources", originally understood from political economy and economics as "labour" -- one of the three factors of production. The broad term "human capital" has evolved to contain the complexity of this term, and in macro-economics the term "firm-specific human capital" has evolved to represent the original meaning of the term "human resources". One political view holds that value is primarily created by human activity which can therefore be understood in energy terms. As collective motivation, group energy can be usefully distinguished from such measurable economic and political framings. In a military context, for example, ensuring the motivation of soldiers in difficult circumstances may be a major consideration irrespective of their strategic superiority.
The economic significance of "team spirit" and "team work" has been explored by Simon Field (Does team spirit make economic sense?, 2001) on behalf of the OECD Centre for Educational Research and Innovation (CERI):

Reliance on teamwork is so universal that it may pass unrecognised. Traditional economic theory allocates a place in production to physical capital, the quantity of labour, and increasingly also to the quality of labour - human capital. Yet 'social capital' - made up of the networks and norms that underpin most types of economic and indeed social activity - is apparently ignored.

Recognized as "social energy", such community energy has, for example, been explored by Elmer M. Ferrer, et al (Affirming the Forces that Give Life and Energy: Revisiting the Theory and Practice of CBCRM in the Philippines, 2003) who adopted appreciative inquiry as "a methodology to enable cooperative search for the best in people, their organization, and the world around them, namely the systematic discovery of what gives life and energy to a system (e.g., search for solutions that already exist, amplify what is working well, and focus on life giving forces)". They note:

This process of learning and the relationships between people that are established as a result of this process generates social energy, which advances and sustains the CBCRM process. Social energy becomes manifest when individuals and groups work together to achieve common aspirations.

Similarly The Other Economic Summit (TOES) declares:

TOES has been successful in generating social energy because people are thrilled to have an opportunity to speak from the heart about issues that are "beneath the screen".

Group energy is recognized as such by those in the facilitation profession involved with interactive community building experiences (DeAnna Martin, Dynamic Facilitation and Group Energy; Jeannie Marshall, Energetic Meetings: Enhancing Personal and Group Energy, 2005; Jim Rough, Dynamic Facilitation/Choice-creating). A descriptive phrase typically used is "palpable energy" -- with "dissipativity" as the rate at which palpable energy is dissipated away into other forms of energy. Live concerts may be specifically attended because of the "palpable energy" experienced there.

Dysfunctional group energy is recognized by those concerned with community development and family therapy. It is strongly emphasized by a range of alternative belief and therapeutic systems. It is recognized as central to community initiatives, such as co-housing projects. Powerful group energy is recognized by religious groups in settings where friendship, trust and love are cultivated for collective benefit. Leadership is to a significant degree concerned with evoking and directing the energy of a group. According to Richard McDermott (Knowing in Community, 2001): "The greatest danger to growing communities is for them to lose energy and drift into apathy, letting the coordinator carry all the responsibility for community care-taking". As with "social energy", terms such as "vibrant" or "buzzing" are indicative of this form of community energy (cf. Tamarack: an institute for community engagement, About Vibrant Communities). "Crowd energy" is recognized as making or breaking a live show and various spectator sports. Such energy may be a palpable force in protest demonstrations and political rallies. Striking historic examples of group energy are provided by crusade and jihad.

As with "social energy", communities and groups may be considered as so lacking in significant "energy" as to be described as "soulless" -- or even as "dead".

- **Group III (c) "Psychic energy"**: As with Group IIIa, this form of "psychic energy" is poorly recognized as a general category even though its various forms are extremely familiar to most individuals. It is recognized by corporations, notably in relation to individual motivation, through a need to maximize the productivity of their "human resources". Such motivation may be especially valued as self-motivation where individual creativity and inventiveness is required for the competitiveness of the enterprise. (cf. Robert J. Sternberg (Wisdom, Intelligence, and Creativity Synthesized, 2003) makes the point that, in his pioneering work on psychology, Francis Galton (1822-1911) characterized intelligence as energy, namely the capacity for labour.

In the form of "charisma" it is experienced as an ability to charm or influence people. It refers especially to a quality in certain people who easily draw the attention and admiration (or even hatred if the charisma is negative) of others due to a "magnetic" quality of personality and/or appearance. Though extremely difficult to define, other similar terms/phrases related to charisma include: grace, chutzpah, exuberance, equanimity, positive energy, 'right stuff', joie de vivre, charm, personal magnetism, personal appeal, 'electricity,' and allure. Different though they are, they project a "positive energy" that radiates beyond the person who embodies it (Carlin Flora, The X-Factors of Success, Psychology Today, 2005). Some forms of this "energy" are notably described by those in the presence of a person held to be enlightened or saintly (more). Such "energy" is vital to leadership, especially in challenging socio-economic conditions. It is then intimately associated with the capacity to inspire and engender the confidence and trust on which tokenized systems are notably dependent for their credibility.

It is also recognized as the "energy" of personal engagement in activities and others. Most obviously it is the "energy" associated with being in love -- recognized in the phrase "love can move mountains" (widely reinforced by a song of Celine Dion). This engagement may be one of devotion, as for those with an active spiritual life, emboldening them to respond with the greatest of "energy" if this is challenged in any way. It may be sensed as a form of transmissible "spiritual energy", as with the Islamic
understanding of Baraka (or Barakah), namely a sense of divine presence or charisma or wisdom and blessing transmitted from master to pupil -- and recognized in other religions [more | more]. This may be understood as a state of blessedness implying an inner spiritual power that is inherent in any religious office (and may cling to the tomb of a revered leader, with chaotic socio-political consequences if it is endangered). Such "energy" may be notably recognized in the course of special rituals, of which the Christian Mass may be an example. Such rituals may be the focus of pilgrimages involving millions. It may take the form of political and/or ideological engagement -- resulting in commitment to "revolutionary" initiatives of a peaceful or a violent kind (eg suicide bombers).

A number of non-western belief systems address this phenomenon in a variety of highly developed ways (eg T'ai Chi Chuan, Ayurveda, Microvita). The Reiki system emphasizes "intelligent energy"; others recognize the "intelligence of energy", notably Jainism. This may be associated with speculations on the next step in human evolution. Some alternative therapies may emphasize the use of "healing energy" with students exploring how to get a tactile sense of "palpable energy" and its flow through the body [more].

The "psychic energy" may be evident in the obsessive engagement in cultural, intellectual or creative endeavours -- or in strenuous physical activities (eg trekking, mountaineering, etc). Cultural artefacts, especially those of historical or spiritual significance, may be experienced as giving off a much-valued (or feared) "palpable energy". It may be considered pathological in the form of workaholism or hyperactivity. Psychic energy has notably been studied in relation to sporting and other activities as "flow" or "being in the zone" -- a mental state of operation in which the person is fully immersed in what he or she is doing, characterized by a feeling of energized focus, full involvement, and success in the process of the activity. It may be closely associated with a form of job satisfaction, independent of any "appropriate" level of financial reward -- recognized (usually dismissively) by economists as "psychic income" [more]. This is:

- the intangible gratification or value that is derived from products, services, or activities, such as the improvement in a consumer's self image as a result of purchasing certain highly desirable products (Dictionary of Marketing Terms)
- the subjective value of nonmonetary satisfaction gained from an activity is known as psychic income.(2004 EconomicsInteractive.com)
- what motivates people other than money, such as respect, recognition, challenge, love of the work itself, opportunity for autonomy, location in a particular community, name of the prestigious institution for a resume, technologies that make work less drudgery, flexible hours, etc

An especially telling expression with respect to any sense of "psychic energy" is the widespread concern with providing "nourishment for the soul", whether or not this is understood through a particular religion or a particular cultural framework. Many spiritual disciplines emphasize the vital role of the "energy of the soul".

Perhaps to be judged as most ironic -- in its dissociation from the the preoccupation with Group I energy constraints and the challenges of climate change -- is the phenomenon of "sexual energy" recognized in most cultures. The denial of the relevance of this form of energy is ironic precisely because it gives rise to the rates of reproduction which result -- through overpopulation -- in the energy crisis and the overheating of the planet. The phenomenon is also of interest because of a range of spiritual disciplines (notably Tantra) concerned with its transmutation to avoid such consequences [more].

Future dependence on psychosocial energy?

The Green Paper for the EU Summit (A European Strategy for Sustainable, Competitive and Secure Energy, COM-2006, 8 March 2006) makes the point that:

Today, roughly half of the EU's gas consumption comes from only three countries (Russia, Norway, Algeria). On current trends, gas imports would increase to 80% over the next 25 years.

Aside from conventional economic and security concerns, it is curious that such dependence on the importation of energy is not explored in terms of its symbolic and metaphorical implications with respect to the psychosocial forms of "energy" on which the identity and dynamism of society is otherwise dependent.

One point of departure is to focus on the transformation of conventional forms of energy (Group Ia and b) into the forms through which a psychosocial system is sustained. It is clear that in the form of electricity and/or motor power, the operation of a wide variety of devices can be sustained. Little attention is given to the assumption regarding the dependency on the sustained operation of these devices for the sustainability of the society in which they are employed. The question is the nature of the interface between the motor (or equivalent) power provided by such devices and the "motor" power of the society. What exactly sustains the integrity of a community?

In discussing social energy, John Ikerd (Toward an Economy of Sustainable Energy, 2005) notes, on the occasion of the Second U.S. Conference on 'Peak Oil' and Community Solutions (Sponsored by The Community Solution, Yellow Springs, 2005):

Social capital or social energy is embodied or stored in the ability of people to benefit from relationships with each other, within families, communities, and societies. Kinships within families, friendships within communities, and civility within societies contribute directly to our happiness and quality of life but also contribute to our ability to work together, to be productive and useful to each other.
Industrial organizations are very efficient in producing personal services because they focus on using existing social relationships to facilitate production, but do nothing to regenerate or restore the social capital that is inevitably lost. When families become business organizations, friendships become business relationships, and citizens become nothing more than consumers the social cohesiveness that makes societies productive as well as personally rewarding is lost. Establishing, maintaining, and renewing positive social relationships are non-productive uses of social energy; it is more efficient to find new people, communities, and societies to exploit. Exploited societies, left without a sense of fairness, equity, or justice, are inherently unstable and destructive. They fall into patterns of reoccurring internal conflicts, which result in the senseless destruction of both natural and human resources, as may be witnessed in many parts of the world today. An industrial society inevitably tends toward social entropy. It is not sustainable.

In the language of economics, the "motor" power of society may indeed be described in ways that reinforce assumptions regarding the dependency on Group I energy sources -- notably through widespread use of the term "economic motor", and despite confusion on the nature of the "energy" required for its continuing operation. However discussions regarding the "quality of life" may readily confuse the availability of "energy" as conventionally understood with what exactly it is that is experienced by the individual, or group, as a desirable "quality of life". There is of course every reason, in support of certain agendas, to strongly correlate the availability of such "energy" with "quality of life" -- possibly even to the point of equating them.

The danger of this argument is that, in a future that may be much challenged by the availability of conventional sources of energy, or by the environmental consequences of the uses of conventional technology to obtain and distribute them, the potential of other sources of "energy" may be ignored. This would be highly regrettable if such sources were to some degree independent of conventional sources (Group Ia), or current "alternatives" (Group Ib) that are envisaged -- or of their vulnerable delivery systems.

In a period when there is increasing interest in collective intelligence in response to complex social situations, an interesting argument is made for the relationship between "social intelligence" and "social energy" by Karl Albrecht (Social Intelligence Theory, 2004):

Social Intelligence (SI) is the ability to get along well with others, and to get them to cooperate with you. Sometimes referred to simplistically as "people skills," SI includes an awareness of situations and the social dynamics that govern them, and a knowledge of interaction styles and strategies that can help a person achieve his or her objectives in dealing with others. It also involves a certain amount of self-insight and a consciousness of one's own perceptions and reaction patterns. Social energy is the impulse to engage other people, to interact with them, to influence them and be influenced by them.

Dematerialization and delinking

In the case of an economic perspective on the future, the focus is typically on how the economic system is to be sustained, notably through development. This is undergirded by a focus on the stability of the financial system, primarily in its monetarized form. It is widely accepted that no economist questioning assumptions regarding these monetary foundations can expect to be assured of a future in that discipline or in the institutions employing such expertise. (Peter Koenig, 30 Lies About Money: liberating your life, liberating your money, 2003). In practice, however, these assumptions are questioned in the operation of over 1,000 complementary currency systems - - of which air miles is perhaps the most obvious.

In considering the monetary system (as noted above), it is important to recognize that it is based fundamentally on confidence and trust - - namely trust that monetary tokens can be exchanged for goods and services later in time at an acceptable rate. Not only is "energy" itself, in any form, essentially intangible, but the forms through which it manifests may themselves be intangible -- rather than tangible in the case of Group I energy, or tokenized in the Group II forms. With the increasing importance of the "service industry", economics has had to come to terms with a process of "dematerialization" of the products with which it is concerned. In 1999, half of Business Week's one hundred biggest global corporations in 1999 were in information and financial services.

Thus for Robert Herman, et al. (Dematerialization, Technological Forecasting and Social Change 37(4): 1990, pp. 333-348):

The word dematerialization is often broadly used to characterize the decline over time in weight of the materials used in industrial end products. One may also speak of dematerialization in terms of the decline in 'embedded energy' in industrial products. Colombo (1988) has speculated that dematerialization is the logical outcome of an advanced economy in which material needs are substantially satiated. I Williams et al. (1987) have explored relationships between materials use and affluence in the United States. Perhaps we should first ask the question: Is dematerialization taking place? The answer depends, above all, on how dematerialization is defined. The question is particularly of interest from an environmental point of view, because the use of less material could translate into smaller quantities of waste generated at both the production and the consumption phases of the economic process. [see also Iddo K. Wernick, et al. Materialization and Dematerialization: Measures and Trends, Daedalus 125(3), Summer 1996, pp. 171-198]

.The question is whether, in the case of "energy", there are parallels to such "dematerialization", and the unquestioned monetarization of "confidence", in the economic system.

This dematerialization is evident in what might e considered the fundamental energy syllogism of modern economies:

Time is money
Money is energy
Time is energy
The first two lines of the syllogism are well recognized. The last follows logically but is less widely recognized. It has however been related to challenges of energy efficiency (cf Daniel Porras, *Time is Energy, Neighborhood Newswire*, 15 April 2005), energy aspects of “daylight saving”, and concerns with efficient “time management” and punctuality. The cost of deregulated energy is notably time-sensitive. The notion of time as energy also corresponds to an early Indian understanding [more more], to that of the Zohar of Judaism, and to some contemporary scientific arguments [more more].

Sigrid Stagl (*Delinking Economic Growth from Environmental Degradation?* Vienna University of Economics / B.A. Research Group: Growth and Employment in Europe: Sustainability and Competitiveness, Working Papers, 1999) reviews the controversial literature on the effect of economic growth on environmental quality, notably claims that there exist in some income ranges a positive relation between per capita income and some measure of environmental quality. This suggests the need for analogous research on whether increasing uses of conventional forms of energy (Group Ia) can be effectively delinked from “quality of life”.

Given that tangible monetarization obscures, to some degree dysfunctionally, intangible relationships of confidence and trust, is it possible that the "kilo-calorification" of energy obscures others forms of intangible relationship that may well be vital to the psychosocial sustainability of society?

"Energy" and "quality of life"

It is absolutely clear that modern lifestyles are highly dependent, and increasingly so, on energy consumption of the types such as the following:

- heating/cooling
- lighting
- communications
- food preparation and storage
- product manufacture and reprocessing (including wastes)
- transportation of people and goods (including water and waste products)

It is absolutely unclear that the energy resources to sustain the proliferating world population will be available in the near-term future -- according to what are perceived as desirable standards and expectations.

A readily ignored issue is the relationship between "lifestyle" and "quality of life". Measures of "lifestyle", including energy requirements per capita or per household, are readily assumed to be adequate descriptors of "quality of life". As in the case of monetarization, tangibles are assumed to be an adequate measure of intangibles. This is summarized in such statements as "money cannot buy happiness but":

- there are certain essential things which you cannot get without money. - access to decent health care - proper shelter - heat and light - food - clothing - certain aspects of education.
- it certainly helps
- did you ever try to buy anything without it?
- it does make it possible for you to enjoy the best that the world has to offer
- it can sure make us comfortable in our misery
- certainly the hopes of improving one's own economic well-being provide a stimulus to happiness

Whether "happiness" is the only dimension of "quality of life" or not, recent research research from Mexico, Ghana, Sweden, the USA and the UK shows that despite vastly different levels of wealth, the citizens of these countries report similar levels of satisfaction. Furthermore most "advanced nations" have seen almost no change to individuals' happiness levels over the last 50 years, despite a huge increase in income [more] (cf Gregg Easterbrook, *The Progress Paradox: how life gets better while people feel worse*, 2003). Such considerations have resulted in the Government of Bhutan promoting a Gross National Happiness indicator (Sonam Kinga, et al. *Gross National Happiness: a set of discussion papers*, Centre for Bhutan Studies, 1999).

The increasing income resulting from recent economic development were naturally accompanied by huge increases in the use of energy as conventionally understood. More problematic, to the extent that conventionally understood energy-based lifestyles are endangered by energy shortages, is the exacerbation of any latent dissatisfaction, resulting in social unrest and the consequent destabilization on which their sustainability is dependent.

Potential of unexplored forms of "energy"

The purpose here is simply to point to areas of investigation that may be associated with the detection of other forms of energy more directly associated with "quality of life". The question to be determined is how conventionally understood, energy-dependent lifestyles, interface with the forms of energy sustaining "quality of life" lifestyles.

Curiously it is readily assumed that many of the conventional sources of energy have been easily detectable. This assumption fails to recognize the amount of expertise and effort that has gone into geological surveys and prospecting, and the skills required to develop that expertise and the technology that supports its use. Some of the most obvious sources of energy, such as solar and wave power, have required a high order of (only recent) research and development. Given the "groupthink" determining the lack of recognition of other forms of "energy", does this suggest that these may only become apparent when unconventional forms of expertise are significantly deployed to detect them?

Just as much research is now devoted to reducing the "environmental footprint" -- increasingly translated (or mis-translated) as "energy footprint" -- there is a case for seeing unforeseen forms of "energy" as a way of reducing the lifestyle dependence on conventional forms of energy. Such forms of energy are to be understood as substituting for conventional forms of energy.
As an example, a case has been made by Ruth Rikowski (Creating Value from Knowledge in the Knowledge Revolution, Information for Social Change, November 2004) regarding the important relationship between value, in its non-economic sense, and social energy:

However, value also needs to be defined on its own, in abstract from both use and exchange, I would suggest. Michael Neary and Glenn Rikowski explore value at a deeper level and describe value as being 'social energy'. They say that:

Value can be viewed as being social energy that undergoes transformations. Value is a multi-dimensional field of social energy - a social substance with a directional dynamic (expansion) but not social identity. (Michael Neary and Glenn Rikowski, Time and speed in the social universe of capital, in G. Crow and S. Heath (Eds.) Social conceptions of time: structure and process in work and everyday life, 2002)

Furthermore, Glenn Rikowski says that:

Value, within the social universe of capital, constitutes a social force field analogous to gravity as a force within the known physical universe. Value is a social energy whose effects as a social force are mediated by the movements of capital (in its various forms) and the social relations between labour and capital. (G. Rikowski, 2002, p.183)

Psycoshocial environments: "low energy" vs "high energy"

Such an exploration calls for reflection on what constitutes a "low energy", "demotivating" psychosocial environment, in contrast with a "high energy", "motivating" environment. However intangible this phenomenon may seem in "energy" terms, it is notably a highly determining factor in the options and preferences of younger generations in the allocation of their resources -- and their engagement in national and regional political processes.

The argument here is that in a "low energy" environment, people are obliged to derive their "psychic nourishment" by a compensatory increased use of conventional forms of energy (Group I a). The process is detectable in relation to the following:

- boredom: it is clear that boredom in modern society is an immediate trigger for the use of conventional sources of energy:
  - transportation to places "where the action is", whether in the neighbourhood or on another continent -- indicative of a form of "happening energy"
  - use of communication devices for entertainment (games, films, etc)
  - "shopping"
  - food consumption
  - drink consumption
  - redecoration / construction (DIY)
  - precursor processes to reproduction. Given the strongly made case that improvements in lifestyles, measured economically, inhibit proliferation of progeny despite their markedly increased call on Group I energy, it might be asked whether evidence has been sought to determine the degree to which engagement in Group III energy processes might reduce Group I energy requirements

- anxiety: any form of insecurity is a trigger for the utilization of conventional sources of energy:
  - inhibition of freedom of movement by personal insecurity: may well lead to acquisition of devices consuming higher amounts of energy (private transportation, 4x4s, humvees, etc)
  - mugging
  - harassment
  - progeny

The two previous conditions are to be contrasted with the sense of well-being and "motivation" associated with:

- motivation / enthusiasm:
  - engaging in employment: if work is of sufficient personal interest, the calls on conventional sources of energy are in consequence significantly reduced; a contrast may be usefully made here between high-energy production processes and manually-intensive processes, especially including craft work
  - engaging in relationships: a rich social life, energized by the interaction processes, significantly reduces the need for conventional sources of energy; in the extreme case this may take the form of life in an intentional community
  - engaging in community activity
  - engaging in recreation sport: both spectator sport and participatory sport are, with some notably exceptions, relatively undemanding of conventional sources of energy
  - engaging in intellectual life: the classic cases of academic or analogous absorption in a rich intellectual life are also relatively undemanding
  - engaging in ideological/political engagement
  - engaging in cultural life: typified by popular and public entertainment (eg village shows, Rio Carnival, LiveAid, etc)
  - engaging in belief systems
  - engaging in spiritual life: whether or not it takes place in an intentional community, absorption in spiritual life has traditionally been one of the lowest calls on conventional forms of energy
quality-of-life environment: certain environments are well-recognized as being associated with a high quality of life, irrespective of their calls on conventional energy sources:
- recreational beach huts
- idyllic villages
- intentional communities: Auroville, Damanhur, Findhorn
- built environments (Arcosanti) and gated communities

Set out in this manner, three points become clear:
- the value of recognizing the nature of the "energy" associated with "motivation", especially the highly valued phenomenon of "self-motivation"
- the dependence of the current economic system, and those with vested interests in it, on encouraging high levels of conventional energy usage and effectively discouraging its reduction (through any engagement in unconventional forms of intangible "high-energy" activity)
- the lack of systematic research into how to encourage unconventional, intangible forms of "high-energy" activity, especially in the face of their commodification into dependence on "high-energy" modes, notably through their marginalization (eg the "soft drink in rural village" syndrome)

Of particular interest is the recognition, in a "high energy" environment, of the effects of what is metaphorically described as "energy vampirism". This is the phenomenon whereby a particular procedure or process, triggered or catalyzed by individuals or groups, dramatically reduces the energy level of those exposed to it -- whether groups, communities, or individuals. Those responsible may be labelled as "negative" -- in contrast with processes in which the energy level is enhanced, that are described as "positive".

Also of interest are situations in which conventional "low energy" impacts of one form may effectively (even surreptitiously) require "high-energy" compensation of whatever form.

"Energy" politics from a psychosocial and developmental perspective

A healthy political corrective with regard to to "social energy" emerged from an Asia-Pacific Action Plan to put into practice International Federation of Chemical, Energy, Mine and General Workers' Unions (ICEM) global "Social Energy Programme", launched in 1998 by the world's energy unions. The main points of the Action Plan include:
- Unions and the ICEM will increase pressure on the World Bank and the International Monetary Fund (IMF) to stop pushing for anti-social reforms and for foreign models that do not take local circumstances into account. Unions must be consulted and their opinions must be respected.
- Unions pledge to intensify information exchange via the Internet, to which practically all of them are connected. This exchange will especially cover experiences on privatization, strong and efficient regulation, and dealing with multinational enterprises.
- Unions will take joint action to fight against destructive privatization and deregulation and support each other whenever needed.
- Unions will join the ICEM's multinational company networks in the oil, gas, electric power and coal mining industries. They support the ICEM's efforts to negotiate global agreements with corporate management to guarantee union rights and high health, safety and environmental standards wherever the companies operate.
- Unions will also focus on internal development and will train officials and shop stewards for strategic campaigning. Organizing is a priority, and efforts will be made to build stronger unions and to consolidate union structures.

With respect to Group III (a)and (b) "energy", the Communication for Social Change Consortium, focuses on bringing people together through dialogue and elevating all voices, seen as critical principles of communication for social change. In a case study in Bangladesh rural areas, the "social energy" dimension emerged as significant (Using Communication for Social Change To Build Social Capital for Bangladeshis Who Are Ultra-poor; CFSC, 2004). The programme showed how communication could be used for much more than information dissemination and, when effectively implemented, could drive significant social change.

Despite their socio-economic and psychosocial implications, current framings of "energy" avoid exploring the relationships between:
- strategies involving extremely high use and exploitation of conventional forms of energy through high technology -- exemplified by the military situation in Iraq
- strategies dependent on an extremely high degree on intangible forms of personal energy -- exemplified by the "motivation" of suicide bombers

In "energy" terms, the engagement of suicide bombers and the long-term stand-off situations they have created, need to be recognized as being as "measurably" significant as the tangible forces deployed to contain them. Their challenge to the effective use of conventional energy to reconstruct devastated environments has also been demonstrated.

Given the current link between energy policies and climate change, it is appropriate to note a concern of the Ministerial Conference on Environment and Development in Asia and the Pacific (Critical Environment and Sustainable Development Issues of the Region and Measures for Promoting Sustainable Development, including Partnership with Private Sector and Civil Society Groups, UN/ESCAP, 2000):

Innovative environmental policies now stress the complementary roles of communities, markets and governments in creating incentives for improving environmental management. Policy makers are acknowledging that popular sentiment has moved beyond the desire for higher material welfare to include aspirations for accountable government, democratic practices and the translation
of economic gains into more liveable urban habitats and socially just societies.... It is fair to say that environmental issues and conflict among special interest groups, classes and communities will drive much of the urban politics of the future. The challenge for governments in the region is to transform this social energy into a positive source of collaboration for enhancing environmental management. (emphasis added)

This challenge is reinforced for developing regions (and perhaps communities within industrialized cultures) by the analysis of Wolfgang Sachs (Development: the rise and decline of an ideal, Encyclopedia of Global Environmental Change, 2000):

At any rate, development has often failed to grasp the rich complexity of non-economized societies. It could not appreciate that such settings can be regarded as symbolic sites... where communities live out narratives that link them to their divinities or where social energy is first of all invested in the upkeep of a network of friends, relatives or clan members. Indeed, it appears that for non-Western actors the rational is nothing but the relational. In such circumstances, any "modernization" will run quickly into communitarian constraints, as relations to divinities or to fellow citizens are likely to collide with the requirements of functional performance. To put it in more general terms, development has aimed at achieving that decisive shift which distinguishes modern civilization from all others: primacy is not given any longer to the relations between persons and persons, but to the relations between persons and things...

### Table 2: Axioms of Energy Systems Behaviour

| 1. Energy systems in general work poorly or not at all |
| 2. New energy systems generate new problems |
| 3. Systems operate by redistributing energy into different forms and into accumulations of different sizes |
| 4. Energy systems tend to grow, and as they grow, they encroach |
| 5. Complex energy systems exhibit unpredictable behaviour |
| 6. Complex energy systems tend to oppose their own proper function |
| 7. People in energy systems do not do what the system says they are doing |
| 8. A function performed by a larger energy system is not operationally identical to the function of the same name performed by a smaller system. |
| 9. The real world is whatever is reported to the energy system |
| 10. Energy systems attract energy systems people |
| 11. The bigger the energy system, the narrower and more specialized the interface with individuals |
| 12. A complex energy system cannot be "made" to work; it either works or it doesn't |
| 13. A simple energy system may or may not work |
| 14. If an energy system is working, leave it alone |
| 15. A complex energy system that works is invariably found to have evolved from a simple system that works |
| 16. A complex energy system designed from scratch never works and cannot be patched up to make it work; you have to start over, beginning with a working simple system. |
| 17. In complex energy systems, malfunction and even total nonfunction may not be detectable for long periods, if ever. |
| 18. Large complex energy systems are beyond human capacity to evaluate |
| 19. An energy system that performs a certain way will continue to operate in that way regardless of the need or of changed conditions. |
| 20. Energy systems develop goals of their own the instant they come into being. |
| 21. Intra-system energy goals come first |
| 22. Complex energy systems usually operate in failure mode |
| 23. A complex energy system can fail in an infinite number of ways |
| 24. The mode of failure of a complex energy system cannot ordinarily be predicted. |
| 25. The crucial variables are discovered by accident |
| 26. The larger the energy system, the greater the possibility of unexpected failure |
| 27. "Success" or "function" in any energy system may be failure in the larger or smaller systems to which it is connected |
| 28. When a fail-safe energy system fails, it fails by failing to fail safe |
| 29. Complex energy systems tend to produce complex responses (not solutions) to problems. |
| 30. Great advances are not produced by energy systems designed to produce great advances. |

### Constraints inhibiting detection of psychosocial forms of energy

The question is how to evoke "out-of-the-box" thinking in relation to the forms and sources of "energy" that may be vital to psychosocial processes. It may be the "in-the-box" thinking that is itself inhibiting vital possibilities.

There are disciplinary/sectoral and institutional consequences of the overly-restrictive framing of any issue. In the former case conceptual boundaries are effectively established that fit the comfort zones of certain disciplines normally preoccupied with conventional forms of energy. Anything outside such boundaries is framed as "irrelevant" or of marginal significance. This pattern is similarly observable in the case of the institutions whose mandates are reinforced by the experts from those disciplines.

There is a certain irony to reliance on the sight-vision metaphor in exploring the future in terms of "foresight" -- indicating a dependence on that which can be seen or envisaged (cf Metaphor and the Language of Futures, 1993). This is of course reflected in the institutional...
Metaphoric clues to detection of unrecognized forms of energy

Fundamental to all the forms of "energy" mentioned above is the existence of a difference of potential between two states. The challenge for future energy resources may well be to derive "energy" from psychosocial contrasts in the light of disciplines and expertise acquired in deriving conventional forms of energy from more tangible and measurable contrasts. The challenge is exemplified by the need to manage "positive" and "negative" energy in psychosocial processes with skills analogous to those developed with respect to positive and negative electrical current (Being Positive Avoiding Negativity: management challenge -- positive vs negative, 2005).

As a stimulus to the creative process of recognizing marginalized forms of energy, there is a case for considering conventional forms of energy as metaphoric templates through which other less tangible forms may be detected -- whether social, group or personal. It has been predicted that in the near future developing eastern cultures will draw upon metaphors inherent in their mode of thought as a means of moving beyond the metaphors conditioning theories of physics -- and energy -- in western scientific models (cf Susantha Goonatilake, Toward a Global Science: mining civilizational knowledge, 1999). These may offer subtler and more powerful understandings of "energy" and its management. It would indeed be ironic if western science were to scorn "energy" as metaphoric templates through which other less tangible forms may be detected (cf Ralph Siu. Mass-Energy, Qi, and Q\(\text{Mass}\))

Energy metaphors are widely used in organizational life. In considering such a metaphoric exploration for new forms of "energy" and their possibilities, it is appropriate to note the increasing recognition of the role of metaphor in framing European political options:

- Petr Drulák. Metaphors Europe lives by: language and institutional change of the European Union
- Carina Elts and Birte Lönneker. The Hamburg Metaphor Database. 2002
- Andreas Musolf. Mirror Images of Europe. Metaphors in the public debate about Europe in Britain and Germany. Judicum Verlag, 2000
- Erik Ringmar. Metaphors of Social Order in Europe, China and Japan

Metaphor may prove useful in distinguishing the contrasts between the components of the classic sequence -- data, information, knowledge, wisdom -- as they relate to energy:

- data corresponds to that which is measureable, namely tangible
- information is associated with interpretations of data, including orders imposed upon it through which it can be tokenized as intellectual property
- knowledge corresponds to patterns detected in information, potentially negotiable as know-how,
- wisdom can be understood as the self-reflexive implications of patterns of external knowledge, namely as what those patterns imply for the modes of awareness and identity of the knower (in contrast with their implications as externalities)

One possibility merit exploration is the application of metaphors and models normally applied to distinguishing the various "energies" of personality types -- notably in team-building and organizational development -- to the "energy" types of Table 1 above. This could be especially fruitful if such frameworks point to the transformational relationships between the types of energy -- with implications as to their functionality or dysfunctionality in the pattern as a whole. Such an approach would have the considerable advantage of interrelating the types of "energy" a time when they are often treated as quite unrelated. A good candidate for such an exploration is the enneagram

<table>
<thead>
<tr>
<th>Table 3: Brainstorming extremes of future &quot;energy&quot; resource scenarios</th>
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| - "Living on air": this extreme dietary approach ("breatharianism" or "living on light") has resulted in claims that some people have successfully "lived on air" for long periods. A breatharian is a person who is "nourished by light and has no need for food or drink". Meditation is believed in some cultures to severely reduce dependency on conventional sources of energy [more more]
| - Audiosynthesis: a suggestion that human beings could get all their nourishment from sound in a fashion analogous to plants getting their nourishment from light. This is a theme explored in a work of science fiction by Suzette Haden Elgin (Earthsong: Native Tongue III, 2002) suggested to her by a concrete example documented by Alfred Tomatis involving extensive use of Gregorian chant and its reduction (following a Vatican directive), as well as by descriptions of religious leaders who have consumed almost nothing [more more]. Elgin also points to the "epidemic of obesity" in western society whose nourishment balance has been shifted by the presence of high quantities of food and constant exposure to music.
| - Energizing military pilots with drugs: the US military makes stimulants available to pilots to sustain combat readiness [more more]
| - Dancing as a partial substitute for recreational transportation: the need for bodily movement, notably expressed through dancing prior to modern transportation, may prove to be an example of an alternative activity to recreational use of automobiles and therefore a means of reducing the drain on non-renewable energy resources |

...
As noted by one commentator, "the application of the enneagram to group dynamics, seems to be a fertile if uncharted area for discussion." Although almost all recent applications of the enneagram have focused on individual energy typology -- often controversially -- some efforts have however been made to use it in relation to countries, companies, and the family. A specific effort was made by Saul Kuchinsky (*Systematics: search for miraculous management*, 1985) to articulate its value for management. John G. Bennett (*The Dramatic Universe*, 1956-66) applied it to systems theory, organizational design and group dynamics -- a theme subsequently explored by Anthony Blake (*The Intelligent Enneagram*, 1997) and related to sustainable development.

With regard to the theme of this paper, it is appropriate to note that Bennett was research director of the UK Coal Utilisation Council (the largest industrial research association in the UK), chairman of the UK Solid Fuel Industry, responsible for drafting the National Fuel Policy of the UK Parliamentary and Scientific Committee, and member of the Fuel Efficiency Committee of the Ministry of Fuel and Power. It would be interesting to discover how he had related the conventional energy (Group I in Table 1), with which he was professionally concerned, to the range of other types of "energy" which were the major preoccupation of his other work -- and whether the enneagram was used for that purpose.

Bennett wrote, for example, in discussing "societies as energy concentrations":

> All that exists is energy undergoing change. Societies, like everything else, produce, consume, store and transmit energy. They are generators for upgrading energy, engines for the instrumental use of energy and accumulators for the storage of energy....The twelve qualities of energy [in Bennett's classification in *Vol. II, ch. 32*] from heat to transcendental energy were the principal departure from commonly accepted notions of energy....The complex transformations of energies involved in any purposive activity requires generators, engines and accumulators....When energy is concentrated it becomes available for instrumental use. For example, the energy of consciousness is universal and omnipresent, but it cannot bed effectual in existing organisms unless it is concentrated....The flux of energy, whereby anabolic and catabolic transformations are made possible requires an appropriate apparatus. For many purposes, this apparatus must be consciously constructed as a human society. (*Dramatic Universe*, Vol III: *Man and Nature*, pp. 274-5)

Dermot Furlong and David Vernon (*Reality Paradigms, Perception, and Natural Science: the relevance of autopoiesis*, 1992) offer a reframing of the complete spectrum of energy transformations identified by Bennett.

Unlike much type-focused use of the enneagram, Bennett then used it to provide a comprehensive mapping of the relationships between energy processes involving humans in relation to the environment (p. 278), having previously provided a general description of the systematics of such processes in terms of the enneagram (pp. 63-72). He argued that, as a whole, its counterintuitive pattern of energy relationships takes account of uncertainty in the face of hazard, namely purpose and the uncertainty of its fulfilment. "The overcoming of hazard is by a synthesis of dynamism and coalescence. The dynamism enables the process to work and the coalescence is the integration of the complexity of action as an independent event" (J. G. Bennett and A. G. E. Blake, *The Discipline of Systematics*, 1966). It would seem that, especially given his responsibilities in the conventional energy sector, Bennett's pragmatic approach to energy integration is worthy of further research -- especially to ensure the design of resilient energy policy to ensure sustainability under the energy crises and instabilities that are foreseen.

**Institutional mandates in relation to various forms of "energy"**

In the light of the above framework, the following schema provides a (very tentative) summary of the correspondence between current (European) institutional mandates and the forms of "energy" with which they are associated. The Group I types of energy are typically the preoccupation of bodies in the *European Energy Network* (EnR) and their particular understanding of *Energy Audit Programmes in Europe*.

Table 4 below points to the possibility of generalizing the notion of an "energy audit" or "energy accounting" to include the full spectrum of "energies" associated with the sustainability of societies and communities. This moves towards highlighting Europe as a "dynamic pattern of energies" rather than a static set of "pillars" (cf. *Animating the Representation of Europe: visualizing the coherence of..."
International institutions using dynamic animal-like structures, 2004). It builds on past socio-political learning that "development" extended beyond particular sectoral mandates, or subsequently that this was also true of "environment". From such a perspective, regular "social audits", such as those of UNDP (Human Development Report), could usefully accord recognition, beyond conventional "energy audits", to intangible forms of psychosocial "energy" that are vital to the sustainable development of societies.

<table>
<thead>
<tr>
<th>Group</th>
<th>Institutional mandate</th>
<th>Forms of &quot;energy&quot;</th>
<th>Examples/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Energy; IEA</td>
<td>Oil, gas, water, tide, wind, geothermal solar power</td>
<td>Pressure on non-renewables; environmental impact</td>
</tr>
<tr>
<td>a</td>
<td>Environment; UNEP</td>
<td>Cycles of nature, &quot;energy of spring&quot;, recycling</td>
<td>Waste disposal, constraints on appreciation of nature</td>
</tr>
<tr>
<td>a</td>
<td>Transportation</td>
<td>Mobility, animal power, walking</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>Agriculture / Rural Development; Fisheries; FAO</td>
<td>Nutrition (calories), taste (?)</td>
<td>GM foods, obesity</td>
</tr>
<tr>
<td>b,c</td>
<td>Employment / Workers; ILO</td>
<td>Manpower (human resources)</td>
<td>Unemployment</td>
</tr>
<tr>
<td>c</td>
<td>Health / Consumer Protection; WHO</td>
<td>Health care costs, absenteeism costs</td>
<td>Obesity, substance abuse</td>
</tr>
<tr>
<td>b</td>
<td>Research; Science; UNESCO</td>
<td>Investment, brainpower, creativity, innovation</td>
<td>Big science&quot; projects, brain-drain</td>
</tr>
<tr>
<td>b</td>
<td>Technology / Industry</td>
<td>Investment, brainpower, creativity, innovation</td>
<td>Brain-drain</td>
</tr>
<tr>
<td>a,b</td>
<td>Economic / Financial Affairs (Banking); Taxation</td>
<td>Confidence, trust, investment</td>
<td>Monetary and other tokens, LETS; fidelity schemes; loss of confidence</td>
</tr>
<tr>
<td>b</td>
<td>Enterprise / Industry; Competition; Market</td>
<td>Confidence, investment, productivity</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>Management (Employers); ILO</td>
<td>Motivation, investment, productivity</td>
<td>Delocalization, achieving &quot;harmonious labour relations&quot;</td>
</tr>
<tr>
<td>b,c</td>
<td>Employment / Workers; ILO</td>
<td>Motivation, satisfaction, creativity, achievement, qualifications</td>
<td>Demotivation of workforce</td>
</tr>
<tr>
<td>a,c</td>
<td>Health / Consumer Protection; WHO</td>
<td>Health care costs, absenteeism costs</td>
<td>Obesity, substance abuse</td>
</tr>
<tr>
<td>a,c</td>
<td>Information / Media; UNESCO</td>
<td>Interesting ideas, &quot;new thinking&quot;</td>
<td>Publications, &quot;news&quot;, patents, &quot;knowledge society&quot;</td>
</tr>
<tr>
<td>c</td>
<td>Education; UNESCO</td>
<td>Academic credits</td>
<td>Brain-drain, knowledge-society</td>
</tr>
<tr>
<td>a</td>
<td>Politics</td>
<td>Popular engagement, democratic participation</td>
<td>Voter apathy, demotivation</td>
</tr>
<tr>
<td>b,c</td>
<td>Sport</td>
<td>Exercise, team energy, supporter enthusiasm, records</td>
<td>Widespread engagement</td>
</tr>
<tr>
<td>b</td>
<td>Social Affairs / Equal Opportunities</td>
<td>Group energy; collective enthusiasm, local initiatives, self-motivation</td>
<td>Rural community decay, social welfare, winning, urban slums, awards</td>
</tr>
<tr>
<td>a,b</td>
<td>Security</td>
<td>Force, crowd energy</td>
<td>Demonstrations, criminality, terrorism, Europol</td>
</tr>
<tr>
<td>a,b</td>
<td>Communication / Public relations</td>
<td>Exciting/attractive image, reputation, status</td>
<td>&quot;Cool cities&quot;</td>
</tr>
<tr>
<td>a</td>
<td>Symbolism</td>
<td>Collective identity, &quot;soul energy&quot;</td>
<td>European flag / anthem, Eurovision song contest, &quot;cartoons&quot;, desecration, &quot;soulless Europe&quot;</td>
</tr>
<tr>
<td>b</td>
<td>Culture; UNESCO</td>
<td>Concerts, popular happenings, commemorations, celebrations, &quot;animation&quot;</td>
<td>European cities of culture&quot;, non-institutional enthusiasms</td>
</tr>
<tr>
<td>b,c</td>
<td>Rituals and ceremonies</td>
<td>Collective engagement</td>
<td>Ceremonies, pilgrimages (Lourdes, etc), outmoded formalism</td>
</tr>
<tr>
<td>a,b,c</td>
<td>&quot;Religious affairs&quot; (?)</td>
<td>Faith</td>
<td>Disaffection, blasphemy (cartoons), spiritual health</td>
</tr>
</tbody>
</table>

### Comprehensive energy accounting

**Energy accounting**: Various understandings of "full cost" energy accounting have been promoted over the years:

- "energy accounting": The California Energy Commission (Energy Accounting: A Key Tool in Managing Energy Costs) describes this as "a system to record, analyze and report energy consumption and cost on a regular basis. Just as financial accounting is used for the effective management of an organization, energy accounting is critical to energy management. It can be one of the most cost-effective tools". Its focus is on the Group Ia energy types: natural gas, electricity and other fuels -- typically distributed by utility services. An associated concept is the "energy accounting audit" [more].

- "environmental and economic accounting" ("Green GDP", "environmental accounting"): President Clinton put environmental accounting on a fast track in his 1993 Earth Day speech by stating: "Green GDP measures would incorporate changes in the
natural environment into the calculations of national income and wealth.". The United Nations Statistics Division has produced a Handbook of National Accounting: Integrated Environmental and Economic Accounting (2003) which brings together economic and environmental information in a common framework to measure the contribution of the environment to the economy and the impact of the economy on the environment. It includes:

- Flow accounts for pollution, energy and materials
- Environmental protection and resource management expenditure accounts
- Natural resource asset accounts
- Valuation of non-market flow and environmentally adjusted aggregates

- "mineral and energy accounting": At its preliminary meeting August 2005 the UN Committee of Experts on Environmental-Economic Accounting (UNCEEA) endorsed a research agenda towards creating an international standard by 2010. The Committee is preparing a handbook on Mineral and Energy Asset Accounting for 2007 [more].
- "embodied energy", refers to quantitative methods of accounting for flows of energy through the environment. Traditionally considered, embodied energy is an accounting methodology which aims to find the sum total of the energy necessary - from the raw material extraction, to transport, manufacturing, assembly, installation as well as the marketing and other costs of a specific material - to produce a service or product. There appear to be three main differences in contemporary embodied energy methodologies, notably distinguished as 'anthropocentric' and 'capitalcentric', and 'ecocentric'. Different types of methodologies produce different understandings of the scale and scope of application and the type of energy embodied:
  - the energy embodied in terms of oil that support economic processes.
  - the energy embodied in terms of sunlight that support ecological processes.
  - systems ecology is concerned about the energy support of ecological-economic process as a whole. Embodied energy as a concept used in systems ecology seeks to measure the "true" energy cost of an item, and the extended this to the concept of "true" value.
  - energy studies have also sought to link embodied energy with foundational concepts, like capacitance for example, in physical, electronic and chemical sciences.

- "energy credits" is a particular concept of "energy accounting" through use of namely an "energy certificate" -- a hypothetical unit of currency used in a technocracy. Unlike traditional money, energy-credits would not be saved or earned, only distributed evenly among a populace. [more]

- "social accounting", as proposed by the New Economics Foundation is working towards social accounting and auditing is a way of measuring and reporting on an organization's social and ethical performance. An organization which takes on an audit makes itself accountable to its stakeholders and commits itself to following the audits recommendations. It has helped to form the Institute of Social and Ethical Accountability to promote professional standards around social accounting and auditing. It has also worked in partnership with the Social Audit Network on a framework for social social accounting that is "scale-able" and appropriate for smaller social enterprises and community organizations. These approaches do not emphasize the "social energy" dimension.

Uncommodified forms of "energy": Narrowly restricting the definition of "energy" to conventional sources, whatever lipservice is paid to "alternative" sources, may be judged by the future as a dangerous exercise in "conceptual gerrymandering" -- definitional game-playing in support of vested interests with what is effectively an anystemic disciplinary perspective. Djeane A. Hosni (Manpower for Energy Production, 1986) noted that the human resources aspect of energy had received little systematic attention. Focusing on commodified energy generation and distribution, even at the most tangible (Group I) level, ignores the energy of animal power and manpower (approximately 10% of horsepower) on which industrial societies were highly dependent prior to the industrial revolution -- and on which many developing countries continue to be almost totally dependent in the form of labour -- remains a major source of "energy" even in industrial societies (whether in paid employment or not). Given the proportion of the world population without access to commodified energy systems, and therefore dependent on their own energy resources, a responsible energy balance should surely take account of the forms of "energy" to which portions of industrial societies might be reduced -- if only to work their gardens (as has been the case in war time).

It is unfortunate that estimates seem only to be available for isolated cases. Some illustrative examples of neglected, but measureable, forms of Group I energy include:

- One estimate of the effective work a person can do in a day (not calories consumed) is 75 Joules/sec/8 hour day (Mark's Standard Handbook for Mechanical Engineers, 1996) -- a figure used by archaeologist Stuart Wier (Recent Pyramid Calculations: Manpower Estimates for Khufu's Pyramid, 1998) to compute the energy required for pyramid construction by 8-10,000 men over some 23 years.

- Stephen Boyden (Western Civilization in Biological Perspective: patterns in biohistory, 1987) offers a useful discussion of human energy-accounting: "It has been estimated that the per capita use of extrasomatic energy in the form of fire in hunter-gatherer societies is roughly the same as that flowing through human organisms as somatic energy, that is, about 10^6 kiloJoules per day, bringing the total energy flow through human communities to about 2 x 10^8 kiloJoules per capita per day."

- Another estimate based on the concept of "energy", as formulated by Howard T. Odum (eMergy Evaluation, 1998), which "evaluates the work previously done to make a product or service. Energy is a measure of energy used in the past and thus is different from a measure of energy now. The unit of energy (past available energy use) is the enjoule to distinguish it from joules used for available energy remaining now." Enrique Ortega (Handbook of Energey Calculation, UNICAMP) estimated the annual
energy spent by a Brazilian "hard worker": 3200 kCal/day x 365 days x 4186 Joules/kCal = 4.889 x 10^8 Joules/year. The figure for "qualified manpower" was based on 2,500 kcal/day

- Guido Gryseels and Michael R. Goe (Energy flows on smallholder farms in the Ethiopian highlands) provide estimates of human energy expenditure by rural women in household activities in MegaJoules/month (converted here to MegaJoules/year), including: cooking 1.24 (14.88), food processing 4.55 (54.6), collecting, preparing and drying cow dung 40.04 (480.48), collecting firewood 55.51 (666.12), fetching water 82.81 (993.72), washing clothes 7.28 (87.36), herding livestock, 59-68 (708-816.3), going to market 5.6-12.6 (67.2-151.2). This totals to: 3072 x 10^6 to 3270 x 10^6 Joules/year per woman, namely 7.44 x 10^12 Joules/year for adult women only

- In an analysis of the unsustainable energy use in the western world, Pierre Chomat (Oil Addiction: the world in peril, 2004) suggests a new pricing structure for oil by comparing the amount of energy in oil to the equivalent amount of manpower and then pricing oil as if its price could be based on its energy value. With 1 gram of oil providing the same amount of energy as a worker digging a ditch for one day, Chomat calls this 1g of oil an "ergamine" and demonstrates just how much energy is available from it. With a typical worker paid at $100/day, a barrel of oil is then estimated to cost $14.6 million

- Another estimate suggests that "manpower" alone constitutes the energy equivalent of 2000 kCal/day (cf Peter DeSanto Jr, Energy and Fossil Fuels). On the basis of a world population of 4,844 million male and female adults (15-64 years) (estimated for July 2005 in CIA World Factbook), this suggests an unrecognized amount of 9,688,000 million kcal/day (namely 14.8 x 10^18 Joules/year) -- to be compared with the forms of commodified energy recognized in the estimates of the International Energy Agency (The Energy Mix of a Sustainable Future, 2006)

- A somewhat different approach can be based on the energy needed to sustain an active adult ± 2200 kCals per day (of which ± 1600 is required to sustain basal metabolism). The remaining ± 600 kCals per day is potentially available for conversion to mechanical energy by an adult human (walking, cycling, climbing stairs, making love, working, etc). Assuming an average of 500 kCals/day for 5,000 million adults (15-64 years) gives an indication of human energy expenditure in a day, viz 25 x 10^11 kCals/day or 9125 x 10^11 Joules/year = 3.82 x 10^18 Joules/year (NB One calorie obtained from stall-fed meat or from greenhouse vegetables may be as much as 500 times more energy-intensive than a calorie from an organic rainfed no-till farm produced vegetable [more]).

- Energy assessments of human activity are a particular concern in relation to air conditioning in buildings (cf TA Markus and EN Morris, Buildings, Climate, and Energy, 1980). The thermoregulatory systems of the body function to achieve a condition of heat balance specified by Fanger's formulation (1972). The rate of total energy production by the body is termed the metabolic rate which, when converted to mechanical power is dependent on mechanical efficiency (typically low, most energy being dissipated as heat). Tables are available for different human activities, in relation to metabolic rates and mechanical efficiency.

Energy efficiency: The current discussion of "energy efficiency" focuses almost exclusively on Group I (a and b) energies, typically as distributed by utility services. There is of course a focus on the efficient use of Group II energy -- notably as project/investment funds or information. But the focus has not yet extended to ways that collectivities can use their other Group II and Group III energies more efficiently.

One unusual approach to efficiency is widely practiced in thousands of Indian villages through the Swadhyaaya movement. According to R K Srivastava (Swadhyaaya: A Movement Experience, 2003) of the Centre for the Study of Developing Societies (Delhi), this makes particular use of individual and community "efficiency" through a process of dedicating it to God in order to sustain community and its development. Emphasis is placed on using "personal efficiency" and time as a devotional offering, generating, what is called, apaurusheya lacos ("impersonal wealth") that is redistributed in response to communal needs. These insights are used to generate and sustain self-esteem and counteract conventional ills (alcoholism, domestic violence, practice of untouchability, gambling, petty crime, ethnic violence, etc) [more].

Towards a common energy currency: Adenosine Triphosphate (ATP) is recognized as the most common energy "currency" of living cells, functioning as an intermediate which drives "energy requiring" (endergonic) reactions. Fundamentally, life is an energy-handling process -- whether in its biological or social forms [more]. Electricity is also recognized as the "common energy currency" [more] -- although the merger of hydrogen and electricity, with the merger of transportation and distributive power, has been predicted to lead to "hydricity" as a common energy currency [more]. Arguably there is a need for a genuinely common currency that reconciles the different energy types identified in Table 1 -- rather than promoting distinct "non-convertible currencies" as though each represented the unique key to the sustainable future of a planetary society.

Of related interest, in the light of recent research, is recognition that the source of energy in biological motion -- the capacity of muscles to generate pulling force -- may be explicable in terms of quantum tunneling. Living cells are indeed capable of "burning" biological fuel to generate energy for muscle contraction. It is enzymes which accelerate the rate of chemical reactions -- with billion-fold enhancements of chemical reactions being common. Enzymes are now understood -- through research on on the structure and dynamics of biomolecules at the atomic level -- to function in a domain governed by the rules of quantum mechanics and to take advantage of quantum tunneling to achieve things that would normally be considered impossible. The dynamics of the enzyme activity promote the quantum tunneling event in order to accelerate the reaction rate -- the enzyme needs quantum mechanics to perform its function. As originally suggested by Erwin Schrödinger, quantum mechanics may be what makes the energy of life so special (cf L. Masgrau, et al. Atomic Description of an Enzyme Reaction Dominated by Proton Tunneling Science 14 April 2006: Vol. 312. no. 5771, pp. 237 - 241) [more]
Conclusion

1. Recognition of "energy" by population: Institutions, such as those of Europe or of the United Nations that are focused on conventional forms of energy, are faced with the challenge that the populations (from whom they claim mandates) have a vastly greater resonance with forms of "social energy" to which such institutions only pay token lipservice -- however much they seek to be representative of such collective energy. By excluding such "energy" from any concern with sustainable energy for the future, institutional programmes effectively cut themselves off from understandings of the very social energy which could ensure popular support for such programmes. The tragedy is that there is more popular support for -- and energetic engagement in -- transnational sporting endeavours and popular concerts than in the "energy programmes" deliberately divorced from forms of "energy" more widely recognized in society.

Innovative environmental policies now stress the complementary roles of communities, markets and governments in creating incentives for improving environmental management. Policy makers are acknowledging that popular sentiment has moved beyond the desire for higher material welfare to include aspirations for accountable government, democratic practices and the translation of economic gains into more liveable urban habitats and socially just societies. Citizens are also becoming more active in challenging the ways in which their environment is being planned and managed. Environmental movements have emerged in significant numbers over the past decade, and many have gone beyond demonstrations and protests to form their own organizations to demand longer-term planning around environmental issues. It is fair to say that environmental issues and conflict among special interest groups, classes and communities will drive much of the urban politics of the future. The challenge for governments in the region is to transform this social energy into a positive source of collaboration for enhancing environmental management.

2. Emergency dependence on unconventional "energy": Conventional sources of energy are delivered to the population through technically complex delivery systems -- vulnerable to breakdown and problematic to repair (see Table 2). A key issue, in reflecting on the future, is the possible, if not probable, breakdown of such systems under conditions of crisis. When these trigger (or aggravate) the breakdown of associated socio-political systems, people are forced to fall back on other forms of energy and their delivery. Which forms -- and how is that energy to be delivered?

3. Uncommodified forms of "energy": Narrowly restricting the definition of "energy" to conventional sources, whatever lip service is paid to "alternative" sources, may be judged by the future as a dangerous exercise in "conceptual gerrymandering" -- definitional game-playing in support of vested interests with what is effectively an asystemic disciplinary perspective. Given the proportion of the world population without access to commodified energy systems, and therefore dependent on their own energy resources, a responsible energy balance should surely take account of the forms of "energy" to which portions of industrial societies might be reduced -- if only to work their gardens (as has been the case in war time).

The current discussion of "energy efficiency" focuses almost exclusively on Group I (a and b) energies, typically as distributed by utility services. There is of course a focus on the efficient use of Group IIa energy -- notably as project/investment funds or information. But the focus has not yet extended to ways that collectivities can use their other Group II and Group III energies more efficiently. Yet, curiously, such efficiency depends in part on the possibility of cutting the "demand" for energy -- but without addressing the social and psychological dynamics that are intrinsic to that "demand" (cf George Monbiot, We must cut demand to have any hope of solving the energy crisis, Guardian, 29 November 2005). It may indeed be possible to cut the demand, but there would appear to be a high probability that this will only be achieved by enabling those dynamics to then be sustained to a far greater degree by social and psychic forms of "energy".

4. Challenge of "intelligence failure" and "unimaginative groupthink": In the field of energy:

- are there analogues within the "energy community" to the inadequate thinking of the:
  - financial development community, as exemplified by its failure to imagine, and its delay in supporting, the role of structures like the Grameem Bank?
  - economic development community, as exemplified by the challenge to its restrictive focus by UNICEF in arguing for development "with a human face" (Santosh Mehrotra and Richard Jolly, Eds. Development with a Human Face: Experiences in Social Achievement and Economic Growth, 1997; UNESCO/UNU, Globalization with a Human Face -- Benefitting All, 2004) -- is there a case for recognizing "energy with a human face"?
  - technological community, as exemplified by the shipbuilding industry's construction of the "state of the art" RMS Titanic (1912)
  - the intelligence community, as exemplified by the conclusion of a report of the US Senate Intelligence Committee (Report on the U.S. Intelligence Community's Pre-War Assessments on Iraq, 9 July 2004) regarding the "global intelligence failure" justifying the invasion of Iraq, arising principally from a tendency to cling to conventional wisdom, or "groupthink" [more]?

- are there inherent dangers to the conventional framing of "energy" by the International Energy Agency, the International Conference on Energy Security (Moscow, March 2006) immediately prior to the G8 Energy Ministerial Meeting (Moscow)? All have a particular emphasis on energy security systems that fails to take account of catastrophic failure in energy distribution and the forms of energy on which populations would then be forced to rely.

- to the extent that the world's energy security problem arises from one kind of mindset regarding energy use, given the unquestionable status of Albert Einstein in relation to fundamental rethinking of energy issues, what is to be learnt from his recognition that: "The significant problems we face today cannot be solved at the same level of thinking we were at when we created them"?
are the prevalent approaches to energy security systems effectively designing in vulnerability -- notably making them vulnerable to some of the Axioms of Energy Systems Behaviour set out in Table 2 especially: "When a fail safe energy system fails, it fails by failing to fail safe" (128)?
• what kinds of energy is the European Intelligent Energy programme, and the EFONET group, likely to consider irrelevant and how vital to any future-in-crisis will those forms of energy prove to be?
• to what extent is the energy community complicit in any process of:
  * sequestering energy technology vital to the energy challenges of the future (whether legally through patents or illegally) [more],
  * discrediting and/or suppressing objective open investigation of controversial reports on new energy technologies, whether claimed to be classified and/or of extraterrestrial origin (as publicized May 2001 at the US National Press Club, by the Disclosure Project) (cf Vivienne Legg, Clean, Free Energy and the Politics of Extraterrestrial Life, September 2002; T. E. Bearden, The Unnecessary Energy Crisis: how to solve it quickly, 2000)
• to what extent are the emergency "energy" measures envisaged by civil defence plans dependent on reactivating conventional energy systems, thereby evading exploration of situations where such systems cannot be reactivated and reliance must be placed on other "energy" systems?
• to what extent do the systems designed by society as a whole to extract and distribute energy, conventionally understood, increasingly tend to "export" their inefficiencies in doing so to the "energy systems" of communities or individuals that are not part of any systems analysis?
• until people can relate their personal sense of "energy" to systemic issues of "energy", what is the probability that appropriate "energy" decisions and disciplines will be voluntarily explored, accepted or implemented?
• who in the energy community should be understood as strategically "trapped" in the light of the observation by an early policy scientist: "A trap is a function of the nature of the trapped" (Geoffrey Vickers, Freedom in a Rocking Boat: changing values in an unstable society, 1970; Human Systems Are Different, 1984). Vickers was the director of the UK National Coal Board, when it was the largest employer in the western world [more].

5. Sustainability of psychosocial communities: With respect to Europe as a psychosocial community:
• is the apathy in relation to any European Constitution, or "Europe" as an entity, in some way related to the focus on Group I and Group II "energies", and an inability to acknowledge or harness Group III energies?
• in considering the original European Renaissance, what kinds of energy might be essential to any new Renaissance of Europe (cf Challenges of Renaissance: suggestive pattern of concerns in the light of the birth metaphor, 2003)
• what kinds of "social energy", "community energy" and "psychic energy" are required to elicit and sustain democratic participation amongst European citizens (cf Practicalities of Participatory Democracy with International Institutions: Attitudinal, Quantitative and Qualitative Challenges, 2003)
• what community experiments are required as laboratories from which understanding can be acquired concerning the kinds of "energy" that are essential to sustain the vitality of such communities (cf Resources on Renaissance Zones, 2003)
• with respect to the Sustainable Energy Europe Campaign (2005-2008) of the European Commission (designed to "raise awareness and change the landscape of energy" as part of the Intelligent Energy - Europe (2003-2006) Programme) -- rather than imposing "top-down", restrictive, "technical" understandings of "energy" on people dependent on "energy" for their survival and thrival -- is there a case for identifying the variety of extant understandings of "energy" variously held to be vital to their daily lives by different sectors of the population?

6. Energy of knowledge-based society: The strategic goal for 2010 set for Europe at the Lisbon European Council - March 2000 is "to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion." European society is now defined as an "Information Society", or as a "Knowledge-based Society", to stress the fact that the most valuable asset is investment in intellectual, human and social capital and that the key factors are knowledge and creativity [more]. From an "energy" perspective, there is therefore a strong case for exploring the psychosocial and economic implications of the widespread insight that "information is energy" and, less frequently, that "knowledge is energy". Otherwise, is there not a danger that conventional understandings of "intelligent energy", currently being promoted, may effectively preclude or marginalize an intelligent approach to unconventional forms of energy -- a classic case of using terminology to reinforce thinking "in-the-box"?

7. New conceptual "language": In a knowledge-based society, there is a need for a new language, of which general systems theory is indicative, to:
  * reframe "energy foresight" to include a wider variety of forms of "energy" and the ability to detect them without dependence on the "sight" metaphor
  * clarify the relationships between different forms of energy to ensure that they can be appropriately transformed into one another in response to changing conditions and unforeseen crises
  * explore alternative systemic mappings (such as the enneagram, discussed above) to interrelate forms of energy, in what may need to be counterintuitive ways (as illustrated by the original Limits to Growth study) -- rather than present them as bulleted laundry lists and profiles (cf International Energy Agency, The Energy Mix of a Sustainable Future, 2006)
  * reframe the fragmented, asystemic approach of distinct institutional "divisions" and sectors to the various forms of "energy" for which they currently have a mandate, possibly recognizing that each specialized "division" needs to develop sensitivity to all the other forms (a "fractal" mode of organization)
  * recognize more clearly the dependence of conventional energy systems on the least tangible forms of energy, especially if there is any risk that the future of energy may indeed be, to some degree, asystemic (personal and local) rather than systemic (national and regional)
clarify where new kinds of research are required to elicit and/or sustain hitherto poorly recognized forms of energy

8. Towards a common energy currency: There is a need for a genuinely common energy currency that reconciles the different energy types identified in Table 1 -- rather than promoting distinct "non-convertible currencies" as though each represented the unique key to the sustainable future of a planetary society.

9. Assisting developing countries and communities: In considering the "energy" resources appropriate to revitalizing developing countries, notably on the African continent, there is a case for exploring radical alternatives to dependence on conventional approaches to energy with their problematic record of implementation. This is especially the case when people in many of those cultures have for centuries been "energized" to an unusual degree by music -- a factor ignored in imposing western models of development (cf Knowledge Gardening through Music: patterns of coherence for future African management as an alternative to Project Logic, 2000). If energy of psychosocial relevance is derived from skillful management of the potential in contrasts, there may indeed be valuable clues to this process from the theory of harmony, notably as understood in other cultures (cf Enhancing the Quality of Knowing through Integration of East-West metaphors, 2000; Susantha Goonatilake, Toward a Global Science: mining civilizational knowledge, 1999).

10. Battle for "hearts and minds": Events in response to interventions by the Coalition of the Willing in recent years have, despite the measureable immense military energies deployed, focused attention on the vital importance of the subtle, intangible, insubstantial challenge of the "struggle for hearts and minds" (cf Alexander T. J. Lennon (Ed.). The Battle for Hearts and Minds: using soft power to undermine terrorist networks, 2003). There is increasing recognition that that battle is being lost, despite the resources allocated to Psychological Operations by the Coalition [more]:

- We lost the hearts and minds of the people - 80 percent of the Iraqis want us out of there, 47 percent say it's OK to kill Americans. (Representative John Murtha (D-Penn.) on Meet the Press, 19 March 2006) [more] [more]
- We Lost Iraqi Hearts and Minds Long Before the Current Occupation (Bert Sacks, Seattle Times, 9 February 2006)
- US admits the war for 'hearts and minds' in Iraq is now lost: Pentagon report reveals catalogue of failure (Neil Mackay, Sunday Herald, 5 December 2004)

Analogous concern for a "battle for hearts and minds" now needs to be articulated in relation to energy issues -- and for the "soft power" required to undermine the networks of ("energy vampires") that are draining non-renewable energy resources. Given the acknowledged failure of intelligence and imagination (noted above), this calls for recognition of the inadequacy of conventional strategic energy initiatives, despite the resources allocated to them. Despite the lack of any scientific foundation for them in the eyes of the conventional energy community, there is clearly a need for the kinds of appropriate "soft power" (highlighted earlier), in the light of the learnings from the recent failures of "psychological operations" in the management of social and psychic "energy" with respect to ensuring conventional energy security.

A "long war" of many decades is now foreseen by the US Secretary of Defense as necessary to contain terrorism (cf Ann Scott Tyson, Ability to Wage 'Long War' Is Key To Pentagon Plan: conventional tactics de-emphasized, Washington Post, 4 February 2006; William Pfaff, A 'long war' designed to perpetuate itself, International Herald Tribune, 10 February 2006). A case now needs to be made for an analogous "long war" to contain those draining non-renewable resources. The future is likely to judge such "energy vampires" as more misguided and desppicable than terrorists are now perceived to be.

Afterthoughts
In the consideration of a country's energy resources -- or that of a community -- especially in the event of system collapse, no consideration appears to be given to a number of interesting examples as indicated below. Each interfaces significantly with energy uses, even in normal circumstances.

- Foot-operated pumps: International Development Enterprises India has been awarded a "Green Oscar" for developing foot-operated treadle pumps that use human power to pump water out of the ground.

- Foot-operated generators: Given the unexpected success of the "clockwork radio", it might be asked whether the activities and equipment of gymnasia and health clubs could not be adapted to feed energy back into the grid (as with local windmills) or be used locally in the event of failure of the public electricity supply. Dynamos could be integrated into gym equipment, in housing and office projects for example. The estimated power produced may be no more than 10 W / person (metabolic increase due to strenuous activity with 25% conversion efficiency). Still, for every person using the gym for an hour, 0.01 kWh of electricity could be obtained -- worth about 0.1 US cent - - enough to light a LED lamp with good optics to light up a room at night for 8 hours.

- Cycling: Most notably in the Netherlands, this substitutes for energy requirements otherwise necessary for public transportation, including transportation to work. Arguably it may also provide necessary exercise, reducing ill-health and its calls on other system resources.

- "Huddling together" for warmth: Most notably in countries where it can be cold at night and there is a tendency to use electric blankets and heated devices (for which a number of energy conserving patents have been issued). This is traditionally replaced by couples or families sleeping together -- "huddling together for warmth", especially amongst those with inadequate shelter or fuel-constrained heating (cf Nonna Chernyakova, A Less Than Cozy Christmas, 8 December 2000). This traditional practice (extensively studied as essential to the survival of many animals) is again a substitute for calls on conventional energy supplies. It also suggests a curious argument for promoting relationships for survival (cf 12 Reasons to Stay Married After Peak Oil and Climate Change, 2007; The Utopia Experiment, 2007). In the case of the UK for example, the National Consumer Council reports:

- Almost four million UK households - that's 5.5 million people - struggle to afford an adequate energy supply. They are victims of 'fuel poverty'. They spend a bigger slice of their income on energy bills than the rest of us. Many cope by rationing their energy use - and often resort to huddling together under blankets and only heating one room. (Energy shouldn't cost the Earth: NCC's blueprint for action on affordable and sustainable...
Subsistence farming: There are numerous activities associated with agriculture and animal husbandry which have been replaced in industrialized countries by devices requiring electrical or oil-based sources of energy. These activities continue to be performed in many countries by individuals without the benefit of such energy sources. Are such cases appropriately taken into account? If not, why not, since each is readily subject to quantification? What other such cases are being systematically ignored?

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