The Oil Drum: Europe
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

ASPO-USA: Support for Global Energy Flow modelling and a Net Energy database

Posted by Euan Mearns on November 1, 2006 - 12:30pm in The Oil Drum: Europe
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Tags: aspo-usa, cutler cleveland, dick lawrence, eroei, net energy database, ron swenson [list all tags]

One of the breakout session working groups at the ASPO-USA conference focused on the need to have greater understanding of all Energy Flows within and between countries on a Global scale and to have greater understanding of Net Energy within all energy production systems. Within the limited time available at the breakout meeting the focus was on the Net Energy topic and it is therefore Net Energy that is the focus of this short post. ASPO-USA directors Dick Lawrence and Ron Swenson led the session.

Professor Cutler Cleveland outlined work in progress at Boston University where they have already begun to compile a Net Energy database. A recent guest post by Professor Cleveland on The Oil Drum presented a compilation of Net Energy data for wind. Professor Cleveland also introduced the Encyclopedia of Earth that is a new WIKI based collection of reviewed articles pertaining to the entire Earth Domain. Professor Cleveland proposed that a subsection of this encyclopedia might be dedicated to Net Energy.

The ASPO-USA working group resolved to:

1. Compile a register of professional expertise and credentials among those who attended this break out session in order to establish how those who attended may be able to support this effort.

2. To define the objectives of ASPO-USA in relation to this Net Energy project.

3. To help define an "industry standard" procedure for measuring and documenting Net Energy.

4. To help form an international panel of experts on Net Energy who may both contribute to defining the industry standard procedure described in #3 (above) and who may also act as editors to entries made on The Encyclopaedia of Earth.

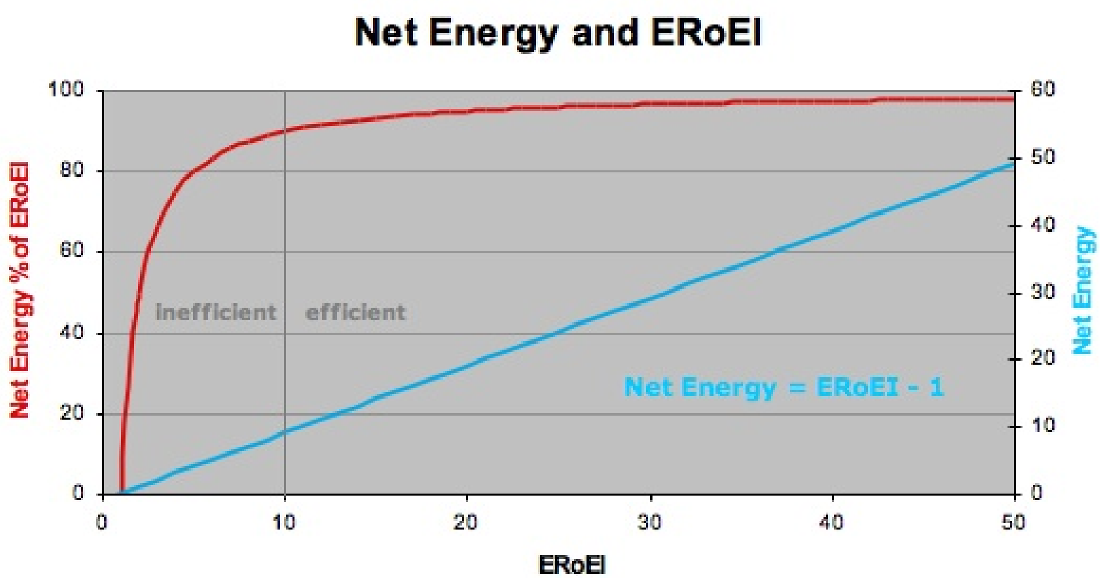
5. To facilitate the public promotion of the Net Energy database and in this regard BLOGS like The Oil Drum may have a key role to play.

The subject of Global Energy Flows will be discussed in greater detail at subsequent meetings of this ASPO-USA working group. The work in progress on Net Energy will provide one of the inputs to the higher goal of creating a Global Energy Flow dynamic simulation.

The view from Cry Wolf

To quote Professor Cleveland "The economic, environmental, social and geopolitical significance of the concepts and implications of Net Energy have never been greater. Yet there is great confusion about every aspect of the concept, and more bad "information" than good. As a result, the impact of Net Energy issues on personal decisions and policy making is nil."

Reliable understanding of Net Energy is in my opinion, fundamentally important to the future prosperity of the Global economy as we become increasingly dependent upon non-fossil fuel energy sources. Consider this, if an energy delivery system has an ERoEI (Energy Return on Energy Invested) close to 1, then our economy will spend all its energy on energy production - not leaving any surplus energy for food production, manufacturing, construction, transportation etc. If the ERoEI is close to 2, then energy delivery systems will spend 50% of their working lives repaying the energy used in their construction and so on. TOD contributor Nate Hagens has outlined these principles in relation to a theoretical community. Maximising ERoEI within our energy production systems will maximise the Net Energy available for society to consume. Our future prosperity, therefore, is inextricably linked to investing in the most energy efficient energy production systems - and this can only happen if the ERoEI of different energy production systems is understood for a range of operating conditions.



In energy production systems with ERoEI less than 10, the energy efficiency plummets towards a Net Energy sink as ERoEI approaches unity. The future prosperity of the World economy will be dependent upon building new energy infrastructure with optimal ERoEI and Net Energy return.

In the past, understanding of Net Energy has not seemed to be important. Early oil and gas production wells had ERoEI ratios > 50. In energy terms, this has been essentially free energy - a 5000% profit on energy invested and wasting this resource has not seemed to matter to mankind. Much of this energy profit has been harvested by national governments by way of taxation both directly and indirectly. Companies and individuals have prospered with "limitless" supplies of virtually free energy and that prosperity has driven the World economy upwards and our climate close to the edge of collapse. The society we know - schools, universities, hospitals, transportation infrastructures, defence, social security and care for the elderly - is all founded upon this fossil fuel bounty.

By way of a personal example, I have been engaged in dialogue with politicians in Scotland concerning their enthusiasm for wind energy and building a hydrogen-based economy. The compilation of wind energy data compiled by Professor Cleveland points to a significant Net Energy ratio for wind in the region 15 to 20. This is approaching contemporary values for fossil fuels making wind energy extremely competitive in Net Energy terms. The disadvantage of wind is intermittency and the relatively "low energy density" of the electricity that is produced. However, with the abundance of Net Energy, my feeling is that the power management and energy storage issues may be more easily resolved - if for no other reason that it will be

permissible to "spill" some energy in achieving stable grid power.

Cry Wolf
aka Euan Mearns TOD UK Contributor
note that I will shortly start posting under my proper name

> Thanks to Dick Lawrence, Ron Swenson, Cutler Cleveland and Nate Hagens for providing supporting information for this post. Readers should also note that Nate is the TOD expert on Net Energy and will be posting more detailed articles on this subject in the near future.