Thinking Long-term About the Post-carbon Society

Introduction

This paper describes the conduct and outcome of a collaborative project facilitated by two Universities - Florida Atlantic University and Vienna University of Technology - for the purpose of exchanging their teaching experience and developing stronger international relationships in the field of planning education. It was held as a two-semester project throughout the academic year of 2008-2009. Each institution participated in this project with a team of varying numbers of students and their tutors. For the project, a common aim and a topic were set; and the students from two universities, with different backgrounds, were supervised to focus on the same future planning issue simultaneously.

Aim of course

The students were to learn the capability of cooperative accomplishment of complex tasks in the fields of regional development planning. Through cooperation and a critical examination their methods and approaches for mastery of tasks they shall acquire a deepened understanding for problem coping strategies. A strong cooperation with the planning practice was another goal to master analysis and demands of future planning problems.

The subject of the course was to develop scenarios for the world behind petroleum in line with an implementation strategy on different levels.

Topic

The interdisciplinary project dealt with “Post Petroleum Planning: Envisioning the Future for Cities and Regions”. On the basis of case study regions in Middle Europe and South Florida topics like changes in the regional economy, mobility or mixed use were discussed. Current topics like peak oil, climate change or renewable energy are on everyday’s agenda and starting point for envisioning the future. Project scenarios as well as proposals for today’s planning policy were developed in a comparative approach. The international, interdisciplinary groups elaborated possible scenarios for the case study regions.

The project is highly related to practice, because it deals with real planning situations and involves local experts. Working in planning teams simulates the every day life of a planner in practice. The students have to work together with colleagues coming from a different educational background, which is also very common to planning processes in practice. Students learn to convince the members of their working group form their planning ideas first. But moreover they have to present their work.

The project was conducted in two Workshops in February and May 2009. The first workshop held in Ft. Lauderdale focused on the development of the scenario basically based on the spatial structures in South Florida as well as their visualization and presentation. This initial step was very important since all students met each other, envisioned possible scenarios, collected data, talked to locals, attended lectures given by guest speakers and thus understood the essence of the problem. The second workshop took place in Vienna and focused on the situation in Middle Europe and the implementation strategies.

Furthermore topics like of mobility and renewable energy were discussed. Especially the design of the suburban built environment with its car-oriented sprawl and the urban-rural interdependencies will need a retrofitting in the "the Great Change". In the transition period we will need to move from a global culture addicted to cheap, abundant petroleum to more sustainable lifestyles, whether through policy directive or market forces.

The post-carbon age challenges our post-industrial societies, giving rise to possible scenarios, for example,

- No problem: science and technology are able to develop new energy sources that can replace fossil fuels;
- Apocalypse: the search for replacement energy sources is unsuccessful and governments are unable to develop a feasible alternatives for individuals;
- Shortage: the energy needs are pushed down through a fundamental restructuring.

The major challenge facing this and the next generation of architects, planners and builders is how to develop land use patterns that respond to the demands of the post-carbon age and provide a high quality of life for future generations.

Scenario Development and Interactive Research

Numerous definitions stress that scenario building/planning does not necessarily focus on making predictions or forecasts, but rather on portraying different outcomes that contest current assumptions. Writing about scenarios applied to the field of land use planning, Xiang and Clarke (2003) envision a scenario as a medium which encourages the communication between the scenarist and scenario users. From their point of view a dual scientific function is achieved simultaneously: inquiry and real world planning.

The project followed the approach of interactive research, defined as “the whole family of approaches which are participative, grounded in experience, and action-oriented” (Astleithner & Hamedinger, 2003: 632). The cooperative dialogue between researchers and other research participants and the understanding of research as a common learning process are central features. The principles for the process are interdisciplinary and a participatory bottom-up approach in an international context.

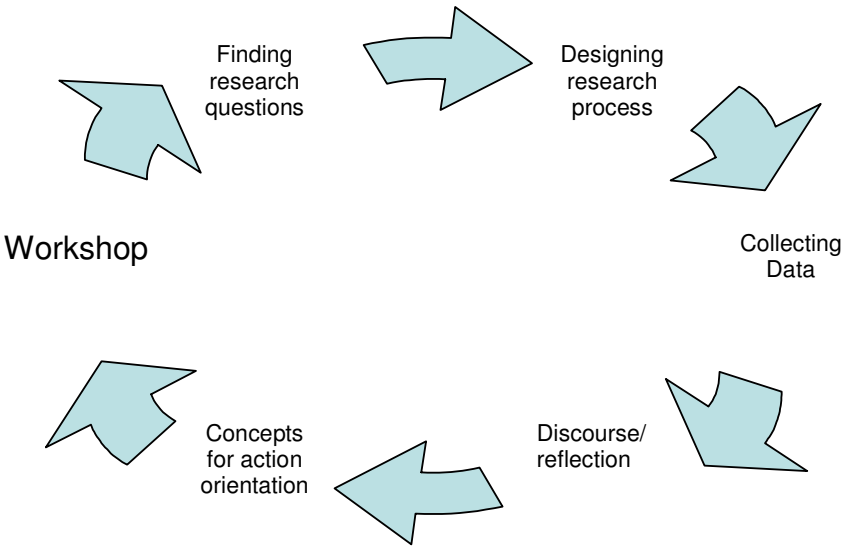

Fig. 1: Interactive research, Source: Astleithner, Hamedinger, 2003: 632

Post Petroleum Planning

Beside the set task of the development of a post carbon scenario and implementation strategy the workshop participants were free in choosing their focus and time frame for their scenario building. Due to this a broad variety of ideas and pictures of the future emerged and were discussed intensively. Finally the developed scenarios follow four different approaches:

- *a world of bubble villages* as a very futuristic picture of the world after an ecological disaster;
- *the regiopolis 2050* as an example of growing importance of regional links in a not longer global world;
- the *alternative energy conspiracy* dealing with ideas for transportation and trade in existing structures;
- *the future? this way!* focusing on the implementation and policy recommendations based on the actual situation and expert statements.

A world of bubble villages (by Anita Kröpfl, Clifford Sherley, Joann Skaria)
In 2100 the world will be clustered with self-sustaining city pockets - domed, or "bubbled" cities. These bubble cities would be finite in area, serve as protection from the outside world and be self-sustaining of all basic and necessary urban services: food, housing, water, sanitation, transportation, etc.

After facing many catastrophes resulting from climate change, due to the overuse of petroleum combined with unsustainable lifestyle practices, daily life became very unsafe and many people died from extreme flooding, tsunamis, drought and hurricanes. Because of these events many people lost their lives or became climate refugees seeking more liveable environments. The challenge was unmanageable on a national level. At this point, each country sent its most reputable scientists to collaboratively formulate a concrete plan for saving humankind and nature.

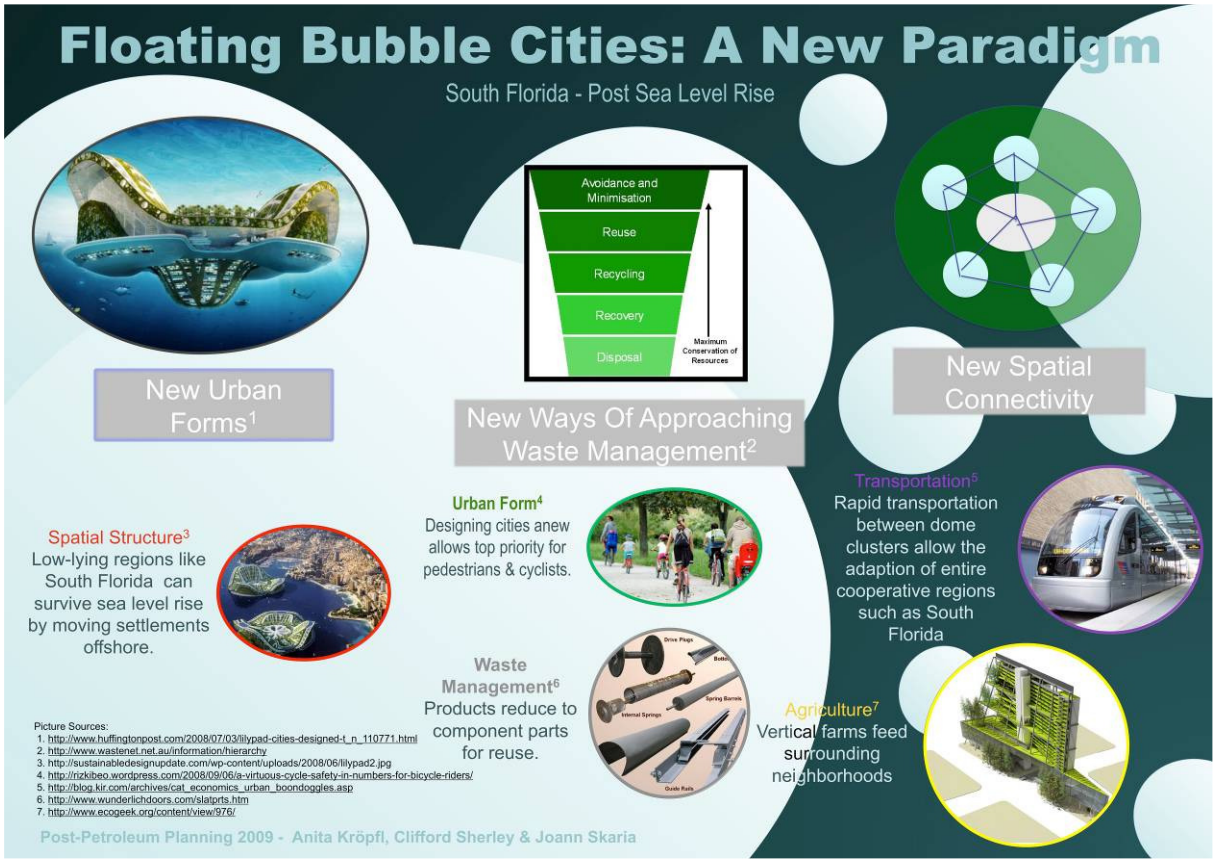

Fig. 2: Floating Bubble Cities: A New Paradigm, Source: Kröpf, Sherley, Skaria, 2009.

A new world structure arose, with cities operating under the protection of domes with a controlled micro climate, and the logistics of such a large scale transition. Each dome accommodates roughly two million people, which in a world of approximately 7 billion people, means about 3,500 domes will be built.

Domes are clustered in areas that have been identified as most suitable, in a suitability analysis that was conducted in the primary stages of the planning process. These clusters are communicative and cooperative - though each dome is designed to sustain basic processes on its own, people are able to travel and trade within their dome cluster, simply for the sake of variety. There are two options for implementing a domed city – either as a "floating dome city" for more coastal regions, or building a dome covering over an existing, well functioning (or potentially well-functioning) city apart from the sea.

Within the domes, the city structure has been reorganized into neighbourhoods that refer to as "petals" that surround a city center. The city center serves as the intellectual and cultural hub of the dome, and is the location of higher education and research, but it also attracts artists, writers, and other creative citizens. Each petal supports approximately 200,000 inhabitants, and provides a majority of necessary goods and services such as food, housing, clean water, sanitation and transportation options.

The transition to such a dramatically different world structure is challenging. Wholly self-sustaining cities may or may not be an attainable goal as of yet; however, if developable, they provide a key solution to the problem of externalized environmental costs.

regiopolis 2050_ Envisioning a Region State Settlement Structure in a Post-Petroleum World (by Cara Capp, Phillis Cichy, Katja Rosner, Michal Jakimowski)

Once peak oil is reached and gas prices rise two, three, or even four times current rates, structural changes to both lifestyles and settlement patterns will be necessary. The regiopolis 2050, in which effective planning tools are utilized and policies implemented which not only minimize hardships in an oil-free era, but use the situation to the advantage of citizens, reconstructs regions in a self-sustaining manner.

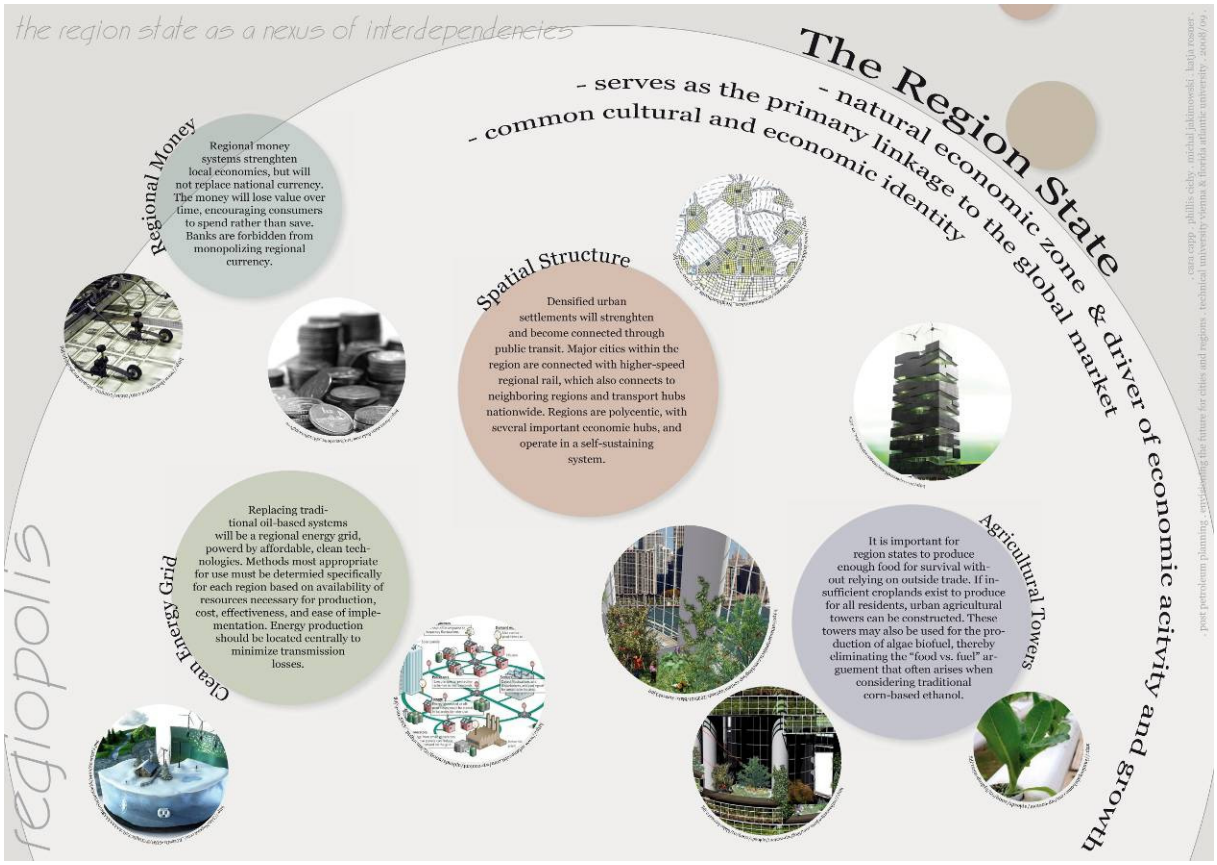

Fig. 3: The Region State, Source: Capp, Cichy, Rosner, Jakimowski, 2009.

City centres must be more strongly connected, both physically and economically, to accommodate transportation without overuse of cars and economies that do not rely on trade. As the need for localized goods and services becomes more urgent, regions will become stronger, ultimately taking the form of self-sustained region states.

Within these self-sustained region states, three vital facets of human life are identified which will require the implementation of specific policies and initiative to maintain a vibrant and successful society: mobility & communication, energy & resources, and production & economics. Each of these categories represents basic needs and services that will be fundamentally altered in a post-petroleum era.

Overall, regiopolis 2050 optimistically plans for healthy, vibrant, liveable, sustainable regions in a post-petroleum world. Through an intricate system of specific implementation strategies, foreseeable concerns with regard to mobility & communication, energy & resources, and production & economics are addressed. They tackle a plethora of issues, including facilitation anti-car transportation methods, enabling citizens to partake in the technological revolution, the ability to produce and use clean energy, initiation the production of regional goods and encourage a thriving economy through a system of regional money. These strategies will help facilitate self-sustained region states in a world after peak oil.

Alternative energy conspiracy (by Karl Bursa, Peter Calließ, David Ehrenhöfer)
This scenario is constructed around the assumption that a basic process will occur in the global marketplace that will see humanity come together in order to prevent a worldwide catastrophe. In the near future oil demands of the emerging markets – specifically India and China – will reach a point where their demands outstrip the available supply of oil. This point is what we refer to as the ‘zero barrier’, the point from which we cannot return. Up to the time zero barriers are breached, the human race can potentially avoid the kind of catastrophic shortages that may cause global instability. According to our scenario, without behavior change or discovery of a new energy miracle, zero barriers would certainly be breached by 2025.

In the next step two case studies – South Florida and Vienna Region - were made in order to show the dynamics in the scenario. The result of the massive restructuring of the South Florida urban region is a deliberately smaller, more compact urban form. Focus on small scale agriculture and better connectivity helps the region emerge from the morass of the transition.

Due to its more compact urban form, the Vienna Region will be able to transition to a Post Petroleum World with few major changes to its structure. Fine tuning of certain systems would need to take place; but otherwise the transition would be much smoother in Vienna in comparison to its sister region in South Florida, where a complete reconfiguration of the spatial structure would be necessary. The latter also applies to the currently growing suburbs of Vienna, though.

The actual movement of people between cities and regions is going to resemble Europe at the turn of the 20th century. Air travel is nearly extinct due to the amount of fossil fuel required. Intra- and inter-regional passenger transportation is in both areas then almost exclusively the provenance of railroads. Most transportation of freight will be via waterways and rail lines, since electric trucks do not have sufficient horsepower and will just be used for local distribution, where other means of transportation are not feasible. Cities on rivers once again become central hubs. Thanks to an emphasis on locally grown food and locally produced goods the amount of freight transported will be drastically reduced.

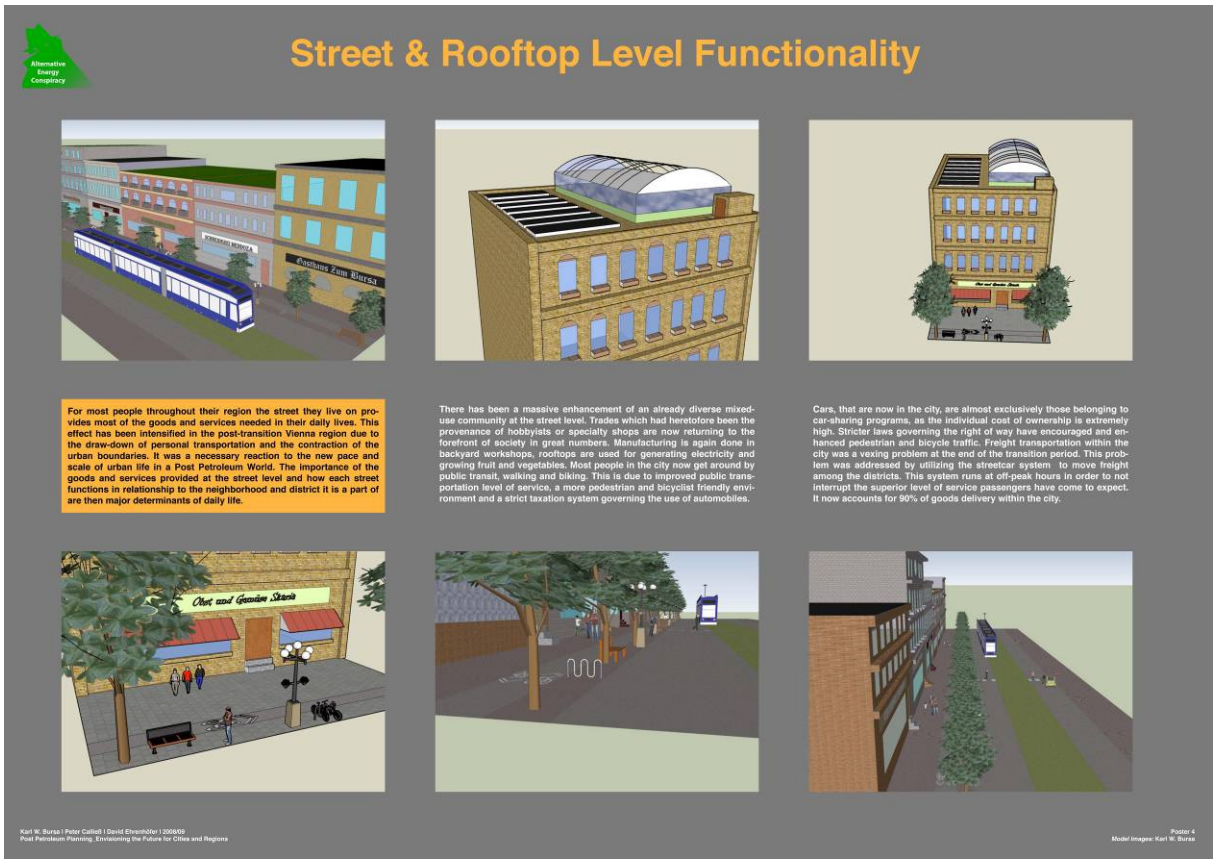

Fig. 4: Street and Rooftop Level Functionality, Source: Bursa, Calließ, Ehrenhöfer, 2009.

Shifting to a Post-Petroleum world will undoubtedly be the greatest challenge humanity has faced in centuries, if not millennia. When one stops and thinks for a moment, one realizes just how dependent a large majority of the modern world is on petroleum and petroleum-based products. The problem with this massive reliance on a single element, of course, is that it leaves our global population vulnerable to shortages in supply and the whims of those who control this resource. In order to achieve a true post-petroleum world, it is vital that we as a populace begin to wean ourselves off of oil as quickly as possible.

future? this way! _how to achieve our post-petroleum liveable neighborhoods? (by by Wolfgang Aichinger, Maribel Feliciano, Diana Mendoza, Andreas Putlitz)

The starting point for the scenario “future? this way!” is that spatial planners and policy-makers that are already developing concepts for post-petroleum planning assert themselves. Peak oil will happen and we will be able to adapt our way of life to the new challenges ahead.

By 2030, residents of South Florida and Vienna should be able to use an efficient regional and local transportation system and thus become less dependent on motorized individual mobility. They should live in walkable and bikable, compact and dense mixed-use neighborhoods with affordable housing. Neighborhoods should have a distinctive local identity and reflecting social and cultural diversity. Food should be produced locally, green land strictly conserved and further sprawl avoided. Only renewable energy sources should be used and waste reduction, water conservation and management implemented.

But what does it take to let this become reality? What kind of planning and state intervention is needed? What other components do we have to take into account? And, finally, what can culture contribute for liveable neighbourhoods? The group tried to assess these questions by interviewing scientists and practitioners in Vienna as well as in South Florida. According to the experts a clear political commitment and vision are a basic prerequisite. Strict compliance between development policies is needed, since public zoning policies, infrastructure

investments or subsidy schemes have high impacts on land use patterns. Thus, they need to be utilised as powerful instruments in order to tackle a set of basic challenges.

Fig. 5: Implementation Vienna, Source: Aichinger, Feliciano, Mendoza, Putlitz, 2009.

Compact neighbourhoods, for example, are the result of pricing, since low density is only possible where cheap land and mobility are available. This is why the internalisation of follow-up costs of mobility, energy use and land use needs to be implemented. Liveable neighbourhoods require more attention towards the aesthetics in the built environment or the quality of public space, as well as adequate means of participation and civic responsibility. Suburbanisation can be reverted, if the urban areas are attractive enough. For attractiveness, mixed-use is indispensable. Favoured by compactness and structural flexibility, it permits dense networks of interpersonal relationships and therefore the development of liveable areas with identity and a local sense of place.

One can conclude, that societal value patterns are changing, as they are being shaped by society and politics. So are settlement patterns, which are tangible for intervention. Promoting the principles of mixed-use and urging for an adequate adoption of the regulatory framework and planning policies are therefore the tasks for today's planners.

Conclusions

This paper has described both the conduct and results of collaboration between two planning schools. The four scenarios represent a wide range of thinking about the future beyond petroleum. Retrospectively the task was challenging on various levels

- There are a lot of, often contradictory, studies and predictions on topics like peak oil, climate change, sea level rise and so forth.
- Based on two case study regions – Vienna Region and South Florida – the huge difference in the spatial structure as well as development dynamics and life patterns of

the two regions seemed hard to compare on the first sight. Furthermore the questions of whether they are becoming more polycentric or more dispersed and their consequences for the world behind petroleum were addressed. The overall goal of the project, to develop scenarios for the world behind petroleum in line with an implementation strategy on different levels for the case study region, culminates in the evaluation of how the regions deal with the future development and in the elaboration of actions and policy recommendations.

- The scenarios followed a multilevel approach taking into account the global, national, regional and local effects. For many regions and agglomerations the actual polycentric or fragmented development is a key challenge of positioning on the local and regional as well as on the global scale.
- Territorial and social capital as key elements of development and driving forces (potentials and their utilisation, networks and strategic efforts on different levels) were discussed in an international and interdisciplinary environment.

Concluding most of the scenarios follow a soft transition for the actual situation to a world behind petroleum. This international group of future planners believes that people will be flexible enough to adjust to different lifestyles. But of course, to organise the transition period as smooth as possible, the preparation and adjustment of development strategies need to start today. Planners play a crucial role in this process.

The spatial agglomeration of economic, cultural and financial functions and activities with different importance play a crucial role in a post- petroleum society on the global, regional and local level.

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