



# Transatlantic Urban Climate Dialogue

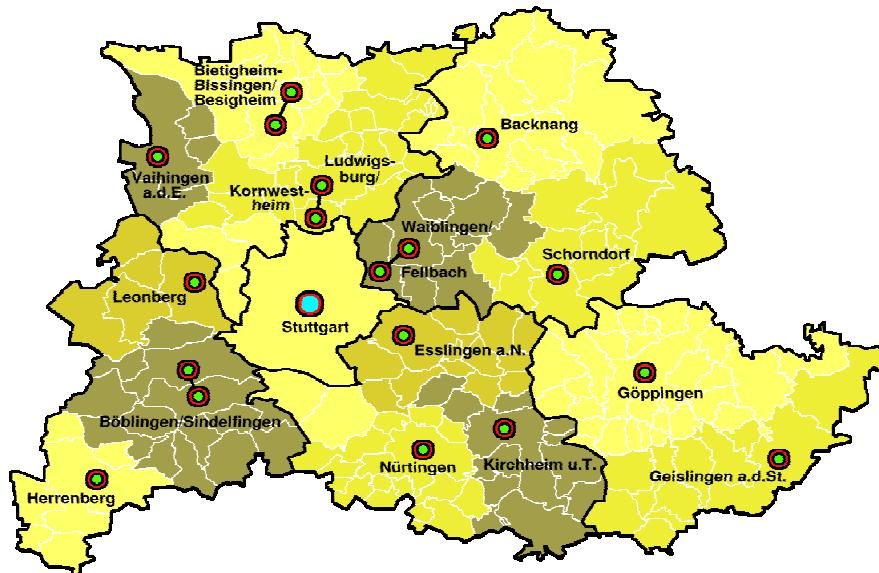
## Briefing Books

### Workshop # 3

## Sustainable Mobility

November 26 – 28, 2012, Stuttgart

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The Project is supported by the Transatlantic Program of the Federal Republic of Germany as Part of the European Recovery Program (ERP) of the Federal Ministry of Economics and Technology



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Special thanks goes to Georg Hubmann for his assistance with the English translation.

# **1 Overview and Origins of the Transatlantic Urban Climate Dialogue**

The Transatlantic Urban Climate Dialogue (TUCD) was designed to strengthen the transfer and application of sustainable energy and climate practices between metropolitan regions in Germany and North America. The reasons for the exchange of these practices are clear. Between 2010 and 2030, metropolitan areas in both countries will see significant increases in the amount of energy consumed. The OECD estimates that by 2030, cities in the U.S. will consume 87 percent of all energy. In Germany, it is projected that cities will consume nearly 75 percent of all energy by 2030. Germany has set ambitious targets to reduce greenhouse gas emissions by 2020 within the context of the Meseberg Declaration. However, questions linger about the country's ability to attain these goals – particularly within urban areas. Likewise in North America, consumption of conventional fossil fuels and emissions of greenhouse gases in the U.S. and Canada continue to rise, and current sectorial energy and climate paradigms are proving insufficient.

The U.S. and Canada continue to use substantially more energy relative to GDP than other major industrial countries of the world. It is rare to see cities in North America develop and implement actionable energy efficiency and greenhouse gas reduction programs with quantifiable benchmarks and targets. In general, the climate and energy plans of most U.S. states and Canadian provinces are voluntary and lack dedicated resources for the necessary large-scale transformation of the energy supply, building and transportation sectors.

However, many communities participating in the TUCD have adopted energy efficiency and greenhouse gas reduction goals and plans and are in the process of developing actionable implementation plans. Therefore, sharing lessons on problem focused, results oriented and geographically specific applications of policies and practices can help each TUCD partner better reach their energy and emission reduction goals.

## **2 The Cases**

### **I. Stuttgart Region**

#### **1. Electromobility is taking off - the federal project " Electromobility in the Model Regions."**

Presumably by 2020 there will be more than one million electric vehicles on the German roads. From 2009 to 2011 the BMVBS<sup>1</sup> has presented the project "Electro Mobility in the Model Regions"<sup>2</sup>.

Between 2009 and 2011, the Federal Government has provided € 500 million from its second economic stimulus package to promote the development and commercialization of electric vehicles. In this context, the BMVBS was allocating a total of € 115 million to initiatives in eight carefully selected pilot regions<sup>3</sup>. Additional funds are being provided by industry. Stakeholders from research, education, business and local government are collaborating closely to develop the necessary infrastructure, and to raise public awareness and acceptance of electric transportation. The joint mission is to find holistic answers to key issues related to the design, manufacture and commercialization of electric-drive technology – and to support the Federal Government in its efforts to put a million electric vehicles on the country's roads by 2020, and to make Germany a leader in the emerging e-mobility market<sup>4</sup>. As part of the wider programme funded by several ministries two major e-mobility initiatives<sup>5</sup> has been launched in the Stuttgart Region.

The Stuttgart Region is the birthplace of the car, and home to the most significant automotive-industry cluster in Europe. The sector accounts for around 180,000 local jobs. As a result, the changing nature of transportation will have a significant impact on life and work here: the coming decades will see the emergence of new mobility concepts and the concurrent deployment of diverse drives (combustion engines, batteries and fuel cells). Against this background, stakeholders in the Stuttgart Region are joining forces to secure technology leadership in the commercialization of electric vehicles.

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<sup>1</sup>BMVBS: Bundesministerium für Verkehr, Bau und Stadtentwicklung

<sup>2</sup>Hyperlink:[http://ecars.regionstuttgart.de/wpcontent/uploads/2011/05/Kompetenzatlas\\_Elektromobilität\\_RegionStuttgart.pdf](http://ecars.regionstuttgart.de/wpcontent/uploads/2011/05/Kompetenzatlas_Elektromobilität_RegionStuttgart.pdf) (10.10.2012)

<sup>3</sup>Modellregionen Elektromobilität

<sup>4</sup>Comparison: Kompetenzatlas\_Elektromobilität\_RegionStuttgart.pdf, p. 14

<sup>5</sup>Modellregion Elektromobilität and Living Lab BWe mobil

## **1.1. Bietigheim-Bissingen**

### **Pedelec Loan and Parking Lot**

The Association "sustainable mobile Stuttgart Region", which is supported by the City of Stuttgart and by the regional associations, offers the electric bicycles (pedelecs) as a convenient transport for the inhabitants of Bietigheim-Bissingen and Schwieberdingen Kirchheim / Teck. Twelve other towns in the region are interested as well. The regional association takes over € 390 000 of the cost, the other half will be paid by the municipalities. The fee for the pedelecs is yet unclear.

Bietigheim-Bissingen also creates a charging station for the pedelecs as an electric mobility requires an appropriate infrastructure for a secure battery charging in public spaces. The pedelec charging stations for up to 40 batteries can be operated by solar power plants. Enztal cycle track and Stromberg Murrtal-way should provide such services for the numerous tourists. The customers can use their ec-card as an ID. In order to cover the costs, it is possible to attract sponsors such as banks, retail companies or public utilities.

#### **Interesting Link:**

<http://www.stuttgarter-zeitung.de/inhalt.mobilitaet-schneller-ins-e-zeitalter-page2.f9d0d53a-f79d-44cd-a059-2de7e88486b3.html>

## **1.2. Ludwigsburg**

Ludwigsburg is one of the three communities that participate in the pilot project for electric mobility of the State of Baden-Wuerttemberg.

The project funds the campaign "electrified Ludwigsburg".

The logo of the campaign is currently displayed on the 15 electric vehicles, on the electric charging stations and in the magazine " Stromaufwärts".

Under the umbrella of the federal project "Model Region Electromobility", the city administration has tested three electric cars, five e-scooters, five Pedelecs and two Segways.

The University of Stuttgart has presented the electric vehicles to the city council in order to test whether these vehicles can be used as business cars. The Stadtwerke as one of the official partners of the project, have supplied the e-vehicles with green electricity. The municipal utility company also took over the construction of the charging infrastructure and had installed five power stations in the vicinity of City Hall. The technical services Ludwigsburg and the employees of the city administration used the e-vehicles along with the traditional cars.

The users of e-vehicles filled out the special logbooks in which they recorded the route traveled and shared their impressions or issues. The Institute of Industrial Engineering of the Fraunhofer Society and the Institute of Industrial Science and Technology Management at the University of Stuttgart evaluated the logbooks and conducted interviews with the users.

The aim of the Ludwigsburg project was to develop the basis for the economic and consumer-friendly transport for the future. Particularly significant was the creation of the necessary infrastructure such as public charging systems for electric vehicles. The project made it possible to collect data on behavior of the e-vehicles users and to test possible future business models. In addition, the project should also create an awareness of electric vehicles among the population, as well as at the local companies.

## Conclusions

### **Next steps to build up the Electromobility in Ludwigsburg:**

- To contact all relevant actors and to discuss how to seek synergies with the existing projects.
- To lay the foundation for a viable electromobile urban development.
- To develop an implementation plan.

### **Interesting Links:**

[http://www.ludwigsburg.de/Lde/start/wirtschaft\\_medien/elektrisiert.html](http://www.ludwigsburg.de/Lde/start/wirtschaft_medien/elektrisiert.html)  
<http://www.wirtschaftsrat.de/wirtschaftsrat.nsf/id/elektromobilitaet-in-der-praxis-ludwigsburg-auf-dem-weg-zur-innovativen-stadt-fuer-nachhaltige-mobi>  
<http://ecars.region-stuttgart.de/>

## 1.3. Waiblingen

### **Transport Development Planning**

The City car sharing corporation “Stadtmobil” has more than 390 vehicles at over 170 locations and thus is the largest provider of the station-based car sharing in the Stuttgart region. The corporation was founded twenty years ago as a volunteer association.

Currently the “Stadtmobil” set a goal to reduce motorized short-distance private traffic. Car sharing is essential for the waiver of the private cars because it offers a diverse range of the public vehicles at easily accessible, central parking spaces. By reducing the amount of the private cars in the city center, there is less environmental impact caused by gases, dust and noise, which makes the city more attractive for the residents, pedestrians and cyclists. A car sharing in Waiblingen exists already for fifteen years. More than 150 users share various vehicles from small cars to the minibuses. The city car sharing corporation “Stadtmobil” encourages the city of Waiblingen to participate in the flagship project that promotes two electric vehicles to be used by the Waiblinger citizens and employees of the municipality.

Travelling by bus and train is not only convenient and safe, but in many cases cheaper than travelling by car. The short-range public transportation network in Rems-Murr-Kreis offers travelling by buses and trains. The two S-Bahn lines S2 and S3 connect Schorndorf and Backnang with Stuttgart airport and Neue Messe. The regional rail lines R2 and R3 connect Aalen-Schorndorf-

Backnang with the Stuttgart central railroad station. The R2 and R3 and the Wieslauftal line R 21 operate on the routes with the highest passenger demand and thus form the backbone of the transportation network in the region. There are also 92 bus lines, with around 838 bus stops. The buses bring the passengers to the stops of the trains. The real-time information system informs the passengers about the possible delays, change in schedules and accessibility of the Commuter Train. Such customer-friendly service visibly improves the quality of public transportation in the region.

Changing the mobility behavior among the car users is a long-term challenge in the region. A well-developed transport and the possibility of car sharing is a first step. The young generation should recognize car sharing as an alternative to private transport. The carbon-neutral electricity-operated vehicles and reduction of the short-distance private transport will bring clean development to the Stuttgart region.

**Interesting Link:**

[http://www.rems-murr-kreis.de/2646\\_DEU\\_WWW.php](http://www.rems-murr-kreis.de/2646_DEU_WWW.php)

## **1.4. Esslingen am Neckar**

### **Sustainable Mobility and Climate Action Plan in Esslingen am Neckar**

The City of Esslingen am Neckar set the goal to reduce carbon dioxide emissions by 25 percent by 2020 (compared to the base year 2007).

In 2010 the city of Esslingen has developed a comprehensive and integrated Climate Action Plan in order to achieve this ambitious goal.

The special committee on climate change in close cooperation with the stakeholders from Esslingen am Neckar work on the implementation of the measures package of the Climate Action Plan that include 43 modules.

A creation of the carbon footprint for Esslingen am Neckar has been of a great assistance in order to collect information on CO<sub>2</sub> reduction in the city by 2020. The carbon footprint shows clearly that the industrial sector along with the services and commercial sectors cause about 60 percent of the CO<sub>2</sub> emissions in Esslingen. The share of the CO<sub>2</sub> emissions caused by transport is about 14 percent, which is well below the national average. Nevertheless, the Climate Action Plan includes 10 important measures to reduce transport-related CO<sub>2</sub> emissions, such as an integrated transport development plan, a pedestrian and bicycle traffic concept, a creation of the mobility points in the city, as well as the reinforcement of the operational mobility management within the municipality.

Esslingen participates in climate protection for many years. For example, the city takes part in the pilot project on electromobility in the Stuttgart region and thus has been testing electric bikes and electric scooters for the city administration.

A considerable financial and constructional effort has been made in order to build a network for public transportation that shall increase the attractiveness of the public transport and promote the electric public transport in particular. The research and teaching on the subject of mobility is also very strong in Esslingen. The University of Esslingen has established a new institute for Sustainable Energy Technology and Mobility (INEM) that promotes the topic of the innovative mobility.

Esslingen public transport system also contributes to the ambitious climate targets of Esslingen by using electric vehicles and trolleybuses in the city. Trolleybuses provide electro mobile transportation for the citizens of Esslingen for many decades. Compared with traditional diesel buses such sustainable public transportation is environmentally friendly and produces less CO<sub>2</sub>. The excellent access to the national public transport features Esslingen along with the additional services such as car sharing and pedelec bicycle parking lot, opened in the vicinity of the central station.

#### **Interesting Links:**

- [http://www.esslingen.de/Lde/start/es\\_themen/klimaschutz.html](http://www.esslingen.de/Lde/start/es_themen/klimaschutz.html)
- <http://www.esslingen-und-co.de/>
- [http://www.esslingen.de/Lde/start/es\\_themen/Neuer+ZOB.html](http://www.esslingen.de/Lde/start/es_themen/Neuer+ZOB.html)

## **II. NRW**

### **1. Master Plan Electric Mobility: North Rhine-Westphalia on its Way to the First Large-Scale Model Region of Electric Mobility in Europe**

The Master Plan Electric Mobility North Rhine-Westphalia (NRW) shows the importance and opportunities of electric mobility in NRW, describes specific action with respect to the mentioned fields of action, and outlines an implementation plan with which the above mentioned objectives can be achieved.<sup>6</sup>

#### **1.1. Trends, Opportunities and Challenges**

In the field of electric mobility, a dynamic, technological and economic development can be expected within the next ten years. Electric drives (hybrid, battery and fuel cell vehicles) offer great potential for reducing dependence on oil imports and reducing CO<sub>2</sub> and local pollutant emissions. Plug-in and battery electric vehicles are from the viewpoint of energy efficiency, the first choice. Other countries like the U.S. and Japan, but also China already recognized that and support their industries with extensive programs on the road to electric mobility. Innovation and employment stimuli

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<sup>6</sup>Last update: 01/04/11

in the area of energy storage are created by both the large industry and small/medium companies (respectively innovative start-ups). The National Development Plan of the Federal Government should foster a concerted strategy from basic research to the market launch of electric vehicles together with science, industry and politics. The entire value chain - from materials components, cells, batteries to the overall system and its application - is being considered. The development and introduction of electric mobility will be a new wave of innovation for the German economy.

Electric mobility will bring together sectors that have hardly linked before: first, the automotive industry and the energy industry but also the chemical industry and information and communication technologies. Whether it is possible to exploit synergies of this new constellation is significantly dependent from the definition of the interface between electric vehicles and the power source. Important contributions from companies and research institutes of the information and communication technologies will be necessary to accomplish that. Moreover, the suppliers will play an increasingly important role as a source of innovation.

## **1.2. Objectives and Strategies for NRW**

North Rhine-Westphalia is Germany's No. 1 energy state and one of the major automotive sites. North Rhine-Westphalian producers annually bring around 700,000 cars and trucks to the world market. Apart from that, there are also trailers, bodies, containers, motor vehicle parts and accessories.

Due to the existing power supply infrastructure in NRW stakeholders from industry, research and politics see an option to bring electric vehicles to the market in a medium term solutions. This means that new actors and new business models will occur in the future for mobility issues, such as for example in the field of leasing batteries, electricity sales or electricity gas station. The project presentations by various actors reach to the production of new vehicles in NRW. Basis of all activities is the "Master Plan Electric Mobility North Rhine-Westphalia", including the rapid development and expansion of the Rhine-Ruhr region as a model for electric mobility.

The key objectives of the State Government in electric mobility are:

- At least 250,000 vehicles should be equipped with electric power drive by 2020.
- The market share of NRW supply industry in this area is going to be expanded significantly over the coming years.
- Another goal is to attract new automotive manufacturers and suppliers to settle in the country in order to use the expected market shift from gasoline to electric mobility as an opportunity for the industry site.

In the electric mobility model region Rhine-Ruhr a series of Pilot projects will be initiated in order to test concrete examples. In this context, North Rhine-Westphalia successfully competed against 150 competitors in an enforced competition of the Federal Ministry of Transport, and thus represents one of eight model regions. The total budget therefore is € 115 million.

Topics cover almost the entire range of electric vehicles:

- Transportation / Logistics (development of e-vehicles, vans)
- Cars (launches, fleet tests, cars with range extenders)
- Infrastructure (Construction)
- Coaches / Public Transport (hybrid buses in regular service)
- Truck / Utility Vehicles (garbage trucks)
- Bikes (mobility - hybrid bicycles for transport) and car sharing

In addition, North Rhine-Westphalia engages in electric mobility with a funding competition in electro mobility, therefore up to € 60 million state and EU funds are ready. Battery and fuel cell electric drives are key technologies of the future mobility. The heavy traffic is still for a long time optimized for Diesel engines but synthetic fuels such as biomass-based fuels will play a crucial role in the future. This makes it necessary for NRW to support such projects at all three pillars.

Energy efficiency is the guiding principle of the fuel strategy of NRW:

1. Clean fuels in conjunction with efficient drive, eg XtL-fuels  
biofuels of 2nd and 3rd generation, natural gas or biogas
2. Electric mobility (electric vehicles, plug-in hybrid, diesel hybrid solutions)
3. Fuel cell / hydrogen

The Government attaches great importance to the fact that market participants get the required information. An important role here play e.g. consumer associations whose motivation it is to inform fully and comprehensively. Therefore, events on the future of mobility are very important platforms to the questions of the mobility of tomorrow. They help consumers to get an overview about the diverse fuel and power drive options and on the other hand they help to ensure that the identified alternatives are perceived publicly. Only then they will be able to compete.

### **1.3. Stakeholders NRW**

In North Rhine-Westphalia, there are more than 100 players - from energy and the local manufacturers (Ford, Opel, Mercedes-utility vehicles to niche providers and factories). There are more than 800 suppliers and researchers, e.g. at RWTH Aachen, Ruhr-University Bochum, Dortmund University of Technology, the University of Duisburg / Essen and Münster. The organisation AutoCluster.NRW who is responsible for the creation of the Master Plan comes to an overall positive evaluation of the competitiveness of the location in North Rhine-Westphalia concerning electric vehicles. This is especially true for the higher education sector and the energy supplier. As part of the Master Plan for electric mobility in North Rhine-Westphalia three areas were established:

- o vehicle technology,
- o battery technology and
- o infrastructure and networks

## **1.4. Key Activities and Projects of the Clusters**

The electro mobility model region Rhine-Ruhr is part of the support program of the Federal Ministry of Transport, Building and Urban Development (BMVBS), which is enshrined in the National Development Plan for Electric Mobility.

The federal government promoted a total of € 500 million from the stimulus package between 2009 and 2011 to expand and ensure a market preparation of electric mobility. Thus, for example in the BMVBS Priority Area "Electric Mobility in Pilot Regions", 8 model projects are receiving a total of € 115 million. Stakeholders from academia, industry and the participating local authorities are working closely with these model projects to establish new infrastructure and to promote electric mobility to the public.

Within the project "ColognE-Mobil", Ford Werke GmbH, University of Duisburg / Essen, RheinEnergie AG and the City of Cologne are carrying out fleet tests with the electric vehicles type "Ford BEV Transit" and "Ford Focus BEV". To this end, the partners who are in the project operate a total of 25 electric vehicles and work on the charging infrastructure and the corresponding scientific and administrative work.

In the project, "E-mobil NRW", which is coordinated by the Stadtwerke Düsseldorf,

7 municipalities in the region are engaged for an integrated field test of different vehicles. The plan is the use of 20 electric vehicles, 26 e-scooters and 4 trucks. The necessary infrastructure is supposed to be built with 58 charging stations. 21 hybrid buses of various bus manufacturers are going to be used in the Regional Transport Network Rhein-Ruhr for public transport (VRR project "Hybrid Buses"). In collaboration with the Institute of Automotive Engineering at RWTH Aachen University and the TÜV Nord, the operation of buses is evaluated especially in terms of noise and analysis of pollutant emissions and fuel consumption. In another bus project called "Hybrid Buses in the Field Test" a prototype of the manufacturer Voith / Solaris is tested with a parallel hybrid bus concept. In the second phase, 4 hybrid buses should be installed.

The project "E-Aix" is located in the Aachen region and will be supported by 50 partners from business and science. The Stadtwerke Aachen are the coordinators. Besides the use of different electric vehicles and the creation of new infrastructure and mobility concepts, the topics are intelligent power supply, market preparation, communication and knowledge transfer. Commuting traffic in the Dortmund, Essen and Mülheim region is part of the project „Stromschnelle“. Here, around 160 electric vehicles within and between the cities are installed and it should be worked on new business models for electric mobility. RWE will install the necessary charging infrastructure. 40 vehicles are going to be delivered by Renault, the other vehicles are converted vehicles based on Fiat Fiorino and Fiat 500. The Stadtwerke Krefeld test 4 hybrid garbage collectors with associated infrastructure in cooperation with its partners called GSAK and SWK Mobil as part of a project called „Hybrid Bins Krefeld“.

The vehicles are in regular operation with various cycles and usage profiles used with the perspective for the introduction of technology to successful testing and references to optimization.

## 2. Mobility 2030

The State of NRW pays particular attention to the evaluation of the impact of demographic change on public transportation. The Commission on future public transportation addresses questions such as development and funding of the local short-distance traffic. The Commission consists of the 18-members panel of experts that includes renowned representatives of academia, utility companies, transport companies and industry, passenger associations, trade unions and the German Association of Cities, the German County Association and the Association of Towns and Municipalities. First results of the Commission are expected mid-2013. In addition, the initiative "Bahn NRW" has commissioned a study in order to find out how the demographic change in NRW impacts public transport sector. The results of this study appear in early 2013.

Dirk Vallée, a University Professor for Urban Engineering and Urban Traffic at the Faculty of Civil Engineering of the RWTH Aachen University (RWTH) conducts research in the field of causes, interactions and consequences of settlement and transport, follow-up costs of settlement structures, effects of demographic change and the consequences of climate change for urban development and transport.

According to the Study of Vallée, demographic changes are having massive consequences on life in towns, cities and regions. The number of inhabitants is falling, while at the same time people are living longer and longer. Furthermore, extensive migration is also taking place. In North Rhine-Westphalia, for example, it is anticipated that there will be around 17 million inhabitants in 2030, which is 3.7 percent fewer than in 2011. The age structure is also shifting. North Rhine-Westphalia is becoming older: In 2011 around 3.5 million inhabitants of the state were under the age of 20—making up 19.5 percent of the entire population—with this figure falling to just 17.1 percent in 2030. In contrast, there are more people over the age of 65. Their share will rise from 20.3 percent of the population in 2011 to 26.9 percent in 2030.

But what does this mean for local public transport? An ageing society needs local public transport that is attractive and safe. The 60+ generation is very active, so that more transport will be required for leisure activities. The over 75s, who drive less, will be increasingly reliant on mobility aids, e.g. ride sharing services, car pooling and delivery services.

In order to ensure that more people use bus and rail services, mobility also has to become easier. Vallée states: "What is required is a mobility network, i.e. offers for bus and rail, bike and car sharing from a single source and with one tariff. Billing has to be simplified and amalgamated."

In the countryside, which is constantly struggling with falling population sizes and therefore also fewer passengers, flexible alternatives to conventional bus routes, for example citizens' or taxi buses, are what is required. In contrast, the towns and cities—which have already reached the limits of their transport capacities—require environmentally friendly and highly efficient solutions that make use of a combination of cars, local public transport and bicycles. Ultimately, local public transport has to give consideration to new financing models, since up to now it has been largely financed by so-called "student transport". As a result of falling pupil numbers, local public transport is faced with the threat of losing this financial backbone. Alternative financing concepts that have a future are what is required<sup>7</sup>.

#### **Interesting Links:**

[www.pro-buergerbus-nrw.de](http://www.pro-buergerbus-nrw.de)  
[www.initiativebahn.nrw.de](http://www.initiativebahn.nrw.de)

## **2.1. Successful Models with a Future**

The future of local public transport in rural areas is a permanent topic not only at transport policy congresses. Falling pupil numbers and the ageing society are raising the question of how to maintain an economical range of local transport services in the sparsely populated rural areas. Here, alternative forms of service are becoming increasingly important. In North Rhine-Westphalia, the citizens' bus in particular has developed into a model of success. Over 100 citizens' bus associations provide a range of voluntary mobility services for the public where a standard bus route is no longer economical.

Other alternative forms of service are the so-called taxi-bus or the multi-bus, which are organized by a transport company: Here, small buses travel along a defined route according to a defined timetable, similar to conventional buses—but only when required, i.e. when the passenger has notified the company in advance that a bus is needed.

A taxi-bus is usually used in situations where a regularly scheduled transport is uneconomic. A taxi-bus operates according to a fixed timetable at a defined distance, but only if passengers have registered for the ride in order to avoid an empty trip. Meanwhile, there are 29 taxi-bus routes in the district. The number of passenger on the left bank of the Rheine has increased to 16 percent in 2010.

In 2001 the Federal Ministry of Education and Research has initiated a research project "Transport for the Region" in several communities of Heinsberg. A part of this project was a usage of the multi-buses. Meanwhile, the multi-buses are in high demand in the area. Round 85,880 passengers used the multi-buses in 2010. For comparison, in 2009 only round 49,900 passengers used this service. The small buses travel only when necessary

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<sup>7</sup>Comparison: TransVer 2012: Mobilität 2030. Verkehrskonzepte zum demografischen Wandel. Ministerium für Bauen, Wohnen und Verkehr des Landes Nordrhein-Westfalen (Hrsg.), Düsseldorf 2012).

within timeframe. The passenger has to register for the journey not later than one hour before departure. There is no fixed timetable or route therefore the multi-bus is similar to a door-to-door service.

The transport companies in North Rhine-Westphalia will have to invest massively in new vehicles in the coming years. According to the latest Intraplan study commissioned on behalf of the VDV (Association of German Transport Companies) in North Rhine-Westphalia, the underground railways and trams will require a capital asset of around €630 million by 2016. By 2025 an amount of €1.62 billion will be required for investments in the vehicle fleet. Against this background, the "Zweiterstellung" (Second Construction) project of the public utility company in Bonn (SWB) has highlighted an alternative to the purchase of new vehicles. In the next six years, technicians and engineers from the company will be completely reconstructing 25 urban rail vehicles produced between 1974 and 1977: as modern vehicles with impressive levels of comfort, high safety standards and environmentally friendly technology for daily use.

(Comparison: TransVer 2012).

## **2.2. Rheinbahn tests innovative Ticket Model**

Since March 2012, passengers in Düsseldorf have had three methods of moving around: with the "Mobile in Düsseldorf" ticket they can use all of the bus and rail travel opportunities available within the city and have 90 minutes of car sharing a month and 240 minutes of bicycle use a day included. The particularly clever aspect: the customers require only a single chip card. This pilot project has been made possible by a cooperation between the Rheinbahn transport company, the Rhein-Ruhr Transport Association (VRR), the car sharing provider car2go and the bicycle hire company nextbike. A 12-month test phase is intended to show whether the multimodal concept proves popular among Rheinbahn customers and is suited for reducing the road traffic in Düsseldorf. The 590,000 inhabitants of the state capital of North Rhine-Westphalia have almost 275,000 cars—an enormous number, which the city would like to reduce in the long term.

(Comparison: TransVer 2012).

## **2.3. Growth of the Rail Transport**

NRW has the densest rail network in Germany and in Europe. There are also major commercial airports, a well-developed road network and significant navigable waterways. Germany's main terminals for intermodal transport are also located in North Rhine-Westphalia. Expansion and maintenance of infrastructure are a key issue. All scenarios for the rail traffic development by 2025 anticipate a significant increase. A main cause for a growth is the rail freight transport with a national average increase of 65 percent compared to 2004. The most important for the NRW hinterlands transport ports of ZARA (Zeebrugge, Amsterdam, Rotterdam, Antwerp) are also expected to grow on average by as much as 168 percent. The nationwide rail passenger transport will presumably increase to 25.1 percent.

(Comparison: TransVer 2012).

## **2.4. eTickets with flexible Tariffs**

With its regular network meetings, the NRW Rail initiative promotes the exchange of views between the stakeholders of the railway and transport industry in NRW. The focus of these one-day events is a wide range of topics. On the occasion of the first network meeting in 2012 in Dortmund the focus was on the further development of Electronic Fare Management (EFM) in NRW. Here, specific work contracts for the further strategic development of EFM in NRW were formulated. Today there are currently 1.8 million eTickets in circulation at the large transport associations of VRR and VRS alone.

Two innovative examples of the public utility company in Münster and the Rhein-Ruhr Transport Association (VRR) represent the latest developments in Electronic Fare Management in North Rhine-Westphalia NRW. The PlusCard in Münster implements a flexible tariff model for occasional customers and those who do not travel very often in the form of the eTicket. The VRR roadmap defines the necessary measures and working steps up to EFM level 3 with automated fare collection.

(Comparison: TransVer 2012).

## **2.5. Network for the Rail Transport Industry**

The idea to create the Network NRW Rail initiative is an important contribution to the success of the North Rhine-Westphalian transport industry development. It strengthens manufacturing locations and secures jobs. The rail and transport industry in the NRW has about 100,000 employees and thus is one of the key industries in the region.

The NRW Rail initiative is a communication platform for the important stakeholders from the rail transport industry for more than sixteen years. A strong nation-wide network connects system traders and suppliers, transport associations and companies, as well as players from science, administration and policy.

The NRW Rail initiative sees itself as a coordinator for efficient local marketing and industry networking. Along with the practical exchange, the Network also studies the ways to investigate the development of public transport in the country and provide valuable input for the future planning. Currently it conducts a study on the impact of demographic change on public transport in NRW.

### **Knowledge Transfer between Industry and Academia**

The economic conditions for the small and medium enterprises from the rail and transport industry have changed in recent years. The NRW Rail initiative assists companies in their transition to the international goods and passenger transport development. The Network also promotes the transfer of knowledge between industrial companies and the engineering departments of the 18 colleges and universities in the country.

In addition, the Network is active in the area of recruiting in order to counteract the lack of skilled employees. The Career Campus Rail promotes the interaction between businesses and potential junior staff from the local universities. The important cornerstone of the networking was a meeting Ticketing in May 2012. This meeting has initiated an interdisciplinary dialogue about the future of the rail industry. Joint visits of the exhibitions and conferences, such as for example InnoTrans in Berlin or the transport logistic in Munich, encourage personal interactions and contribute directly to potential business contacts. Finally, the NRW Rail initiative provides a platform for the direct dialogue on political conditions of the Transport Industry in NRW as well as enables a dialogue about competition opportunities on the foreign markets.

(Comparison: TransVer 2012).

### **3. Action Plan to promote Local Mobility**

How can the German federal state of NRW encourage its 427 municipalities (18 million inhabitants) to improve their local mobility policy?

#### **1. What is Local Mobility?**

By local mobility, the state government understands non-motorized basic mobility by bicycle, on foot and by other means (e.g. in-liners, scooters, skateboards/kickboards). Within this group, the bicycle is the means of mobility with the broadest radius of action and greatest potential as a substitute for car travel. The bicycle can be used for all travel purposes and so is the most important asset.

#### **2. The state's action plan**

NRW is regarded as the “most bicycle-friendly federal state” in Germany. Exemplary aspects include the 'Bicycle-Friendly Towns, Cities and Municipalities Working Group' (AGFS), the Bicycle Route Planner on the Internet, bike stations and a systematic funding programme. NRW boasts an impressive record: More than 140 million page impressions per year in the Bicycle Route Planner, over 14,000 kilometers of signposted routes in the state-wide bicycle path network, a 50% reduction in fatal accidents, 64 bike stations and growth in the AGFS’ membership from 27 to 66 – and the figures are rising.

NRW’s government has now formulated an action plan. It sees local mobility as a core forward-looking task.

#### **3. Instigation of a Change in Perspective**

Whereas the action plan defines political objectives, key aspects and core contents of the state’s traffic policy on local mobility, technical planning and the subject matter are described in more detail in a document from the AGFS. Both complement each other.

With the active integration of ministries, redefinition of the concept and formulation of objectives across departments, local mobility is given a new meaning both in terms of planning and policy. The goal is to highlight its opportunities and potential, assess it in terms of traffic policy and reposition it in relation to the car and public transport.

#### **4. Example components of the action plan**

- Support of the AGFS
- Intensified development of the local mobility infrastructure
- Conversion of former railway lines into cycle paths
- Construction of bicycle fast lanes
- Promotion of bike stations and bicycle parking facilities
- Promotion of the infrastructures for e-bikes
- Strengthening of bicycle tourism
- Greater commitment in promoting health and sport
- Preservation of independent mobility among children and the elderly

#### **5. Background**

Local authorities need ideas, guidance and funding for the improvement of their local mobility policy with respect to non-motorized transport. Therefore, the state government implements a new action plan together with corresponding funding possibilities to encourage the municipalities to invest in measures to promote 'basic mobility'

#### **6. Methods**

Establishment of an action plan supported by co-funding with state and federal money, e.g. with the following topics:

- Support of the 'Bicycle-Friendly Towns, Cities and Municipalities Working Group'
- Intensified development of the local mobility infrastructure
- Conversion of former railway lines into cycle paths
- Construction of bicycle fast lanes
- Promotion of bike stations and bicycle parking facilities
- Promotion of the infrastructures for e-bikes
- Strengthening of bicycle tourism
- Greater commitment in promoting health and sport
- Preservation of independent mobility among children and the elderly

#### **7. Results**

The paper presents a new action plan. The expected results will be achieved with the introduction of the corresponding measures. However, a first action plan introduced in 1999 had major results in the improvement in bicycle infrastructure such as state-wide sign posting, construction of dedicated bicycle paths, opening of bike stations at railway stations, etc.. Some cities showed a major improvement in modal-split figures, e.g. city of Münster with 37 % bicycle trips.

## **8. Conclusions**

The state government is convinced that the top-down strategy of a comprehensive action plan (supported by sufficient funding possibilities) is the best way to improve non-motorized mobility in the state municipalities.

### **Reference:**

Ministry for Building, Housing, City Development and Transport of the State of North Rhine-Westphalia

### **III. Northern Virginia**

## **1. Electric Vehicles in Metropolitan Washington: Understanding the Region's Current EV Readiness and Options for Expanding Their Use**

Based on the Metropolitan Washington Electric Vehicle (EV) Report, Final Draft September 2012<sup>8</sup>.

Although total EV ownership in the metropolitan Washington region is relatively low (compared with other cities such as Portland, Oregon, or Los Angeles), consumer interest in EVs is growing and more EV models are being introduced in the regional market. However, the metropolitan Washington region's charging infrastructure and EV policy frameworks are not yet positioned to accommodate greater market penetration of these vehicles.

The Metropolitan Washington Electric Vehicle (EV) Report contains recommendations for stakeholders to promote a consistent set of practices across the region that will remove barriers to EV adoption and infrastructure planning while mitigating potential impacts on the electrical grid. This coordinated planning effort will help ensure that the region can receive the health, environmental, and sustainability benefits that EV technology offers.

### **Benefits of EV Deployment**

EV adoption presents environmental, economic, and energy security benefits to the country and to the region. The U.S. Department of Energy (DOE) sees the electrification of vehicles as one of the highest impact strategies for reducing greenhouse gas emissions between now and 2030. Due to the relatively low greenhouse gas emissions profile of the Washington region's electrical grid, EVs charged in most parts of the region produce fewer greenhouse gasses than any currently available hybrid vehicle (equivalent to 50 mpg or greater).

And as renewable portfolio standards and other policies increase the proportion of low- and no-emissions electricity available on the grid, the environmental impact of EVs will continue to improve.

EVs can play an important role in achieving the region's air quality goals by reducing vehicle emissions. In the metropolitan Washington region, transportation emissions accounted for 55 percent of NOx emissions and 16 percent of fine particle (PM2.5) emissions in 2007. Because EVs produce no

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<sup>8</sup>Electric Vehicles in Metropolitan Washington: Understanding the Region's Current EV Readiness and Options for Expanding Their Use  
Draft Final September 2012

Prepared by the Metropolitan Washington Council of Governments (COG) for  
Climate, Energy, and Environment Policy Committee (CEEPC) & the COG Board of Directors. Metro  
Washington EV Report draft 9-27-12-1-copy-pdf.

tailpipe emissions, they are good candidates to help significantly reduce pollution from mobile sources.

Additionally, EVs offer their owners protection against future gasoline price volatility. And because EVs rely on domestically produced electricity rather than on petroleum, a largely imported fuel, they promote energy security.

### **Challenges to EV Adoption**

Despite the benefits of EVs, challenges such as unfamiliarity with the technology, range anxiety, underdeveloped charging networks, limited vehicle availability, and relatively high vehicle cost have hindered their adoption. In addition, the absence of a clear policy framework for EV infrastructure planning—which considers permitting, siting, zoning, utility policy, and other issues—has amplified existing market barriers. A regional strategy is needed to bridge these obstacles and clear the way for wider EV recognition and use.

### **Recent COG EV Planning Initiatives**

COG held an EV Workshop in early 2011 to examine successful EV readiness strategies and to begin the conversation at a regional level on how to effectively and collectively deploy EV transportation technology. Participants, including local governments and industry experts, agreed on the need for an EV readiness strategy to facilitate deployment in the metropolitan Washington region.

In 2011, in response to interest in EV planning across the metropolitan Washington region, COG and the Greater Washington Region Clean Cities Coalition embarked on a new regional Electric Vehicle Planning Initiative. The scope of this stakeholder-driven initiative is to identify the issues for regional EV deployment and to make recommendations for the region and local jurisdictions to consider in designing and implementing programs to facilitate EV adoption. Under this initiative, the Electric Vehicle Planning Workgroups (referred to herein as the Task Force) were focused on infrastructure development and local government policy. Six subgroups were formed to address the specific issue areas of infrastructure siting; comprehensive planning, zoning, and building codes; permitting and inspection; electric utility policy; EV use in fleets; and outreach and education. These subgroups met regularly from February through June 2012 to develop the recommendations put forth in this report.

### **EV and EVSE Deployment Planning**

COG staff and the EVSE Deployment Planning subgroup sought to provide an assessment of the current state of EV adoption and charging infrastructure (broadly referred to as electric vehicle supply equipment, or EVSE) in the Washington, DC region. Staff used vehicle registration data, survey data on regional driving patterns, and information on publicly accessible EV charging stations to assess the potential for EV expansion. Given these findings, the stakeholder group provided recommendations on strategic locations for charging stations, suggestions for incentives to promote charging expansion,

provisions to reduce the cost of future EVSE installation, and considerations for multifamily residential and workplace charging.

### **Regional Forecast for EV Ownership**

According to data provided by Virginia, Maryland, and the District of Columbia Motor Vehicle Departments, there are approximately 500 EVs registered in the metropolitan Washington region. At least three major EV and PHEV models are available in the region, and service to convert hybrids to PHEVs is available.

While it may not be possible to predict exactly how many EVs will be operating in the region in coming years, one means of estimating future EV adoption is to analyze the recent experience of hybrid vehicle adoption. According to data from the Transportation Planning Board (TBP), from 2005 to 2011, the number of registered hybrid vehicles in the region grew more than 600 percent, from approximately 12,000 vehicles to more than 70,000. COG staff determined that a conservative estimate would be 1,500 to 3,000 EVs operating in the region by the end of the decade. The high estimate could see anywhere from 50,000 to 75,000 EVs on the region's roadways by 2020.

### **Potential for EV Use**

COG staff analyzed the potential for EVs in the context of current driving patterns in the region. According to COG's Household Travel Survey, most vehicle trips in the region are relatively short, with an average vehicle trip length of 7.7 miles. This is well within the range of one charge for all EVs in the market today. Therefore, for most daily commutes and other trip purposes, the relatively short length of the trips would not cause significant range anxiety.

### **Publicly Accessible EV Charging Infrastructure**

A growing EV charging infrastructure exists in the metropolitan Washington region as a result of stimulus funding through state governments and private investment. COG staff developed an inventory of EV charging stations for the metropolitan Washington region. Altogether, the inventory identified 332 chargers in 133 publicly available charging station locations, 11 of which are planned stations. The District of Columbia has the most charging stations among COG jurisdictions (36), followed by Arlington County, Virginia (15); Fairfax County, Virginia (18); and Charles County, Maryland (11). The District of Columbia and Arlington County, Virginia, have the highest number of chargers (85 and 62, respectively).

## **Local Government Policy**

To understand the current EV policy landscape of the metropolitan Washington region, COG conducted a survey of its 22 member jurisdictions in early 2012 about EV permitting procedures and infrastructure planning efforts. Results of the survey indicated that with some exceptions, most jurisdictions reported having no EV policy development in place. Two exceptions are the District of Columbia and Fairfax County, Virginia, which are integrating EV considerations into the permit review process, building code policy, and ADA parking restrictions. The City of Frederick, Maryland, and the City of Falls Church, Virginia, indicated that they are tracking EV charging permit applications. In other jurisdictions, electrical permits do not indicate whether an EV charging station is being installed—thus presenting a barrier to tracking. Additionally, if a dedicated circuit is already installed, EV drivers charging at 120V (Level 1) outlet would not need to obtain a permit.

The Municipal Policy and Permitting/Inspections subgroups emphasized that local governments will play a critical role in the region's EV readiness. To facilitate continued growth of the market and smooth the transition to higher rates of EV adoption, the subgroups recommend that local governments ensure that EV infrastructure development is addressed in comprehensive planning efforts and that zoning, building codes, and permitting and inspection processes provide a pathway to the expeditious installation of charging equipment. Streamlined permitting and inspection processes, EV and charging incentives, infrastructure readiness, low permitting and inspection costs, and nominal installation costs all contribute to reducing barriers to greater EV adoption.

## **Electric Utility Policy**

The regulatory status of EV charging stations—contained in provisions of electric utility policy—can help or hinder the ability of private companies and utilities to provide EV charging services. Across the region, the regulatory status of EV charging service providers is inconsistent and in some cases unclear. Maryland, Virginia, and the District of Columbia have all taken steps in recent years to resolve areas of uncertainty in their electric utility policy as it relates to EVs and EV charging. However, room for improvement remains, particularly when it comes to notifying utilities about EV charging station locations.

The Electric Utility Policy subgroup found that clear state-level policies are needed to promote private investment in EV charging infrastructure for charging in the for-pay charging market. They recommend that ideally, local and state policy would allow utilities to be notified in advance about the location of EV charging equipment so they can ensure that appropriate infrastructure is in place to accommodate the increased load and avoid service disruptions for their customers.

## **EVs for Fleet Use**

A 2012 survey of fleets in the metropolitan Washington region found that EVs are being adopted slowly. The Greater Washington Region Clean Cities Coalition's survey of 11 fleet managers found that most EVs currently in operation are used onsite, such as trucks used on landfills or campus landscaping equipment. According to the Coalition, fleet managers cite the cost of EVs and infrastructure as obstacles to purchasing additional EVs.

The Fleets subgroup provided recommendations on promoting partnerships between governments and manufacturers to reduce costs and increase utilization of EVs in fleets, encourage charging infrastructure sharing, and promote cooperative purchasing.

## **Outreach and Education**

The public's current level of knowledge about electric vehicles is limited. Education efforts by private and public entities (including nongovernmental organizations, electric utilities, PEV service providers, auto dealers, other businesses, and government) are needed to bridge the gap. To set the stage for EV marketplace success in the metropolitan Washington region, regional partners involved in the Metropolitan COG Electric Vehicle Planning Initiative have identified key target audiences and information needs for those audiences.

In addition to identifying an initial list of resources for EV stakeholders to use in education and outreach efforts, the subgroup provides recommendations on how to increase outreach efforts throughout the region. Continuing to search for and share resources, engaging with regional partners to encourage collaboration and to share experiences, and promoting EV awareness through industry training and curricula should be priorities for the region.

## **Summary of Recommendations**

Achieving EV readiness in the metropolitan Washington region will require a coordinated approach among all stakeholders, including utilities, players in the EV industry, state and local governments, and nonprofit groups. The Metropolitan Washington Electric Vehicle (EV) Report contains recommendations for these stakeholders to promote a consistent set of practices across the region that will remove barriers to EV adoption and infrastructure planning.

The top five recommendations to facilitate EV deployment in the region are as follows:

- Stakeholder partnerships, such as a Washington Regional Electric Vehicle Partnership, should be formed to develop a business case for EVs, and to assess the potential for community return on investment.
- Stakeholders should consider offering incentives such as preferred parking, HOV occupancy exceptions, and tax credits to promote EV

adoption.

- Electric permitting procedures should identify EVSE installations and notify electric utilities of their locations.
- Outreach and education is needed to promote EV adoption and inform the public of its benefits.
- Comprehensive plans and zoning regulations should guide EV infrastructure development and ensure that the built environment can accommodate future EVSE installations.

**Interesting Link:**

[http://www.mwcog.org/store/item.asp?PUBLICATION\\_ID=449](http://www.mwcog.org/store/item.asp?PUBLICATION_ID=449)

## **2. Columbia Pike as a critical gateway between Northern Virginia and the District of Columbia**

Based on the Columbia Pike Transit Initiative ROI Study, July 2012.<sup>9</sup>

### **1. Summary**

Columbia Pike is a vital corridor that serves as a critical gateway between Northern Virginia and the District of Columbia. Over the past decade the formerly low-density, auto-dependent corridor has been steadily transforming. Arlington and Fairfax Counties have been actively working with the neighborhoods along the corridor to articulate a long-range vision for how they would like this transformation to unfold, and the policies and investments needed to realize their vision. The Columbia Pike Transit Initiative is thus one outcome of a decade's worth of planning work on the part of community residents and county planning staffs.

Columbia Pike has the largest stock of housing in Arlington County. While Columbia Pike has significant retail space in its own right, with a terminus at Pentagon City the streetcar route would serve a significant share of Arlington's retail stock as well. The segment of the corridor in Fairfax County serves a similar retail and residential role, anchoring the eastern portion of Fairfax County. The private and public investments made over the next ten years are long-term investments that will measurably shape the future of the corridor and the counties for many years beyond.

Building on the work of community residents and county staff over the past decade to articulate a vision for their community, the current phase of planning for the corridor's transportation future focuses on environmental analysis and associated engineering work to select the alignment and mode of transit that best meet the community's need and fulfill its vision (...).

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<sup>9</sup>Comparison: Columbia Pike Transit Initiative ROI Study, July 2012, p. ES-1.

## **2. Project Need and Existing Conditions**

The local jurisdictions of Arlington County and Fairfax County, Virginia, in cooperation with the FTA, are proposing to implement high-quality, high-capacity transit service along a 5-mile corridor, running mainly along Columbia Pike, between the Pentagon/Pentagon City area in Arlington County and the Skyline area located in the Baileys Crossroads Community Business Center (CBC) in Fairfax County.

The proposed project, known as the Columbia Pike Transit Initiative, supports the transportation goals of the counties and fosters their vision for a multimodal corridor, linking its walkable, mixed-use, mixed-income neighborhoods and connecting these to the Washington, DC area transit network, and thus, the region's major activity centers.

Transit is not only a vital component of what makes the corridor function, but is also important to the future vision for the corridor. Within a quarter-mile of the corridor, there are transit-dependent populations, clustered around Jefferson Street, in Pentagon City, and southeast of Four Mile Run. Furthermore, the corridor carries the most bus riders of any corridor in Northern Virginia, with average weekday ridership of approximately 16,000 boardings per day (WMATA 2010, Arlington County 2010). The introduction of an enhanced transit service would add capacity, building incrementally on this market.

The need for the Columbia Pike Transit Initiative stems from existing and expected transportation problems along the corridor related to limited roadway and transit capacity to accommodate increasing travel demand as the population grows and development increases.

## **3. Pedestrian and Bicycle Accommodations**

Currently, pedestrian facilities consist primarily of sidewalks and crosswalks, which are generally present throughout the area. The sidewalk widths and separation from vehicular travel way vary throughout the area.

No on-street bike lanes exist within the area; however, the Washington & Old Dominion (W&OD) and Four Mile Run shared use trails provide off-street facilities for pedestrians and bicyclists at the western portion of the study area near Four Mile Run stream. The existing pedestrian facilities include sidewalks, pedestrian crossings, and access to adjacent uses. Streets within the study area generally include sidewalks along both sides of the street with only a few minor exceptions. However, sidewalk width varies greatly; sidewalks are as narrow as three feet and as wide as 15 feet.

Pedestrian signals typically have countdown displays and push buttons to cross Columbia Pike and side streets. Crosswalks and curb ramps are typically provided at pedestrian crossings of signalized intersections.

Some crosswalks do not have curb ramps, and some curb ramps do not have detectable warning surfaces. Some of the study area streets are very wide

and as a result may be challenging to cross. The curb-to-curb street width varies between 40 feet and 84 feet, and most street segments do not have raised medians or other types of mid-crossing pedestrian refuges. Distances between signalized pedestrian crossings vary along the corridor. Most commercial areas are set back from the street with parking areas located between the sidewalk and storefronts. Convenient pedestrian access from side streets to commercial and residential developments is also limited in many areas.

Columbia Pike does not have bike lanes or other on-street bicycle accommodations. The only segment of the proposed on-street transit alignment that has striped dedicated bicycle lanes is South Hayes Street in Pentagon City. Some roadway segments of the proposed transit alignment are designated as on-street bicycle routes but do not have special accommodations for bikes. The availability of bicycle parking varies along the corridor. Some areas of Columbia Pike, Pentagon City and Crystal City have recently installed bicycle racks. Arlington County recently installed 41 new bicycle racks along Columbia Pike between South Oakland Street and South Garfield Street as a part of a current Arlington County streetscape project. Other bicycle racks have been installed in association with recent private development projects such as the Halstead.

#### **4. Planning Initiatives**

Arlington County and Fairfax County have each introduced a similar strategy to help foster the revitalization of the Columbia Pike corridor and Baileys Crossroads. As articulated in the *Columbia Pike Initiative: A Revitalization Plan—Update 2005*, the goal for Arlington County and the partner jurisdictions is the transformation of the corridor from an “aging auto-oriented, suburban, commercial strip” into a more vibrant, pedestrian-friendly, “Main Street” destination.

Similarly, the Fairfax County Comprehensive Plan for the Baileys Planning District—2011 Edition includes a vision of a “pedestrian-oriented, mixed-use development with a pedestrian scale and urban character that will complement the adjacent residential areas and promote transit usage” (*Fairfax County Comprehensive Plan*, 2011).

Collectively, the zoning, premium transit availability, and the enhanced walkability and accessibility of the corridor would not only accommodate the projected population and employment growth, but could also support the transformation of residents’ experience of place in the Columbia Pike corridor and Baileys Crossroads. Real estate studies are finding that more walkable environments are desirable places for development investment (Gary Pivo and Jeffry Fisher, *The Walkability Premium*, 2010).

*The Columbia Pike Neighborhoods Area Plan Policy Framework* draft was written in October 2011 and the final Neighborhoods Area Plan was released in April 2012 to help guide the residential developments along Columbia Pike in Arlington, Virginia. The goals included encouraging healthy, diverse communities; stabilizing the existing neighborhoods while encouraging

economic growth and mixed-use centers; expanding housing options that preserve affordability; providing a safe, pedestrian-friendly multimodal corridor; preserving character and history; enhancing urban design; and incorporating sustainable and efficient designs. The *Neighborhoods Area Plan* provides a set of directives taking into account existing conditions and community input. In the Plan are recommendations to encourage residential development and redevelopment between the commercial revitalization district nodes along Columbia Pike.

## 5. Conclusions

The corridor is a vital transportation route for commuters to and from Washington, D.C. as well as a vibrant neighborhood with diverse populations, incomes, educations, and backgrounds. Providing the region with enhanced transit will allow the corridor to continue to redevelop mixed-use developments that will support residents with local employment, retail, and recreation opportunities.

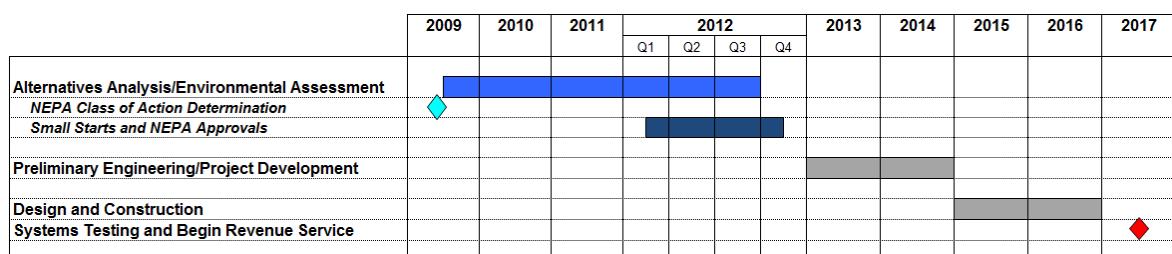
Additionally, connecting these inner-ring suburbs to WMATA's regional Metrorail system will save users time and money. Higher-quality transit in this corridor would present a variety of opportunities for residents, developers, and the counties alike.

Columbia Pike Streetcar:

- Provides an affordable and high-quality transit option
- Increases transit ridership
- Reduces reliance on private automobile travel
- Decreases vehicle miles traveled and emissions
- Serves local trips
- Improves access to regional transit, employment, and business centers
- Provides the greatest transit capacity and the greatest capacity for future expansion
- Improves walkability and increases livability
- Sustains the economic vitality of the corridor and promotes community development
- Supports additional housing as indicated in Arlington County's Columbia Pike Neighborhoods Area Plan

## 6. Implementation Schedule

The implementation schedule—showing streetcar operation in 2017—reflects the time anticipated to complete environmental documentation, obtain appropriate approvals and determine the project sponsor for project delivery and operations. The schedule anticipates use of the Design-Build method of project delivery, which combines the design and construction phases.



Implementation Schedule

Source: Columbia Pike Transit Initiative.

### Interesting Link:

[http://www.piketransit.com/aboutstudy\\_current.php](http://www.piketransit.com/aboutstudy_current.php)

## **IV. Guelph – Review and Preview**

### **1. Link between Guelph Energy Plans and the Local Economy**

#### **Provincial Support for Integrated Community Energy Systems (ICES)**

The Province has undertaken a number of initiatives in support of ICES as part of its broader effort to achieve long-term prosperity and social well-being, which it recognizes “depend on maintaining strong communities, a clean and healthy environment and a strong economy”.<sup>10</sup>

A key part of ensuring long-term prosperity, a clean environment and a healthy population is a secure energy supply and the reduction of greenhouse gas (GHG) emissions that contribute to climate change. On this front, the province has encouraged the development of more compact communities, energy efficient buildings, sustainable transportation options, and renewable energy.

The PPS in particular provides overarching policy direction for the planning and development of compact, transit-supportive communities, and policies that promote energy efficiency and the uptake of alternative and renewable energy sources that produce fewer GHGs than traditional fuels.

#### **1.2. The Thermal Energy Policy Gap**

The Province has taken significant steps to secure a more sustainable and reliable energy future for Ontarians. However, the analysis of Provincial policies and regulations revealed, that efforts to date have been largely focused on matters related to electricity, and silent on matters related to thermal energy policy.

#### **1.3. Recommendations**

Communities can reap economic benefits from District Energy system implementation. Not only can it offer fuel flexibility and reduced risk from exposure to uni-fuel price shocks, it can also provide local investment, jobs, and utilize local fuel resources.

The recommendations are intended to address some of the gaps in thermal energy planning across the Province, and to provide strong support and encouragement for municipalities to plan for and implement District Energy systems. The consultation process included a half-day workshop, electronic circulations and a web meeting with senior representatives of local municipalities (Vaughan, Toronto, Guelph, Barrie, Markham, Pickering, Burlington, York Region, Mississauga, East Gwillimbury) and other interested organizations and agencies (Ontario Sustainable Energy Association, QUEST, World Association of Distributed Energy (Canada), Canadian Urban Institute, ICLEI, Waterfront Toronto, Enbridge, Natural Resources Canada,

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<sup>10</sup>Comparison: Provincial Policy Statement (PPS), Part IV

Ryerson University, CaGBC). The participation of these key stakeholders reflects a significant amount of interest from municipalities and energy providers to move forward with more sustainable, community-based energy solutions, and demonstrates demand for enabling policies at the Provincial level.

## **2. Community Energy Initiative**

District Energy, that cleanly and efficiently delivers thermal and electrical energy and is commonly used in Europe and other parts of the world, is the backbone of the City's Community Energy Initiative (CEI). Guelph Hydro Inc.\* has made a corporate commitment to the City of Guelph and the Community Energy Initiative. With the Province's involvement, support, encouragement and direction, the Guelph Community Energy Initiative has been rigorously incorporated into the City's growth planning, economic and environmental strategies. In doing so, the City and its many aligned partners, Guelph Hydro among them, have taken on significant risk.

Although the Ontario Power Authority Combined Heat and Power Standard Offer Program was designed primarily for existing thermal loads, the bigger opportunity is actually with new systems exactly along the lines of the ones proposed in Guelph. Drawn by the added value from this infrastructure, companies and investors have already started to make commitments to locate in the Downtown Urban Growth Area and the Hanlon Creek Business Park. It is providing a significant advantage to the City of Guelph in its economic development strategies.

### **2.1. Solution to Bulk Supply Issue and Job Creation in Guelph**

The Combined Heat and Power (CHP) district energy installations can ease the electricity supply (Bulk Supply) issues that are currently facing the City of Guelph and hindering its main job growth area in the Hanlon Creek Business Park. Companies considering locating in the Hanlon Creek Business Park need to be reassured that a reliable supply of electricity will be available to them should they decide to locate in Guelph.

## **3. City of Guelph – Prosperity 2020**

Prosperity 2020 is about sustaining and enhancing the City of Guelph's position as a competitive and prosperous location for private and public sector investment. Economic Base Analysis Report<sup>11</sup> lays the foundation for Guelph's Economic Development and Tourism Strategy.

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<sup>11</sup>Comparison: Economic Base Analysis Report. CITY OF GUELPH – PROSPERITY 2020 Phase 1: Economic Base Analysis Report.

In 2007 the City of Guelph adopted an ambitious vision to be the city that makes a difference.<sup>12</sup>

The city's Strategic Plan describes six goals, one of which targets a diverse and prosperous local economy.

To implement that goal and its strategic objectives, the city committed to defining an Economic Development and Tourism Strategy, called Prosperity 2020. A consulting team comprised of Malone Given Parsons Ltd. and Lynn Morrow Consulting was retained to prepare the Strategy. The study process will generate two key deliverables:

- Phase 1: Economic Base Analysis Report
- Phase 2: Economic Development & Tourism Strategy.

Phase 1 is intended to describe and assess the context and foundations shaping economic growth prospects for the City of Guelph. It identifies the business sectors driving economic growth to 2006 (most current Census information), those expected to continue to do so into the future, and the City's competitive advantages and disadvantages.

The Phase 2 Economic Development & Tourism Strategy will provide direction, priorities and performance measures for the transformation of Guelph's economy over the next decade and beyond.

The City of Guelph has initiated a number of economic development and tourism planning projects:

- Employment Lands Strategy
- Guelph Innovation District Land Use Secondary Plan
- Guelph Innovation District Life Science and Innovation Cluster in □Agri-Technologies and Environmental Technologies Study
- Hanlon Creek Business Park
- City of Guelph Transit Growth Strategy
- City of Guelph Recreation, Parks and Culture Master Plan
- Downtown Community Improvement Plan
- Guelph Inclusivity Alliance.

The available research findings and adopted strategies will be considered as Prosperity 2020 is formulated. Integration with these strategies and initiatives will be important to defining and implementing the Economic Development and Tourism Strategy. □Among its initiatives the City has targeted three key sectors as bringing added value to the local economy and a strategic advantage to Guelph:

1. Advanced Manufacturing;
2. Agri-Food and Innovation; and
3. Environmental Technologies.

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<sup>12</sup>Comparison: Phase 1, Prosperity 2020.pdf. pp.: 9-96.

## **4. Planning Cities Beyond Peak Oil: A Resilience Approach**

Based on the Supervised Research Project by Jennifer McDowell.

On one hand, the peaking of world oil supplies will necessarily mean a decrease in global consumption of fossil fuels, resulting in less pollution, especially from the transportation sector. On the other hand, switching from petroleum to other forms of energy can create new resilience and sustainability issues. For instance, many regions will likely turn to electric transportation as a replacement for combustion-based mobility. Given that transportation accounts for 27% of total global energy consumption, this will represent an enormous surge in demand for electricity (EIA 2011). The demand may be supplied by coal-generated electricity or nuclear energy. Both of these have significant environmental repercussions.

In France, Austria and Germany, there is a burgeoning movement toward heating homes and small communities with biomass such as wood. Increased reliance on biomass for heating and energy needs on a local level could harm natural forest ecosystems and cause soil erosion and increased flood risks if rigorous sustainable forestry practices are not maintained. Care must be taken to avoid over-exploitation of the surrounding forest resources as demand for energy grows. Where hydroelectricity becomes the primary source of power, water quality and aquatic ecosystem health could be affected.

Land consumption is a further concern. Cheap transportation has permitted urban development to creep outwards at very low densities, particularly in North America (Jackson 1985). This type of development has consumed prime agricultural lands and open spaces, limiting future opportunities for local, decentralized food and energy production. While local food and energy farms (e.g. wind farms, solar parks) are considered measures for enhancing resilience, they both require significant space to meet current demands. Concerning food production, it is important to consider that a post-peak oil scenario could lead to unaffordable artificial fertilization for large industrial-scale crops. Organic farming is much less intensive, but produces less food per spatial measure than industrial farming. Thus more space is needed to account for biodynamic and organic farming practices that afford a certain percentage of crop loss to pests and diseases, and still produce sufficient crops to meet demands (Barrere 2010).

All of these potential risks also have a negative impact on biodiversity, which is considered one of the essential features of a resilient and healthy ecosystem (Kinzig et al. 2007).

### **Planning Cities Beyond Peak Oil**

Resilience is an approach to addressing risks, and risks are often challenging in and of themselves to define. Peak oil and future energy supply issues are no different. There exists today a range of diverging opinions on the degree of risk associated with peak oil. Experts disagree on the impacts it will have on us, and when it is likely to occur. Some claim that we will develop replacement technologies before negative consequences are felt, while others believe that

catastrophic crises will occur as humanity readjusts to functioning without oil.

We may never know for certain – an uncertainty that poses additional political challenges. Thus, it may be difficult to harness the necessary political will and community leadership to launch and drive forward resiliency efforts.

The science of resilience, being relatively new, also poses some challenges. There is first the common problem of too many definitions and not enough consensus. However, time and research generally sort this problem out on its own. More challenging is that academics and practitioners have not yet mastered the ability to understand complex systems

Another challenge for planners and policy makers lies in understanding the trade-offs and benefits of redundancy versus efficiency. Redundancy is one of the fundamental characteristics of resilience: in a resilient ecosystem, for example, there are usually multiple species that perform similar functions, such that if one species is wiped out, the function is maintained by others.

However, our society is obsessed with efficiency. Justifying investment in a decentralized energy infrastructure system, for example, may make resilience sense, but be completely illogical from an economic efficiency point of view. The trade-offs for long-term benefits are as yet unclear and more research and understanding is required before we can expect decision makers to accept measures that seem potentially economically inefficient for a gain in redundancy and hence, resiliency.

Specific resilience approaches such as adaptive management require more practice and experience in a greater diversity of fields and disciplines. Current examples and case studies are very few and are almost entirely based around natural resource management. To gain confidence in this process and fine-tune the practice of adaptive management in other disciplines, academics and practitioners need to pilot and document more examples and share findings with the resilience planning community.

## **Implementation Constraints and Barriers**

The practical challenges of resilience planning relate mostly to gaps in the ability to obtain and measure the data. Aspects of resilient cities, such as good governance or resilient ecosystems, are not necessarily easy to measure, evaluate and monitor over time. This makes it challenging to gauge progress, communicate successes, and compare one city to another. It may also make it hard to obtain the necessary information required to project future vulnerabilities or resilience in order to effectively plan for resilience (and not just develop another emergency preparedness plan).

Another pervasive challenge with all planning practices, but especially in resilience planning, is achieving effective participatory processes. The urban planning literature is full of studies on the challenges and barriers to representative, effective, just and equitable public participation. This will remain a challenge for resilience planning as well, but may also present an opportunity to enhance our practice and perfection of participatory planning

processes.

But the most difficult challenge to overcome is likely the cultural challenge around resilience. The political and institutional frameworks within which current cities operate are highly rigid, centralized, efficient and riddled in complex dependencies that are both very vulnerable to disruptions, and yet very resistant to change. Individual behaviours and perceptions also pose barriers to implementing resilience – one need look no further than controversies over wind farms to see that it will not be easy to implement some of the changes that resiliency would require. Cities will not suddenly become resilient upon instituting a resilience plan; the changes will take a significant investment of time and resources to see meaningful results.

### **Next Steps**

Despite these challenges, the future is full of hope and opportunity for resilience planning. Already, international conferences and associations are sprouting up to support practitioners, decision-makers, and policy planners in all disciplines. The Resilience Alliance, the Stockholm Resilience Centre, and ICLEI Resilient Cities conferences are but three examples. The United Nations has also adopted the concept and makes increasing reference to resilience as a model and technique for addressing some of society's most pressing problems.

With minds around the world researching and applying resilience methods to their work, the aforementioned challenges will be diminished and barriers will be reduced. The focus for the near future is to improve our understanding of complex urban systems, improve our ability to measure and evaluate all aspects of resilience, and begin informing the general public in order to gradually foster a culture of resilience thinking.

### **Final Remarks**

Cities are complex social-ecological systems that we are just in the early phases of understanding. Institutes like the Stockholm Resilience Centre are producing leading-edge prototypes, pilot projects and research in the fields of urban and social-ecological resilience. We can also continue to learn and grow from the experiences of places like Vorarlberg, where quality of life continues to improve in step with enhancing energy resiliency efforts.

As practitioners and researchers, we are all seeking to enhance and share our understanding of how to make our cities better places to live, to work or visit. Some of us are concerned about the threat of climate change, others with security, and others still about our dwindling energy supplies. Resilience thinking can provide many practical approaches and tools to greatly improving quality of life, regardless of which threats are perceived or addressed. Resilience planning can help us achieve our objectives for sustainable development, economic well-being, local food and energy security.

Is it possible to plan a resilient city? Of course it is, and it is being done. As numerous examples in this guide have shown, there are cities, towns, villages and communities around the world who have recognized the multitude of benefits in enhancing community, economic and ecological resilience. The path to getting there may be scattered with challenges and barriers, but the fight is well worth it: it connects communities, reinforces the links between government, residents and businesses, reduces various vulnerabilities and prepares communities for the unavoidable and unpredictable risks we face on a daily basis.

It seems sensible to make a concerted effort to integrate resilience concepts into planning practice as a fundamental concept. It goes beyond sustainable development by bridging the gaps between many of the common societal challenges our cities currently face, from poverty to climate change to economic stability. It provides home-grown solutions to global problems, recognizing the local context and resources as advantages to solving these problems. It strongly advocates for good governance and equity, and bases a large part of its effectiveness on the ability to remain flexible by responding to changing conditions and needs, evolving to new risks or vulnerabilities, and involving a wide variety of experts, from the traditional institutional experts to the unconventional local wisdom acquired from the aged population or indigenous peoples.

Resilience is not a panacea for all the world's problems, but it does provide an excellent framework within which we can strive to make our cities better places to live, work, and visit. For those who are firm adherents to the Precautionary Principle, whether peak oil occurs next year or next decade or in the next century, a resilience approach to urban planning and policy making may ensure a much smoother transition to a very different energy future. If this guide has inspired a planner to review his or her practices and integrate a few of the approaches and practices suggested herein, then it has already accomplished its mission.

### **3. Transatlantic Perspectives**

#### **1. Sustainable Urban and Regional Transportation Systems: Financing and Planning**

(Outline of the panels with AICGS – American Institute for Contemporary German Studies on 28.11.2012.)

##### **Panel One: Transportation Planning for Sustainable Transport**

In their forthcoming AICGS Policy Report, Dr. Ralph Buehler and Dr. Wolfgang Jung will compare and contrast travel behavior, transportation systems, and transportation planning in the U.S. and Germany. They also will review the institutional contexts and legal frameworks governing land-use planning in Germany, including the concept of central places which guides the German land-use planning system. Additionally, they will outline federal transportation policies that have shaped the German and American transportation landscape. The report will compare the similarities and differences of travel patterns and planning for sustainable transportation in the U.S. and Germany with a specific focus on the Washington DC and Stuttgart regions.

##### **Panel Two: Financing Aspects of Urban and Regional Transportation**

In this panel, the speakers will present the companion AICGS Policy Report on the financial aspects of supporting sustainable transportation in the U.S. and Germany. This panel will present case studies of successful funding initiatives that have incentivized the development of sustainable transport in the Northern Virginia and Stuttgart regions. Traditional financial support of transportation such as fares, the development of infrastructure banks, the application of impact fees and road pricing will be discussed.

##### **Roundtable Discussion: Regional Sustainable Transport in Times of Economic Challenges**

The third panel will use the Policy Reports and the site visit as basis for a discussion of the implications of the findings. Representatives from the Washington DC, Stuttgart, and Rheine-Ruhr regions, as well as business and policy experts will outline the challenges and opportunities to develop regional sustainable transport in times of economic challenges.

## **2. Daily Travel and CO<sub>2</sub> Emissions from Passenger Transport: A Comparison of Germany and the United States.**

By Ralph Buehler

### **Introduction and Overview**

Federal, state, and local governments in the United States and Germany aim to reduce petroleum use and associated greenhouse gas (GHG) emissions from transport. In 2010, the transport sector was responsible for 20 percent of GHG emissions in Germany compared to 31 percent in the U.S. In both countries the vast majority (~95 percent) of energy for transport came from petroleum and carbon dioxide (CO<sub>2</sub>) accounted for about 95 percent of GHG emissions from transport.

Automobiles, light trucks, and public transport were responsible for roughly two-thirds of transport GHG emissions in each country—accounting for 13.5 percent of total CO<sub>2</sub> emissions in Germany and 22.7 percent in the U.S. Annual per-capita CO<sub>2</sub> emissions from ground passenger transport in the U.S. were three times greater than in Germany: 3,800 vs. 1,200 kg. Even adjusting for economic activity, CO<sub>2</sub> emissions from passenger transport per unit of gross domestic product (GDP) were 2.4 times greater in the U.S. than in Germany.

Tackling emissions from ground passenger transport has proven difficult, because improvements in technological efficiency of cars and fuels can be offset by heavier vehicles, more powerful engines, and longer travel distances (the so-called “rebound effect”). Compared to the energy and industry sectors, passenger transport emissions are more difficult to regulate, because travel behavior depends on individual decisions about residential location, vehicle ownership, transport mode choice, number of trips, and travel distance.

### **Many Similarities between Germany and the U.S.**

Germany and the U.S. present many similarities that make a comparison of CO<sub>2</sub> emissions from transport and related policies meaningful. Both are western democracies with market economies, a high standard of living, and federal systems of government in which the interaction between federal, state, and local governments shapes transport policies. Both countries have large networks of limited access highways, a similar share of licensed drivers (70 percent) in the population, and an important automobile industry. In both countries most suburban development occurred after World War II during periods of rapid motorization. In Germany and the U.S. the automobile is an important status symbol. Both countries have among the highest motorization rates in the world. However, compared to Germans, Americans own 30 percent more vehicles: 766 versus 585 cars and light trucks per 1,000 population.

## **Trends in CO2 Emissions from Passenger Transport in Germany and the U.S.**

Germany was more successful than the U.S. in reducing CO2 emissions from passenger transport over the last two decades. Between 1990 and 2010, total ground passenger transport CO2 emissions in Germany declined by 15 percent compared to a 12 percent increase in the U.S. CO2 emissions in the U.S. increased sharply between 1990 and 2005 (+21 percent) and then fell between 2005 and 2010. The drop in CO2 emissions between 2005 and 2010 is likely related to the economic crisis, volatile fuel prices, and consequently less driving. The U.S. Department of Transportation reports a sharp drop of 15 percent in passenger kilometers of car travel between 2006 and 2009.

Adjusting for population size, per-capita CO2 emissions increased in the U.S. between 1990 and 2005, but declined between 2005 and 2010—resulting in 9 percent lower CO2 emissions per capita in 2010 compared to 1990. In Germany, per capita CO2 emissions declined by 17 percent between 1990 and 2010. Between 1990 and 2010, CO2 emissions per kilometer traveled declined by 20 percent in Germany but only 3 percent in the U.S.—reflecting a slower increase in driving demand and larger gains in vehicle fuel efficiency in Germany during this time. Compared to economic activity, measured in dollars of constant GDP, between 1990 and 2010 Germany decreased its CO2 emissions from passenger transport at a slightly faster rate than the U.S. (-36% versus -31%).

In summary, between 1990 and 2010 Germany reduced CO2 emissions from passenger transport at a faster rate than the U.S.—even controlling for population growth, economic activity, and travel demand. Moreover, for all indicators CO2 emissions from transport were much higher in the U.S. than in Germany.

## **Federal GHG Reduction Goals for Transport**

Since ratifying the Kyoto Protocol Germany has set national targets for reducing GHG emissions. Between 1990 and 2010, Germany reduced its total GHG emissions by 22 percent and continues to strive to achieve a 40 percent reduction relative to 1990 by 2020. Between 1990 and 2010, emissions from transport declined at a lower rate than those for industry and energy sectors. Achieving the overall 40 percent target by 2020, however, requires the transport sector to reduce its annual emissions by 20 to 25 percent between 2005 and 2020.

There is no explicit federal policy to reduce GHGs in the U.S. However, since 2009 the Environmental Protection Agency (EPA) has regulated GHG emissions as air pollutants that endanger public health and welfare. Moreover, twenty-three states had GHG reduction targets and thirty-seven states had climate action plans in 2012. GHG reduction targets vary by state. For example, California's target is to achieve 1990 emission levels by 2020.

In both countries federal governments have developed a number of policies that directly or indirectly reduce CO<sub>2</sub> emissions from automobile transport including fuel economy and CO<sub>2</sub> tailpipe emission standards, vehicle registration fees and taxes, incentive programs for the purchase of fuel efficient cars, biofuel standards, and gasoline taxes. Federal governments also support local and state policies that can help change travel demand by promoting public transport, walking, and cycling, as well as land-use policies that keep trip distances short.

### **Improved Technology□Fuel Efficiency and CO<sub>2</sub> Emission Standards**

The EU and the U.S. attempt to reduce GHG emissions from transport through vehicle fuel efficiency and/or CO<sub>2</sub> emissions standards. The two standards are treated interchangeably here, because the burning of fossil fuels is closely related to CO<sub>2</sub> emissions. In 2010, the German automobile and light truck vehicle fleet was 45 percent more fuel efficient than the U.S. light duty vehicle fleet.

In 1975, the U.S. implemented the world's first fuel economy standard for cars and light trucks, the Corporate Average Fuel Efficiency (CAFE) standards. Between 1980 and 1991, the fuel efficiency of the U.S. light duty vehicle fleet increased from 16 mpg to 21 mpg. Progress has been slower since then, reaching a fleet average of 24 mpg in 2009. Decreasing gains in fuel efficiency are partially explained by the failure to raise CAFE standards for new passenger cars after reaching 27.5mpg in 1985. Moreover, CAFE set lower fuel economy standards for increasingly popular light trucks that surpassed the sales of passenger cars in 2002.

Recently revised fuel economy standards apply to both passenger cars and light trucks (< 8,500 pounds). The standards vary by vehicle-size, requiring higher fuel efficiency for smaller than for larger vehicles. New light duty vehicles are set to average 30 mpg by 2015 and 39 mpg by 2020. Because of the close connection of fuel efficiency and CO<sub>2</sub> emissions, the new standards were developed in collaboration with the EPA, which gained the authority to regulate GHG emissions under the Clean Air Act. The mpg standards for 2015 and 2020 translate to 181 and 144 g CO<sub>2</sub>/km for new light duty vehicles.

There are no fuel efficiency standards in Germany. Higher fuel efficiency is mostly explained by higher taxes on fuel and demand for more fuel efficient cars. However, more recently, German passenger cars have become subject to EU CO<sub>2</sub> emission standards requiring manufacturers to achieve an average of 130 g CO<sub>2</sub>/km by 2015 and 95g CO<sub>2</sub>/km by 2020. Similar to the revised standards in the U.S., EU standards vary by weight, with stricter standards for lighter than for heavier vehicles. Compared to the U.S., proposed EU standards for 2015 (130 vs. 181g) and 2020 (95 vs. 144g) are more stringent. However, the U.S. proposes to reduce CO<sub>2</sub> emissions to 107g per km by 2025.

## **Incentives to Lower Pollution from Cars**

Governments in both countries provide incentives for less polluting cars and fuels. For example, in 2009, Germany changed its formula to calculate annual vehicle registration fees for new cars to include CO<sub>2</sub> emissions besides engine size and fuel type (diesel/gasoline) of the vehicle. The CO<sub>2</sub> share of the tax is small and is calculated as €2 for each gram of CO<sub>2</sub> emissions above a certain emissions threshold: 120g in 2009, 110g in 2012, and 95g in 2014. Electric vehicles are exempt from annual registration fees for five years.

Vehicle registration fees in the U.S. vary by state. However, the federal government has offered tax incentives for the purchase of alternative fuel vehicles, certain cars with diesel engines, hybrids, plug in hybrids, and electric vehicles. Incentives and program structures vary, but can be as high as \$7,500 in federal tax credits for electric vehicles and plug-in hybrids. In 2012, all but twelve states offered additional incentive programs for hybrid electric vehicles and plug-in hybrids.

During the economic crisis of 2008/2009, federal governments in Germany and the U.S. sought to support their automobile industries through monetary incentives for new car purchases if buyers turned in their old vehicles (better known as “Cash for Clunkers”). In both countries older, less fuel efficient vehicles were replaced with more fuel efficient newer vehicles with lower CO<sub>2</sub> emissions per km. But the volume of new vehicles was too small to significantly reduce CO<sub>2</sub> emissions from passenger transport.

Both countries support the development of alternative fuels and alternative fuel vehicles including biodiesel, electricity, hydrogen, natural gas, and ethanol. The U.S. has a longer history of experimenting with and using alternative fuels. For example, a 10 percent share of ethanol in gasoline (E-10) is common in the U.S. But in 2011, the German government experienced a public relations disaster and public resistance when attempting to increase the ethanol content of gasoline from 5 to 10 percent. Many Germans believe that E-10 would destroy their vehicles.

## **Travel Behavior and Federal Policies**

More CO<sub>2</sub> emissions from passenger transport in the U.S. can be partly explained by the lower fuel efficiency of the U.S. vehicle fleet discussed above. However, more trips by automobile and longer travel distances are important factors as well. Americans drive almost twice as many miles per year as Germans (13,500 vs. 6,800 passenger miles of car travel). The automobile also accounts for a much higher share of trips in the U.S. than in Germany (86% vs. 58% of daily trips). By contrast, compared to Americans, Germans make a 4.5 times higher share of trips by public transport (9% vs. 2% of trips), 10 times more likely to ride a bicycle (10% vs. 1% of trips), and 2.2 times more likely to walk (24% vs. 11% of trips).

Longer average trip distances in the U.S. (9.8 miles) than in Germany (7.0 miles) do not fully explain different driving rates. For example, in both countries a similar share of all trips (32% in Germany and 27% in the U.S.) is

shorter than 1 mile. However, Americans drive for 65 percent of these short trips compared to only 28 percent of Germans.

Average population densities are higher in German cities than in the U.S. However, even controlling for population density Germans are more likely to walk, cycle, and ride public transport. Americans living in dense, mixed-use areas, and close to public transport are even more likely to drive than Germans living in lower density areas, with more limited mix of land-uses, and farther from public transport.

Public policies at federal, state, and local levels of government help explain differences in car use. The following provides a short overview of German federal government policies that make car use less attractive and help promote walking, cycling, and public transport. The summary is based on previous publications by the author.

### **Gasoline Taxes and Funding for Roads**

In 2010, the cost of one liter of gasoline (95 RON unleaded) was \$1.75 in Germany compared to \$0.74 in the U.S. Most of the difference was due to an eight times higher gas tax in Germany compared to the U.S. In 2010, taxes accounted for 62 percent of the retail price of gasoline in Germany compared to only 18 percent in the U.S.

The difference in gasoline retail price between Germany and the U.S. has been increasing. In 1986 gasoline cost about 80 percent more in Germany than the U.S. In 2010, the price of gas was 2.4 times higher in Germany. This divergence is partly explained by Germany's environmental tax reform that increased gasoline taxes annually by €0.03 per liter (\$0.14 per gallon) between 1998 and 2003 —totaling €0.15 per liter (\$0.71 per gallon) over five years. The tax was designed to curb energy use from transport and to encourage more fuel efficient cars and less driving. The policy of annual increases expired in 2003, but the five-year implementation of the environmental tax helped boost gas taxes and prices permanently. By contrast, federal gasoline taxes in the U.S. have not been raised since the early 1990s.

Revenue from highway user taxes and fees in Germany was 2.2 times higher than government road spending in 2010. By contrast, highway users receive net subsidies in the U.S. In 2009, highway user revenue collected by federal, state, and local governments in the U.S. covered only 58 percent of highways spending by all levels of government. Moreover, since 2008 the federal Highway Trust Fund, which receives the revenues from the federal gas tax, has been supplemented with general funds several times.

Higher gasoline taxes in Germany do not lead to higher household expenditures for transport in Germany. In fact, U.S. households spend about \$2,500 more per year on transport—with transportation accounting for 17 percent of household expenditures in the U.S. compared to less than 15 percent in Germany.

On the local level, most German cities have increased the cost and/or reduced car parking in city centers and many neighborhoods. In the U.S., the vast majority of automobile trips (95 percent) are still subsidized with free car parking. Driving is also slower in German cities. In contrast to the U.S., limited access highways in Germany rarely penetrate cities and city centers. In the U.S., the federal government subsidized the construction of limited access highways in most American cities with a 90 percent federal share. The lack of high-speed highways in cities, combined with widespread traffic calming of residential neighborhoods, restricts car travel and makes it slower in German cities. Most German cities, including large cities like Berlin and Munich, have traffic calmed over 70 percent of their road network to speeds of 30km/h (19 mph) or even walking speed (7km/h or 4mph).

Tolling passenger cars for stretches of highways and for newly added lanes, bridges, and tunnels has been more common in the U.S. than in Germany. Trucks are tolled on the German *Autobahn*, but there is no charge for passenger cars. Moreover, the German Autobahn network still has many stretches without speed limits, compared to speed limits between 65 and 75mph on the U.S. interstate system in most states.

## **Walking and Cycling**

The German federal government plays a minor role in promoting walking and cycling—mainly limited to federal traffic laws protecting cyclists and pedestrians and making their safety an integral part of the German driver's license test. Most innovations, such as car-free pedestrian zones, area-wide traffic calming, integrated city-wide bicycling networks, bicycling training courses for school children, and pedestrian-activated traffic signals, were pioneered and implemented at the local and state level. The German federal government supported these efforts with technical guidance and flexible funding mechanisms, which allowed municipalities to use federal funds for non-motorized modes.

Since the 1990s, the U.S. federal government has provided an increasing amount of federal funds that can be used for walking and cycling projects on the local and metropolitan levels. Some U.S. cities have used this opportunity to promote walking and cycling. However, most U.S. cities still lack integrated networks of bike paths and lanes. Moreover, many suburban settlements in the U.S. do not have sidewalks or crosswalks for pedestrians. Driver's training in the U.S. does not emphasize the rights of pedestrians and cyclists. Even though some cities have made progress, the U.S. is still less bike and pedestrian friendly than Germany. For example, in 2010, cyclist and pedestrian fatality rates per km cycled or walked were four to five times greater in the U.S. than in Germany.

## **Public Transport**

Germans make 6.5 times as many public transport trips per year as Americans (135 vs. 21 trips per person per year). More attractive public transport in Germany can be explained by regional integration of public transport services, multi-modal coordination with other modes of transport, region-wide fare integration across transit operators, steeply discounted monthly and annual tickets, unified user information systems, real-time information at transit stations and on board vehicles, as well as traffic priority for buses and light rail.

In the U.S., the majority of public transport trips is concentrated in large cities with subway systems and regional rail, such as New York City, Boston, Philadelphia, Washington, Chicago, or San Francisco. Moreover, public transport service in suburban areas and many cities typically focuses on commuter hours with service going toward downtown in the morning and return services in the late afternoon. Even though many transit systems have made progress during the last decades, regional integration of timetables and ticketing, steeply discounted monthly tickets, and real-time passenger information are still rare or non-existent in the U.S. Even with the steeply discounted tickets and more service, German governments subsidize public transport at a lower rate than U.S. governments. In 2010, only 25 percent of public transport operating costs was subsidized in Germany, compared to a 65 percent subsidy share in the U.S.

## **Land-Use Planning**

Federal involvement in land-use planning in Germany is limited to defining the legal framework for planning, ensuring consistency of planning techniques, and—in collaboration with the states—setting broad strategic goals for spatial development, such as sustainability. Municipal governments draw up the actual land-use plans and decide where different land uses are permitted. Local plans in Germany are restricted by regional and state plans—which are drawn up with the involvement of lower levels of government. Moreover, land-use plans must be coordinated with other sectors (e.g., transport) and neighboring jurisdictions.

By contrast, land-use planning in the U.S. is typically in the domain of municipalities, rarely coordinated across jurisdictions, and typically not integrated with transport planning. Additionally, mixed land use and dense development typically require changes to existing zoning codes in the U.S. German land-use planning is more flexible, because “residential zones” allow for doctor’s offices, small shops, restaurants, and multi-family housing. In the U.S., areas zoned as “single family residential” ban any mixed land uses or multi-family homes. German zoning typically applies to small areas (one block or a couple of blocks), while zones in the U.S. are usually much larger. Fine-grained zoning in Germany allows for a better mix of land uses that results in shorter trip distances.

## **Conclusion**

CO2 emissions from transport are much higher in the U.S. than in Germany, even when controlling for population, economic activity, and travel distance. Between 1990 and 2010, Germany has reduced CO2 emissions from ground passenger transportation. Passenger transport CO2 emissions per capita and per km of travel have also declined in the U.S., but only between 2005 and 2010 during the economic crisis and volatile fuel prices.

Both countries attempt to improve the fuel efficiency of their vehicle fleet using CO2 tailpipe emission standards and incentives for less polluting vehicles and fuels. The U.S. has a longer history of fuel efficiency standards dating back to the 1980s. However, as the U.S. experience shows, policies focusing on technological improvements alone will not be enough to reduce CO2 emissions from transport, because of the potential rebound effect of heavier vehicles, larger engines, and increasing travel demand. Germany's experience shows that public policies can help reduce car travel demand and make walking, cycling, and public transport attractive modes of transport. The most important lesson from Germany is the package of policies that restricts car use in cities and makes it more expensive while at the same time improves other modes of transport. Large subsidies for driving in the U.S. still make the automobile the most attractive option for the vast majority of trips. Reducing subsidies for driving, increasing its cost, and planning for walking, cycling, and public transport will take time, but promises lasting impact in both countries.

### **3. To zone or not to zone? Comparing European and American Land-use Regulation**

By Sonia Hirt, Ph.D. Associate Professor in Urban Affairs and Planning  
College of Architecture and Urban Studies, Virginia Tech<sup>13</sup>

This paper compares German and American approaches to land-use regulation. Conclusions are derived from a review of regulatory documents and expert interviews conducted in the German city of Stuttgart. The analysis shows that in the United States, the zoning approach is most commonly based on the assumption of exclusivity (i.e., each land-use district is suitable for only a single type of human activity, such as residential, business or industrial); whereas in Germany the prevailing principle is that of predominance (i.e., each land-use district is suitable for multiple types of activity and most districts end up essentially mixed-use). Thus, although the names of the land-use categories used in both countries are similar, their definitions – the types of activities they permit – are starkly different. The paper concludes that zoning reform in the United States must start with a fundamental rethinking of the definitions behind our standard zoning categories and recommends further learning from European nations.

A broad consensus has emerged among planners that contemporary American urban and regional landscapes, particularly those developed since the 1950s, are unsustainable (e.g., Burchell et al. 2005, American Planning Association 1998, Talen and Knaap 2003, Duany and Talen 2002, Calthorpe 1993). These landscapes, often labeled as »sprawl,« are defined by low densities, segregated land uses and housing types, increasing traffic congestion and air pollution, and a failure to restore the vitality of historic urban cores (Downs 2005). Not surprisingly, much planning energy has focused on combating the problem. Yet, the sprawling patterns stubbornly persist. Smart Growth, as Downs (2005: 367) notes, seems to be »much more talked about than actually carried out in practice.«

In this paper, I focus on one of the most popular tenets of Smart Growth: mixed land uses. Many premier urban scholars and many programmatic planning documents point to mixed use as key to restoring the vibrancy of American cities (e.g., Grant 2006, Talen and Knaap 2003, Daniels 2001, Downs 2001, Congress for the New Urbanism 2001, American Planning Association 1998, Montgomery 1998, Kunstler 1996, Schwanke et al. 1987). Mixed use has become, as Grant (2002: 71) put it, the new planning »mantra.«

Yet, wherever empirical research on the implementation of the mixed-use principle has been carried out, it has shown that in practice mixed-use zoning remains an exception (Talen and Knaap 2003; Hirt 2007; Grant 2003, 2002).

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<sup>13</sup> See: PNDonline II/2010  
<http://www.planung-neu-denken.de/>

I argue that when it comes to mixed use, the problem is not just that it is »much more talked about than actually carried out in practice.« Rather, the problem is that when we, American planners and citizens alike, talk about mixed use, we lack a good reference point which would enable us to define the term meaningfully. Yet a reference point is important because as Angotti and Handhardt (2001) argue, there is no single definition of mixed use. There are degrees of mixed use and our definition of the term depends entirely on our point of comparison. I believe that when we talk of having mixed use in our cities, we tend to talk of having *more* mixed use than we used to have under strict Euclidean zoning from the mid-20th century. Thus, if we adopt a new downtown mixed-use district, it seems to us we have made a significant change. I propose to switch the reference point: instead of comparing current, ostensibly pro-mixed-use American zoning codes with standard Euclidean codes from the 1950s, I suggest we begin comparing them to land-use practices in other nations. And since Germany is the country credited with inventing use-based zoning (Talen 2005, Platt 2004, Liebmann 1996), it is a logical starting point. Then, when compared to German (and, more generally, European) land-use practices, many recent U.S. ideas of what pro-mixed-use zoning is seem surprisingly modest.

I first review the benefits of mixed use, as outlined in the literature, and argue for the need to learn from other nations such as Germany. I summarize the basic principles of German land-use planning, especially with respect to promoting mixed use, and compare them to standard American practices. I find that while the names of German and American land-use zones seem similar, their definitions and the uses they permit are very different. I conclude with a brief note on land-use regulation in other European countries and offer some thoughts on the current status of land-use regulatory reform in America.

The overview of German land-use planning is based primarily on data I collected during a field visit to the German city of Stuttgart in 2006. The data include federal land-uses statutes; local planning and land-use regulatory documents; and in-person and phone interviews with the planning staff of the City of Stuttgart, planning consultants working in the region, and planning academicians from the University of Stuttgart and the University of Bonn. Other data sources include secondary literature on German planning and land-use regulation, both historic and current, and online resources.

### **The benefits of mixed use**

Diversity – diversity of people, built forms, human activities and land uses – is the lynchpin of urbanity (Talen 2006, 2005: 37). As J. Jacobs (1961) astutely argued nearly half a century ago, land-use diversity may be the most important precondition of urban vitality. It has the potential of attracting more pedestrian activity, increasing social interaction, and restoring a richer civic life (Montgomery 1998, Calthorpe 1993, Krier 1988, Jacobs and Appleyard 1987). It also brings important benefits along the three key aspects of planning sustainable cities: efficiency, equity and environmental protection (Campbell 1996). As Grant (2002: 72-3) explains:

Mix creates an urban environment active at all hours, making optimum use of infrastructure.

- Smaller, post-baby-boom households can have a greater range of options (rather than just detached homes).
- Mixing housing types could increase housing affordability and equity by reducing the premium that exclusive, segregated areas enjoy.
- By providing housing near commercial and civic activities, planners could reduce the dependence of the elderly and children on cars.
- Enabling people to live where they can shop, work, or play could reduce car ownership and vehicle trips, increase pedestrian and transit use, and thus alleviate the environmental consequences associated with automobile use.

U.S. planning, however, has historically sought to separate the uses (Boyer 1983). Separation was a reaction to the threats which noxious industry posed to public health in the late 19th century (Grant 2002). It served several positive purposes: it reduced health and safety hazards and stabilized the market. But it reduced civic life (Kunstler 1997, Calthorpe 1993, Krier 1988, Jacobs 1961), increased inequities by inflating housing prices (Asabere and Huffman 1997, Dowell 1984) and erecting legal barriers between rich and poor, contributed to sprawl (Talen 2005), increased car dependence, worsened pollution (Ewing, Pendall et al. 2002; Fischel 1999; Pendall 1999), and even harmed public health by reducing the need for physical activity (Burchell and Mukherji 2003).

Growing evidence for the negative effects of separation and the benefits of mixed use led to a paradigm shift in planning (Hirt 2005). Mixed use has become the new planning gospel in the U. S. and Canada (Grant 2002). It is a key tenet of today's leading planning movements such as Smart Growth and New Urbanism (Downs 2005, 2001; Talen and Knaap 2003; Daniels 2001; Congress for the New Urbanism 2001). It is also heavily promoted in Europe (Office of the Deputy Prime Minister 2005, Hoppenbrouwer and Louw 2005, Wiegandt 2004, Rowley 1996, Sykora 1995, Healey and Williams 1993). In fact, when it comes to mixed use, programmatic documents issued on both sides of the North Atlantic share much of the same rhetoric (European Commission 1999b, American Planning Association 1998; also Siy 2004). But the rhetorical similarities are superficial because, as we shall further see in examining the German experience, the European and the American approaches to mixed use – past and present – have been quite different.

### **Learning from European countries**

Kenneth Jackson (2005: 13, also von Saldern 2005) recently observed that what distinguishes the United States from other democratic nations in the post-World War II-era is that while other nations have been eager to learn lessons from the United States, Americans »did not bother to learn from European and Asian experience.« This lack of learning is regrettable for planners, Jackson argues, because European cities albeit not problem-free,

tend to be more vibrant, compact, mixed-use, and ecologically friendly.

Jackson's dire assessment aside, there is now a burgeoning body of literature that has taken on the task of »learning from European cities« (Beatley 2000). Nivola's (1999) study of national policies across the North Atlantic and their impact on the urban landscape is perhaps the most influential example. Nivola points out that European cities have retained much of their vitality as a result of a number of government policies, such as the much larger proportion of national budgets dedicated to mass transit rather than highways, the higher European taxes on gas, the lack of home-ownership subsidies, the heavier reliance on consumption in lieu of income and property taxes, and the policies designed to protect European small business. Beatley (2000) adds the greater European emphasis on green technologies; and the stronger role of national and regional governments in protecting farmland and establishing growth boundaries and greenbelts (also Alterman 1997). Siy (2004) points to recent planning initiatives of the European Union which also promote compact cities and the conservation of green space.

Most of the above-cited literature acknowledges that European cities »exhibit a much higher level of mixing and integration of functions,« and it identifies mixed use as a key asset (Beatley 2000: 41). However, while some studies have noted the exceptional nature of U.S. single-family zoning (Cullingwoth 1993), none has examined in depth the question of exactly what is different about European regulation that enables the mix.

This gap in the literature has had unfortunate consequences for planning practice. American practitioners tend to be unaware of the key distinctions between American and European land-use regulation. They generally lack an international perspective that would allow them to assess American practice critically. As a result, the standard American way of zoning land in a highly prescriptive fashion and in mutually exclusive districts – fit for housing, commerce or industry, but rarely for a mix of them – has come to seem the normal and inevitable state of affairs, the only possible »default system« (Levine 2006). In turn, recent ideas for mixed-use zoning, which are often promoted as almost revolutionary proposals for regulatory revamping, have proceeded largely in a vacuum, without the benefit of learning from abroad. Thus the current system has taken on an aura of inevitability, while proposals for its reform have taken on an aura of brave innovation. These connotations fade, however, when we consider that in other nations mixed-use zoning has always been the normal state of affairs.

## American versus German approaches to mixed use

### Comparative basis

A choice to compare German and American land-use regulation rests on several rationales. In both countries, zoning developed as an extension of 19th-century nuisance laws which aimed to amend the dangerous conditions of the polluted industrial city (Lefcoe 1979, Logan 1976). By the 1860s, European countries like Italy and France had already adopted rules to protect housing from factories. A select few American cities had made similar

attempts (Fischler and Kolnick 2006). However, it was German reformers in the 1870-80s who invented the idea of zoning an entire city into separate residential and industrial districts (Platt 2004, Liebmann 1996). In 1891, Frankfurt became one of the first large cities to have a citywide zoning plan with use-based districts (Logan 1976). The German system was widely emulated in the U. S. (Logan 1976, Scott 1971).

Today, the planning systems in Germany and the U.S. share fundamental features. Both countries are federations with national, state and local levels of government. In both, the federal level plays a limited role in planning by providing key framework documents, while most land-use planning occurs locally. In both countries, municipalities employ two main land-use policy instruments. They first prepare a general plan, which broadly outlines the intended uses of land for the entire municipal area (i.e., the U.S. Master Plan and the German Preparatory Land-use Plan, *Flächennutzungsplan*). These plans serve as the basis for legally binding documents that set the rules of building. In the U. S., the rules are written and graphically presented in a zoning code comprising text and map, and a set of subdivision regulations (see Levy 2005). In Germany, they take the form of the Building Land-use Plans, *Bebauungspläne*. Like American zoning codes, the *Bebauungspläne* regulate use, area and bulk (e.g., lot depth and coverage, setbacks, building height, etc.). But unlike American codes, they also show existing buildings and infrastructure (see Wiegandt 2000; Federal Office of Regional Planning, Building and Urban Development 1993; Kimminich 1975). Another difference is that in the U. S. the zoning code is a single document with a map of the entire municipality. In Germany, a municipality draws many *Bebauungspläne*. Typically, each is a map of a city block and includes written rules regarding land use, bulk and area.

Most importantly, the U.S. and the German systems share an overarching premise. In both, development is guaranteed *by right* as long as property owners abide the legal rules. This is far from trivial because not all planning regimes around the world operate in this way. The English system, for example, is discretionary in that there are no formal zoning rules, compliance with which guarantees the private party's right to build (Booth 2003).

## **Historical perspectives**

Despite the similarities Germany and the U.S. have always treated mixed use differently. The goals of German zoning since its inception were control of noxious industry, relief from crowding and protection of the countryside (Liebmann 1996, Lefcoe 1979). The first two of those were of course aims of U.S. zoning as well (the third gained prominence later; Liebmann 1996). But U.S. planners had additional concerns and the zoning system they devised became a quintessentially American institution (Platt 2004).

What distinguished the two systems from the start was that German regulations focused on bulk and density, while U.S. regulations emphasized land-use control. German planners rarely prohibited all industry from residential areas; rather, they permitted it under performance standards. The Frankfurt code from 1891, for example, had six zones: two residential, two

mixed-use and two industrial. Industrial enterprises that needed permits under the Imperial Code were banned from residential areas, but all others were allowed under certain criteria (Logan 1976). Moreover, in German codes commercial uses were permitted in all parts of town; they were banned amid residences only if they released noxious fumes. Single- and multi-family dwellings were almost always allowed to co-exist freely; the legal texts rarely distinguished between them (Liebmann 1996). In fact, J. Stübben, the doyen of early 20th-century German planning, spoke forcefully of the need to connect places of business with dwellings and argued that »mixing of the wealthy and the poor should be promoted« (cited by Talen 2005: 156).

From early on, U.S. planners were keener on separation. In 1914, J. Nolen noted that the key U.S. contribution to planning might be »the separation of business and residential neighborhood« (cited by Talen 2005: 154). In 1929, E. Freund argued that: »People [in Europe] do not mind a little store around the corner a bit...We wouldn't have that in this country [the U.S.] because it is not compatible to our ideals« (cited by Liebmann 1996).

Through the 20th century, American planners can be credited with inventing at least four zoning ideas: hierarchical zoning, the exclusively residential zone, the exclusively single- family zone, and non-hierarchical zoning. By the consecutive application of these ideas, U.S. zoning evolved over time in a clear direction: toward more use-separation.

The most fully zoned American city in the early 1900s was Los Angeles. By 1915, it had zoned almost its entire area in various residential or industrial districts. Initially, even the most restrictive residential zones allowed some commerce and industry as »residence exceptions« (Scott 1971, Pollard 1931). But by 1916, when New York enacted the first truly comprehensive zoning code in the U.S., all industry and most commerce were banned from the residential districts. New York's code established three types of zones: residence, business and unrestricted (Willis 1993). The addition of the business zone is significant in that commerce was for the first time deemed sufficiently incompatible with residences as to require its own category. The code introduced the notion that the land uses form a *pyramid*. Residential uses made the top of the pyramid, while industrial uses made the bottom. Residential uses could locate freely in all zones that were below them in the pyramid (i.e., in business and industrial zones), but non-residential uses could not be built in the residential zones. Similarly, commercial uses could freely exist in the industrial zones, but industrial uses were barred from commercial zones (Hirt 2007, Platt 2004, Asabere and Huffman 1997). The code was quasi-separationist because mixed use could legally occur – albeit only in the lower-level zones – and because it did not distinguish between single- and multi-family housing types but allowed them to mix.

In the same year, 1916, Berkeley, California invented the idea of the *exclusively single- family zone*, which prohibited other types of housing (Fischler 1998b). Berkeley's code also differed from New York's in that it was *non-hierarchical*. It treated each zone as »pure« or suitable for only a single use. In other words, not only did it ban industry in the residential zones but it also banned residences in the industrial zones (Scott 1971).

Widespread adoption of zoning across the U.S. occurred after two pivotal events in 1926: the Supreme Court ruling in *Euclid v. Ambler* and the adoption of the Standard Zoning Enabling Act. Both legitimized separation. In *Euclid v. Ambler*, the Court affirmed zoning as a valid exercise of police power and endorsed the sanctity of single-family zones by declaring apartments in such zones as almost »nuisances« (see Nelson 1977: 11). And although the Standard Zoning Enabling Act dealt mostly with procedural matters (see Platt 2004), it did mention that land should be zoned for »trade, industry, residence, or other purpose,« thus implicitly endorsing the idea of single-use areas (Department of Commerce 1926).

In the years immediately following 1926, New York's quasi-separationist hierarchical code served as a model for U.S. locales. But after World War II, New York's model lost its appeal and Berkeley's model (in which each zone is deemed suitable for a single use) spread around the U.S. (see Gerckens 2005, 2003). Even New York, when adopting its second code in 1961, moved toward separation by limiting residential-business mix, differentiating between dwelling types and creating exclusively single-family zones (Strickland 1993). By the late 20th century, a large majority of U.S. locales had adopted non-hierarchical codes (Platt 2004). In doing so, they split their land into cells each fit for a single type of activity and outlawed the building of new mixed-use areas.

### **Current American versus German practice**

Today, there is remarkable consistency in zoning districts used across the U.S. In almost all municipalities – Katz (2004) estimates in around 99 percent of them – the districts are land-use-based. In other words, the key factor that distinguishes between districts is the list of land uses they allow (of course along with area and bulk rules). Regardless of the variation in names (e.g., »business« instead of »commercial,« and »industrial« instead of »manufacturing«), the standard classes of districts are: residential, commercial (often split into retail and office), industrial and agricultural. Separate public districts are also common, albeit less so, since public uses are often conditionally listed in the other zones. The classes are normally subdivided into sub-classes; e.g., residential classes branch into one-family, two-family and multi-family ones. Regarding each land-use district, the zoning code typically specifies the primary (or by-right) permitted uses, the accessory uses (which are closely related to the primary uses; e.g., garages in residential zones), and the conditional uses (e.g., civic buildings in residential zones). In hierarchical codes, as already noted, mix is allowed in the lower-level districts. But in the more common, non-hierarchical codes, the mix is very restricted, and it may occur only as non-conforming use, at the border of neighboring districts, or in a special mixed-use zone. In both hierarchical and non-hierarchical codes, however, the single-family zones ban all other major uses (for a summary, see Platt 2004, Cullingsworth 1993).

To my knowledge, there are no studies of exactly what proportion of U.S. locales use hierarchical vs. non-hierarchical codes, nor are there any nationwide surveys of locales with mixed-use zones. Where case studies have been performed, they have pointed to the dominance of non-hierarchical

zoning, and the marginal status of mixed use (Grant 2002). Talen and Knaap (2003) showed that while half of Illinois locales have nominally mixed-use zones, most of these zones allow only residential-civic mix while banning the mix of housing types and the mix of retail and housing. Thus, these zones qualify as »mixed-use« only in name. In a study of sixty Ohio locales, Hirt (2007) found that only a fifth of the codes are hierarchical. And although half of all codes had mixed-use zones, they permitted a very limited mix. Levine (2006: 76-79) observed that while single-family zones occupy by far the largest share of territory in any U.S. metropolitan area, they typically ban all other main land uses and are almost immune to variances or re-zonings allowing for land-use change. In short then, American zoning separates uses quite strictly. Exactly how strictly becomes clearer when we look at German practice.

Municipal land-use regulation in Germany is guided by a federal statute: the Federal Land Use Ordinance (*Baunutzungsverordnung* or *BauNVO*). This document defines several districts and the uses they permit (Federal Ministry for Transport, Building and Housing 1990). It is flexible in that it allows locales, when preparing their legally binding plans, to choose which federal categories to use on their land. However, locales cannot invent districts that do not exist in the federal statute. Once they select which federal categories to apply, they must broadly comply with the list of uses permitted under each *BauNVO* category (European Commission 1999a, Dietrich and Dransfeld 1995).

At first glance, the German land-use classes are remarkably similar to their U.S. counter-parts. They carry virtually the same names. But there are stark differences in the definitions of German vs. U.S. land-use classes; i.e., in the lists of land uses they permit.

The *BauNVO* lists four land-use classes: residential, mixed, commercial and special. These are divided in ten subclasses: small- scale residential, exclusively residential, general residential, special residential, village- type, mixed-use, town-center, commercial, industrial and special districts. But consider the uses each of them allows. From a U.S. standpoint, almost all qualify as mixed-use. »Small-scale residential« areas may allow the following uses by right: single- and two- family homes, farms, small shops, restaurants, crafts, and non-disturbing industry. The »exclusively residential« areas, despite their name, permit by right all dwellings (without distinguishing between single- and multi-family) but also list small shops, crafts, hotels and civic buildings as special uses. The »general residential« areas allow by right all dwellings, small shops, restaurants and civic buildings; they may permit as special uses hotels, gas stations and non-disturbing industry. Regarding what constitutes »non-disturbing industry,« another statute applies—the German Industrial Norms (*Deutsche Industrienorm* or *DIN 18005*). This statute sets standards for industrial emissions and noise for each of the *BauNVO* residential classes.

Thus, no area is envisioned for only single- family houses. There is no residential-only category to begin with. The residential classes differ in their *balance* of uses; yet none is single-use. According to the experts, the guiding principle is that at least 50 percent of the land in residential zones should be

occupied by dwellings. One expert explained:

*»Clearly, the residential classes are intended so that people can have normal and comfortable living conditions. They are, as their names say, meant for ‘living.’ But how do you define living? You obviously need shelter but you cannot really sustain living without an easy access to things that make it possible – like buying bread or other basic necessities. So having access to such services seems to me as part of living as having shelter. They really are part of the same. So if someone proposes a store in a ‘living’ district, my thought is whether it enhances living. If it’s a big specialized store, most people don’t need it in their lives on a daily basis. But if it’s a small bakery, I see it as part of daily living.«*

Notwithstanding the above discussion, many city blocks in German cities are single-use. In fact, large areas made of contiguous city blocks may turn only residential and, just as in the U.S.; the urban outskirts often end up dominated by mono-functional chunks of land occupied by mega-stores or industrial campuses. The *BauNVO* does not require mixed use. The only class under which a mix is mandated is the Mixed-use District (*Mischgebiete*). In all other classes, the *BauNVO* only lists the uses which locales *may* allow. Furthermore, it gives locales the flexibility to place additional restrictions. For example, although according to the *BauNVO* the »exclusively residential« areas *may* allow stores, a particular *Bebauungsplan* may ban them. But the experts interviewed said that this is rather rare in German practice. Moreover, they noted that the most restrictive of the *BauNVO* residential classes are all but extinct. The small-scale residential class, which limits dwellings to only single-and two-family, is used only in small villages. The exclusively residential class, which does not restrict dwelling types but allows non-residential only as conditional uses, today takes only an estimated 5-to-10 percent of Stuttgart and does not exist in Bonn at all. In contrast, 66 percent of metro Detroit and 80 percent of metro Cleveland are under single-family zoning, which bans all but single-family houses and their accessories (Hirt 2007, Levine 2006, NOACA 2002).

The following scenario illustrates the difference between German and U.S. standard practice. If a developer proposes a new single-family development occupying several vacant city blocks, located in a predominantly residential part of town, there certainly would be no legal reason to prohibit it in either country. In both, the residential group would normally be zoned under some residential label (most likely »single-family residential« in the U.S. and »general residential« in Germany). However, if a property owner proposes a small new store amid the residences, under U.S. zoning this could occur only if the future store’s lot were rezoned as commercial. Such rezoning, however, is in most cases very unlikely. In Germany, in contrast, the store’s construction would not require rezoning or other legal reclassification. Rather, the store would already be on the list of permitted uses and planners would be unlikely to ban it, if it would serve only the local residents. In other words, the underlying presumption in the United States is that a store does not fit amid the dwellings, unless proven otherwise; whereas in Germany, the underlying presumption is that the store fits amid the dwellings, unless proven otherwise.

## **The experience of other European countries**

Only a survey of planning across Europe can show whether the German approach is typical. Here I can only offer brief notes on three South European states: Greece, Serbia and Bulgaria. In recent decades, all three have undergone economic or political hardships and, in the case of Serbia, even war. Yet in all three, large cities like Belgrade, Salonica and Sofia are remarkably vibrant. In all three, the planning systems use the same main instruments: a general city plan and multiple legally binding building land-use plans. Yet the level of mixed use allowed exceeds what we find in Germany, not to mention the U.S.

In Serbia, state statutes categorize land-use districts (including residential ones) based on their predominant – not single – use. Belgrade's code interprets the statute in setting specific percentages of residential vs. commercial uses for the various parts of town. The percentage varies from 50/50 to 80/20. No residential areas ban commerce completely. In Greece, a Presidential Decree outlines the following districts: exclusively residential, general residential, central, light industrial, heavy industrial, tourist and green space. But the »exclusively« residential areas not only allow all types of dwellings, but also permit by right small stores and small hotels, as well as all civic uses. Note that the decree does not list commercial districts, as commerce is allowed in *all* residential areas. Bulgarian state statutes use almost the same typology, again omitting any reference to commercial areas, as small-scale commerce is deemed an integral part of the residential experience.

## **Discussion and conclusions: American zoning from the comparative perspective**

American zoning of course does not preclude mixed use. Mixed use may occur in special zones, in areas with non-conforming uses, at the borders of single-use zones, or via re-zonings and variances even in the standard zoning districts. But American zoning does make mixed use difficult by treating it as an exception. This is, I believe, because eight decades of Euclidean zoning have given land-use separation (especially separation which occurs via the establishment of single-family districts) an air of normalcy and inevitability (Wickersham 2001). Separation has become the »default planning system« (Talen 2005), the »state of nature« (Levine 2006), a habit of the heart. Yet the experience of other countries shows that there is nothing normal or inevitable either about separation or about residential-only districts. In fact, in other countries residential areas are by definition mixed-use and single-family zones do not even exist.

From this perspective, recent planning efforts to promote mixed use in America fall short of their stated goal. If Talen and Knaap (2003) and Hirt (2007) are correct in asserting that the most common zoning tools to encourage mixed use in U.S. locales are planned unit developments (PUD) and mixed-use zones, then this provides further proof that mixed use continues to be treated as an exception. Both tools presume that mixed use is suitable for a few corners of the city and needs its own, exceptional districts.

Both are piecemeal solutions that do not question the basic premise of standard zoning: that uses should *normally* be separated. Both reduce the idea of the mixed-use city to that of the mixed-use *part* of the city. Perhaps instead of coloring new spots on the zoning map under »PUD« or »mixed-use« labels, a much more substantive approach – one with citywide impact – would be to revise the zoning text and expand the oppressively short list of permitted uses in the standard residential zones. This could be done, as in Europe, by allowing small-scale commercial uses that will serve the local residents.

Of course aside from PUD there are other, more promising alternatives to standard zoning: performance and form-based codes. Performance zoning was proposed in the U.S. in the 1950s (Scott 1971) and has been used in cities such as Largo, Florida, and Ft. Collins, Colorado. Building on the German tradition of regulating industry, it requires development to meet certain standards (in terms of impervious surface, noise, traffic, etc.) without specifying land use. Form-based zoning, the New Urbanist idea, was proposed in the 1990s and is used in places such as Kendall and Seaside, Florida, and parts of Arlington, Virginia. It ostensibly defines zones according built-form character (scale and style) rather than land use (Katz 2004, Duany et al. 2004, Duany and Talen 2002a, b).

Unfortunately, performance and form-based zoning have had limited impact. Only a few dozen locales have switched from standard to performance zoning. And while Duany et al. (2004) notes that 900 developments with form-based codes have been built (which represents a small proportion of *all* new developments), the website of the Congress for New Urbanism lists only 22 locales with form-based codes (out of 40,000 US cities and towns). Furthermore, form-based zoning is not used town-wide. Rather, form-based or performance elements are co-opted into standard codes as additional rules and applied (like PUD or mixed-use zones) to small areas (Langdon 2006, Miller 2004, Porter 1998).

I believe the root of the problem lies in that we have become too accustomed to guiding urban development by dividing cities into pieces of land, each fit for a single human activity. Yet, international experience shows that a different approach is not only possible but also widely practiced. And I would like to end with an additional problem with form-based zoning, which I see as follows: it goes too far, yet not far enough. By doing away with the familiar categories of residential, commercial and industrial, I believe form-based advocates often shock local officials and citizens alike. Yet there is nothing inherently wrong with land-use-based zoning. In fact, Germany and the other countries I studied do practice it. But instead of defining use districts in terms of exclusivity, other countries define them in terms of predominance; i.e. residential zones are dominated by dwellings, yet they allow other appropriate uses which enable and complete everyday life. What these appropriate uses are may be defined in terms of form, performance standards, or land-use ratios – all methods are used in some combination in Germany and Southern Europe. Planners may also use their discretion in deciding which services target only the local residents. But while form-based zoning may go »too far«

in nominal abolition of standard use-based categories, it does not go far enough in allowing mixed use. For example, Duany and Talen's (2002) »transect« model – the theoretical basis of the so-called *Smart-Code* – eliminates use-based zones in favor of the following six alternatives: Rural Preserve, Rural Reserve, Sub-urban Edge, General Ur- ban, Urban Center and Urban Core. Yet only the last two, the Urban Center and the Urban Core, qualify as mixed-use from a European viewpoint. The Sub-urban zone is for single- family detached housing with possible civic or office uses – yet a single-family category does not even exist in Germany. The General Urban zone is for single-family detached and row housing with retail »confined to designated lots, typically at corners« – a definition more restrictive than that of even the »exclusively« residential areas in Greece. So perhaps instead of spending energy on new systems of classification, we should strive to learn more from other countries where mixed use has always been a way of life.

## Biographies of Speakers

**Sebastian Althen** is responsible for traffic management solutions in international markets at Siemens AG. This role includes consulting, technical architecture and solution design, business development, innovation management as well as sales and implementation strategies in Europe, Middle East and Asia. He has worked for Siemens since 2002, and since 2004 in various business development and product management functions of the ITS department. Mr. Althen has been educated at the Technical University Berlin and University of California Berkeley, and holds a degree in business administration and electrical engineering.

**Wolfgang Arnold**, aged 62, has been member of the board of management of Stuttgarter Straßenbahnen AG (SSB) since 2000. He is in charge of transport planning, infrastructure, operation and vehicles. He is a civil engineer by training. After his studies and some years as a researcher at Stuttgart university he was head of the planning department at Verkehrs- und Tarifverbund Stuttgart, the coordinating body for public transport in Greater Stuttgart area. He joined SSB in 1987 being responsible for general planning and transport studies. He is a member of UITP Commission on Transport and Urban Life and since 2010 head of the Baden-Württemberg division of VDV, the national association of public transport authorities and operators.

**Andrea Broaddus** is a transportation policy expert whose research is focused on managing the demand for travel through behavioral incentives and land use practices. Her work experience includes state and federal level policy work in Wisconsin and Washington DC, and serving on the Berkeley Transportation Commission. After completing a Master of Public Policy/Urban Planning at the Harvard Kennedy School of Government, she travelled to Hamburg, Germany as a Humboldt Foundation German Chancellor Fellow. She is currently a doctoral candidate at the Department of City and Regional Planning at the University of California, Berkeley researching road pricing and transit oriented development.

**Ralph Buehler** is Assistant Professor of Urban Affairs & Planning Virginia Tech in Alexandria, VA. Originally from Germany, most of his research has an international comparative perspective, contrasting transport and land-use policies, transport systems, and travel behavior in Western Europe and North America. Including national and international best practices, his work informs policy makers at local, regional, and federal levels. Ralph is the author of reports to the German and U.S. federal governments, the Brookings Institution and BMW as well as over 30 refereed articles in academic journals in the area of urban planning, public health, and transport. Ralph is co-editor of the forthcoming book City Cycling (MIT Press) that offers a guide to urban cycling in Western Europe and North America. Ralph is the Chair of the Transportation Research Board's Committee on Bicycle Transportation.

**Sean T. Connaughton** is Secretary of Transportation for the Commonwealth of Virginia, serving in the cabinet of Governor Bob McDonnell. As Secretary, he oversees seven state agencies with more than 9,700 employees and combined annual budgets of \$5 billion. Mr. Connaughton was named U.S. Maritime Administrator by President George W. Bush in 2006. As Maritime Administrator, he was head of the Maritime Administration at the U.S. Department of Transportation. Prior to joining the McDonnell administration, he served as Corporate V.P., Government Affairs for the American Bureau of Shipping. Mr. Connaughton is a graduate of the U.S. Merchant Marine Academy and served in the U.S. Coast Guard as both a commissioned officer and as a civil servant in the Office of Marine Safety, Security, and Environmental Protection. After gaining a Master's degree from Georgetown University, he joined the American Petroleum Institute, representing companies involved in the energy and marine transportation industries, during which time he also earned a law degree from George Mason University. As a lawyer in private practice he specialized in maritime and international law. He has appeared before the United States Supreme Court and is a member of the Virginia Bar Association and the District of Columbia Bar Association. He served in the U.S. Naval Reserve from 1986 until retiring in 2006. He is a graduate (with honors) of the U.S. Naval War College and was awarded an honorary doctorate in Public Administration from the Massachusetts Maritime Academy in 2007. Mr. Connaughton was elected Chairman At-large of the Prince William County (VA) Board of Supervisors in 1999 and 2003 and serves on the Metropolitan Washington Council of Governments and the Northern Virginia Transportation Authority. In 2004, he was recognized by the National Association of Counties with its Distinguished Service Award for his efforts on workforce development.

**Prof. Georg Fundel** has been a Managing Director of Flughafen Stuttgart GmbH since August 1996. He is responsible for the traffic, controlling and finances, press and public relations divisions.

#### Professional career

2006 Appointment as honorary professor at the University of Stuttgart  
1999 Lecturer at the Institute for Railway and Transportation Engineering at the University of Stuttgart on the subject of aviation and airport management  
1996 Managing Director of Flughafen Stuttgart GmbH  
1989 Head of the construction and real estate and public relations and marketing divisions at the Landesgirokasse (LG) credit institute, now known as the LBBW. He was later also a Managing Director of the LG Grundstücksanlage-GmbH and LG foundations, along with holding the post of LG press spokesperson  
1982 Head of the Wirtschaftsförderung der Landeshauptstadt Stuttgart (economic promotion body of the city administration in Stuttgart)  
1982 Assistant to the Planning and Organisation chair at the University of Tübingen Education  
1976 Studied economics at the University of Stuttgart-Hohenheim  
1974 Military service

1974 Secondary Education Leaving Certificate (Abitur) at the Kolleg der Schulbrüder, Illertissen, a De la Salle school

**Peter Garforth** runs a specialist consultancy based in Toledo, Ohio, and Brussels, Belgium. He advises major U.S. and Canadian companies, communities, colleges and universities, property developers, and policymakers on developing competitive approaches that reduce the economic and environmental impact of energy use. He has held senior management roles around the world at Honeywell, Landis & Gyr (now Siemens) and, most recently, was Vice President of Strategy for Owens Corning, the largest U.S. manufacturer of insulation and other materials. Mr. Garforth has long been interested in energy productivity as a profitable business opportunity and has a considerable track record establishing successful businesses and programs in the U.S., Western and Eastern Europe, Indonesia, India, Brazil, and elsewhere. He was the co chairperson of the International Advisory Committee of the Alliance to Save Energy in Washington, D.C., a founding member of the European Business Council for a Sustainable Energy Future, a member of the Steering Committee on Energy Efficiency Financing of the Russian Federation, and Chairman of the International Institute for Energy Conservation. He is also past President of the Board of Trustees of Toledo Opera and Vice Chairman of Downtown Toledo Inc, a non-profit organization dedicated to the revitalization of Toledo's city center.

**Max Grünig** joined Ecologic Institute in 2007 and focuses on the transformation of the transport and energy sectors, covering smart grids and electric mobility as well as consumer behaviour. He conducted research on aspects of international environmental governance related to the inclusion of aviation and shipping in the EU Emissions Trading Scheme and was also responsible for the 2010 Smart Energy Dialogue. In addition, he works on the environmental impacts of electric vehicles and on possible improvements to the European car-labeling directive. In his most recent work he compared approaches to sustainable urban mobility in the United States and Europe. As a specialist author, Max contributed to ETTAR (Environmental Technologies, Training and Awareness-Raising), a European transport research project coordinated by Ecologic Institute and sponsored by the European Commission (EC) within the 6th Framework Programme (FP6), as well as to a project assessing the sectoral costs of environmental policy. Furthermore, he formulated the transport-related aspects of the position paper on the EU budget review. In 2004, Max received his degree in economics from the Humboldt-Universität zu Berlin (Germany). Max Grünig has lived and worked in the United States, Iceland, and Japan. He is a founding member of the European Institute for Sustainable Transport (EURIST) and a member of the Consumer Research Network run by the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV).

**Dr. Jackson Janes** is the President of the American Institute for Contemporary German Studies at the Johns Hopkins University in Washington, DC. He has been engaged in German-American and European affairs for more than three decades. Dr. Janes is a member of the Council on Foreign Relations and also a member of the International Institute for Strategic Studies. He serves on the Board of Trustees of the American Bundestag Intern Network (ABIN) in Washington, DC, and on the Advisory Board of the Allied Museum in Berlin. He was also Chair of the German Speaking Areas in Europe Program at the Foreign Service Institute in Washington, DC, from 1999-2000. In 2005, Dr. Janes was awarded the Officer's Cross of the Order of Merit of the Federal Republic of Germany, Germany's highest civilian award. Dr. Janes earned his Ph.D. in International Relations from Claremont Graduate School, his M.A. from the Divinity School at the University of Chicago, and his B.A. in Sociology from Colgate University.

**Dr.-Ing. Wolfgang Jung** studied at the University of Kaiserslautern and the University of Strathclyde, Glasgow, and holds a University Diploma in Spatial and Environmental Planning from the University of Kaiserslautern. He worked as assistant professor at the Institute for the Foundations of Planning, University of Stuttgart, and received his PhD in Architecture and Urban Planning at the University of Stuttgart. Since 2008 he is senior researcher at the Institute for Urban and Regional Planning at the University of Karlsruhe. He is associated member of the Academy for Spatial Research and Planning (ARL) and holds close contacts to planning institutions and regional associations in Germany and Europe.

His main activities are urban and regional planning, planning methods and theories. His experiences of national and international research projects are used in planning education as well as presentations at international congresses.

**Rob Kerr** is the Community Energy Plan Manager for the City of Guelph. Rob holds a bachelor's degree in physics and environmental studies and has over 25 years of experience working in field of energy management, with a unique mix of private sector experience and a strong background in public service. Rob's career has evolved in parallel to a rapidly changing energy landscape-from straightforward energy conservation activities to leading edge approaches to energy, climate change and community sustainability. In addition to working for recognizable energy management providers such as Honeywell Ltd, Rob worked for energy-service subsidiaries of Toronto Hydro and Hydro Quebec. He has worked in energy related program delivery for both the provincial and federal governments. The majority of Rob's career has focused on local governments and community sustainability initiatives-whether it's as a service to clients from his private sector positions, as the Energy Management Coordinator for the City of Mississauga, or the Director of the Canadian office for the International Council for Local Environmental Initiatives. Rob has provided policy and program support to the Ontario and federal governments and has officially represented local government interests

to international bodies such as the United Nations Framework Convention on Climate Change and its annual climate conferences starting in Kyoto in 1997. In April 2010, Rob joined the City of Guelph as the Community Energy Plan (CEP) Program Manager. Rob will represent the City of Guelph as a cornerstone partner in a community-wide effort to implement Guelph's CEP. Rob will play a key role in educating the public and keeping stakeholders informed of the goals, progress and successes of the plan.

**Franz Loogen** is the president of e-mobil BW, Baden-Wurttemberg's regional agency for electric vehicles and fuel cell technology. He studied mechanical engineering at RWTH University Aachen and has more than twenty years of professional experience in executive positions in the automotive industry. By promoting new and intelligent (electric) mobility solutions he wants to make an active contribution to a sustainable connection of economic development and environmental protection in Baden-Wurttemberg.

**Dominic Marcellino** has been a Fellow at Ecologic Institute in Washington, DC since the fall of 2008. In his work, Dominic focuses primarily on energy policy (including bioenergy, energy efficiency, renewable energy, and transportation), climate policy in Europe and the USA, as well as emissions trading systems. Dominic Marcellino is currently leading the project Incubating Communities of Influence to Transform Economies and the Environment (I-CITE), funded by the European Commission (EC). As part of I-CITE, Dominic is working with the Atlantic Council of the United States (ACUS) to create a first-of-its-kind transatlantic social network for young leaders in environmental policy Emerging Leaders in Energy and Environmental Policy (E-LEEP). After graduating from the University of Dayton (Ohio, USA) in 2002 with a degree in philosophy and a minor in economics, Dominic studied environmental ethics at the University of Augsburg as a Fulbright Scholar from 2002 until 2004. He was also a Robert Bosch Fellow in Germany from 2008-2009.

**Jennifer McDowell** is the Transportation Demand Management (TDM) Coordinator for the City of Guelph, where she is responsible for the development of policies and programs that facilitate sustainable transportation choices. In the past ten years, Ms. McDowell has been extensively involved in policy and awareness measures to encourage sustainability, particularly with respect to climate change and energy issues. She led the policy arm of the Canadian Youth Delegation to the UN climate change negotiations for three years, contributed to a major energy emission reduction project at her University, and established the City of Guelph's TDM program. Ms. McDowell continues her role as the TDM Coordinator at the City of Guelph to enhance the evolution toward a more resilient transportation system that is sustainable, equitable and efficient. She holds a Bachelor of Science in Ecology, and a Master in Urban Planning.

**Nicola zur Nieden** was born in Böblingen, Germany in 1977. She studied Political Science, Economics and Sociology in Tuebingen, Germany. In 2008, she received her PhD in Economics at the Faculty of Economics of Stuttgart-Hohenheim University, Germany and Lund University, Sweden. After several assignments at former DaimlerChrysler in the United States, Singapore and Germany, zur Nieden worked in the Economic and Market Intelligence department of Daimler AG. Since 2009, Nicola zur Nieden has been in charge of Alternative Technologies and Infrastructure within Daimler's External Affairs department at Corporate Headquarters. Managing the interfaces between the company and its political stakeholders, she is working on mobility issues to promote innovative and sustainable solutions.

**Ingo Olschewski** is one of the cluster managers in the AutoCluster.NRW and is responsible for B2B and B2Science networking activities and has conducted several studies since the foundation of the cluster in 2008 (e.g. "Masterplan Electric Mobility North Rhine-Westphalia"). Mr. Olschewski started his professional career in 2005 as project leader and member of the scientific staff in the department of "Strategy and Consulting" at the fka – Forschungsgesellschaft Kraftfahrtwesen mbH Aachen. Since 2010 he is head of the department "Strategy and Consulting". Before his professional career he studied economics with deepening expertise in accounting and economic law and obtained the Diploma from the RWTH Aachen University. Previous he was being professionally educated as industrial clerk.

**Prof. Dr. Miranda Schreurs** is the director of the Environmental Policy Research Centre and Professor of Comparative Politics at the Freie Universität Berlin. Prior to this she was Associate Professor in the Department of Government and Politics, University of Maryland. Schreurs' work focuses on comparative environmental politics and policy in Europe, the US, and East Asia. She was born and raised in the United States and has also lived for extended periods in Japan and Germany and briefly in the Netherlands. Her PhD is from the University of Michigan and her MA and BA from the University of Washington. She has also spent time researching or teaching at Harvard University, Utrecht University, the Freie Universität Berlin, Keio University, Chuo University, and Rikkyo University and has held fellowships from the SSRC-MacArthur Foundation Program on International Peace and Security Affairs, the Fulbright Foundation, and the National Science Foundation/Japan Society for the Promotion of Science.

In July 2008 Miranda Schreurs was appointed to the German Advisory Council on the Environment.

Her key research areas are: Environmental governance, climate change policy and politics, energy policy, German, EU, US and East Asian environmental policy.

**Willi Schweinfort** is a research and development engineer for new grid concepts at the third biggest German distribution system operator EnBW Regional AG. He got a Diploma in Engineering with the University Stuttgart (Germany) and a M.Sc. in Engineering & Technology Management with the Portland State University (USA). His work's goal is to develop and implement new smart grid tools. This also includes changes to both internal company processes and regulatory frameworks in order to enable their operational availability. Currently, he focuses on smart charging of electric vehicles and energy storages.

**Horst Stammler** (54), born in Heidelberg, is Managing Director of Verkehrs- und Tarifverbund Stuttgart (VVS). VVS is a tariff and transport association, its shareholders are the Public Transport Authorities and the operators in the Stuttgart Region. After study of Public Management Stammler started his career in the public transport sector as marketing director of the transport company of Karlsruhe in 1983. In the 90's he was responsible for establishing a tariff and transport association in the Karlsruhe Region (Karlsruher Verkehrsverbund). 2006, Stammler changed to Berlin where he took over the position of a marketing director of tariff and transport association in the metropolitan area of Berlin-Brandenburg (Verkehrsverbund Berlin-Brandenburg). 2009, he was elected as Managing Director of VVS.

**Mathias Stickel** is a Project Coordinator at the Stuttgart Region Economic Development Corporation and leads regional initiatives in the field of innovative technologies of sustainable mobility and environmental technology. His thematic interests are entrepreneurial issues regarding innovation and knowledge transfer with a special focus on SME. He received his MBA from Steinbeis University Berlin. In 2013 he will be responsible for projects accelerating knowledge transfer between Germany and Brasil in context with the "Deutschlandjahr 2013-2014".

**Franz Untersteller, member of the State Parliament** is Minister of the Environment, Climate Protection and the Energy Sector, Baden-Württemberg and was born on 4 April 1957 in Ensheim (Saarland);

#### Education and career:

- |           |   |
|-----------|---|
| 1977      | Secondary school: commercial high school in Saarbrücken   |
| 1978      | Degree programme at Nürtingen-Geislingen University, Department of Landscape Planning. Degree (Dipl. Ing.) received in 1982 |
| 1981      | Employee at the Öko-Institut (Institute for Applied Ecology), Freiburg  |
|           | Research fellowship from the Carl Duisberg Society in Columbia.   |
| 1982      | Participation in a project of the Colombian Environment Ministry in the Cauca region  |
| 1983-2006 | Adviser on environmental and energy policy for the Green Parliamentary Group in the Baden-Württemberg state parliament      |

1998/99	Lecturer at the Nürtingen University of Applied Science
since 2006	Member of the Green Parliamentary Group in the Baden-Württemberg state parliament
2006-2011	Deputy chairman of the Green Parliamentary Group in the Baden-Württemberg state parliament
Since May 2011	Minister of the Environment, Climate Protection and Energy Sector, Baden-Württemberg

Memberships/Activities (amongst others)

Member of the Green Party since 1983; including periods as chairperson of the Esslingen District Party  
Öko-Institut e.V.: Unpaid member of the board from 2003 to March 2011  
Heinrich Böll Foundation  
Europa-Union Deutschland (EUD), Baden-Württemberg state association

**Dr.-Ing. Walter Vogt** studied civil engineering. He is senior academic council and vice director of the Chair for Road Design and Construction, one of the two chairs of the Institute for Road and Transportation at the Universität Stuttgart. He is giving lectures in road and urban planning as well as in transport and environment, also in international context (Winter University of Urban Planning in Irkutsk/ Lake Baikal (Russia); workshops in different Latin-American countries). Recent research activities apply topics like physical and virtual mobility (telecommunication), bicycle traffic in international context as well as pedelecs (electric bikes). Dr. Vogt is co-editor of "Stadtverkehrsplanung" (urban transportation planning), one of the basic books in this field in Germany.

**Dr.Ing. Irene Wiese-von Ofen** was educated as architect at the Technical University Aachen (Germany), graduated as DiplomIngenieur, Postgraduate studies in town planning, doctor's degree in urban planning with distinction

Professional career and activities:

1962 – 1990 City of Essen, office of Town Planning Research, Spatial Planning and Urban Renewal  
1990 – 1998 Deputy Mayor of the City of Essen, Head of the Department for Housing and Planning, Construction, Building Licence, Sanitation, Traffic, Real Estate and Heritage Protection. as such responsible for the world heritage monument "Zeche Zollverein".  
1985 – 1998 Member of several commissions of the German "Städtetag" (Community of German cities)  
Since 1998 free lance private consultant in urban planning and mediation  
Jury member and chair of several national and international urban competitions  
Moderation and chairing of professional orientated conferences and seminars

Scientific activities:

1975 – 1977 Lectureship at the Technical University Stuttgart (Germany) for town planning  
1977 – 1985 Lectureship at the University Essen (Germany) for town and administrative law

Honorary functions (amongst others)

Honorary President of the German Association for Housing and Planning DV, Berlin  
Member of the German Academy for Town and Spatial Planning DASL, Berlin  
Deputy chair of the Advisory Board of the Federal Ministry for Housing and Traffic BMVBS, Berlin  
Member of the National HABITAT Committee 1994 – 1996 at the Federal Ministry of Construction, Bonn  
Member of the advisory commission during the amendment of the Federal Building Law, 1994 – 1995  
Member of the German delegation for the World HABITAT Conference 1996, Istanbul  
Member of the German delegation for UNGASS 2001, New York  
Member of the Advisory Board of the WUF 2004 in Barcelona and Vancouver 2006  
Member of the Advisory Board for the Vienna Memorandum of the UNESCO, Wien - Paris  
Organiser and Head of the steering committee of the UN HABITAT Professionals Forum 1999 – 2004, Nairobi  
Member of the Board of EUROPAN (European competition every two years for young architects), Berlin – Paris  
Founding member of the “Friends of the Foundation Zollverein” (world heritage monument), Essen  
Founding President of the Local Agenda 21 Forum in Essen

Awards:

Wilhelm-Borchers-Medal for special scientific achievements by the Technical University Aachen 1968  
Cornelius-Gurlitt-Memory-Mint for special merits in Housing and Planning by the German Academy 1999 1998 decorated by the President of the Federal Republic of Germany with the Order of Merit

**Mariia Zimmerman**, Principal of MZ Strategies, LLC, is a national leader on transportation and development issues. With over 15 years of federal experience, Ms. Zimmerman held senior leadership positions with the federal government, the national Center for Transit-Oriented Development, and on Capitol Hill. She is a frequent national speaker and author on public

transportation issues including transit-oriented development (TOD), inclusive public participation strategies, urban planning and transportation finance.

Throughout Ms. Zimmerman's career she has worked at the intersection between elected officials, planners, private developers and community advocates to crafty policies and programs that support healthy, economically thriving and inclusive communities. As Principal of MZ Strategies, LLC, Ms. Zimmerman offers consulting services to help develop common sense, politically proven strategies that help to make government more effective, generate value for citizens and property owners, and create greater opportunity for all members of the community. Prior to launching her own business in the summer of 2012, Ms. Zimmerman served as Deputy Director for the Office of Sustainable Housing and Communities at the US Department of Housing and Urban Development (HUD). In this position she helped launched two new grant programs supporting planning work in over 150 urban, suburban and rural communities to better integrate transportation, housing and economic development. Mariia worked previously worked at Reconnecting America and the Center for Transit-Oriented Development where she lead the organization's policy work and spent six years on Capitol Hill as Chief of Staff for Congressman Earl Blumenauer's (D-OR) Washington DC office. She also spent time at the Federal Transit Administration where she was recognized for her work with DOT's modal administrations to implement the newly created Transportation and Community and System Preservation (TCSP) program, and served on the President's Council for Sustainable Development and the White House Climate Change Task Force.

Ms. Zimmerman served on the Arlington County Transportation Commission in Virginia and is active in a number of transportation and planning organizations. She was named WTS Woman of the Year in 2009 by the Washington DC Women's Transportation Seminar, and awarded the EPA Gold Medal for Exceptional Service in 2010. Originally from Minnesota, Mariia has advanced degrees in Urban Planning from the University of Minnesota and in Geography from PennState, and an undergraduate degree from Macalester College.