MALAGA CASE STUDY ON SMART MOBILITY PROJECTS

16th and 17th of July, 2014
La Granja, Segovia
1. INTRODUCTION

Socioeconomic, demographic & urban characteristics:

Capital of the “Costa del Sol”

- Population: 575,322
- Urban surface: 7,151 Ha
- Population density: 80,5 hab/Ha

- GDP (province): 20,241 millions €
- Per capita income: 12,928 €/hab (80% of Spain average income – 2011)
- Unemployment rate: 35% (2012, province)
- Expenditure in R&D: 1,480,460,000 €
  177 €/hab (2012 Andalusia Region)
- Main economic activities (2010):
  Services (especially Tourism): 77,6%
  Real Estate: 12,4%
1. INTRODUCTION

SOCIOECONOMIC, DEMOGRAPHIC & URBAN CHARACTERISTICS:

- Gini relation (2011, city): 0.32
- % of people at risk of poverty / social exclusion: 22.58%

- ICT baseline
  - Fast Internet (ADSL/Optical): 98%
  - Houses connected to internet: 67.7%
  - Population using internet: 70.3% (Province)
2. MAIN CHALLENGES

Territory and City Configuration, Natural Resources Management,
Social Cohesion & Economic Development, Participation and Governance

Urban revitalization, Culture, Coast, Knowledge

EU 20-20-20 strategy accomplishment (cross-cutting)

Malaga Sustainable Urban Mobility Plan
Reduction of traffic congestion and CO2 emissions originated from traffic
2. MAIN CHALLENGES

 Territory and City Configuration

OBJECTIVES (URBAN PLANNING):

- To reduce the ecological footprint of the city
- To overcome and correct the urban sprawl, by increasing the city density and complexity
- Avoid new soil consumption
- Regenerate the consolidated city surface

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<thead>
<tr>
<th>Problem</th>
<th>Indicators</th>
<th>current</th>
<th>optimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban sprawl / motorized mobility dependency</td>
<td>Population density (hab/Ha)</td>
<td>80</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>City compactness (Houses/Ha)</td>
<td>39</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>City complexity (diversity ratio)</td>
<td>3.3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Proximity to basic services (&gt;500m)</td>
<td>83</td>
<td>100</td>
</tr>
<tr>
<td>Accessible Housing</td>
<td>% of social housing</td>
<td>5.1</td>
<td>30</td>
</tr>
</tbody>
</table>

Urban revitalization
2. MAIN CHALLENGES

Urban Density-Transport Energy Consumption

source: Newman and Kenworthy 1990; plus DMAU 2013

North American Cities
Australian Cities
European Cities
Asian Cities
3. INDICATORS

Evolución del suelo urbanizado
Málaga 1950-2007

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</thead>
<tbody>
<tr>
<td>Superficie</td>
<td>623</td>
<td>924</td>
<td>1696</td>
<td>3327</td>
<td>4245</td>
<td>5849</td>
<td>6970</td>
</tr>
</tbody>
</table>

Evolución del suelo urbanizado
Málaga 1.950 - 2.008
2. MAIN CHALLENGES

Territory and City Configuration

Urban revitalization
2. MAIN CHALLENGES

 Territory and City Configuration

 Urban revitalization
 Culture, Coast
2. MAIN CHALLENGES
2. MAIN CHALLENGES

** Territory and City Configuration **

** Malaga Sustainable Urban Mobility Plan **

** OBJECTIVES (MOBILITY): **

- To reduce traffic congestions and emissions derived by traffic
- To increase the weight of Public Transport, cycling and walking in the city modal split
- Private vehicle use dissuasion strategies
- Strategies for public transport, cycling and walking promotion

** URBAN INDICATORS: **

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Private motorized mobility dependency</td>
<td>Modal Split (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td></td>
<td>34,9</td>
<td>20</td>
</tr>
<tr>
<td>motorbike</td>
<td></td>
<td>6,2</td>
<td>10</td>
</tr>
<tr>
<td>public transport</td>
<td></td>
<td>11,2</td>
<td>20</td>
</tr>
<tr>
<td>cycling</td>
<td></td>
<td>0,4</td>
<td>10</td>
</tr>
<tr>
<td>walking</td>
<td></td>
<td>45,9</td>
<td>45</td>
</tr>
<tr>
<td>Road congestion</td>
<td>Traffic intensity (nº vehicles / day)</td>
<td>846.259</td>
<td>700.000</td>
</tr>
<tr>
<td>Sustainable transport accessibility</td>
<td>proximity to bus stops (500 m) %</td>
<td>93,7</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>proximity to bike lanes (500 m) %</td>
<td>32,8</td>
<td>100</td>
</tr>
</tbody>
</table>
2. MAIN CHALLENGES

Territory and City Configuration

Malaga Sustainable Urban Mobility Plan

**MEDIO UTILIZADO PARA IR AL COLEGIO (%) DATOS GLOBALES**

- Andando: 39.7%
- En coche: 51.8%
- En autobús: 7.0%
- En metro: 0.2%
- En tren: 0.1%
- Otros: 1.4%
2. MAIN CHALLENGES

Territory and City Configuration

Malaga Sustainable Urban Mobility Plan
2. MAIN CHALLENGES

OBJECTIVES:
- To adopt at a local level the EU 20-20-20 Strategy
- Design and implementation of the Action Plan for Sustainable Energy in Málaga

Málaga Action Plan For Sustainable Energy

URBAN INDICATORS:

<table>
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<tr>
<th>Problem</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Air quality</td>
<td>nº of days with bad air quality (O3, SO2, Nox, CO, PM10)</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>CO2 emissions (t)</td>
<td>2.651.730,00</td>
<td>2.000.000</td>
</tr>
<tr>
<td>Energy dependency</td>
<td>Energy consumption (TEP/hab)</td>
<td>1,4</td>
<td>1,1</td>
</tr>
<tr>
<td></td>
<td>Renewable energy over total (%)</td>
<td>1,08</td>
<td>20</td>
</tr>
<tr>
<td>Water availability</td>
<td>Water consumption (l/hab/day)</td>
<td>142</td>
<td>100</td>
</tr>
</tbody>
</table>
2. MAIN CHALLENGES

Natural Resources Management

Malaga Action Plan For Sustainable Energy
2. MAIN CHALLENGES

**ECONOMIC:**
- To reduce the dependency on tourism and real estate sectors
- To reduce unemployment rate by increasing the number of skilled jobs/knowledge based companies
- To convert Málaga in a City of Knowledge
- To become a EU benchmark in technological projects based on ICT/Smart City solutions (planning, transport and mobility, municipal services)

**URBAN INDICATORS:**

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<tbody>
<tr>
<td>Unemployment</td>
<td>unemployment rate (%)</td>
<td>35</td>
<td>10</td>
</tr>
<tr>
<td>Dependency on tourism and real estate</td>
<td>GAD Services</td>
<td>77,60</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>GAD Industry</td>
<td>6,30</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>GAD Real Estate</td>
<td>12,4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>GAD Agriculture</td>
<td>3,7</td>
<td>5</td>
</tr>
<tr>
<td>Social exclusion</td>
<td>Gini Index</td>
<td>31,5</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Population at risk of poverty (%)</td>
<td>22,58</td>
<td>15</td>
</tr>
</tbody>
</table>
2. MAIN CHALLENGES

Social Cohesion & Economic Development

Knowledge
2. MAIN CHALLENGES

Goverance and participation

OBJECTIVES:

- To increase citizenship commitment towards the achievement of city sustainability objectives
- To encourage bottom-up decision making processes
- To introduce a participative and collaborative culture in local politics and policy making

URBAN INDICATORS:

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</tr>
</thead>
<tbody>
<tr>
<td>Participation / citizenship involvement</td>
<td>participative budget (% / total)</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>environmental awareness actions</td>
<td>37,00</td>
<td>50</td>
</tr>
<tr>
<td>Municipal equality</td>
<td>Women in key roles (%)</td>
<td>23,4</td>
<td>40</td>
</tr>
</tbody>
</table>
2. MAIN CHALLENGES

Governance and participation
SMARTCITYMALAGA:
- First framework project on smart city solutions in Malaga
- Recommendations and baseline for future / further development of smart city projects in Málaga
- Affecting:
  - Energy & environment
  - Transport & Mobility
- But also:
  - Urban development and planning
  - Public services and utilities

NECESSARY LINK TO THE ACHIEVEMENT OF URBAN INDICATORS MAIN GOALS
5. PROJECTS: VICTORIA

VEHICLE INITIATIVE CONSORTIUM FOR TRANSPORT OPERATION & ROAD INDUCTIVE APPLICATIONS
PRIVATE - PUBLIC INITIATIVE

- **Private bodies:**
  - ENDESA (Lead Partner), Isotrol, Mansel, Conacon - MC2, Omeca (SMEs)

- **Public bodies:**
  - Malaga City Council – Malaga Transport Company, CIRCE Foundation (University of Zaragoza), University of Malaga, AICIA (Andalusian Association for research & industrial cooperation)

OBJECTIVE:
- to double the range of electric buses without affecting operating times

MAIN ACTIVITY:
- To develop wireless en-route charging for electric buses in Malaga, including a triple technology: conventional static, static wireless and dynamic wireless charging

PREVIOUS SIMILAR PROJECTS:
- first pilot project for wireless electric recharge / dynamic induction in PT
5. PROJECTS: VICTORIA

- Main objective: Inductive charging of a 100% electric bus

- Three kind of electric charge:
  - Standard (overnight recharging)
  - Static induction
  - Dynamic induction

- R&D:
  - Installation of a new engine to implement the three kind of electric charge.
  - Faraday cage
5. PROJECTS: VICTORIA
5. PROJECTS: VICTORIA

- Bus Line nº 16
- Route: 10 km
- Line will be operative in December 2014
5. PROJECTS: VICTORIA

FU N D I NG:
- EU ERDF (FEDER Interconnecta Andalusia 2013) + national government (centre for industrial and technological development CDTi) + Analusian Regional Government

BU D G E T:
- 3,7 millions - DURATION: 21 months

E X T E N S I O N A R E A:
- single neighborhood (bus line 16)

D E V E L O P M E N T S T A T E:
- Under pilot implementation

P R O J E C T I M P A C T S:
- Indicators: wifi recharge reliability – average BUS autonony (before/after)
- Potential beneficiaries: all population / bus lines in Málaga
6. PROJECTS: ZEM2ALL
PUBLIC - PRIVATE INITIATIVE

- **Private bodies:**
  - ENDESA (Lead Partner), Mitsubishi, Hitachi, Ayesa, Telefónica I+D

- **Public bodies:**
  - Malaga City Council, Japanese Government (NEDO - New Energy and Industrial Technology Development Organization), Spanish government (CDTí, Centre for industrial and technological development)

- **SMEs**
  - Alphabet (car sharing & mobility services), ASAC, Safamotor, Mansel, MMCE

**OBJECTIVE:**
- to give to all Malaga citizens the opportunity of having at hand a free emissions in Malaga metropolitan area.

**MAIN ACTIVITY:**
- to make easier to Malaga citizens, companies and particulars, access to electric mobility, through all-included flat-rate renting formulas

**PREVIOUS SIMILAR PROJECTS:**
- first large scale demonstration project at EU level. Previous: SmartCityMalaga
6. PROJECTS: ZEM2ALL

- **Main objectives:**
  - Demonstrate the smart community-related technologies.
  - Prepare for the large-scale introduction next-generation vehicles.
  - Establishment of a new infrastructure including EV management systems and EV charging facilities.
  - A significant reduction in CO2 emissions.
6. PROJECTS: ZEM2ALL

- Vehicles:
  - 160 Mitsubishi i-MiEV.
  - Introduction of 40 Nissan Leaf in April 2014.
  - Different type of users: public administration, fleets, companies, and citizens.
  - Different type of use: free run, shuttle, milk run, etc...
6. PROJECTS: ZEM2ALL

• **Standard Charge:**
  - Every user has a standard charging point in their home or headquarter.

• **Quick Charge:**
  - 9 stations with 23 chargers.
6. PROJECTS: ZEM2ALL

- Vehicle to Grid (V2G) Charge:
  - 6 points of charge: the biggest network in the world.
  - Vehicle-to-grid (V2G): EVs communicate with the power grid to sell demand response services by delivering electricity into the grid.
6. PROJECTS: ZEM2ALL

Video: ZEM2ALL project
6. PROJECTS: ZEM2ALL

- Figures after one year of operation (December 2013):
  - More than one million kilometers travelled.
  - The 160 e-vehicles included in the programme have avoided the emission of 72 tonnes of CO2 into the atmosphere compared to using conventional combustion-engine vehicles.
  - Users recharged their vehicles over 25,000 times at the charging points.
6. PROJECTS: ZEM2ALL

**FUNDING:**
- Innovation Programme Japan-Spain (JSIP), between NEDO (75%) and CDTi (25%) (national ministries of industry and technology)

**BUDGET:**
- 60 millions - DURATION: 42 months (May 2015 – December 2015)

**EXTENSION AREA:**
- Malaga and its coast metropolitan area (Fuengirola and Marbella)

**DEVELOPMENT STATE:**
- Under implementation

**PROJECT IMPACTS:**
- Indicators: average nº of kilometers per vehicle / CO2 emissions saved / nº of rechargings carried out / cost benefit analysis – economic viability
- Potential beneficiaries: all population in Málaga metropolitan area
7. PR: PARK MANAGER
PRIVATE - PUBLIC INITIATIVE

- Private bodies:
  - ParkHelp Spain
- Public bodies:
  - Malaga City Council (Municipal Parking Society and Municipal Energy Agency)

OBJECTIVE:
- to drastically reduce the parking time and congestion due to parking search, in metered parking areas, by providing citizens with the location of available parking areas.

MAIN ACTIVITY:
- Installation of sensors in all the metered parking areas of Malaga, together with a management tool, panels and an app to identify and pay parking.

PREVIOUS SIMILAR PROJECTS:
- SmartSantander, 400 parking sensors, developed together with Telefonica I+D
7. PR: PARK MANAGER

1. Sensors
   - Blue spaces sensorized

2. Informative Panels
   - Key places of traffic flow.
   - Automatic update

3. ParkManager
   - The parking operator have information about parking occupancy and spaces under penalty.

4. Infopark
   - Information on parking availability through app.

5. ParkAgent
   - Allows parking agents go to the spaces under penalty.
7. PR: PARK MANAGER

- **Main objectives:**
  - Reduction in time spent searching for parking
  - 10% decrease in the number of vehicles looking for parking spaces
  - A significant reduction in CO2 emissions to the atmosphere (21.6 Kg. CO2 per vehicle and year)

- The system consists of 2229 parking lots with sensors and 60 panels in different restricted time parking areas of the city centre.
7. PR: PARK MANAGER

*ParkManager*

- The Smart Parking System APP:
  - Allows every kind of payments.
  - Helps to find parking in a quicker and more efficient way.
7. PR: PARK MANAGER

Video: Park Manager Project
FUNDING:
- Cooperation agreement between ParkHelp and Malaga City Council

BUDGET:
- 0.5 millions (approximately) - DURATION: 24 months

EXTENSION AREA:
- All the metered open air parking areas of the city (2,229). Number of vehicles in Malaga: around 250,000 (city); 750,000 (Province)

DEVELOPMENT STATE:
- Under pilot implementation

PROJECT IMPACTS:
- Indicators: traffic intensity-congestion levels / reliability of the system / estimation of CO2 emissions and fuel consumption reduction
8. PROJECTS: CITYSENS
PUBLIC INITIATIVE

- **Public bodies:**
  - Malaga City Council, Malaga Municipal Transport Company (EMT)
- **Private bodies:**
  - EDP Ingenieria (local ICT SME)

OBJECTIVE:
- To obtain a complete and cost effective air quality map of the city of Malaga, linked to traffic control and management

MAIN ACTIVITY:
- To install mobile air quality sensors on top of four buses of the municipal transport company fleet, comparing their data with the ones provided by the regional government fixed stations

PREVIOUS SIMILAR PROJECTS:
- Previous similar projects: Rotterdam (OpenSense), Technical University of Braunschweig (EMMA), Santander mobile monitoring and city sensing (not specified yet).
Main objectives:
- To obtain a complete map of air quality in Malaga
- To provide further tools for decision makers in traffic management policies
- To obtain cheaper / more cost effective tools for air quality monitoring
- To accomplish EU and national regulations on air quality monitoring at local level

Current map of air quality in Malaga (fixed stations): 24.5% of total population (1 Km radium)

Air quality map in Malaga after the project implementation (mobile sensors): 77.7%
8. PROJECTS: CITYSENS

General scheme of CitySens project
8. PROJECTS: CITYSENS

- Current status:
  - Sensors installed and resistance trials carried out
  - Wireless communications established
  - First reliability trials and comparisons with fixed stations: needed change of sensors
FUNDING:
- EU FP7 Civitas Plus II Programme, 2MOVE2 Project (Project partners: Stuttgart, Tel Aviv, Brno, Malaga)

BUDGET:
- 270 K€ - DURATION: 48 months (November 2012, October 2016)

EXTENSION AREA:
- 4 sensors installed in the main city bus lines (managing to cover the majority of city surface)

DEVELOPMENT STATE:
- Under pilot implementation

PROJECT IMPACTS:
- Indicators: NOx, CO, Ozone (Not PM), sensors reliability, cost benefit analysis
- Potential beneficiaries: all population / bus lines in Málaga
9. CONCLUSIONS

Clean vehicles / R&D
Public transport

Clean vehicles / DEMO
Private motorized mobility

Traffic Congestion / DEMO

Environment - Holistic approach / R&D
Air pollution
Thank you!

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EU Projects - Urban Environment Observatory (OMAU)

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Tel: +34 951 928 837