The city at the end of the cheap-oil era

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Introduction

Our cities and their suburbs are the habitats of motorcars feeding on oil. Motorcars occupy the public space and fill the air with their exhaust gases. Therefore, I was surprised to see that the motorcar and the prospects for the future survival of this species do not seem to be a main concern to be addressed at this symposium. The documentary *The End of Suburbia – Oil Depletion and The Collapse of The American Dream*, distributed as a DVD, has drawn attention to the fundamental problems facing cities worldwide. However, I shall now seek to draw your attention to these problems: problems which are repressed in the media and non-existent on the public political agenda because the coming decline in oil supply has such dire consequences for the prospects for the future of consumerism that few dare to confront reality. The head of the ostrich is securely buried in the sand.

The modern nature of cities

I have been wondering about the connotation "Natural City." In conventional modern Western thinking, *Nature* is what is found in natural parks – apart from roads, parking lots and signposted trails – i.e. what is not made and arranged by humans. In contradistinction, a *City* is an agglomeration of human artefacts arranged for human purposes. In nature, life in each particular local domain is nourished through a multitude of internal food-chains, sustained by sunlight and precipitation. In a city, life is sustained by food and materials imported from the surroundings. Thus, in the conventional framework of modern Western thinking, a city does not belong to nature. It is *per se* unnatural.

However, this conventional conceptual distinction between *Nature* and *City* and between human activities and the environment crumbles when confronted with the physical and biological realities of modern life on earth. Between the cities and the artificial natural parks, there is nowadays nothing which is not governed by humans and their machines. There is no nature and no environment of which we and our machines are not integral parts. Like ant heaps and termite nests, cities are integral parts of nature – alas, by far those with the most heavy impacts on all other parts of the ecosystems. What is called "environmental protection" is the protection of the conditions of life on earth in all its diversity. "Life protection" would be a better term.

I presume that "Natural City" should be interpreted in this conceptual context, as in *Natural Capitalism*, the title of the book by Paul Hawken and Amory and Hunter Lovins, published in 1999. In this sense, a city should be a sustainable physical and biological component of the ecosystem to which it belongs, in future regulated by a new economy which governs its development and activities under the constraints of life protection and limited resources which, most certainly, is not the case for the cities of the second half of the 20th century.

We must keep in mind that the second half of the 20th century bears no resemblance to any earlier period in the history of the Earth and that therefore no reference to history is relevant to the analysis and understanding of the problems we face today. Columbus could not foresee what was ahead but he did have a compass and the stars of the firmament to help him to set his course and estimate the latitude. Setting out for our voyage through the 21st century, we have no such fix-points for our navigation. We are, in fact, at a singular point on the trajectory of the development of human cultures.

Never before did the world's population grow from 2 to 6 billion over half a century. Never before was it a regular experience for millions of people to watch from above the myriads of motorcars and trucks circulating on motorways around a city when their plane approached the destination of their holiday or business trip. Never before were so many new urban areas, roads, motorways and airports built. Never before did agricultural and industrial production and international trade grow exponentially to the levels of the present economy. And never before did humans have the power to exhaust the fish stocks in the seas and to change the climate.

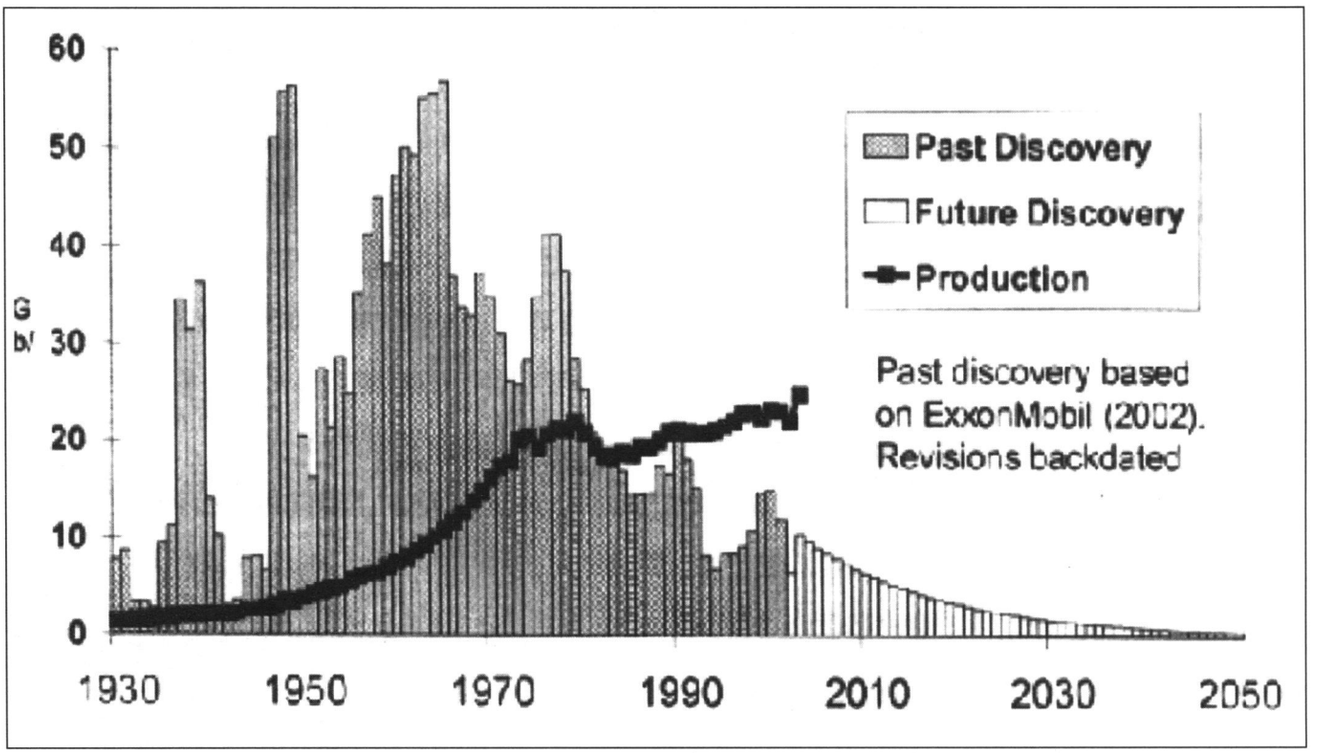


Fig. 1: The growing gap. (*Source:* ASPO Newsletter. www.peakoil.net).

Obviously, this explosive economic growth, which in all respects has changed the world, was based on abundant supplies of cheap fossil fuels: coal, mainly for electric power generation; oil and gas mainly for industries and for the heating of buildings; and petrol and diesel for the millions of internal combustion engines in cars, trucks, buses, airplanes, tractors, ferries, cargo ships and fishing boats.

Had large oil reserves not been found in the 1950s and 1960s (fig. 1), the basic infrastructures of the industrialized societies – the physical structures and transportation networks of the cities, the industrial production networks, the mechanized agricultural production – would not have been as they are today. Also, the migration of millions of people from rural areas to the megalopolises in the Third World was conditioned by oil for the transportation of food and other basic necessities to these huge, overcrowded habitats.

We now live in a world whose cities in all respects depend on ample supplies of cheap oil. A new "nature" is dominated by 600 million cars and sports utility vehicles (SUVs), millions of trucks, and hundreds of thousands of airplanes – including bombers and fighters – which consume 80 million barrels or 12 million cu.m of oil every day and emit 30 million tons of CO_2 in the process. If the amount of oil consumed in one day were filled into oil drums, the array of oil drums placed with one foot between each of them would span the Earth at the equator. The frightening prospect is continued exponential growth from this already excessively high level of consumption.

Limits to growth

The nature of exponential growth is not widely appreciated even though the illustrative water hyacinth example is well known. Imagine a water hyacinth which multiplies at such a rate that one plant becomes three in five days (fig. 2a). Assume that in the course of 10 years 10 percent of the surface of a big lake has

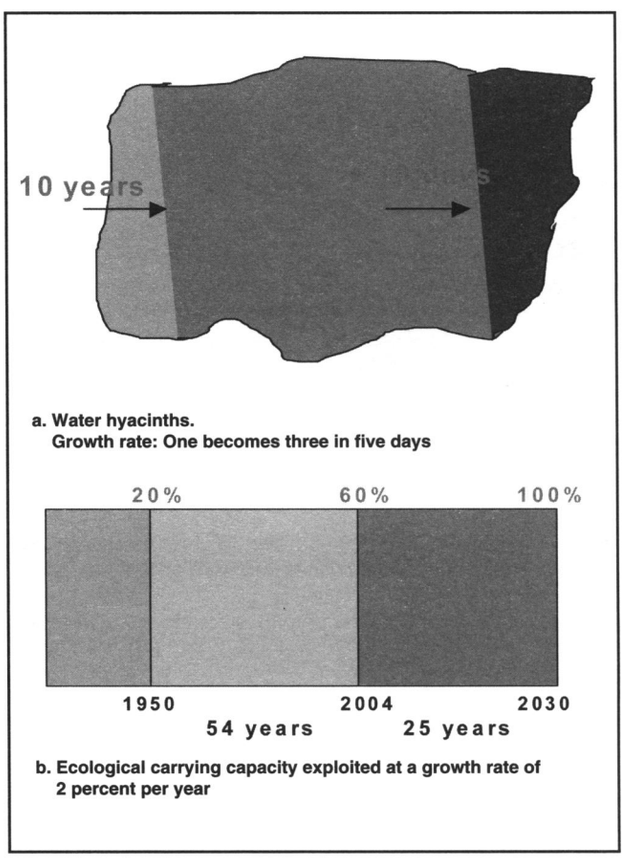


Fig. 2: Limits of growth.

become covered by such plants. After only 10 more days, 90 percent of the surface will be covered.

Now assume for the sake of argument that, in 1950, human societies had exploited 20 percent of the earth's sustainable ecological carrying capacity (fig. 2b). Then, at a growth rate of 2 percent per year, 60 percent would now be exploited and 100 percent would be reached 25 years from now. Thus, there are limits to growth and, at the present level of environmental impacts and resource depletion, we approach the limits at a rapidly growing rate; 80 percent of the world's population lives under severe limitations. It is a matter of one or two decades before the affluent countries reach the limits.

Oil is a limited resource. The bulk of the reserves now being depleted were found before 1980. We will not run out of oil for a long time but, at the present exponential growth in global oil consumption of more than 2 percent per year, oil demand may surpass oil production capacity within one or two decades as production levels peak and subsequently begin to decline irrevocably.

Continued growth in the supply of oil implies that no competitive alternatives to oil will be introduced on the market on a large scale – otherwise the growth in supply would cease as demand decreased. A consumption growth rate of 2 percent per year (fig. 3) means that 20 years from now, consumption will be 42 billion barrels per year as against the 28 billion barrels today. It takes an enormous increase in the number of piston engines, jet engines and oil boilers to bring about such an increase in consumption: one may expect one billion oil-powered motorcars on the world's roads instead of 600 million today, and millions of additional oil-powered trucks, tractors, harvesting machines, ships and airplanes. Moreover, it takes many more miles of asphalted roads, parking lots, and runways to accommodate all the additional vehicles and aircraft needed to consume 42 billion barrels per day.

As long as supply can meet demand, the market price of oil may remain low. In that case, growth in consumption – i.e. the growth in the number of oil-based machines and facilities – will continue until production can no longer meet demand. Thus production capacity will peak while demand is still growing, whereupon the oil price will surge in a seller's market with no swing producers to balance supply and demand. Under such circumstances, the peak situation becomes more catastrophic the longer the peak is postponed.

In short, if a growing world economy is fuelled by ever-growing supplies of cheap oil, the economy will become technologically ever more dependent on cheap oil. Hence, when the peak occurs, the economy will be technologically unprepared for the decline in the supply of its most vital resource.

Adapting the economy to a decline in oil consumption

The conventional wisdom of the prevailing economic theories relies on the axiom that worldwide economic growth which implies continued growth in the production and consumption of energy-consuming hardware can continue for an indefinite length of time. It is assumed that market forces will ensure that new resources and new technologies will always be at hand when access to the resources upon which our societies depend becomes restrained and present technologies, therefore, become obsolete.

History shows that man has hitherto succeeded in making life easier by means of new energy sources and technologies, from

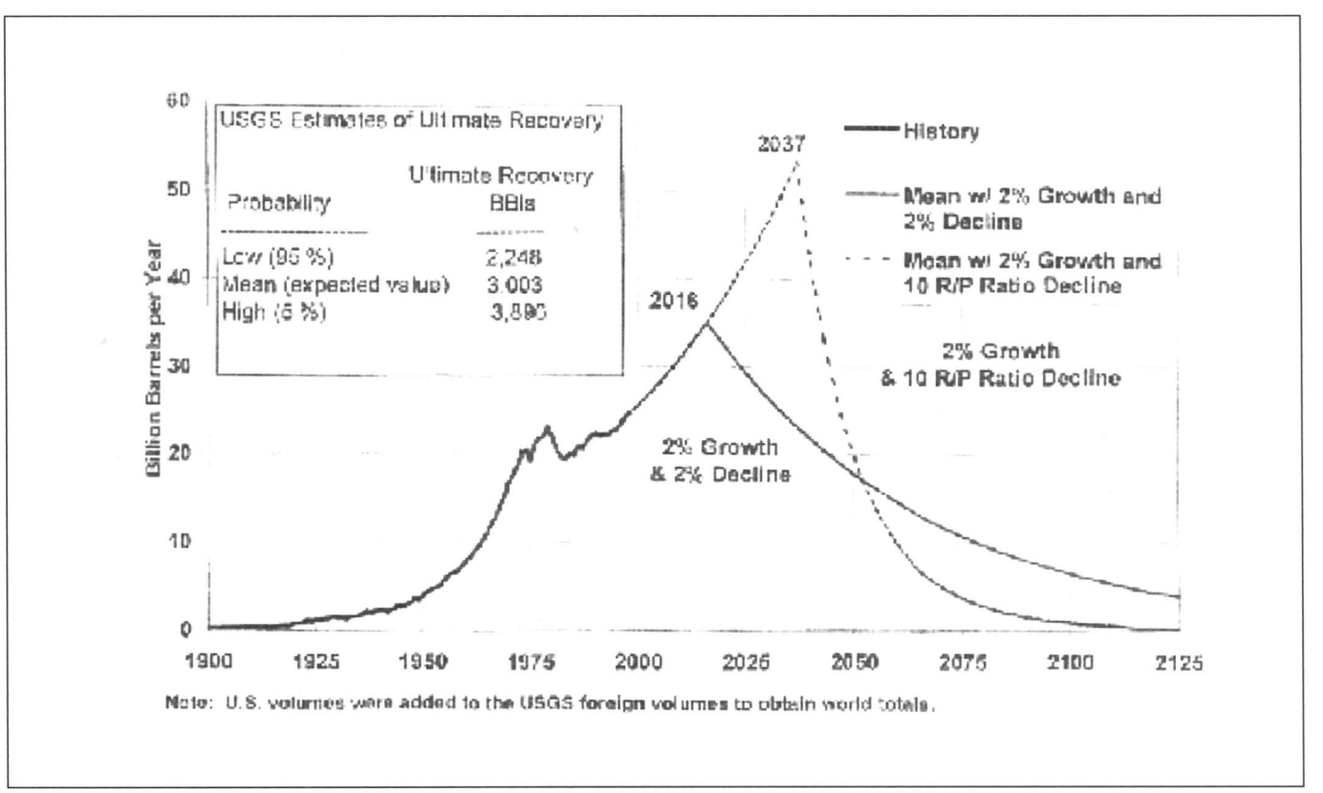


Fig. 3: Annual production scenarios with 2 percent growth rates and different decline methods. (*Source:* US Department of Energy, Energy Information Administration (EIA), 2000).

manpower to horsepower and row boats to sail ships; from horsepower and sails to coal-fired steam engines; from steam engines to oil-engines. However, as we now come to the end of the cheap-oil era, there is nothing in sight which is so easy and cheap to get, handle, store, and to use in cars, buses, trucks, tractors, ships, and airplanes as oil from oil wells.

The low cost of oil has allowed the development within a few decades of a world economy which is based on extravagant and wasteful use of this unique, most valuable fuel and thus has depleted its most precious resource base much faster than long-term economic considerations would justify. No market forces will bring about any easy and cheap substitutes for oil.

Considering what it takes to adapt the economies of the affluent countries to a decline in oil consumption, it should be recognized that it is not a question of replacing fossil oil by other fuels, renewable or non-renewable. At the present level of oil consumption, there is no substitute for oil. The task to be accomplished is the dismantling of the oil-technological complex developed over the last 50 years in a regulated manner.

In the first round, the objective must be to ensure that the demand for oil peaks before the oil production capacity peaks. Therefore, it is folly to invest hundreds of billions of dollars every year in the next decades in oil production on the one hand and oil-consuming machinery on the other, desperately seeking to climb the ever steeper slope of increased oil consumption, which ends at a cliff. Instead, a substantial part of these thousands of billions of dollars should be invested in the dismantling of the oil-technological complex so as to ensure that oil demand peaks before oil production capacity peaks.

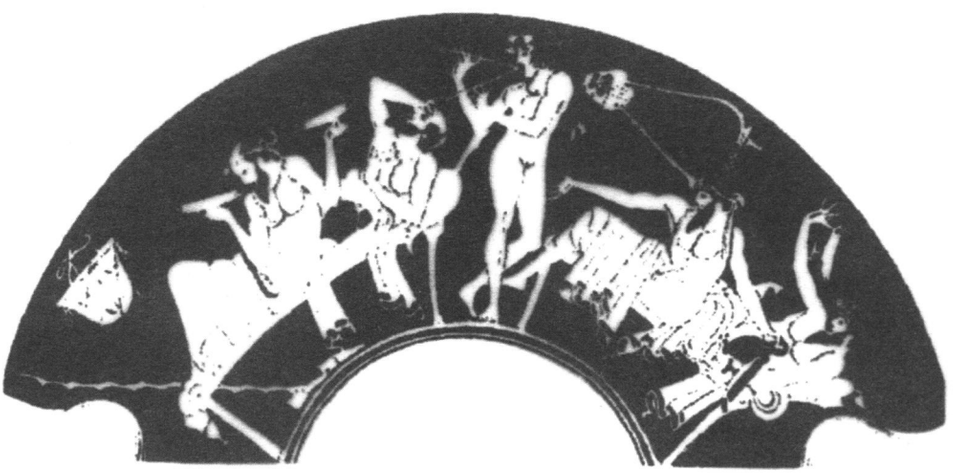
In the market economy, the only way to pursue this policy is to tax oil consumption so as to ensure that the consumer price grows by something in the order of 15 percent per year over the next 10 years in order to gradually adjust the economy to high oil prices, instead of waiting for the price to soar in a world economy which has, in the meantime, become even more addicted to oil.

The restoration of the city

Imagine being a town planner in a city where gas at the gas station is progressively taxed so that the price increases to 10 dollars per gallon over a 10-year period and that the taxation revenue is allocated to the construction of energy-efficient, rapid and comfortable means of transportation, such as modern trams, trolley buses, local trains, and footpaths and bicycle lanes lined with trees and flowers where voices and birds are heard instead of the noise of cars. Imagine creating, in this way, a new kind of economic growth and useful employment in the restoration of a city after the occupation by motorcars, instead of transferring more and more resources to the motorcar industry and the oil industry and more and more capital to the oil-exporting countries until one day the gasoline price surges to 10 dollars per gallon anyway.

If this is unrealistic, wishful thinking, it is hard to see how the Natural City should emerge, except from the ruins of the habitat of the motorcar. It must be realized that, before those who are young today retire, most motorcars will be scrapped motorcars in any case. Instead of lamenting this state of affairs, it should be seen as an opportunity to restore the city as a natural human habitat.

It is hard to accept that the lavish motorcar and what it stands for as the emblem of vulgar consumerism should constitute the ultimate achievement of human invention and cultural development.



The men of Athens enjoy the customary delights of a *sumposion*: wine, women and song.
Early 5th century.

The World of Athens
An introduction to classical Athenian culture
Joint Association of Classical Greek Teachers
Cambridge University Press

Fig. 4: There is a life without motorcars. (*Source: The World of Athens, An Introduction to Classical Athenian Culture,* Cambridge, Cambridge University Press, Joint Association of Classical Greek Teachers).

The culmination of human development?

Looking back on the multitudes of cultures in which religions, philosophies and arts have developed in the preceding millennia, it is hard to accept that the history of human development should culminate in the affluent countries' industrial growth culture where people as consumers serve to sustain economic growth with no other purpose than growth itself. Hopefully, the unprecedented technological capabilities we have achieved can be used not only to produce more and more superfluous material products and immaterial services which, only at great advertising costs can be sold to the consumers whose incomes depend on their employment in the industries which produce those products and services. Let us also not forget to mention the production of modern weaponry used to safeguard the resource bases of this production-consumption complex.

The terrifying scenario is that no serious political actions are taken to curtail oil consumption, and that when oil supply stagnates and begins to decline, the affluent countries will, for some years, be able to sustain their consumption either because they can pay a high price for crude oil or because they take military control of the remaining oil reserves in the Middle East, thus leaving the less affluent and the poor countries – including China, India, and the Latin and South American countries – to survive with rapidly decreasing supplies of oil for which they will have to pay a steeply growing portion of their already disproportionately small incomes. To uphold, for some years, such an apartheid in the global community, further fortification of the affluent countries and their military outposts is needed. That implies unprecedented militarization and the renunciation of any aspiration of a development towards global equality. In the affluent countries, the problems will be aggravated with no sustainable solutions in sight.

It takes a revolution in political and social thinking and in architectural design to restore a city to become a pleasant human habitat with few motorcars and it takes more technological ingenuity than to land astronauts on Mars (fig. 4). So, it is a worthy objective to restore our cities and thereby reduce oil consumption in the affluent countries by 50 percent before the Americans land on Mars. Success will mark a culmination in human culture.