2050 CliMobCity Newsletter

Newsletter 3 – JUNE 2022

Welcome to Newsletter 3 of the 2050 CliMobCity project!

We are happy to present to you the progress of our project with insightful results of the mobility effects analysis and inspiring reflections on seminar sessions.
The mobility effect analysis is a great effort taken by the city partners: on the basis of the earlier defined mobility measure packages, detailed modelling input is generated. Applying advanced models, the cities now have available well-substantiated outcomes that could be very useful in the further policy discussions.
The outcomes also form the basis for carbon emission calculations, their outcomes being the subject of the following newsletter.
The seminars, held during the project meetings, with interesting presentations and meaningful discussion provide a source of inspiration for effective mobility measures, as well as for the cities' Action Plans.

The project team,
Ekki Kreutzberger, project coordinator

2050 CliMobCity – goals and approach

2050 CliMobCity is about climate mitigation in the field of urban mobility, hence about reducing CO_2 emitted by cars, trucks, public transport and other vehicles in the city. Many cities have ambitious climate goals aiming for substantial reductions of CO_2 emissions like achieving climate-neutrality in 2050 or earlier.

Many of the same cities, however, are uncertain about how the mobility should change in order to reduce CO_2 emissions to the levels of their aims. And because the spatial setting of a city affects the sustainability of mobility the question includes: how must the urban structure change to achieve climate-friendly mobility? These questions were found relevant by what became the project partners: the municipalities Bydgoszcz, Leipzig, Plymouth and Thessaloniki and the knowledge organisations Potsdam Institute for Climate Impact Research (PIK) and the Delft University of Technology (TUD), the latter being the project leader. The project started in August 2019 and will end July 2023.

The project's central focus is on strategic planning and thus aimed at the question which long-term measure packages should the municipality envisage to achieve the self-stated climate aims? The identification of such measure packages is the central learning issue of the project. Within the measure packages electric mobility and large scale charging, and information and communication systems supporting climate-friendly mobility represent two additional learning issues.

The partner cities have, prior to the project, manifested themselves in one or more of the three learning issue fields. The project idea was to have all cities transfer knowledge and experience wherever they can, while letting them learn in all three fields.

The learning has taken place by means of demonstrations: Each partner city demonstrated the carbon reduction effects of explorative policies in their own city. The work and learning steps were:

- each city defines one or more measure packages which expectantly will lead to a reduction of CO_2 emissions from mobility in the city;
- each city predicts the change of mobility due to these measure packages and indicates locations in the city where the space requirement of mobility is difficult to facilitate;
- PIK analyses the reduction of CO_2 emissions derived from the change of mobility;
- each city together with PIK and TUD also analyses other attributes of the packages, for instance the impact on space utilisation and liveability;
- PIK and TUD indicate in qualitative terms other benefits from CO_2 reducing measures, like savings in the sphere of air pollution and noise;
- the cities learn from the own demonstration and from the demonstrations of the other partner cities;
- the cities draw conclusions from the demonstrations for further policy-making.

The findings from the own demonstrations and the learning from the demonstrations of the other partner cities are to convince decision-makers of the municipalities and of stakeholders in the city's region, that solutions to meet the climate aim are challenging, but also that the aim can be achieved. This however if – and only if – all public and private actors on the local to (inter)national levels take rather large efforts to make mobility climate-friendly. The findings also serve as input for the future strategic planning of the city. The cities can incorporate one or more findings (e.g. which parts of the measure packages?) in a new strategic plan like a Sustainable urban mobility plan (SUMP) or a sustainable strategic land use and spatial development plan. Such strategic plans represent municipal policy decisions and are the starting point for the elaboration and implementation of measures at a later moment. The project work can also result in the observation that the analysed measure packages are not sufficient to achieve the climate aims, in which case the involved partner city needs to draw policy conclusions.

The findings and conclusions of all learning are planned to lead to main project outputs, namely the **Action plans** (APs), one per partner city, and the **Project report**. Action Plans are important project output, as they lead to a first set of changes in real life and influence the policy instruments. Next to these, the Project Report is very relevant as well, as the policy conclusions are not limited to what can be implemented in one year.

In the third project year (August 2021 - July 2022) the following project achievements were foreseen:

1. The four cities have each launched an Action plan which was accepted by Interreg Europe.
2. The cities have introduced more differentiation in their measure packages, by more clearly distinguishing between business-as-usual (BAU) and more ambitious measure packages and thinking more out of the box.
3. The cities have successfully predicted the change of mobility due to the different measure packages in combination with (exogenous) developments in demography, land use and economy.
4. PIK has used the prediction results to analyse the change in CO_2 emissions, also using and actualising its carbon calculation database.
5. All partners have used the findings from the mobility prediction and emission analysis to contribute chapters to the project report.
6. The project has prepared ten `Good practices'. Good Practices are examples of concrete measures that can contribute to CO_2 reduction caused by mobility. Five of the good practices are already visible on the project website. One of the five has been included in the Interreg Europe Good Practice database.

Earlier Newsletters focused on steps 1 and 2, this Newsletter further elaborates on step 2 and presents the outcomes of the mobility forecasts of step 3.

The progress of work in the third year was discussed in numerous bilateral and six plenary project meetings. This rather large number of meetings was possible because of meeting online, a consequence of COVID 19, and felt to be necessary, given the complexity of the work and the difficulty to achieve sufficient thorough discussion during online meetings. In April 2022 the first project meeting since COVID19 took place again allowing physical attendance. This meeting hosted by Thessaloniki and the following one in May, hosted by Bydgoszcz, were organised as hybrid meetings.

The measure packages of the cities differ significantly in scope an ambition level. This is especially related to the local circumstances and the already existing policies and ambitions – this is already a valuable learning experience: there is no single 'best' approach to achieve a significant CO_2 reduction, but measures should be tuned to local circumstances and ambitions.
Bydgoszcz's demonstration is driven the most by out-of-the-box thinking. The explorations focus on the 2050 horizon. Two 2050 CliMobCity scenarios have been envisaged, one focusing on a powerful expansion of the city's tram and rail system, the other on future relocation of housing to the central parts of the city. In terms of decreasing travel distances and modal shift, both important for CO_2 reduction, the second scenario scores slightly better.
The other cities have directed their demonstrations to the time horizons of current policy-making. Thessaloniki has already a very ambitious 'Business as Usual' (BAU) policy for 2030 including implementing two new metro lines, much new pedestrian and bicycling infrastructure and smart mobility instruments. The 2050 CliMobCity scenario is like a supplement, addressing electrification in several transport markets. The main CO_2 reduction is therefore likely to be achieved in the BAU, and emissions will be further reduced with the 2050 CliMobCity measure package.
Plymouth's 2050 CliMobCity scenario is directed towards 2034, the year of the city's Joint Local Plan. The ambitious 'UK Max' measure package is an exploration of the potential of what would happen if all types of measures that have been applied in or considered for other cities in the UK would be applied in Plymouth.
Finally, Leipzig starting from its quite ambitious strategic mobility and spatial plans (BAU), in its 2050 CliMobCity scenario focusses on the update of the city's smart mobility policy, addressing electric and shared vehicles and hub development.
The outcomes of the mobility forecasts can be found in the 'Estimation of the change of mobility' and 'Lessons Learnt' sections of this newsletter.

Alongside the work on evaluating the effects of measure packages, cities have developed Action Plans. These are inspired by seminar sessions, interregional learning and the measure package analysis. The Action Plans contain concrete actions, paving the way towards future strategic planning and other policy-making or in some cases already implementing pilot projects aimed at reducing CO_2 emissions. The defined actions are planned to take place in Phase 2 of the project, between July 2022 and July 2023. During Phase 2 of the project, the progress on the actions will be monitored.
The four Action Plans are available on the project website.

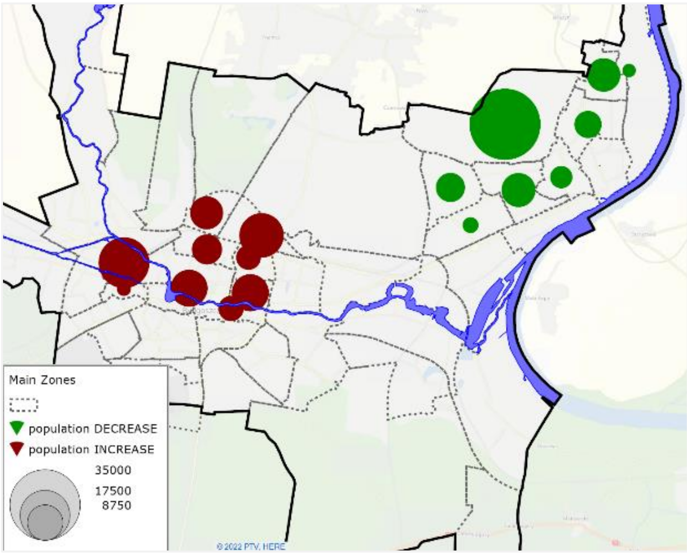
Estimation of the change of mobility

The following boxes contain some highlights concerning the mobility changes due to alternative measure packages and scenarios of the partner cities, and the tools used. The main messages come forward from comparing different scenarios. The results of different cities cannot be directly compared. However, one can get a rough impression of the effects of alternative foci of cities.
The modelling results do not describe the electrification of road (and other) transport, except in the case of Thessaloniki, where shared electric car use has been modelled.

Bydgoszcz

Measure packages and scenarios

- Exploration horizon: 2050.
- 2050 W0: Business as Usual (BAU).
- 2050 CliMobCity package W1: suburbanisation, road and public transport infrastructure extension, central area Low Emission Zone / road charging.
- 2050 CliMobCity package W2: city re-urbanisation (figure), public transport frequency maximisation, road investment decrease. The re-urbanisation as all input represents out-of-the-box-thinking input and in no way local policy.



- 2050 CliMobCity package W1+ and W2+: same measures, but assumed changes in travel preferences, expressed in higher perceived attractiveness (utility) of active travel, public transport and car as passenger, and in lower attractiveness of car as driver.
- Projection of population decrease from 348,000 in 2021 to 336,000 inhabitants in 2050 ≈ -3,5% (-0,1% per year). The projected relative decline of regional population has a similar magnitude.

Approach

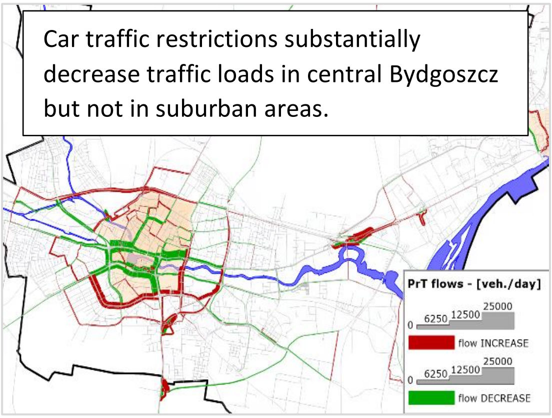
Application of a 4-stage multimodal mobility model (PTV Visum by Gradiens Sp. z o. o.) of the Bydgoszcz city and its agglomeration area.
The model includes passenger travel modes: road, public transport, bicycling, walking, and also freight traffic.

Estimated Mobility Effects in short

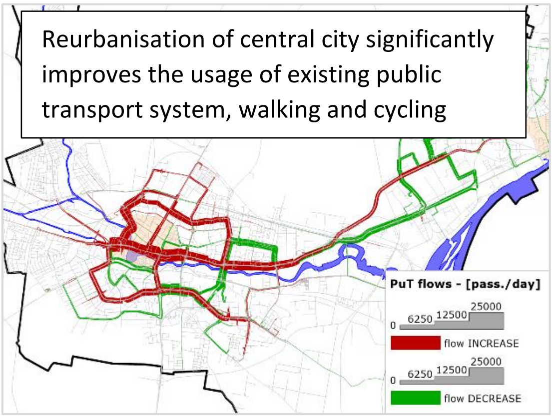
- An initial increase of vehicle-kms from 2021 to 2050 due to the general growth of mobility per capita despite population decline.
- The modal share of the private cars (in passenger-kms) moves between 2021 and 2050 from 50% to 54% (W0) and to less in most CliMobCity scenarios. The largest shift takes place in W2+: the share declines from 50% to 46%.
- In the central area of the city the modal share of cars is lower than in the city as a whole: in 2021 it is 42%, in 2050 (W0) 46% and less in most CliMobCity scenarios. The largest projected shift takes place in W2+: the share declines from 50% to 36%.
- In the BAU scenario (W0) the average trip distance increases from 8,4kms to 10,7kms. The CliMobCity measure packages lead to a reduction of the average trip distance to 10,6kms (W1) and 10,2kms (W2). The mentioned changing preferences in W1+ and W2+ imply modal shift, but also slightly longer average distances: 10,8km (W1+) 10,7km (W2+). Behind these averages one can observe average road distances lying around 13km and average public transport distances around 6km.
- In general, scenario W2 tends to lead to more sustainable mobility than W1 (also in terms of road network load). The PLUS scenarios reinforce further the sustainable results of the 'plain' scenarios.

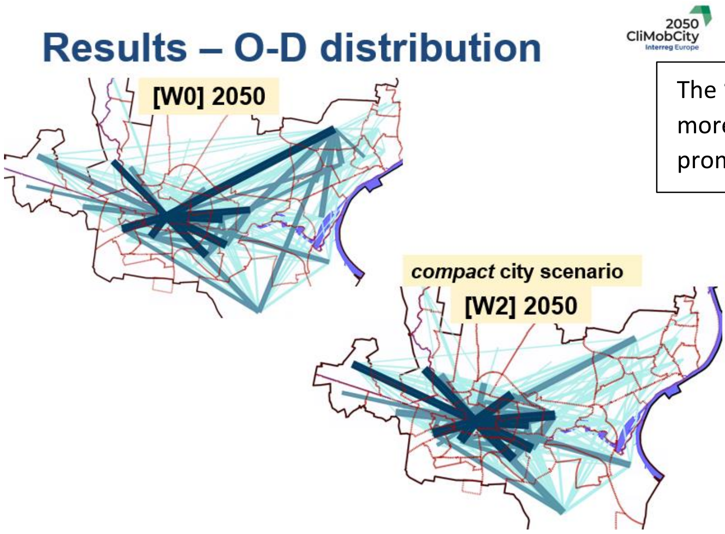
- A rough interpretation of the results:
  - As the tram network is already rather good in many parts of the city (in some parts in cooperation with the train network), the PT coverage extension in W1 has only limited effects. This is partially attributable to PT being insufficiently attractive for long-range trips from/to Bydgoszcz suburbs.
  - The relevance of spatial measures for sustainable mobility is evidently expressed in the scenarios W2 and W2+. Re-urbanisation of central city area eventually renders certain road expansion schemes as obsolete, while increasing the utilisation of existing PT network capacity. The W2 scenario allows to inhibit the problem of (ever) increasing journey distances and travel times due to suburbanisation.
  - Central-area car traffic restrictions and/or road narrowing schemes can be effective in reducing traffic loads in historical Bydgoszcz centre, with projected reductions in veh-kms of up to 30% against W0.
  - Transport models, also advanced ones, assume current mobility preferences of people to remain unchanged in the future, typically because there is little information about the possible change of preferences. For such reasons experts hesitate to apply transport models for periods as long as 30 years (here from 2021 tot 2050). For the Bydgoszcz exploration this problem has been tackled by – on the basis of experts' opinion – varying the utility of different modes, leading to lower shares of the private car. To be validated by further research, but likely appropriate for long term issues.
  - Model estimates show that ca. 15% of motorised trips in Bydgoszcz correspond to bicycle trips of max. 10 minutes, and about half of motorized trips to max. 20-minute cycling trips. These findings show the potential for bicycle traffic growth in Bydgoszcz, achievable only with long-term infrastructure, promotion etc. measures that will effectively influence everyday travel habits.

Results – W1 road traffic flows' changes



Results – W2 public transport (passenger) flows' changes





The ‘compact city’ scenario results in more centralised flows and less prominent flows between suburbs.

Plymouth

Measure packages and scenarios

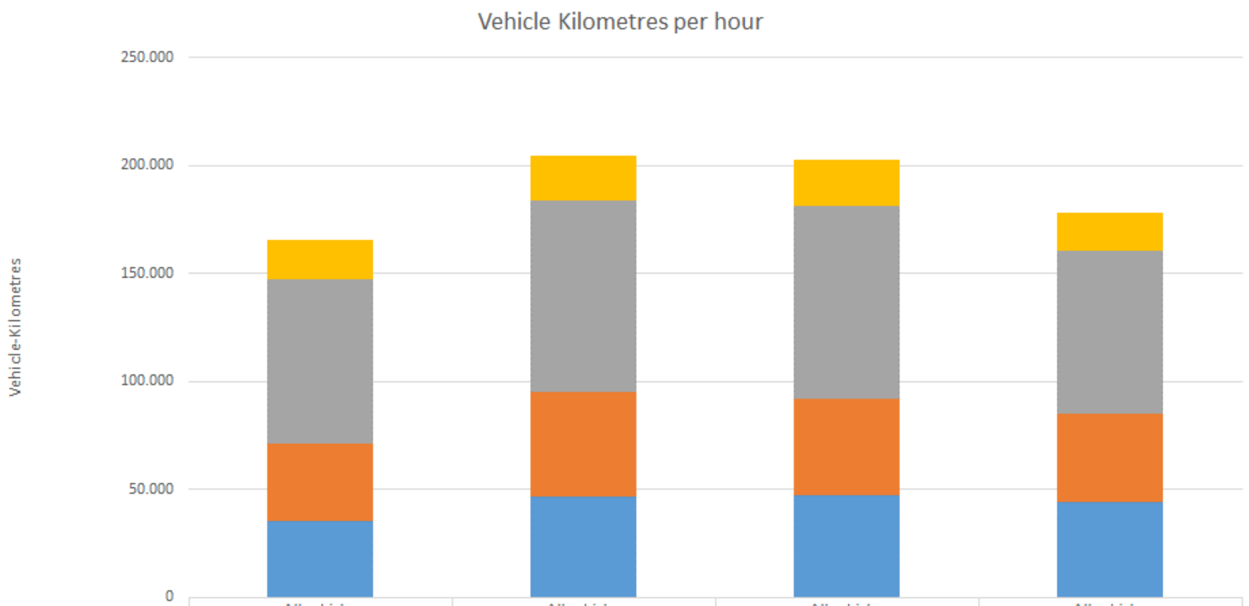
- Exploration horizon: 2034.
- 2034 Re-baselined Joint Local Plan scenario (network changes).
- 2034 Re-baselined Joint Local Plan scenario with post-JLP sustainable transport measures (BAU).
- 2034 UK Max Scenario (explorative scenario, assuming that all innovative measures feasible in the UK context would be taken in Plymouth [= 2050 CliMobCity package]). The scenario's headline is a reduction in car trips and vehicle kilometres.
- Projection of population growth in all scenarios: from 263,000 (2015) to 298,000 (2034) ≈ +13% (0,7% per year).

Approach

Application of an adapted SATURN Highway Assignment Model (WSP).
The model is limited to road transport, distinguishing cars, buses, light duty and heavy duty vehicles.
The reduction of car mobility (implying a shift to active travel and PT) has been achieved by intervening in the model on the basis of experts' opinion: some physical features in the road network were changed and the volume of vehicle-trips between zones was adjusted, assuming less car mobility especially on shorter distances.

Estimated Mobility Effects in short

- Comparing the UK Max (2050 CliMobCity) scenario with the re-baselined JLP (BAU) scenario:
  - There is a substantial reduction of car trips and vehicle-kms within the municipality, namely 13% for both.
  - Most car trip reduction (absolutely and relatively) takes place within the municipality of Plymouth, especially from and to its central area.
  - Correspondingly, the largest percentual reduction of vehicle-kms is predicted for urban roads, the smallest for national motorways (for absolute values see figure).
  - There is an improvement of road traffic flow in terms of average vehicle speeds, average junction queue lengths, average ratio of junction volume to capacity, average journey times between model zones. Without rebound effects (additional road users attracted by the improved traffic flow on urban roads) this contributes to reduction of energy consumption and hence of CO_2 emissions.
- All future scenarios, also the UK Max scenario, show an increase of total car mobility (vehicle-km or people-km) in comparison with 2015 (figure). This is due to the projected population growth and to an increase of mobility per capita. But in the UK max scenario the growth of car mobility is smaller than in the re-baselined BAU scenario, namely (in people-km) only 5% instead of near to 20%.
- A rough interpretation of the results:
  - Decrease of car transport and avoidance of rebound effects on roads must be achieved by travel alternatives that absorb road mobility, like active travel for short distances and bus and train travel for longer distances. The model does not tell. Additional assumptions are needed on the way to input for the CO2 analyses, using other information from local to national level and experts' opinion on changes.
  - The expected spatial distribution of population and activities is the same in all future scenarios, implying negligible differences of average distances between them.



	All vehicles 2015	All vehicles Baseline 2034	All vehicles JLP 2034 (BAU)	All vehicles UK max 2034 (2050
Urban residential roads	18.366	21.251	21.160	17.679
Urban collection roads	76.139	88.490	89.642	75.602
Urban main roads	35.672	48.188	44.649	40.982
National motorways	35.309	46.937	47.349	44.057

Thessaloniki

Measure packages and scenarios

- Exploration horizon: 2030.
- SUMP 2030 (BAU).
- CliMobCity scenario 2030: Additional interventions: shared electric mobility, triggering behavioural changes, electrification of bus fleet and municipal fleet and energy savings from street lighting.
- The BAU scenario focuses on traffic management and modal shift, while the 2050 CliMobCity scenario focuses more on shared mobility and technological innovation.
- Projection of population growth in all scenarios: in the Municipality of Thessaloniki (MoT) from 313,000 (2018) to 330,000 (2030) inhabitants ≈ 6% (0,5% per year). The population including the surrounding 7 municipalities (together = Urban area of Thessaloniki) is estimated to increase by from 794,000 to 811,000 ≈ 2% (0,2% per year).
- The MoT has a high and increasing population density. In the projections it averagely moves up from about 16,000 residents/km^2 to 18,000 in 2030. In a large residential area accessed by the future metro (Nea Elvetia , Charilaou , Analipsi), the current and projected density is respectively 22,000 and 26,000 residents/km^2. The population density is also high and growing in the city's large centre which then also hosts many other functions.

Approach

Application of a 4-step multimodal model (VISUM, CERTH/HIT). The model includes the modes road (car and taxi, public transport (bus, new metro), bicycling and walking. The penetration of shared electric cars was modelled by applying tools of the MOMENTUM project. The reduction of fuel based public bus transport was the result of the policy decision to adjust the bus network because of the metro and estimate travel shifts by applying the transport model (SUMP) and by determining the bus lines to be electrified and assigning the corresponding passenger- and vehicle-kms to that change (Thessaloniki's Bus Fleet Renewal Action Plan, as part of the study of the Ministry of Transport "Renewal of the Urban Bus Fleets for the cities of Athens and Thessaloniki", 2021).

Estimated Mobility Effects in short

Concerning mobility in the MoT between 2018 and 2030 (with two ends of the trip in the municipality):

- Both scenarios: the number of trips increases by 8% (all modes).
- In the BAU scenario car mobility declines by roughly 9,000 trips or 15%.
- The introduction of electric car-sharing scheme (2050 CliMobCity scenario; 100-200 electric vehicles, in 17 stations) can undertake a 4% of the daily car trips.
- Daily (diesel) bus-kms decline from some 27,000 (in 2018) to 19,000 (BAU scenario: integration of metro, west suburban railway and maritime public) to 10,000 (2050 CliMobCity scenario; electrification of bus fleet).
- Both scenarios: the share of car (in number of trips) moves from 23 to 18%, of public transport from 38 to 42%, and of the other modes from 39 to 40%.

With regard to the mobility between the MoT and the Urban area between 2018 and 2030 (trips with only one end in the MoT):

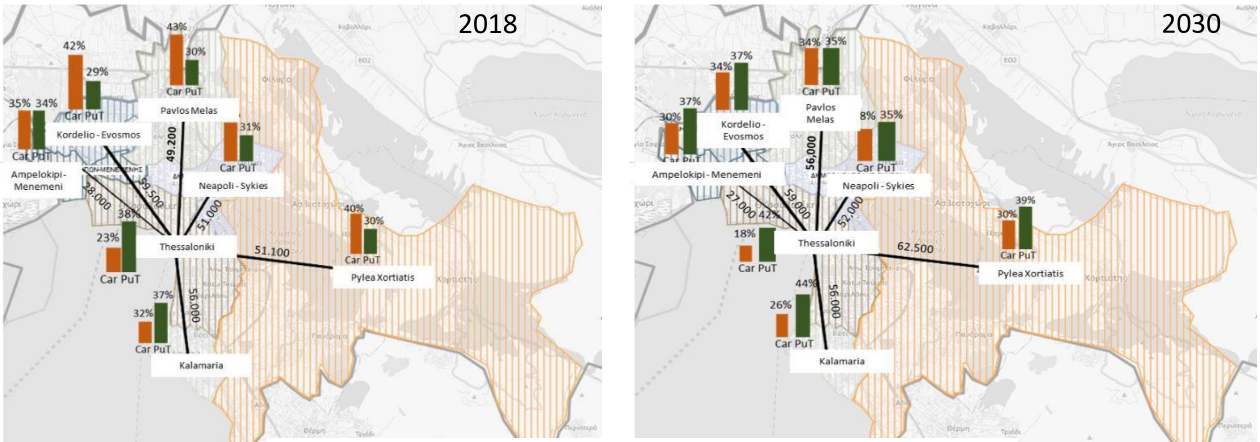
- Both scenarios: the number of trips increases by 6% (all modes).
- In the BAU scenario car mobility declines by roughly 26,000 trips or 22%.
- Both scenarios: the share of car (in number of trips) moves from 40 to 29%, of public transport from 30 to 38%, and of the other modes from 30 to 32%. While car mobility used to have the largest share, this will expectantly be public transport.

Within the other modes walking shows the largest increase, followed by bicycling, while travel by taxi and motorcycle decline (change of number of trips in the metropolitan between 2018 and 2030).

A rough interpretation of the results:

- The further development of public transport (in the long term) and the establishment of car sharing schemes in several municipalities of the Urban Area (in a short/medium-term) can bring a significant further reduction of the car-vehicle kilometres in relation to the BAU scenario.

- The reduction of diesel bus-kilometres from innovation (introduction of e-buses) can strongly (and equally) support the one from modal shift.
- The very high and increasing population densities in the MoT in general are favourable for active travel. In the feeding areas of the future metro the high and increasing densities support the use of public transport.



Daily trips between Thessaloniki and neighbouring municipalities

Leipzig

Measure packages and scenarios

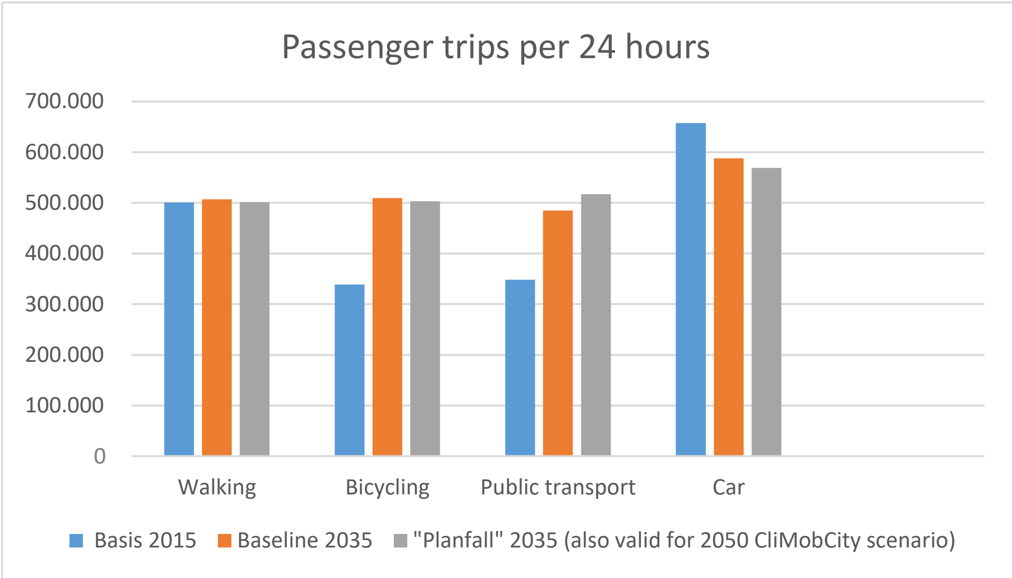
- Exploration horizon: 2035.
- Baseline scenario 2035 (“Nullfall” in the transport model).
- Leipzig policy scenario 2035 (“Planfall” in the transport model): measure package represents an extended version of the Mobility Strategy 2030 (“Mobilitätsstrategie 2030”) and of the city’s policy of smart mobility (“Stadt für intelligente Mobilität”). This all represents BAU policy.
- The update of the smart mobility policy is Leipzig’s subject in the 2050 CliMobCity project. As this policy focusses on electric mobility, car sharing and the launch of innovative mobility concepts, the future mobility structure might differ only little from that in the BAU scenario. The project has therefore declared the Planfall modelling results to be valid also for the 2050 CliMobCity scenario.
- A central feature of the Leipzig policy 2035 is the reduction of the projected population growth in comparison to the forecast 2030 of the Mobility Strategy 2030. This now is from 583,000 (2015) to 657,000 (2035) inhabitants ≈ 13% (0,7% per year).

Approach

Use of (earlier) mobility modelling estimations on basis of PTV VISUM – IVLM model. The model includes the modes road, public transport, bicycling, walking and freight. The mobility effects of substituting private by shared car and bicycles are not modelled.

Estimated Mobility Effects in short (BAU and 2050 CliMobCity)

- The total number of person trips increases by +13%. The growth rates are the largest of flows between Leipzig and the region. The largest absolute growth is expected within the central area of Leipzig (= its centre and 19th century belt) and from and to the industrial and logistic zone at the northern edge of the municipality.
- The number of bicycle trips increases by 48%. Its modal share moves from 18% to 23%.
- The number of public transport trips increases by 49%. Its modal share moves from 18% to 24%.
- The number of person trips in cars decreases by 13%. Its share declines from 35% to 27%. The largest decreases, like -30%, emerge within the central area of Leipzig. The involved flows are large also in absolute terms. Person trips in cars show the largest growth rates between Leipzig and the region, but the involved flows are rather small.
- In total there is a slight increase of average trip distance in Leipzig (from 4.2 to 4.4 km ≈ 4%), especially by car (from 6 to about 6,5km ≈ 10%).
- The volume of car-kms per 24 hours decreases by 23%.
- The volume of truck-kms per 24 hours increases by 14%.
- A rough interpretation of the results:
    - Expected modal shift policy in BAU is very effective in Leipzig, despite of the already existing rather high quality of the public transport network. The success is partly due to the relative high residential densities in the central areas of the city.
    - The transport modelling does not show the effects of measures entailing electric mobility, shared cars and corresponding nodes on future mobility, as these are nihil in case of electric mobility or difficult to model in case of the other measures. On the way to input for CO_2 analyses additional assumptions are required, based on other information from local to national level and experts’ opinion on changes. This is the subject of the next step of the project and of Newsletter 4.



Passenger trips per 24 hours
700.000
600.000
500.000
400.000
300.000
200.000
100.000
0
Walking
Bicycling
Public transport
Car
Basis 2015
Baseline 2035
"Planfall" 2035 (also valid for 2050 CliMobCity scenario)

Lessons learnt

Different cities, different outcomes; still generic lessons to be learnt

The partner cities are quite different in terms of population size and development, economical structure, geographical setting, existing transport system as well as the local planning and policy cultures. Also, the CO_2 emission reduction targets, base and target years differ, so, what generic lessons can be learnt?

- In all cities, the *demographic, economic and spatial development* has a huge impact on expected mobility (growth), both in the business as usual and future scenarios.
- Different (types of) *measures impact each other*, and that it really makes sense to use advanced mobility modelling tools to get insight in the these mutual influences as well as in the precise impact of demographic and spatial developments.
- An interesting side-effect of using models is that mobility measures must be elaborated to a quite high level of detail so to be able to translate the measures in model-input. This elaboration already gives a lot of insight in the possible impacts**.**
- The potential impact of specific measures very much *depends on the precise local conditions*, such as spatial density and existing transport system. For instance, introducing a new advanced public transport system can have a huge impact, extending an existing system has a much lesser impact, which nevertheless can still be substantial.
- Measures that aim to boost active modes (walking, bicycling) can result in a significant *modal shift in terms of trips* – contributing to improvement of accessibility and liveability – but have a limited effect on the *modal split in terms of mileage*.
- Even if mobility policy aims to improve public transport and to promote active modes, in general, the quality of the passenger car system *increases as well*: either because of the cumulative effect of local network improvements (crossings, green-light wave) or as a result of modal shift to other modes.
- Emissions by freight transport are significant, so, specific measure packages for freight transport should be developed alongside measures for mobility for people.

Systematically reduce CO_2 emissions of mobility

The partner cities all included measures in their analysis that lead to one or more of the following central energy saving changes in mobility:

- *reduction of mobility demand*;
- *shift to climate-friendly transport modes*, such as (well utilized) public transport and active modes;
- *substitution of carbon by post-fossil vehicles,* assuming that electricity, hydrogen etc. increasingly come from green sources;
- *increase of occupancy* rates of motorized transport modes;
- *decrease of average distance* travelled in motorized transport modes;
- *smoothening of traffic flow on roads* to reduce energy consumption;
- *reduction of vehicle weight*.

If none of these central changes emerge, there will be no energy saving and hence no reduction of carbon emissions from mobility.

Seminars

Electrification of passenger boats in Plymouth

Andy Hurley
Plymouth Boat Trips
project manager for electric boats

Source photo: University of Plymouth; https://www.plymouth.ac.uk/news/uks-first-sea-going-electric-ferry-launches-in-plymouth

The UK Department of Transport has set 2050 as a target for carbon neutral transport, and aims to have in 2025 some carbon neutral vessels in the UK. Plymouth Boat Trips (PBT) had already the ambition to reduce emissions. PBT operates quite a large fleet of vessels with a large variety in carrying capacity that operate all over the Plymouth area as tourist vessels as well as ferries. PBT annually transports some 300.000 people. Also, PBT operates some supporting vessels, including the e-Voyager, the first electric vessel (carrying 12 passengers).

Within the UK, there is no regulation in place on zero-emission vessels of the types operated by PBT. But PBT collaborates with the Maritime and Coastguard Agency in the field of regulation – including safety aspects. Further, collaboration takes place with the city, universities and specialised companies and manufacturers.

Currently a feasibility study is taking place to broaden the use of (small) electric vessels for passenger transport.

Electric propulsion does not only reduce CO2 (and other environmental) emissions on board the vessel, but also reduces noise: there is no machine noise, only propeller wash noise, which is a great advantage for passengers and the surrounding. Also, maintenance is easier and cleaner.

Therefore, electric propulsion makes sense from both an environmental and commercial point of view.

Now also larger vessels are converted to electric propulsion with updated battery technologies applied at a larger scale and with a range extender, and a new purpose build ferry is planned.

The ferries can connect to transport hubs that the Council of Plymouth is planning, and so become part of a broader, CO2 friendly transport system.

PlyMotion – 'nudging' and 'planned behaviour' based initiative to promote bike, pedestrian and bus mobility in Plymouth

Rosemary (Rosie) Starr - Plymouth City Council head of the sustainable transport team

PLYMOTION
Make the connection!

RESIDENTS NEWS Spring 2022

Plymotion aims to make it easier for everyone to get around Plymouth by bike, on foot and by bus. Read on to find out about what's coming up and how you can get involved.

WHAT'S NEW?

The past year has seen several new additions to Plymouth's walking and cycling infrastructure. These include:

- Southway now has a new traffic free cycle route with new crossings to make it safer and easier to get to school and to work by bike
- Major path improvements have also been delivered connecting Plymbridge Road to Miller Way in Moor View
- A brand-new, purpose-built path along the route of the old railway line in Plymstock and another new path from Somerset Place to Ponsonby Road making it easier to walk or cycle from Stoke to Central Park. For more detail, including video ride-throughs of these paths, visit www.plymouth.gov.uk/newsroom/pressreleases/twonewlocalcycleroutesopenresidents
- Derriford Community Park. This new 2.4km walking and cycle link provides safe and accessible off-road commute options. It connects a north/south route between Marsh Mills and Derriford Hospital/Plymouth Science Park with east/west links between the Forder Valley Link Road and Crownhill and Derriford Hospital/Plymouth Science Park and the Tavistock Road Northern Corridor.

The benefits include increased transport choice, access to green space, supporting the Plymouth Carbon Emergency Action Plan and linking communities to sources of employment in the Northern corridor growth area.

This ongoing programme of investment, supported by the Plymotion programme, has helped deliver almost a doubling in levels of cycling in Plymouth in the last 10 years

BIG WALK AND WHEEL

The UK's biggest inter-school active travel challenge, the Sustrans Big Walk and Wheel, is coming to Plymouth for 2022!

Sustrans Big Walk and Wheel is the new name for the Sustrans Big Pedal which Plymouth schools have been competing in very successfully since 2012. Last year we had our best results ever, coming top in the South West with several schools in the top 50 nationally, and this year we're hoping to repeat or better this achievement.

On each day of the challenge schools compete to see who can record the highest percentage of pupils and parents cycling, walking, using a wheelchair or scooting to school. There are fantastic daily prizes to compete for nationally, as well as great local prizes for Plymouth schools only. As always, the aim is to encourage more families to travel to school actively, to help create happier and healthier communities.

The Sustrans Big Walk and Wheel will run for 10 days from 21 March to 1 April 2022, so look out for announcements at a school near you!

For more information visit www.bigwalkandwheel.org.uk

BIKESPACE

Free Open Access Workshop sessions have resumed at Bikespace!

The format of these sessions has changed a little due to Covid-19 restrictions. You will just need to book one of the 1.5 hour slots (5.30pm to 7pm or 7.30pm to 9pm) before attending as only a maximum of four plus two staff are allowed in the building at one time.

Information about the Open Access Workshops, including available dates and how to book for free via Eventbrite, can be found on the Bikespace website www.bikespace.org.uk/open-workshop.html or by calling 01752 500211.

Source illustration: PlyMotion Residential Newsletter

The PlyMotion programme aims to help individuals to walk and bike more, by a variety of initiatives targeting habitual behaviour. PlyMotion is a positive initiative, not 'anti car', and based in a nudge theory and the theory of Planned Behaviour.

Initiatives include challenges, trainings, courses, loans for e-cargo bikes, information shared via a website and newsletters etc., but especially Personalised Travel Planning. The Personalised Travel Planning addresses every individual who wants to participate with a 10 minute personal talk with a travel advisor, considered much more effective than broad information provision. People are addressed at work, at events and at home, for example if they have moved places. Of course, people have to be in the right frame of mind to be inclined to think about their mobility behaviour and the team therefore often addresses people when they move houses.

Regarding biking, the efforts aim to increase bike ownership and bike use, emphasizing the benefits of bicycling for the users. There is also an e-bike subsidy (grant) scheme in which inhabitants can get subsidies for e-bikes: in a hilly and compact city like Plymouth, e-bikes are quite interesting transport alternatives.

As a result of the initiative, there was a 4% drop in car ownership and use in the target group.

Urban Freight Transport

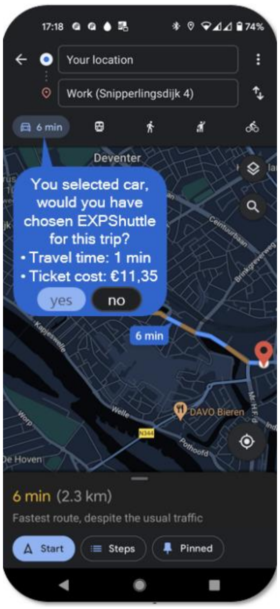
Marcel Michon
Buck Consultants International
Managing Partner

Source illustration: CityDepot.be

E-commerce and food are regarded as (very) important economic sectors regarding urban CO2 emissions (and therefore also reductions), compared with for instance manufacturing industry related and non-food retail related transport. Future economic developments will like result in an increase in urban freight transport and especially home deliveries.
The actual transportation costs in urban areas are already about half of total logistics costs, and the share of environmental impact is even higher. Hence the commercial economic as well as societal importance to try to increase the efficiency of urban freight transport and last mile deliveries.
Broad attention for urban freight transport issues is only of a fairly recent date: in research and some case studies alternatives were probed, but only recently, thinking about urban freight transport within the context of urban transport becomes more mainstream.
Important developments that can improve efficiency and reduce the environmental impact include the introduction of low and Zero-Emission zones in cities, the development of concepts such as ‘future proof logistics’ and, as part of that, the introduction of different types of urban logistics ‘hubs’, electric trucks, vans and alternative transport modes such as (e-) cargo bikes for last mile deliveries. The types of hubs include E-fulfilment centres, urban, regional and city Distribution Centres, goods exchange points and pick-up drop-off (PUDO) points for customers. These all need space, attention for the traffic conditions, embedding in logistics processes, investments and careful planning. The Dutch Climate Agreement for sustainable transport is an example of public-private collaboration. This entails working in a development and implementation cycle including knowledge development, implementation agendas, incentive arrangements, actual implementation and involving launching customers.

Modelling new mobility concepts

Luuk Brederode
DAT.Mobility



Source illustration: Luuk Brederode (adapted)

If we want to include smart urban mobility in transport models, choice behaviour of people when confronted with smart mobility concepts needs to be included. In order to do so, choice behaviour must be known (requiring additional data), relevant interactions must be included (requiring a different modelling methodology) and we have to deal with knowledge uncertainties because of the novelty of new mobility concepts.

Paradigms in traditional strategic transport models dictate that vehicle and service availability in space and time are exogenous to the model and the set of considered modes by travellers is fixed per traveller type, and possible dependencies between sequential choices made by travellers are not considered. In Smart Mobility all these assumptions do not hold, therefore, Smart mobility requires a different type of demand model: explicitly taking into account the limited availability of shared vehicles at specific locations and times, variability in travel options in different settings and sequential (intermodal) use of different systems. This can be best analysed using an agent based microsimulation model, i.e. a model in which individual travellers are modelled and their individual behaviour is aggregated.

An important aspect to take into account explicitly is dealing with uncertainty. Causes of uncertainty include observation uncertainties of objective elements (variance in travel times, costs, vehicle availability, …), perceptual differences within the population (value of time, value of reliability, experienced comfort) and value sets and beliefs (including care for the environment), resulting in 'personal constructs': the complex of individual personal preferences for transport modes. The perception, value sets and beliefs can change over time, for instance on the basis of earlier experiences and changing contexts.

Modelling smart urban mobility for strategic applications requires: a micro simulator that can produce outcomes that adhere to predefined conditions (maximum entropy, maximum utility or user equilibrium), an online panel that can provide accurate longitudinal stated and revealed preference data, and a system-dynamics application approach to deal with uncertainties.

Mobility Stations and Mobility Hubs in Germany

Viktor Wolff
Taubert Consulting
Project Consultant

Source illustration: Taubert Consulting

'*Mobility stations*' are locations especially focused on information provision and a small scale hub functionality (for example for shared bicycles). *'Mobility hubs'* on the other hand are larger facilities aiming to boost intermodal transport and are therefore planned near public transport (tram) lines. Others are planned in neighbourhoods, for example providing shared electric cars. The facilities typically need 4 parking spaces.

The Mobility Stations are equipped with displays and touchscreens giving access to all kind of information and possibilities to make reservations; the system is interoperable with smartphone apps. Some mobility stations also have electric charging possibilities which can be directly paid, but can also be used via contracts. Half of the charging points are open for all (electric vehicles), half reserved for shared services. The system now proposed is modular and open for all service providing partners.

The responsibility of mobility stations are split between the mass transit provider (municipality providing funding) and the electric energy provider.

The overall usage of the system is quite good. Most users use the app, but not necessarily the screen on the mobility station. So, the location of the station is perhaps more important than the hub screen functionality. Users use shared cars and bikes as well as – likely – trip and point of interest (POI) information.

Shared-Mobility Hubs in Delft

Jan Kees Verrest
Municipality of Delft

Source illustration: Nieuw Delft

The city of Delft (103.000 inhabitants) has a relatively small geographical footprint but still has the challenge to house more people and therefore has to densify. This has to be achieved alongside improving the living quality of Delft, as well as fulfilling the aim to become climate neutral in 2050 (and minus 50% emission in 2030 as compared to 1990). To this end, a sustainable mobility plan has been developed in which bicyclists and pedestrians are prioritised and three pillars for shared mobility are introduced: shared mobility in area development projects, in public space and as part of mobility chains.

In a newly to develop urban neighbourhood of Delft, the city will implement a mobility hub: first a temporary one available already from the start of the urban project (but located some 100 meters from the existing houses), a later one on a closer final location. The hub will offer access to shared electric scooters and passenger cars (20 shared cars for residents, 10 shared cars for public use as well as electric scooters in the final situation). Current residents may have a car but could be inclined to get rid of it, the new residents cannot get a parking permit for parking on the street or in (public) parking garages. The initial phase is financially supported by the municipality, which tenders the operation of the hub.

Next to that, Delft will realise mobility hubs in the historical city centre: this centre will be made almost car free. Cars of residents and visitors have to be parked in parking garages at the old city centre borders. Up to four mobility hubs will be implemented to offer alternative transport solutions. Delft also has the ambition to expand the hub network increasing demand in shared vehicles. Eventually, there will be different types and sizes of shared mobility hubs in the city.

CleverShuttle (Leipzig)

Johanna Reinhardt

Source illustration: Clever Shuttle

Clever Shuttle was founded in 2014, and operated from 2016 also in Leipzig. With Clever Shuttle you could order an (hydrogen or battery electric) car with an app ride, which offered shared drives.
Main shareholder is DB (Deutsche Bahn, the German national railway company), but there are other minority-shareholders as well. As from January 2022 Clever Shuttle does not directly operate for customers anymore in Leipzig, but is still active in other German cities.
CleverShuttle is positioned as an additional, flexible shared service to be combined with regular public transport, in particular train services, making it more attractive. CleverShuttle offers the operations (back office), representative drivers, electric vehicles and marketing. Quite a lot of cities are interested in these services.
Where large companies like Uber especially focus on large cities, CleverShuttle is also interested in smaller cities.

CleverShuttle operated 64 shuttles in Leipzig (and was and is also serving the Flexa system, with an additional 9 vehicles). From January to December 2019, demand increased from 35,000 to more than 70,000 rides. Also, the pooling ratio increased hand in hand with increasing the fleet size (because with a larger fleet size, the potential of sharing a ride increases as well). Highest demands are in the evenings and nights. Of course, in low demand periods, having a large fleet is not very efficient, so it would be better if there wouldn't be too large peaks.
CleverShuttle aimed in Leipzig to have a fleet large enough to limit waiting time to 5-10 minutes (as it is known that the larger the waiting times, the lower the use).

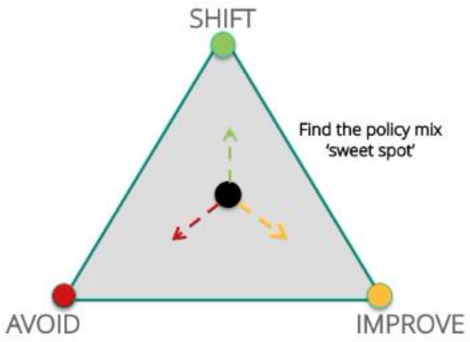
CleverShuttle is a commercial service that is used when public transport quality is bad and/or for those travellers normally using the private car. The system is used in addition to existing transport modes, especially train services. It shows that around 70% of the users already have a public transport (especially train) subscription, so such public transport revenues hardly disappear.

Flexa, Public Transport (Leipzig)

Johannes Simons
Leipziger Verkehrbetriebe GmbH (LVB)

Source illustration: Flexa

'Flexa' on demand services is complementary to regular public transport services for areas or at times the public transport quality is low. For example, in low density residential areas of which only a boundary is accessed by tram or bus or very low frequencies of public transport are offered, Flexa cars can connect travellers' locations with a bus or tram stop, hence where the access/egress distances are too large. Other problematic cases include very long public transport trips. A traveller can hail a service, Flexa decides on the basis of available public transport options if the request is granted or not.
Flexa belongs to Leipzig's public transport company LVB. Flexa operates its own taxi-like vehicles (hybrids with an approximate 100 kms electric range), collaborates with other transport providers, including taxi firms and hires Clever Shuttle for taxi services. As is common with public transport in Germany, the system is subsidized.
Some positive effects of Flexa on the utilisation of public transport have been measured: Flexa increases the use of bus lines by about 6-12% and that of tram lines by about 3-4%.
In summary, Flexa runs in an own niche market, supporting public transport services of LVB and does not compete much with the taxi sector.

Sustainable Urban Mobility Planning: Pathways and Links to Urban Systems (SUMP-Plus)	
Emilia Smeds University of Westminster, **Steve Wright** Vectos / SRL **Peter Jones** University College London	

The SUMP-Plus approach aims to accelerate SUMP implementation, to coordinate between transport and other urban sectors and to develop a long term vision: the SUMP Transition Pathways are developing a 20-30 year vision, whilst SUMP itself focuses on a 5-10 years period.

The approach includes working with targets that must be achieved eventually, but perhaps are not achievable at the moment given competences and the available measure packages. A back-casting approach can perhaps help to find what additional developments and measures would be necessary. Measures to be taken are ideally a mix aiming to:

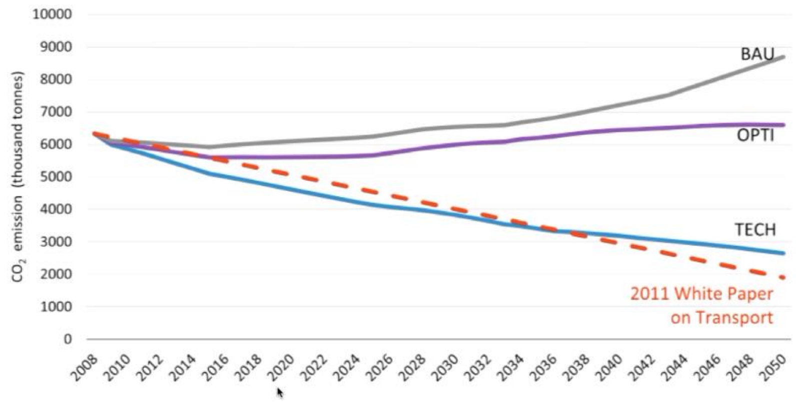
- try to reduce transport distances ('avoid' approach);
- try to reduce emissions by reducing the carbon required to move ('shift' and 'improve' approaches), for instance by using more fuel-efficient modes, increasing fuel efficiency, using other energy sources).

By estimating the costs and effect of measures and combinations thereof an optimal balance can be found.

To support actual implementation, the CREATE project identified eight success factors for mobility transition, related to political dynamics, financial resources, implementation approaches, organisational approaches and the measures itself, indicated as 'Mood, Motivation, Mass, Momentum, Mechanisms, Measures, Methods and Money.

Study reduction CO_2 emissions Warsaw

Jakub Zawieska, *Warsaw School of Economics*



For the city of Warsaw a study on potential CO_2 emission reduction has been done for the year 2050, focussing on road transport and direct emissions only. The ForFITS model (UNECE) is used for the CO_2 calculations: it provides a robust framework for analysing different scenarios for sustainable transport development and transport policy strategies, and is suitable for analysis on local (urban), regional and national levels.

In the application for Warsaw, different scenarios have been evaluated, including a reference BAU scenario, a 'Tech' scenario (focusing on technical improvements) and an 'Opti' scenario (focusing on other types of measures, including mode shifts).
The analysis results are striking, because even the OPTI scenario still shows a growth in emissions; only TECH gives a significant reduction, but would result in emissions that are still higher than the 2011 White Paper goal. Next to some modelling limitations, a main reason for this increase is the strong correlation between GDP and transport activity. As Warsaw is growing, an increase of transport activity is perhaps to be expected.

An additional SMART scenario, that included aspects of smart city solutions was added to the analysis. This includes ITS systems, traffic management and signal control, GPS driver information systems, intelligent parking management, hybrid and electric propulsion, smart public transport and logistics and eco driving. Such solutions can be implemented next to (or on top of) each other, but regarding the effects, there will be some overlap. The overall average effect is estimated to achieve an additional 50% CO_2 reduction. This would mean that adding the SMART scenario could result in reaching the White Paper goal. Still, this is a very unlikely scenario, because it is based on some rather radical assumptions.

The conclusions of the analysis show:

- Mitigation of CO_2 emissions from transport is very challenging;
- The implementation of smart city concept can significantly contribute to emission reductions;
- Although a range of assessment tools is available, there is still a lack of data;
- Economic growth is an important driver of growth in mobility; to facilitate a competitive advantage while trying to reduce CO_2 emissions is a long and challenging process.
- Case-specific solutions must be developed.

Funding and financing of sustainable urban mobility measures

Stefan Werland,
Wuppertal Institute Germany

The SUMP 2.0 'Topic Guide on Funding and Finance' focuses on the issue that a lot of climate mitigation measures will save money in the mid- to long term, but requires quite significant upfront investments. There is a 'financing gap', a need for upfront investments for preparation and experiments, procurement and construction and operation and maintenance. Revenues (financial gains or lower costs, societal advantages) often come much later. Also, benefits of transitions are often less accountable or tangible, while costs are often well discernible.
Therefore, mobility transition requires a financing strategy with clear investment related targets and indicators, linked to the urban mobility strategy. The envisaged financial instruments are ones next to the core financing instruments that exist in each country.

Regarding the terminology, distinction can be made between 'funding' (i.e. money provided for a specific goal, often free of charge) and 'financing' (where money providers expect re-payment as well as interest).
For local governments, there are different debt mechanisms and external finance solutions, however, the usability and availability of those relates to local legislative and financial frameworks. Main instruments include city bonds, revenue bonds and green bonds. Next to that, there are also different regional national, bilateral and transnational programmes for getting funding or financing (public or private), also for different stages of project development, construction/procurement and operation.

Nevertheless, funding or financing CO_2 mitigation projects could be difficult, one of the reasons being that there seems to be a general lack of strategic thinking on mobility in policy making processes.

Willingness to participate / mobilizing citizens

Maria Chatziathanasiou
E-Smartec project (Interreg)

The participatory approach of Citizen involvement in Sustainable Urban Mobility Projects can be an important success factor. The E-Smartec project aims to better engage stakeholders and citizens in sustainable mobility planning with the use of marketing techniques. These marketing techniques are tailor made mixtures of actions that target the public with the objective of promoting an initiative. 'The public' can be all citizens, the broader public (also outside the city), specific groups of people or specific stakeholders. A participatory approach for sustainable urban mobility projects is already or will be obligatory in some countries, but even if it is not obliged it is still something worthwhile to do as to get more knowledge both from external stakeholders as well as from the users (who should be the final beneficiaries). Also, in order to arrive at sustainable mobility, you do not only need approval for a plan or project approved on paper, but actually in principle accepted by the people who will be affected by it. Therefore, you need to reach out to your citizens because this will really support the change that you want to bring about with your project. And this will also help you to build a long lasting relationship with the citizens.

Typical approaches in marketing include:

- 'Cause Marketing'/Word of Mouth marketing: raising awareness during public events;
- 'Digital Marketing': e-engagement campaigning, e-participation, crowdsourcing;
- 'Dialogue Marketing': surveys, focus groups, experts panel, public consultation;
- 'Relationship marketing', emphasizing on (building long lasting relations with) specific target groups. This can be achieved via workshops, participatory mapping;
- 'Wheel of Persuasion', capacity building aiming to alter the behavioural patterns,
- 'Guerrilla Marketing', via pilot intervention and gaming
- 'Undercover Marketing', using gamification, popular events and ambassador campaigns

The approaches each have advantages and disadvantages, so should be used in a balanced way – often in combination.

Conclusions and tips of the project include:

- Be aware of 'participation fatigue';
- Use appropriate 'language' based on the target group;
- Clarify the expectations and everyone's role in the process;
- Don't be afraid to ask 'uncomfortable questions' or receive 'uncomfortable' answers.
- Ensure an appropriate follow up: be clear on how the SUMP has been informed by the citizens'/stakeholder opinions.

In practice, the process might face challenges for example because of information, expertise or knowledge imbalances, the potential overflow of feedback, the question of fair representation and the represented interests. In order to manage these challenges, it would be especially important to start stakeholder involvement already from early stages in the policy design process, so to bring this process right from the very beginning.