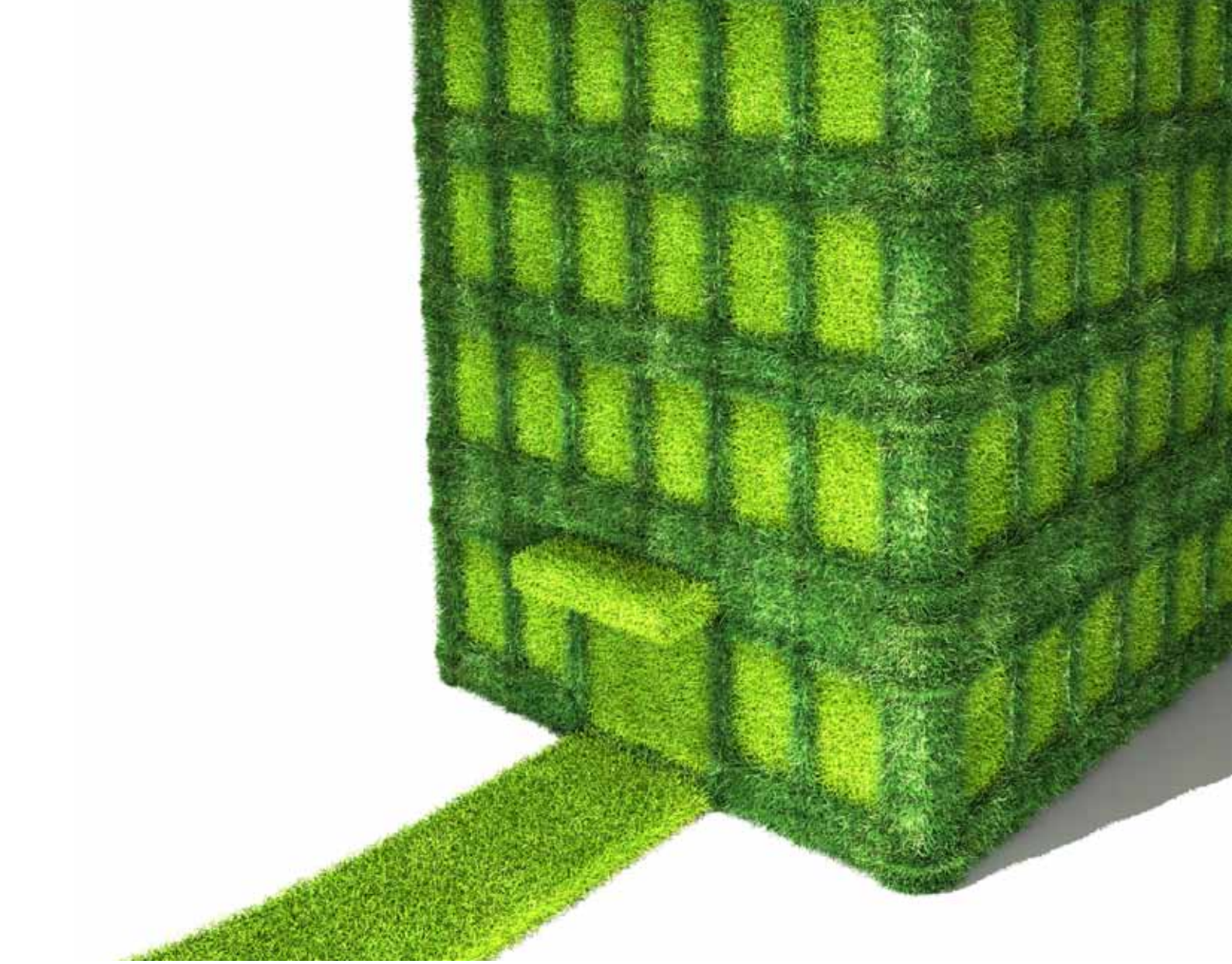


Rejuvenative cities

A transformative vision for urban development

PHILIPS

Contents

Abstract

Urban living is the future of the majority. But although urbanization has brought great progress to human civilization, it is also a key factor in compromising the natural balance of the planet; it has become one of the key threats to loss of biodiversity. There are a number of associated macro level issues such as pollution, decline in natural resource, and numerous current and escalating social issues that will increasingly detract from the benefits brought by urban living if we continue to develop cities in their current format. Many approaches to improve urban development are still driven on an issue-based level rather a systemic approach.

This paper examines the systemic issues and drivers of change associated with urban development. It explores possibilities for a holistic approach to systemically transform cities into places that positively contribute to human personal development, social harmony and diversity, and the environment and health of the planet at large. The paper concludes that we have to think differently about the role and the function of cities, which will inspire us to develop future cities and urban living in a different way.

Introduction

Humans are arguably one of the most successful and adaptive species on the planet. Since the start of the agricultural age 10,000 years ago, humans have progressively shaped not only their own habitat, but also the face of the planet at large through various activities including deforestation, agriculture, urban development and, construction, transportation infrastructure, manufacturing and consumption of products. With the advent of large-scale trade and transport infrastructure, proximity to resources seems to have ceased to be the driving force behind the growth and decline of a population.

Many of these shaping processes are progressing at an escalating rate. There are increasing signs that the current pace of natural resource exploitation and impact on the environment is not sustainable, and that the current model of human progress has an adverse effect on quality of life and the sustainability and health of the planetary ecosystem.

Future human residence will increasingly be in cities. In 2009 we reached an unprecedented milestone in the history of the planet in that more than half of all people now live in cities. Urbanization has started to mature in many developed economies, but is continuing at an unabated rate in developing economies such as China, India and Brazil, which all have large populations. China's current urbanization rate of 46% was much lower than the average level of 85% in developed countries, and was also lower than the world average of 55%. China has set a goal of 65% of urbanization rate in 2050, which means another 300 million people in China will move into urban environments over the next four decades.

Although cities exemplify progress of human civilization and the promise of a better life to many, there is a reality that the current model of urban development is also fraught with problems and challenges. Much of the current and past urban development has devastating environmental implications that extend far beyond the borders of cities and affect the planet at large. Many modern cities are increasingly also a mix of modern glitz and urban slums and living conditions of people are often compromised by poor air and water quality, inadequate waste and sewage processing, inadequate and undemocratic access to employment, health care and personal development, and lastly inadequate attention to the social role of cities in order to secure future progress of human civilization. This calls for serious re-thinking about the future role and path of development of cities. A good place to start is to consider the evolving role and function of cities that happened over many millennia.

Urban evolution and the changing role of cities

From hunter-gatherer to urbanite

The evolution of the human race is inextricably linked to the evolution of cities. Cities have precipitated the development of mankind from hunter-gatherers to farmers to urbanites. Cities are not just places where people live in close proximity. In essence, urban development has been the main driving force in the development of modern institutions and thought.

The first true urban development started around 3,000 B.C. in ancient Mesopotamia, Egypt, and the Indus Valley. Ancient cities displayed both 'organic' and 'planned' types of urban form. Cities quickly became hierarchies of power and human social organization developing religious, political, military and social hierarchies. Two typical features of the ancient city are the wall and the citadel: the wall for defense in regions periodically swept by conquering armies, and the citadel – a large, elevated precinct within the city – devoted to religious and state functions. Cities also grew up around marketplaces, where goods from distant places could be exchanged for local products. Throughout history, cities have traditionally been founded at the intersections of transportation routes, or at points where goods must shift from one mode of transportation to another, such as at a river or an ocean port.

Accumulating and wielding the wealth accrued through colonial conquests and centralized trade was a key model for early cities.

From agricultural trading markets to smokestacks of Industrial production

During the Industrial Revolution starting in the mid-1800's, many cities started to experience rapid growth. New York had a population of about 300,000 in 1840 but had reached almost five million in 1910. Millions of rural dwellers no longer needed on farms flocked to the cities where new factories churned out products for the new markets made accessible by railroads and steamships. Increasingly, urban economies were being woven into the national and international economies.

The industrial paradigm utilized humans as units of production and consumption, and increasingly caused disconnection from nature. Urban human environments were entirely shaped by modernity, and the ideals of scientific and material progress. During the industrial age, cites became smokestacks of industrial production.

The working class lived in crowded districts close to the city centre, near their place of employment. The increasing crowding, pollution, and disease in the central city produced a growing desire to escape to a healthier environment in the suburbs. The mass production of the car caused a growing number of people to move to the suburbs and commute into cities. The typical industrial city still focused on the city centre, which contained both the central business district, defined by large office buildings, and substantial numbers of factory and warehouse structures.

From centers of industrial production to centers of consumption

Around the mid 1900's, many large cities started to evolve into centers of consumption, where people worked and produced to earn wages in order to purchase consumer goods. As the suburbs expanded ever further away from the city centers and more people owned cars, the quality of suburban life started to diminish. People spent increasing time commuting and being stuck in traffic jams.

'Urban sprawl' generally has negative connotations due to the health and environmental issues it creates. Residents of sprawling neighborhoods tend to emit more pollution per person and suffer more traffic fatalities. Sprawl negatively impacts land and water quantity and quality, and may be linked to a decline in social capital.

It is also linked to increased obesity since walking and bicycling are often not viable commuting options which in turn has led to an increase in the ownership of cars. The wider the urban spread around the city, the longer the commuting times, the greater the pollution and the less fulfilling the social life of the people. The end result is a loss in social capital where neighbors do not know one another anymore and the local social network has become fragmented. Houses cease to be homes but have become merely places to sleep.

In many cities, the process of urbanization and consumer culture has led to increasing levels of individualism at the expense of social responsibility or communal ties. On the one hand it has progressed human liberty for those who were included in the formal economy, but it has led to increasingly self-centered mindset with a 'survival-of-the-fittest' mentality *(Aburdene 2007)*.

The end of the consumer economy as the key driver of urban development

Consumerism in many regions has slowed in recent years due to a number of factors. The 2008/2009 global recession has resulted in a drop in private consumption in mature economies for the first time in nearly 20 years. Consumers experienced a decline the value of their property and their pension savings decimated on the stock market. Not only have consumers watched their wealth being eroded – many countries are faced with a persistent and probably enduring decline in employment opportunities.

The shift in employment opportunities towards connected knowledge workers has brought an interest in rich experiences and personal development, and access to services, rather than material consumption or product ownership. This, combined with the hard economic fact that rising fuel prices make it less attractive to commute long distances, has led to a change in lifestyle ideals and aspirations. This is becoming clearly visible in declining shopping centers and suburbia in the US. Even before the recession which started in 2008, U.S. consumers had developed 'mall fatigue', and the classic enclosed shopping mall was in decline. More than 400 of the 2,000 largest shopping malls in the U.S. have closed in the past two years.

The impact of the recession has put the brakes on the credit-fuelled rampant consumer culture in the US and emerging consumer cultures in Russia, India and China. This drastic shift will have long lasting consequences. On a policy level there are international actions underway to regulate and overhaul the world financial systems, which would limit access to limitless credit. There is also a change in mindset emerging. Many credit happy consumers are now starting to realize the perils of a life of rampant consumption built on personal credit, and for the first time in decades, the savings rate in the US is increasing. The recession has brought with it a new frugality that pushed the U.S. household savings rate to 6.9% in May 2009 (from less than 1% a year ago), a level it hasn't reached since the mid-1990s.

Reflections on the urban future

It is clear that human societies have reached a crossroad of fundamental change. There are a number of emerging issues that bring us to a point of reflection where we have to find different models of evolving our urban human and social existence *(E. Assadourian 2010 / E. Assadourian 2002)*.

Systemic change that will impact on future urban habitat

There are a number of developments on socio-demographic, sociocultural, policy, technological, environmental and economic level which need to be understood in a systemic way in order to reflect on future visions for transforming urban habitat. Most attempts to deal with these factors in isolation will at best be ineffective and at worst be counter-productive.

Population growth and urbanization

Growing global human populations

If we consider that our human ancestors were hunter-gatherers for about 2 million years before settling 10,000 years ago in small agricultural communities and villages, and only in the last 150 years started the process of mass scale urbanization, it becomes clear how rapidly we are changing our style and conditions of living. It also means that in the last century we have seen, for the first time in the history of human evolution, a very marked dissociation from nature as people migrate to the completely man-made urban environments.

The world population is expected to increase by 2.5 billion by 2050, to 9.2 billion. By that time, urban population is expected to rise from nearly 3.4 billion in 2008 to 6.4 billion in 2050. The urban regions thus will absorb most of the world's population increase in the next four decades while withdrawing people from the rural population as well *(Hakim 2010)*.

Urbanization is one of the critical global trends shaping the future, according to World Resources 1996-97. More than half of the world's 6.7 billion people are living in urban areas since the beginning of 2009 for the first time in world history according to a recent United Nations report. By 2025, two thirds of the world's people will live in cities. Nearly 200 years ago, London was the only city in the world with more than one million people. Today, across the globe, there are more than 400 cities of at least that size.

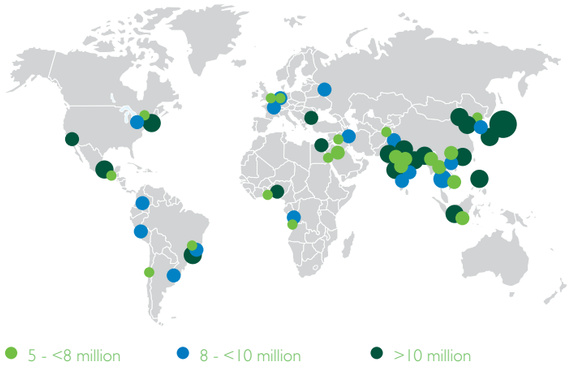
The proliferation of megacities

According to a recent McKinsey report, China will build 20,000 to 50,000 new skyscrapers over the next two decades – this is the equivalent to ten cities the size of New York. By 2015, the world will have 33 "megacities" with populations over 10 million and more than 500 cities with populations of 1 million or more. Urbanization is adding the equivalent of a city the size of Vancouver to the planet each week

Megacities are a double edge sword. As centers of human progress, populations have flocked to them, and as cities they have flourished. But as culture and economy has grown, and as populations have grown with them, mega cities have naturally become some of the world's biggest polluters and therefore they cannot fail to contribute to growing concerns of over climate change.

Finding sustainable solutions is increasingly seen as a 'must do' to avoid that mega cities become a victim of their own success. Any such initiatives will not only be served by technology, but need to engage residents through education and incentives to cooperate *(E. Assadourian 2010)*.

Megacities of the world



Wealth disparity and inclusion

In many large cities, there is a mixture of formally organized and serviced high density housing and under-serviced slums, which is an increasing side-effect of rapid urbanization. In China for example, there are around 200 million urban migrants' who unofficially live in cities without any rights. The urban disenfranchised often has very poor access to health care and services and poor access to education, which often has negative implications for the crime and safety in urban environments. There is a rising need to develop opportunities to engage and socially include the urban poor in urban societies.

Demographics (aging society)

The world is aging. Birth control, and advances in health care and living conditions ensured higher longevity. In absolute terms, the number of older persons has more than tripled since 1950 and will almost triple again by 2050. *(World Population Ageing: 1950-2050 – United Nations Report 2002)*. According to the BBC, more than half of babies now born in the UK and other wealthy nations will live to 100 years.

The reasons are many-fold and may vary amongst societies. They include increasing life-span due to better health care, changing values (smaller families), empowerment of women, and the decline of institutions like the traditional family and marriage, and rapidly declining fertility rate.

The effects of this will impact cities on many levels. Aging societies have a major impact on the cost of healthcare and the incidence of diseases such as dementia, cancer, and cardiovascular disease to name a few. Many healthcare and retirement systems are ill equipped to deal with this reality and may be on bankruptcy track – their premises are outdated.

Older people need much higher levels of health care and social support, which result in growing costs, while their contributions to the tax income of cites and countries decline. This places extreme pressure on health care systems.

Furthermore, older people are more inclined to suffer from loneliness, depression and social exclusion, especially in Western societies where they are often seen as a burden to society. In the last year, there have been several articles that concluded the inevitable: retirement may simply disappear for the majority of people as pension funds fail.

Mobility

The rise in access to transportation and mobility is a double edged sword. On one hand it has become a symbol of personal freedom and empowerment to own private transportation. However, each day, around 1,000 new cars are added to the streets of Beijing alone. This transformation in personal empowerment carries a hefty price: badly congested streets and rising carbon dioxide and other air pollutant emissions. China currently has a car penetration of around 6%, which is a far cry from around 90% in the US. Even at this low penetration level, China surpassed the US in 2008 to become the biggest global producer of atmospheric CO_2.

In the future, mobility will need to increasingly be provided by a mix of personal and highly efficient public transportation.

Natural Resources

The depletion of the natural non-renewable resources is one of the most serious side-effects of population growth, urbanization, rising prosperity and material consumption *(E. Assadourian 2010)*. Currently we are consuming resources at an unsustainable rate and we are accruing a massive environmental debt. *(World Resources Institute 2010)*

Energy

Dealing with the growing energy demand will be a serious issue in cities in the future. Currently, more than 60% of all energy in the world comes from fossil fuel (oil and coal), which has serious environmental implications. According to findings of the International Energy Agency, hydrocarbons will continue to play the leading role in meeting the world's growing hunger for energy for at least the next quarter of a century, and probably well beyond *((EIA) 2010)*.

Philips Design Probe:
Off the Grid Sustainable Habitat 2020
The active skin of the building reacts to the sunlight and automatically moves into the most efficient position to channel light and generate energy.

There will be an increasing shift to renewable energy sources (12% growth pa in US). However, currently only 10% or US energy comes from renewable sources. This means, future energy supply in the medium term will come under increasing tax and regulation pressure.

Strict new energy regulations will become increasingly common-place in the future. A new Chinese law is being considered that will require all new buildings to cut energy in half by 2010. Despite such measures, by 2020, energy use will increase by 50% to 100%. Emissions of greenhouse gases (like CO_2) that contribute to global warming are likely increase by 45% to 90%. The need for off-grid supplementary energy production in urban environments will become increasingly attractive. Awareness of energy consumption is a key factor, and initial efforts will focus on awareness creation and behavior change. In the medium term, renewable bio-fuels will increasingly replace fossil fuels as a source of energy. Bio-fuels, however is still actively contributing to the carbon cycle and is therefore not carbon neutral. Longer term efforts will increasingly focus on developing off-grid renewable energy sources that do not contribute to the carbon cycle (e.g. wind power).

Water shortage

Although the earth is a 'blue planet' with oceans and lakes covering much of the plant surface, less than 1% is available for human consumption.

Almost one fifth of the world's population (about 1.2 billion people), live in areas where the water is physically scarce. One quarter of the global population also live in developing countries that face water shortages due to a lack of infrastructure to fetch water from rivers and aquifers.

Many of the rivers in Asia that supply cities with water are being fed from glaciers, which are rapidly retreating as a result from global warming. Two-thirds of China's cities are now short of water and the very existence of some, such as Taiyuan, the capital of Shanxi, is threatened. In India, 20% of freshwater use is extracted from non-renewable aquifers and groundwater tables are falling dramatically, a reminder that climate change is not the only cause of water scarcity.

Philips Design Probe: Food
The Biosphere home farm concept has been designed to occupy a minimum of floor space and instead to stack the various mini-ecosystems on top of each other. It contains fish, crustaceans, algae and edible plants, all interdependent and in balance with each other. Water filtration, recycling of nutrients and optimum use of sunlight are all central to its appeal.

Philips Simplicity Event (2008), Circle of Life
A concept for a truly informed and heightened shopping experience, in which old products are returned, recycled and re-used, and new products are assembled on-site and co-created with the customer.

Food

There are a number of food related issues that will profoundly impact urban development in the future *(Rosegrant 2001)*.

The U.N. Food and Agriculture Organization (FAO) global price index leapt 40% in 2007. This unprecedented price boom in agricultural commodities is raising production costs for everyone. Causes include drought, the demand for bio-fuels, and rising demand from China, India, and other rapidly growing economies. The rising cost of energy and fuel prices adds to the cost of food due to transportation. Furthermore, long distance transportation adds to food waste and spoilage, it adds CO_2 to the environment, and it consumes energy. In the United States 25-28% of all food is wasted.

Nearly one billion people get most of their protein from fish. Over-fishing has already depleted more than one-fourth of the world's marine fish stocks. This is partly to indiscriminate fishing practices, but it is also fuelled by an affluent lifestyle resulting in demand for particular fish delicacies (such as blue-fin tuna – popular in sushi but now an endangered species).

Rising affluence also changes the eating habits of populations, which can often have catastrophic environmental consequences if it happens on a large scale. A kilogram of beef for example, requires ten times more water to produce as a kilogram of grain. It furthermore adds methane, a greenhouse gas to the environment. In China, the demand for beef is rising dramatically, with potentially global consequences on the environment *(Hongbo 2006)*.

Food safety concern is increasingly a global issue. There is increasingly a disconnection between how and where food is produced and how and where it is consumed. In the last years, food production and processing has increasingly become industrialized and much of it is shipped from afar to urban areas.

Recurring food scares of the food chain becoming contaminated by industrial pollutants or disease spreading uncontrollable through livestock of industrial farms have raised much public debate and is pushing many to consider a different, more intimate relationship with food. There is an increasing demand for more transparency about food production, food ethics and the environmental impact of food.

Pollution and waste

Annual global waste amounts total several billions tons and are increasing. There is an urgent global need reverse this trend to avoid being submerged in waste. In emerging economies, such as India and China, municipal waste amounts are expected to increase 200% or more between now and 2030. This contributes to a 38% global increase in waste. Without strong measures the EU could, by 2020, be generating 45% more waste than it did in 1995. About two-thirds of waste is dumped into landfill sites. Specific forms of waste, such as electronic equipment, are filled with hazardous substances such as lead, mercury, and cadmium. These toxins are throughout our offices and homes residing in monitors, computers, printers, and fax machines. If this obsolete equipment is not disposed of correctly our land and water ways will become polluted with these toxins. It is important to deal with waste at the location of use. Future regulation is expected to require producers to bear the cost of the collection, recovery and disposal of devices no longer wanted by consumers.

More than 70% of China's rivers and lakes were reported by the BBC to be severly polluted.

Air pollution and noise

A serious challenge of megacities is the levels of noise, pollution and congestion caused by transportation. A recent European Union study has shown that megacities like London and Paris result in a life-span shortening of up to a year, which is primarily linked to inhalation of polluted air.

Home habitat pollution

Our modern lifestyle has introduced 70,000 chemicals in our home habitat that were not there at the turn of the century *(Goldman 1998)*. About 2,000 new compounds being introduced every year many of these chemicals are accumulative in our bodies with serious potential long term health consequences. Many of these compounds are disruptive to the human endocrine system, which means synthetic compounds that mimics a natural hormone when it is absorbed by the body. It can turn on, turn off, or change normal signals. The effects of these compounds have been linked to male infertility, breast cancer, hyper-activity, sleep-disturbances, obesity (thyroid function disruption) and autism. These chemicals occur in our packaging (including food packaging, home surfaces (flame retardants), floors, food chain, air, cleaning compounds, air fresheners, hair sprays, household appliances and even toys.

CO_2: Local and global effects.
Cities are generally 3-5 degrees Celsius warmer than the surrounding areas. This region of city warmth, known as an urban heat island, can influence the concentration of air pollution. The urban heat island is formed when industrial and urban areas are developed and heat becomes more abundant. In rural areas, a large part of the incoming solar energy is used to evaporate water from vegetation and soil. In cities, where less vegetation and exposed soil exists, the majority of the sun's energy is absorbed by urban structures and asphalt. Hence, during warm daylight hours, less evaporative cooling in cities allows surface temperatures to rise higher than in rural areas. Additional city heat is given off by vehicles and factories, as well as by industrial and domestic heating and cooling units. This effect causes the city to become up to 6 degrees C warmer than surrounding landscapes. Impacts also include reducing soil moisture and intensification of carbon dioxide emissions.
Global warming would bring a disruption of geological, climate and natural cycles that would put the lives of billions of people at risk due to changes in land temperatures, sea-water levels, rainfall patterns, biodiversity erosion, agricultural decline, spread of infectious diseases, and increased intensity of extreme weather events.

Cities with large populations are some of the highest contributors to world CO_2 emission levels, meaning that climate change and CO_2 emissions cannot be separated from the growth of cities. While much focus is currently on the reduction of CO_2, we need to remember that methane is a much more powerful greenhouse gas than CO_2. A ton of methane is responsible for nearly 100 times more warming over the first five years of its lifetime in the atmosphere than a tonne of CO_2. Methane is also a precursor of ground-level ozone, which is a toxic air pollutant. Global methane emissions are divided roughly equally between the energy sector (coal mine emissions and leaks from oil and gas wells), waste management (landfill, waste water and animal manure) and agriculture (mainly rice paddies and emissions from livestock).

Loss of diversity
In all natural systems, diversity is a key safeguard against change. Diversity is important on all levels from environmental, phylogenetical as well as cultural. Natural evolution of systems always favours diversity rather than the optimization of a single approach or idea.

Loss of cultural diversity
Western scientific knowledge of the environment is based on a strictly utilitarian approach, where elements in the environment have been reduced to objects which can be manipulated with impunity to serve human purposes.

Knowledge and the management systems developed by indigenous peoples, cannot be separated from their lands, territories, institutions, laws, cosmovisions, and identities as peoples *(Terralingua – the study of Cultural Diversity 2010)*. The preservation of natural diversity is therefore intricately linked to allowing cultural and linguistic diversity to evolve and flourish. Each language reflects a unique world-view and culture complex, mirroring the manner in which a speech community has resolved its problems in dealing with the world, and has formulated its thinking, its system of philosophy and understanding of the world around it. Many modern cities are permeated with a degree of sameness (similar food, similar material artifacts, similar behavior and dress code) and there is legitimate fear that globalization is increasingly eroding the cultural diversity of the world.

Loss of biodiversity
Humankind is likely to have more impact on earth's biological, geological, and chemical systems during our and our children's lifetimes than all preceding human generations together had. Nearly half of the world's original forest cover has been lost, and each year another 16 million hectares are cut, bulldozed, or burned. Forests provide over US$400 billion to the world economy annually and are vital to maintaining healthy ecosystems. Yet, current demand for forest products may exceed the limit of sustainable consumption by 25%. Significantly, the rate of species extinctions at present is estimated at 100 to 1000 times 'background' or average extinction rates in the evolutionary time scale of planet earth. Two of every three species is estimated to be in decline. Urban sprawl and the demand for agricultural land are the main culprits impacting on natural habitats *(World Resources Institute 2010) (Global Impact Of Urbanization Threatening World's Biodiversity And Natural Resources 2008)*.

Forests used to be the lungs of our planet that sequesters CO_2 from the atmosphere and waste from the soil and turn it into biomass. Bio-diversity in natural eco-systems are increasingly recognized as essential for safe-guarding our future existence. Much of our past and future medicines are derived from diverse species *(WWF 2008)*.

Health and disease
Urban density and epidemics
Through environmental degradation and global travel, human-kind is increasingly threatened with the outbreak of treatment-resistant disease and global epidemics. Recent global epidemics captured the human contemporary imagination of a vulnerable, interconnected earth. Bursting from a confined area onto the world stage, epidemics demonstrate precisely the kind of combustible unpredictability that fuels fears of systemic, global risks. This rise in epidemic risk is the result of a complex combination of social, ecological, environmental and economic factors, including changing patterns of land use and migration, climate change, travel, urbanization, indiscriminate use of antibiotics and ineffective healthcare systems.

Lifestyle and health
Urban lifestyle is predominantly sedentary as many people spend increasing sitting behind computers and desks. Affluence and time pressure has also brought increasingly poor eating habits and the combination of nutrition-poor fast food and lack of exercise has led to a rapid rise in obesity and related illnesses such as diabetes and cardiac disease *(Schlosser 2002)*. Stress-related illnesses such as insomnia and depression have also been increasing, often due to work pressure, financial pressure, environmental noise and the urban pace of life. There is an increasing level of awareness and many initiatives to motivate and educate people to move more, eat more healthly and live more consciously.

Due to the rising cost in health care, there is an increasing shift towards personal health responsibility, home health care and self medication, which is empowered by the fact that people have increasing access to knowledge and are able and willing to make their own health decisions.

Building blocks to transform the urban future
By assessing aforementioned issues, it becomes clear that the quality of life in urban environments will be increasingly compromised by many factors and that there is a need to envision and enable a different urban living paradigm. On the surface, the magnitude of the issues mentioned seems overwhelming. It is important for us to be sensitized about these issues, without becoming paralyzed by them.

It is important to remember that most of the issues mentioned do not just happen to us, but are brought about by the choices that society and individuals make on a daily basis, often unconsciously. The improving urban existence is to developing and communicating shared ideals what the new goals for cities are and mobilizing people into action. It is not about solving single issues, but first and foremost about changing mindsets.

There have been much public discourse and debate about 'sustainability' and 'reducing our environmental footprint'. The problem is that this somehow always ends up sounding like a sacrifice that people need to make because of a looming future threat. Although there is indeed a looming threat, it may be preferable to find positive reasons to create momentum towards a different and preferable way of living. Furthermore, it is less than inspirational to make sacrifices simply to 'sustain' an already highly compromised environment and an unjust existing social system.

The future needs to be transformed through and inspirational vision than can mobilize action and can practically leverage many of the positive building blocks of a better future that already exist today. Much of our potential future exists today, but only not in large enough quantity.

Perhaps the time has come to review some of the building blocks at our disposal to build a positive urban future that brings opportunities for personal development, social inclusion and actively restores and nurtures a balance with the environment.

Socio-economic building blocks

Society is more ready now than in any era in the history of humanity to actively participate and contribute towards building better urban futures. We live in a world that has become increasingly globalized and interconnected. Today almost a third of the total world population of 6.4 billion people is connected via the internet. Social media platforms are flourishing and have become the most powerful platforms to globally disseminate messaged and mobilize public interest around key issues.

Ordinary citizens in democratic countries are more empowered than ever. Increasingly there is a shift from, material production and consumption towards global platforms, where value creation is increasingly democratized and is more content, service and experience based. Many people, especially in Western societies have become more interested in meaningful living and achievements than in material gain.

People are not waiting for companies and governments to solve problems, but are increasingly willing and able to self organize and address issues. Innovation programs in many companies increasingly leverage open platforms where end-users can be creatively engaged to contribute value and ideas.

We are increasingly experiencing a world where there is a much higher level of transparency and a sense of immediacy than ever before. Trust has shifted from institutions towards peers in voluntary shared interest networks and local communities. There has been a sharp rise in social entrepreneurship years.

Generation Y (birth cohorts born between 1982 and 2002) is the most educated and technology enabled generation in the history of mankind, with a strong entrepreneurial mindset. The internet especially, has in recent years given rise to a number of strong social platforms. Facebook is an example of a platform with more than 500 million people. These trends create a fertile social environment to drive and mobilize bottom-up social change.

Technological building blocks

There are many promising technologies on the horizon that can play a role towards creating better societies and better urban environments. However, people are much better informed and much more critical about accepting new technologies than in the past. Companies are increasingly scrutinized in public platforms about the safety and value of new technologies that they wish to bring to market. Nevertheless, technology will continue to play a major role in the progress of humanity, but there will be much greater demands for technology to deliver sustainable, affordable and socially ethical results.

Many new technology areas such as bioinformatics and stem cell research hold great promise for improving human quality of life by eliminating diseases that are today difficult or impossible to cure. Stem cell technology even shows potential to generate entire new replacement organs in the future which can drastically reduce the need for chronic treatment.

Cleantech – technologies aiming at clean energy production and environmental rehabilitation has become a key growth industry.

In the future it will become more important to socialize new technologies and 'probe' society with new technological ideas for reflection, critical questions and feedback, as past technologies have often resulted in greater problems over the long term because they were deployed with a utilitarian view to address single issues without taking the broader consequences of time and scale into consideration.

Environmental Building Blocks

Cities as habitats of biodiversity

In many cases the vision for future sustainable cities is based on efficiency, and not on a vision of cities becoming environmentally nourishing. Instead of cities being areas of development that destroy biodiversity, why can we not think of designing cities to become hot spots of biodiversity? That means designing cities to take over the role of the forests that they replace *(Kaika 2005) (Mitchell 2009)*.

Urban habitats have numerous benefits:

1. Like forests, they are able to absorb CO_2 and convert it into biomass
2. Several studies have shown that urban green has a positive personal on the wellbeing of people, by making them feel more in touch with nature
3. Urban green also has positive social impact, especially in public urban habitat
4. Urban green has the ability to cool cities by reducing the urban heat island effect
5. Urban biospheres can provide sustenance to maintain biological diversity and prevent extinction of many species that are adversely influenced by shrinking habitats

Cities will determine the fate of the remaining biodiversity of our planet. According to a recent UN report, every year about 10 million hectares of world's forest are lost to unsustainable modes of economic development.

Efforts at halting global biodiversity loss have often focused on preserving large, intact natural habitats. However, preserving biodiversity should also be an important goal in the urban environment, especially in highly urbanized areas. Increasingly, research at the city / county scale as well as at the landscape scale reveals that urban areas can contain relatively high levels of biodiversity. Important percentages of species found in the surrounding natural habitat, including endangered species, have been found in the urban forest.

Urban areas can often harbour far higher biodiversity than the surrounding rural areas, which are often used for monoculture farming practices that limits their contribution to harbouring biodiversity. The potential for urban areas to harbour considerable amounts of biodiversity needs to be recognized by city planners and urban foresters so that management practices that preserve and promote that diversity can be pursued.

Numerous studies have shown that public urban green and nature has a positive sociological and psychological impact. Even more so, plants in personal living spaces has a calming and up-lifting effect on people, as well as a positive impact on improving the air quality inside buildings. The attitude of people towards nature in urban spaces has changed throughout the years. In the past people saw nature as something uncivilized to be conquered. In our post-modern world (through media and education) people have come to view nature as something that represents good, and there is an increasing attitude that nature has a superior innate moral code that has been subverted by civilization and urbanization, and there are numerous urban efforts underway to have elements of restored in our daily living environment. There is also increasing awareness about the number of species driven to extinction through the impact of civilization, and there is a rising interest to create habitats for nature to flourish. Co-existence with nature has become a more appealing concept and there is genuine interest to create urban spaces that are more accommodative to natural biodiversity.

There is an increasing realization, also in the UN, that urban areas can be rendered more suitable for other species such as insects, birds and small mammals. The concept of protected urban biospheres is not a fast emerging concept that finds its way into the strategic agendas of many cities. Today the best examples of green cities (e.g. Bonn, Germany) are ecosystems with high levels of biodiversity and often include relics of natural and semi-natural habitats *(Biological 2007)*. They also contain a wide variety of uniquely urban habitats (brown field sites, gardens, parks and industrial areas, for example) and are centers of importation, naturalization and the spread of non-native species. Although green cities will never be able to replace the role natural habitats and forests to support biodiversity, they can make a major contribution to support biodiversity, whilst at the same time providing cleaner air and water, and more livable habitats for humans.

Beyond sustainability – a vision for rejuvenative cities

It is becoming clear that humanity can and should set their aims to a vision that goes beyond sustaining the highly compromised conditions of today. It is proposed that we start a dialogue towards forming an actionable vision towards creating 'rejuvenative cities'. Rejuvenative urban environments do not only strive to minimize their impact, but they strive to actively rejuvenate and improve existing conditions on social and environmental level.

Through the history of human progress towards productive urban living, we have produced great achievements and monuments that showcase human civilization and ingenuity, but as mentioned before, we have also lost much in the process. We have severely crippled our natural environment and in many urban and rural environments, we have created situations of great social inequality and injustice. Many cities have become dormitories of existence and have lost their welcoming capacity to share human warmth and conditions for flourishing communities. The mission for rejuvenative cities is to engage the talent, ingenuity and contribution of all to restore and nourish this dynamic of a world that is flourishing in its diversity and full social and environmental potential.

Perhaps it is useful to attempt to identify key dimensions of rejuvenative cities, as future efforts always have to take a systemic approach towards progress.

Rejuvenation of identity

Authenticity and identity are key traits of rejuvenative cities. Just as humans are always learning and developing but are able to maintain a truthful and distinct personality, cities have to develop beyond the blandness and sameness permeating many cities of today. The identity of cities and the humans that live in them is intimately connected. In the creative age, cities are not merely places of residence, but places of inspiration which should stir the passion of its inhabitants and evoke vivid and pleasant memories from visitors who passed through it *(Florida 2007)*.

It is important to think of rejuvenative cities as places that evoke a sense of culture and identity, but is able to balance that with a constant sense of discovery, delight and surprise *(Newman 2009)*. This is only possible if cities are able to celebrate diversity and treat change not as a threat, but as an opportunity for constant renewal. Rejuvenative cities have to remain authentic whilst evolving their identity.

Personal rejuvenation

Cities are not the sum of the infrastructure, but rather the sum of the people who live in them and enjoy their hospitality. People are the life blood of the city, whereas the infrastructure is like the skeleton. People, their lives, loves and stories are what create living and thriving cities. Rejuvenative cities therefore need to aim to empower individuals and provide a backdrop for them to live rich lives and create the stories of the city.

This means rejuvenative cities have to provide a seeding ground for people to flourish, develop, participate and most of all contribute and create value. Anyone who is excluded from participation or active contribution loses their connection to the fabric of the city and becomes a drain on the city community.

Socio-cultural rejuvenation

Human progress has largely been made possible through social cooperation and the exchange of ideas. Although this has now become possible on a global level thanks to the Internet, many cities are seemingly unable to build healthy and active local communities. Rejuvenative cities need to re-think how the city can enable and stimulate social and communal engagement in public and work-place. Cities are not a collection of individuals with rights, but need to develop local communities based on shared issues and values, mutual empathy and shared socio-cultural identity. Communities are not people in proximity of place, but people who take and interest in each others' lives, and who do things together. Urban communitiees need to on one hand foster diversity but also offer ways to bridge religious, ethnic and lifestyle differences. Sports, community events, opportunities for co-creation and cooperation, and active engagement and collaboration to address social inequalities is therefore a key factor in building healthy flourishing communities with a high level of trust and happiness.

Environmental rejuvenation

Rejuvenative cities need to see themselves as part of nature rather than cities surrounded by nature. In reality, many cities are surrounded by monoculture agricultural land or industrial development that is not suited for biodiversity. Often city parks and domestic gardens offer a refuge where many species of wildlife can flourish, and in reality, the biodiversity in many cities is already far higher than that of surrounding areas. If we take the view that cities become part of nature, there is no reason why cities cannot become the forests and hotspots of diversity in the future. This means we need to take a very different approach to how cities are planned and developed. Through this vision, rejuvenative cities do not merely strive to minimize their footprint, but actively contribute to natural biodiversity, CO_2 capturing through plant biomass and natural planet cooling through plant life.

Five dimensions of rejuvenative cities

There are five dimensions of importance to rejuvenative cities:

1. Rejuvenation of identity
2. Personal rejuvenation
3. Socio-cultural rejuvenation
4. Environmental rejuvenation
5. Economic rejuvenation

All of these are systemically interlinked and should always be considered as such.

Glowing places (2005)
An exploration into creating social interaction through lighting in public spaces. The seating light patterns respond to the rhythm of people sitting, giving a feeling of rest, tranquillity and personal connectivity.

Economic rejuvenation

Rejuvenative cities have to consider the economic enabling context of its inhabitants. Cities that only rely on foreign markets are much more vulnerable to economic upheaval than cities or city-regions that create a healthy balance with their local economy. Economic rejuvenation means also stimulating the maximal economic diversity to make cities economically prosperous and robust, rather than relying on single economic drivers of scale that killed so many mining and industrial towns in the past. Today, as many ordinary citizens not only consume but are able to create value, it is important to stimulate opportunities for people to create local value networks where value is exchanged. Much of the economic rejuvenation can be derived from enabling social and environmental rejuvenative initiatives in the city. The process of rejuvenation should not be a cost, but a driver of growth and prosperity. When communities relate strongly to the local environment, the city's heritage and its unique culture, such places are able develop a strong social capital of networks and trust that forms the basis of a sound economy.

Progressing towards Rejuvenative Cities: inspirational examples and cases

Perhaps future urban rejuvenation is best activated by scaling up positive stories and examples that already exist today.

From ownership to access

People are increasingly interested to access services and functional convenience without the burden of ownership. This means a much greater level of sharing infrastructure with diminished environmental impact.

Vélib is a public bicycle rental program in Paris, France. The initiative was launched in 2007. 10,000 bicycles were introduced to the city with 750 automated rental stations each with 15 or more bikes/spaces. This number has since grown to 20,000 bicycles and 1,639 stations, roughly one station every 300 metres throughout the city centre, making Vélib' the largest system of its kind in the world.

Greenwheels is the larges car sharing scheme in the Netherlands, which has been growing rapidly since its launch in 2004. They now also plan to introduce electric vehicles to minimize environmental pollution.

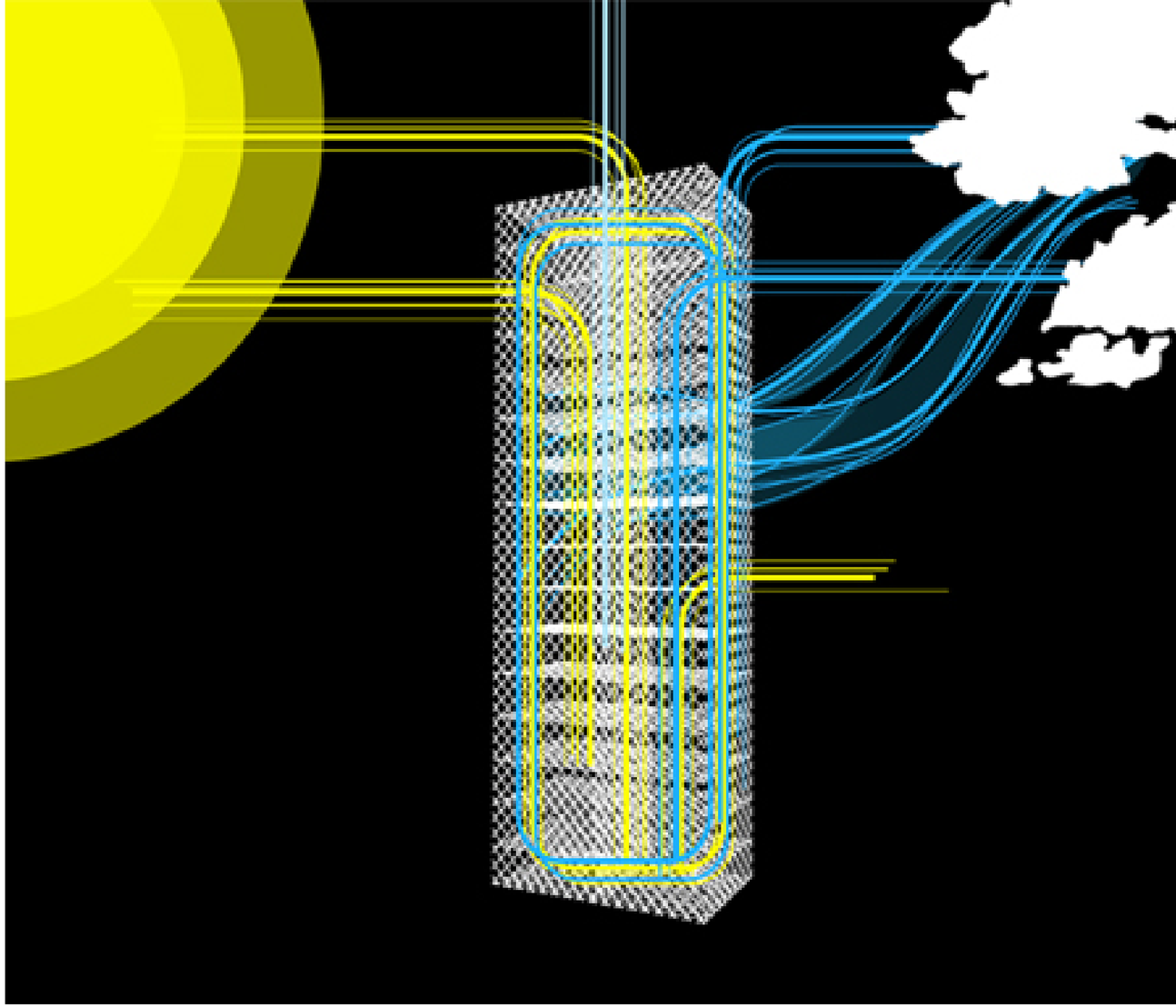
CouchSurfing is a project started in 1999 for what is now the world's largest hospitality exchange network. With over 2 million members in 237 countries and territories, CouchSurfing is the most visited hospitality service on the Internet, averaging around 40 million daily page views from July-December 2009.

Urban farming

Vancouver has communicated a vision to become the most sustainable city in the world. As part of the city's '2030 Challenge', Romses Architects developed the Harvest Green Tower concept as part of this initiative. This concept for a vertical farm will have a tower for growing fruits and vegetables, a livestock grazing plane, a dairy farm, transit lines and more. This approach will make a valuable contribution towards shifting production to 'local' and minimizing costly and environmentally damaging long-distance transportation of food. It also addresses food safety issues and concerns that have become very prominent in the form of global food scandals in the last decade. It will give local communities control over their own food supply, and due to the construction, it will limit the sprawl of agricultural land that leads to mono-culture and destroys biodiversity.

Self-cleaning Urban Habitat

Wilhelm Barthlott of the University of Bonn in Germany, has a vision of a self-cleaning cities, where a little rain washes the windows and walls of skyscrapers clean. In Japan, technologists are developing self-deodorizing and disinfectant surfaces for bathrooms and hospitals. Michael Rubner and Massachusetts Institute of Technology (MIT) envisage similar technologies keeping bathroom mirrors fog-free and controlling microfluidic 'labs on a chip' (in which fluids move through microscopic pathways). Already with us are shirts, blouses, skirts and trousers that shrug off ketchup, mustard, red wine and coffee. A revolution in self-cleaning surfaces is under way. New nano-materials also hold great promise to develop coatings that can repair corrosion. This will let people enjoy living in healthy and hygienic environments that continuously monitor, maintain and improve the quality of the urban habitat *(Forbes 2008)*.



In industrial and urban areas and even those downwind, raindrops can assimilate high concentrations of particulates and pollutants from the air. More so, once the rain comes into contact earth and street surfaces, it can absorb even far more toxins. Rain water is the main source of drinking water. However, most of us depend upon the efforts of municipalities to store and purify it for us.

The increasing water scarcity that will affect many urban environments in the future will make it feasible to develop supplementary off-grid systems to supplement water supply for domestic use. Self-cleaning systems will also help to reduce the use of chemical detergents and cleaning agents that contaminate the human habitat.

The Philips Design Probe: Sustainable Habitat 2020 addresses worldwide problems such as energy crisis, clean water shortage, global warming and environmental pollution. The Probe fundamentally changes the current approach to buildings in order to supply the habitat with all necessary sources to be able to live 'off the grid'.

Green engagement and education
Green living is more a matter of changing people's hearts and mindsets and inspiring them to feel engaged and to think differently. A process of education and active engagement is much more effective than regulation.

A good example is a current green innovation competition in China.

More than 3,000 teenagers gathered in Taizhou, Jiangsu province, to showcase their ingenuity in the weeklong national final of a creative competition that features low-carbon technologies. The competition, co-founded by the Chinese Society of Education and Copyright Society of China, requires competitors to make eco-friendly gadgets out of parts provided to them. The groups that produce the most efficient and ingenious of solutions win the contest. The contestants in the final stage of the competition were sifted from 1.5 million candidates across the country's 24 provinces and regions. Between March and June this year, 37 qualifying trials were held nationwide *(Song 2010)*.

Another example of inspiring young people to think differently is LEGO's new Renewable Energy Add-On Set, a supplement to the LEGO Simple & Motorized Mechanisms Set. When the Renewable Energy Add-On Set is combined with the customized activity pack, students will explore renewable energy sources; investigate energy supply, transfer, accumulation, conversion, and consumption; and use measurements and data analysis to describe and explain outcomes through hands-on activities and exciting, real-life models. Students will experiment using energy from their own bodies and the three main energy sources – solar, wind, and water – to generate, store, and use power.

Zero-footprint cities
Abu Dhabi is in the process of designing and building a new city which will be a model for sustainable cities of the future. The word 'Masdar' means 'Source' in Arabic. Masdar City is an impressively planned and funded 'green' city, to be constructed near the airport in Abu Dhabi. Designed and managed by the Abu Dhabi Future Energy Company and in collaboration with the Worldwide Fund for Nature, it will be the world's first zero-carbon, zero-waste, car-free city. All of this will be made possible by new clean technologies. Masdar will cover an area of roughly 6 square kilometers and will eventually be home to approximately 1500 businesses and 50,000 residents.

The vision behind this unprecedented effort is based on ten broad-based principles of sustainable living, and on a desire to make Abu Dhabi a hotbed for innovation in energy, environment, water and sustainability – resources that are bound to be scarce in the future.

The ten principals of this city are:
1. zero CO_2 emissions
2. zero waste
3. sustainable transportation
4. use of eco-conscious materials
5. sustainable food supply
6. sustainable water
7. protection of habitats and wildlife
8. integration of local culture and heritage
9. equity and fair trade
10. overall health and happiness of its residents

Personal Public Transport
Visitors to the future Masdar City will have to leave their cars outside the city and use PRT (Personal Rapid Transit) vehicles. Personal Rapid Transit automotives will be the only means of transport in the planned zero-carbon and zero-waste city taking shape just outside Abu Dhabi as one of cleanest and most environment-friendly habitats in the world *(Masdar City 2010)*.
Passengers will be able to choose their destination on the computerized screen inside the vehicle and the computerized, battery-powered pods head straight to the required destinations. The vehicles can travel at around 40kph through a maze of roads inside Masdar and can carry four adults and two children.

Waste as a resource
A number of new technologies are on the horizon that will help to use waste as a valuable resource.

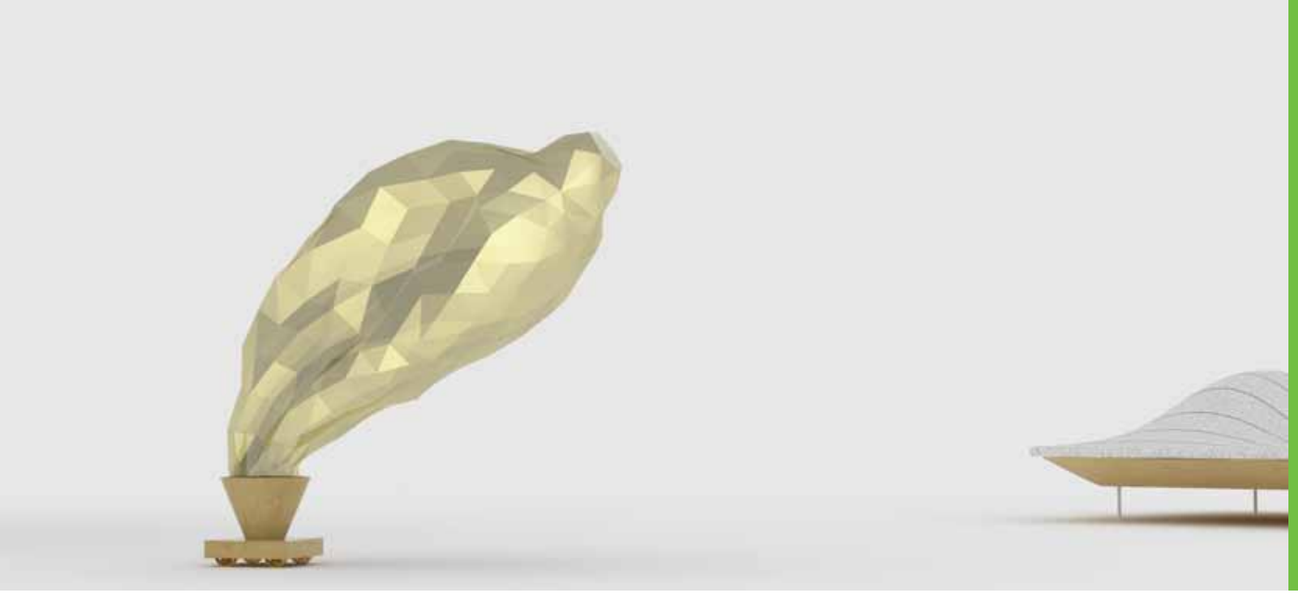
New industrial technologies may augment the role of cities in converting CO_2 into useful biomass are on the horizon. Global Research Technologies, LLC (GRT), a technology research and development company has achieved the successful demonstration of a bold new technology to capture carbon from the air on industrial scale. The "air extraction" prototype has successfully demonstrated that indeed CO_2 can be captured from the atmosphere. This is the first step toward a commercially viable air capture device. At the same time, much progress has been made with using algae fed with CO_2 as a highly effective way to convert CO_2 into bio-fuel.

High oil prices, competing demands between foods and other bio-fuel sources and the world food crisis have ignited interest in algaculture (farming algae) for making vegetable oil, bio-diesel, bio-ethanol, bio-gasoline, bio-methanol, bio-butanol and other bio-fuels. Among algal fuels' attractive characteristics: they do not affect fresh water resources, can be produced using ocean and waste water, and are biodegradable and relatively harmless to the environment if spilled. Algae can yield over 30 times more energy per hectare than other, second-generation bio-fuel crops *(Oilgae 2010)*.

These two technologies can potentially work together in cities with high levels of air pollution by turning CO_2 into a resource. CO_2 is already an important industrial chemical with a myriad of end-uses ranging from food processing and food transportation to water treatment, plastic and rubber foaming, dry ice for metal cleaning/blasting, beverage carbonation, fumigants in grain storage and fire extinguisher fluid. Currently worldwide demand for CO_2 is estimated to exceed 80 million tons annually and is growing.

Particularly interesting work at MIT, is the recent discovery that Geobacter, a bacterial species also have the ability to transfer electrons onto the surface of electrodes. As outlined under the Microbial Fuel Cell link, this has made it possible to design novel microbial fuel cells which can efficiently convert waste organic matter to electricity. This approach holds great promise for future domestic fuel cells that can convert organic household waste directly into energy. They have already selected strains with very high conversion efficiency, and are almost ready to start commercial/industrial application development *(New Microbe Strain Makes More Electricity, Faster - ScienceDaily 2009)*.

Philips Design Probe: Off the Grid Sustainable Habitat 2020
From recycling to upcycling. Human waste and other organic waste will be transformed into biogas/energy to be used for heathing and cooking as well as providing hot water for washing.



Philips Design Probe: Metamorphosis

Blowbot: The solar powered robotic device senses human presence and activity. It is powered by solar reflectors and has been designed to 'visualize' air by dramatically inflating and deflating to create directional gusts and breezes.

Air Tree: Unlike an air-conditioner or fan, Air Tree 'breathes' in rhythm to the airflow outside, maintaining a healthy level of filtered air with subtle changes in humidity.

Vertical urban gardens and forests

Gwanggyo, a new city to be built south of Seoul, South Korea, will get a futuristic, green city centre designed by Dutch architecture group MVRDV. The town is planned to be self-sufficient, with 77,000 inhabitants, and the buildings in its center will be unlike any others in the world. Box hedges will be planted on the terraces and roofs of the buildings. The intention is to improve ventilation, and reduce energy and water usage.

The shifting of the floors causes as a counter effect hollow cores that form large atriums. They serve as lobbies for the housing and offices, plazas for the shopping centre and halls for the museum and leisure functions. In each tower a number of voids connect to the atrium providing for light and ventilation and creating semi-public spaces. This approach may become one of the first realized visions towards transforming an urban environment into a healthy biosphere.

Ambient design for multi-functional spaces

Single households are the fastest growing demographic reality in Europe. It is caused by the LAT lifestyle (Living Apart Together) as well as students living in their own apartments and single divorcees, and elderly who want to live independently, as well as highly mobile professional transnational workers. These people prefer a lifestyle, in which the facilities in the city become an extension of their 'living space'.

Diverse human activities can easily leave these tiny spaces cluttered and claustrophobic, detracting from enjoyable living and wellbeing and in some cases even compromising mental and physical health. Aspirations in many societies are shifting from materialism to other aspirations such as life-enjoyment, fulfillment and self-development. Although sizes of living spaces in many cities are shrinking in size, it does not mean that these spaces are becoming mere dormitories of existence. On the contrary – people are increasingly performing a multitude of very diversifying activities in these spaces. Living spaces have changed from the industrial paradigm of being places of rest and shelter to becoming spaces of entertainment, creative production, work, hobbies, relaxation, rejuvenation, reflection, socialization, personal care, exercise, food preparation and enjoyment, romance and places to express your identity. People are increasingly challenged to arrange and manage their living environments to be conducive to all these activities.

The Philips Design Probe: Metamorphosis explores how we have become separated from the natural world, both in terms of our surroundings and how we perceive and manage our time. Within the themes Light, Air, Sound and Body, design concepts view the home as a filter to limit air pollution, electromagnetic smog, and industrial noise penetrating our living and working space while letting in natural light, air and sound. The concepts work as a filter between people and the natural world from which, over time, people have become detached.

Work-play

With the emergence of the knowledge / creative economy, the tools of value production is democratized and owned by people (computers, internet access and software to create and share). This makes it possible to work, collaborate create value from your home as well as at your work place. We therefore see increasingly that workplaces in creative economy cities start to look like the home (with creative spaces, sofas and coffee tables), whereas the homes of knowledge workers increasingly become accommodative to working from home. This is due to the fact that in the knowledge economy, workers are increasingly looking for fulfillment from their careers that is in line with their personal interests and passions and will help them to develop their potential *(Florida 2002)*.

Examples of these new work-life arrangements are now emerging. The WorkPlay work-life initiative (http://www.workplay.com/private-events/) was introduced as a new urban living concept around 2001 in London, UK. It features the newest and most progressive technologies for both work and play, the facility is home to a live performance theatre, a creative office village, and a dynamic bar.

This is in line with emerging lifestyle aspirations in the creative economy, where self-actualization, personal development and discovering one's talent and potential have become more important to people than material status and consumerism *(Ray 2001)*.

Inclusion

Social inclusion is more than giving each individual access to services, but it is about giving each individual responsibility, respect and a meaningful contribution to make. A good example is cases where older people are recruited as volunteers to give emotional support to children in orphanages or to sick people. Older people are pillars of society in many societies, but in others they are treated as a burden. Through meaningful engagement, they can use the time they have at their disposal and a lifetime of experience to make a difference, whilst getting respect, and social engagement in return. In coming years, more people reaching their 60s and 70s are going to want to work, at least part-time. Researchers are finding that far from wearing people down, work can actually help keep them mentally and physically fit. Many highly educated and well-paid workers – lawyers, physicians, architects – already work to advanced ages because their skills are valued. Boomers, with more education than any generation in history, are likely to follow that pattern. And today's rapid obsolescence of knowledge can actually play to older workers' advantage: It used to be considered wasteful to train people near retirement. But if training has to be refreshed every year, then companies might as well retrain old employees as young ones.

Equally important, high-level work is getting easier for the old. Thanks to medical advances, people are staying healthy, enabling them to work longer than before. Fewer jobs require physically demanding tasks.

"For far too long we have been obsessed with paid work – assuming that the money changing hands made it far more important... Of course it isn't like that anymore. People of all ages and social class are giving their time. Some of them even have fun. And the old narrow definition of work is blurring more every year" – Anita Roddick *(The Body Shop)*.

Conclusion

Urban living is the future of humanity. The majority of mankind will reside in cities. Acknowledged as the indisputable engines of economic growth world-wide, cities are also widely seen as key factors in environmental destruction, overuse of non-renewable resources, decline in biodiversity, rising pollution and persistent social inequality.

There is growing awareness amongst urban developers, government officials and the public that the future of the planet is intricately linked to urban development in the next decades. There is therefore many initiatives that search for new ideas and visions for future urban living. This paper proposes the concept of 'Rejuvenative Cities' as a model for future development of new and existing urban areas.

'Rejuvenative Cities' aims beyond mere sustainability of an existing compromised ecosystem, but instead aims for a systemic approach to social, environmental and economic rejuvenation through personal and social engagement and harnessing promising new technologies in an ethical and socially responsible way.

Bibliography

(EIA), Energy Information Administration. International Energy Outlook 2010. 2010. http://www.eia.doe.gov/oiaf/ieo/.

Aburdene, Patricia. Megatrends 2010: The Rise of Conscious Capitalism. Hampton Roads Publishing , 2007.

Assadourian, Erik. 'Cultivating the butterfly effect.' World Watch Magazine, 2002.

State of the World 2010: Transforming Cultures: From Consumerism to Sustainability. W. W. Norton & Company, 2010.

Biological, Bonn. 'City Biodiversity Report: Urban nature in Bonn.' http://www.cbd.int/doc/external/cop-09/bonn/bonn-biodiversity-report-en.pdf. 2007.

Commission, Directorate General 'Regional Policy' of the European. 'State of European Cities.' http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/urban/state_exec_en.pdf . 2007.

Council, British. Creative Cities. 2010. http://creativecities.britishcouncil.org/.

Florida, Richard. The Flight of the Creative Class: The New Global Competition for Talent . Collins Business, 2007.

The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life. Basic Books, 2002.

Forbes, Peter. 'Self-Cleaning Materials: Lotus Leaf-Inspired Nanotechnology.' Scientific American, August 2008.

Goldman, L.R. 'Chemicals and children's environment: what we don't know about risks.' Environ Health Perspect, 1998 : Suppl 3:875-80.

Green, Ronald M. Global Bioethics: Issues of Conscience for the Twenty-First Century (Issues in Biomedical Ethics). Oxford University Press, 2009.

Hakim, Rafadi. *Urbanization Outlook.* 2010. https://ourtask.wikispaces.com/Urbanization+Outlook.

Joachim, Mitchell. 'Future Cities.' World Science Festival. Terraform, 2009.

Jowit, Juliette. 'World is facing a natural resources crisis worse than financial crunch.' The Guardian, October 29, 2008.

Kaika, Maria. City of Flows: Modernity, Nature, and the City. Routledge, 2005.

Lovley, Derek R. 'Cleaning Up With Genomics: Applying Molecular Biology to Bioremediation.' http://www.geobacter.org/publications/Lovley35.pdf. 2003.

Mittelman, James H. 'The Future of Globalization.' http://pkukmweb.ukm.my/~penerbit/global.pdf. 1999.

Newman, Peter. The Place-Based City. 2009. http://blog.islandpress.org/322/peter-newman-the-place-based-city.

Online, People's Daily. 'China's urbanization rate expected to reach 48% in 2010.' People Daily Online China, 2009.

Pine, B. Joseph. Authenticity: What Consumers Really Want. Harvard Business School Press, 2007.

The Experience Economy. Harvard Business Press, 1999.

Pringle, Heather. 'The Slow Birth of Agriculture.' *Science*, 1998: 282: 1446.

Ray, Paul. The Cultural Creatives: How 50 Million People Are Changing the World. Three Rivers Press , 2001.

Rosegrant, Mark W. '2020 Global Food Outlook: Trends,Alternatives, and Choices.' http://www.ifpri.org/sites/default/files/pubs/pubs/fpr/fpr30.pdf. 2001.

Schlosser, Eric. Fast Food Nation: The Dark Side of the All-American Meal. Harper Perennial, 2002.

ScienceDaily - from (The Nature Concervancy 2008). 'Global Impact Of Urbanization Threatening World's Biodiversity And Natural Resources.' June 17, 2008.

Stearns, Peter. Consumerism in World History: The Global Transformation of Desire. Routledge, 2006.

Twist, Jo. 'Eco-designs on future cities.' BBC News, 2005.

Van Heerden, Clive. Food Probe. Philips Design, 2009.

Van Heerden, Clive. Sustainable Habitat 2020. Philips Design, 2008.

World Resources Institute. 2010. http://www.wri.org/.

WWF. Living Planet Report. WWF, 2008.

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