

Intended for
City of St Paul

Document type
Report

Date
December, 2014

FORD SITE ENERGY STUDY

BEST PRACTICES IN CAR USE ALTERNATIVES



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Revision **02**
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Ref 1100012867-35
Document ID 400826-13
2B

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1. INTRODUCTION

The City of St. Paul is in a process of developing the former Ford production facility into a sustainable urban neighborhood which can be a show case for the coming transformation of an old industrial area into an attractive and livable community.

All over the world cities are being haunted by an ever growing number of cars as urbanization continues and populations grow. This has led to rather desperate measures in some cities; Hamburg, Germany is looking to ban all cars in 20 years, but softer measures can also be applied as in Milan, Italy, where the local government rewards citizen with 1,5€/day for leaving their car at home.

This memorandum responds to Activity 1.2 Best practice in car use alternatives with the objective to identify best practices in neighborhood site design to maximize walking, biking and transit as alternatives to car use.

The study brief calls for an outline of best practices from the US and Europe, considering that the Ford site will be a new brownfield development it seems obvious to focus this report around smart planning measures for creating such a site in a sustainable manner with focus on reducing transportation by car and optimizing transportation by other more sustainable means.

Where appropriate reference cases are highlighted to illustrate the planning measure addressed.

Being a Danish consultant our experience from the US market in this particular area is naturally limited. However, Throughout the US and Canada there seem to be much focus on electrification of the car pool more so than maybe decreasing car use in general and encourage walking, biking and public transport. It should be noted that electrical vehicles are only really low carbon if the electricity is produced by renewables means otherwise it is just a mean to move pollution.

Having said that in the US more and more cities are starting to consider alternatives to cars by implementing free or low costs city bikes, a variation of walking and cycling paths and light rail connecting sub-urbs with Downtowns.

In Canada Community Energy Plans are in the process of being mapped throughout the country the work is being led by the Community Energy Association (CEA) The work to date highlights that focus appear to be different in different states. Alberta, Québec and Newfoundland & Labrador having more focus on low carbon transportation. In Alberta GreenTRIP provides \$2 billion in community funding for sustainable public transport.

Example 1 Community Energy Plans

2. GENERAL OVERALL CONSIDERATIONS

As cities have been rapidly growing the last decades the once remotely located industrial areas have now been enveloped into new and modern urban developments. The old industrial sites are in many cities barriers for the citizens and children creating networks and relationships in the neighborhood and also form a serious barrier for the accessibility in and through the greater district for example for efficient public transport routes whether they are bus routes or tram lines.

Transformation of these old industrial areas into thriving urban neighborhoods can be a huge contribution to the development of livable city centers. However any transformation of an old abandoned industrial area into a living urban district will generate a demand for transportation, which has to be addressed. This demand can be met in many different ways from the entirely car based solution to the pure public transportation solution. If the choice and development of the transportation solution is handled carefully it can be a huge benefit for the urban development in terms of unit prices, diversity, environmental impact, salability etc. Any redevelopment of these centrally located facilities into a new active function whether it is residents, offices or mixed use will inevitably lead to a higher demand for transportation. This higher demand will of course be concentrated on the site but will also influence the adjacent transport system outside the site.

The impact on-site and on the general traffic network can be influenced significantly with a series of 'smart' planning measures. These planning measures can be categorized in the following headlines:

1. Holistic infrastructure concept
2. Land use based on principles of mixed use
3. Balanced physical planning measures - matching density to the transit capacity
4. Increased density around transit nodes
5. Compact community with short commutes
6. Walkability – neighborhoods that promotes walking
7. Cyclable city – direct, safe and fast cycle routes with high connectivity
8. High quality transit supply – Bus Rapid Transit (BRT) and Light Rail Transit (LRT)
9. Mode shift facilities – regulation of parking, P&R incentives
10. Strategic infrastructure design
11. Strategic parking policy
12. Branding and communication measures
13. Economic incentive planning

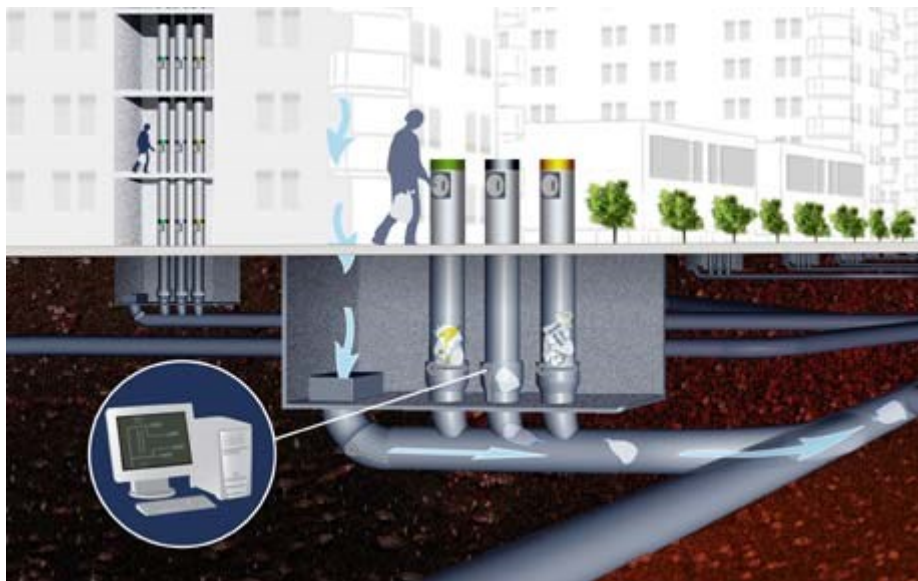
3. PLANNING MEASURES

Each of the above mentioned planning measure will briefly be addressed in the following.

3.1 (1) Holistic infrastructure concept

Studies of cities and community developments that have succeeded in achieving a low car ownership and low private car transportation share are cities that have taken a holistic view on the whole infrastructure system and not only focused on singular solutions within the sectors. The neighborhood as a whole has to be designed for sustainability, and thus the land use, the energy system, the waste system and the transportation has to be interlinked onto one sustainable system. For example a central suction waste system prevent waste collection cars inside the urban area and the waste can immediately be pre-treated for biogas production for city cars or electricity to be used by then households, for street lighting or for EV's. The suction system can also be used for storm water drainage. And removing the waste trucks from the street network opens for more design opportunities towards walkable streets encouraging citizens to use other transportation means than the car.

Picture 1: Waste suction system



Basically a series of relatively detailed holistic, sustainable and operational objectives have to be developed to be able to design precise and action related policies and design guidelines. The holistic policies have to be able to effectively push the sustainable measures in the direction of the objectives and to choose between the many sustainability measures. Not all measures fit with each other in an overall sustainable system. Selection of measures has to be based on the overall objectives and the sustainable effects including not the least the economic and social sustainability.

3.2 (2) Land use based on principles of mixed use

New neighborhoods should be planned with close consideration for the land uses of the adjacent communities. And the neighborhood itself has to be developed with a strategic mix of uses, which on the one side promotes the business case of the development and on the other supports the sustainable mobility of the neighborhood.

A development in the close proximity of existing residents' areas may have a majority of working places while proximity of working areas may have a majority of residential uses. However there must still be a mix of uses and facilities that allow for diversity and density within the site with the focus on enhancing mobility and minimizing traffic. To achieve this effect the land use plan must carefully design an accessibility relationship between the homes, the working places and the public facilities – the shops, kindergartens, schools, health institutions and leisure facilities.

In order to enhance livability, walkability, cyclability and the feeling of security it is important through the land use planning to ensure direct connectivity for

the soft road users as well as nice experiences along the travelling or commuting route, such as well-equipped lighting, plantings, parks and entertainment areas where people gather. In the same instance the land use may strategically provide car parking in centralized multi-storeys, still though giving access to every single address for unloading of goods or for disability access.

The land use plan may even put restrictions on the extent of uses for specified building plots. In Copenhagen's Nordhavn (North Harbor) district Ramboll has developed a concept of a "5-minute-city", where the walking distance from one home to a public facility or to a high speed public transport facility that can lead you to it, is no longer than 5 minutes. This has required detailed planning reserving space for kindergartens, shops etc. inside specific building plots. Thus the developers must accept that they may provide public facilities inside their plot to serve the community even though it was not part of their original business plan.

8-80 Cities is a non-profit organization based in Toronto, Canada. They are dedicated to contributing to the transformation of cities into places where people can walk, bike, access public transit and visit vibrant parks and public places. Their approach is to engage people and communities across multiple sectors to inspire the creation of cities that are easily accessible, safe and enjoyable for all. We achieve our mission through grant projects, advocacy work and our innovative services.

The philosophy being that if you create a city that's good for an 8 year old and good for an 80 year old, you will create a successful city for everyone.

<http://www.8-80cities.org>

Example 2 8-80 Toronto, Canada



Picture 2 Mixed use master plan in Nordhavn, Copenhagen

3.3 (3) Balanced physical planning measures - matching density to the transit and infrastructure capacity

The detailed physical planning has to be integrated with the development of the infrastructure system – the energy system, the power system, the waste system and the transportation system. All systems have to be integrated in every development stage of the project. Failure will cause investors to avoid investments. And failure in the mobility system will cause potential residents to choose other areas or existing residents to behave against the intentions and objectives of the site.

The development plan must balance development and infrastructure in a way that demand at all times is matched with sufficient capacity. In many cases it has shown that provision of a rail based transport system – metro or light rail – is hugely stimulating for the ability to attract investors for urban development. At the same time it will attract residents that have intentions to use the public transport and as provision for high quality public transportation, restrictions on car parking should follow.

3.4 (4) Increased density around transit nodes

High density of urban development around transit nodes has evidently great impact on the utilization of the infrastructure system and the travel demand.

In the very big scale there is evidence that the energy consumption in large and dense cities are lower than in dispersed cities, which are applicable also in the lower scale where high density and a compact building structure will have less façade area exposed to the cold or warm climatic environment. Compact low to mid-rise buildings (ground floor plus 5-10 stories) seems to be optimal in many climatic regions, but it has to be calculated carefully in the local climatic and utilization context.

In compact cities the utilization of the infrastructure system, the water supply, the sewage system and the energy system is much higher than in dispersed

cities. And the infrastructure cost per household is much lower. This economical factor makes it possible to establish homes and offices in a variety of price levels and types of ownerships, which can leverage the diversity in the community.

On the transportation side, data from the UK shows that urban areas with higher density also have shorter car travel distances and a modal split with lower car share and higher public transportation share.

The impact on the transportation demand and behavior is due to at least three major reasons:

1. High density around a public transit node increases the viability of a rail based system. A rail based public transportation system attracts more passengers and households within a catchment area of a metro or tram station tend to choose to live with a lower car ownership.
2. The walking distance for a large number of potential passengers is within the acceptable distance of 600 meters or 5-10 minutes.
3. People tend to 'follow the leader'. And with a high residents density many will become active daily users of the public transportation system which in itself will attract more users as 'this is what you do' in this neighborhood.

The new urban development plan for Chicago Lakeside – the transformation of the old steel plant south of Chicago – is designed with a multi-purpose transportation system. BRT lines are connecting the Lakeside to the rail line and at the same time are contributing to the connectivity of the Lakeside with the adjacent neighborhoods. The BRT corridors are prepared to be upgraded to LRT once the Metra rail line is upgraded and thus giving short commuting time to downtown Chicago.

<http://chicagolakesidedevelopment.com>

Example 3 Chicago Lakeside Connectivity



Picture 3 Nordhavn, Copenhagen, Metro and Bike lane illustration

In terms of livability it is important to study the local context carefully. High-rises have the tendency to keep life inside the building, while low to mid-rises to a much larger extent generates city life on the streets outside the building complex. So a sustainable solution is not just to establish high-rises around

stations. It is a considerable piece of planning work to estimate the most sustainable balance between functions, livability, modal choice, diversity and economic viability.

It is always a discussion what the appropriate urban density is. And there is no 'correct' answer. An indicative minimum is 25 dwellings per hectare (dph) for bus services and 60 dph for tram service, depending on a number of parameters such as urbanity, length of tram line, car ownership, local culture etc. But in many cases these values are much higher in areas with great success. In Hammerby Sjöstad, Stockholm, which is considered a very successful and sustainable new urban neighborhood, the density is 160 dwellings per hectare (395 dpa) while the planned density of Nordhavn, Copenhagen is 100 dph (247 dpa) but with an additional 100 workplaces per hectare.

3.5 (5) Compact community with short commutes

A compact community built up by a series of high density nodes around the public transport stations and hubs, and with a diversity of mixed use functions will leverage very low car utilization especially if a part of the public transportation system is rail based. The combination of diverse mixed use and the reliability of a rail based transportation system will cause the households to consider whether to acquire the second car and maybe even the first one, because the daily commute can be achieved by public transportation and because the public transportation is the 'smarter' and quicker transportation.

The 5-minute city concept just makes it quicker to walk or go by bicycle. And the daily commute modal choice is not about environmental concern or political beliefs; it is about the smarter and quicker choice that releases time from sitting inactive in jammed car traffic to active personal free time used with the family or by the individual.

3.6 (6) & (7) Walkability and cyclability

Creating an urban development with a high rate of cyclists and walkers automatically causes an ease in the pressure and demand for road capacity. Pedestrians and cyclists demand considerable less urban space both while moving around and while parking. The saved space can be used for more livable environments and design and it can be used to create more compact urbanity for higher public transportation use and viability.

TransForm in California founded in 1997 by Bay Area environmental and social justice groups promotes walkable communities with excellent transportation choices to connect people of all incomes. TransForm's work is focused on four key impact areas:

- Reducing greenhouse gas emissions
- Reducing the combined cost of housing and transportation
- Increasing the rates and safety of walking and bicycling
- Increasing access to jobs via public transportation

<http://www.transformca.org>

Example 4 TransForm California

But creating walkable and cyclable cities is not only done by establishing cycle lanes along the roads. It takes considerable planning to develop exactly the routes and design that give the best mobility for cyclists and pedestrians. The transportation planning methodologies has to be reconsidered as mobility is alpha and omega to create an attractive city for cyclists and pedestrians. Thus the planning challenge is not to establish the right capacity, but to create the right and optimal connectivity. This may include establishing specific facilities for the soft road user for example wide cycle tracks, bridges, air pump stations, litter bins, foot rests etc.

Furthermore the accessibility of cycles for inhabitants and visitors can greatly affect the rate of cycling trips. In Copenhagen electric city bikes are available all over town with built in touch screen computing and GPS. Correspondingly the "Nice Ride" city bikes are accessible all over St. Paul and Minneapolis, and serves as a good opportunity to enhance the cyclability of the Ford Site.

Picture 4 Bicycle bridge in Copenhagen



Bicycle bridge as part of the bicycle motorway in Copenhagen. The design takes into consideration that in a biking city the bicycle is used for many purposes that requires more space.

Picture 5 Footrest and litter bins for cyclists



Urban land use planning policies are highly important to create walkable and cyclable cities. The 5-minutes city as mentioned above will improve the urban life as more people are walking and cycling in the public areas instead of taking

the elevator to the parking garage under the building and drive individually along the streets.

3.7 (8) & (9) High quality transit supply – mode shift facilities

Almost all public transport trips consist of one or more transfers between transportation modes. Creation of a high quality transit supply system must be based on the assumption that the users must experience a seamless cohesion between the different modes of transportation. This requires that the different suppliers of transportation have a common focus on the customers. This accounts for the public modes of transport and between the public and private suppliers of transportation.

An important step into a high quality transit supply system is to ensure that the public transportation is an integrated part of the urban planning. Thus the policies for the development must follow the principles of Transit Oriented Development (TOD). In Portland, Oregon an implementation plan has been developed including a funding program for transit-oriented development.

In the Copenhagen region this is implied by the principle of station proximity, which means that within a core area of 600 meters around a train station the utilization rate of the building rights can be double as high as outside the core area.

This has encouraged developers to locate especially office buildings in the proximity of stations again encouraging employees to commute by public transport rather than by car.

Portland, Oregon, was the first US local authority to approve a sustainability plan for addressing the climate change issues. In 1993 a long term plan was adopted resulting in record low carbon dioxide emissions.

This came on top of a community led switch of public money from a motorway to a light rail system. These programs are long and sustaining term by nature and they form stepping stones for continuous adoption of new measures.

Just recently the city has signed up to an Electric Vehicle (EV) project implying initially 36 charging stations in the city, but growing to 500 stations.

<http://www.chargeportland.com/>

Example 3 Portland, Oregon, sustainability plan

Picture 6 Above ground part of the metro in Copenhagen



Design and planning of the feeder system to BRT or trams must be an integrated part of the regional connectivity and the site master planning. This means that BRT/tram terminals and bicycle facilities and parking must be developed closely related to the public transport system and to train stations to give the best physical integration, the best customer service and convenient transfer conditions. The mode shift facilities may have different service offers such as car wash and cleaning, bicycle service, pumping service, personal shopper service etc.

Once an integrated high quality system is established the viability of the transit system will increase and pay off to the investors in terms of lower demand for car parking which is a costly element in any building complex.

3.8 (10) Strategic infrastructure design

Design of the transportation infrastructure systems has a significant influence on the utilization of the system and the behavior of the users. A streetscape¹ can be designed to:

- Fully regulate the traffic in any case
- send the signal to the users who has the priority
- discard normal regulation and leave it up to the users – the shared space principle

The most ordinary design standard is the total regulation of the traffic. In this case the regulation is marked on the roads, on signs or by signals. And the different user systems, driving lanes, cycle tracks, sidewalks, parking spaces etc. are completely separated by road marking signage and by curbs or similar physical marking. In this case the strongest wins and usually this is the car traffic. They will be given the most space and almost all signage and road marking is directed to their drivers. This generates the impression of a 'machine' and leaves a barrier feeling with the soft road users.

Picture 7 Full regulation of traffic. Lyngby, Denmark

¹ The equivalent to landscape for streets



A streetscape in urban areas can be designed with a use of materials and geometric design that signals low speed, frequent pedestrian crossings etc. In this case it is important to be consistent in the design to ensure the same design

standard in the whole stretch or district. In this case signage and road marking can be limited to a minimum and the incentive to stay in the open spaces and squares is more evident.



Picture 8 Lyngby Main Street, Denmark

In designated areas, often commercial districts, the principle of shared space has been tested with positive results. The principle of the shared space is to give back the responsibility to the road users. Normally the road designer takes on the most responsibility by regulating all traffic behavior. With the shared space design all road markings, signage and physical curbs etc. are removed and you leave one space from façade to façade. Then it is up to the road users to agree on the right of way, where to park etc. The results are very positive as the drivers are no more just blind following the signage and standing on their rights, but have to have eye contact with the other road users to negotiate maneuvers. The effect is less conflict, less accidents and increased feeling of security.

Picture 9 Shared space in Brighton, UK

3.9 (11) Strategic parking policy

All car trips are dependent of at least two parking spaces, one at the origin and one at the destination of the trip. This means that in principle all car traffic can be controlled by a parking strategy and regulation - no parking spaces, no cars or the higher the parking rates the lesser cars.

A parking strategy has a huge influence on the car ownership, car utilization, public transportation mode share and the hence the design of the urban spaces. In developing the parking policies for a specific area there are a number of terms to take into account: the residents and other users in the community, the level of the public transport service and capacity, the business case for the development and the aspirations for the urban spaces and the neighborhood.

Given a high standard public transport system and a compact development, restrictions can be put on the parking norms to reduce the number of parking spaces and to increase the parking fees. Even the locations can be moderated and put in a number of specific multi-storey car parks. In this case every car trip includes walking to the parking space raising the attractiveness of the public transport system or cycling. Many new developments are designed around this parking regulation, for example Ørestad in Copenhagen.

3.10 (12) Branding and communication measures

Changing an ingrained habit of using the car in almost any part of the transportation chain is not only done by providing new means of transportation. This calls for a profound cultural change management process in which provision of highly efficient alternative solutions to the car of course is a fundamental request. The alternatives must evidently and objectively be the smartest choice. But working with the mind-set of the users and the potential newcomers to the district is equally important. Branding and communication of the alternatives play an important role. In Copenhagen a communication and

branding strategy has been developed in recognition of the importance of getting the urban users to take ownership of a transportation mode shift from the car to bicycles.



Picture 10 Copenhagen cycling communication

This strategy builds upon communicating, branding and documenting cycling as the fast way forward in the urban traffic. While cars are queuing, bicycles can move with a higher speed through the Copenhagen road network.

Every second year The City of Copenhagen publishes the "Copenhagen City of Cyclists - Bicycle Account", which is an assessment of the development of the cycle facilities, the development of key figures for cycling and a survey of the cyclists assessment of the level of service and the supply of cyclists facilities. The cycling account's key figures are compared with the goals announced in the cycling strategy. For 2015 the main goals are:

- At least 50% of the commuters or students use bicycle as their mean of transport. In 2010 a percentage of 35 were achieved.
- The number of severely injured cyclists is halved from 2005 to 2015. In 2010 a reduction of 22% was achieved
- At least 80% of the cyclists are feeling secure in the traffic. In 2010 a percentage of 67 were achieved.

The cycling account is a central tool for the planners and the politicians to follow the development and to react on failing performance and new cyclists demands. Further the cycling account is a tool for the public to follow the political decisions and the fulfilment of the goals of the strategy.

Branding and communicating Copenhagen as a city of cyclists have had a huge impact on the attractiveness and livability of the city and is now part of the tourist attractions of Copenhagen. The same could be the case for the Ford development as a showcase for new sustainable urban retrofitting in US.

3.11 (13) Economic incentive planning

Almost any urban development is driven by economic incentives. Ramboll therefore consider it an integral part of urban planning to perceive planning as business development. A beneficial exercise for any public authority before starting an urban development process is to ask the question "What if the municipality was a private company?" This approach will extend the planning process before and after the traditional physical planning process. The pre-planning process will include topics like: Mapping of existing qualities, investigating future trends and potentials, carrying out market analysis, creates partnerships, building of common baselines, creating an operational vision, formulating a business case, branding and communication, investment and financial plan, etc.

Return on investments and profits are the number one trigger for investors whether they are private or public. We have to be very specific and well prepared in our pre-planning to be able to point on exactly the right solutions that are profitable for the investors and the users on the one hand, and that improves urban life and climate adaption efficiency on the other.

In the post-planning process the implementation is the main topic. We have seen many brilliant master plans passively sitting on the shelf, because of an insufficient implementation plan. The implementation plan has to assess the governance structure of the implementing body, the decision process needed, the knowledge capacity of the implementing organization, the legislation etc. The implementing body has to be geared to implement for example a transition of the energy system, the transportation system and the behavior etc.

In the development and planning process economic incentives play an important role for the investor, the developer and the municipality. For the users and the soon to be residents the economic incentive is a major driver too even though the private individuals tend to be slightly more philanthropic than investors. Regarding the car use the parking policy is one of the main denominators for the choice of transportation mode. The location of the parking facilities, the parking norm and the parking rate. These three parameters can determine the car use in the district. But the restrictions imposed on the car use have to be in balance with the alternatives provided. If the alternatives do not match the demand and the expected service quality the district will lose its ability to attract investors and residents.

So working with economic incentive strategies should always be an integrated part of urban planning.

4. CONCLUSION

A number of planning measures and means can be used to lower the dependence on cars and assure good transportation for the future users and inhabitants of the site, without compromising the neighborhood's infrastructure. The development of a transportation concept goes hand-in-hand with the other planning aspects of the site and is crucial in deciding on the building densities with more dense areas around the transit nodes.

The concept of the "5-minute-city" and/or the 8-80 cities concept prove that with the right planning, demand for car transport can be minimized while at the same time allowing a rather high building density and seamless transportation for the inhabitants.

Just as the City of St. Paul already well on its way with a bicycle plan and the twin city bike sharing plan the Ford site could/should be planned around focus of being a non-car development. In due time supported by a connection to the light rail, making it easier to commute to Downtown St. Paul and Minneapolis without having to rely on a car.