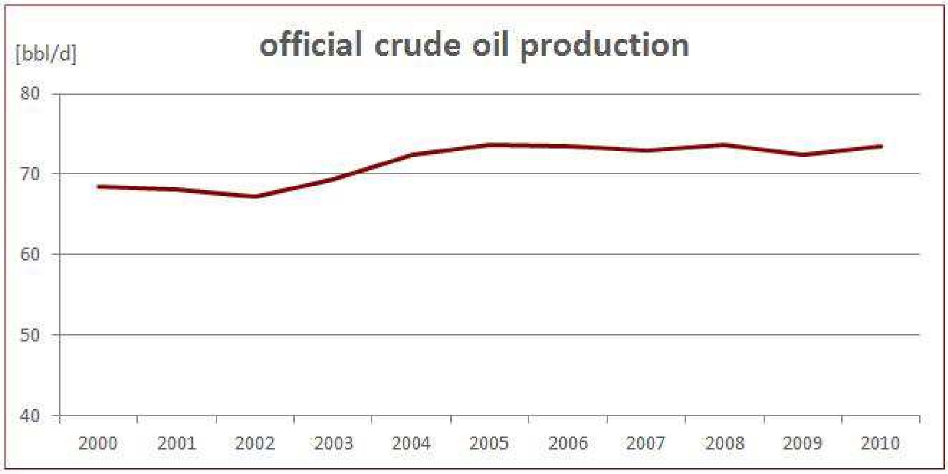
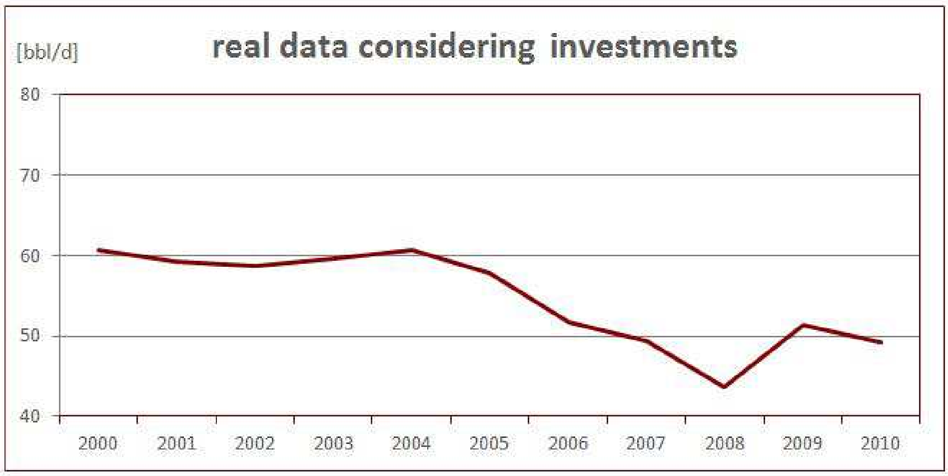
The amount

of crude oil produced is dependent on the amount of effort put into it. If production levels stay the same over a given period of time, but efforts increase, then productivity has actually decreased. This is what happened quiet drastically between 2005 and 2010, in which upstream investments where doubled. This profound change in the energy equation demands for an adjustment of all graphs describing oil production today.





the fact of Peak Oil has been hidden by an increase of upstream investments

The trend of increased investment continues unabated. Capital spending on exploration and production will reach $406 billion in 2011, according to a study of 139 publicly traded oil & gas companies released in August 2011.[1] Other sources predict as much as $533 billion in 2011.[2] The start out point for the surge was $95 billion in 2000.[1]

Adjustment

of the original graph[3] was done by subtracting the input-energy required for production. The real input-energy, which cannot be calculated for practical reasons, is substituted by converting the annual investment into production volume, in barrels. Although investments are usually not considered to affect current production volumes, they do belong to the real-time input/output balance of the oil-industry.

The rising cost of production is part of the graph. Without it, the curve would fall down steeper because the energy equivalent of investments would be greater. Production cost were simplified to 1$ each year. The negative impact of increasing production cost is nevertheless included in the graph because much likely production would have been higher with static cost (assuming there was a physical peaking).

The industry specific rate of inflation (UCCI) does not affect the graph because this factor would reduce investments, but with the same factor production cost and thereby the amount of subtracted production.

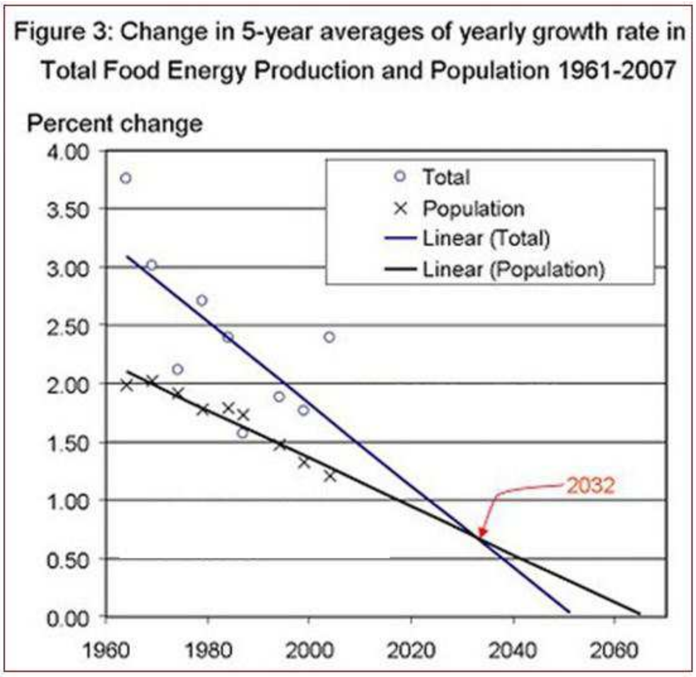
Interpretation

of the graph in terms of defining a date for Peak oil is pointless considering the larger picture of resources within the world economy and the environmental degradation caused by the use of resources. Peak oil, as well as other dependent peaks like "ecological water", "non-renewable water" or even "Peak soil" is a thing of

[1] "Global E&P CAPEX Review" IHS Herold, 2010
[2] "Engergy industry trends Review" Accentrue, July 2011
[3] "Petroleum Monthly" The Energy Information Administration, Dec 2010

the past [4]. Important now is to understand the nature of the implications all this has for Peak Agriculture…

Modern agriculture is an industry that converts fossil fuels and water into food including non-renewable fossil water reserves. It is connected to oil production just like the gas industry is. Below is a chart showing the crossroads of global food production and population.[5] Just to give an impression of what the decrease in resource availability holds in store.



Prototype Creation takes a different approach to reducing the use of fossil resources in dry land agriculture with the IBTS desalination greenhouse. The invention of this closed-loop system is equivalent to the invention of high efficiency solar-cells or a biogas power plant with unprecedented resource-productivity. Although embedded energy in food is not as much on the radar of consumers (and other base decision makers), as alternatives in the electrical energy sector, it is the same on many levels. It is different again reminiscing that food-production is the beginning of any

[4] "Peak Water: Conceptual and Practical Limits to Freshwater Withdrawal and Use" Proceedings of the National Academy of Sciences, Gleick, P.H. and M. Palaniappan, June 2010
[5] "Global food production and consumption trends - an energy-based approach" The Crash Watcher, Oct 2011

economy – all subsequent products and services are dependent on the uninterrupted functionality of food provision.

The IBTS

Integrated Biotectural System is a broadband solution for energy- and water generation providing fresh water from a highly saturated greenhouse atmosphere relying on solar power. The beauty of the utility lies not in its appearance only, but in the proximity and linkage of all the core elements of agriculture. None of the commodities have to be imported once the water- and nutrient cycles are charged – on the contrary: The IBTS exhibits solar desalination as means of charging the internal freshwater cycle. This desalination feature continues to operate after requirements of the greenhouse are met, then producing overcapacity for export. The electrical energy requirement for the condensation of the humid air lies below 1.8kwh per m³, the new efficiency record for desalination in all classes. The reason for this leap is not a secret but well known - Integration

An example: The low efficiency of photosynthesis with ~4% inside the greenhouse can be compared to new solar-cells with 16% conversion of solar irradiation. Inside the IBTS all plants act as water pumps and fine dispersers in addition to the generation of bio energy. Principally they offer the same effect that energy intensive tech. evaporation would offer. The height of this effect occurs in the morning, when solar irradiation and energy in the thermal storage of the IBTS are down.

Sugarcane : 8% efficiency$_p$
or 10kg/m²a
2% capture of
all irradiation
Energy forms :
Biomass, biogas or bioliquid
Options :
Thermal depolymerisation in conjunction with biomass from septic tanks

Solarcell: 14% efficiency$_p$
minus production energy
minus thermal losses
minus aging process

Only electrical current

Damage before payback
Incompatable with emerging Bioenergy systems

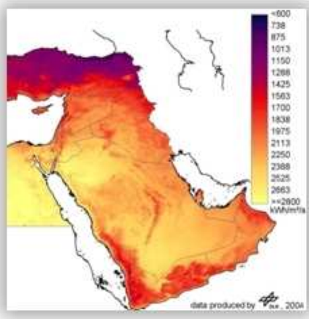
Solar-Energy captured* :

400 MegaWatt hours
per year and hectare ~

400 KiloWatts per day/m²

- Enough for 10 households
with 40.000 kWh/a

*with 100% sugarcane surface-cover



A truthful perspective

Photosynthesis is a process of converting sunlight into useful energy embedded in a perfectly optimized system. It is employed instead of cumbersome photovoltaic panels and associated technology in greenhouses. The peak efficiency of photosynthesis ranges between 1% and 8% only but accumulates throughout the years of growth and adoption to the environment. Each leaf on a tree varies from the others with several dozen characteristics in its capability to harness and convert sunlight.[6] Overly high temperatures, which reduce the efficiency rates of photosynthesis, as well as solar-cells, do not occur above well-sized plantations. This valuable cooling effect is due to integrated "services" like sunlight reflection or day-time evaporation (from soil).

The peak efficiency of solar-cells ranges between 8% and 17%, but this is not the whole picture because they are high in investment compared to plantations. Life cycle assessment (LCA) studies state their energy payback time or EPBT to lie between 1 to 4.5 years,[7,8,9] but the energy required to build the production plants is not accounted for. This would about double the time because the EPBT of plants is 3 to 4 times higher than that of modules.[10]

Another just stunning detail in these studies is the desire to imagine that each unit of energy, a PV module produces, is actually three units of energy, because it supposedly substitutes fossil energy sources that lose two thirds of their primary energy when converted to electrical energy. Without this assumption the EPBT is about 3 times longer. In reality the fossil resources were only used to generate the solar-cells. The power they generate is additional electricity. As the installed capacity of new solar plants increases each year their energy production does not even make up for the annual energy investments (all globally).[9]

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6 "Photosynthesis adaptations and adjustments to changes in light and temperature" James Ehleringer University of Utah – Global Change and Ecosystem Center, Oct 2011

7 "Environmental impacts of Crystalline Silicon Photovoltaic Module Production" Erik A. Alsema1, Mariska J. de Wild-Scholten, 2006

8 "Rec produces first PV modules with one year energy payback time and leading low carbon footprint" Renewable Energy Corporation, Sep 2011

9 "Standardized Life Cycle Assessment of Current Photovoltaic Technologies" Tim Bakhishev, May 2009

10 "Considerations about Global Data on Payback Times of PV-Installations" C. Harder, June 2011

On top of these differences solar-cells forfeit up to 18% of efficiency when temperatures climb up to 85°.[11] Unfortunately high temperatures occur frequently in hot deserts. Not that all of this was enough solar-cells shed about 0.5 to 1% of efficiency per year due to aging.

All of these facts put together in an LCA and compared to the range of synergetic effects in an integrated greenhouse draw a different picture on what is substantial for a smart, global energy economy - one that can sustain after various peaks in resource availability have knocked down.

LCA according to ISO 14040 has become just another tool for bleaching data in favor of an industrial point of view. Not to talk about the high ranking that CO2 assessment has in the process, although higher CO2 levels in the atmosphere promote plant growth.[12]

Summary

The adjusted oil-production graph shows us the need for a revision of fundamental data and for an accelerated shift towards renewable energies. Agriculture is presented as the (new) stage for this acceleration. The Integrated Biotectural System is a potent solution for agriculture in desert areas because it relies on photosynthesis and is capable of generating its own freshwater. Integration - the key to efficiency, underlying Ecosystems and the IBTS, is illustrated by comparing photosynthesis to photovoltaics. Life Cycle Assessment for PV technologies is exposed having become a puppy for the industry and letting energy pay back times appear 6x shorter than they really are.

The IBTS desalination greenhouse could become the loophole methodology, missing in the energy infrastructure of Arab countries today.

[11] "Reduced Temperature Dependence of high-concentration photovoltaic Solar Cell open-circuit voltage (Voc) at high concentration levels" Sewang Yoon, Vahan Garboushian, 1994

[12] "Interim Report - Terrestrial Plants and Soils" Craig D. Idso, Robert M. Carter, S. Fred Singer, Nongovernmental International Panel on Climate Change, Sep 2011