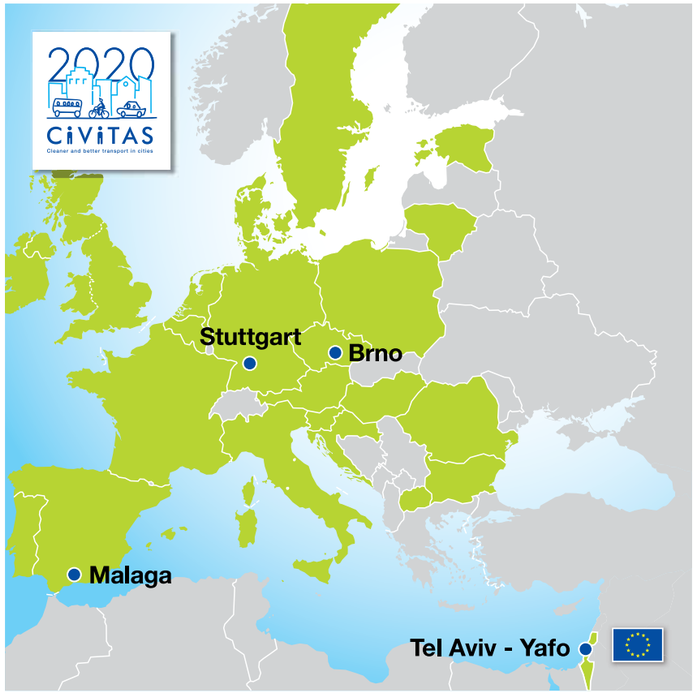
CiViTAS | 2MOVE2

Assessing the impacts of restrictive parking standards in Tel Aviv–Yafo

CiViTAS 2020
Cleaner and better transport in cities
TEL AVIV - YAFO

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

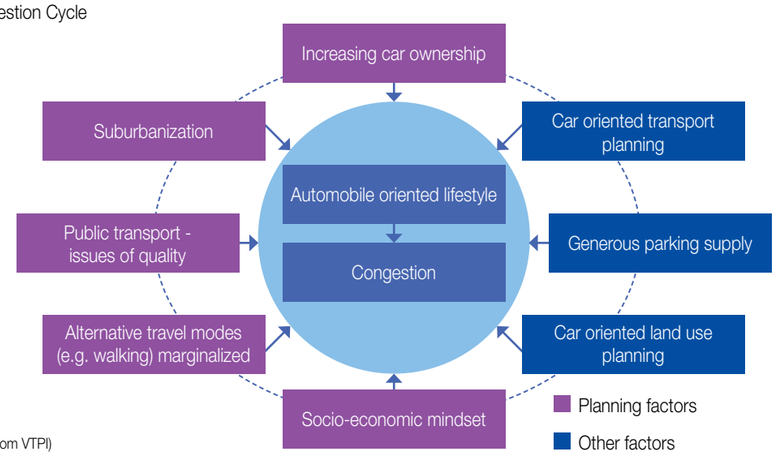
Contents



1 Introduction

Most of us live in cities. We rely on the transportation system to support our daily routines. We seek accessibility, yet we require convenient and speedy mobility. City economy depends on the transportation system. A thriving city means massive movements of people and goods. Whichever way we look at it, modern city living is almost always accompanied by traffic congestion.

Figure 1: Congestion Cycle



(Source: modified from VTPI)

Congestion is exacerbated when mobility needs are met largely by private cars and, since each car trip originates and ends in a parking space, there is an attendant problem of wasteful use of urban land.

For much of the 20th century cities' main purpose with regards to parking policies was to accommodate car user needs so as to ease perceived shortages and to eliminate possible spill-over effects. In recent decades, however, the previously overlooked relationship between parking and congestion has come to the fore and many cities have started reconsidering their policies of demanding ample parking with each new construction and allocating valuable street space for parking.

In Israel too, the last decade has seen a major rethinking vis-a-vis transportation and parking: on the one hand, a considerable investment in public transport and on the other, an effort to reduce the attractiveness of car use. One of the key measures to reduce car attractiveness is to reduce the number of parking spaces generated as a result of new construction by reducing parking standards through regulation.

Recently, the Israeli National Board of Planning and Building adopted a new parking standard which was subsequently enacted into the Planning and Building Law. The law amendment, when accompanied by a suitable local approach, can contribute to the desired change. This paper presents a methodology for determining parking policy, utilising the metropolitan transportation model. The methodology was conceived as a support tool for decision makers and was developed by the Municipality of Tel Aviv-Yafo and the Technion- Israel institute of technology, as a part of the "CIVITAS 2MOVE2 Project" (Box 1). Its goal is to systematise and improve decision making with regards to parking policy. The development of the tool was inspired by the change in the state-wide parking regulation and the resultant opportunity to reorient the City's parking policy towards two apparently conflicting ends: (1) to preserve and strengthen the economic wellbeing of the City which is dependent today on commuting dominated by the private car, and (2) to affect a change in the modal split of the commuters in order to reduce congestion.

Box 1: CIVITAS 2MOVE2 Project in Tel Aviv-Yafo

Eight partners in four countries (incl. Stuttgart, Brno, Malaga and Tel Aviv-Yafo).**Project duration:** Dec. 2012 – Nov.2016.**Topics addressed included:** E-mobility, urban logistics, public-transport prioritisation strategies, sustainable urban mobility plans (SUMPs), cycling, corporate mobility management, city logistics and mobility culture including raising public awareness to green routes.

2 Tel Aviv Metropolitan Area

The Tel Aviv Metropolitan area covers 1,519 km² with a population of over 3.7 million people and 1.3 million jobs. There are 67 municipalities within the metropolis.

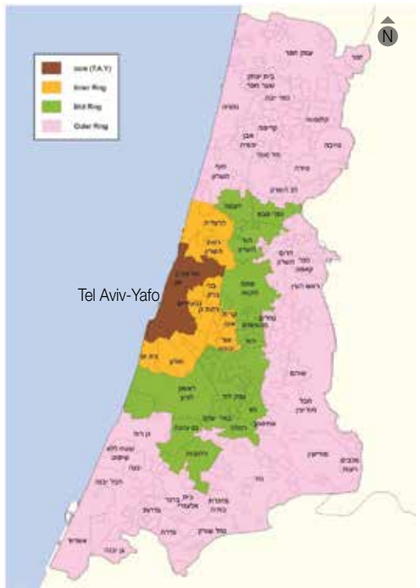


Figure 2: Tel Aviv Metropolitan Area

3 The City

Tel Aviv is the heart of the metropolitan area and provides frequent services to approximately 4 million people within a 60 km radius. It is the financial, economic and cultural centre, practically affecting all of Israel. As the land values attest, it is also considered a particularly desirable living location abounding in opportunities and attracting people from all walks of life. In 2015 Tel Aviv-Yafo was a city of 426,140 residents spread over an area of 52 square km and a source of employment for over 407,000 workers (11% of Israel's workforce). More than 57% of all jobs in banking and finance are concentrated in the City, and the City has become one of the top ten high-tech centres in the world. Tel Aviv-Yafo is also a centre of art and culture, housing the three major museums of Israel and its four leading theatres[1].

FINANCE

To provide a wide range of services to its residents, to the entire metropolitan area and beyond and maintain its status as a leading and vibrant place, the City is obliged to assure continuous investment in its infrastructure, including heavy investment in high quality public space and street-space. In recent years most of the municipal budget is a self-generated income, mainly from Council taxes. In 2014 council taxes accounted for about 80% of the entire budget, with 75% of this sum originating from businesses operating in the City.
Thus, and in view of the fierce competitiveness of neighbouring municipalities, maintaining Tel Aviv-Yafo's attractiveness as a locale for businesses is one of the City's uppermost concerns.

[1] For additional details see http://www.civitas.eu/content/tel-aviv-yafo

TRANSPORTATION

As a major transportation hub, the city is served by a comprehensive public transport network, with many of the major national transportation network routes running through the city. There are 840 km of roads, with 420 traffic-lighted intersections and over 130 km of bicycle paths. As with the rest of Israel, bus transportation is the most common form of public transport. The city is also served by local and inter-city share taxis. Tel Aviv-Yafo is served by suburban railway lines with stations located along the Ayalon Highway (the main highway route that transverses the city). 2015 saw commencement of construction of the first line (Red) of the light railway network: 22km of rail connecting Petakh Tikva in the east of the metropolitan area with Bat Yam in the south. 11 km of the Red Line crossing Tel Aviv-Yafo will be underground. During the next decade, three additional metropolitan lines of the light rail are set to get underway and crisscross the City. However, most of the planned LRT network is still in the planning stage.
The City is a focal point for commuting. Each day 500,000 cars and 1 million people enter the city. During the morning peak period the number of cars entering the city is 96,000 making it one of the busiest transportation networks in the country. This is perhaps best illustrated when we look at the City relative to the metropolitan area (Figures 3 and 4):

	TLV	Metro	%
Area	52 sq. km	1491 sq. km	3.5%
Population	425,000	3,463,000	12.3%
Employees	407,000	1,525,000	27%
Morning peak hour trips [2]	96,000	416,000	23%

Figure 3: Tel Aviv-Yafo and its metropolitan area

[2] 7:30-8:30 AM

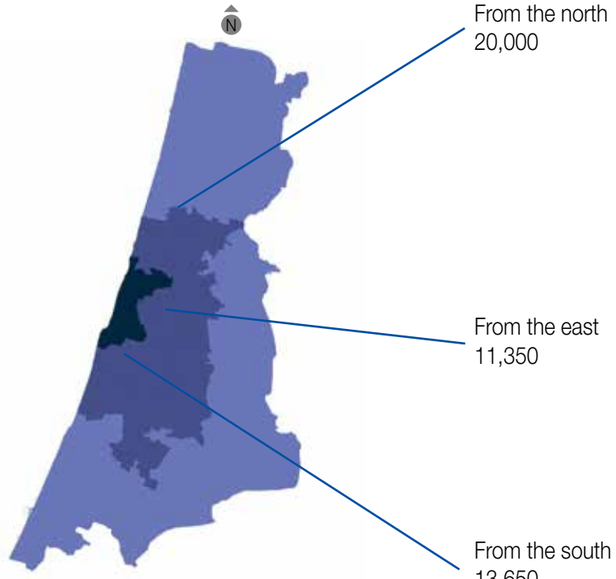


Figure 4: Morning peak hour trips into the City

PARKING

Tel Aviv-Yafo, like most major cities, experiences considerable parking shortages. On-street parking in most parts of Tel Aviv-Yafo is free-of-charge for residents while commuters are required to pay a fee of around 1 Euro an hour. Off-street parking supply is provided by publicly and privately owned parking lots. Some of the private parking lots are dedicated to residents or employees. The distribution of parking in Tel Aviv-Yafo is illustrated in figure 5.

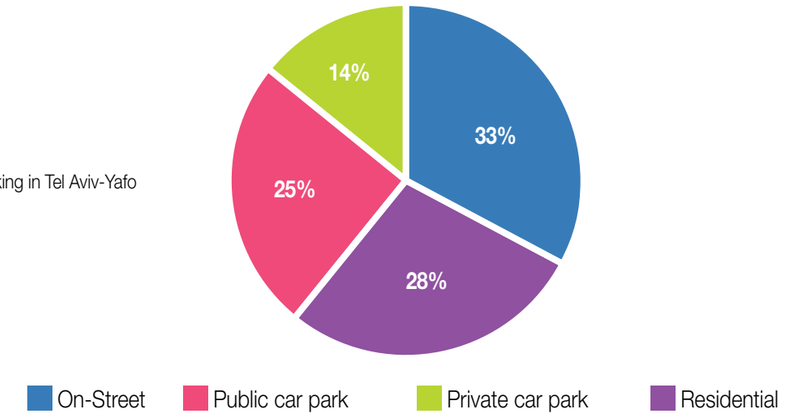


Figure 5: Parking in Tel Aviv-Yafo

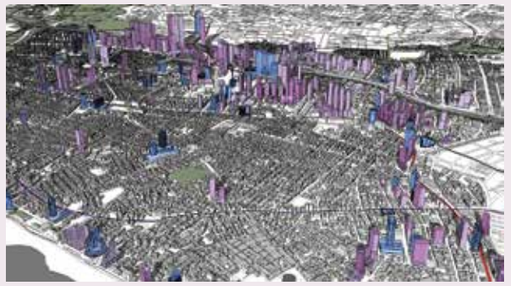
There are approximately 278 thousand parking spaces in the City on and off-street. If all parking spaces were at street level, a hefty 9.7 square km. would be consumed – almost a fifth of the municipal territory. Although the many multi-level carparks in the City reduce the share of land used for parking, parking still remains a major consumer of public space, meaning narrower sidewalks and fewer open spaces.
If the previous national parking standards were to be employed to accommodate the growth of the City, based on the comprehensive plan, by 2030, 162,000 additional parking spaces would be needed. Even with the significantly reduced new parking standards, an addition of about 85,000 is expected.

Box 2: Transport Authority and Responsibilities

In Israel the main responsibility for transport (including public transit) lies with the central government. The central government is responsible for transport planning and implementation, while the City is responsible for public space/streets (planning, construction and maintenance) and **parking policy**.
Both, the central government and the City, are involved in traffic management and control: the central government's authority relates mostly to the major alignments of public transit and roads affecting neighbouring cities while the City regulates and manages the rest of the transport network.

Box 3: Future trips

According to the City comprehensive plan growth targets, by 2030 the number of trips into Tel Aviv-Yafo will increase by 75%, from 96,000 to 168,000.



4 The project – tackling congestion through parking standards

Cities employ a broad range of strategies to affect travel behaviour, improve accessibility and combat congestion. Many cities resort to parking pricing or regulatory mechanisms such as parking supply caps or parking maximums (Box 4). In Tel Aviv-Yafo increasing car ownership and an insufficiently efficient public transit make the effort to transition from the private car to public or shared transport modes especially challenging. Mass transit in the metropolitan area (LRTs and BRTs) has only recently moved from the planning sphere into execution and the first, underground LRT line in Tel Aviv-Yafo is due to be commercially operational only in 2022.
Following the recently approved national parking standards (Box 5), the City is employing a strategy of reducing parking requirements for new construction. However, reduction depends on mass transit availability. Therefore, full implementation of the new parking standards is at least a decade away.
A tool is needed to assist the City in making parking policy decisions. National parking standards need to be adjusted to meet City needs to enable gradual implementation of the new standards. More importantly, to avoid damage to the local economy, it is necessary for decision makers to be able to identify problem areas where intervention is needed to assist commuting employees. The work conducted as part of CIVITAS 2MOVE2 produced such a tool - a fundamental building block for a municipal strategic framework within which new measures can be identified, developed and deployed to provide solutions for employees lacking decent public transport service so as to maintain the City's attractiveness and its economic prosperity[3]. This general framework is illustrated in Figure 6.

Box 4: Parking Management Strategies
Two examples of a dramatic change in the parking management paradigm

Parking Supply Caps: Both Zurich and Hamburg froze the existing parking supply in the city centre. When a new space is built off-street, an on-street space has to be removed, so it can be repurposed for other needs like widened sidewalks or bikeways. This type of cap-and-trade was implemented in Hamburg in 1976 and in Zurich as part of its "historic parking compromise" in 1996. Zurich went even further. Outside of the zone where the parking cap applies, the City of Zurich only allows developers to build new parking spaces if the surrounding roads can absorb additional traffic without congestion, and the air can handle additional pollution without violating ambient air quality norms. **This policy has helped make Zurich one of the most liveable cities in Europe**.
Source: Michael Kodransky and Gabrielle Hermann, "Europe's parking U-Turn: from Accommodation to Regulation", ITDP, Spring 2011.

[3] The quality of public transport services is not uniform in the metropolitan area, nor will the reduction of parking spaces be uniform. Such non-uniform reduction of parking spaces in municipalities adjacent to Tel Aviv-Yafo might lead to unwanted consequences, namely, firms which might choose moving out of the City. Considering that businesses contribute about 75% of the city's council budget, a need for a thorough analysis of the expected impacts of the implementation of the new standards is obvious.

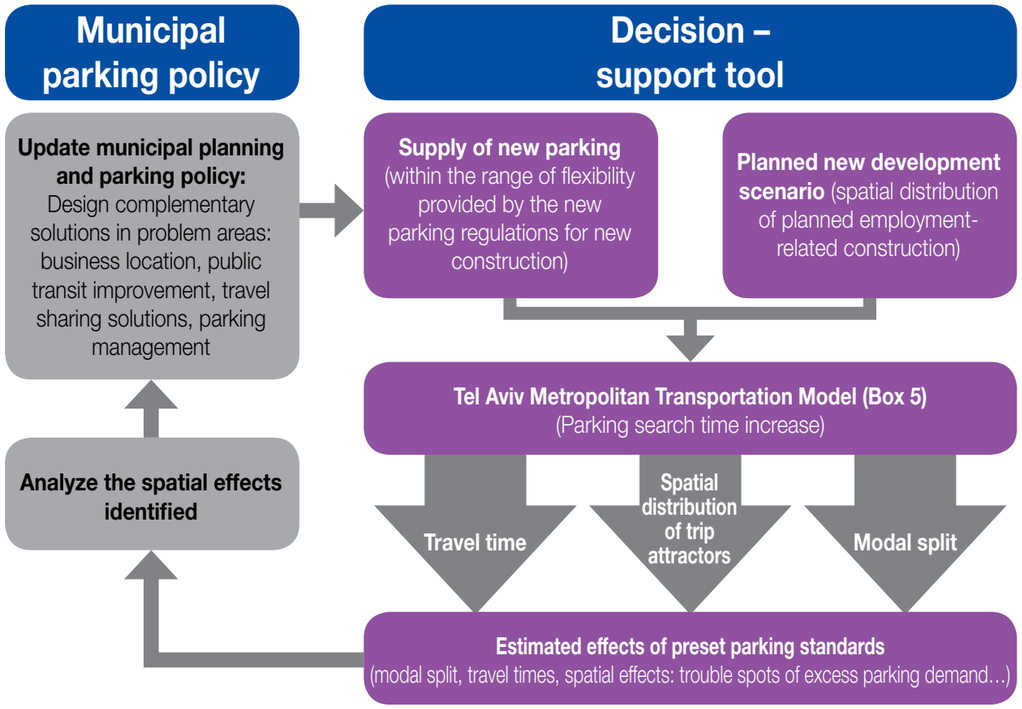


Figure 6 – General framework for parking policy

OBJECTIVES

One of the goals of the City's policy is to affect a change in commuter travel behaviour and to reduce the share of the private car driver in peak hour commuting. On the basis of previous studies in Israel, the City realized that it has to establish a parking policy not only to accommodate resident and commuter needs but also to generate a change in commuter travel planning. The implementation of the new national parking regulations set the stage for balancing those two often conflicting needs. Hence, the decision making support tool was developed with the following objectives:

1. Estimation of the contribution of the new national parking standards and the subsequent reduction in parking requirements[4] to the promotion of a car-free urban life-style (specifically, an increase in public transport use and a resultant change in the modal split),
2. Estimation of the potential risk of the implementation of the new standards (most importantly, the number of employees exceeding public transport capacity with no available parking in the City),
3. Identification of the locations where the risk is significant to provide the basis for the development of new measures.

[4] The new parking standards allow certain flexibility in their local deployment and require local approval.

METHODOLOGY

It was assumed that:
1. Parking availability affects parking search time (which, in turn, affects travel behaviour).
2. The effects are consistent and can be measured
3. Parking search time can be reasonably incorporated in travel forecasting models.
A literature review was conducted to devise a formula expressing the relationship between parking availability and parking search time. Eventually, the "Lyon model"[5] was selected as the most suitable tool for explaining the relationship between parking inventory and parking search time. The main work stages are shown in Figure 7.

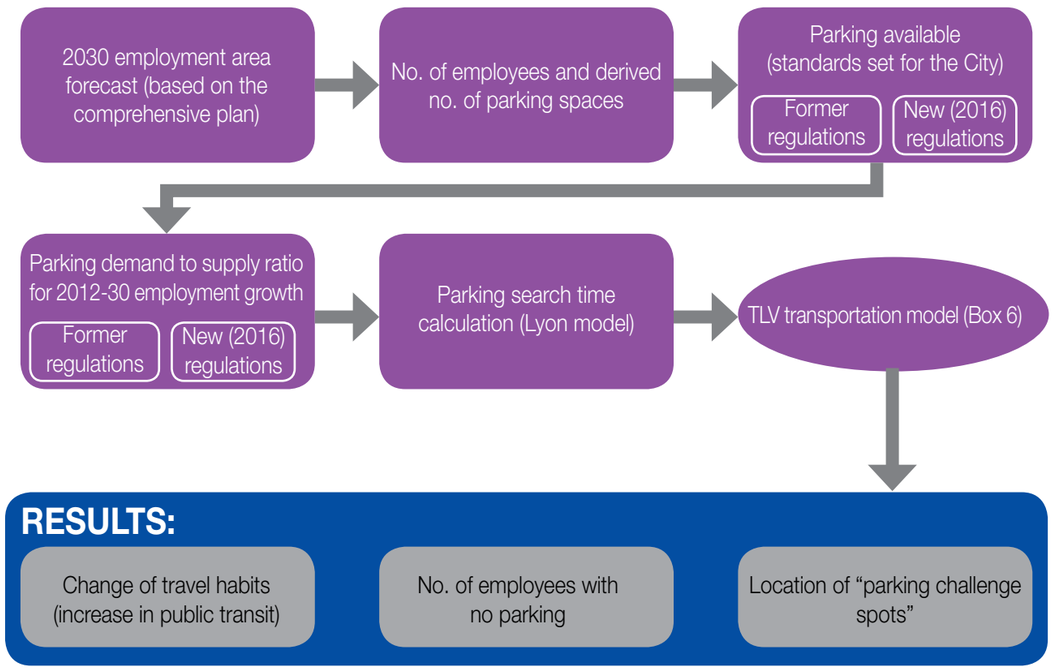


Figure 7 – Prediction of the size and location of “parking challenge spots”

[5] The model estimates the parking search time taking into account the spatial characteristics of the area.
It describes the relationship between occupancy and parking search time and is calibrated using an on-street field survey.

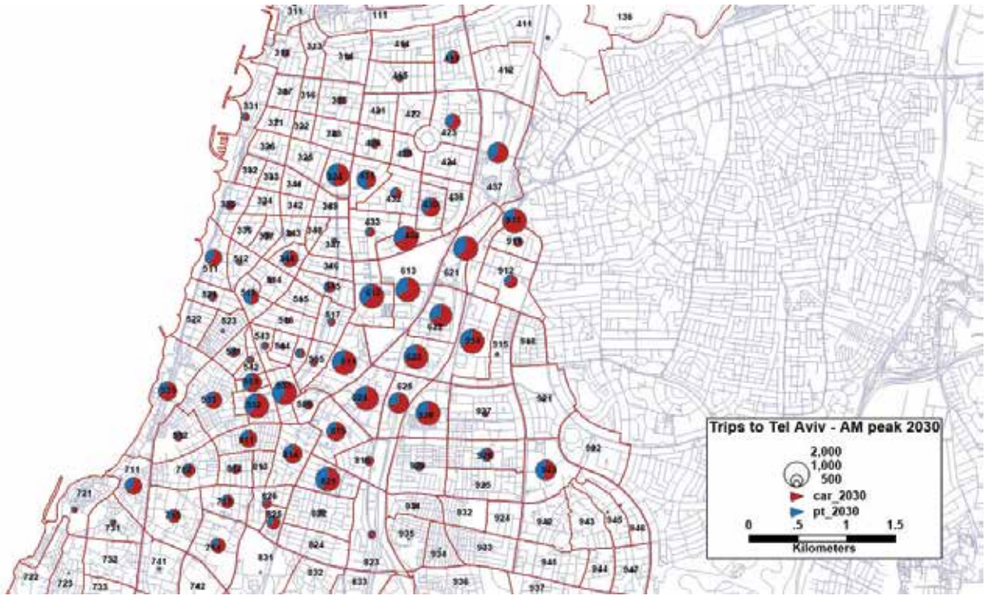
The 2030 employment area forecast was based on the employment-related development targets of the City's comprehensive plan and a 2014 compendium of current detailed plans. The plans were overlaid over Tel Aviv-Yafo's statistical zones and the approximate share of each zone in the planned built-up area was estimated. Plan implementation pace was likewise estimated. Thus, each zone was associated with a single figure representing the anticipated addition of employment area in sq. meters. The number of employees was then calculated in accordance with the City's comprehensive plan standards, i.e.25 sq. meters per employee.

The number of additional parking spaces for each statistical zone was calculated using the anticipated area of office development in each zone and the former parking standards.
Identical procedure was employed to calculate the supply of additional parking spaces in 2030 using the new 2016 parking standards. Since the new parking standards are implemented relative to the progress of the mass transit construction (Box 5), statistical areas were spatially associated with parking regulations' zones (Zones A, B or C). Landmark time points in the realisation of the planned mass transit lines were also brought to bear in the final calculation.

RESULTS

The results of the initial run of the decision support tool using the TLV Transportation Model (Box 6) are illustrated in Figures 8 and 9. As seen in Figure 8, the new parking standards in Tel Aviv-Yafo yield an overall positive result in terms of commuters' travel habits and the resultant traffic congestion. The share of car-based trips under the former parking standards was found to be 73%. By reducing parking requirements under the new standards, the share of the car-based trips drops to 66%.

Figure 8 – Modal split 2030

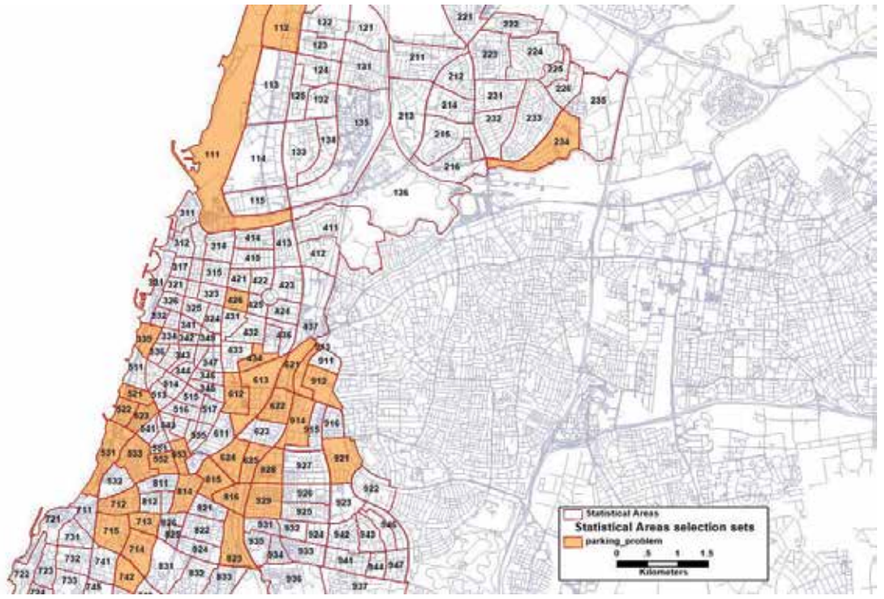


More accurately, the reduction in the parking standards results in a reduction in car based trips in all statistical zones of the City – every zone experiences fewer car trips. In average, the contribution of the new standards to the modal split is estimated to be an 8% decrease of car-based trips. It also reflects a relative increase of 30% in public transport trips.

However, the main importance of the decision support tool lies in its ability to quantify and spatially identify possible risks. The share of the public transport in the modal split of the TLV Transportation Model is capped by its capacity and the travel times of each mode. When the model is run under these circumstances, and a reasonable limit on parking search time is imposed (in our case – 15 minutes) a certain share of employees will continue to use a private car. Thus, the methodological approach described above and its algorithm make it possible to eventually estimate the maximal number of commuters still using their cars but lacking a parking place. This share of employees viewed in terms of their spatial distribution throughout the City is labelled in Figure 9 as "parking challenge spots". **To solve those locations with no adverse effect to the City's attractiveness for business, the City's decision makers will have to employ other planning or parking policy measures. Once those measures are in effect, the decision support tool can be used to periodically monitor the results and alert the decision makers if additional planning intervention is required.**

The spatial distribution of employees requiring innovative mobility solutions is shown in Figure 9.

Figure 9: Statistical zones with extensive growth of employees and parking search time[6]



[6] The number of employees is expected to be increased by more than 500 and parking search time is expected to be increased by more than 15 minutes.

Box 5: The new parking regulations

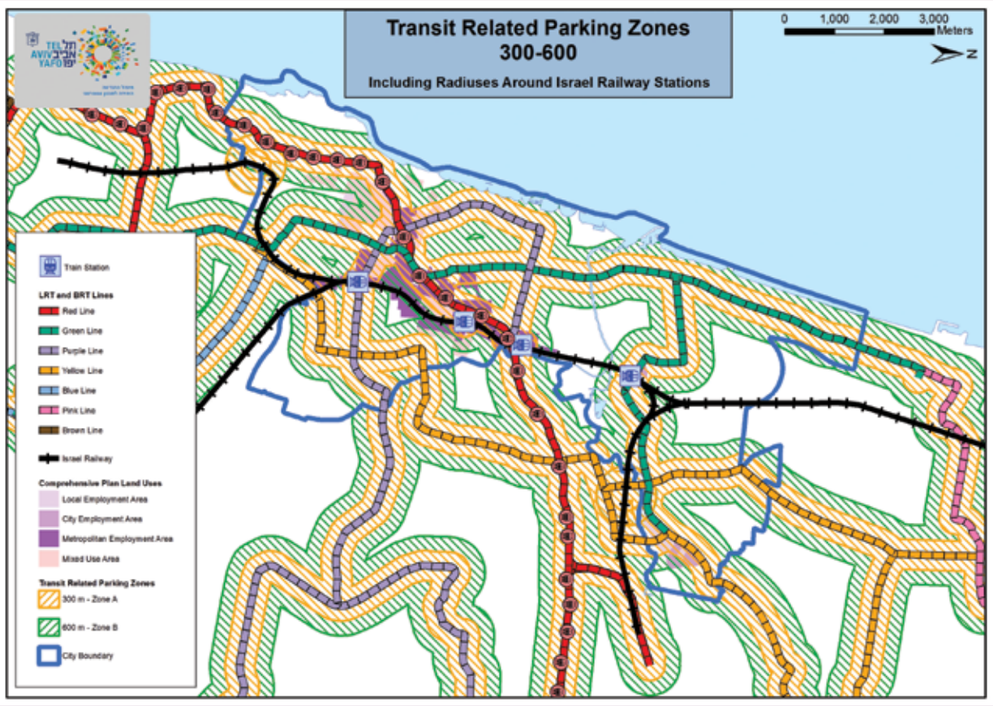
The new Israeli parking standard similarly to the previous regulation requires the provision of parking spaces on building lots as a function of land use. In the new regulation however, the availability of mass transit becomes a major consideration. The new regulation defines three levels of mass transit services in accordance with the distance (measured as air distance) between the project to be built and the mass transit service:

Zone A – an area located within a distance of up to 300 meters between the perimeter of the project and a mass transit alignment centreline or a distance between the project and the entrance point to the Israel Railways station.

Zone B – an area as above within a distance of 300-600 meters.

Zone C – any area as above within a distance exceeding 600 meters.The most significant change relates to parking requirements for employment. The following table compares the previous employment parking standards to the newly adopted ones.

	2016 Regulations			1983 Regulations
	Zone A	Zone B	Zone C	
Parking spaces per 240 office sq. meter	0 - 1	0 - 2	0 - 4	6 - ∞
Number of employees per parking space	9.6 - ∞	4.8 - ∞	2.4 - ∞	0 - 1.6



Box 6: The TLV Transportation Model

The Tel Aviv metropolitan area is the largest urban concentration in Israel with a respectively great travel density. For travel modelling purposes the area is divided into 1,219 traffic analysis zones and the planning network contains about 10,000 links and 1,000 transit lines.

The methodology for the travel demand model system was built upon the “best practice” model estimation to provide a behaviourally based, policy-sensitive tour-based model of travel behaviour that is applicable in an urban travel context. In summary, the model system is guided by the following concepts:

- **Disaggregate Choices -** The model system consists of choice models estimated and applied with individual and household level data.

- **Activity Orientation -** The demand for travel is derived from the demand for participation in activities that require travel. Thus, the activities pursued and the factors that affect activity behaviour are represented in the travel demand model.

- **Tours and Trips -** The ultimate purpose of the model system is to predict volumes of trips. However, the model system explicitly models tours that are sequences of trips beginning and ending at home or work places and may have intermediate stops during the tour.

- **Choice Hierarchy -** A choice hierarchy is used to reflect longer term decisions such as automobile ownership and shorter term decisions such as the daily travel behaviour that is conditional on longer term decisions.

5 Conclusions

The City's parking management policy, similarly to other City management decisions, aims to balance gains (reduction in congestion) against risks (possible weakening of the business tax base as a result of insufficient parking). The fear of misconstruing the crucial balance point is an integral part of any parking management decision, but it is particularly poignant when alternative travel solutions such as efficient mass transit, are yet to become reality.

In this situation, a quantitative tool for predicting outcomes becomes especially handy. The 2MOVE2 Project produced a tool able to yield several significant results. First, it constructed a quantitative framework to estimate the expected impact of a parking standard in terms of the gains, i.e. the decreased share of car-based trips, and possible risks (which might turn into loses) – greater parking search time and a potential restriction on the City's growth. It actually calculated the contribution of the new parking standard to the City's main objective of changing the car-based life-style. The work showed that the contribution of the reduced parking standard to the modal split is a decrease of 7% of car-based trips.

Additionally, the results obtained enabled identifying the spatial distribution of employment areas with inadequate mobility solutions for employees and highlighted the number of employees affected by those insufficient solutions. This result facilitated the understanding of what areas are in need of more innovative ways of dealing with the parking difficulty and to assist in differentiating those from areas in which traditional services (i.e. shuttle services) would suffice.

Most importantly, a methodological framework was created which can be embedded in a wider framework of the City's land use planning and parking policies, and utilised to better rationalise and explicate decisions related to the location of employment and parking supply. When new solutions are introduced and the results monitored, the decision support tool can serve as an evaluation mechanism and thus provide a basis for further policy maintenance and refinement.

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

CIVITAS PLUS II – 2MOVE2

Assessing the impacts of restrictive parking standards in Tel Aviv-Yafo

Publisher
City of Tel Aviv-Yafo in the framework of CIVITAS 2MOVE2

Content and Editors
Tel aviv-Yafo Municipality:
Zofia Santo
Haggai Yaron
Ofir Klorfeld
Roi Ivri
Lara Daor
Simona Leibovich

Technion – Israel Institute of Technology
Niv Eden
Shlomo Bekhor
Oded Goldberger

Graphic Design
Peer&Levin

Photos
Copyright
Page 1: Fotolia

Date of publication: December 2016

Contacts

Website

www.civitas.eu
http://www.civitas.eu/content/tel-aviv-yafo
www.tel-aviv.gov.il

Coordination

Haggai Yaron
Site Coordinator, City of Tel Aviv-Yafo
haggai_y@mail.tel-aviv.gov.il

Technion:

Shlomo Bekhor
sbekhor@technion.ac.il

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION