



MAthUP

WP , Task 4.1,

D 4.14 Antalya Lighthouse Interventions Design – Final Version

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MAthUP

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Abbreviations and Acronyms

Acronym	Description
API	Application program interface
CKAN	Comprehensive Knowledge Archive Network
CoAP	Constrained Application Protocol
ETSI	European Telecommunications Standards Institute
EV	Electric vehicle
FIWARE	Future Internet Core Platform
GHG	Greenhouse gases
HTTP	Hypertext Transfer Protocol
ICT	Information and communication technologies
IoT	Internet of Things
ISG	Information Systems Group
ISO	International Standards Organization
ITS	Intelligent transport system
JSON	JavaScript Object Notation
KPI	Key performance indicators
LWM2M	LoraWan Machine to machine
M2M	Machine to machine
MQTT	Message Queuing Telemetry Transport
NGSI	Next Generation Sensors Initiative
NZEB	Near zero energy buildings
OMA	Open Meta Archive
PV	Photovoltaic
RES	Renewable energy system
SEAP	Sustainable Energy Action Plan
SECAP	Sustainable Energy and Climate Action Plan
SUMP	Sustainable urban mobility plan
V2G	Vehicle to grid



Abstract

This report constitutes Deliverable “*D4.14: Antalya Lighthouse Interventions Design*”, which is the main outcome of Task “*T4.1: Antalya Lighthouse Interventions Design*”. The first version of the report (D4.1) was delivered in September 2018 in the project month M12. This is the final version of the deliverable.

Within the scope of the MAtchUP Project, 42 interventions will be realized in Antalya. These interventions comprised of energy, mobility, ICT and non–technical actions.

The main focus of this document is the design of the interventions and the definition of each action to be implemented in Antalya, starting from the Grant Agreement and including the modifications carried out in the ongoing process of the project that are going to be requested in the amendment in next months.

In the document, initially, the overall description of Antalya city scape will be given including the socio – economic aspects, demography, geographical and climatic structure, current urbanization status and land use. Then the newly built high – performance district - Kepez – Santral - demo site will be evaluated in depth as the focal point where the demo activities will be carried out.

Each action will be described in detail as action cards for a better understanding of the project goals. Every action card includes information belonging to technical specifications such as the description of the action, partners involved, other actions linked, monitoring and indicators, financial scheme and innovative business models, and social strategy. This information is very important for the successful developments, upscaling and replication. Another important focus is on strategies for dissemination of the successful implementation of actions and for an active and broad engagement of citizens.



1 Introduction

1.1 Purpose and target group

This report is the final version of the Deliverable “D4.1: *Antalya Lighthouse Interventions*”, which is the main outcome of Task “T4.1: *Antalya Lighthouse Interventions Design*”.

One of the core objectives of this document is to describe the detailed design of the interventions to be implemented in Antalya. This design includes technical descriptions, detailed financial plans (including the accompanying business models structure of each single action) and the citizens’ engagement and social strategies. Moreover, we give an overview on the general framework conditions in Antalya (socio-economic aspects, geographic and climatic structure) and introduce our high-performance district.

This deliverable is an open document being a source of information for the interested public and input for a number of related tasks within the MAtchUP project as described below.

1.2 Contribution of partners

The following Table 1 depicts the main contributions from participant partners in the development of this deliverable.

Participant short name	Contributions
ANT	Task and deliverable responsible party
SAM	ICT interventions and supported ANT for the whole deliverable
ANP	Responsible for the demo-site
DEM	Energy interventions
TAY	Mobility interventions
AKD	Non-technical Actions
CAR	Support for the definition of ToC. General support for the technical partners to fulfill the action cards. Review of the document

Table 1. Contribution of partners

1.3 Relation to other activities in the project

The following Table 2 depicts the main relationship of this deliverable to other activities (or deliverables) developed within the MAtchUP Project and that should be considered along with this document for further understanding of its contents.



Deliverable Number	Relation
D4.x	D4.1 is the basis for all further tasks and Deliverables in WP4.
D1.1, D1.2, D1.7	The status quo for energy, mobility, ICT and social aspects described in D4.14 is based on desk research conducted in relation to WP1, T1.1 (Advanced City Diagnosis).
D6.x D1.14	The detailed design of Antalya's lighthouse interventions includes also detailed financial plans and the accompanying business model structure of each single action. It is thus directly linked to WP6 (Exploitation and Market Deployment) and will be an input for the Antalya Replication Plan (D1.15).
D4.12,D4.26	The detailed design of Antalya's lighthouse interventions includes also citizens' engagement and social strategies for the individual actions.
D5.x	The detailed design of Antalya's lighthouse interventions includes also aspects related to monitoring and the measurement of progress. It is thus directly linked to WP5 (Technical, Economic and Social Evaluation).

Table 2. Relation to other activities in the project



In what follows, we give an introductory overview on the city of Antalya, its socio-economic background and geographical and climatic structures. Then the Kepez – Santral high-performance district is introduced.

Located on Anatolia's flourishing southwest coast bordered by the Taurus Mountains, Antalya is the largest Turkish city on the Mediterranean coast with **over 2 million people** in its metropolitan area. It includes the antique regions of parts of Cilicia, Pisidia, Pamphylia and Lycia, inhabited for since historical times and now a region rich in with its cultural, physical and modern attributes. The region is about 2.6 % of the total area of Turkey but has a **long coast** measuring **640 km**. 60 % of the region is covered by forest housing a rich flora and fauna, very significant for the biological diversity of the country. Census results show that Antalya has been the fastest growing urban regions in the country with growth rates much higher than the Turkish average.¹

3rd after London and Paris in Europe and Asia Minor in the list of most visited cities; and 6th in the world tourism. As it becomes an exemplary city for international standards, Antalya has set out to achieve sustainable local development based on a high quality of life, skilled employment and competitive service, agricultural and clean industries. Apart from being a tourism destination, with being surrounded by a fertile region, it is also the market leader in the fresh vegetables-fruits production and export.

¹ https://www.gyoder.org.tr/uploads/Yay%C4%B1nlar/arastirma_raporlari/ar1.pdf

The region around Antalya offers sights of astonishing natural beauty as well as awesome historical remains.

Antalya, due to its importance as a tourist destination and an important greenhouse vegetables production hub (citrus fruits, cotton, cut flowers, olives, olive oil and bananas), attracts a very large traffic mainly through highways and air.

Antalya is Turkey's biggest international sea resort, located on the Turkish Riviera. Large-scale development and governmental funding has promoted tourism. A record 12.5 million tourists passed through the city in 2014. Antalya also has the largest bed capacity in Turkey with more than **400,000 beds**. Since 2000, shipyards have been opened in Antalya Free Zone, specialized in building

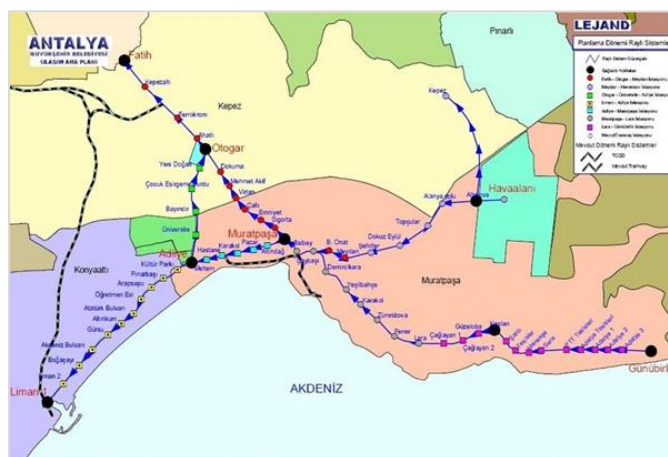


Figure 2 Antalya Transportation Master Plan

pleasure yachts. Some of these yards have advanced in composites boat building technology.

In general, transportation is provided by land and aviation. The most important part of freight shipment belongs to land. Sea transportation lines have been newly developed and there isn't any railway in the city yet. Antalya urban planned Light Rail System line is expected to affect the public transportation accessibility to project area and immediate environment positively.



The **2015 20 Antalya Summit** was the tenth annual meeting of the G20 heads of government and held successfully in Antalya. The Leaders of the G20, met in Antalya on 15-16 November 2015 to determine further collective actions towards achieving strong, sustainable and balanced growth to raise the prosperity of our people.



As Turkey's first EXPO, **EXPO 2016 Antalya** was held from April to October 2016. Starting with the title of "Flowers and Children" EXPO 2016 Antalya has adopted the theme "Cultivating a Green Life for Future Generations", along with the motto "A Green Life for Future Generations". History, Bio-Diversity, Sustainability and Green Cities make up the four subthemes of EXPO 2016 Antalya. EXPO 2016 Antalya was held on a 112-hectare exhibit site in Aksu and it is anticipated that 8 million local and foreign visitors visited EXPO 2016 Antalya over its 6-month duration.

The **Strong Cities Network** is a global network of local authorities united in building social cohesion and community resilience to counter violent extremism. Antalya is one of the 20 founding members of Strong Cities Network together with important cities of the world such as New York, London, Paris, Montreal, Atlanta, Palermo, Rotterdam and Oslo. Strong Cities Network, initiated by USA President Barack Obama, was established to counter together against violent extremism under the supervision of the

United Nations. Strong Cities Network Summit was held in **May 11-12, 2016 in Antalya, Turkey** with support from the city of London.

Antalya is growing with its giant investments including; two important High Speed Rail Networks, Light Railway Networks, Urban Transformation Projects of New Kepez Project, Konyaaltı Urban Design and Seaside Organization Project, Tünektepe Architectural Design Project, Cruise Port & Marina Project and Boğaçay Creek Master Plan projects.

2.1.1 Population and Socio-Economic Structure

Antalya's population is **2,328.555 (2016)**. The city gets more and more populated as it receives domestic migration. Most of the population lives in the province and the central districts. The rest lives in villages. Not only locals but also foreign nationals live in Antalya. Foreign guests who have chosen to settle in Antalya buy around **5 thousand houses** every year, and have more than **50 thousand real estate** now. A considerable majority of the population make their living at hotels as they offer a great variety of jobs. In the villages, people earn from agriculture. They produce many kinds of crops in their fields, greenhouses or vineyards and sell them at the public-markets located all around the city. Other areas of jobs mainly consist of commerce, industry, and animal husbandry. While agriculture, industry and construction were the main sectors in 1970 in Antalya, agriculture, commerce, tourism, transport and community services became the main sectors in 1990. Compared with similar towns, community services seem to be preserving its presence and importance in the city of Antalya, and that the industry is no longer the main sector, instead, sectors of trade, tourism, social and personal services have become the main sectors. With the enlargement of the borders of the municipality and the inclusion of agricultural areas, its share in the urban economy has increased and agriculture has emerged as the main sector.

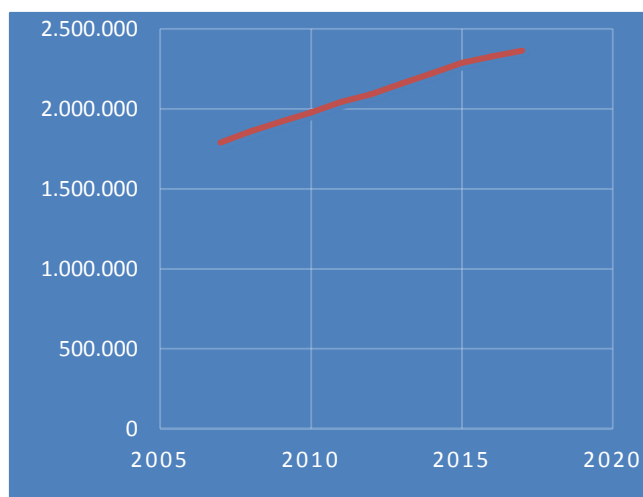


Figure 3 Antalya Population Development w.r.t years

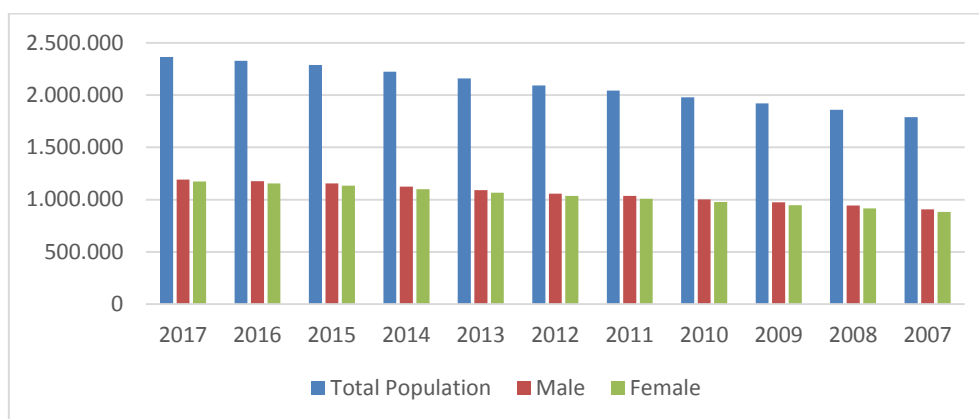


Figure 4 Population Development w.r.t genders [1]

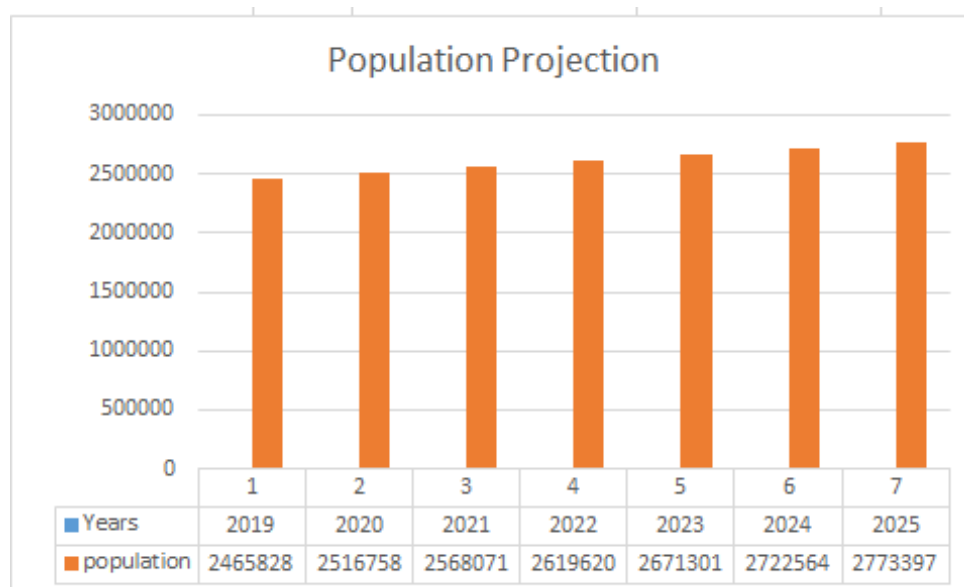


Figure 5 Population Projections (Data source: Turkstat.gov.tr)

Life Style: There are heritages of two lifestyles prevailing in Antalya and the region. When the Turkish people first came here (1085), they immediately oriented the settled lifestyle and built villages, towns and cities. Another part of the population continued the unsettled life as they did before they came to Anatolia. According to a lifestyle called semi settled 15-20 and sometimes hundreds families in relation live in hair tents and migrate to mountains in summer and then warm lowlands in winter called “Kışlak”. They raise sheep, camel, and sell or exchange the products they made from these animals with ones of settled people. They produce meat, milk, oil and weave hair tents and carpets with the madder. There are also people who bread crops, vegetables even in the confined areas. There were even big unsettled groups (i.e. aşiret, oymak) that rose horses to Ottoman Army.

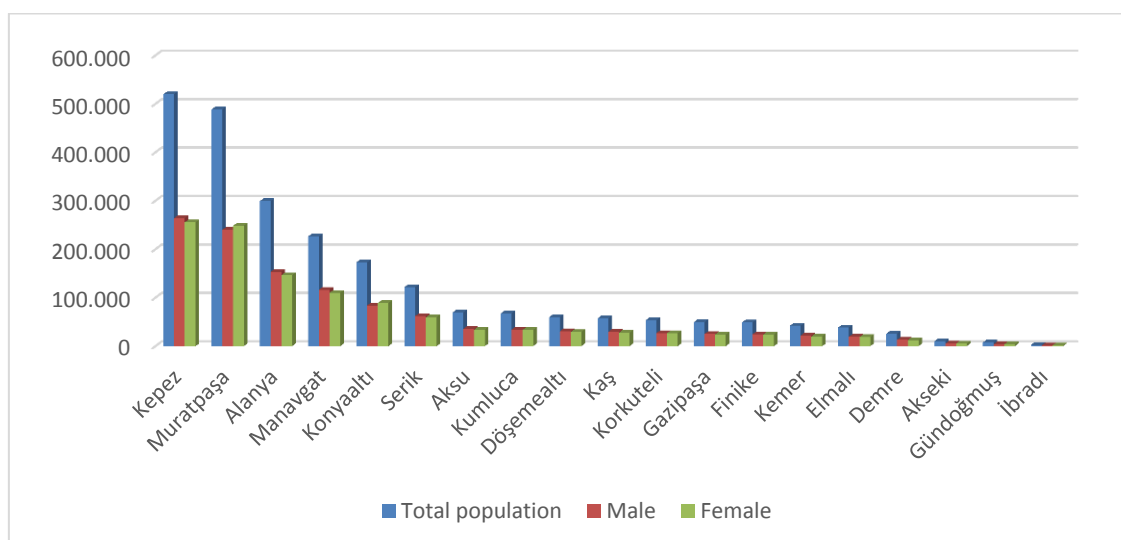


Figure 6 Population by Districts (2017)

2.1.2 Geographical and Climatic Structure

Climate in Antalya is prevailing Mediterranean climate, winters are temperate and rainy, summers hot and dry. Antalya has fertile soil, magnificent forests, beautiful coasts and many historical places. There are 549 archaeological protected zones. Renowned for its banana and orange orchards, Antalya is surrounded by Mersin, Konya, Isparta, Burdur and Muğla provinces on the Mediterranean coast. The city is located between the 36°06' and 37°27' north latitudes and 29°14' and 32°27' east latitudes. It is surrounded on three sides by Taurus Mountains and the area is shielded from the northerly winds by them. With its beautiful weather, fertile soil, richness of forests, historical places and the beauty of its coast Antalya is one of our most prosperous cities. The climate character, the high quality history, cultural and historical sites of this region constitute the tourism potential of Antalya.

mountain	Kızlarsivrisi (3086 meters)	59 km (kilometers) west-southwest
mountain	Dipoyraz (3007 meters)	69 km (kilometers) northeast
dam	Oymapinar Dam (185 meters)	73 km (kilometers) east
mountain	Mount Karagöl (3107 meters)	81 km (kilometers) west-southwest
volcano	Karapinar Field (1302 meters)	275 km (kilometers) east-northeast

(straight-line distances between city center and feature coordinates)

Figure 7 Some geographic features of Antalya.

ANTALYA	January	February	March	April	May	June	July	August	September	October	November	December	Annual
(1929 - 2017)													
Avg. Temperature(*C)	10.0	10.0	12.8	16.3	20.5	25.3	28.4	28.3	25.1	20.4	15.4	11.6	18.7
Avg. Highest Temperature (*C)	14.9	15.5	17.9	21.3	25.5	30.7	34.0	34.0	31.0	26.5	21.2	16.6	24.1
Avg. Lowest Temperature (*C)	5.9	6.3	8.0	11.1	15.1	19.5	22.6	22.6	19.3	15.1	10.7	7.5	13.6
Avg. Sunbathing Time (hrs)	5.0	5.7	6.7	7.9	9.6	11.3	11.7	11.2	9.7	7.7	6.3	4.8	97.6
Avg. Rainy Day Number	12.4	10.6	8.7	6.7	5.3	2.5	0.5	0.5	1.6	5.6	7.5	12.0	73.9
Average Monthly Total Rainfall (mm)	235.2	154.5	97.0	52.4	32.2	9.3	2.4	2.7	14.4	71.9	131.1	259.3	1062.4

Figure 8 Average weather indicators of Antalya [2]

Most of the famous long beaches of sand and gravel in Antalya have been awarded with the Blue Flag. It is an indispensable destination for local and foreign tourists who want to spend their holiday by the sea. Antalya has a typical Mediterranean climate with wet humid winters and hot dry summers. Winters are mild and rainy, and summers are hot and dry. The winters are like spring, and the spring resembles summer. During the months of April, May, October and November it is most likely to experience good weather with pleasant average temperatures. Antalya has 300 days of sunshine in a year. Annual average sea water temperature is 22.5 degrees.

Serik, Antalya	35 km (kilometers) east	51 119 people
Manavgat, Antalya	68 km (kilometers) east	81 903 people
Isparta	99 km (kilometers) north	184 735 people
Denizli	175 km (kilometers) northwest	511 751 people
Konya	191 km (kilometers) northeast	1.074 million people

(straight-line distances between city centers)

Figure 9 Nearby cities.

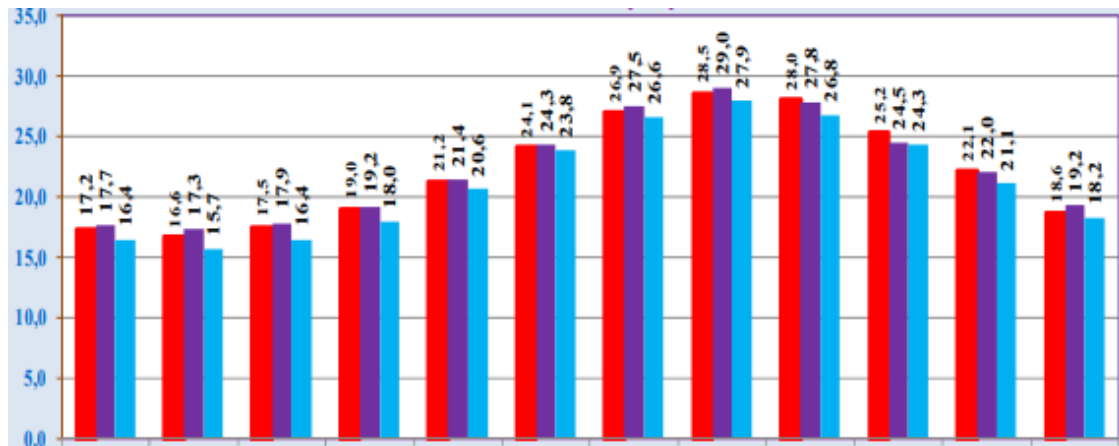


Figure 10 Average sea temperatures [2]

- Avg. Sea Water Temperature 2016 (°C)
- Avg. Sea Water Temperature 2017 (°C)
- Avg. Sea Water Temperature 1970- 2017 (°C)

...

2.1.3 Urbanization and Land Use

The spatial formation of the city of Antalya started at the seaside. The "Antalya Old Town Region", which is an urban protected area, can be considered as the Core of Antalya. Because of the city's topography, the grid system was barely used. Therefore, the city, which is spontaneously developed in terms of space, showed its development in the city walls over centuries and the city started to open outward in the 17th century. The first urban development work was done in the second half of the 1950s. But at that time socio-economic changes that were developing rapidly, so these plans were inadequate and inconsistent. In the 1960s the old town center became a commercial center. In the 1960s, while the urban area around the core was expanding, an intense squatting process began towards the walls. This pattern which was formed in an unplanned manner, was tried to be removed with plans approved in the 1970s, but no results were obtained. The traces of the squatting process, which concentrated in the 1960s, still exist today in the Kepez district. In the 1980s, town planning was carried out for Konyaaltı and Lara region.

In the years when urban land was evaluated, the city center and valuable coastal areas began to change rapidly. Investments such as airport, ports and urban workplaces which were brought to the city in the 1990s, have significantly affected the development of the city and also caused the concentration of residential areas around these regions. Again these years, the buildings at the Old Town were restored and efforts were made to protect the historical center and to engage in tourism. According to the Master Plan in 1977, the urban form covering a small part of today's Muratpaşa and Kepez districts has reached to a very wide form by growing in fast momentum until today. According to the Environment Plan in 2008, the city form, which is composed of all 5 villages, has come together 5 administrative districts, although not fully realized. Transportation is provided by highways, airline and maritime line. Antalya airport is

open to international air traffic. Figure 11 shows the urbanization based on the 2017 statistic taken from turkstat, population density is 114 people per km² in Antalya.

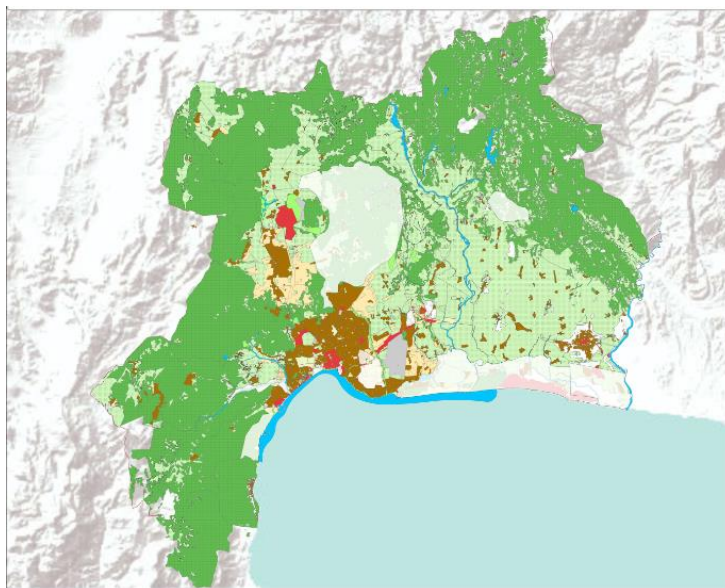


Figure 11 Urbanization in Antalya (Data Source: Department of Urbanisation, Antalya Metropolitan Municipality)

2.2 Demo site description

2.2.1 The case of Kepez

NEW KEPEZ SMART CITY is one of the largest urban regeneration projects in Turkey with the land size of **1.327.330 sqm** including **Residential** areas, **Retail** areas, **Education** areas, **Recreation** areas, **Healthcare** field, **Cultural** areas within an **Ecologic Smart City** concept in Kepez District in central ANTALYA. The project area has been declared as an urban transformation area within the scope of **Turkish Act. 6306** and the development process started in December 2014 has been completed in March 2016 including

all technical works, master and zoning plans, ownership issues, conceptual design and investment feasibility. 3000+ land owners living in unhealthy conditions are contracted during the negotiation period with a record success of civic engagement.

Demo site comprises of two different neighbourhoods which is called Kepez and Santral. The area which known as shantytown is 15 km from Antalya city centre and 25 km away from airport. It is surrounded by Ferrochrome factory, city prison in the south, motorway in the east, zoo in the north, forest and hydroelectric power plant in the west. When the spatial development data has been assessed, the emerging of the squatting

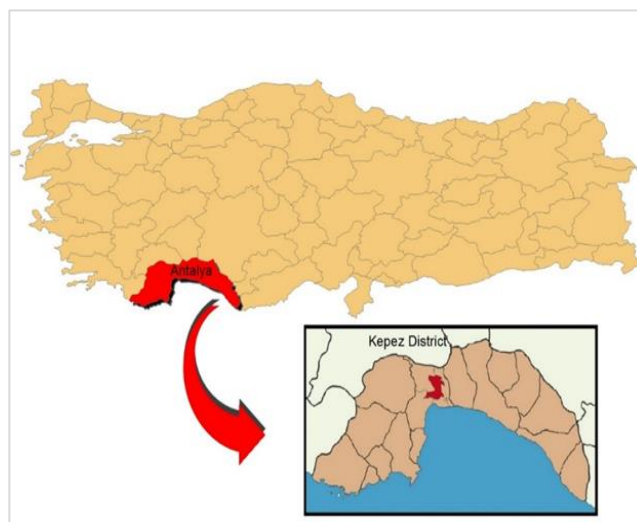


Figure 12 Antalya and New Kepez District

in line with the establishment of the factory and hydroelectric power plant have traced back to second part of the 50's. The process has been increased sharply due to domestic migration until the first decade of 2000's. Based on the recent census, the figure shows that population, number of building and land owners.

Population	Number of building	Number of land owner
13.547	3443	3242

Table 3 Population of Kepez and the land owners (2016)

Kepez-Santral district has been declared as a 'Risky Area' by the decision of the Council of Ministers on 24.11.2014 and numbered 7041 within the scope of "Law No. 6306 on the Disaster Relief Areas" and published in the Official Gazette on 25.12.2014.



Figure 13 Kepez Smart City Demo-site

In addition to the following decision taken by municipal council, the area has been declared as unhealthy and earthquake-risky. The total demo site area consists of 1.4 million sqm. The table highlights that the number of the land use, construction site in terms of m² and the percentage before demolishing the area.

Land use	Number	Construction area (m2)	%
Residential	3.097	365.274	%90,8

Unspecified	175	22.570	%5,6
Commercial	55	7.349	%1,8
Primary school	3	3.881	%1,0
Commercial + Residential	4	1.040	%0,3
wasteland	5	527	%0,1
Plinth wall	50	463	%0,1
Other (mosque, warehouse, healthcare facilities etc.)	23	1.220	%0,3
TOTAL	3.412	402.324	%100

Table 4 Land Use in Kepez



Figure 14 Kepez Smart City Project area view

After the contract signing period, land owners evacuated the land, all the buildings are demolished and the total project area was made ready for infrastructure and construction works. According to the project schedule, the first phase of the construction will be delivered in early 2019 with 600.000 sqm residential units. Following the first phase, remaining 800.000 sqm residential units, retail zones, recreation zones (260.000 sqm), education, healthcare facilities and museum premises will be delivered accordingly.

Background and Motive:



The main objectives of transformation in Kepez and Santral Neighbourhood is:

- to solve property disputes ongoing for years and provide opportunity to planned urban development preventing illegal housing
- to keep inhabitants/ working population of the region at this region after transformation with in-situ transformation model
- to create use and socialization areas for local community with square, park arrangements and social reinforcement areas to be created,
- to increase urban welfare level by infrastructure and superstructure renovation and regulations,
- to increase the importance of project area in the city by creating various prestige points in the project area with its important surface area in the whole city,

In order to have a successful transformation process in the project area, it is very important to provide central and exclusive management. At the same time, in order to develop the project area within the framework of plan, it should be aimed to give housing deed instead of land deed. With the aim of this, it is aimed to solve the financial requirement providing equivalence increase without collecting any payment from inhabitants of the project area.

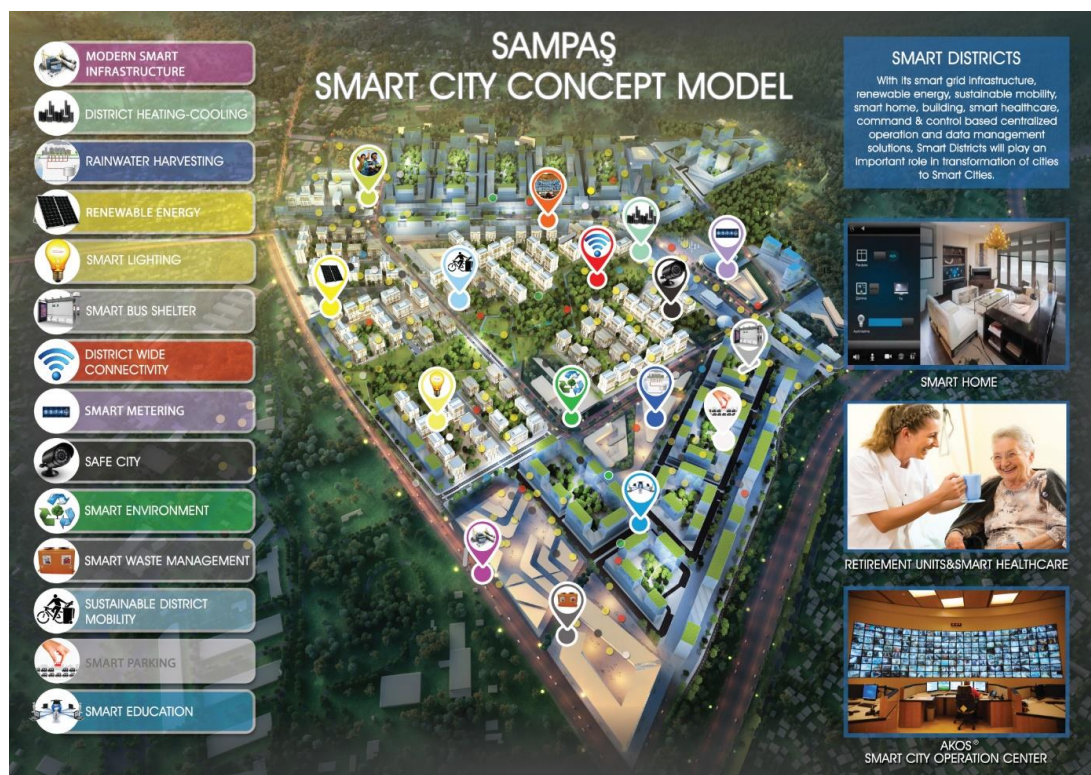


Figure 15 Kepez Smart City interventions scheme

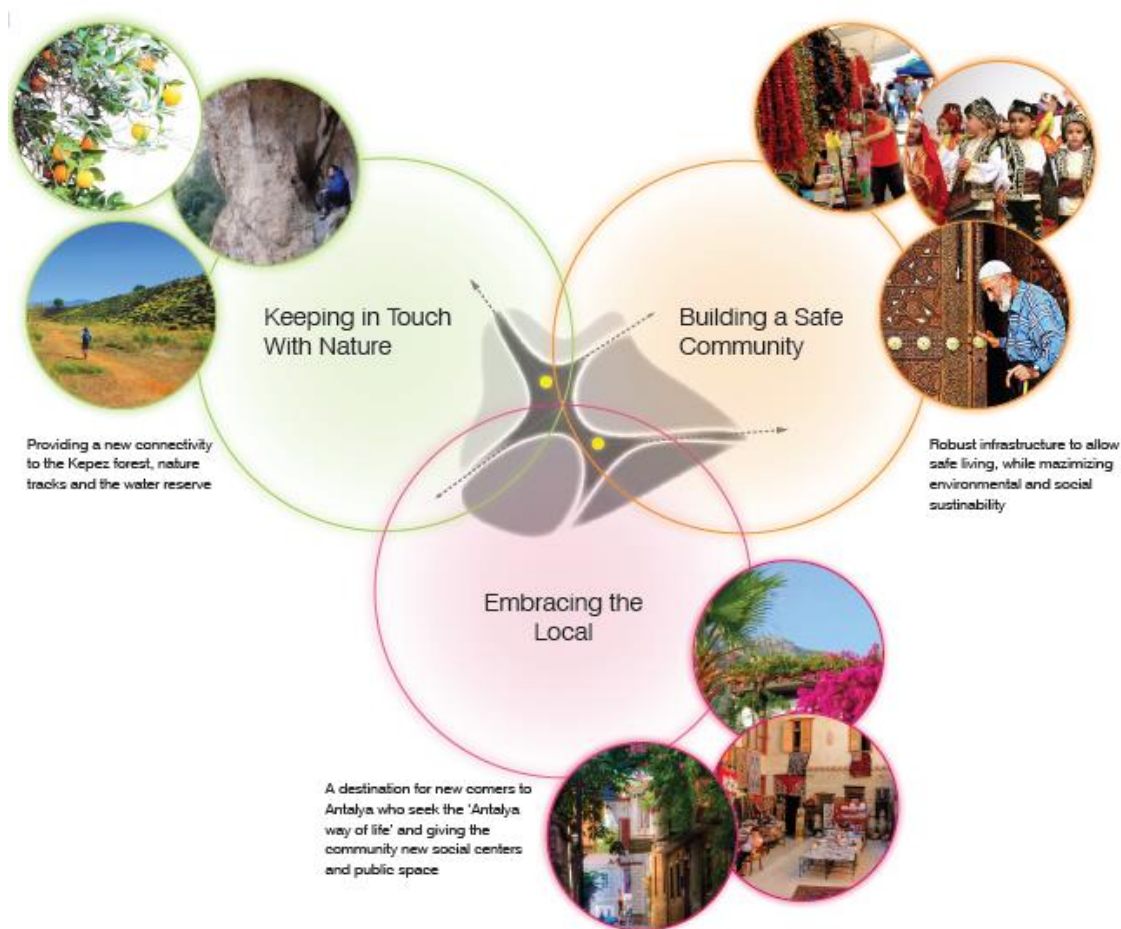


Figure 16 Concept vision

Output and Impacts:

The New Kepez Ecologic Smart City will be the first of its kind where a smart city is created from scratch with several smart city initiatives including infrastructure, energy, mobility, water, lighting, the environment, security, health, smart home and intelligent, instrumented, integrated technology solutions for 80,000 residents that will live and work in the region, beginning from 2019.

- Land owners will receive their new houses according to their rights.
- New Kepez Smart City Project is one of the biggest transformation project in Turkey. Within the scope of the Urban Transformation Project, 5000 housing units for land owners should be built within 24 months.
- It is to improve the living standards of the land owners living on unhealthy conditions (illegal housing, unauthorized buildings, unprofitable housing units, earthquake risks, etc.).
- According to modern urban planning criteria, New Kepez Smart City Project including **Residential** areas, **Retail** areas, **Education** areas, **Recreation** areas, **Healthcare** field, **Cultural** areas within an **Ecologic Smart City** concept.
- It is the construction of 5,000 dwellings (totally 600,000 sqm) in a short period of 24 months and delivery to the land owners.

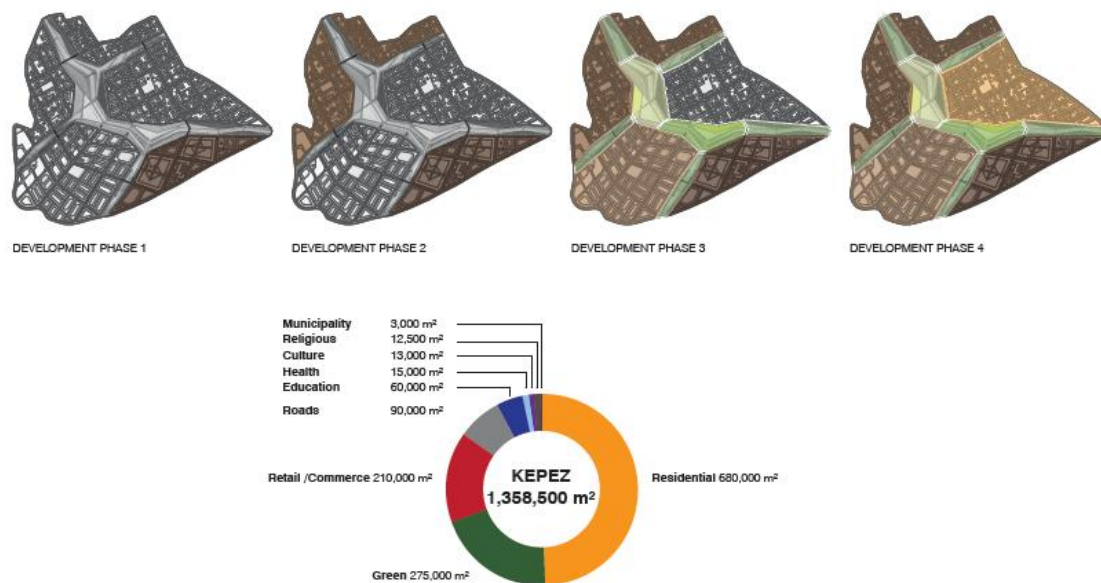


Figure 17 MatchUP Kepez Smart city development phases

This is going to be the first implementation of large scale urban transformation and development of a smart city from scratch using a **PPP model framework** with citizens, private investor (Sur Yapı), Ministry of Urbanisation and Environment and Antalya Metropolitan Municipality, Antepe Construction and Trade Inc. All the development approach, smart urban transformation methodology and smart city development will be a role model for Antalya, for Turkey and for the region. Other stakeholders have been involved are: NGOs (planning, zoning, architectural), local district authorities, technical teams of including Urban Planners, Architects, Engineers, Designers, Landscape Architects, Environmental Engineers, Economists, Financiers, Legal Advisers, Sociologists, Academicians and Consultants.



Figure 18 The Kepez Smart city general scheme








SMART CITY KEPEZ SANTRAL



antalya.bel.tr



matchup-project.eu





This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774477.

SMART CITY KEPEZ SANTRAL

The first of the many "smart districts" targeted by Antalya Metropolitan Municipality within the scope of urban transformation is the New Kepez Santral District. Through MATCHUP, the district will create a 2 Billion USD economy for Antalya and will be the first of its kind where a smart city is being created from scratch using several smart city initiatives. Infrastructure, energy, mobility, water, lighting, environment, security, health, smart home and integrated technology solutions will be provided to 80,000 residents who will live and work in the region by the year 2019. Dangerous and earthquake-risk urban area has been demolished while all ownership problems have been completely resolved. These allow the development of a smart, green, liveable area.

The first stage of development will include the high performance district targeted by the demo site. "Best practices" on smart, energy efficient built environments will be presented to the rest of the New Kepez Development. This will be followed by a demonstration of high degree on the urban renewable concepts and on the smart urban solutions to be implemented in buildings as well as mobility. The smart district will have a large green corridor and will be pedestrian and bike friendly. With all its innovative smart city solutions and the PPP model supporting them, Antalya will serve as a role model for the Southern Europe and Middle East regions in creating Smart Cities from scratch.



TURKEY'S LARGEST & MODERN URBAN TRANSFORMATION PROJECT

Act 6306 – Urban Transformation of Disaster Risky Areas (At least %66 Approval of Land Owners)
 Largest Urban Transformation Project in Turkey, 1,327 million sqm land area
 3245 families (%99.8 Contracted) Oct.2016
 Evacuation of the Land – Apr.2017
 Infrastructure Works
 (5 Km Sewage, 8 Km Rainwater, 6 Km Drinking Water Network)
 Zero Waste District & Recycling
 165,254 tons of C&D waste, 223 tons of wood, 1324 tons of iron waste
 260,000 sqm recreation zone
 Green Spaces (%23 of the total land)
 11,786 trees labeled (owners name), protected and to be lived in both Kepez District & Konyaaltı beach project
 Amenities & Facilities
 Schools (%180), Health Facilities (%167), Social & Cultural Facilities (%69), Recreation Zone & Green Spaces (%32)
 5,5 Km Bike Path & Light Rail Integration
 Public Buildings
 3 local health care facilities, 3 Mosques, 11 schools, Sports Center (1.300 sqm), Culture & Youth Facility (1.600 sqm + 500 sqm), Swimming Pool (1.700 sqm), Hospital, Natural History Museum, Bazaar
 1st phase of the Construction
 5073 Land Owners Unit (residential)
 1344 Investors Unit (residential)
 784.417 sqm construction
 Delivery in 2019
 Citizen Engagement – Land Owners Lottery
 5073 units delivered to 3245 families with a Notary based Lottery (Feb. 2018)
 A Role Model Smart Districts and Smart Cities for Urban Transformation



2.2.2 Summary of actions

District/Buildings	Domotics & Smart Controls	A6 Smart controls & domotics (SAM)
	Building Integrated RES	A3 PV installation for public buildings (ANT) A4 Solar thermal collectors' installation for residential buildings (ANP)
	Storage	A5 Electrical storage for buildings and charging stations (ANT)
	New buildings	A1 Residential blocks 18,000 m2 (B energy rating district) (ANP) A2 New construction of public tertiary buildings 50,000 m2 (min B energy rating) (ANP)
City Infrastructures	Smart grids	A7 Smart meters (SAM)
	Public lighting	A8 Led Public Lighting (ANP) A9 Smart control of public lighting (ANP)
	Urban RES	A10 PV systems with a total capacity 5MWp (ANT) A11 LFG and electricity generation (ANT)
	Electrical storage	A12 Integration of district electricity storage (ANT)
Mobility	Electric vehicles	A13 2 e-buses (ANT) A14 20 e-vehicles for municipality fleet (ANT) A15 30 e-bikes (ANT)
	Charging stations	A16 5 e-vehicle charging points (ANT) A17 5 e-bike charging stations (ANT) A23 e-bus charging stations (ANT)
	Demand management: EV-to-grid / grid-to-EV	A18 Management of charging systems (SAM) A22 Management of e-fleet (SAM)
	Multi-modality	A19 2 multimodal hubs (ANT) A20 Integrating existing light rail with eBike station and bus transport (ANT) A21 Applying last mile mobility for citizens via integration of e-bike station with the light rail station (ANT)
ICT, IoT & Urban Platform	Urban Platform	A39 New open data gateway (SAM) A40 New open API developments (SAM) A41 Big data functionalities (SAM)
	IoT	A42 IoT adaptors (SAM)
Non-technical actions	Policy improvements	A24 City policies update: taxes, subsidies, traffic management and electro-mobility promotion (ANT) A25 Single window/desk for energy retrofitting and high energy performance greenfield construction (ANT) A26 Smart district-level energy renaissance strategy (ANT)
	Innovative Businesses	A28 Lighthouse economic and social living lab (ANP) A29 Demand management living lab (ANT) A30 PPP modelling guidelines for creating smart districts via urban transformation (SAM)
	Urban Planning	A31 Antalya upscaling plan (ANT) A32 SEAP to SECAP Upgrade and monitoring of actions (DEM) A33 Update of sustainable urban mobility plan (ANT)



	Citizens' engagement	A34 Participation – co-creation model in Antalya (SAM) A35 Citizens' feedback channel (SAM) A36 Local toolkit for production, storage and self-consumption of renewable energy at the district scale (ANT)
	Staff exchange	A37 City mentoring (ANT) A38 Collaboration with Covenant of Mayors Office to communicate SEAP and SECAP experiences (DEM)



3 Interventions design and detailed definitions

Design of the main architectural issues, energy facilities, mobility strategies and urban infrastructures.

3.1 Baseline Situation

3.1.1 Energy

3.1.1.1 City Level

Energy Consumption

Based on the latest available information, the total energy consumption is calculated as 26,503,792 MWh for 2017. This value includes all sources' energy consumption in MWh equivalent excluding energy consumption of electricity power plants² and energy consumption of aviation activities³ (due to fuel consumption). The source of data is mostly from sectoral reports of EMRA (Energy Market Regulatory Authority), which is the regulatory authority for all energy segments including Electricity, Natural Gas, Fuel Oil and Petroleum Sectors⁴. A breakdown of energy consumption is summarized as follows:

Table 5 Breakdown of energy consumption in Antalya city level

Cluster	Energy Consumption [MWh]
Industry	2,588,479
Commercial	5,381,306
Residential	7,393,174
Public Lighting	129,170
Agriculture (mostly water pump)	162,170
Transportation	10,818,640
Other	30,448
TOTAL	26,503,792

² A significant amount of fuel consumption under electricity generation is related with a single 1150 MW capacity Natural Gas Power Plant which results in approximately 8,176,859 MWh/year equivalent energy consumption. This is not included in the city level energy consumption since the electricity generated is not only consumed within Antalya but is delivered to the interconnected national grid system.

³ Antalya is one of the busiest touristic attraction sites of Turkey which is also reflected in aviation activities. 92,228 ton of aviation fuel has been consumed in 2017. This is not included in the city level energy consumption.

⁴ Ref: EMRA www.epdk.gov.tr



As could be seen from the above table the energy consumption in transportation cluster is the highest with 34% followed by energy consumed by power plants to generate electricity with 23% and residential buildings with 21% of the total energy consumption.

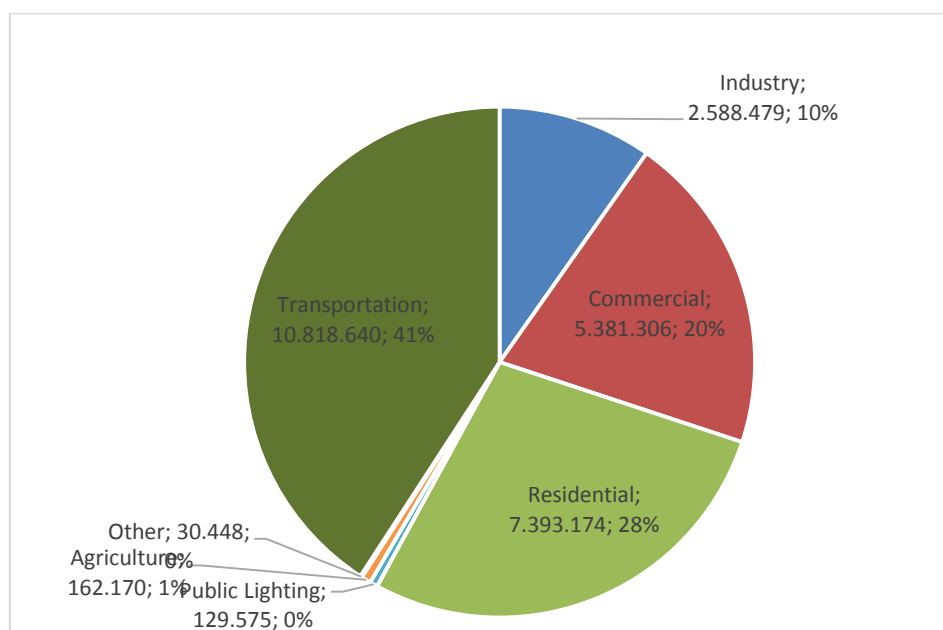


Figure 19 Antalya Energy Consumption

The energy is consumed in several sources at city level including electricity, natural gas, coal, LPG and Oil products. The highest energy consumption by source is Oil Based Fuels which includes gasoline, diesel, fuel oil, etc. with 9,459,462 MWh equivalent consumption. Most of the consumption is due from transportation activities. A breakdown of consumption by source type is summarized shown as followed:

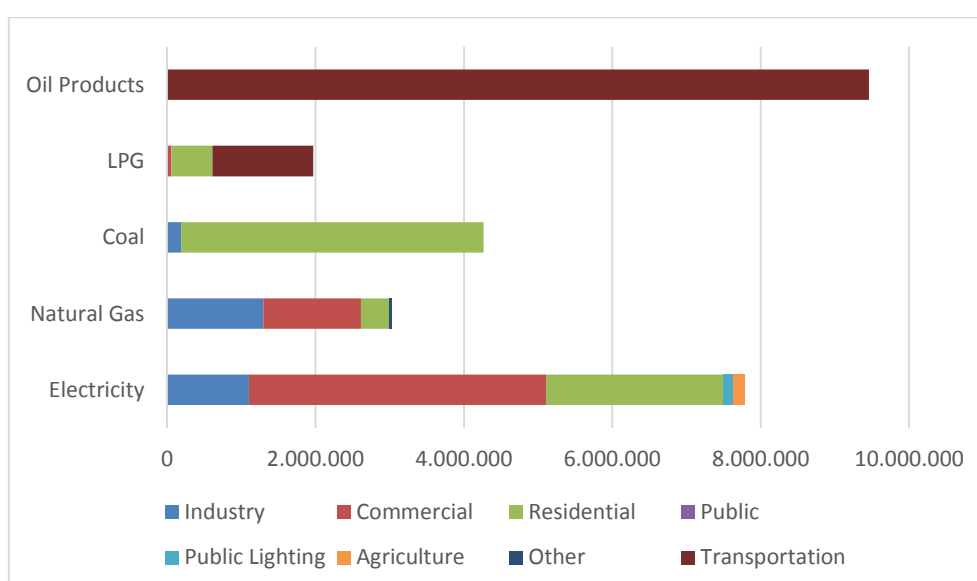


Figure 20 Consumption by source type

Table 6 Consumption by source type

Energy Consumption by Source	Energy Consumption [MWh]
Electricity	7,786,897
Natural Gas	3,021,171
Coal*	4,264,278
LPG	1,971,984
Oil Products	9,459,462
TOTAL	26,503,792

*Since there is no coal consumption data for 2017, the figures related with coal are calculated based on 2016 data. The document will be revised once data vintage is updated.

In accordance with the coal statistics from Antalya Province Environmental Report 2016, a total of 501,230 ton of coal is consumed for residential heating and 27,358 ton of coal is consumed within industrial sector⁵. This results in 4,264,278 MWh equivalent energy consumption from coal resources which is one of the main environmental and health problem in Antalya. However, it should be also noted that there is a significant demand for coal in Antalya for greenhouse sector. Greenhouse agriculture is one of the major economic drivers of the City and Antalya hosts approximately 39% of the total m² of greenhouse of Turkey⁶. Although the high demand for heating for greenhouse activities in Antalya is known to be covered by coal, no reference or data was reached on the amount of coal consumed within the agriculture sector exclusively or if the data source for “residential purposes” include the amount of coal consumed for agriculture.

Renewable Energy Potential

Antalya is home to 29 water streams with various sizes with a total potential representing 7.6% of Turkey. Average flow rate is estimated as 338.4 m³/s. These water streams host 23 hydroelectric power plants (including run-off-river) with a total of 814.67 MW capacity.

Antalya has a very high solar radiation. A total of 380 TWh/year solar energy potential is estimated by the Ministry of Energy and Natural Resources.

⁵ Ref: http://webdosya.csb.gov.tr/db/ced/editordosya/Antalya_icdr2016.pdf

⁶ Ref: <https://antalya.tarim.gov.tr/Menu/75/Antalyada-Tarim>



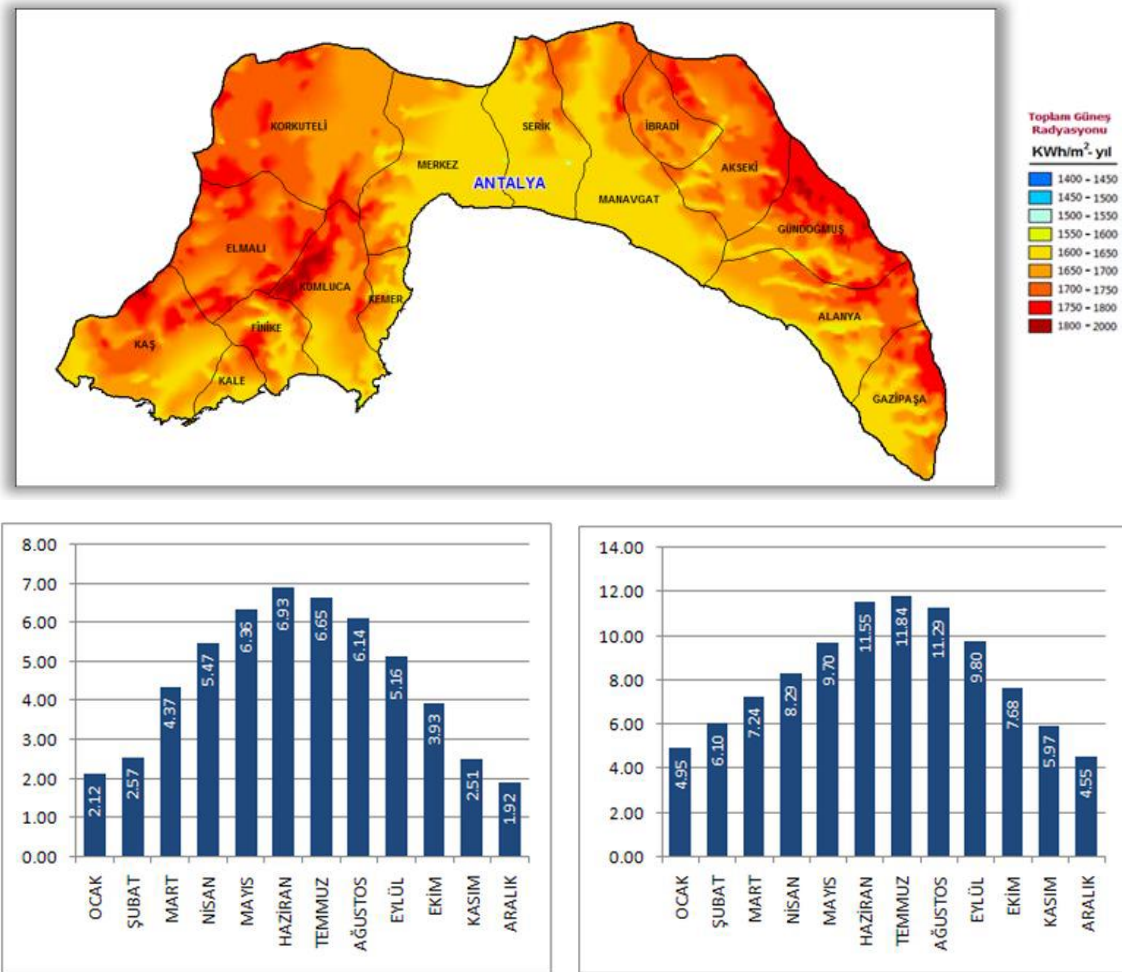


Figure 21 Irradiation and sun hour values

Although no quantitative reference is available, Antalya has a very high rate in utilizing the solar energy through solar thermal collectors. Almost every building has a solar collector which is used to supply hot water.

With recent developments (since 2010) in renewable energy incentive, electricity generation from solar energy benefits from a favorable 13.3 \$cent/kWh base tariff. Combined with the recent licensing practices allowing small scale (below 1 MW) generation facilities to generate electricity without the requirement of a license, electricity generation from solar energy through PV systems have increased in Antalya. Currently there are 40 Solar Power Generation Facilities with a total capacity of 38.88 MW.

There are 72 electricity generation facilities in Antalya with a total installed capacity of 2050 MW, with a total electricity generation of 6,706,370 MWh estimated. 27.9% of the electricity generation comes from renewable energy resources, while 71% of the generation is based on a single power plant which is a 1150 MW capacity combined cycle natural gas power plant.

It should be noted that Turkey has an interconnected electricity transmission and distribution network with no sub or micro grid systems. Although hot spots for electricity generation and consumptions can be identified within the grid, there is no dedicated or

isolated grids. This means electricity generated within Antalya is not exclusively consumed within Antalya.

Breakdown of electricity generation based on fuel source is presented as follows

Table 7 Breakdown of electricity generation

Fuel Type	Capacity [MW]	Generation [MWh]	Share of Generation [%]
Natural Gas (combined cycle)	1,168.68	4,827,312	72.0
Hydro Power	814.64	1,733,470	25.8
Solar Energy	38.88	53,684	0.8
Biogas	18.10	80,699	1.2
LNG	9.95	11,205	0.2
TOTAL	2050.29	6,706,370	100.0

CO₂ Emissions:

The Greater Antalya Municipality has signed the European Covenant of Mayors (CoM) in 2013 and a target of 20% reduction in GHG by 2020 has been set through calculation of GHG inventory and adaptation of “Sustainable Energy Action Plan” (SEAP). This resulted in an extensive report including a comprehensive data on energy characterization of city along with data on city level emissions.

In accordance with the SEAP Antalya report, total emissions have been calculated as 8,821,979 tCO₂e for the reference year 2012 of which only **144,200 tons of CO₂** are emitted by the City government ABB.

Breakdown of GHG emissions Inventory of Antalya is summarized as follows:

Table 8 Antalya Urban GHG Inventory, 2012

City						
Category		CO2	CH ₄	N ₂ O	Total	
		ton CO2e				
Residential						
Scope 1	Stationary Combustion					
Scope 2	Electricity Consumption					
Commercial						
Scope 1	Stationary Combustion					

Scope 2	Electricity Consumption				
Industrial					
Scope 1	Stationary Combustion		7.986	3.029	302.110
Scope 2	Electricity Consumption				342.251
Free Consumers					
Scope 2	Electricity Consumption				1.048.444
Energy Generation Facilities					
Scope 1	Stationary Combustion		-		
Scope 2	Electricity Consumption				
Transportation					
Scope 1	Mobile Combustion Emissions		1.969		
Scope 2	Mobile Combustion Emissions				
Scope 3	Aviation				
Solid Waste					
Scope 1	Methane Emissions				385.010
Waste Water					144.233
Scope 1	CH4 and N2O Emissions				
Agriculture and Land Use					
Scope 1	Enteric fermentation				
Scope 1	Fertilizer				
TOTAL					

3.1.1.2 Building Level

The area that will be included in MATCHUP comprises a new Construction area, located in Kepez Santral District. Since the buildings will be newly constructed, the baseline for energy demand are the minimum requirements of building codes applicable for heat and electricity. Following section provides a brief description of the building code TS 825 and summary of baseline simulation results on energy demands.

TS 825 Building Code

Turkey's building energy regulation focuses on thermal resistance. The National Standard of Thermal Insulation Requirements for Buildings TS 825 was first issued in 1999 and became mandatory in June 2000. This standard has been revised several times subsequently, latest version of which was published in 2013. More recently, Turkey has begun to align with the European legislation on buildings, including the Energy Performance of Buildings Directive (EPBD). A part of this process is adoption of



Building Energy Performance (BEP) Regulation, which envisages the use of district heating and/or renewable energy for the buildings above a certain threshold. BEP (Building Energy Performance) is mandatory for all new buildings except for industrial buildings, temporary buildings used less than 2 years, buildings with a total useful floor area of less than 50 m², greenhouses, workshops as well as stand-alone buildings without heating or cooling requirements.

Table 9 Regulation for the residential buildings

Residential Buildings	Scale (National, Regional, Local, etc...)	Building size threshold
New Buildings	National (Building Energy Performance Regulation)	Buildings with more than 2,000 m ² of usable space will be equipped with a central heating system; for buildings more than 20,000 m ² , various ways to use renewable energy and cogeneration facilities are defined.
Existing Buildings	National (thermal regulation only): TS 825	All new buildings except buildings containing passive solar energy systems

The TS 825 is related with the rules of calculation methods of the heating and cooling energy requirements of the new and old buildings. It divides Turkey into five climatic zones (depending on average degree days) and limits heat loss from the building envelope.

According to TS 825, five different degree-day (DD) regions have been defined for Turkey, which are shown in figure below. Antalya is considered within Zone 1.



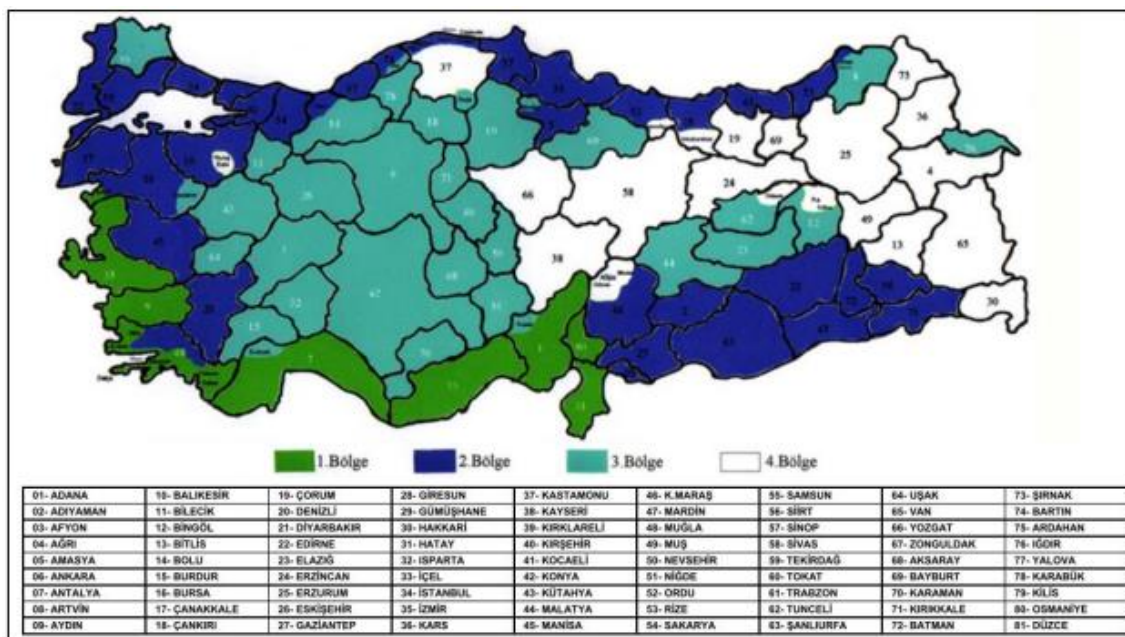


Figure 22 Turkey's provinces according to DD regions

Every new building constructed shall comply with at least C energy rating. In accordance with the minimum requirements of the code, the following table summarizes the minimum heat transfer coefficient values for buildings for Antalya (Zone 1). These values are also considered as the baseline for buildings in Antalya Intervention Area (New Kepez Santral District).

Table 10 TS825 1. Zone min. heat transfer coefficient values

	U_D	U_T	U_t	U_p
Zone 1	0,7	0,45	0,7	2,4

Based on the energy simulation run for demo site building the baseline demand values have been calculated as follows.

Table 11 Results from energy simulation for different orientations in accordance with TS 825 requirements

North-South Orientation		West -East Orientation	
	kWh/m ² year		kWh/m ² year
Heating	25.00	Heating	0
Cooling	41.30	Cooling	59.09
Lighting	23.70	Lighting	23.70

Domestic Hot Water	14.00	Domestic Hot Water	14.00
Fans&Pumps	4.60	Fans&Pumps	5.54
TOTAL	108.60	TOTAL	123.93

Considering that the total area of impact, which will be affected by the interventions described within the scope of MATCHUP Project, is approximately 20,000 m² for residential buildings the total baseline energy demand can be calculated as follows:

Table 12 Baseline energy demands of residential buildings in demo site

	North-South Orientation	West -East Orientation
Heating	500 MWh/year	432 MWh/year
Cooling	826 MWh/year	1,181 MWh/year
Lighting	474 MWh/year	474 MWh/year
Domestic Hot Water	280 MWh/year	280 MWh/year
Fans&Pumps	92 MWh/year	110 MWh/year
TOTAL	2,172 MWh/year	2,478 MWh/year

3.1.2 Mobility

Antalya is spread over a wide area with 19 districts. There are 5 districts in the Antalya which are evaluated as city center. These districts are Muratpaşa, Konyaaltı, Kepez, Aksu and Döşemealtı districts. These districts have 55.47% of the total population.

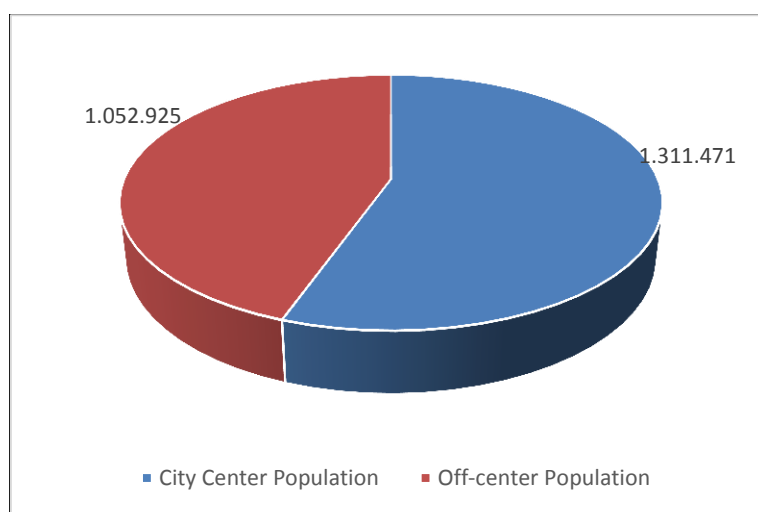


Figure 23 Antalya Population

When you look at Antalya's transportation master plan and current data, 49.1% of daily trips in Antalya are made by motor vehicles. The situation that arises when these trips are separated by modes is shown in the graph.

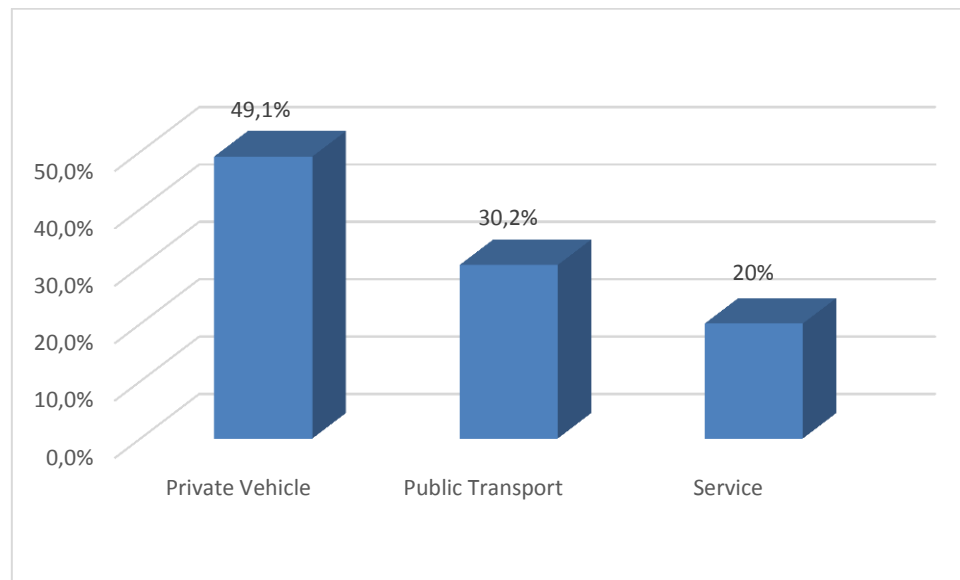


Figure 24 Modal Split of Passenger Transport

In Antalya, where the rate of private vehicle usage is high, the rate of private vehicle and service buses usage increases even more during the summer. The study shows that there is a need to improve the public transport system in the city continues. All of the buses in the public transportation system operate in the electronic payment system. Private and municipal buses can be monitored instantly while the data regarding the departure times and passenger numbers can be viewed through the system. All of the city buses work with diesel fuel in Antalya. While 753 buses were serving in the city centre, the "Total number of passengers" value on the indicator list was calculated as 54.64.

Approximately 11,000 planes descend to Antalya, where mobility is increasing in the summer months. Especially in July and August there are an average of 2,000,000 foreign visitors. On the domestic routes, 370,000 passengers arrive in Antalya by air. If you look at the total value of mobility for tourism purposes in the summer months, an average of 5,000,000 trips take place. This is an important factor that changes the intra-city mobility values and average values of Antalya.

Extreme hot weather conditions that occur during the summer months are becoming rainy in winter. These weather conditions are a cause for the urban transportation to take place mainly with motor vehicles. In the city centre, the main reason "why the use of bicycles is so low", is the high temperature values in the summer. At present, the length of the bicycle route is 1.05 km for 100,000 habitants in the city centre. This value will be further increased by the ongoing coastal arrangement and cycling road project in the Konyaalti region, which takes priority among the tourist areas of the city centre.

In the Kepez area, which is determined as demo area within the scope of the project, bicycle routes, rail system and rubber wheeled public transport system are planned in an integrated style. Designs have been made to help people who live in the region complete the journey between the last stop and the home with e-bikes. Apart from this, the preparations for the transfer points, stop and charge areas to be formed in the region and the electric vehicles planned to be used are being completed.

A detailed study has been carried out on the indicator values and current data not available in the meeting held in Antalya in September. In this context, a productive meeting was held with the relevant representatives of the project outside the project group. With this study, a collective working group has been established that will enable the follow-up of the electronic fee collection system data and the continuity of bicycle investments

3.1.3 Urban Platform and ICT

The Municipality of Antalya, in line with its Digital Agenda, has developed a global ICT-Infrastructure in which many vertical services of the city are integrated. This Urban Platform of Antalya is in charge of gathering information from these municipal services and to provide information to make city decisions by elaborating a set of key indicators to support this process. Another objective of the platform is to offer data to the citizens and municipal managers to support all the necessary information to ease their daily life.

To enhance the interoperability capabilities and ensuring an appropriate scalability to ease the extension of this Urban Platform, Antalya Municipality has running its own data centers in its new building where they manage the following main solutions:

- Management Information Systems (MIS) including 30+ modules of tax management, accounting, HR, procurement, ticketing and other departmental requirements.
- Geographical Information Systems (GIS)
- 3rd Party Integrated Solutions
- e-Government Integrations
- e-Municipality
- Mobile Citizen Solutions
- MUBIM – Regional District Authorities Management Portal
- City Council Decision Portal
- Web Interfaces of Antalya
- E-Ticketing for Theatres
- Accessibility Portal for Antalya
- City Information System
- 360-degree Panoramic View Portal
- Smart Cities initiatives

Antalya Metropolitan Municipality manages its own data center in its new building. Almost all the solutions are integrated, secured and controlled through the central data center, which has disaster recovery and maintenance options. In more than 20+ different size of servers and storage units, Antalya manages more than 100 cores of



CPU and around 500 GB of memory with terabytes of data. All modern data center management techniques are being used daily under the control of ICT team of Antalya. Security and Privacy is one of the main pillars of the Urban Platform, as sensitive data is managed. The security of the network infrastructure is ensured by various security components, including for example, the multi-level firewall as well as the establishment of so-called demilitarized zones (DMZ), which ensure secure access by external users and, in particular, protects the internal network against unauthorized access. Another widely used secure access technology is via Virtual Private Network (VPN). In addition, several access control schemes and authorization techniques is applied to ensure authentication and authorization requirements for all sorts of solutions under Urban Platform.

The following Vertical services are integrated and managed through this platform:

- Water Authority (ASAT)
- Traffic & Transport
- Administration
- Governance
- E-Government Integrations
- 3rd Party Integrations
- Energy in Municipal buildings
- Energy in Private Buildings
- Energy in industry
- Tenders
- Contracts
- Citizens' portal
- Geographical Information Systems
- Ticketing Systems (Theatres)

Antalya is currently developing its urban platform through its smart city framework given in figure below.

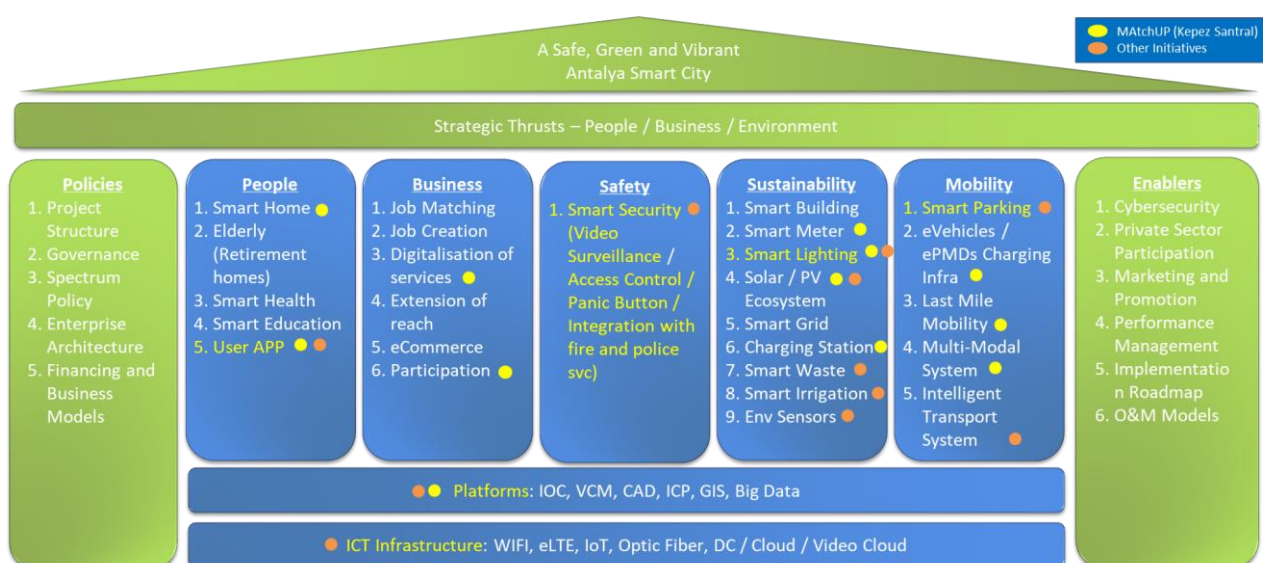


Figure 25 Antalya Smart City Framework

3.2 Description of interventions

Antalya is home to the largest urban transformation project in Turkey, which is also the first for Antalya. The transformation of the 1.7 Million sqmeter New Kepez District aims to improve the urban quality of the district while strengthening the building environment that are considered within earthquake zone. Through construction of new buildings, the district will evolve to a smart, green and energy efficient area. The transformation of this large area will be implemented in phases. The MATchUP interventions are focused to the first stage, which will include high performance district targeted by the demo presenting “best practice” to the rest of the New Kepez District. The demo site will demonstrate “Class B” energy performance buildings a higher standard from the Turkish building code. In this way, new efficient construction techniques will be used, as well as the integration of renewable energies, such as PV, electrical storage and solar thermal. Additionally, monitoring and control strategies will be implemented. Regarding mobility, a new fleet of electrical vehicles will be deployed with the corresponding charging points, complemented by services for sustainable mobility. Finally, non-technical actions will support the technical ones with new policies, urban plans, business model and the update from SEAP to SECAP.

Below sections will provide a better understanding and detail on these interventions.

3.2.1 High performance district interventions

District and building level of interventions cover a series of actions including deployment of domotics & smart controls, integration of renewable energy and energy storage. The following section provides information on the actions; its interaction with other actions within the project; progress including important milestones; monitoring aspects as well as financial scheme and business model and social strategy where applicable.

3.2.1.1 New Buildings

A.1: Residential Blocks (B energy rating district)

The area that will be included in MATchUP comprises a new Construction area, located in Kepez Santral District. From a total area of 20,800 m² (conditioned area) - 4 residential buildings - 264 flats that will be built beyond current standards for new construction will be the focus area. These buildings, whose constructive principles are high performance envelop through insulation, low u-value glazing, and energy efficient lighting. Demand for domestic hot water will be supplied mainly on renewables comprising Solar Thermal Collectors integrated in the buildings [Action 4]. This action also integrates other actions such as installation of home domotics and controls [Action 6] at apartment level as well as smart meters [Action 7].



Involved partners	Action leader: ANP Other MAtchUP partners: DEM, SAM, ANT
Other actions linked	A4: Solar Thermal collectors' installation for residential buildings A6: Smart controls and & domotics A7: Smart meters
Deviations from initial plan	Linked with potential deviations for A2 (New construction of public tertiary buildings) the scope of this action might be extended to cover more residential building and flats. This decision is not final and still under discussion.
Monitoring / measurement of progress	Efficiency measures will result in reduction of energy cost due to energy savings. The progress and result will be followed through monitoring of; E2: Reduction in annual final energy consumption E4: CO ₂ emission reductions
Financial scheme and business models	The project is implemented by a contractor, which is also financing the project. The new buildings/flats will be later sold to potential tenants / clients. The cost of energy saving interventions will be initially financed by the contractor and later will be reflected to the potential buyers via sales price. The energy savings and lowered energy costs will therefore be a sales model for increased cost of the houses compared to the baseline performance.
Social strategy	Internal communication with the building users will increase transparency, public acceptance of the interventions, and awareness for energy saving potentials. <i>Means: Flyer, dedicated events, etc.</i> External communication shall support the upscaling of the Action within the city of Antalya, as well as the replication in other cities. <i>Means: Flyer, dedicated events, link to other city activities, etc.</i>

A.2: New Construction of Public Tertiary Buildings 50,000 m² (min B energy rating)

The action involves the construction of new public buildings with a target of min B energy rating through utilization of;

- high performance building envelope (insulation and glazing),
- advanced lighting and control systems,
- high performance HVAC systems,
- Heat recovery ventilation systems, and;
- Occupancy control.

The building will also benefit from use of Renewable Energy systems integrated to the building(s). An estimated total area of 50,000 m² can be allocated to PV (Photo-



Voltaic) System integration **[Action 3]**, where the electricity generated from solar energy is stored in battery groups **[Action 5]**.

These building(s) will also benefit from smart controls **[Action 7]** and smart meters **[Action 6]** for a better energy management (such as advanced lighting, energy and comfort controls).

Involved partners	Action leader: ANP Other MAtchUP partners: DEM, SAM, ANT
Other actions linked	A3: PV installation for public buildings A6: Smart controls and & domotics A7: Smart meters
Deviations from initial plan	There are delays in decision-making. The local elections have resulted in delay in the progress. It is not certain on which public buildings will be implemented. Significant fluctuations in Turkish currency has significantly impacted the financials of the implementations on the public buildings, forcing the municipality to reconsider their initial plans. There is a risk that these interventions would not be finalized within the anticipated timeline which is in line with Match UP milestones. Several alternatives are under discussion including the option to increase the square meter of intervention area under A1 (new built residential buildings) and / or selecting another public building with a timeline in line with MAtchUP milestones ensuring the same anticipated impact.
Monitoring / measurement of progress	E2: Reduction in annual final energy consumption E4: CO ₂ emission reduction
Financial scheme and business models	This action will be implemented in new buildings, which are a part of a larger project (1.5 M m ² project area). The construction will be financed by Antalya Municipality.
Social strategy	Internal communication with the building users will increase transparency, public acceptance of the interventions, and awareness for energy saving potentials. <i>Means: Flyer, dedicated events, etc.</i> External communication shall support the upscaling of the Action within the city of Antalya, as well as the replication in other cities. <i>Means: Flyer, dedicated events, link to other city activities, etc.</i>

3.2.1.2 Building Integrated RES

A.3: PV Installation for public buildings

The action involves integration of PV system to the rooftop of the transportation hub building. The PV system will be integrated to the transportation hub within Kepez



District. This transportation hub offers great benefits due to its location and proxy to charging stations, which the system will be linked to (through storage system). The aim is to install 345 kWp PV system which will have a potential to generate 552 MWh/yr electricity annually. The generated electricity will be used for charging stations and lighting. The excess electricity from PV system will be linked to battery groups for storage and can co-supply charging stations energy demand and/or share of quarters' energy demand.

Involved partners	Action leader: ANT Other MAtchUP partners: DEM, SAM, ANP
Other actions linked	A2: New construction of public tertiary building A5: Electrical storage for buildings and charging stations.
Deviations from initial plan	There are no major deviations or time delays expected for Action 3.
Monitoring / measurement of progress	E3: Increase in local renewable energy generation E4: CO ₂ Emission reduction
Financial scheme and business models	The PV system integrated to the public building is under the responsibility of Antalya Greater Municipality itself. The project will be completely financed by the Municipality itself. The design works, permit / licensing process and preparation for construction tender documents are subcontracted to a third-party consultant company experienced in his field. The construction works as well as commissioning will be subcontracted to a third party through a tender process. The operation and maintenance of the PV system will be under the responsibility of the associated department of Antalya Greater Municipality. The generated electricity will be used for charging stations and lighting. The excess electricity from PV system will be linked to battery groups for storage and can co-supply charging stations energy demand and/or share of quarters' energy demand. The system is designed together with the PV system [A3] hence the initial investment covers design, construction, commissioning and equipment costs for both PV system and storage units [A5] The initial investment cost is estimated to reach approximately 5.9 million TL.
Social strategy	The PV system will be implemented in a public building (ex: transportation hub) which will have a high rate of exposure to citizens. This will result in an opportunity to increase transparency, public acceptance of interventions and awareness for energy saving potentials as well as use of renewable energy. This could be achieved through distribution of printed materials (ex: flyers) as well as digital media (ex: websites, online news etc.) External communication shall support the upscaling of the



	Action within the city of Antalya, as well as the replication in other cities.
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A.4: Solar Thermal Collectors Installation for Residential Buildings

The action involves integration of solar thermal collectors for residential building **[Action 1]**. The aim is to install approximately 500m² solar collector system, which will have a potential to generate 696 MWh/yr equivalent hot water. The hot water will cover all or portion of the domestic hot water demand in the newly built residential buildings. The system is planned as a centralized system for each building block.

Involved partners	Action leader: ANP Other MATCHUP partners: DEM, SAM, ANT
Other actions linked	A1: Residential blocks
Deviations from initial plan	There are no major deviations or time delays expected for Action 4.
Monitoring / measurement of progress	E1: Reduction in primary energy demand and consumption E4: CO ₂ emission reduction
Financial scheme and business models	The buildings are constructed and financed by the Contractor. However, the contractor will not be responsible for integration of the solar collectors to the building although they will be responsible for the infrastructure (piping, centralized boilers, pumps, heat exchangers etc.). After the constructions are completed, the tenants will be responsible for installation and cost of the implementation. The energy savings and lowered energy costs will be a sales model for the extra cost of the solar thermal collectors compared to conventional heating (Natural Gas).
Social strategy	Internal communication with the building users will increase transparency, public acceptance of the interventions, and awareness for energy saving potentials. <i>Means: Flyer, dedicated events, etc.</i> External communication shall support the upscaling of the Action within the city of Antalya, as well as the replication in other cities. <i>Means: Flyer, dedicated events, link to other city activities, etc.</i>

3.2.1.3 Storage

A.5: Electrical Storage for Buildings and Charging Stations

The action involves integration of battery groups for electricity storage. The electricity generated in PV system **[Action3]** will be linked with approximately 100 battery units to utilize 240 kWh storage capacity. The system will be integrated to the selected public building. The generated electricity will be used for charging stations and lighting. The



excess electricity from PV system will be linked to battery groups for storage and can co-supply charging stations energy demand and/or share of quarters' energy demand.

Involved partners	Action leader: ANT Other MAtchUP partners: DEM, SAM, ANP
Other actions linked	A2: New construction of public tertiary buildings A3 PV installation for public buildings A16: 5 e-vehicle charging points A23: 2 e-bus charging stations
Deviations from initial plan	Linked with potential deviations for A12 (Integration of District Electricity Storage) the installed capacities might be increased to support higher storage capacities. This decision is not final and still under discussion.
Monitoring / measurement of progress	E5: Peak load reduction E8: Storage capacity factor E10: Storage capacity allocated
Financial scheme and business models	The storage system integrated to the public building is under the responsibility of Antalya Greater Municipality itself. The project will be co-financed by the Municipality. The design works, permit / licensing process and preparation for construction tender documents are subcontracted to a third-party consultant company experienced in his field. The construction works as well as commissioning will be subcontracted to a third party through a tender process. The operation and maintenance of the storage system will be under the responsibility of the associated department of Antalya Greater Municipality. The system is designed together with the PV system [A3] hence the initial investment covers design, construction, commissioning and equipment costs for both PV system and storage units [A5] The initial investment cost is estimated to reach approximately 5.9 million TL.
Social strategy	The storage system will be implemented in a public building (ex: transportation hub) which will have a high rate of exposure to citizens. This will result in an opportunity to increase transparency, public acceptance of interventions and awareness for energy saving potentials as well as use of renewable energy. This could be achieved through distribution of printed materials (ex: flyers) as well as digital media (ex: websites, online news etc.) External communication shall support the upscaling of the Action within the city of Antalya, as well as the replication in other cities.



3.2.1.4 Domotics & Smart Controls

A.6: Smart Controls & Domotics

The action involves introduction of new technologies such as smart control calorimeters, smart control sensors (humidity, heat, water leakage etc.) smart control domotics (home alarm, smart door locks, movement sensors, smart lighting and smart switches etc.) to apartment and dwellers [Action 1]. It is estimated that 356 smart controllers, 256 domotics controllers and 1020 sensors will be installed within the scope of the activity in the apartments. It contains a central unit to provide smart home technologies based on widely used CoAP (Constrained Application Protocol), MQTT, RESTful HTTP, XMPP (Extensible Messaging and Presence Protocol) protocols and bindings like KNX, ZWave, etc.

Through implementation of the action, Residents can control and monitor the connected heating facilities and calorimeters as well as electrical partner appliances, such as heat sensors, dimmers, switchers or washing machines, via smartphones, PCs/laptops or tablet computers in order to save energy with the support of such applications. In addition, the smart homes will be connected to the IoT platform (Antalya urban platform) and residents will be able to benefit from powerful and flexible rules, event and time-based triggers and notification systems.

In order to control and monitor all smart controllers, sensors and devices, an integrated platform (as one of the services at top of the Antalya urban platform) like OpenHAB will be provided. The aim will be to integrate all home automation systems and technologies into one single solution in the demo site. The reason for choosing OpenHAB like solutions is to support hundreds of different technologies and devices available in the market. All these are going to be integrated with the Urban ICT Platform via well-known and secure service integration patterns and protocols.

Involved partners	Action leader: SAM Other MAtchUP partners: DEM, ANP
Other actions linked	A7: Smart meters
Deviations from initial plan	There are no major deviations or time delays expected for Action 6.
Next milestones	Until 09/2020 [M36]: Implementation and commissioning of interventions will be finalized. Until 09/2022 [M60]: Continuous monitoring and evaluation.
Monitoring / measurement of progress	The implementation of the action will give residents more control over the energy related decisions and will facilitate a more efficient energy management and demand control, which will lead to energy and cost saving as well as improvement in



	living comfort. The impact of implementation and action will be monitored through the following indicators: - Reduction of electricity and heat load demand - Reduction in final energy consumption - CO₂ emission reductions - Successful modelling - Yes / No - High adaptation needs? - Usability for other buildings Energy related monitoring will be based on direct measurement from meters while the CO₂ emission reductions will be based on calculations based on actual measurements compared with the baseline calculation.
Financial scheme and business models	The actions will be implemented in new buildings, which are a part of a larger project (1.5 M m ² project area). The intervention is financed by MATCHUP Budget.
Social strategy	Internal communication with the building users will increase transparency, public acceptance of the interventions, and awareness for energy saving potentials. <i>Means: Flyer, dedicated events, etc.</i>

3.2.2 City Infrastructures

City infrastructure level of interventions cover a series of actions including deployment of smart meters, installation of energy efficient public lighting, integration of urban renewables and electrical storage system. The following section provides information on the actions; its interaction with other actions within the project; progress including important milestones; monitoring aspects as well as financial scheme and business model and social strategy where applicable.

3.2.2.1 Smart Grids

A.7: Smart Meters

The action involves introduction of smart meters in newly built area of Kepez Santral District. This will enable development of dynamic data management. The data will be aggregated at various levels from individual consumers (dwelling) to building and even to district level. To complement available data, supply of complementary standardized aggregated data, supply of contextual data and integration into the urban data platform.

Heightened demand for power availability, distributed generation, and greater efficiency are creating a need for more consumption and power quality measurements at the edge. Smart electricity meters allow you to accommodate auxiliary meters (gas, water, heat) through a standards compliant interface, and are fully capable of securely connecting to ZigBee radio frequency or LonWorks® PL, M-bus, Multipurpose



Expansion Port (MEP) or Open Smart Grid Protocol (OSGP) devices for Home Area Network integration, energy management or other services. A Smart Meter and Powerful Grid Sensor are combined on smart meter.

A sophisticated and advanced Building Energy Management (BEM) system will be deployed like BEMOSS that will be integrated with the Urban ICT Platform to monitor these smart meters. Kepez Santral BEM will be able to integrate Smart Appliances, Smart Grid, Smart Meters, Smart Street Lighting, Building Automation System and IoT devices. This BEM is expected to provide scalability, robustness, plug and play, open protocol, interoperability, cost-effectiveness, as well as local and remote monitoring, allowing it to work with load control devices **[Action 6]** from different manufacturers that operate on different communication technologies and protocols. It supports different communication technologies and data exchange protocols like Ethernet (IEEE 802.3), Serial (RS-485), ZigBee (IEEE 802.15.4) and Wi-Fi (IEEE 802.11); and BACnet, Modbus, Web, ZigBee API, OpenADR and Smart Energy Profile (SEP) protocols. With its multi-layer architecture, it can be easily expandable to the entire building and it allows remote and local monitoring by supporting enhanced security features.

Involved partners	Action leader: SAM Other MATCHUP partners: DEM, ANP
Other actions linked	A6: Smart controls and domotics
Deviations from initial plan	There are no major deviations or time delays expected for Action 7.
Next milestones	Until 09/2020 [M36]: Implementation and commissioning of interventions will be finalized. Until 09/2022 [M60]: Continuous monitoring and evaluation.
Monitoring / measurement of progress	Deployment of smart meters to provide data aggregation at various scales (home, building, district). These smart meters will be integrated with a Building Energy Management linked to Urban ICT platform. This will allow more advanced energy and data management increasing technical capability and improved interoperability. The impact of implementation and action will be monitored through the following indicators: - Reduction in annual final energy consumption - Establishment of data stream / control signal - Peak load reduction - CO₂ emission reductions



	Energy related monitoring will be based on direct measurement from meters while the CO ₂ emission reductions will be based on calculations based on actual measurements compared with the baseline calculation.
Financial scheme and business models	The actions will be implemented in new buildings, which are a part of a larger project (1.5 M m ² project area). The intervention is financed by MATchUP Budget.
Social strategy	Internal communication with the building users will increase transparency, public acceptance of the interventions, and awareness for energy saving potentials. <i>Means: Flyer, dedicated events, etc.</i>

3.2.2.2 Public Lighting

A.8: LED Public Lighting

The action involves installation of approximately 350 LED integrated street lighting systems in the newly built Kepez Santral District. The use of LED will result in an estimated 40% increase in energy efficiency. In addition, the lighting system will be coupled with an intelligent communication system allowing smart control for further efficient use **[Action 9]**.

Involved partners	Action leader: ANP Other MATchUP partners: DEM, SAM, ANT
Other actions linked	A9 Smart control for public lighting
Progress and Deviations from initial plan	The location of the lighting system is determined. Technical design and planning completed The luminaire layout plan, smart lighting and intelligent energy supply plan were completed. Tendering and procurement process is in progress There are no major deviations or time delays expected for Action 8.
Monitoring / measurement of progress	E2: Reduction in annual final energy consumption E4: CO ₂ emission reduction
Financial scheme and business models	The actions will be implemented in newly constructed Kepez Santral District.
Social strategy	Internal communication with the neighborhood citizens will increase transparency, public acceptance of the interventions, and awareness for energy saving potentials. <i>Means: Flyer, dedicated events, etc.</i>



A.9: Smart Control of Public Lighting

Linked with LED public lighting [Action 8], a new service for smart control of public lighting will be developed. The aim of this action is to optimize the usability of the public lighting by means of application of gradation, maintenance etc. The energy saving potential is estimated as 30%.

Involved partners	Action leader: ANP Other MATchUP partners: DEM, SAM, ANT
Other actions linked	A8 LED public lighting
Deviations from initial plan	There are no major deviations or time delays expected for Action 9.
Next milestones	Until 09/2019 [M24]: - Selection of lighting locations have been finalized - Detailed planning on interventions has been made Until 09/2020 [M36]: Deployment and commissioning of interventions will be finalized. Until 09/2022 [M60]: Continuous monitoring and evaluation.
Monitoring / measurement of progress	Integration of smart control system to street lighting will result in energy savings of the city infrastructure. This will also lead to CO ₂ reduction. The impact of implementation and action will be monitored through the following indicators: - Reduction in annual final energy consumption - CO ₂ emission reduction Energy related monitoring will be based on direct measurement from electricity meters while the CO ₂ emission reductions will be based on calculations based on actual measurements compared with the baseline calculation. The implementation of the action will also have economic and social impact which will be monitored through the following indicators: - Reduction of energy cost - Increased fiscal benefit to municipality Electricity meters will monitor electricity consumption on LED lighting. This data will be then used to calculate its fiscal benefit to Municipality compared to the baseline scenario.
Financial	The actions will be implemented in newly constructed Kepez



scheme and business models	Santral District. The intervention is funded from MATCHUP Project Budget
Social strategy	Internal communication with neighborhood citizens and users will increase transparency, public acceptance of the interventions, and awareness for energy saving potentials. <i>Means: Flyer, dedicated events, etc.</i>

3.2.2.3 Urban Renewables (RES)

A.10: Systems with a Total Capacity of 5MWp

The action involves integration of Solar Power Plant with a total of 5 MWp to the city infrastructure. The electricity generated will be mostly used to power irrigation pumps within the city for agriculture. The power plant is estimated to generate approximately 7,500 MWh/yr and reduce carbon emission around 3,680 tCO₂/yr. It is also planned to increase the capacity to 8 MWp within a 5-year period.

Involved partners	Action leader: ANT Other MATCHUP partners: DEM, SAM
Other actions linked	A7 Smart meters
Deviations from initial plan	There are no major deviations or time delays expected for Action 10.
Monitoring / measurement of progress	E3: Increase in local renewable energy E4: CO ₂ emission reduction
Financial scheme and business models	The project is owned and coordinated by Antalya Metropolitan Municipality / Department of Agricultural Services. The project is financed by Antalya Metropolitan Municipality Co-Financed by BAKA (West Mediterranean Development Agency). The total initial investment is 19,174,458 TL for the total capacity. The first phase is completed with approximately 8,382,000TL while the second phase was 10,792,458 TL. Approximately 70% of the total investment cost is co-financed by BAKA (West Mediterranean Development Agency, Turkey) . The generated electricity is used to power 153 irrigation pumps. The electricity is free of charge to the farmers. Approximately 7500 farmers are benefiting from this SPP. Any surplus amount of energy is sold to the grid from the RES feed in tariff of 13.3 \$cent/kWh.
Social strategy	Communication will increase transparency, public acceptance of the interventions, and awareness for use of renewable energy. <i>Means: Flyer, dedicated events, etc.</i>



A.11: LFG and Electricity Generation

The Project involves the installation of the LFG collection technology for the purpose of electricity generation in Kızıllı Waste Management Site in Antalya. Waste management site receives 3000 tons/day (max) of Municipal Waste. The landfill receives only Municipal Solid Waste since 2003 covering a land of 75 hectares. Kızıllı landfill area is the largest and main landfill area within Antalya serving for almost %70 of the total city population. Prior to the project activity, there were no waste management, LFG flaring, destruction or utilization. The landfill was operated as a wild landfill area and all the methane was emitted to the atmosphere without any treatment.

The project involves Renewable Energy Generation from Municipal Waste. There are two major activities for electricity generation

- Capturing the LFG in the landfill which is later burned in the gas engines to generate electricity
- Generating methane in Anaerobic Digesters which is later sent to the gas engines to generate electricity.

The generated electricity is then imported to grid. The facility is expected to reach an annual production capacity of approximately 52.6 GWh/year once fully operational.

Involved partners	Action leader: ANT Other MATCHUP partners: DEM, SAM
Other actions linked	A7 Smart meters
Deviations from initial plan	There are no major deviations or time delays expected for Action 12.
Monitoring / measurement of progress	E3: Increase in local renewable energy E4: CO ₂ emission reduction
Financial scheme and business models	The landfill is owned by the Municipality. The right of use of the landfill (including the right to utilize the Landfill Gas) is transferred to a private company with a tendering process. The Private Company acts as Energy Generator through utilization of LFG also undertaking the investment and construction & operation responsibilities of the LFG utilization facility. The facility is transferred back to the Municipality after 29 year of operation. The total initial cost is approximately 250,000,000 TL which is undertaken by a private company ITC Invest Trading and Consulting. The facility has an electricity generation license and all the



	electricity generated is exported to the grid from the RES feed in tariff of 13.3 \$cent/kWh.
Social strategy	Communication will increase transparency, public acceptance of the interventions, and awareness for use of renewable energy. <i>Means: Flyer, dedicated events, etc.</i>

3.2.2.4 Electrical Storage

A.12: Integration of District Electricity Storage

Linked with [Action 10], a district electricity storage system (based on batteries) will be integrated in the city to store the electricity generated by the PV Power Plant. The battery group is planned to reach to a total storage capacity of 720 kWh through installation of 300 units.

Involved partners	Action leader: ANT Other MATCHUP partners: DEM, SAM,
Other actions linked	A10 PV systems with a total capacity 5MWp
Deviations from initial plan	The district level electricity storage action will be amended for exclusion due to legal barriers which are not foreseen to be overcome during the project timeframe. Alternatives are under discussion. One alternative is to increase installed capacities under A5 (building level storage) to support higher storage capacities. This will allow flexibility to a certain level and will enable the Municipality to switch to district level storage once the legislation is feasible.
Monitoring / measurement of progress	E5: Peak load reduction E8: Storage capacity factor E10: Storage capacity allocated
Financial scheme and business models	The district level electricity storage action will be amended for exclusion due to legal barriers, which are not foreseen to be overcome during the project timeframe.
Social strategy	The district level electricity storage action will be amended for exclusion due to legal barriers, which are not foreseen to be overcome during the project timeframe.

3.2.3 Mobility interventions

3.2.3.1 Electric vehicles

A.13: 2 e-buses

This action will monitor the e-buses belonging to the Antalya Metropolitan Municipality and, it will collect some data such as: vehicle Id, type of vehicle, state of battery, kilometers. Using the e-buses will be new public transportation solution for the City. For

this purpose, 2 e-buses for touring purposes and charging stations in the district which will be deployed within the project will demonstrate the feasibility of e-mobility to citizens.

Involved partners	Action leader: ANT Other MATCHUP partners: TAY, SAM, ANP																							
Other actions linked	A14: 20 e-vehicles for municipality fleet A15: 30 e-bikes																							
Deviations from initial plan	The initial plan is mainly saved and there are some minor changes. In the assessments made with the new coordinators of the local government and the technical team; Electric bus and hybrid bus alternatives will be investigated and the vehicle type to will be decided. As the mobility partner of the project, the reached information to this stage and the available information were shared with Antalya Metropolitan Municipality (ANT). In current situation of the project, a change has been made in terms of the fact that the buses in the project will be small buses. The decision on the number and energy characteristics of the decided bus types is expected to be finalized by the beginning of December. There are several alternative suggestions that are being discussed in Antalya. Suggestions developed for this action are presented below: Alternative one: Vehicles will be purchased and operated by the municipality Cost Table <table> <tr> <th>Brand Name</th><th>6 m</th><th>8 m</th><th>10 m</th><th>12 m</th></tr> <tr> <td>Mercedes</td><td></td><td></td><td></td><td>400-500 10³ Euro</td></tr> <tr> <td>Karsan</td><td>200x10³ Euro</td><td>310x10³ Euro</td><td></td><td></td></tr> <tr> <td>Temsa</td><td></td><td></td><td>400-450x10³ Euro</td><td>600x10³ Euro</td></tr> </table> Second Alternative: Build-Operate-Transfer (YID) The build-operate-transfer model means that all costs are covered by the private enterprise within the framework of a contract between public institutions or organizations of a public service and national or international private sector actors. The obtained facility is operated by the private enterprise that meets the expenses, the expiry of the period specified in the contract. It is a form of public investment and financing				Brand Name	6 m	8 m	10 m	12 m	Mercedes				400-500 10 ³ Euro	Karsan	200x10 ³ Euro	310x10 ³ Euro			Temsa			400-450x10 ³ Euro	600x10 ³ Euro
Brand Name	6 m	8 m	10 m	12 m																				
Mercedes				400-500 10 ³ Euro																				
Karsan	200x10 ³ Euro	310x10 ³ Euro																						
Temsa			400-450x10 ³ Euro	600x10 ³ Euro																				

that ensures that the facility is transferred to the relevant institutions or organizations in a functioning condition, free of any commitments and debts. For the implementation of the model, the most important actor of this project should be a local or foreign capital company. These companies sometimes appear as joint venture companies. Joint venture companies are multinational structures established by local and foreign private sector representatives. Depending on the scope of the project, this company can become a consortium and sometimes the existing consortium (s) establish a company.

The goods and services produced as a result of the investment made by the joint venture company are produced and marketed by the company. This is an exception to the principle that public service is provided by public institutions and organizations. However, it should be noted that the authority is not taken from the relevant public institution, i.e. there is no transfer of authority indefinitely. However, the power of producing and marketing public services for a certain period of time may cause some problems between public institutions and corporations and joint venture companies.

With the expiration of the contract, which is organized according to the BOT model, the investments and services are self-managed without any debts and commitments, free of charge, in working and usable condition. In other words, management has the authority to monitor, audit, and sanction to determine the price to be collected from the beneficiaries.

Municipalities may award public transportation works by tender. Within this scope, the bus line and the electric bus line whose route has been determined, will be tendered for 9 years. Charging stations, maintenance and repairs for the relevant enterprise are directly owned by the operator and will be inspected by the municipality.

Municipalities may award public transportation works by tender. Within this scope, the bus line and the electric bus line whose route has been determined will be tendered for 9 years. Charging stations, maintenance and repairs for the relevant enterprise are directly owned by the operator and will be inspected by the municipality.

The company, which has the right to operate for 9 years, will leave the job at the end of 9 years and the vehicle used on the route will be the property of the municipality.

Approximately 25 km and 32 km 2 different routes proposed in this plan for the purpose of the municipality of the electric bus system in the financial sense is to facilitate the municipality.

Third Alternative: Rent

2 electric buses provided by the municipality will be tendered and rented. This alternative, which is foreseen for a period of 9 years, aims



	to minimize the financial burden of the investment made by the municipality. The proposal will alternatively make the municipality to invest in charging stations. Maintenance and repairs are directly owned by the operator and will be inspected by the municipality.
Monitoring / measurement of progress	Utilization of 2 hybrid or e-buses will result in lower CO₂, air pollutant emissions and reduction in energy costs (low trip costs). The progress and result will be followed through monitoring of; • Annual total energy consumption and per km energy cost of 2 hybrid/e-buses • CO₂ emission reduction of 2 hybrid/e-buses per Km • Utilization of 2 hybrid/e-buses will result an increase energy efficiency, environmental awareness for the utilization of hybrid/e-buses Vehicles. The progress and result will be followed through monitoring of; • Impact on fuel consumption • Reduction of energy costs • Passenger numbers of 2 hybrid/e-buses
Financial scheme and business models	During the project, electric or hybrid buses between 6-10 m will be purchased by Antalya Metropolitan Municipality (ANT) to complete the existing bus fleet in Antalya. This process will be done by ANT and they will be operated by ANT. Throughout the operation, all data will be integrated into the Antalya Urban Platform in order to monitor data and apply data statistics to determine performance of the buses.
Social strategy	Social strategies of this action can be summarized as given below: • Increased the utilization and public acceptance of hybrid/e-buses in public transportation • Provided optimum travel time by using e-Buses • Increased sustainability use of e-bus and environmental awareness • Contributed to transportation authorities' strategic plan and utilization of hybrid/e-buses buses

A.14: 20 e-vehicles for municipality fleet

The smart district is already planned to be pedestrian and bike friendly with a large green corridor facilitating this development. With the objective of sustainable mobility, Antalya is committed to reduce pollution by the incorporation of 20 electrical vehicles into the municipality fleet. Then, this action will complement the e-buses one (Action 13) in increasing the public sustainable mobility. Similarly, these e-vehicles will be fully monitored and integrated into the Antalya urban platform in order to extract aggregated data to evaluate the sustainability.

Involved partners	Action leader: ANT Other MATCHUP partners: TAY, SAM, ANP
Other actions linked	A13: 2 e-buses A15: 30 e-bikes
Deviations from initial plan	Slight deviation is expected in the purchasing process. Developed suggestions for this action are presented below.



	Alternative 1. Purchase and operation of vehicles by the municipality Cost: Average 50,000 Euro to 20 Vehicles Cost 1,000,000 Euro Alternative 2. Rental 20 electric vehicle rental services will be obtained by the municipality. In this tender which will be 24-36 months alternative, maintenance, repair, insurance etc. expenses of the vehicles will be covered by the service provider. Cost: The cost to the municipality will be quite low compared to the purchase.
Monitoring / measurement of progress	Utilization of 20 e-vehicles will result in lower CO₂, air pollutant emissions and reduction in energy costs in fleet management. The progress and result will be followed through monitoring of; • Annual total energy consumption and energy costs of 20 e-vehicles • Energy costs and CO₂ emission reduction of 20 e-vehicles per Km • Annual maintenance cost of 20 e-vehicles Utilization of 20 e-vehicles will supply an increase energy efficiency, environmental awareness for the utilization of e-vehicles. The progress and results will be monitor by measuring: • Impact on fuel consumption • Reduction of energy costs • Passenger numbers and total travel distances of 20 E-Vehicles
Financial scheme and business models	During the duration of the project (max. in 3 years), 20 e-vehicles will be provided by Antalya Metropolitan Municipality (ANT) in order to complement the existing municipality fleet in the city of Antalya. This process will be held by ANT and all e-vehicles will be operated by ANT. In the operation duration, they will be monitored continuously and all data will be integrated into the Antalya urban platform with the objective of applying data statistics so as to determine the performance.
Social strategy	Social strategies of this action can be summarized as follow: • To Increase the utilization of e-vehicles in municipality fleet and public acceptance of e-vehicles in daily utilization • To provide optimum travel time by using e-vehicles • To Increase sustainability use of e-vehicles and environmental awareness of the users for e-vehicle utilization • To be contributed to transportation authorities' strategic plan for e-vehicle utilization and utilization of e-vehicles

A.15: 30 e-bikes

The smart district is already planned to be pedestrian and bike friendly with a large green corridor facilitating this development. At least 30 e-bikes and charging stations in



the Antalya city which will be deployed within the project will demonstrate the feasibility of e-mobility to citizens.

Involved partners	Action leader: ANT Other MATCHUP partners: TAY, SAM, ANP
Other actions linked	A13: 2 e-buses A14: 20 e-vehicles for municipality fleet
Deviations from initial plan	Slight deviation is expected in the purchasing process. Developed suggestions for this action are presented below: Alternative 1. Purchase and operation of electric bicycles entirely by the municipality Cost: 30 EUR e-bike cost from EUR 1,200 to EUR 36,000 Alternative 2. Rental 30 electric vehicle rental services will be obtained by the municipality. In this tender which will be 24-36 months alternative, maintenance, repair, insurance etc. expenses of the vehicles will be covered by the service provider. Cost: The cost to the municipality will be quite low compared to the purchase. Alternative 3. E-scooter proposal Changing the type of transport to be taken as e-scooter is also an alternative.
Monitoring / measurement of progress	Utilization of 30 e-bikes will result in lower CO₂, air pollutant emissions and reduction in energy costs (low trip costs). The progress and result will be followed through monitoring of; • Annual total energy consumption and energy costs of 30 e-bikes per Km • CO₂ emission reduction of 30 e-bikes per Km • Annual maintenance cost of 30 e-bikes Utilization of 30 e-bikes will result an increase in energy efficiency, environmental awareness for the utilization of e-vehicles. The progress and result will be followed through monitoring of; • Impact on fuel consumption • Reduction of energy costs • Passenger numbers of 30 bikes.
Financial scheme and business models	During the duration of the project, 30 e-bikes will be provided by Antalya Metropolitan Municipality (ANT). This process will be conducted by ANT. These new 30 e-bikes will be operated by ANT. In the operation duration, they will be monitored and all data will be integrated into the Antalya urban platform with the objective of applying data statistics so as to determine the performance.
Social strategy	Social strategies of this action can be summarized as given below:



	• To Increase the utilization and acceptance of e-bikes in public transportation • To provide optimum travel time by using e-bikes in daily travel and public transportation • To Increased sustainability and environmental awareness on e-bike utilization. • To contribute transportation authorities' strategic plan for e-bike utilization as e-vehicles
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3.2.3.2 Charging stations

A.16: 5 e-vehicle charging points

This action will deal with the integration, management and monitoring of the new chargers of electric vehicles. For this purpose, 5 e-Vehicle charging stations in the district which will be deployed within the project will demonstrate the feasibility of e-mobility to citizens. Charging points will provide electric vehicles fleet operators and city managers with smart management functionalities of EVs charging points, as well as scheduling capabilities.

Involved partners	Action leader: ANT Other MAtchUP partners: TAY, SAM, ANP
Other actions linked	A17: 5 e-Bike charging stations A23: 2 e-Buses charging stations
Deviations from initial plan	Between M12 and M24, the plan changed twice. Plans, reasons for change are presented below: First Plan: As a result of the decisions taken in the negotiations with the municipality of Antalya, e-vehicle charging station locations were decided at different locations in the city center. In this aim, the locations determined in the picture below are presented.

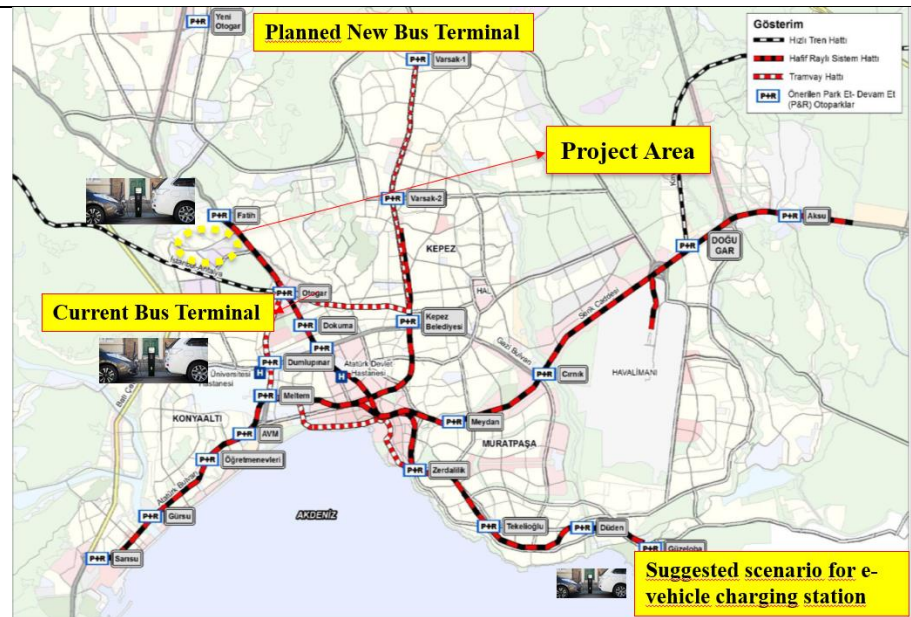


Figure 26. Locations of suggested e-vehicle charging stations (Plan 1)

As it can be seen from the Figure, an e-vehicle charging station was proposed to the new bus terminal in the Transportation Master Plan. In addition, 2 (one of the fast one normal) demo area, an existing bus station (fast), one of the city's central Muratpasa district was proposed.

In the foreground, density, dissemination and productivity were the main priorities of these proposals. However, this plan was changed upon the request of Antepe and Antalya Metropolitan Municipality and a new proposal was developed.

Second Plan:

In the new plan, 2 e-vehicle charging stations were taken to the roadside parking areas within the demo area. In this context, the proposal prepared by the demands of Antepe and Antalya Metropolitan Municipality is presented in the picture below.



Figure 27. Locations of suggested e-vehicle charging stations in Demo area (Plan 2)

While only one of the fast charging stations in the previous plan was in the demo area, 2 fast charging stations were included in the demo area in this plan.

Third Plan:

In this plan, a fast charging station in Muratpaşa were preserved within the demo area, and Konyaaltı Port and Meydan Kavağı Bus stops were added.

Another charging station, which is supposed to be in the new bus station, was cancelled considering the application time of the new bus station.

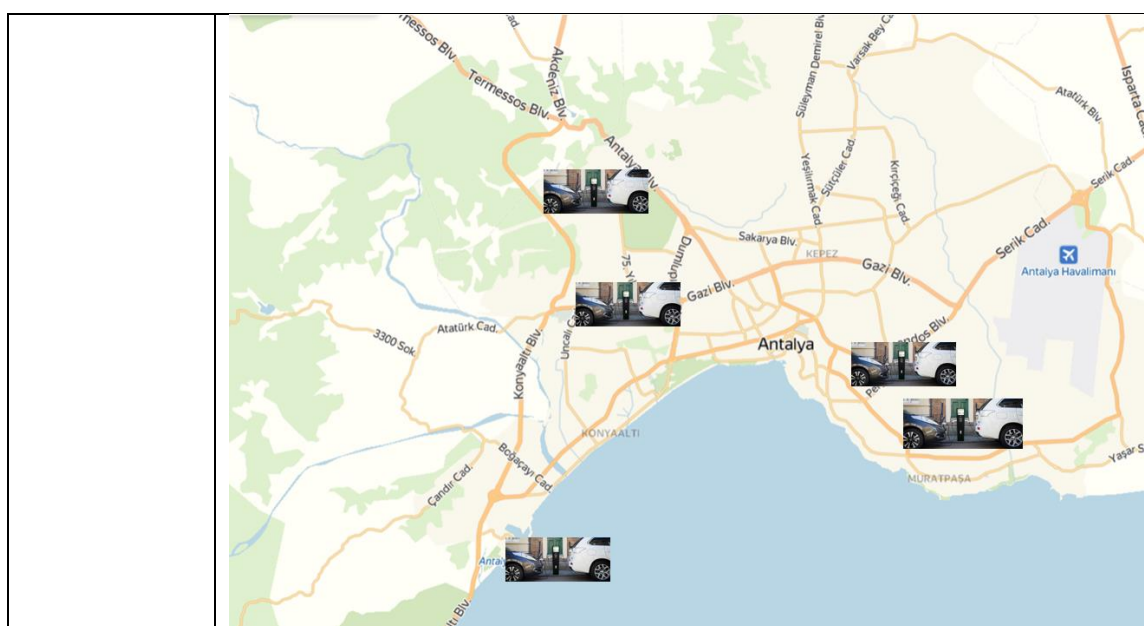


Figure 28.. Locations of suggested e-vehicle charging stations (Plan 3)

As a result of the latest interviews, e-vehicle charging station locations have been decided as shown in the picture above. These chargers will follow the standard EN61851-1/23/24 with efficiency over 95%.

Next milestones	Supply of charging stations: Reconsidering the technical specifications for procurement of charging station units by taking into account the selected vehicles and obtaining them by tender. Provision of monitoring equipment: Provision of monitoring equipment to be included in the monitoring system of existing municipal vehicles Inclusion of urban platform via web interface: Making publicly accessible applications for dissemination possible. Implementation: Application of stations by making purchases of intermediate works
Monitoring / measurement of progress	Utilization of 5 e-vehicle charging stations will result in lower CO₂, air pollutant emissions and reduction in energy costs (low trip costs). The progress and result will be followed through monitoring of; ✓ Annual total energy consumption 5 e-vehicle charging stations for 20 e-vehicles of municipality fleet ✓ Annual energy cost of 5 e-vehicle charging stations for 20 e-vehicles of municipality fleet ✓ Energy costs of 5 e-vehicle charging stations for 20 e-vehicles of municipality fleet ✓ CO₂ emission reduction of 5 e-vehicle charging stations for 20 e-vehicles of municipality fleet ✓ Performance of 5 e-vehicle charging stations for 20 e-vehicles of municipality fleet ✓ Annual maintenance costs of e-vehicle charging stations for 20

	e-vehicles of municipality fleet Utilization of 5 e-vehicle charging stations will result an increase energy efficiency, environmental awareness for the utilization of e-vehicles. The progress and result will be followed through monitoring of; ✓ Impact on fuel consumption ✓ Reduction of energy costs
Financial scheme and business models	The budget of the Antalya municipality for this action can be summarized as given below: <u>E-vehicle charge station monitoring & control equipment</u> Eligible equipment according innovation criteria (innovative monitoring equipment) Eligible budget: 36,750 € Depreciation (Total Cost: 49,000 € - Duration: 4 year - Use in the project 3 year – Depreciation ratio: 75%) <u>Other goods</u> Antalya - Action 16: 5 e-vehicle charging stations (monitoring) Electronic equipment for integrating city level PV-storage - Eligible budget: 5,000 € <u>Subcontract.</u> Antalya - Action 16: 5 e-vehicle charging stations (monitoring) Integration and commissioning of monitoring equipment – Eligible budget: 5,000 €
Social strategy	Social strategies of this action can be summarized as given below: ✓ Increased the utilization of e-vehicle charging stations ✓ Increased public acceptance of e-vehicles in transportation activities ✓ Provided optimum travel time by using effective e-vehicle charging stations ✓ Increased sustainability use of e-vehicles ✓ Increased environmental awareness of users on e-vehicles ✓ Contributed to transportation authorities' strategic plan on e-vehicles and their charging stations ✓ Contributed the utilization of e-vehicles

A.17: 5 e-bike charging stations

This action will deal with the integration, management and monitoring of the new chargers of e-bikes. For this purpose, 5 e-Bike charging stations in the district which will be deployed within the project will demonstrate the feasibility of e-mobility to



citizens. All the recharging points will be distributed across the intervention district, including the multimodality hubs. As well, the monitoring data from the charging stations will be integrated in the Antalya urban platform.

Involved partners	Action leader: ANT Other MATCHUP partners: TAY, SAM, ANP
Other actions linked	A16: 5 e-vehicle charging stations A23: 2 e-Buses charging stations
Deviations from initial plan	Between M12 and M24, the plan changed twice. Plans, reasons for change are as follows: First Plan: E-bike charging station locations are shown in the figure below. Planned bus station area, demo area, University Campus area, Konyaalti and Meydan stop areas e-bike charging station locations have been proposed.  Figure 29.. Locations of suggested e-bike charging stations (Plan 1) Second Plan: In this plan, the proposal prepared by the demands of Antep and Antalya Metropolitan Municipality is presented in the picture below.

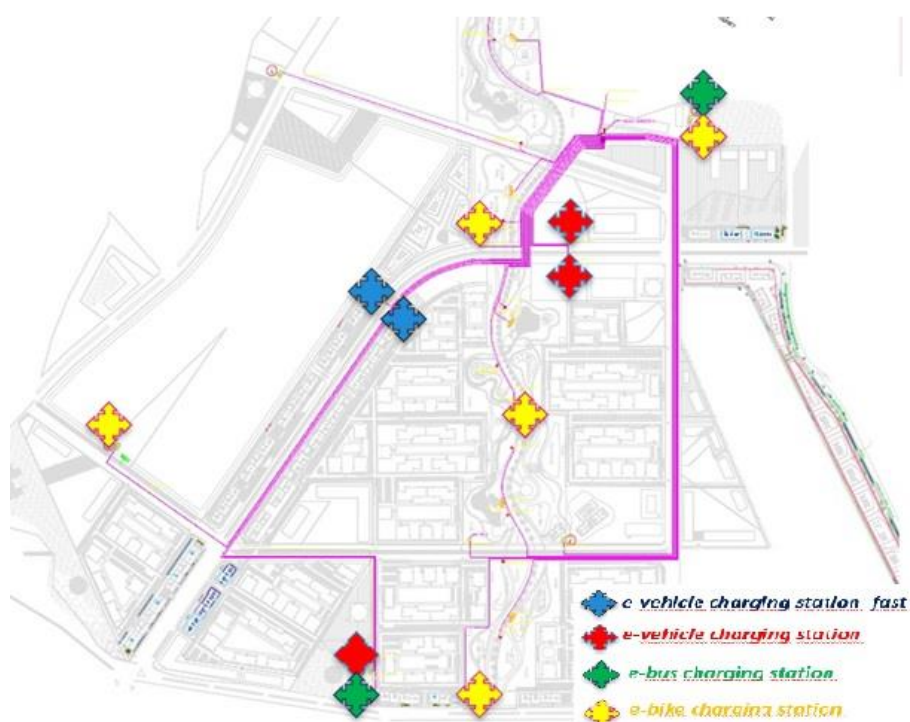


Figure 30.. Locations of suggested e-bike charging stations (Plan 2)

According to this plan; e-bike charging station units are located in the green band, 1 of which is a religious facility, 1 of which is a training area and 3 of which are within the study area.

Next milestones

Supply of Charging Stations: Reconsidering the technical specifications for procurement of charging station units by taking into account the selected vehicles and obtaining them by tender.

Provision of monitoring equipment: Provision of monitoring equipment to be integrated into the existing municipal bicycle system

Inclusion of urban platform via web interface: Making publicly accessible applications for dissemination possible.

Implementation: Application of stations by making purchases of intermediate works.

Monitoring / measurement of progress

Utilization of 5 e-bikes charging stations will result in lower CO₂, air pollutant emissions and reduction in energy costs (low trip costs). The progress and result will be followed through monitoring of;

- ✓ Annual total energy consumption of 5 e-bike charging stations for 30 e-bikes
- ✓ Annual energy cost of 5 e-bikes charging stations for 30 e-bikes
- ✓ Energy costs of 5 e- bikes charging stations for 30 e-bikes
- ✓ CO₂ emission reduction of 5 e- bikes charging stations for 30 e-bikes

	✓ Performance of 5 e-bikes charging stations for 30 e-bikes ✓ Maintenance cost of 5 e-bikes charging stations for 30 e-bikes Utilization of 5 e-bikes charging stations will result an increase energy efficiency, environmental awareness for the utilization of e-vehicles. The progress and result will be followed through monitoring of; ✓ Impact on fuel consumption ✓ Reduction of energy costs
Financial scheme and business models	The budget of the Antalya municipality for this action can be summarized as given below: Action 17: 5 e-bikes charging stations (monitoring) 5 e-bike charge station monitoring & control equipment Eligible equipment according innovation criteria (innovative monitoring equipment) Eligible budget: 36,750 € Depreciation (Total Cost: 49,000 € - Duration: 4 year - Use in the project 3 year - Depreciation ratio: 75%)
Social strategy	Social strategies of this action can be summarized as given below: ✓ Increased the utilization of e-bike charging stations ✓ Increased public acceptance of e-bikes in transportation ✓ Provided optimum travel time by using effective e-bike charging stations ✓ Increased sustainability use of e-bikes by the users ✓ Increased environmental awareness on e-bikes ✓ Contributed to transportation authorities' strategic plan on e-bikes ✓ Contributed the utilization of e-vehicles

A.23: 2 e-bus charging stations

This action will deal with the integration, management and monitoring of the new chargers of electric vehicles. For this purpose, 2 e-buses charging stations in the district which will be deployed within the project will demonstrate the feasibility of e-mobility to citizens. The recharging points will be distributed across the intervention district, including the multimodality hubs. In addition, e-bus charging station at the district will be connected to PV system and electricity storage system.

Involved partners	Action leader: ANT Other MATchUP partners: TAY, SAM, ANT
Other actions linked	A16: 5 e-Vehicle charging stations



	A17: 5 e-Bike charging stations
Deviations from initial plan	Between M12 and M24, the plan changed twice. Plans, reasons for change are presented below: First Plan: In the first plan, charging station locations for electric buses were determined as the bus station area of the square junction with the existing bus station area.  Figure 31.. Locations of suggested e-bus charging stations (Plan 1) The main objective here is to support the efficient operation of new electric buses, taking into account the planned routes. However, a new plan was prepared as a result of the discussions on the change of the plan. Second Plan: The electric bus charging stations are located in and around the demo area. The planned new charging stations are shown in the following figure.

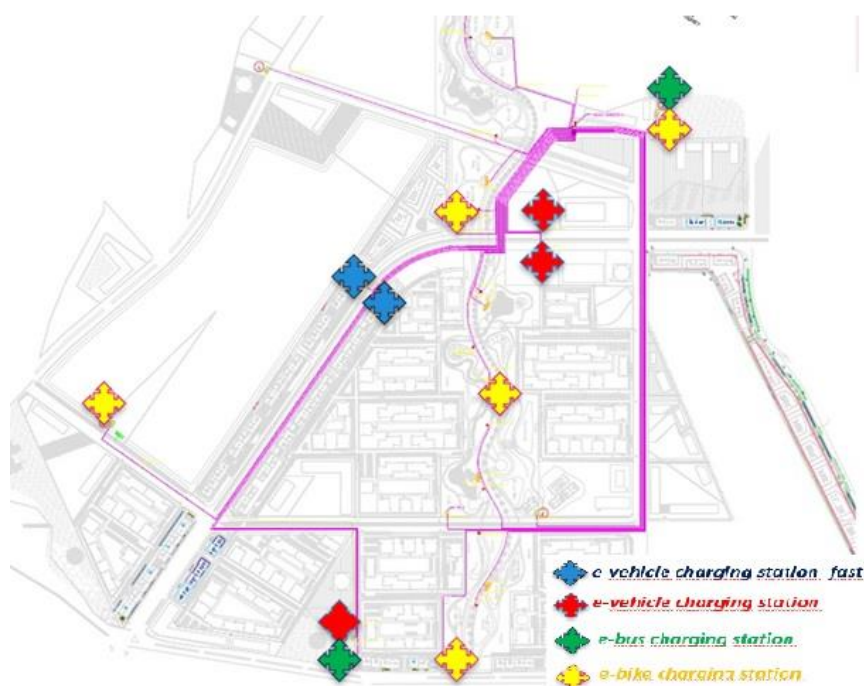


Figure 32.. Locations of suggested e-bus charging stations (Plan 2)

The areas marked green to indicate the location of the proposed e-charging station in this plan.

Third Plan:

It is the same as the locations agreed on first plan.

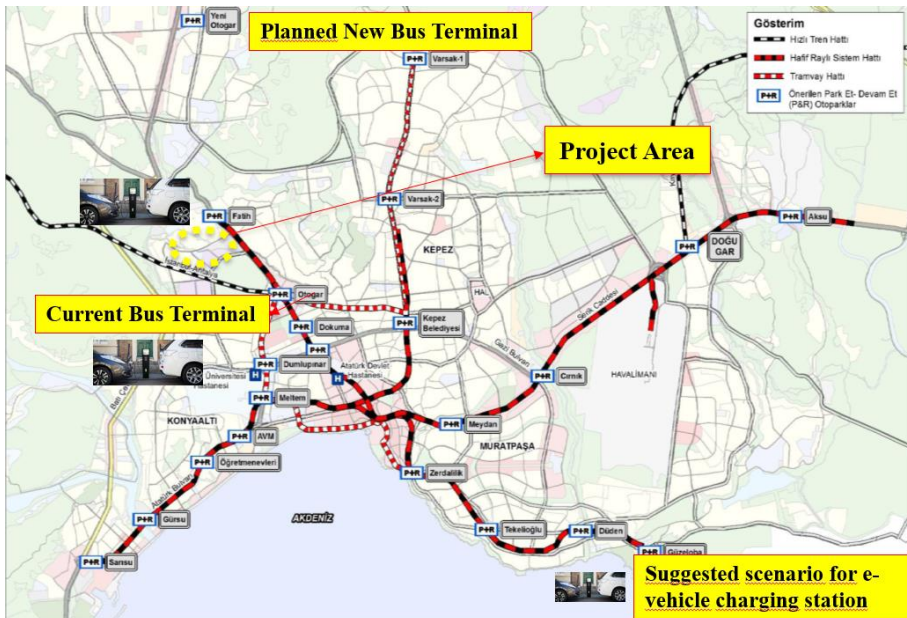
Next milestones	Supply of Charging Stations: Reconsidering the technical specifications for procurement of charging station units by taking into account the selected vehicles and obtaining them by tender. Provision of monitoring equipment: Provision of monitoring equipment to be integrated into the existing municipal public transport system Inclusion in urban platform via web interface: Including public transportation system internet applications currently used. Implementation: Application of stations by making purchases of intermediate works.
Monitoring / measurement of progress	Utilization of 2 e-bus charging stations will result in lower CO₂, air pollutant emissions and reduction in energy costs (low trip costs). The progress and result will be followed through monitoring of; ✓ Annual total energy consumption 2 e-bus charging stations for 2 e-bus. ✓ Annual energy cost of 2 e-bus charging stations for 2 e-bus. ✓ Energy costs of 2 e-bus charging stations for 2 e-bus. ✓ CO₂ emission reduction of 2 e-bus charging stations for 2 e-bus. ✓ Performance of 2 e-bus charging stations for 2 e-bus.

	✓ Maintenance cost of 2 e-bus charging stations Utilization of 2 e-bus charging stations will result an increase energy efficiency, environmental awareness for the utilization of e-vehicles. The progress and result will be followed through monitoring of; ✓ Impact on fuel consumption ✓ Reduction of energy costs
Financial scheme and business models	The budget of the Antalya municipality for this action can be summarized as given below: <u>Equipment</u> Antalya - Action 23: 2 e-buses charging stations (monitoring) 2 e-bus charge station monitoring control equipment Eligible equipment according innovation criteria (innovative monitoring equipment) Eligible budget: 11,640 € Depreciation (Total Cost: 15,520 € - Duration: 4 year - Use in the project 3 year – Depreciation ratio: 75%) <u>Other goods</u> Antalya - Action 23: 2 e-bus charging stations (monitoring) Electronic equipment for integrating city level PV-storage - Eligible budget: 2,000 € <u>Subcontract.</u> Antalya - Action 23: 2 e-bus charging stations (monitoring) Integration and commissioning of monitoring equipment – Eligible budget: 2,000 €
Social strategy	Social strategies of this action can be summarized as given below: ✓ Increased the utilization of e-bus charging stations ✓ Increased public acceptance of e-bus in transportation ✓ Provided optimum travel time by using effective e-bus charging stations ✓ Increased sustainability use of e-bus in transportation ✓ Increased environmental awareness about the utilization of e-bus in transportation ✓ Contributed to transportation authorities' strategic plan on e-bus utilization in transportation ✓ Contributed the utilization of e-vehicles in transportation

3.2.3.3 Demand management: EV-to-grid / grid-to-EV

A.18: Management of charging systems

The integration of data coming from the monitoring equipment of the Action 16 and Action 17 will be developed under this action in order to feed the Antalya urban platform. Besides, with the information that comes from the monitoring system, a demand management service will be implemented as an urban platform service with the objective of optimally managing the charging demand from the EV and charging systems. In this way, the service will provide smart charging functionalities to the stakeholders, including scheduling and billing activities in order to perform demand management operations to optimize the use of the grid.

Involved partners	Action leader: SAM Other MATCHUP partners: TAY, ANT, ANP
Other actions linked	A22: Management of e-fleet
Deviations from initial plan	Between M12 and M24 months, the plan changed twice. Plans, reasons for change are presented as follows: First Plan: As a result of the decisions taken in the negotiations with the municipality of Antalya, e-vehicle charging station locations were decided to be made at different locations in the city center. In this context, the locations determined in the picture below are presented.  Figure 33.: Locations of suggested e-vehicle charging stations (Plan 1) As it can be seen from the Figure, 1 e-vehicle charging station was proposed to the new bus terminal in the Transportation Master Plan. In

addition, 2 (one of the fast one normal) demo area, 1 existing bus station (fast), one of the city's central Muratpaşa district was proposed.

In the foreground, density, dissemination and productivity were the main priorities of these proposals. However, this plan was changed upon the request of Antepe and Antalya Metropolitan Municipality and a new proposal was developed.

Second Plan:

In the new plan, 2 e-vehicle charging stations were taken to the roadside parking areas within the demo area. In this context, the proposal prepared by the demands of Antepe and Antalya Metropolitan Municipality is presented in the picture below.

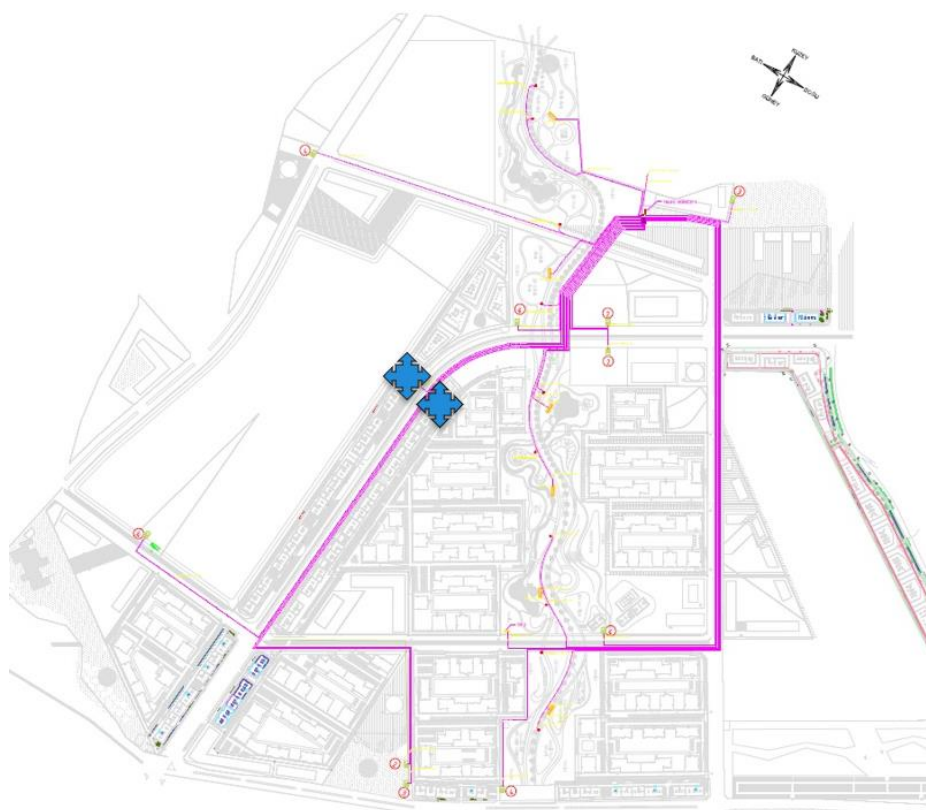


Figure 34.: Locations of suggested e-vehicle charging stations in Demo area (Plan 2)

While only one of the fast charging stations in the previous plan was in the demo area, 2 fast charging stations were included in the demo area in this plan.

Third Plan:

In this plan, 1 fast charging station and Muratpaşa, existing bus station stations were preserved within the demo area, and Konyaaltı Port and Meydan Kavağı Bus stops were added.

Another charging station, which is supposed to be in the new bus station, was cancelled considering the application time of the new bus station.

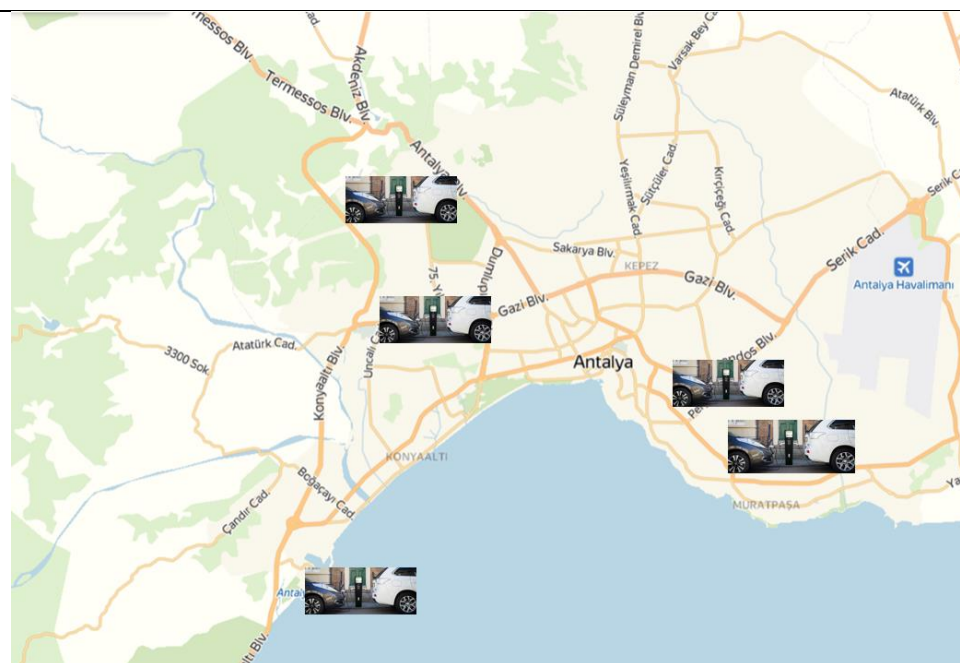


Figure 35.: Locations of suggested e-vehicle charging stations (Plan 3)

As a result of the latest interviews, e-vehicle charging station locations have been decided as shown in the picture above.

Next milestones	Supply of Charging Stations: Reconsidering the technical specifications for procurement of charging station units by taking into account the selected vehicles and obtaining them by tender. Provision of monitoring equipment: Provision of monitoring equipment to be included in the monitoring system of existing municipal vehicles Inclusion of urban platform via web interface: Making publicly accessible applications for dissemination possible. Implementation: Application of stations by making purchases of intermediate works.
Monitoring / measurement of progress	Utilization of charging systems will result in lower CO₂, air pollutant emissions and reduction in energy costs. The progress and result will be followed through monitoring of; ✓ Annual total energy consumption all e-vehicle types (Including e-busses and e-bikes) ✓ Annual energy cost of all e-vehicle types (Including e-busses and e-bikes) ✓ Energy costs of all e-vehicle types (Including e-busses and e-bikes) per Km ✓ CO₂ emission reduction (including 5 e-vehicles and 5 e-bikes charging stations) per Km ✓ Annual maintenance and management cost (including 5 e-vehicles and 5 e-bikes charging stations) Utilization of charging systems will result an increase on energy efficiency, environmental awareness for the utilization of all e-vehicle

	types (Including e-busses and e-bikes). The progress and result will be followed through monitoring of; ✓ Impact on fuel consumption ✓ Reduction of energy costs ✓ Passenger numbers of all e-vehicle types (Including e-busses and e-bikes) (Daily, Monthly and Annually). ✓ Total travel distance of all e-vehicle types (Including e-busses and e-bikes) (Daily, Monthly and Annually).
Financial scheme and business models	Electronic equipment for integrating city level PV-storage - Eligible budget: 5,000 € Integration and commissioning of monitoring equipment – Eligible budget: 5,000 €
Social strategy	Social strategies of this action can be summarized as given below: ✓ Increased the utilization all e-vehicle types (Including e-busses and e-bikes) by supplying quality charging systems and effective operation and management ✓ Increased public acceptance all e-vehicle types (Including e-busses and e-bikes) in daily utilization by supplying quality charging systems and effective operation and management ✓ Provided optimum travel time by using all e-vehicle types (Including e-busses and e-bikes) by supplying quality charging systems and effective operation and management ✓ Increased sustainability use of all e-vehicle types (Including e-busses and e-bikes) by supplying quality charging systems and effective operation and management ✓ Contributed to transportation authorities' strategic plan on e-vehicles (Including e-busses and e-bikes) ✓ Contributed the utilization of e-vehicles by supplying quality charging systems and effective operation and management

A.22: Management of e-fleet

Through the data monitored from the e-buses, a new service on top of the urban platform will be developed with two objectives: management of the e-fleet and optimally manage the charging activities for this e-fleet. In this sense, the manager will be able to schedule the charging and circulation of the e-fleet with the goal of maximizing the battery use.

Involved partners	Action leader: SAM Other MAtchUP partners: TAY, ANT, ANP
Other actions linked	A18: Management of charging systems.



Progress Deviations initial plan	and from	In the municipal fleet, electric vehicles used in the past have not performed successfully. Due to insufficient charging stations, vehicles were used for a short time and returned. In this study, the location of the charging stations has been carefully chosen for the efficient use of electric vehicles. In addition, long battery life will be preferred by paying attention to the technology used in vehicles. Up to the present; - The waiting and charging points of the vehicles are determined. - The data to be collected from the vehicles were determined. - Work plans for monitoring and data transfer have been completed. There are no deviations or time delays expected for Action 22.
Next milestones		The supply process of the vehicles will be initiated - Monitoring equipment will be installed on vehicles - Monitoring and data transfer tests will be performed. - The monitoring process will be started by transferring to the whole very urban platform.
Monitoring measurement of progress	/	Utilization of e-bus and e-bus charging stations will result in lower CO₂, air pollutant emissions and reduction in energy costs. The progress and result will be followed through monitoring of; ✓ Annual total energy consumption of fleet (Including e-bus and e-bus charging stations) ✓ Annual energy cost of fleet (Including e-bus and e-bus charging stations) ✓ Energy costs of fleet (Including e-bus and e-bus charging stations) per Km ✓ CO₂ emission reduction of fleet (Including e-bus and e-bus charging stations) per Km ✓ Annual maintenance cost of fleet (Including e-bus and e-bus charging stations) Utilization of fleet will result an increase energy efficiency, environmental awareness for the utilization of e-bus. The progress and result will be followed through monitoring of; ✓ Impact on fuel consumption ✓ Reduction of energy costs ✓ Passenger numbers of e-bus (Daily, Monthly and Annually). ✓ Total travel distance of e-bus (Daily, Monthly and Annually).
Financial and	scheme business	There is a budget of 9,000 € for the monitoring costs to be used after the supply of vehicles and communication costs with the



models	web-based application. The total cost is € 12,000. Duration: 4year - Use in the project 3year - Depreciation ratio: 75%
Social strategy	Social strategies of this action can be summarized as given below: ✓ Increased the utilization of e-fleet by supplying good and effective charging systems, operation and management activities ✓ Increased public acceptance of e-fleet by supplying good and effective charging systems, operation and management activities ✓ Provided optimum travel time by using e-fleet by supplying good and effective charging systems, operation and management activities ✓ Increased sustainability use of e-fleet by supplying good and effective charging systems, operation and management activities ✓ Increased environmental awareness about e-fleet ✓ Contributed to transportation authorities' strategic plan about e-fleet and e-fleet management ✓ Contributed the utilization of e-vehicles by supplying good and effective charging systems, operation and management activities

3.2.3.4 Multi-modality

A.19: 2 multimodal hubs

This innovative concept will increase the capability of the city in terms of sustainable mobility. Then, 2 multimodal hubs will be built in city center and new built in the city center and Kepez Santral zones. These multi modal hubs will allow the shift between sustainable public transports such as e-Buses and e-Bikes, including EV chargers. The ultimate goal is to allow citizens to use sustainable mobility in the daily journeys.

Involved partners	Action leader: ANT Other MATCHUP partners: TAY, ANP, SAM
Other linked actions	A.20. Integrating existing Light Rail with e-Bike Station and Bus Transport A.21. Applying Last mile delivery for citizens via integration of e-Bike Station with the Light Rail Station
Deviations from initial plan	The rail system planned to make a route in the demo area has been removed from the project. For this reason, the project is currently being developed in the area north of the demo area, which is the last stop of the rail system. In this context, the Department of Transportation of the Antalya Metropolitan



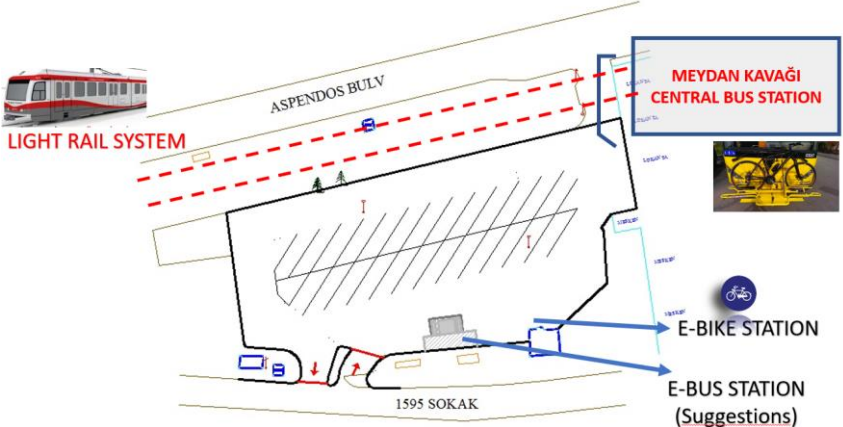
	Municipality and the mobility partner TAY will complete their work together and will be finalized with the energy partner DEM. Further grand applications planned for more mobility hubs and further expenses covered by own capital resources.
Next milestones	- The supply process of the vehicles will be initiated - Monitoring equipment will be installed on vehicles - Monitoring and data transfer tests will be performed. - Application phase will be started. The monitoring process will be started by transferring to the whole very urban platform
Monitoring measurement of progress	Utilization of charging systems and e-vehicles will result in lower CO₂, air pollutant emissions and reduction in energy costs. The progress and result will be followed through monitoring of; • Annual total energy consumption, energy cost of all e-vehicle types and charging stations all e-vehicle types and charging stations (Including e-buses and e-bikes) • CO₂ emission reduction (including e-vehicles and charging stations) per Km • Annual maintenance and management cost Utilization of charging systems and e-vehicles will result an increase on energy efficiency, environmental awareness for the utilization of all e-vehicle types (Including e-buses and e-bikes) and multimodal hubs. The progress and result will be followed through monitoring of; • Impact on fuel consumption • Reduction of energy costs • Passenger numbers of all e-vehicle types • Total travel distance of all e-vehicle types • Total Multimodal Hub activities of the passengers by using e-vehicles
Financial scheme and business models	During the duration of the project (in 3 years), all e-vehicle types and e-charging stations (Including e-buses and e-bikes) will be provided by Antalya Metropolitan Municipality (ANT). All the durations of this process will be conducted by ANT. Therefore, e-vehicle types and their charging stations will only be operated by ANT. Additionally, the management process of this process will also be conducted by SAM. All obtained data from the operation duration will directly be integrated to Antalya Urban Platform. Hence the performance of two multimodal hubs will be determine by using all obtained data.
Social strategy	Social strategies of this action can be summarized as given below: • To increase the capability of the city in terms of sustainable mobility and the shift between sustainable public transports such as e-Buses and e-Bikes, including EV chargers • To Increase the utilization of sustainable mobility in the daily journeys. • To increase the utilization all e-vehicle types (Including e-buses and e-bikes) by supplying quality charging systems and effective operation and management for the multimodal hubs • To Increase the public acceptance all e-vehicle types in daily

	utilization by supplying quality charging systems and effective operation and management • To provide the optimum travel time by using all e-vehicle types by supplying quality charging systems and effective operation and management • To increase sustainability use of all e-vehicle types by supplying quality charging systems and effective operation and management • To contribute to transportation authorities' strategic plan on e-vehicles and multimodal hubs
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A.20: Integrating existing light rail with e-bike station and bus transport

Following the same concept of multimodal hubs, this action treats the integration of a shift station where citizens would be capable of shifting between light rail public transport, e-Bike station (including the chargers) and bus transport stations inside the Kepez Santral urban transformation region. Both will be integrated providing sustainable mobility to the citizens

Involved partners	Action leader: ANT Other MATCHUP partners: TAY, ANP, SAM
Other actions linked	A.19: 2 Multimodal Hubs A.21. Applying Last mile delivery for citizens via integration of e-Bike Station with the Light Rail Station
Progress and Deviations from initial plan	The integration was determined by using all current data but to determine final location study is still continue. Additionally, determining process of technical specifications (technical standards for purchasing) for e-Bikes and e-Bus are still continue according to the project calendar. After completing purchase all vehicles and chargers, the integration performance of Light Rail with e-bike station and bus transport will be examined and evaluated. In line with the new planning, the light rail route in the demo area was changed by the municipality. In the new plan, the light rail system, which is planned to pass through the demo area, was cancelled. Meetings were held with Antalya Metropolitan Municipality in order to develop solutions for this new situation and new alternatives were produced. In this period, the rail system in the demo area has been removed as mentioned in the initial plan. For this purpose, some meetings were held with Antalya Metropolitan Municipality (ANT) in order to develop solutions for the new situation and new alternatives were produced. For this purpose, new suitable locations are proposed (previous suggested locations were changed) to integrate existing light rail with e-bike station and bus transport by consulting the ANT. It is planned to move the area to the north of the demo area, which is currently a triage area, by making a new planning. Efforts are underway to ensure that the electrical infrastructure is appropriate and applicable to this situation. It is planned to move the area to the north of the demo area, which is currently a triage area, by making a new planning. Studies are still continuing to ensure that the

	electrical infrastructure is appropriate and applicable to this new situation. Central Bus Stations - Rail system - Tire wheel system (electric) - Bike integration is recommended.  Figure 36. Integration Train-Bike.
Monitoring / measurement of progress	Utilization of e-vehicles and charging systems will result in lower CO₂, air pollutant emissions and reduction in energy costs. The progress and result will be followed through monitoring of; • Annual total energy consumption all e-vehicle types (Including e-busses and e-bikes) • CO₂ emission reduction per Km • Annual maintenance and management cost Utilization of charging systems and e-vehicles will result an increase on energy efficiency, environmental awareness for the utilization of all e-vehicle types (Including e-buses and e-bikes) and multimodal hubs. The progress and result will be followed through monitoring of; • Impact on fuel consumption • Reduction of energy costs • Passenger numbers and Total travel distance of all e-vehicle types • Total Multimodal Hub activities of the passengers by integrating existing light rail with e-Bike station and bus transport
Financial scheme and business models	Changing the position of the integration point does not have a negative impact on the current finance and business model of the project. Integration points will be completed after providing charging station, electric vehicles and other equipment according to its own budget and business plan.
Social strategy	Social strategies of this action can be summarized as given below: • To increase the capability of the city in terms of sustainable mobility and the shift between sustainable public transports existing light rail with e-Bike station and bus transport • To increase the utilization of sustainable mobility in the daily journeys. • To Increase the utilization all e-vehicle types (Including e-buses and e-bikes) by supplying quality charging systems and

	effective operation and management for the multimodal hubs • To Increase the public acceptance all e-vehicle types in daily utilization by using existing light rail with e-Bike station and bus transport • To provide the optimum travel time by using all e-vehicle types by supplying existing light rail with e-Bike station and bus transport • To increase sustainability in use of all e-vehicle types by supplying existing light rail with e-Bike station and bus transport • To contribute transportation authorities' strategic plan on e-vehicles and multimodal hubs by integrating existing light rail with e-bike station and bus transport
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A.21: Applying last mile mobility for citizens via integration of e-bike station with the light rail station

According to the Action 20, this Intelligent Transport System will be implemented into the Antalya urban platform with the objective of providing citizens with a service for last mile delivery by means of shifting between rail and e-Bikes. This service will also allow the shifting between fossil fuel vehicles towards e-Bikes. In this way, the action will contribute to the reduction of energy consumption by reducing the use of fossil vehicles, noise levels, pollution and traffic congestion.

Involved partners	Action leader: ANT Other MAtchUP partners: TAY, ANP, SAM
Other actions linked	A.19: 2 Multimodal Hubs A.20. Integrating existing Light Rail with e-Bike Station and Bus Transport
Deviations from initial plan	The biggest challenge we face in planning and implementation is the long decision-making process. Administrative differences, differences in needs of the city and financially delayed implementation of municipal priority business plans. In this sense, lagging behind the implementation time of the project will shorten the time required for monitoring. We estimate that our data may be limited due to the decrease in the collected data. The planned light rail system within the demo area was canceled in accordance with the plans of the new local government. Last mile application was planned to be implemented in the demo area. This cancelled rail system would be the continuation of the system, which is currently the last stop north of the demo area. According to our new proposal, electric bicycle station area planning is made at the last stop of the rail system. Plans will be updated by TAY with the overlap of the current and proposed situation. In order to make the electrical infrastructure suitable and applicable to this situation, TAY studies will continue with DEM.

Next milestones	To determine the performance of this integration and supply necessary information for citizens, a new Antalya urban platform is being developed. This platform will have an objective to apply data statistics of e-Bikes and light rail integration so as to determine the performance of integration. For this action, there is no need many specifications. Because this platform needs e-Vehicles and e-charger utilization data. After all purchases completed utilization data will be collected and then all information will be summarized and shared in this platform for the authorities and citizens. To work on this action will began after completed all related previous actions.
Monitoring / measurement of progress	Utilization of charging systems will result in lower CO₂, air pollutant emissions and reduction in energy costs. The progress and result will be followed through monitoring of; ✓ Annual total energy consumption e-bikes and light rail integration ✓ Annual energy cost of e-bikes and light rail integration ✓ Energy costs of e-bikes and light rail integration per Km ✓ CO₂ emission reduction of e-bikes and light rail per Km ✓ Annual maintenance and management cost for all e-bikes and light rail Integration of e-Bike Station with the Light Rail Station will result an increase on energy efficiency, environmental awareness for the utilization of e-Bikes and light rail integration. The progress and result will be followed through monitoring of; ✓ Impact on fuel consumption ✓ Reduction of energy costs ✓ Passenger numbers of e-Bikes and light rail integration (Daily, Monthly and Annually). ✓ Total travel distance of e-Bikes and light rail integration (Daily, Monthly and Annually).
Financial scheme and business models	During the duration of the project (in 3 years), all e-vehicle types (Including e-bikes) will be bought by Antalya Metropolitan Municipality (ANT). This process will be conducted by ANT. These all new e-bikes will be operated by ANT and the management process of charging systems will be conducted by SAM. In the operation duration, they will be monitored and all data will be integrated into the Antalya urban platform with the objective of applying data statistics of e-Bikes and light rail integration so as to determine the performance.
Social strategy	Social strategies of this action can be summarized as given below: ✓ Increased the capability of the city in terms of mobility ✓ Increased the shift between sustainable public

	transports such as e-Bikes and existing light rail ✓ Increased the utilization of mobility in the daily journeys. ✓ Increased the utilization all e-vehicle types (Including e-bikes) by supplying quality charging systems and effective operation and management for the multimodal hubs ✓ Increased public acceptance about the integration of e-bikes and light rail integration ✓ Provided optimum travel time by using e-bikes and light rail integration ✓ Increased sustainability use of e-bikes and light rail integration ✓ Contributed to transportation authorities' strategic plan on integration e-bikes and light rail
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3.2.4 Non-technical interventions

3.2.4.1 Policy improvements

A.24: City policies update: taxes, subsidies, traffic management and electro-mobility promotion e-vehicle charging points

According to all the developments in MAtchUP several changes on the city policies will be developed in Antalya. Metropolitan Municipalities have no authority to alter tax structures and legislation changes can be done by the central government, so different actions will be targeted. For example, the opportunity to affect what are termed "plan notes" inserted into spatial development plans, will be realized. These "notes" allow special provision to be enacted by the local government in the construction of buildings particularly for new construction. Another modification will define and combine new schemes for public or private subsidies and loans to foster private investments in energy efficiency; once analysed the results that can be used to improve these local policies, strategies, institutional responsibilities, etc. In the case of Turkey, the successful PPP practice in the health and infrastructure sectors will be thoroughly analysed for EE/RES investments and uptake. Lastly, new policies to promote the adoption of sustainable mobility in the city will be developed, including new clauses in municipal tenders that will include the promotion and use of e-Vehicles & e-Chargers. Throughout the whole project, discussions in experts' panels consisting in SME, industry, public authorities, science and research institution representatives will be made, to prepare fertile ground for these new policies in Antalya.

Involved partners	Action leader: ANT Other MAtchUP partners: SAM, DEM, TAY, AKD, ANP
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Other actions linked	Action .30. PPP modelling guidelines for creating smart districts via urban transformation A31. Antalya Upscaling Plan
Deviations from initial plan	According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	Between [M36] – [M60]: New policies on Antalya city council (D4.11) Between [M36]-[M60]: Local dissemination and transferability in Antalya
Monitoring / measurement of progress	Until 09/2022 [M60]: Continuous monitoring and evaluation
Financial scheme and business models	Will be financed by Antalya Metropolitan municipality
Social strategy	Will be defined later

A.25: Single window/desk for energy retrofitting and high energy performance greenfield construction

The most important barrier to the implementation of energy efficiency and renewable technologies in the building sector in Turkey has been identified as the information gap. A new platform that comprises a major simplification of the refurbishment process concerning technical, administrative and funding aspects will be implemented to reach a high potential for local individual initiatives. The idea is to create an information and support system legitimized by the local government that satisfies different situations and meets the needs of individuals: simplification of procedures to access support and funding, improving readability of the past and finally structuring supply companies towards individuals and construction firms.

Involved partners	Action leader: ANT Other MAtchUP partners: SAM, DEM, TAY, AKD, ANP
Other actions linked	
Deviations from initial plan	There are no deviations or time delays expected for Action 25.



Next milestones	Between [M36] – [M60]: New policies on Antalya city council (D4.11) Between [M36]-[M60]: Local dissemination and transferability in Antalya
Monitoring / measurement of progress	The successful implementation of single/window desk.
Financial scheme and business models	The action will be funded by Antalya Municipality.
Social strategy	Through successful implementation will simplify procedures to access support and funding, improve rehabilitation and create information and support system.

A.26: Smart district-level energy renaissance strategy

Antalya will adopt, based on the existing solutions and lessons learned from the interventions, a model and strategy for district-level energy renovation for Antalya. The model considers technical interventions as well as urban planning interventions like densification and mobility planning. The strategy is based on the project evidence, and open data to be produced in **[Action 39]**.

Involved partners	Action leader: ANT Other MATchUP partners: SAM, DEM, TAY, AKD, ANP
Other actions linked	A39: New open data gateway
Deviations from initial plan	There are no deviations or time delays expected for Action 26.
Next milestones	Between [M36] – [M60]: New policies on Antalya city council (D4.11) Between [M36]-[M60]: Local dissemination and transferability in Antalya
Monitoring / measurement of progress	The successful adaptation of a model and strategy for district level energy renovation for Antalya
Financial scheme and business models	The action will be funded by Antalya Municipality and the MATchUP project.



Social strategy	Will be completed in line with the strategy implementation.
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3.2.4.2 Innovative Businesses

A.28: Lighthouse economic and social living lab

MATCHUP combines a whole range of social, technical, and financial changes that in reality make up an urban living lab in which the reality of the future is tested in all the above indicated categories. Especially proper for the replication and spread of suggested socio-technical features is the fact that they have to be creative and innovative to crack the present status of slow acceptance regarding energy efficiency and climate friendly technologies and some applications. This concept will be to create niches on transformation of market which are economically and socially acceptable.

Involved partners	Action leader: Antalya Other MATCHUP partners: SAM, DEM, TAY, AKD, ANP
Other actions linked	A25. Single window/desk for energy retrofitting and high energy performance greenfield construction A29. Demand management living lab
Deviations from initial plan	According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	Between [M36] – [M60]: New policies on Antalya city council (D4.11) Between [M36]-[M60]: Local dissemination and transferability in Antalya
Monitoring / measurement of progress	The successful implementation of lighthouse economic and social living lab
Financial scheme and business models	Will be financed by Antalya Metropolitan municipality
Social strategy	Will be defined later



A.29: Demand management living lab

Demand management is affecting energy use. It is one of the crucial total efficiency issues. Moreover, it is easier for social acceptance as long as affirmative financial and economic business cases can be indicated. Demand management in building energy utilization is recognized as a leading energy efficiency intervention with user friendly interfaces of consumption, creating the energy saving behaviour. Also the same is true for EV's and charging and the users, in this case, are managers and citizens. The living lab will once again be a testing ground for the social acceptability of technical solutions besides the testing of some technical solutions themselves.

Involved partners	Action leader: Antalya Other MAtchUP partners: Sampaş, Demir, Taysim, AKD, Antepe
Other actions linked	A25. Single window/desk for energy retrofitting and high energy performance greenfield construction A28. Lighthouse economic and social living lab
Deviations from initial plan	According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	Between [M36] – [M60]: New policies on Antalya city council (D4.11) Between [M36]-[M60]: Local dissemination and transferability in Antalya
Monitoring / measurement of progress	The successful implementation of demand management living lab
Financial scheme and business models	Will be financed by Antalya Metropolitan municipality
Social strategy	Will be defined later

A.30: PPP modelling guidelines for creating smart districts via urban transformation

PPP as an innovative financial instrument that has been used widely in Turkey in the health and infrastructure sectors. Its use in the construction of large scale high-performance building stock however is novel and will need the creation of good practice examples where Metro Municipalities are leading and guiding private sector banking and construction interests for citizen friendly land valuation projects. Urban



transformation, in theory, present an excellent opportunity for this transformation that will gradually form its models in technical, economical, financial and urban planning practices in close collaboration with citizens. MAtchUP presents just such an opportunity for the city of Antalya. Solutions themselves.

Involved partners	Action leader: Antalya Other MAtchUP partners: Sampaş, Demir, Taysim, AKD, Antepe
Other actions linked	A24.City Policies Update: taxes, subsidies, traffic management and electro-mobility promotion A31. Antalya Upscaling Plan
Deviations from initial plan	According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	[Between [M12] – [M24]: D4.14: Antalya Lighthouse interventions detailed definition Between [M36]-[M60]: Local dissemination and transferability in Antalya
Monitoring / measurement of progress	The successful creation of PPP modelling guidelines
Financial scheme and business models	Will be financed by Antalya Metropolitan municipality
Social strategy	Will be defined later

3.2.4.3 Urban Planning

A.31: Antalya upscaling plan

An ambitious Upscaling plan with replication targets of the technologies that were more efficient in terms of technical, social and economic (bankable) evaluation will be developed. These technologies, once applied by MAtchUP Urban Transformation, will be outlined and planned, together with their accompanying business models that have demonstrated that their performance is in line with the expectations. The consolidated upscaling plan will of course consider the initial Antalya replication strategy submitted during the proposal phase. A refined financial plan will be provided as well, identifying technologies, financial sources (specially the accompanying business models) that once tested have shown a reduced risk. The development and final implementation of



this plan will follow a participatory process which will be citizen-centered. As the Antalya demo site is the first stage of the development of the larger New Kepez Santral Development Plan that aims at developing approximately 1.7 million sqm of land essentially for residential use, replication and upscaling will have a ready candidate.

Involved partners	Action leader: Antalya Other MAtchUP partners: SAM, DEM, TAY, AKD, ANP
Other actions linked	All Actions. Specially linked to the tasks of WP1
Deviations from initial plan	According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	A preliminary item for the draft upscaling plan.
Monitoring / measurement of progress	During the implementation process continuous monitoring will be started.
Financial scheme and business models	Will be financed by MAtchUP
Social strategy	Will be defined later as the implementations starts.

A.32: SEAP to SECAP Upgrade and monitoring of actions

Antalya Municipality is an active participant in Covenant of Mayors initiative, with an approved SEAP, and is also the first Turkish Metropolitan Municipality to have done so. Antalya is committed to continue upgrade the current SEAP version into the new SECAP, providing more ambitious targets and therefore actions and also Adaptation actions to fight against the negative effects of climate change. This new SECAP will be in line with the Upscaling plan that will be developed **[Action 31]**. The new objectives (and new time-horizon of the actions, established for 2030) of this SECAP will be in line with the new Covenant of Mayors for Climate and Energy. Antalya is also committed to monitor and update the execution of these actions. As a pioneer city regarding this upgrading process, and all the insights acquired during this process will be shared with Covenant of Mayors Office, through guidelines on monitoring and updating processes that will be developed and disseminated **[Action 38]**.



Involved partners	Action leader: DEM Other MAtchUP partners: ANT
Other actions linked	A31: Antalya upscaling plan (SECAP will be in line with the upscaling plan) A38: Collaboration with Covenant of Mayors Office to communicate SEAP and SECAP experience
Deviations from initial plan	There are no deviations or time delays expected for Action 32.
Next milestones	Until 09/2020 [M36]: Impact based evaluation of implemented actions will be finalized (T 1.3) Until 03/2022 [M54]: Through the implementation of the methods and mechanisms developed within T 1.3, replication and upscaling plans will be developed (T 1.5). Until 07/2022 [M58]: Development of a proposal of adaptation of SECAPs to urban transformation planning and monitoring (T 1.6) Until 09/2022 [M60]: Continuous monitoring and evaluation. Guidelines to improve the evaluation/update /upgrade process of the SEAPS and SECAPs (T5.10) Until 09/2022 [M60]: In parallel, to above actions; SECAP will be in core role in redefinition of policies in Antalya (T 4.7)
Monitoring / measurement of progress	The successful implementation and upgrade of SEAP to SECAP will be followed through CoM approval
Financial scheme and business models	The upgrade of SEAP to SECAP will be financed by MAtchUP project.
Social strategy	Will be defined later

A.33: Update of sustainable urban mobility plan

Antalya local team will learn from the mobility results during the course of the project and in a close collaboration with WP1, new city challenges related to the mobility sector will be identified. As Antalya is in the process of modifying its Mobility Master Plan, all these challenges will be tackled by new actions to be included in the SUMP of the city of Antalya. Again, the basis for this SUMP update will be the upscaling plan developed in Action 31, considering also the new targets included in the more ambitious SECAP version to be developed in Action 32, and the aforementioned Upscaling plan developed in Action 31.

Involved partners	Action leader: ANT Other MAtchUP partners: SAM, DEM, TAY, AKD, ANP
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Other actions linked	A31. Antalya Upscaling Plan A32. SEAP to SECAP Upgrade and monitoring of actions
Deviations from initial plan	According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	Urban mobility plan studies will be performed during the next term, after some of the related implementations
Monitoring / measurement of progress	Mobility indicators will be followed up during the mobility interventions implementations.
Financial scheme and business models	Will be financed by Antalya Metropolitan municipality and the MAtchUP project.
Social strategy	Will be defined later aligned with the mobility interventions.

3.2.4.4 Citizens'engagement

A.34: Participation – co-creation model in Antalya

A user-centric approach will be implemented in all the actions implemented during the project for citizen's engagement. Antalya already has consultative and participative urban planning practices in place that have been used for the long range strategic plans and the SEAP. These practices will be extended and refined throughout the MAtchUP Project. Co-Creation methodologies will be investigated and used for the involvement of citizens and all other stakeholders. This will be achieved through an innovation platform that combines trend spotting and foresight with idea creation and innovation management. SAM will provide their co-creation related H2020 projects experience in this action.

Involved partners	Action leader: Antalya Other MAtchUP partners: SAM, DEM, TAY, AKD, ANP
Other actions linked	All Actions.



Deviations from initial plan	According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	- The implementation of virtual co-creation tools (Decidim and others) New citizens' engagement strategies in Antalya [36] - Co-creation activities defined in citizen engagement planning D4.26 - The next workshop has been planned to be carried out in the upcoming months.
Monitoring / measurement of progress	The successful implementation of co-creation model in Antalya
Financial scheme and business models	Will be financed by Antalya Metropolitan municipality and MATCHUP project.
Social strategy	As defined in citizen engagement strategies in D4.26

A.35: Citizens' feedback channel

A channel for citizens' feedback, under the umbrella of the Urban Platform will be established to engage citizens in the process of smart transformation of urban districts. These feedback flows, already used for mobility and environmental issues will become easier to use and reach through applications during the Project. Mobile and Web feedback channels will be provided to collect citizen insights and survey channels will be opened.

Involved partners	Action leader: Antalya Other MATCHUP partners: SAM, DEM, TAY, AKD, ANP
Deviations from initial plan	According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	The implementation of virtual co-creation tools (Decidim and others) New citizens' engagement strategies in Antalya Citizen Engagement through virtual channels: - Web site of Antalya – https://www.antalya.bel.tr - Antalya demand & complaint channels – https://www.antalya.bel.tr/i/iletisim - WhatsApp, Call Center (ABİM) and MUBİM (through local district authorities) - Online E-Government Services: https://online.antalya.bel.tr/

Monitoring / measurement of progress	For the monitoring of the engagement process, we will take both qualitative and quantitative measures. Antalya Metropolitan Municipality Foreign Affairs team will be responsible to monitor the progress of each engagement activity (either virtual or F2F) with MAtchUP local partners and relevant authorities in Antalya. For qualitative measures, Antalya local monitoring task group will analyse the responses and create a list of actions generating activities or activities with high impact and report this during the quarterly reporting process. For quantitative measures, we will be using the following tools and example questions (not limited to the list below) to check the audience reached and activity responses from each of them. (see D4.12, Sec.5.2)
Financial scheme and business models	Will be financed by Antalya Metropolitan municipality and MAtchUP project.
Social strategy	The feedback channels serve as a platform that reflects citizens' needs and priorities. By these channels the transparency in the process of being a "Smart City" would be increased by involving citizens in to progress. Moreover, this involvement will lead to public acceptance and awareness about the transformation of Antalya into a "Smart City". As defined in citizen engagement strategies in D4.26

A.36: Local toolkit for production, storage and self-consumption of renewable energy at the district scale

Antalya has a very active solar community, citizens, producers and research community in the solar area. The use of solar heat for domestic use is almost universal and PV systems are widespread. In line with the actions of RES production, storage and self-consumption will be promoted (at different scales) for the citizens and institutions in Antalya. Best practices will be identified and a toolkit will be developed for the development of local renewable energy production and self-consumption projects adapted to each specific context. The tool will analyze the best business cases in renewable energy production, storage and will provide a decision support process to promote these actions. The Municipality will act as the information exchange medium in this topic.

Involved partners	Action leader: ANT
Other actions linked	
Deviations from initial plan	There are no deviations or time delays expected for Action 36.
Next milestones	Between [M36] – [M60]: New policies on Antalya city council (D4.11)



	Between [M36]-[M60]: Local dissemination and transferability in Antalya
Monitoring / measurement of progress	The successful development of a local toolkit
Financial scheme and business models	The action will be funded by Antalya Municipality.
Social strategy	The toolkit will support citizens, producers and research community in their decision-making process and promote the use and implementation of RES. The Municipality will act as the information exchange medium in this topic.

3.2.4.5 Staff exchange

A.37: City mentoring

In the course of WP1, and partially in WP7, the most important insights acquired during the project execution in Antalya will be selected for a mentoring campaign that will be promoted among the rest of cities participating in the project (Valencia, Dresden, Herzliya, Oostende, Skopje, Kerava). Not only the Municipality, but also other members of the Antalya local team will be selected as mentors so that they can explain in detail their experience and guide about the application of these topics that were identified in the other cities.

Involved partners	Action leader: ANT Other MAtchUP partners: SAM, DEM, TAY, AKD, ANP
Other actions linked	All actions
Deviations from initial plan	According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	City Mentoring activities will be defined during the implementation
Monitoring / measurement of progress	Until 09/2022 [M60]: Continuous monitoring and evaluation
Financial scheme and business models	Will be financed by Antalya Metropolitan municipality and MAtchUP project.
Social strategy	Will be defined during the implementation process.



A.38: Collaboration with Covenant of Mayors Office to communicate SEAP and SECAP experiences

Antalya will upgrade the current SEAP to SECAP (**Action 32**), monitor and update the recently approved new SECAP. During this process, guidelines to support cities in this monitoring and update process that will be based on the upscaling and replication plans will be developed. Antalya will offer collaboration to Covenant of Mayors Office, for which one of its main objectives is the encouragement of mentoring activities within the cities participating in the initiative.

Involved partners	Action leader: DEM Other MAtchUP partners: ANT
Other actions linked	A31: Antalya upscaling plan (SECAP will be in line with the upscaling plan) A32: SEAP to SECAP Upgrade and monitoring of actions
Deviations from initial plan	There are no deviations or time delays expected for Action 38.
Next milestones	Until 09/2020 [M36]: Impact based evaluation of implemented actions will be finalized (T 1.3) Until 03/2022 [M54]: Through the implementation of the methods and mechanisms developed within T 1.3, replication and upscaling plans will be developed (T 1.5). Until 07/2022 [M58]: Development of a proposal of adaptation of SECAPs to urban transformation planning and monitoring (T 1.6) Until 09/2022 [M60]: Continuous monitoring and evaluation. Guidelines to improve the evaluation/update /upgrade process of the SEAPS and SECAPs (T5.10) Until 09/2022 [M60]: In parallel, to above actions; SECAP will be in core role in redefinition of policies in Antalya (T 4.7)
Monitoring / measurement of progress	The successful implementation and upgrade of SEAP to SECAP will be followed through CoM approval
Financial scheme and business models	The upgrade of SEAP to SECAP will be financed by MAtchUP project.
Social strategy	Will be defined later.

3.2.5 Urban platform and ICT interventions

3.2.5.1 Urban Platform

A.39: New open data gateway

For Action 39, from all the developments to be implemented in MAtchUP actions in Antalya, the current existing Urban platform in Antalya must be extended, integrating new data sources from the different data acquisition systems that will be deployed. Data from the energy and mobility domains should be integrated in the vertical services of the Antalya Urban Platform and to do that, several improvements, providing new functionalities are necessary. A new open gateway for the interconnection of these datasets following the open specification concept is going to be implemented. Another new functionality is the preparation of the platform to publish pre-processed, non-sensible and anonymized data (once considered privacy and security aspects). These open datasets will be offered to citizens and third-party developers, in order to let entrepreneurs, start-ups and SMEs create new innovative services for Antalya on top of the Urban Platform. The common open specifications concept will be used, ensuring that the data can be explored in a uniform and interoperable way in the three lighthouses, easing the replication in other cities. In the platform, security access levels and control flow mechanisms are available (although must be improved). As a final functionality of this open data gateway, the interoperability of the implemented Open APIs with other existing APIs developed will be ensured by using standard mechanisms

Involved partners	Action leader: SAMPAS Other MAtchUP partners: ANT
Other actions linked	Action 40: New Open API developments Action 41: Big data Functionalities Action 42: IoT Adaptors
Progress and Deviations from initial plan	During the two MAtchUP project year [M1-M24], the following steps are finalized: - Building open data gateway to existing Antalya's urban data platform - Building Co-creation portal - Test bed configuration and deployment of the Antalya urban platform will be carried out with the aim of allowing the integration of real-time and batch context data. Then, the information will be available in an open data portal according to open data management features. In this way, a new open data gateway will serve as open data collector - Testing of open data gateway integration with urban platform Antalya does not have an open data portal yet. Data set requirements analysis phase have started. SAM is working on existing tools, methodologies and possible data sets that may be used in open data portal according to interventions. Platform requirements are determined. Architecture of the platform is created. Technical studies for the ICT platform, open data and Co-creation portal are in progress

	According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	Until 09/2020 [M36]: 2nd BEMS from the smart meters and control systems - Information Management system integration (open data and APIs) - Management cockpit & city intelligence dashboard - Big data analysis for KPI calculation - Integration of Open Data - Integration of data catalogue - Integration of co-creation - Visualisation of Big Data
Monitoring / measurement of progress	Until 09/2022 [M60]: Continuous monitoring and evaluation
Financial scheme and business models	Platform implementation and component integration is a part of WP4 efforts and all these efforts will be financed by MATCHUP project.
Social strategy	Design and development of open data platform provides to access the data which is produced by IOT adapters or other components of urban platform. Therefore, SMEs and institutions will be able to implement their projects by using data which is provided by open data platform In addition, SAMPAS will supply continuous support for the Antalya urban platform so as to evaluate the citizen's feedback through the inquires upon the usage of the services and modify the platform based on their needs.

A.40: New open API developments

Antalya already has an Urban Platform. However, existing platforms need to be extended to accomplish Urban Platform development goals in Antalya MATCHUP context as mentioned Action 39. First of all, all distributed data sets should be directed to new open data gateway. After new data gateway development, API necessities and settings are going to be shaped with SDKs. These APIs will be aimed at improving the collection, aggregation and analysis functionalities. Development of APIs (With SDKs) planned to be start during New Kepez Smart City interventions that expected between M24 M36.

Involved partners	Action leader: SAMPAS Other MATCHUP partners: ANT
Other actions linked	Action 39: New open data gateway Action 41: Big data Functionalities Action 42: IoT Adaptors



Progress and Deviations from initial plan	- Existing APIs are determined - New APIs are developed - Definition of Interoperability and Integration standards are defined According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	- Integration of New APIs to the urban platform
Monitoring / measurement of progress	Until 09/2022 [M60]: Continuous monitoring and evaluation
Financial scheme and business models	Platform implementation and component integration is a part of WP4 efforts and all these efforts will be financed by MATCHUP project.
Social strategy	SAMPAS will provide continuous support for the Antalya urban platform so as to evaluate the citizen's feedback through inquiring upon the usage of the services and modifying the platform based on their needs.

A.41: Big data functionalities

Using the analysis of Big Data has a crucial important to calculate KPI's and provide new knowledge acquired from the actions developed in Antalya. After Action 39 and Action 40 are done and open data gateway is prepared, all data coming from input modules; sensors, real-time and near real-time and historical time will be available for monitoring of energy efficiency measures sustainable mobility, high performance buildings and environment. To proceed the development of more complex big data analysis required, a set of data analytic functionalities are going to be prepared for reuse. In Antalya MATCHUP project, in all interventions under energy, mobility, ICT and social pillars, data sets coming from sensors, legacy systems are expected to generate big data. In Antalya we will evaluate big data from four important aspects of general big data projects; volume, variety, velocity, veracity with main concern of; validity, volatility.

Involved partners	Action leader: SAMPAS Other MATCHUP partners: ANT
Other actions linked	Action 39: New open data gateway Action 40: New Open API developments Action 42: IoT Adaptors



Progress and Deviations from initial plan	- Definition of the Big data functionalities and components (see D4.9) - Big Data Visualization Architecture is created - Big Data functionalities and components are implemented According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	Until 09/2020 [M36]: - Creation and integration of Big Data monitoring
Monitoring / measurement of progress	Until 09/2022 [M60]: Continuous monitoring and evaluation
Financial scheme and business models	Platform implementation and component integration is a part of WP4 efforts and all these efforts will be financed by MATCHUP project.
Social strategy	SAMPAS will supply continuous support for the Antalya urban platform so as to evaluate the citizen's feedback through inquiring upon the usage of the services and modifying the platform based on their needs.

3.2.5.2 IoT

A.42: IoT adaptors

Actions 39, 40 and 41 in Antalya MATCHUP project needed input data which is going to collect with Smart City input modules and deliver to core module that can be proceed. IoT devices supply large amount of data from city. There are already existing IoT devices and IoT ad-hoc adaptors allowing connection among devices in Antalya Urban Platform. In context of MATCHUP project, more IoT devices and configurations are needed. To integrate new IoT devices and make synchronized connection with them are needed to be implemented with standard semantic languages (like UL 2.0, Sensor ML) and transported with protocols (like OMA LWM2M, COAP, MQTT, HTTP) again. This action planned to be done after full discovery of existing IoT devices to specification of need of new devices and configuration for Smart City Input and Core modules.

Involved partners	Action leader: SAMPAS Other MATCHUP partners: ANT
Other actions linked	Action 39: New open data gateway Action 40: New Open API developments Action 41: Big data Functionalities



Progress and Deviations from initial plan	- Existing IoT gateway studies - Definition of IoT related interventions - Implementation of new synthetic IoT devices - According to our action plan, there is not any envisaged deviations from initial plan
Next milestones	- Integration of IoT devices with Big Data Architecture
Monitoring / measurement of progress	Until 09/2022 [M60]: Continuous monitoring and evaluation
Financial scheme and business models	Platform implementation and component integration is a part of WP4 efforts and all these efforts will be financed by MATCHUP project.
Social strategy	SAMPAS will supply continuous support for the Antalya urban platform so as to evaluate the citizen's feedback through inquiring upon the usage of the services and modifying the platform based on their needs.



4 Conclusion

This document presents the description of the interventions to be carried out in the city of Antalya, in particular in the district of New Kepez Smart City.

New Kepez Smart City is one of the largest urban regeneration projects in Turkey with the land size of 1,327,330 sqm including Residential areas, Retail areas, Education areas, Recreation areas, Healthcare field, Cultural areas within an Ecologic Smart City concept in Kepez District in central ANTALYA. The project area has been declared as an urban transformation area within the scope of Turkish Act. 6306 and the development process started in December, including all technical works, master and zoning plans, ownership issues, conceptual design and investment feasibility. 3000+ land owners living in unhealthy conditions are contracted during the negotiation period with a record success of civic engagement.

MATCHUP project is considered as a perfect fit that supports Antalya smart city vision to replicate smart districts in Antalya and throughout Turkey with Smart Energy, Mobility, Infrastructure and ICT initiatives. Actions in MATCHUP such as renewable energy and storage actions for residential and public buildings, smart control and domotics, smart meter, smart lighting, city wide initiatives like PV and LFG facilities, electric vehicles (e-buses, e-vehicles, e-bikes), charging stations, innovative and sustainable mobility solutions, large scale urban platform with hundreds of Internet of Things (IoT) devices and several non-technical actions both for uptaking, citizen engagement and dissemination, will enable New Kepez to be one of the leading smart districts and enable Antalya to lead Smart City initiatives. With these actions, new Kepez-Santral Antalya will be transformed from infrastructure to social lives of our citizens to create the aesthetic, smart and sustainable city. Within this framework funds from MATCHUP will enforce and multiply the impact of the urban transformation project turning the district into a reference and first smart city implementation from scratch in energy efficiency, sustainable mobility and social transformation.

The first stage of development that will include the high performance district targeted by the demo site, will present "best practice" to the rest of the New Kepez Development in terms of smart, energy efficient built environment with a demonstration of high degree of urban renewable concepts and smart urban implementations in buildings, as well as mobility. The demo site will demonstrate "class B" energy performance buildings, considerably above present Turkish building standards. Demands side management implementations will offer first tests in Turkey for large scale energy saving behavioural patterns and potential privacy problems. Within energy interventions, A.1 and A.2 will provide new buildings for residential and public areas. A.1 construction is going as planned the first phase will be delivered during 2019 but the construction is still ongoing. Antalya metropolitan municipality will decide the A.2 public buildings' location and will invest for them after. A.8 and A.9 smart lighting initiatives will be started soon as planned. A.4 and A.7 will be followed up during the construction period. Urban RES actions (A.10 and A.11) are under planning for next term. Regarding Storage actions, A.12 is expected to be integrated to A.5 integrated with A.3 interventions.



The smart district is already planned to be pedestrian and bike friendly with a large green corridor facilitating this development. At least 30 e-bikes (A.15), a fleet of 20 Municipality e-cars (A.14), 2 e-buses (A.13) for touring purposes and charging stations in the district which will be deployed within the project will demonstrate the feasibility of e-mobility to citizens. A.13 and A.14 investment timing has not been decided by the municipality yet. An extension to the city tram line ANTRAY is expected to arrive at the district in the near future. A.16, A.17 and A.23 charging points will be covered in the next years' procurement stage. Then demand management actions (A.18, A.22) and multi-modality actions (A.19, A.20 and A.21) will be carried out as planned. These initiatives will also be integrated with Antalya's another Smart City project named "Konyaaltı Smart Beach". Multi-modal hub and electric vehicles will be integrated and shared with the innovative smart beach project of Antalya in Konyaaltı district.

From ICT perspective, New Kepez Santral Urban Transformation will be one of its first implementations of smart districts with high performance district and building solutions. New Kepez Santral Smart District will include several ICT initiatives including integrated smart lighting, smart mobility, metering and smart controls in residential units, smart environmental sensors. Integrated, Intelligent and Instrumented urban ICT platform that will be realized and integrated. The urban platform will act the Open Data Gateway for all interventions and integrations between other ICT services of Antalya, 3rd parties and other e-government services. It will also provide SOA based Open API developments regarding all open data sets, measurements, smart controls, domotics and several IoT and device integrations. Considering the big data collected, analysis and visualization techniques will be adapted to provide sights to policy makers using business intelligence capabilities. All these actions A.39 (open data) , A.40 (open APIs), A.41 (big data) and A.42 (IoT) and the rest of ICT and Urban platform issues in Antalya are provided in details in D4.21 and D4.23 and the development action plans are already provided in those deliverables.

From the non-technical actions perspective Antalya has provided five different groups of actions including Policy improvements (A.24, A.25 and A.26), Innovative Businesses (A.28, A.29, A.30), Urban Planning (A.31, A.32, A.33), citizens 'engagement (A.34, A.35, A.36) and Staff exchange (A.37 and A.38). Among these workshops and direct integration inside the municipality and with relevant authorities have started. Some non-technical actions were waiting some preliminary work in other work packages and intervention implementation and they will evolve more in the next period (M24-M36). Among non-technical actions, Antalya was more active in citizens' engagement co-creation platform (Decidim) which is already reported in 4.12.

Antalya has prepared all administrative and technical specifications for the tendering of some of the intervention (A.3, A.5, A.8, A.9, A.12, A.15, A.16, A.17 and A.23) and will implement during the next period.

An amendment to the MAtchUP Grant Agreement will be necessary due to changes in some of the interventions (public buildings, renewable energy, etc.) and difficulties to implement actions exactly as planned in Spring 2017. Up to now, there will be changes to the way actions are implemented. However, these will not be necessary to



change the general goals of the respective actions. Negotiations between Antalya partners on necessary amendments are ongoing. Description of the amendment request for technical interventions is being described and will be delivered after the submission of this deliverable through the coordinator.



5 References

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