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TABLE OF CONTENTS

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Responsible Author (Partners)	JSI			
Responsible Author	D. Kontić		**Email**	davor.kontic@ijs.si
	Partner	JSI	**Phone**	
Other partners (Institution)	ALL			

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1 INTRODUCTION

The aim of this deliverable is to present the key drivers and barriers for the transferability of measures/strategies proposed by the ICARUS project. The core of the strategies is on considering health, air quality and climate impacts, as well as costs and utility losses. In task T5.4 the development of consistent, clear, and feasible policy recommendations have been made. A continuous process evaluation scheme has also been applied in the framework of T5.4 in order to discover barriers and drivers for the implementation of *win-win* measures in each ICARUS city, and to find the characteristisc of these processes that would provide the answers about how to most efficiently transfer successful measures to other European cities.

1.1 Concept/approach

The concept for assessing the potential for transfer to other cities is based on the process evaluation scheme, where, following the identified barriers and drivers for a policy/strategy implementation, the most efficient way is identified. In practical terms this means that measures with highest potential of implementation (costs, stakeholders' support, spatial availability etc.) and expectation of achieving significant air pollution and GHGs reductions in ICARUS cities have been selected for furher analysis.

The results produced by the cities have provided a large amount of information from the practical experience acquired during the planning and implementation of measures/policies. The importance of understanding the context of surrounding circumstances of measure implementation is at the heart of the issue of “transferability”, considering that the replication of measures/policies can only succeed if the favouring context is correctly understood in order to be assessed and possibly replicated in the target city (CIVITAS METEOR, 2007; Macario R. & Marques C.F., 2008).

A concluding task of the ICARUS assessment framework, therefore, is to identify those measures which have been successful in achieving the ICARUS objectives and which could also be successful in other cities across Europe. One of the main tasks is to identify the success of measures/policies implemented in the ICARUS cities in order to transfer good practice to cities elsewhere. Therefore, the main objective of the transferability analysis is to assess whether the success of measures in a city are dependent on any particular conditions, and whether the success achieved and the lessons learnt in one city can be transferred to other cities.

For assessing transferability of the measures, the following information has been considered, which will have been collected through the impact and process evaluation activities:

- City objectives with respect to air quality
- Baseline and ex-post scenarios
- How the impacts are modelled/calculated (emissions, pollution, health risk assessment, Cost-Benefit-Analysis)
- The main barriers encountered and how the problems were overcome
- Geographical, environmental, demographic, socio-economic and cultural backgrounds
- Legal framework
- Political framework
- Public acceptability
- Enforcement issues

Many factors can contribute to the success of a measure/policy including the characteristics of the measure itself; transport/traffic and industrial/energy supply conditions, geographical, environmental, demographic, socio-economic, cultural backgrounds, institutional and legal frameworks, etc. Understanding the cause-effect relationships between the impacts and the city settings is necessary for the identification of key transferability factors. This is the essence of success for transferring practices into another city.

1.2 Organisation of the report

After the introduction, Chapter 2 is dedicated to an overview of selected measures and policies, which have been previously filtered down from a list of possible measures/policies. The filtering was based on the potential contribution of the measures and polices to air pollution reduction (for details, refer to the ICARUS deliverable D5.2 – “Two databases of a) policies and b) measures towards integrated win-win solutions on the urban scale”, D5.4 - “Final report on integrated assessment of policies” and D5.5 – "Report on green strategy and implementation plan in one each of the cities", ICARUS 2017, 2019, 2020). Chapter 3 presents the key drivers and barriers for transferability. Chapter 4 collects conclusions, discussion and suggestions for future work.

2 OVERVIEW OF SELECTED POLICY SCENARIOS/MEASURES BY CITIES

This section provides an overview of urban policy long-term scenarios chosen for the integrated assessment and further evaluation in the ICARUS project.

The total number of analysed policy scenarios is 21, with approximately 2-4 measures for each ICARUS city. The respective scenarios have been selected out of the policy and measure list as presented and described in ICARUS Deliverable D5.4 (ICARUS, 2019), based on their potential for air pollution reduction (based on the evaluation of emission/pollution reduction, contribution to climate change, health impacts, and costs). The selection was done based on the *significant positive impact* and *minor possible positive impact* in terms of emission/air pollution, morbidity/mortality reduction and significant or minor possible positive financial impact, as described in Chapter 7 of ICARUS D5.4 deliverable (ICARUS, 2019).

The policies and measures underlying the scenarios cover a wide range of possible abatement options for different emission source sectors. More than half of the chosen policy scenarios are associated to the transport sector (14 out of 21). The most recurrent themes are:

- Reduction of motorized individual transportation by measures such as:
    - Promotion of a switch from road transportation to more environmentally friendly transportation modes such as public transportation, walking and cycling.
    - Introduction of new metro lines and further public transport infrastructure expansion.
    - Reserved infrastructure for public transportation and dedicated bus lanes.
    - New parking regulations according to air quality criteria.
- Introduction of Low Emission Zones and driving bans.
- Renovation of the public passenger transport vehicle fleet (CNG, hybrid or electric buses).

Traffic reductions and sustainable transportation modes have been selected for further evaluation in all cities. A scenario representing the increasing electrification of the urban fleet – either private vehicles or urban buses – has been selected in Brno, Thessaloniki, Stuttgart, Ljubljana and Milan. The reduction of motorised traffic (access restriction) and promotion of sustainable transport means (cycling, walking) has been chosen for further analysis in Athens, Stuttgart, Milan, Brno, Thessaloniki – even though the specific design of the measure varies from city to city.

The scenarios related to the transport sector are followed by the energy sector - building and households (in combination with the industrial sector) with one third of the policy scenarios (7 out of 21). These include:

- Replacement of fossil heating technologies by technologies such as:
  - High efficiency gas boilers.
  - Heat pumps and solar heating.
- Implementation of energy saving measures by insulation and renovation of the building stock.
- Energy efficiency in the cement industry: Use of refuse derived fuels.

The list of selected policy scenarios/measures is presented in Table 1.

Table 1: A description of the policy scenarios/measures

City	No	Scenario name	Scenario description
Athens (Attica)	1	SusMob	Promotion of sustainable mobility through eco-driving, cycling and walking in the Greater Athens Area (Attica)
Athens (Attica)	2	SusMobPuT	Promotion of sustainable mobility through eco-driving, cycling and walking in the Greater Athens Area (Attica) as well as minimizing the use of private passenger cars in Athens metropolitan area by enhancing public transportation means
Basel	1	NoHeat	Replacement of fossil heating technologies by heating pumps and solar heating (until 2020: 1/3 will be replaced; until 2030:100%)
Basel	3	FirewoodBan	Introduction of a ban on small combustion of firewood (2030 scenario)
Basel	4	NoHeatFirewood	Replacement of fossil heating technologies combined with the introduction of a firewood ban (2030 scenario)
Brno	1	M1opti	Promoting low carbon electric vehicles
Brno	2	M2opti	Reduction of the motorized vehicles in the city and increase of the usage of clean transportation (i.e. walking, biking and using public transport)
Brno	3	M2zero	Reduction of the motorized vehicles in the city and increase of the usage of clean transportation (i.e. walking, biking and using public transport)

Ljubljana	1	M1_DecreaseCAR	Decrease of personal car use (the combination of the car reduction measures and parking policy will lead to a decrease of personal cars on incoming roads/avenues by 20 %); specifically the promotion of electromobility is planned to result in an additional 2% of emission reduction (M1) (2030 scenario)
Ljubljana	2	M2_IncreasePT	Increased share of public transport use (increased use of PT on the account of better service and transfer from car users) (The renovation of the public passenger transport fleet and the reduction of personal car use is also integrated in this scenario) (2030 scenario)
Ljubljana	3	M3_Ptfleet	Renovation of public passenger transport vehicle fleet (CNG, hybrid buses); the replacement of EURO 0,1,2 buses with CNG propulsion system (86 buses in total) (The reduction of personal car use is also integrated in this scenario, but no increase of public transport is assumed) (2030 scenario)
Ljubljana	4	M4_DistrHEAT	Increased utilization and expansion of district heating systems; renovation of the system - replacement of existing combustion units with more appropriate means (i.e. 70% reduction of coal use) (2030 scenario)
Madrid	4	Logistics	Public-private collaboration in order to make urban logistics processes more efficient
Madrid	5	EnEff	Regeneration of neighbourhoods by improving energy efficiency and thermal insulation of the building stock and re-naturalization of the city
Milan	1	AreaB	Low Emission Zone (Area B): Control and tracking of access into the city by banning up to Euro 3 diesel cars (up to Euro 4 from October 2019)
Milan	2	ElectricBus	Conversion of all public buses to electric ones by 2030

Roskilde	1	Emission curbin. In Strategisk Klima- og Energiplan 2019-2022	Aspire to achieve CO_2 neutrality within various sectors as well as complete neutrality for Roskilde as a business (2035) and a geographical area (2040) through e.g. implementation of windmills, solar cells, district heating, and electric buses.
Roskilde	2	Using green solutions, 2019-2022	Aim to identify, develop and implement green solutions through extensive collaborations and supporting and facilitating transitions for private and industrial consumers.
Roskilde	3	Sustainable Transport	Aims to reduce emissions, climate footprint and noise from transport through cleaner fuels and increased share of active transport modes
Roskilde	4	Roskilde Festival: Sustainable Strategy 2016-19	Pursue environmental sustainability through minimizing environmental input (resource consumption) and output (emissions) by various means.
Stuttgart	1	ScEL	Promoting low carbon electric vehicles (share in vkm to 7% in 2020, 20% in 2030)
Stuttgart	2	ScUV	Promoting environmentally friendly transport modes (walking, cycling, PT) (decrease of individual transport by 7% in 2020; 20% in 2030) (2030 scenario)
Stuttgart	4	Sc1	Increase of building insulation (+2%) and heating system exchange to high efficiency gas boilers
Thessaloniki (region)	2	M2	Promotion of cycling/walking, green vehicles and public transport
Thessaloniki (region)	4	M4	Energy efficiency in the cement industry: Use of refuse derived fuels

3 PROCESS EVALUATION OF POLICY SCENARIOS/MEASURES

3.1 Introduction

The process evaluation is aimed at helping to identify barriers and drivers in planning and implementing the measures for increasing air quality in ICARUS cities. The main task in this regard is to guide the cooperation and communication with city representatives in order to obtain the information about the process of developing the city policies and measures as well as to gain insights for assessing the feasibility of measures/policies developed within ICARUS for each city.

The Process Evaluation is defined as follows:

“Process evaluation concerns the evaluation of the processes of planning and implementation including the roles of information, communication and participation”.

Process evaluation – sometimes also referred to as formative evaluation – is a method for implementation assessment carried out while the activities are forming or happening. In some projects, the European Commission has pushed for an emphasis on process evaluation right from the beginning of the demonstration projects. One of the ambitions was to quickly detect and overcome unexpected barriers. If problems are detected early enough in the implementation period, process evaluation would allow correcting the design of a specific activity/measure/solution etc. In addition, the identification of drivers of the implementation could be used to further promote these drivers for an even more successful measure implementation.

The main objectives of process evaluation are:

- Getting insight to drivers and barriers during preparation, implementation and operation of the measures.
- Getting insight to roles of communication and participation.
- Getting at the stories behind the data.
- Contributing to cross-site evaluation and policy recommendations.
- Contributing to transferability and up-scaling of proposed interventions (activities/measures/solutions).

For details on process evaluation, please see the D5.5 – "Report on green strategy and implementation plan in one each of the cities" (ICARUS, 2020).

The following categories for barriers and drivers have been used - presented in the table 2 below, including indications of their influence on a successful measure transfer and implementation (adapted after CIVITAS METEOR, 2007).

Table 2: Overview of categories for barriers and drivers of implementation

Category	Subcategory	Interpretation as Barrier	Interpretation as Driver
Politics and Strategy	Opposition/ Commitment	Opposition of key actors based on political and/or strategic motives; Lack of sustainable development agenda or vision	Commitment of key actors based on political and/or strategic motives; sustainable development agenda /vision
	Conflict/ Coalition	Conflict between key actors due to diverging material interests and expectation of redistributive losses	Coalition between key actors due to shared/complementary material interests and expectation of redistributive benefits
Planning	Technical	Insufficient technical planning and analysis to determine requirements of measure implementation	Accurate or visionary technical planning and analysis to determine requirements of measure implementation
	Economic	Insufficient economic planning and market analysis to determine requirements for measure implementation	Accurate economic planning and market analysis to determine requirements for measure implementation
	Policy Conflict/ Synergy	Conflicting policies or policy frameworks hampering measure implementation	Synergetic policies or policy frameworks fostering measure implementation
	User assessment	Lack of user needs analysis; Limited understanding of user requirements	Thorough user needs analysis; Good understanding of user requirements
Institutions	Administrative Structures and Practices	Hampering administrative structures, procedures and routines	Facilitating administrative structures, procedures and routines

	Legislation and Regulation	Hampering laws, rules, regulations and their application	Facilitating laws, rules, regulations and their application
Cooperation	Partnership and Involvement	Failed or insufficient partnership arrangements and limited involvement of key actors	Constructive partnership arrangements and open involvement of key actors and/or other stakeholders
	Key Individuals	Lack of leadership, individual motivation or know-how of key persons	"Local champions" motivating actors and catalysing the process
Citizen Participation		Insufficient or poorly performed consultations with and involvement of citizens	Broad consultations with and involvement of citizens
Information and Public Relations		Insufficient information of key stakeholders; lack of awareness raising activities	Information of key stakeholders; Awareness raising activities
Technology		Technology failure; additional technological requirements	New potentials offered by technology
Public Funds and Subsidy		Dependency on public funds and subsidies	Availability of public funds and subsidies
Exchange and Mutual Learning		Relative isolation of the measure and lack of exchange with other cities	Exchange with other cities on experiences and lessons learned
Cultural and Life Style		Hampering cultural circumstances and life style patterns	Facilitating cultural circumstances and life style patterns
Problem Pressure		not applicable	Severity of problems to be solved (e.g. air pollution)

Process barriers

Process barriers are events or overlapping conditions that hampers the process to obtain strategic, project related or *policy scenario/measure based* objectives (goals). In the checklist below there is a number of barrier fields and examples of barriers, which might have been encountered in trying to reach these objectives. These are also the main focus in assessing feasibility.

Barrier fields and examples of possible barriers are:

NR	Barrier field	Examples of barriers
1	**Political / strategic**	Opposition of key actors based on political and/or strategic motives, lack of sustainable development agenda or vision, impacts of a local election, conflict between key (policy) stakeholders due to diverging believes in directions of solution
2	**Institutional**	Impeding administrative structures, procedures and routines, impeding laws, rules, regulations and their application, hierarchical structure of organizations and programs
3	**Cultural**	Impeding cultural circumstances and life style patterns
4	**Problem related**	Complexity of the problem(s) to be solved, lack of shared sense of urgency among key stakeholders to sustainable mobility
5	**Involvement, communication**	Insufficient involvement or awareness of (policy) key stakeholders, insufficient consultation, involvement or awareness of citizens or users
6	**Positional**	Relative isolation of the measure, lack of exchange with other measures or cities
7	**Planning**	Insufficient technical planning and analysis to determine requirements of measure implementation, insufficient economic planning and market analysis to determine requirements for measure implementation, lack of user needs analysis: limited understanding of user requirements
8	**Organizational**	Failed or insufficient partnership arrangements, lack of leadership, lack of individual motivation or know-how of key measure persons
9	**Financial**	Too much dependency on public funds and subsidies, unwillingness of the business community to contribute financially
10	**Technological**	Additional technological requirements, technology not available yet, technological problems
11	**Spatial**	No permission of construction, insufficient space
12	**Other**	…

Process drivers

Process drivers are events or overlapping conditions that stimulates the process to obtain objectives/goals. In the checklist below there is a number of driver fields and examples of possible drivers, which might have been encountered in trying to reach the objectives.

Driver fields and examples of possible drivers are:

NR	Driver field	Examples of drivers
1	**Political / strategic**	Commitment of key actors based on political and/or strategic motives, presence of sustainable development agenda or vision, positive impacts of a local election, coalition between key (policy) stakeholders due to converging (shared) believes in directions of solution
2	**Institutional**	Facilitating administrative structures, procedures and routines, facilitating laws, rules, regulations and their application, facilitating structure of organizations and programs
3	**Cultural**	Facilitating cultural circumstances and life style patterns
4	**Problem related**	Pressure of the problem(s) causes great priority, shared sense of urgency among key stakeholders to sustainable mobility
5	**Involvement, communication**	Constructive and open involvement of policy key stakeholders, constructive and open consultation and involvement or citizens or users
6	**Positional**	The measure concerned is part of a (city) program and/or a consequence of the implementation of a sustainable vision , exchange of experiences and lessons learned with other measures or cities
7	**Planning**	Accurate technical planning and analysis to determine requirements of measure implementation, accurate economic planning and market analysis to determine requirements for measure implementation, thorough user needs analysis and good understanding of user requirements
8	**Organizational**	Constructive partnership arrangements, strong and clear leadership, highly motivated key measure persons, key measure persons as 'local champions'
9	**Financial**	Availability of public funds and subsidies, willingness of the business community to contribute financially
10	**Technological**	New potentials offered by technology, new technology available
11	**Spatial**	Space for physical projects, experimentation zones
12	**Other**	...

The barriers and drivers are cited specifically for the following phases of the policy scenario/measure lifetime – these include:

- ✓ Preparation phase: the policy scenario/measure is developed in detail and design work for the measure is conducted. At the end of this phase all planning details are fixed, including all decisions and permissions that are a pre-condition for starting the implementation phase.
- ✓ Implementation phase: the policy scenario/measure is being implemented in real life. At the end of this phase the measure starts operation.
- ✓ Operation phase: the policy scenario/measure is opened to the public, i.e. users are able to increase their utility. The first phase of operation lies within the time-frame of the ICARUS Initiative and can be analysed and evaluated by ICARUS. The long-term running is the outstanding time until the measure comes to the end of its life, which could be caused by technical facts, programme termination, end of funding, redesign, or reconstruction.

3.2 Identification of transferability barriers and drivers results per city

3.2.1 Athens

City	Policy scenario / measure name
ATHENS	Athens(Attica)_SusMob_Promotion of sustainable mobility through cycling and walking Athens(Attica)_SusMobPuT
Objectives	
Increase the cycling and walking mode share; Promotion of sustainable mobility through eco-driving, cycling and walking in the Greater Athens Area (Attica) as well as minimizing the use of private passenger cars in Athens metropolitan area by enhancing public transportation means	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
POLITICAL, INSTITUTIONAL, PLANNING, FINANCIAL, SPATIAL	Local elections and poor coordination among different related stakeholders/actor has lead to time-consuming internal procedures, insufficient technical planning and analysis to determine requirements of measure implementation, dependency on public funds and subsidies. There have also been issues with issuing construction permits.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of driver**

POLITICAL / STRATEGIC, POSITIONAL INVOLVEMENT, COMMUNICATION, FINANCIAL, INSTITUTIONAL, PLANNING	Commitment of key actors based on political will combined with strategic motives, presence of sustainable development agenda or vision has been the most important driver. Other key drivers have been related to open involvement of policy key stakeholders, availability of public funds and subsidies, facilitating structure of organizations and programs, facilitating laws, rules, regulations and their application as well as to accurate technical and economic planning.

MITIGATION ACTIONS

Involvement, communication: Constructive and open involvement of policy key stakeholders, constructive and open consultation and involvement or citizens or users, campaigns to promote sustainable mobility is a key approach to successful implementation in other cities/locations.

INTERPRETATION

The commitment of key actors based on political and/or strategic motives, presence of sustainable development agenda or vision as a part of a (city) program and/or a consequence of the implementation of a sustainable vision is the key enabling factor in terms of transferability of this measure. Additionally, a strong support by stakeholders, the availability of funds and efficient organisation has created a strong basis for the feasibility in implementation and operation. Due to facilitating cultural circumstances and life style patterns this measure is expected to be well accepted among the public. This is also a prerequisite for a successful shift of the personal car use mentality towards the widespread use of other means of transport. It should be emphasised, that besides the promotion activities per se, a stronger attention must be given to the improvement of walking and cycling infrastructure in order to further increase the potential for change of travel habits, while due to low maintenance costs, efficient travel speeds, positive impact on human health as well as the experience that cycling brings to users is cycling in urban settlements, the increase in its popularity should be the main agenda for tackling the urban mobility air pollution issues.

3.2.2 Basel

City	Policy scenario / measure name
BASEL	NoHeat
Objectives	
Replacement of fossil heating technologies by heating pumps and solar heating (until 2020: 1/3 will be replaced; until 2030:100%)	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
POLITICAL	Strong opposition from commerce and industry because of higher costs has resulted in a long political debate before implementation. Political reasons may be the most important barrier in terms of transferability.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
POLITICAL	Strong support of "green" and left wing political parties
MITIGATION ACTIONS	
The transferability in this case is strongly dependent on politics. For example, the presented costs of the implementation costs for home owners were criticized by opponents and the effectiveness of the measure was therefore doubted - in the end the parliament voted for the measure and the law came into effect in 2017.	
INTERPRETATION	
There appears to be quite a strong opposition towards the measure due to associated higher costs, but eventually the measure was accepted by the political circles. In terms of social acceptance, it is still unclear whether the measure will gain strong support in future in order for measure to be fully implemented (100%). In such cases a share of the population would always rather stick to what they are used to. In addition, such changes also require the adaptation of the heating systems in houses and this is also not a favourable options for some.	

City	Policy scenario / measure name
BASEL	FirewoodBan
Objectives	
Introduction of a ban on small combustion of firewood (2030 scenario)	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
INVOLVEMENT	Lack of awareness/involvement presents a key hindering factor for the transferability of this measure.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
TECHNOLOGICAL	New technologies like heat pumps offer attractive alternatives for renewable heating.
OTHER	Effective air pollution control measures in other sectors might raise awareness of the air pollution produced by firewood.
MITIGATION ACTIONS	
Efforts to raise awareness about the problem – there have been public debates every winter when PM2.5 values are high.	
INTERPRETATION	
Due to lack of awareness and involvement, this measure could face an issue during the implementation. Effective air pollution control in other sectors might raise awareness, which may contribute to successful tackling of the problem in the future.	

3.2.3 Brno

City	**Policy scenario / measure name**
BRNO	Brno_M1_OPTI - Promoting low carbon electric vehicles
Objectives	
Increase usage of the low-carbon vehicles within the area of the City of Brno	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
PLANNING/ FINANCIAL SPATIAL TECHNOLOGICAL	Placing charging stations in sufficient density in the city and related maintenance. Propagation of the usage/purchasing of the electric vehicles by citizens and companies is heavily dependent on financial situation (i.e. subsidies), since electric cars are still much more expensive than regular cars. It is possible that other low-carbon technologies (hydrogen, bioCNG...) will increase.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
POLITICAL/ FINANCIAL COMMUNICATION	Overall European support of the low-carbon vehicles. Many grants relevant for low-carbon cars European and national. The measure positively affects the attitude towards sustainable transport options
MITIGATION ACTIONS	
The increased communication surrounding the measure implementation positively affects the attitude towards sustainable transport options.	

INTERPRETATION
It is evident that the measure has a relatively high social acceptance as well as political support. There are however some technological concerns possibly affecting a potential transferability of the electric car technologies, but since these are currently in the development phase, the concern that they could hinder the propagation of electric vehicles in unlikely.

City	**Policy scenario / measure name**
BRNO	Brno_M2_OPTI/ZERO - Reduction of the motorized vehicles in the city and increase of the usage of clean transportation (i.e. walking, biking and using public transport)
Objectives	
Reduction of the motorized vehicles in the city by 42/22% respectively.	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
PLANNING/ SPATIAL	Providing enough alternative means of transportation in sufficient quality.
POLITICAL/ CULTURAL/ PROBLEM RELATED	There may be a strong opposition against any restrictions related to the usage of the personal cars when trying to implement sustainable transport options.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of driver**
INSTITUTIONAL/ COMMUNICATION	City of Brno must carefully communicate all promotions/restrictions, using multiple media.
SPATIAL/ ENVIRONMENTAL	Planned measurements of the air quality before/after implementing of the measure.

COMMUNICATION	The measure positively affects the attitude towards sustainable transport options

MITIGATION ACTIONS

Communication and promotions of alternative transport using multiple media - the potential improvements/benefits of sustainable transport options (e.g. air quality) must be communicated clearly to all citizens/stakeholders.

INTERPRETATION

It is evident that the measure has a relatively high political support, but the nature of measure (restrictions to personal car use) can present an important cultural barrier. In regard to the PT potential the measure exhibits a high level of transferability potential mainly especially in the areas , where there is already a high public acceptance of public transport. An efficient air quality related promotions could further encourage the widespread of acceptance of alternative transport measures and thus provide further support in implementation.

3.2.4 Ljubljana

City	Policy scenario / measure name
LJUBLJANA	M1_ReducedCar
Objectives	
Decrease of personal car use (the combination of the car reduction measures and parking policy will lead to a decrease of personal cars on incoming roads/avenues by 20 %); specifically, the promotion of electromobility is planned to result in an additional 2% of emission reduction.	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
SPATIAL CULTURAL PLANNING	Opposition towards the limitations for passenger cars. General attitude towards the importance of car flow in traffic planning instead of the mobility (flow of people) Infrastructure construction for motorised transport as a precondition for implementation of measures of sustainable transport.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
COMMUNICATION	Multiple media coverages of sustainable transport; media and some leaders support for changes in transport culture and policy.
POLITICAL / ORGANISATIONAL	The driver in this regard is the fact that the sustainable transport remains as a priority in the policies/planning documents; however stronger shift toward the actual implementation is crucial for success.

MITIGATION ACTIONS
In planning documents, a strong support for financing sustainable transport measures is required – namely, the current practice has been experiencing a significant halt. Focussed actions (NGO) can be organised in order to provide the impetus for change towards the sustainable mobility actions.
INTERPRETATION
In order to reduce pollution at the expense of traffic, the cities must find the appropriate means to accelerate their development in the field of sustainable mobility.

City	**Policy scenario / measure name**
LJUBLJANA	M2_IcreasePT
Objectives	
Increased share of public transport use (increased use of PT on the account of better service and transfer from car users)	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
FINACIAL	Low number of PT passengers hinders rational measure planning – due to the economics behind the PT company operations, the decisions must be supported by revenues.
PLANNING	A lack of systematic data collection about the PT usage, which could inform rationale decision-making; The measures for comfortable PT usage have been cancelled (yellow lanes, priority at intersections…) The larger investments into PT (tram lines, rapid bus transport) have been omitted from the long-term planning documents.

KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
ORGANISATIONAL	Firm cooperation with city planners, PT company and traffic infrastructure operators/controller software developer.
CULTURAL	public support of the measure (positive feedback on the implementation)

MITIGATION ACTIONS

Without the limitation to the personal car traffic, there can be no stimulation for the passengers to turn to PT. Along with that also the technical measures for increased PT travel speeds must be given high importance, such as the PT priority lanes and priority at intersections, fully functional P+R system etc. Without this the PT will not be a competitive means of transport. Communication activities with the city planners, PT company and users (citizen engagement) - strong stakeholder involvement is also crucial in this regard.

INTERPRETATION

Good public passenger transport is the backbone of mobility in large and medium-sized cities, while also providing optimal accessibility conditions from the wider metropolitan region. Provision of attractive, fast and comfortable public passenger transport is essential to ensuring that mobility is central in the city and beyond. Quality public passenger transport services must be fast, accessible and affordable; it must be possible to easily switch between different means of transport (bus - train - bicycle - car). Foundations quality offers of public passenger transport are: cooperation between bus and rail transport, supply new, comfortable, capacity and environmentally friendly vehicles, as well as quality information support to the system and users. Only such a public passenger transport system will compete with the passenger car and be able to take the lead the role of mobility

Following the barriers listed here it should be noted, that only with a holistic planning approach, this measure can be deemed transferable to other cities in order to contribute significantly to the air pollution reduction from transport.

City	Policy scenario / measure name

LJUBLJANA	M3_PTfleet
Objectives	
Renovation of public passenger transport vehicle fleet (CNG, hybrid buses); the replacement of EURO 0,1,2 buses with CNG propulsion system (86 buses in total)	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
PROBLEM RELATED	Planning of a measure was too ambitious in terms of predicting future relevant events (availability of suitable buses, financial crisis/recession, political support, etc.).
FINANCIAL	Financial aspects of the fleet renovation.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
POLITICAL	Strategic decision of city administration and PT company management towards more environmental friendly vehicles meaning that CNG buses will replace at least half of the fleet.
TECHNOLOGICAL	Environment friendly technology: lower fuel consumption = lower emissions = PT operator's environmental friendly image
MITIGATION ACTIONS	
Strong stakeholder involvement is an important aspect of transferability in this case. The other important aspect is the status and the planning of a financial framework.	
INTERPRETATION	

The technological aspect is only one segment for a successful implementation of PT system. The other such as the availability of appropriate number of buses to cover the necessary demand in terms of frequency, the routes, attractiveness compared to private cars or other means of transport etc. is another side of a potential success story, however these aspects are difficult to achieve by an independent work and effort of a PT operator – it must be done in synergy with the city administration, spatial planning and transport authorities and this may be more difficult to achieve.

City	Policy scenario / measure name
LJUBLJANA	M4_DistrHEAT
Objectives	
Increased utilization and expansion of district heating systems; renovation of the system - replacement of existing combustion units with more appropriate means (i.e. 70% reduction of coal use)	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
SPATIAL	Occupancy of space with existing municipal infrastructure - conditioned technological and implementation;
LEGISLATIVE	Inappropriate heating units are not forbidden by law, which makes the transition to cleaner technologies more difficult.
FINANCIAL	High cost of construction of hot water network and connections (no subsidies for the network / a large part of the cost of construction of the connection falls to the owners of the buildings);
TECHNOLOGICAL	Natural gas as a fossil fuel is still unacceptable to proponents of a carbon-free society

KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
POLITICAL	High political priority for district heating (EC, Pures, Air Quality Ordinance, etc.) Political support exists as an appropriate support scheme for high-efficiency CHP is adopted;
PROBLEM RELATED (ENVIRONMENTAL)	The technology is cleaner than coal, reducing greenhouse gas, dust and the like. Consequently, the fuel is suitable for the transition to a carbon-free society;
FINANCIAL	It is possible to obtain an Eco Fund subsidy (for a thermal station) to connect an existing building (change of heating mode);

MITIGATION ACTIONS

Communication activities to improve acceptance among the political circles in the early stages of measure planning process (from year 2000 onwards).

Efforts should be made to overcome the potential administrative issues regarding the zoning and licensing process of district heating expansion.

Another thing to consider is also the potentially higher costs of constructing/expanding the district heating system – the potential subsidy schemes must also be considered during the decision making processes.

INTERPRETATION

The main goal for the introduction of LPG technology is to replace part of the very old production units with the new unit, thus ensuring the continuation of reliable supply of heat within the City; Also important is the fact, that this is a highly efficient cogeneration unit, which is identified as an appropriate technology in terms of primary fuel efficiency and

energy savings, and as such it contributes significantly to meeting the commitment to reducing CO2 emissions and meeting the goals of cogeneration in systems district heating.

From a social point of view, and with a sober reflection and unburdening of a need for a carbon-free power source, the LPG is proved to be quite acceptable as the resource that is cleaner and enables a transition to a carbon-free society and it is here to stay at least in the mid-term period. As such it may prove as a good technological alternative for transfer to cities in similar situations.

3.2.5 Madrid

City	**Policy scenario / measure name**
MADRID	Urban distribution of goods using low emission vehicles
Objectives	
Application of measures prioritizing access and timetables for low emission vehicles in the Central Zone (Madrid Central) and regulated parking zones (SER)	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
POLITICAL/ STRATEGIC	Opposition of key actors based on political and/or strategic motives, conflict between key (policy) stakeholders due to different points of view about the measure implementation.
TECHNOLOGICAL / FINANCIAL	Additional technological requirements, technology not available yet, cost of technology
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
POSITIONAL	The measure concerned is part of a (city) air quality and climate change plan.
INSTITUTIONAL	Facilitating laws, rules, regulations and their application
ORGANIZATIONAL	Collaboration with all stakeholders
SPATIAL	Space dedication for physical projects, experimentation zones
MITIGATION ACTIONS	

Working Groups working closely with the stakeholders have proved an important factor when regulating the access of urban distribution of goods to the city centre.
INTERPRETATION
The opposition of key actors based on political and/or strategic motives, combined with the lack of appropriate technological solutions along with the financial issues might prove a significant barrier for the transferability of similar measures. Although the experimentation zone has proven successful for the implementation, the transferability to other areas might be problematic, mainly because it forces the users to adopt different operation patterns, dynamics etc. The related pollution reduction and improved quality of life in the areas in question usually do not justify higher costs of operations in the eyes of the goods delivery companies. Therefore, it could be expected that some reluctance might still appear. The applications of the related legislation and related processes of stakeholder engagement will play a crucial role in the transferability/implementation process.

City	**Policy scenario / measure name**
MADRID	Interventions in buildings and municipal facilities
Objectives	
Moving towards a zero emissions model through energy efficiency and the use of renewable energies, acting on municipally owned buildings and street installations that use energy. Development of programmes to improve heating and cooling installations, implementation of PV systems, technological communication platforms, implementation of environmental management and energy management systems, and fulfilment of the municipal commitment to buildings with nearly-zero positive energy consumption.	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
POLITICAL / STRATEGIC/	Lack of shared sense of urgency among Policymakers to take actions related with energy efficiency and sustainability.

FINANCIAL	Lack of consensus to create specific budget to address the measure.
PROBLEM RELATED	Re-conversion of energy systems based on coal or petrol to new and efficient heating/cooling system require to adapt the buildings to the newest materials. Therefore, additional reconstruction work has to be done in most of the public buildings.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
POLITICAL / STRATEGIC	Commitment and consensus among Policymakers and stakeholders to develop an ambitious plan to modernize and introduce cost-efficient energy systems based on renewable energies on all the public buildings.
FINANCIAL	Availability of public funds is essential to address the changes required.
PLANNING	In order to satisfy all the technical requirements needed to address the complexity of the measure, an exhaustive planning is required including the timing and all priorities.
MITIGATION ACTIONS	
A sense of urgency among policymakers to take actions related to energy efficiency and sustainability should be established, combined with a strong consensus to allocate specific budget to address this kind of issues is a key factor for the successful transfer of this measure.	

INTERPRETATION
Re-conversion of energy systems based on coal or petrol to new and efficient heating/cooling system require to adapt the buildings to the newest materials. Therefore, additional refurbishment has to be done on most of the public buildings leading to relocations etc., which might cause new problems. Therefore, it could be expected that some reluctance might still appear in the case of transferring this measure to other cities/locations. The positive aspect is the fact that a strong commitment of policymakers and stakeholders to develop an ambitious plan to modernise and introduce cost-efficient energy systems based on renewable energies throughout all the public buildings can provide a needed push for change.

3.2.6 Milan

City	**Policy scenario / measure name**
MILAN	AreaB
Objectives	
Low Emission Zone (Area B): Control and tracking of access into the city by banning up to Euro 3 and Euro4 diesel cars	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
CULTURAL	Impeding cultural circumstances and life style patterns.
POLITICAL / STRATEGIC	Lack of shared sense of urgency among citizens and some stakeholders (e.g. commercial/private services) to sustainable mobility. Conflict between some policy stakeholders due to diverging beliefs in directions of solution.
INVOLVEMENT, COMMUNICATION	Insufficient consultation, involvement or awareness of citizens or users
PROBLEM RELATED	Lack of shared sense of urgency among key stakeholders to sustainable mobility
FINANCIAL	Unwillingness of the citizens to contribute financially (e.g. buy a new car) or to change their behaviour with transports
PROBLEM RELATED	Insufficient implementation of corresponding improvements in public transports (metro/bus)
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of driver**
POLITICAL / STRATEGIC	Presence of sustainable development city vision- The measure concerned is part of a city program

POSITIONAL PROBLEM RELATED	and/or a consequence of the implementation of a sustainable vision. Need to take effective actions to face the well-known air pollution problems in the city (need to act)
FINANCIAL	Relative low-cost measure for the municipality
OTHER	Reduced health costs related to air pollution in urban area. Big-data collection and data management about transports in the urban area: analysis of the improvements (reduced time spent on the roads, less car accidents, better liveability)

ACTIONS TAKEN

The transferability of this measure is enhanced by the communication strategies and media campaigns to put the air pollution and sustainable transport back on the priority list emphasizing the benefit of Air Quality improvement on the population health and life conditions. Air Quality monitoring network data from existing cases that show a significant reduction of Air Pollution levels in the city centre can also be a crucial factor for enhancing transferability.

INTERPRETATION

It is evident that the measure has a relatively high political support, but the nature of measure (restrictions to personal car use) can present an important cultural barrier for transferability. An efficient air quality related promotions could further encourage the widespread of acceptance of alternative transport measure and thus provide further support for implementation.

City	**Policy scenario / measure name**
MILAN	ElectricBus
Objectives	

Conversion of all public buses to electric ones by 2030

KEY TRANSFERABILITY BARRIERS

Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
PROBLEM RELATED	Lack of shared sense of urgency among key stakeholders to sustainable mobility
FINANCIAL	Very much dependent on public funds and subsidies. Insufficient market analysis of the final costs (cost of bus ticket; management of fleet; cost of energy).
PROBLEM RELATED	Complexity of the problem to be solved due to the construction of new infrastructure (e.g. recharge of the bus fleet).

KEY TRANSFERABILITY DRIVERS

Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
POSITIONAL	The measure concerned is part of a city program and/or a consequence of the implementation of a sustainable vision.
PROBLEM RELATED	Need to take effective actions to face the well-known air pollution problems in the city of Milan.
OTHER	Creation of new job profiles and competencies.
ENVIRONMENTAL	Reduction in CO2 and other GHGs emissions and of air pollutants related to fuel combustion. Noise reduction.
OTHER	Reduced health costs related to air pollution in urban area and reduction of noise-related health impacts.

ACTIONS TAKEN

The transferability of this measure is enhanced by the communication strategies and media campaigns to put the air pollution and sustainable transport back on the priority list emphasizing the benefit of Air Quality improvement on the population health and life conditions.

A study of feasibility has also been done during the planning and operation phase in order to overcome technological problems related to the management of a full electrical bus fleet and for the creation of an innovative energy smart grid which is a good decision-making basis in case of the measure transfer.

INTERPRETATION

Based on the fact that this measure is primarily oriented towards implementation of a not-so- new technology, the barriers encountered do not pose much risk in terms of transferability. The major issue in this regard would be of financial nature.

3.2.7 Roskilde

City	Policy scenario / measure name
ROSKILDE	M1-M4 - Roskilde 2040: CO_2 neutral

Objectives

The objective of the strategy is to transform the City of Roskilde into a city with zero carbon emissions by 2040. This objective include the public authorities, city. The strategy thus focuses on climate mitigation while it acknowledges reduction of air pollution as an important side effect of the carbon neutral strategy.

Aspire to achieve CO_2 neutrality within electric and district heating (2030) and individual heating (2035) as well as complete neutrality by 2035 as a business (yearly reductions of 2 %, 2007-2025) and by 2040 as a geographical area (emission reduction of 35 %, 2008-2025) through i.e. implementation of electric buses (fossil fuel free service in 2030), windmills, solar cells, and district heating.

Aim to identify, develop and implement green solutions through extensive collaborations (internally and externally), municipally provided laboratories, and supporting and facilitating transitions for private and industrial consumers. Green mobility, infrastructure, city planning and development contribute to the stimulation of sustainable behaviour.

To curb emissions through three key areas: power supply (i.e. windmills and conversion of heating systems), transport (prioritizing sustainable public transport and establishment of an infrastructure that makes it easier to choose green means of transport), and buildings (extensive energy renovations for the municipal buildings).

Pursue environmental sustainability through minimizing environmental input (resource consumption) and output (emissions) by purchasing and renting eco-labelled products, reducing water consumption (3 % yearly, 2017-2019), only employing energy and resource from sources with no environmentally negative consequences (reducing 3 % yearly direct greenhouse gas emissions, 2016-2019) as well as recycling and reusing the majority of the resources consumed (e.g. 10 % yearly increase in waste separation, 2016-2019).

KEY TRANSFERABILITY BARRIERS

Barrier field (e.g. financial, political, spatial…)	Specification of barriers
POLITICAL	The objective involves multiple policy areas such as mobility and transport, energy and energy system,

	land-use, waste, housing and the municipal organisation. Very complex planning phase.
INSTITUTIONAL	Complex institutional interactions; success of the strategy involves many sectors of the city and multiple stakeholders, including public and private and citizens, and aims to change behaviour as well as systems through early involvement in initiatives and measures.
COMMUNICATION, INVOLVEMENT	Change of mobility habits are challenging and if not addressed adequately will provide a barrier.
FINANCIAL	Taxation of different energy types that hinders the smooth transition to renewable energy.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
POLITICAL	Climate mitigation has become the top priority in the Danish political system.
TECHNOLOGICAL, FINANCIAL	The main driver of the implementation of zero-emission technologies is that they are rapidly becoming cheaper relative to their fossil fuel counterparts.
TECHNOLOGICAL, FINANCIAL	Operation will be less complex and be operated at a lower cost than fossil fuel technologies, which needs more maintenance, as the tear and wear are higher in combustion technologies.
ACTIONS TAKEN	
The political ambition to reach zero emissions will drive the planning process and ensure that government officials have political backing. The objective is shared not only by the political	

system but also by companies and citizens. It is likely that such shared objective will enhance the transferability of proposed measures.
INTERPRETATION
The main driver of the implementation of zero-emission technologies is that they are rapidly becoming cheaper relative to their fossil fuel counterparts and thus attract more and more political and public support. Already wind turbines and solar cells are cheaper to implement and operate than coal-fired power plants. Also, battery technology heat pumps and other heat and storage technologies are at a stage where they are competitive.

3.2.8 Stuttgart

City	Policy scenario / measure name
STUTTGART	Sc1 - Increase of building insulation (+2%) and heating system exchange to high efficiency gas boilers

Objectives

Promoting energy efficient systems at new buildings, retrofitting older buildings and changing of heating systems.

KEY TRANSFERABILITY BARRIERS

Barrier field (e.g. financial, political, spatial…)	Specification of barriers
POLITICAL, CULTURAL	Unwillingness of citizens - political decisions
FINANCIAL,	Financial questions (funding)
INSTITUTIONAL	Technical and financial realisation and conviction of citizens and building investors/owners and institutional differences in some climate and air quality questions and energetic questions.

KEY TRANSFERABILITY DRIVERS

Driver field (e.g. financial, political, spatial…)	Specification of drivers
POLITICAL	Political interests and debates
COMMUNICATION,	Civic associations and public communication.
FINANCIA	Funding
INSTITUTIONAL, PLANNING	Implementation in development plans

MITIGATION ACTIONS

Communication efforts should be made in order to make air quality plan and action plans to make the measure more attractive (communication in media and with leaflets and other actions in public spaces).

INTERPRETATION
From the descriptions it is evident that there is strong political will as well as intent behind this measure, which is clearly shown by the inclusion in the development plans and dedicated funding. However, the main obstacle in the transferability lies in the suitability of technical progress and the possible differences in opinion of citizens and building investors/owners and related institutions in regard with climate and air quality questions and energetic questions, which could result in issues regarding the implementation.

City	**Policy scenario / measure name**
STUTTGART	ScEL - Promoting low carbon electric vehicles (share in vkm to 7% in 2020, 20% in 2030)
Objectives	
Promoting low carbon electric vehicles.	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
CULTURAL	Unwillingness of citizens
FINANCIAL	Financial questions.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
POLITICAL	Update of air quality plan, update of inner-city action plans.
COMMUNICATION	Presentation of air quality plan and action plans in media.
FINANCIAL	Permit of funding,

MITIGATION ACTIONS
Communication of air quality plan and action plans to make the measure more attractive. Communication in media and with leaflets.
INTERPRETATION
Apart from the fact that the promotion of electromobility has been included in the air quality plan and consequently some financial incentives being available, the measure faces some barriers in terms of realisation and public acceptance. As a result of this, it remains the question of organisation on how this measure could reach the full potential for vast implementation.

City	**Policy scenario / measure name**
STUTTGART	ScUV - Promoting environmentally friendly transport modes (walking, cycling, PT) (decrease of individual transport by 7% in 2020; 20% in 2030) (2030 scenario)
Objectives	
Promoting and develop new and attractive environment friendly transport modes like new bicycle lanes, footpaths and expansion of public transport.	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
FINANCIAL, POLITICAL, OTHER	Unwillingness of citizens (due to topographic relations), political decisions.
TECHNICAL	Technical realisation.
FINANCIAL	Financial questions (especially in public transport questions)
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**

POLITICAL	Political interests and debates; Political interests in funding and expansion of public transport and bicycle lanes etc.
FINANCIAL	Realisation of funding; financial structures of public transport.
ACTIONS TAKEN	
Communication in air quality plan and action plans to make the measure more attractive. Communication in media and with leaflets and other actions in public spaces.	
INTERPRETATION	
Political interest and availability of funding are a strong foundation whet it comes to transferability, however the downside remains on how to find an even better conditions for financing to increase the potential low public acceptance.	

3.2.9 Thessaloniki

City	**Policy scenario / measure name**
THESSALONIKI	M2- Promotion of cycling/walking, green vehicles and public transport
Objectives	
Promotion of citizens' health balance and life quality, reduction of environmental pollution, make the city leader in clean- transport.	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
FINANCIAL	Too much dependency on public funds
SPATIAL	Road and traffic conditions Lack of facilities for cycling/walking Lack of vehicle charging point
COMMUNICATION	Encourage citizens to adopt new walking and cycling behaviours
NONE	All public buses and municipal vehicles will be replaced with electric ones by 2030. 10km of cycle lanes is to be built into the administrative boundaries of the Municipality of Thessaloniki.
KEY TRANSFERABILITY DRIVERS	
Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
POSITIONAL	The measure is a part of a city program/vision
INVOLVEMENT, COMMUNICATION	Actions to promote cycling/Develop campaigns of personalized the benefits of cycling/create city maps for bike users
PLANNING FINANCIAL	Create infrastructure for electric vehicles/ s/create special parking spaces

	Very low prices to electric charging point/ reduction of parking fees
OTHER	Reduce air pollution and urban noise

MITIGATION ACTIONS

Extensive communication activities have been organised to promote walking and cycling.

Public transport was free of charge on heavily polluted days in order to facilitate the promotion of PT usage.

INTERPRETATION

Although the measure is a part of the city programme/vision, the nature of the measure, which focuses primarily on promotion of walking/cycling in could prove inefficient in terms of providing significant changes in behaviour. It could be pointed out that social acceptability may prove an important factor for potential decreased success of the measure, also considering the fact that the current status of walking and cycling facilities in not optimal. In addition, the improvement of the infrastructure is mainly dependant on public funds, which should be taken into consideration in terms of transferability/implementation.

City	**Policy scenario / measure name**
THESSALONIKI	M4-Energy efficiency in the cement industry: Use of refuse fuels
Objectives	
Increase the use of alternative fuels in the cement production in order to reduce CO2 emissions.	
KEY TRANSFERABILITY BARRIERS	
Barrier field (e.g. financial, political, spatial…)	**Specification of barriers**
COMMUNICATION	Lack of knowledge of some stakeholders and local authorities and citizens regarding the use of alternative fuels in cement sector

POLITICAL/ ENVIRONMENT	Excessive bureaucracy in regards to permitting for co-processing / Energy recovery not supported on national level
OTHER	Lack of suitable waste / High quality waste not available to the cement sector in sufficient quantity / Waste processing industry is not well-developed / National economic situation doesn't allow investments in waste industry
CULTURAL	Public acceptance of incineration in general is low

KEY TRANSFERABILITY DRIVERS

Driver field (e.g. financial, political, spatial…)	**Specification of drivers**
PLANNING	Most Greek cement plants are technically ready to increase their use of waste-derived alternative fuels
INVOLVEMENT, COMMUNICATION	Alleviate the bureaucratic barriers for permitting
TECHNOLOGICAL	Investment has been made in plant level to allow for higher co-processing rates
POLITICAL	EU's push to adhere to waste framework directive / Better compliance with EU directives.

ACTIONS TAKEN

- Co-operate with the local waste management industry to ensure suitable quality of processed waste and plan the development of more advanced waste treatment methods.
- Ensure reliable waste collection and treatment system and ensure stable stream of pre-treated waste to the cement industry.
- Consultation/ informing the local authorities, stakeholders and citizens that the industry will comply with the specifications.
- Communication strategies in order to notify the lower environmental impact of cement production by using alternative fuels.

INTERPRETATION
Since the measure is not affecting the wider area, the listed barriers could in fact prevail the benefits, and could hinder the implementation of the measure. Given the fact that there is also a low public acceptance of the measure it could in the end result that the measure will not be prioritised compared to other air pollution measures. The positive aspect in terms of transferability potential may be, that usually the industry is not dependent of the public funding; usually the decisions of top management are also independent to a certain extent in other aspects. Measures can be therefore implemented outside of the public decision-making framework, however, the public support is always beneficial. Compliance with regulation is a prerequisite.

3.3 Key findings about transferability of policy scenarios/measures

In this section key findings about the transferability of policy scenarios/measures are presented with the barriers and drivers, which contribute to decisions about their implementation.

3.3.1 ENERGY: BUILDINGS & HOUSEHOLDS

Barriers appear in all phases of the efficient energy associated interventions; in planning they congregate mostly around political/legislative, spatial and financial fields. During implementation and operation phases the financial and technological barriers are the most prominent.

Driving factors are mainly associated with the political support due to environmental benefits in preparation stages, followed by the availability of technological advancements and available financial support.

During the implementation an ample effort must be placed in communication activities to improve acceptance among the political circles in the early stages of measure planning processes as well as to raise awareness - make the measure more attractive for general public, which would in turn facilitate the bottom-up support for realisation. Technological advancements can serve as an important factor in this regard, combined with the detailed information about environmental benefits. The adoption of a detailed air quality monitoring/evaluation plan combined with *ex-ante* modelling techniques is also of high importance in this case (ICARUS, 2019). Significant efforts have to be made to overcome the administrative issues regarding the spatial issues within the study/intervention areas (zoning and licensing processes).

3.3.2 TRANSPORT

3.3.2.1 Car-independent lifestyles

The provision of mobility alternatives to car usage is an essential component of any comprehensive strategy for transport related air pollution and GHGs reduction in the cities. Among these, public transport and measures for decreased car ownership/usage (car sharing) are the two groups of policy measures considered. At the same time, cycling and walking related measures are recognised as a valid alternative for the promotion of this behavioural shift.

Public transport

Public transport measures often face institutional, financial and spatial barriers, and these generally become apparent in the initial phases of implementation. No such obstacles usually appear during the operational phase. Extra investments and/or institutional adjustments are

often required for implementation, and it is usual for political drivers to play an important role in all phases of implementation.

In case of fleet management (replacing the propulsion system, renovation of the fleet etc.), the most frequently mentioned barriers during the planning/preparation phase are: lack of political support, technological, institutional and organisational. Financial barriers during implementation were also frequently cited. During the operational phase, mostly technological and organisational barriers were mentioned. Strong political will to support and implement these measures is a major driver in some cases, together with a set of organisational factors aimed at smoothing the entire process.

Increasing the Public Transport (PT) users by the promotion and improvement of service is both desirable and feasible, however, the main barriers are cultural and technological in nature. Integration and homogenisation of ticketing systems, hardware and software issues, and real-time data problems can hamper the technical feasibility of implementation. Another barrier presents itself when multiple operators are involved, as various co-operative arrangements between operators and authorities need to be made. The drivers are diverse, but are mainly organisational in nature. Multiple stakeholder involvement sessions and good planning of interactive stages are crucial factors for success. Users and stakeholders are usually quite accepting of measures relating to PT fleet management, and the usual intent is to up-scale such measures.

Car-sharing

Barriers are mainly concentrated around political, financial and technological factors. Driving factors during the implementation of these measures included high congestion levels, parking costs, shortage of parking spaces and high costs of owning a car. But even if these particular conditions are not present, positive results are equally achievable by pulling other levers, such as introducing financial incentives and offering free use of services on a trial basis.

A paradigm shift is needed to make a move away from car use and car ownership to alternative mobility services. Such a shift involves not only changing people's minds, but also changing legislation and forms of social organisation, which is challenging, but feasible.
In this regard, a number of important conditions need to be taken into account if these ideas and programmes are to be put in motion.

Cycling

The promotion of cycling consists of various interventions. The enhancement of cycling infrastructure, for example, is hampered by several barriers, and at various stages. Cultural and political aspects present the greatest difficulties during the preparation phase. Financial

and planning barriers are highest during the implementation stage, while cultural and organisational factors are again more influential at the operational phase.
Stable political support, resulting in tailor-made legislation and combined with very early workshops, encourages stakeholder involvement and contributes to the generation of new ideas and consequently feasibility of related actions.

The wider improvement and provision of cycle and pedestrian infrastructure has been deemed a feasible component of future city-wide transport policies in most cities that have implemented such measures. Such measures will bring greater benefits to active travellers by way of well-connected networks, a safe cycling environment and improved security.
In general, measures aimed at creating or improving existing cycling infrastructure are considered as feasible and therefore also suitably transferable to other parts of the cities.

3.3.2.2 Alternative fuels and driving technologies

Strong political will to support and implement these measures is a major driver, together with a set of organisational factors aimed at smoothing the entire process. Barriers are more diverse and are concentrated especially in the planning and preparation phase, namely: technological gaps, absence of legislation, lack of political support and insufficient financial planning.

It is feasible in most situations to implement and/or up-scale to fuels and propulsion systems that are more environmentally sustainable. However, operating conditions, costs involved in implementation, operational and performance characteristics, fuel availability and the extent to which a fuel meets environmental objectives present certain limits. Other factors that play a role include legacy systems, training, and public or political acceptance. Cities that have achieved impressive results have already taken the initiative to assess up-scaling potential. Decisions on some measures, however, will depend on the impacts of the global economic downturn on regional economies. On the other hand, it is not easy to transfer measures promoting alternative fuels to other cities because a number of conditions need to be met. National legislation can also hamper feasibility to switch to clean fuels. The relative attractiveness of fuel alternatives depends on tax rates, legislation and regulation, supply reliability, and general technical and operational competency.

3.3.2.3 Efficient urban logistics

Interventions covering the implementation of new freight operating modes or distribution schemes were hampered by several barriers at various stages. Lack of political support and stakeholder involvement as well as financial issues were identified as the main barriers during

the preparation stage. At the implementation and operational stages organisational barriers were deemed the most influential.

New distribution schemes are generally characterised by high feasibility for implementation. However, local constraints in the urban structure can have negative impacts. Integration with pre-existing services could be beneficial. An analysis of success factors highlights the fact that cities should seize the opportunity to combine measures and maximise benefits.

3.3.2.4 Demand and traffic management strategies

Low emission zone

Access management measures are often unpopular with the public, both in financial and spatial terms. As a result, political support and excellent communication with the public are powerful drivers. Accurate measurements of environmental parameters, up-to-date technology and good quality data are important drivers at the operational stage. Research and development measures have strong potential in this case. However, it is worth noting that expertise in conducting research is of utmost importance, e.g. in the development and use of computer models. Involvement of the right partners with appropriate expertise is crucial. *Ex-ante* studies require significant effort in data gathering to ensure that models are able to produce sound and consistent outcomes.

Regarding the feasibility of implementation - if a measure proposes the introduction of a payment system to enforce access limitations, there will be strong political and public opposition. Moreover, the feasibility of such a measure depends to a large extent on local and national legal norms, such as privacy legislation regarding the use of cameras and data. European legislation (e.g. GDPR Regulation) must also be taken into account at this stage.
Despite being a very important issue and a powerful tool, road pricing is not normally expected to command public or political support. Citizens and stakeholders must be informed and considered as 'part of the solution and not part of the problem' – i.e. in the process of measure preparation it is important that they sense the "ownership of the measure". However, for successful implementation and operation, it is crucial not to base approval of a measure solely on citizen support, at least not initially. Citizen support can grow after implementation once people experience the benefits of reduced congestion and pollution. On the whole, large-scale trials are preferable to small technology demonstrations.

Parking management

For the measures associated with parking management, barriers mainly occur in the preparation phase. Finding political support and commitment for potentially unpopular measures, such as parking charges, has proved to be difficult. Securing the right location for park-and ride facilities is a frequently encountered spatial barrier. Planning barriers primarily

result in delays in implementation. In addition, cultural barriers (increased parking fees, negative past experiences with similar facilities) play quite a prominent role.
Drivers were mentioned most frequently in relation to the preparation phase, but were also said to influence the other implementation phases. Political support and commitment, the availability of funds as well as involvement and communication with stakeholders were the associated drivers.

Whenever a measure proposes to introduce a payment system to change parking behaviour, considerable opposition from politicians and the general public is to be expected. What is needed for success in these cases is to obtain public support and to engage in clear dialogue with the public.

3.3.2.5 Enhanced environmental conscious behaviour in traffic

Culture and communication-related problems combine to form the main barrier for changing traffic behaviour through eco-driving programmes. Course attendance is usually low, but as far drivers are concerned, well-established training programmes, equipment and communication are proven success factors.

For eco-driving to be considered successful, a strong support at a strategic level, either within companies and/or municipalities is required. Front-runners and influencers are needed and the car drivers involved require full technical support. Options for acquiring additional interest might include training courses for electric vehicles, which would provide comparative evidence against standard cars.

3.3.3 INDUSTRY

In case of increasing the refuse derived fuels as a means to increase energy efficiency in the cement industry the barriers appear in all stages of the measure development. The most important ones are associated with communication and political fields – primarily this refers to a lack of knowledge about the technology, which results in poor public acceptance and low political support. On the other hand, drivers that have been cited for all stages would allow for a successful implementation and operation of the facility (available technology, financial and political support).

In terms of ensuring feasibility, it is important to start the communication strategies as early as possible in order to provide evidence about the lower environmental impact of cement production by using alternative fuels as well as to dedicate the additional effort to consultation activities, informing the local authorities, stakeholders and citizens that the industry will comply with the technological specifications regarding the environmental

parameters. A detailed monitoring/evaluation scheme foreseeing accurate measurements of environmental parameters is crucial in this regard.

3.4 Lessons learned for the transferability/implementation of measures

In the implementation of the different measures, some common barriers and drivers were experienced. From the conducted process evaluation, several lessons were also learned on the critical success factors of the measures that must be considered in case of the transfer of measures to other cities/locations.

Common objectives

Many measures required the cooperation between a large number of measure partners and other stakeholders. The success of this type of measures depends strongly on the good cooperation and mutual understanding. To ensure a good cooperation, efforts might be needed to make the common objectives clear among all partners. If this is not the case, a successful implementation of the measure might not be possible, resulting in delays or a discontinuation of the measure.

Political support

Political involvement in measure development is essential for the implementation of the measures according to plan. In this respect, it is helpful if the measures fit in already existing strategies (of the city or on a higher level). There were several measures in the project where politicians feared negative reactions from the public, especially for the more controversial topics like restricting car traffic.

Public support

Citizens played an exceptional role in the ICARUS project. Also, several measures required public support as a crucial element for a successful implementation. For example, many positive reactions from citizens on pilot cases pushed the measure implementation forward. It can be concluded here that it is important to involve citizens as early as possible and put efforts in raising awareness on air quality and climate forcing. Specific efforts should be dedicated to target groups that are hard to reach, e.g. car drivers.

Technical issues

Many of the measures in ICARUS had the aim to implement innovative technological systems, such as new vehicles technologies, smart solutions, etc. Especially for such measures, technical problems might induce delays in measure implementation. This type of barrier is difficult to prevent as new technologies are concerned. Nevertheless, its impact can be

reduced by foreseeing sufficient time for testing a system before its implementation and by exchanging experiences with cities that have implemented similar measures.

Unfavourable administrative procedures

Some measures were facing serious issues because of long and complex administrative procedures. This time needs to be incorporated in the measure planning.

Financial issues

For many measures the financial issues affected the available budgets of the city administration, measure operator etc., which mainly affected the implementation in a negative way.

4 CONCLUSIONS AND DISCUSSION

The majority of policy scenarios/measures exhibit relatively high transferability potential. This is primarily due to the fact that since these are sustainability-oriented approaches, most of them have been designed and developed following modern planning concepts and paradigms, which *per se* meet the success criteria adopted here. Some of them have been faced by significant barriers during the development or implementation process, but since these are hierarchically important interventions, the barriers have been overcome before they could seriously hamper the implementation. The only barriers lagging through several phases are financial ones, but with a strong interest for realisation these can eventually be overcome as well (various financial instruments).

Policy scenario/measure implementation management

As mentioned before, the majority of policy scenarios/measures analysed here are of strategic nature, and as such they provide a solid framework for implementation, but even so, they do not specify in detail how the specific interventions will be executed. It needs to be emphasised that the implementation process also needs to follow a structured approach to refine targets and to plan, detail, manage, communicate and monitor the implementation of measures. These processes will be much shorter than the planning itself and therefore need to be flexible enough to adapt to new situations. They need to be institutionalised in the organisation that is in charge of implementing a measure. Namely, a good policy scenario/measure does not automatically lead to good results. It is crucial to deliver the goals effectively and to apply appropriate management to oversee the implementation and to manage risks.

To allow for the most effective transition from an idea about the air quality and climate change improvement measure to the actual impact thereof, the following should be considered:

- Intervention definition: This stage involves the detailed definition of the policy scenario/measure, either based on the objectives or through the direct identification of the problems or issues to be addressed. It includes the specification of requirements and the identification of constraints, as well as the selection of performance indicators.

- Option generation: Several options (e.g. different features or routes) need to be prepared to find the most effective and efficient scheme which maximises stakeholder support. Various tools can be used to aid professional creativity and stakeholder involvement in the option generation process.

- Option assessment: This involves the appraisal of options/alternatives with regard to their potential impacts (air pollution, climate change, health and cost-effectiveness/cost-benefit). Typically, this process assesses many characteristics, covering impacts on the environment, society as well as local economy.

- Formal decision making: The decision is made by the responsible institution (or delegated body for smaller schemes), taking into account the findings of the option assessment stage. It includes agreement on the preferred option, arrangements for when the project will be implemented and by whom, and the allocation of resources.

- Monitoring and evaluation: Data on the performance of the policy scenario/measure are collected and analysed to determine whether the objectives have been met. This can lead to improvements in future policy scenario/measure design and can contribute to the evaluation of the strategy of which it has formed one part.

The former requires agreements with all actors involved in measure implementation. Therefore, it is highly beneficial to formalise the roles of actors involved in measure implementation, to ensure sound coordination among all parties involved, to help facilitate an efficient and effective implementation process, to address potential risks and synergies and to ensure transparency of implementation.

Citizen/stakeholder engagement

Another important aspect, often considered as an imposition rather than benefit, is the information to and the engagement of citizens. This is actually a crucial requirement not only while developing a policy scenario/measure, but when they are directly affected by a specific implementation. As implementation goes on, it is also necessary to inform the wider public about the progress.

This is a prerequisite to ensure acceptance of societally unattractive measures, to raise awareness for opportunities or restrictions that come with measure implementation and consequently enhance ownership of measures. This is best achieved to directly address the citizens or stakeholders that are directly affected (positively as well as negatively) by a planned measure before starting the implementation, and respond to their concerns. It should be noted here that those who are negatively affected will naturally make more “noise” than those who benefit from a measure. Also important is to mitigate possible negative effects that accompany measure implementation (e.g. support for businesses affected through long-lasting reconstruction of a pedestrian zone).

To keep citizens/stakeholders as active partners a highlight of milestones of measure implementation must be disseminated in all possible ways – for example, celebration of accomplishments with citizens (e.g., street festival after reconstruction of a pedestrian zone).

Reflection on the assessment process

In a reflection of an assessment process, it should be noted that the selection of the measures to be appraised as green strategies was done on a basis of assessment conducted within the ICARUS deliverable D5.4- “Final report on integrated assessment of policies”. Afterwards, the

selection has undergone another screening process in collaboration with the selected groups of stakeholders in each ICARUS city.

Representativeness of the selected stakeholders should be discussed here – namely, the development of the measures has been done throughout a lengthy planning and administrative processes and there exists a possibility of personnel change, the possibility that in a particularly large city authority bodies the most relevant stakeholders have not been available at the time the meetings were organised. Similar statements could be made for the involvement of NGOs.

Another point would be the expectedly variable depth of addressing the issue by different stakeholder groups. For example, some stakeholders have been more dedicated to address the questions regarding policy scenarios/measures, while other exhibited only minor interest for cooperation. As a result, different viewpoints have been collected, different hierarchy of the issues has been presented, resulting in difficulties in interpretation of the results. We have overcome these via an extensive iteration with stakeholders and the strong engagement of all the members of the ICARUS team in understanding the viewpoints of the different stakeholder groups across the participating cities and countries in Europe. This overall engagement and interconnectivity process is a valuable lesson for the follow-up period after the conclusion of ICARUS in order to foster the implementation of the measures considered and analysed herein.

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