



# Regional Action Plan

Creating spatial population prediction scenarios in urban-rural context in the region of Kymenlaakso (Finland)

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## Introduction

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Finnish Environment Institute (SYKE) is a partner in MARA. Our role in the MARA project has been supportive, helping other partners to improve their stakeholder involvement in their case study regions and give feedback and guidance for developing strategic stakeholder engagement plan. In addition, SYKE has closely collaborated and conducted different studies and analyses for regional authorities of Kymenlaakso region.

Kymenlaakso region is located in South-East Finland. The region has two main cities, Kouvola and Kotka and smaller city Hamina. Kymenlaakso was among the first industrial regions in Finland, but nowadays it suffers from industrial recession. The region has shared border with Russia.

The key objective of Finnish case was to support regional authorities to develop the Kymenlaakso transport strategy 2035, regional land use plan and roadmap for Carbon Free Kymenlaakso. In the MARA project, the focus was to emissions of transportation of the region by providing valuable information about population, mobility needs and developing innovative transportation model. SYKE's case research included (a) development of transportation model for the Kymenlaakso region to test impact of different policy goals to carbon emissions, (b) PPGIS survey for non-resident visitors to analyse their mobility behaviour and needs in the region, (c) producing spatial population prediction scenarios for 2050 to estimate future need for public transportation in rural areas in the city of Kouvola area.

# Transport planning

## – national and regional level regulations

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### **Main information about transport policy in the country**

The Programme of Prime Minister Sanna Marin's Government gives weight in transport policy to two aims: dynamic and thriving Finland and carbon neutral Finland that protects biodiversity. The policies for these aims are:

The aims of the transport network development are efficient transport infrastructure, low-emission transport and efficient communications and information exchange.

In terms of the transport infrastructure network, it is time to adopt a more systematic approach to long-term planning and development. Accessibility must be ensured in all parts of the country.

The targets for reducing emissions from transport must be in line with Finland's carbon neutrality targets. Transport emissions account for one fifth of the country's greenhouse gas emissions. Finland is committed to reducing transport emissions by 50 per cent by 2030. This is a step towards carbon-free transport. (Ministry of transport and communications)

Procedure of transport planning and regulations important for transport planning at the national level and/or in the region

The first national transport system plan is under preparing, it will be ready spring 2021. It will be prepared by the Ministry of transport and communication and approved by the Government. The Parliament will be informed. The national transport system plan will be made for years 2021-2031. The plan will support making the transport policy more strategic. The plan includes

- the analysis of the state and operating environment,
- the vision for developing the transport system until 2050 and
- aims for the transport system.

The national transport system plan includes 12 years action programme, including state and municipality level actions, as well as state funding plan for the transport system. The national transport system plan describes the effects of the implementation. The plan is based on the Law on transport system and road network.

The regional transport system plan reflects the vision of what is important in the region related to well functioning transport and safety. The regional transport plan is being made in the urban regions, regions and multiregionally. The regional council is responsible for strategic regional

development. It is responsible for starting the regional transport system plan process, leading the co-operation related to regional transport planning and coordinating it with other planning, for example, land use planning. The coordination promotes the functional structure of the region. The multiregional transport strategy work can be led also by ELY-centres (Centre for Economic Development, Transport and Environment). The regional transport system plan takes into account the changes in land use and the needs of economic sector. The regional transport system plan includes the prioritization of the actions.

### **Decision making levels**

National level: national transport system plan

Regional level: regional transport system plan and regional land use plan. In addition, some urban regions in Finland negotiated shared policy goals for land use, housing and transportation (e.g. regional MAL agreements) between cities.

Municipality level: local transport plan and city level master plan especially in growing cities.

### **Existing national legislation of each partner region for different types of transport**

The Law on transport system plan and roads. This law promotes functional, safe and sustainable transport system.

The national transport policy guidelines (from the Programme of Government)

The national energy and climate strategy.

Other legislation:

Law on transport services

Road transport Law

Law on transport and communications agency

Public transport Law

Railroad traffic Law

Aviation Law

Water transport Law

Land Use Act

## **Financing of transport development**

State funding for the national and regional implementation (roads, railroads, waterways, transport support). Decision by Parliament.

Municipality funding for local implementation. Decisions by municipal councils.

Combined funding for urban regions (combined plan for land use, housing and transport) from state and municipalities.

State and municipal companies (Finavia (aviation), ports) also make some funding.

# Description of the region and existing mobility models/offers

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## Detailed description of the region

Kymenlaakso is a region in South-East Finland (Fig. 1). The region has two main cities, Kouvola (Fig. 2) and Kotka and smaller city Hamina. Kymenlaakso was among the first industrial regions in Finland, but nowadays it suffers from industrial recession. The region has shared border with Russia.



Figure 1. Location of Kymenlaakso



Figure 2. Kymenlaakso region and city of Kouvola which covers almost half of the region.

### Key attributes of Kymenlaakso region and city of Kouvola:

#### Kymenlaakso:

- 180 000 inh., negative trend
- Ageing population
- Loss on competitiveness
- Near St. Petersburg
- E18 connection, TEN-T
- Main interface to Russia
- Russian tourism important, growing
- Strong industrial history
- Importance of Port of Kotka

#### Kouvola

- 85 000 inh., negative trend
- United from six municipalities 2009
- Europe's biggest railway hub
- Famous summer cottage area
- Large rural areas
- Strategy for launching free-of-charge public transport
- Active master planning

Kymenlaakso region has railway connections to Helsinki metropolitan area, to St. Petersburg and to Eastern Finland. The city of Kouvola is the national railway hub that partly grew up because of the railway.



The region is located at the Gulf of Finland. The harbour Kotka-Hamina is the biggest general port in Finland, and also the biggest export port.

The regional structure in Kymenlaakso is revealed from the urban-rural classification below. The map clearly shows the urban concentrations, rural areas between them and the sparsely populated lake area in the north (Fig. 3).

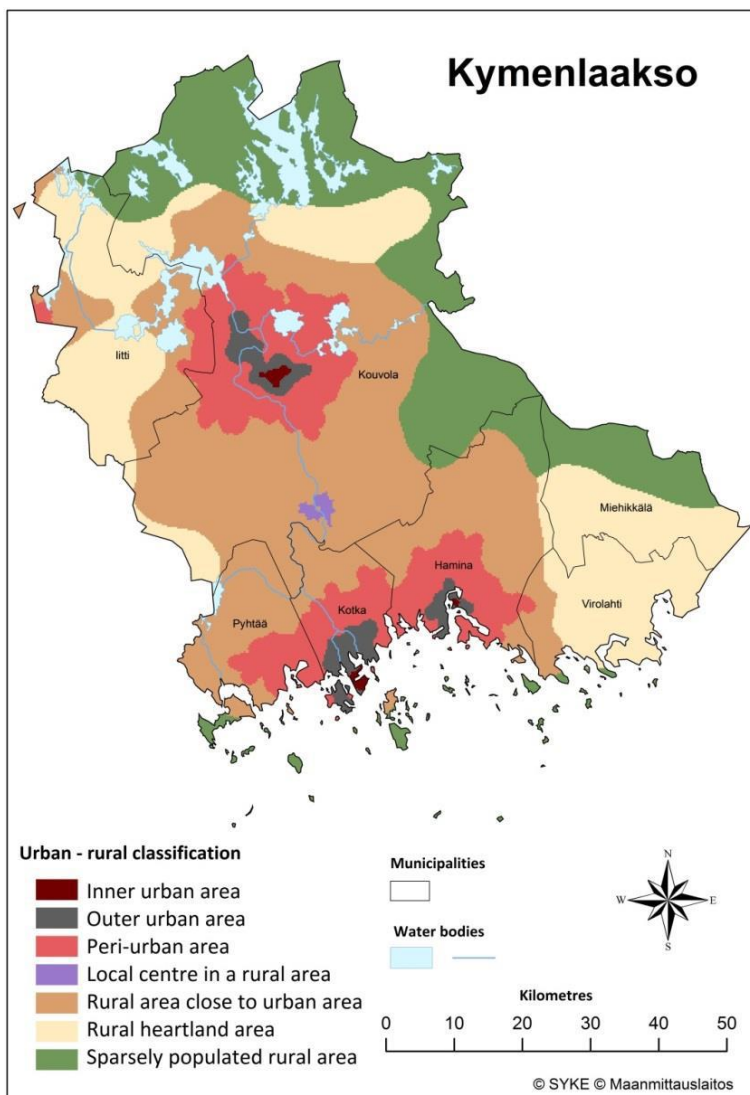


Figure 3: The spatial distribution of different urban-rural classification types in Kymenlaakso.

## The key statistics for Kymenlaakso and Kouvola

The population in Kymenlaakso region is declining (Fig.4).

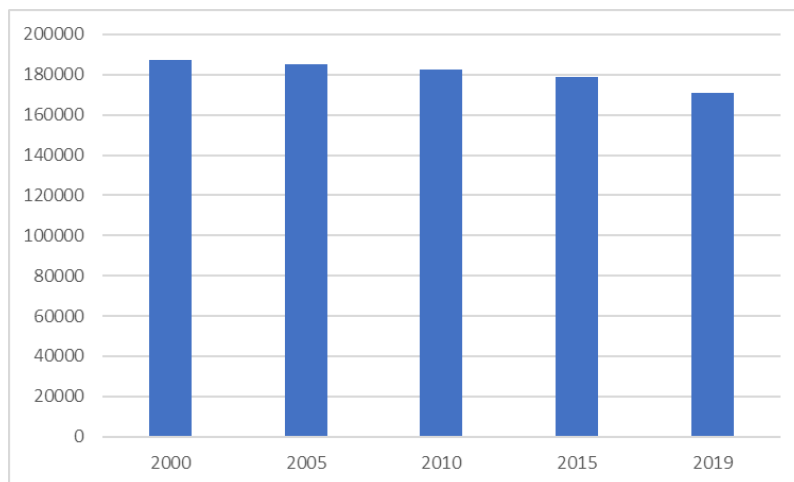


Figure 4. Population in Kymenlaakso (source: liiteri.ymparisto.fi).

The population development by age groups is presented in the diagram below (Fig. 5). The development has been negative for the whole 21<sup>st</sup> century (and even before) in all age groups under 50 years. In share and amount of older age groups is growing all the time. This picture sums up the development and problems in Kymenlaakso. The core questions are:

- how to guarantee the services – including transport services in the region
- how to finance the services and infrastructure
- how to strengthen the vitality
- how to prioritize the spatial development, like spatial planning and transport services.

Creating spatial population prediction scenarios in urban-rural context in the region of Kymenlaakso (Finland)

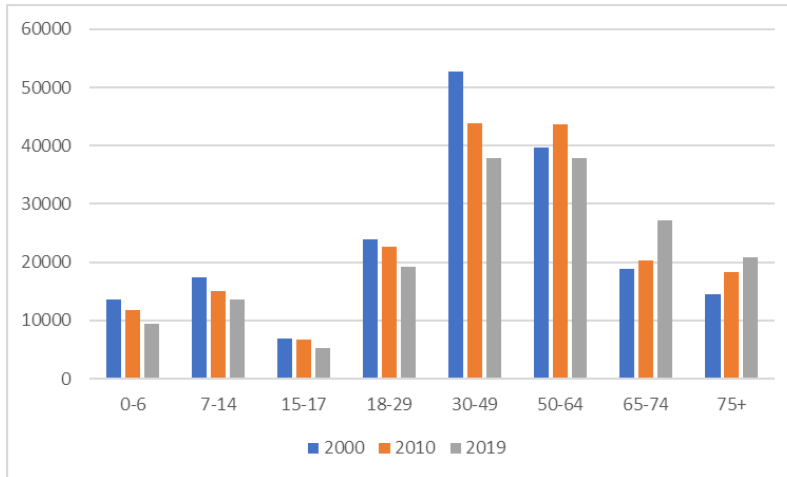


Figure 5. Population development between 2000-2019 among different age groups.

The population development in the areas of urban-rural classification (Fig. 6) is the following in the 2000's:

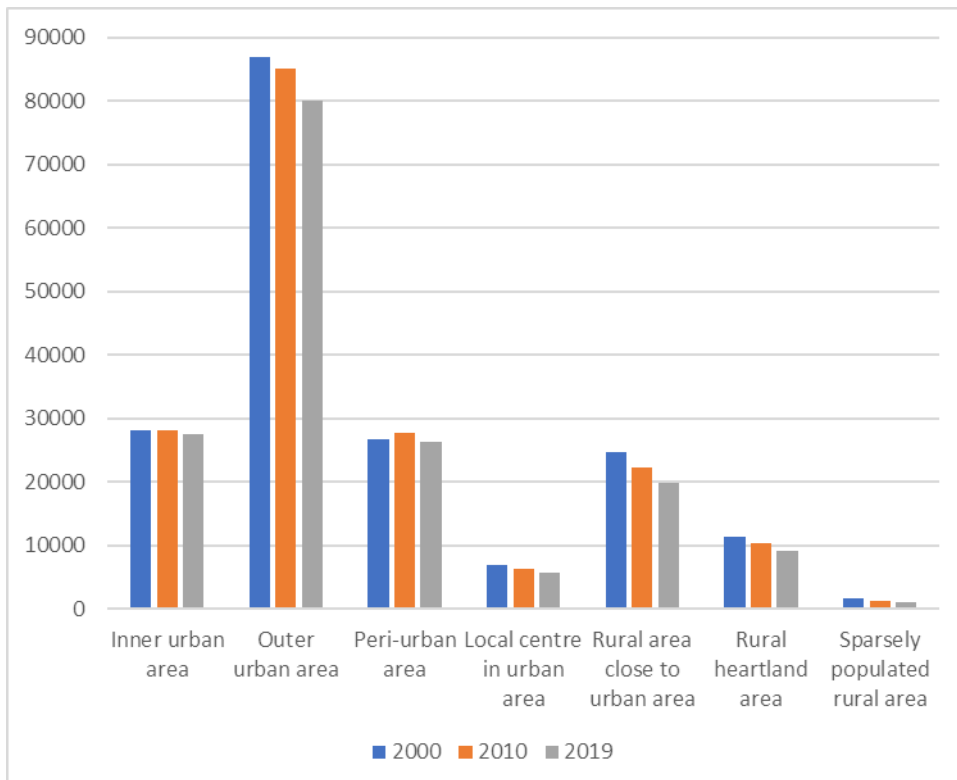


Figure 6. Population development in urban-rural areas in Kymenlaakso.

### Mobility models in the region, including maps

The accessibility in densely populated areas is generally good. In the biggest cities there are also potential for cycling and bike line network is fairly good. The public transport is functional and provides easy access for residents only in certain parts (especially central urban) of the cities of Kouvola and Kotka.

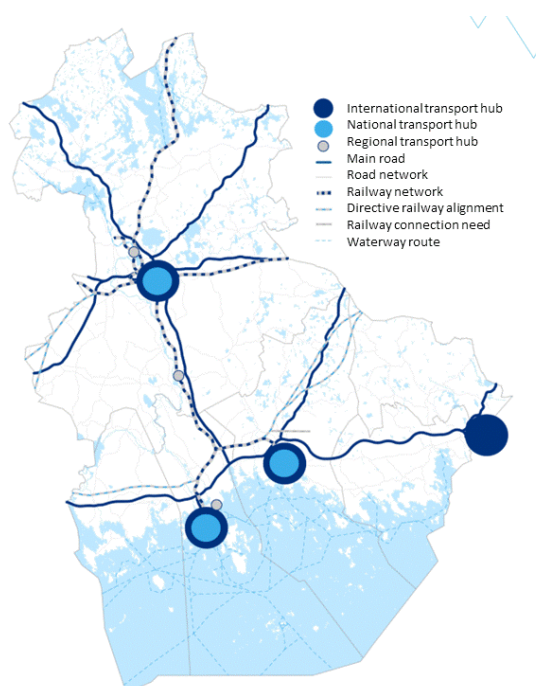


Figure 7. The strategic transport system plan for Kymenlaakso.



Figure 8. TEN-T network in Finland and core network corridors (source: Kymenlaakso transport strategy 2015).

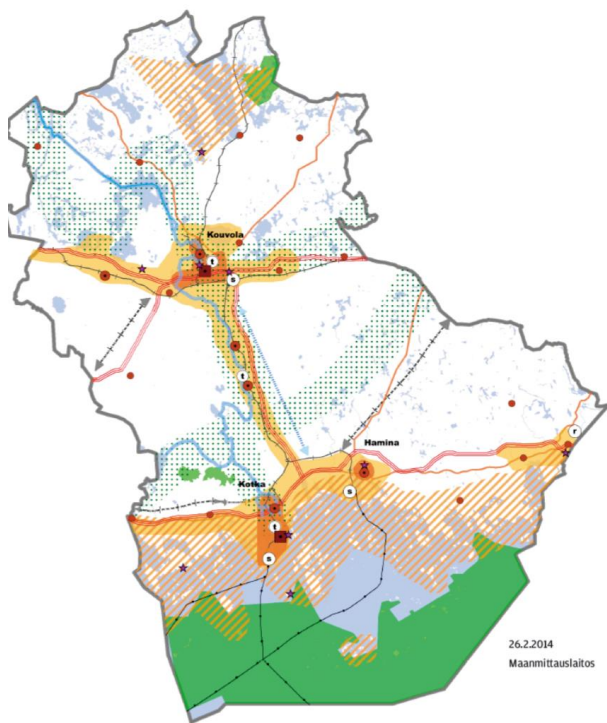


Figure 9. Regional structure of Kymenlaakso 2030. (source: Kymenlaakso transport strategy 2015). The main transport corridors are coloured yellow.

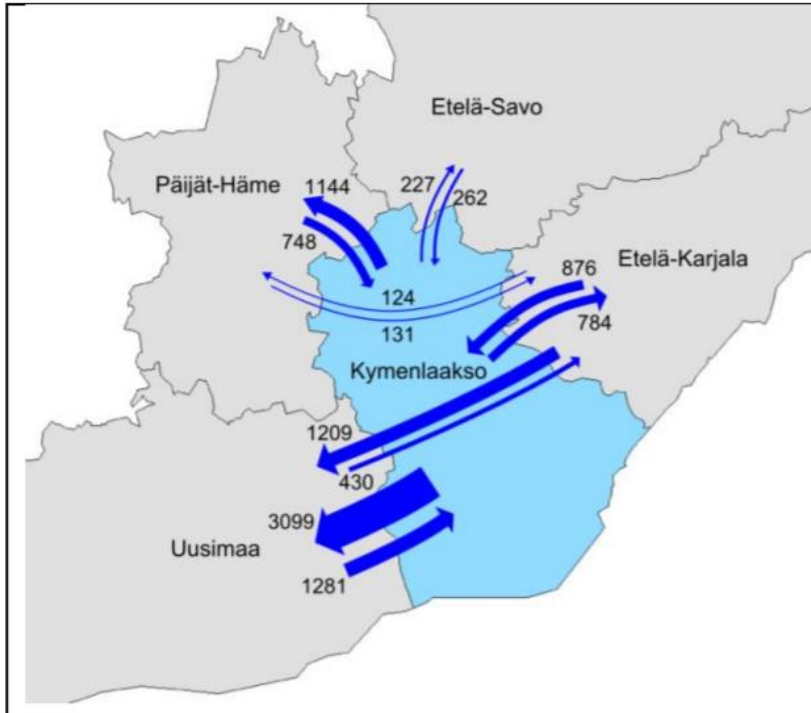


Figure 10. Commuting flows between Kymenlaakso and neighbouring regions (source: Kymenlaakso transport strategy 2015).

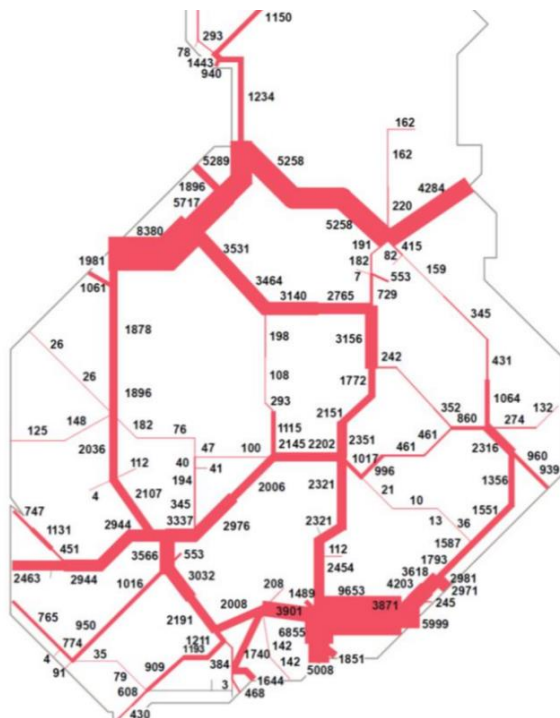


Figure 11. Freight volumes (brt tons, 2014) in railways (source: Liikennevirasto).

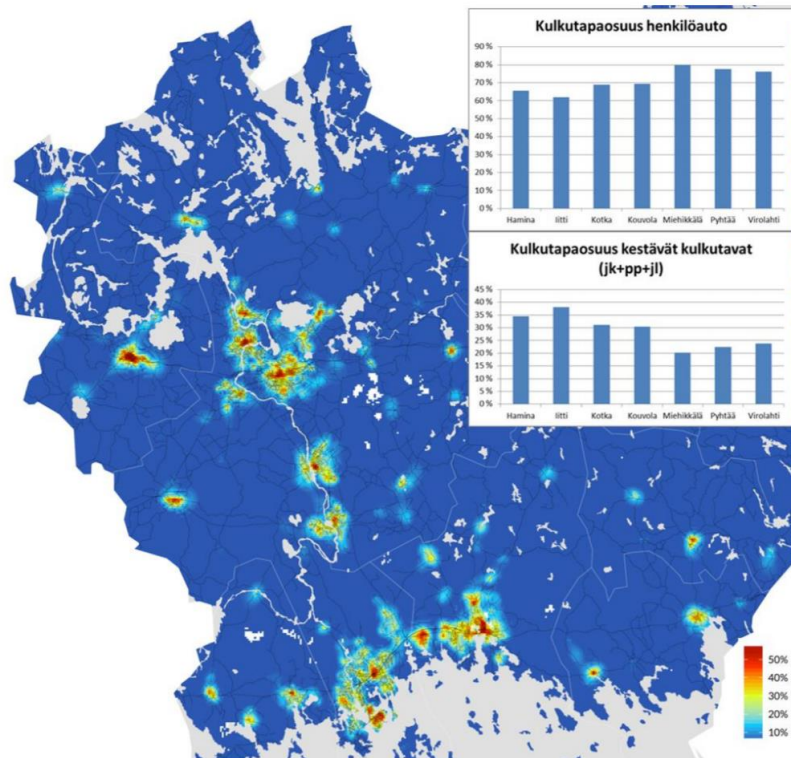


Figure 12. The share of sustainable transport modes (walking, biking, public transport). The upper diagram shows the share of cars in municipalities, the lower diagram shows the share of sustainable transport modes in municipalities. (Sources: the potential of the MaaS services in Kymenlaakso).



Figure 13. The service levels of public transport in Kouvola. Color codes: **Competitive**, **Attractive**, **Middle level**, **Basic level**, **Basic level at winter**, **Minimum level**



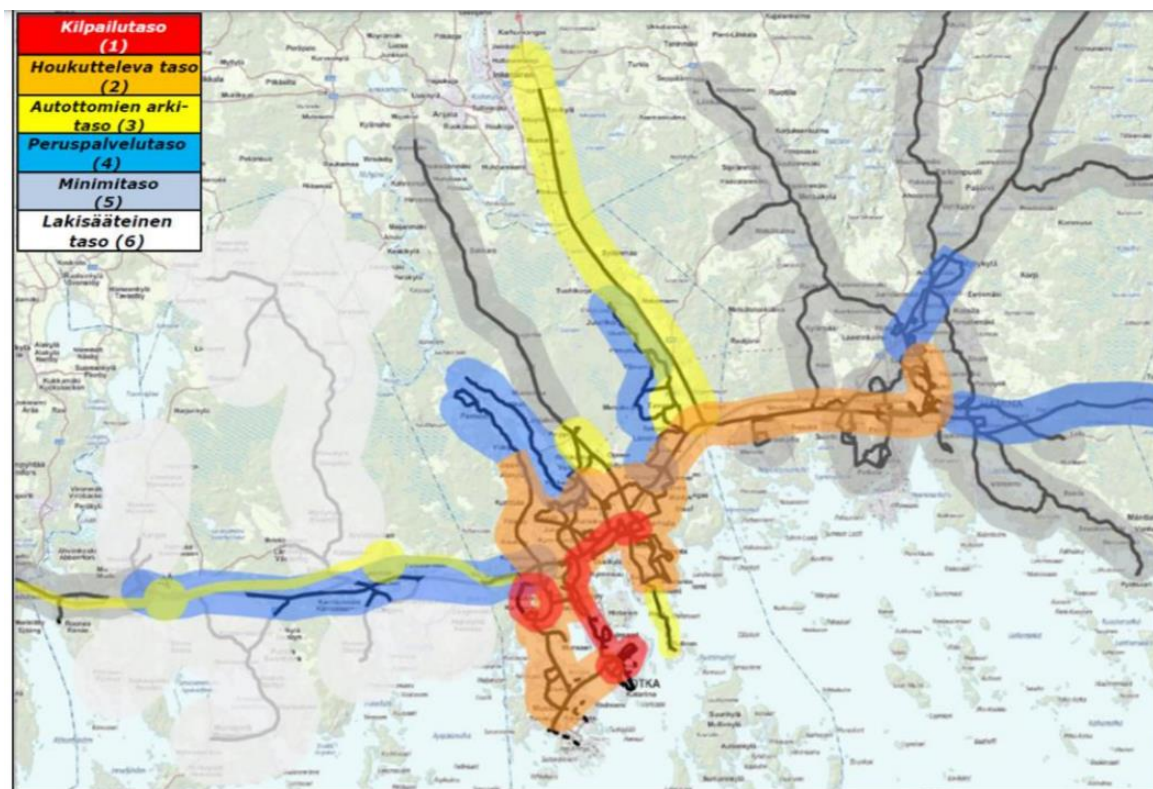


Figure 14. The service levels of public transport in Southern part of Kymenlaakso. Color codes: **Competitive**, **Attractive**, **Level for the without car**, **Basic level**, Minimum level, statutory level

## Demographic description

Table 1. Basic information about population

Region	Total population	Population		Population change per 1,000 inhabitants (2014-2019)	Population		
		city	village		0-19 years	20 – 65 years	over 65 years
Kymenlaakso Region	171167	107569	5709	-8691	28138	94968	48029

Note:

Definitions: city: inner and outer urban area according to Urban-Rural Classification; village: local centres in rural areas. For further information see: [https://www.syke.fi/en-US/Current/Updated\\_urbanrural\\_classification\\_Finlan\(57443\)](https://www.syke.fi/en-US/Current/Updated_urbanrural_classification_Finlan(57443))

Population: age structure used: 0-17, 18-64, 65+.

Data source in all statistics: Liiteri Information System, see <http://liiteri.ymparisto.fi>

Table 2. Basic information about region

Region	Area of the region (km <sup>2</sup> )	Number of inhabitants	Density of population (number of inhabitants per km <sup>2</sup> )	Hard paved public roads per 100 km <sup>2</sup> in km	Cars registered per 1000 inhabitants	Bicycle paths (km)	Geographical location/local border traffic/ connectivity to transport hubs (airports, ports)	Access to railway/buses/waterways	Number of holiday and other short-stay accommodation (with more than 10 beds)
Kymenlaakso Region	5592 (total), 5149 (land)	171167	33	14,12	568	200	Located at E18 road which connects the whole Southern Finland and Russia. Northern part of region (Kouvola) is a national railway hub. National border region with Russia- Contains the 2 <sup>nd</sup> biggest port (Kotka-Hamina) in Finland. Train and bus connection to airport (Helsinki-Vantaa)	Quite good railway connections to northern part of the region from Helsinki and Eastern Finland. Good bus connections to Helsinki region from southern part of the region.	26 accommodation companys, of which 14 hotels. 2200 beds.

Note: Bicycle paths estimated from statistics combining bicycle paths along roads in Kymenlaakso and Southern Carelia

Table 3. Touristic attractiveness about region

Region	Touristic attractiveness
Kymenlaakso Region	<p>Diverse nature, cultural, historical and lifestyle attractions. Fairly short distance from the Helsinki metropolitan area. The northern part of the region is lake area, the southern part is located by the sea. The attractions include:</p> <ul style="list-style-type: none"> <li>- Gulf of Finland Archipelago. Numerous islands with commercial boat connections and accommodation services.</li> <li>- Old military defence structures: Salpalinja, Hamina</li> <li>- Verla industrial museum. Unesco world heritage site</li> <li>- National parks: East Gulf of Finland, Valkmusa, Repovesi</li> <li>- Hamina old town</li> <li>- Lots of buildings designed by Alvar Aalto</li> <li>- Fishing sites: Kymijoki</li> <li>- Summer cottages: Kouvola region</li> </ul>

### **Existing mobility models in the region (illustrated by maps and quantitative data)**

The accessibility in the urban areas is generally good.

In villages the workplace structure is monotonic and the most work trips are made to bigger centres. The amount of people living in villages is quite low, so there're no possibilities to arrange effective and customer friendly public transport. Cycling is not an option and the transport is based on the use of cars. Public transport is mostly used in school trips.

In sparsely populated areas the most dependent people on public transport and other mobility solutions are the elderly population. They often lack driving license and require public transport for getting their basic needs to be satisfied. The level of public transport is low and is mainly designed for service transit few times a day.

The location of the population is crucial for the prerequisites for public transport. Therefore, it's important to support the combined land use and transport planning for making realistic plans, but also for enabling the best possible conditions for services and public transport in declining development trend. It is often wise to target the actions to places with the most population but also to identify potential areas. This means that the peripheral places will suffer more. However, there should be fair enough treatment for all places.

The car ownership reflects well the nature of mobility. The picture below shows the number of cars per household in Kymenlaakso. The areas with black outlines are densely populated areas.

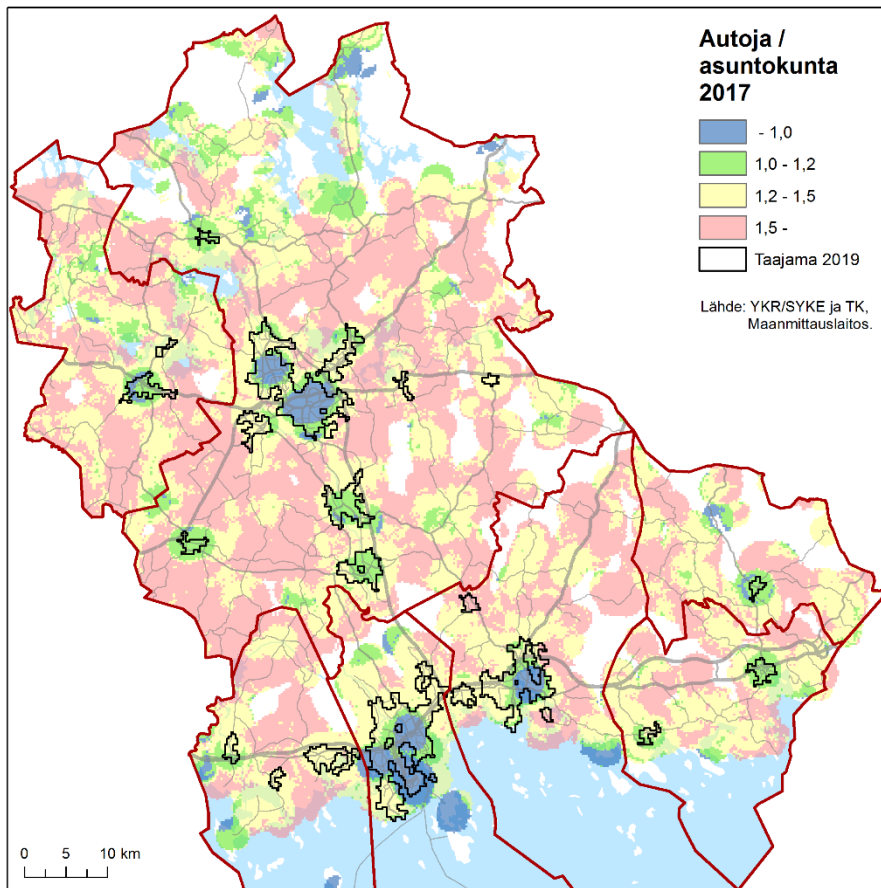


Figure 15. Cars/households in Kymenlaakso 2017.

The next picture shows the change in car ownership:

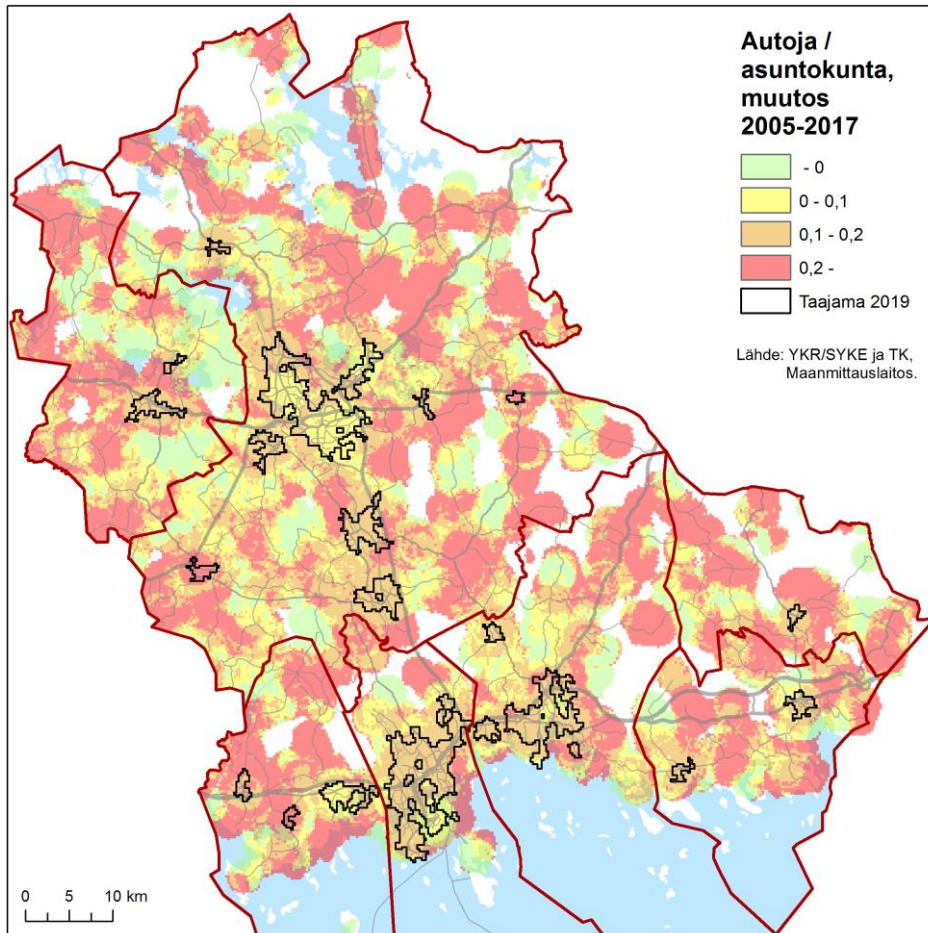


Figure 16. The change in cars/household in Kymenlaakso 2005-2017. The share of cars has grown most in the rural areas.

The possibility to use alternative fuels is connected to infrastructure. The picture below shows the CNG stations (red) and fast charging station (blue). The map also shows the number of households within 2 km's distance.

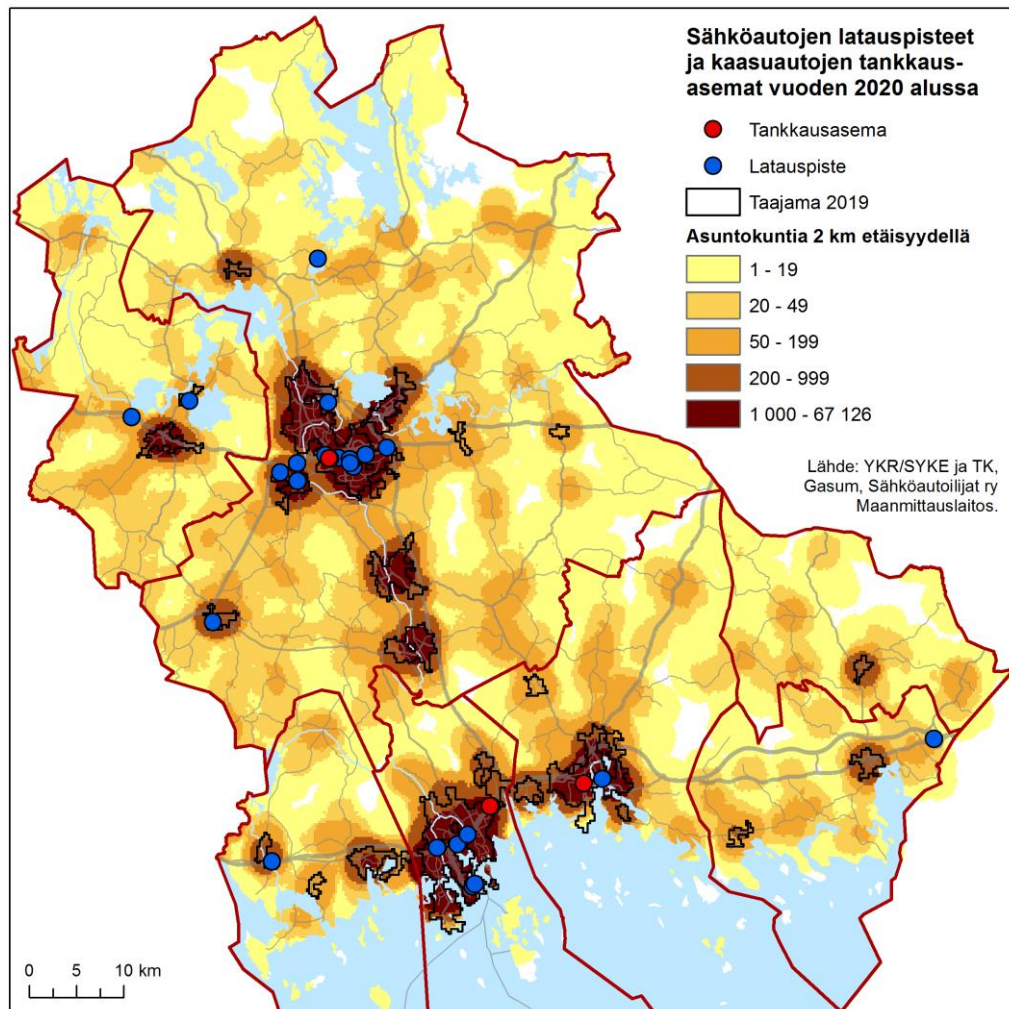


Figure 17. the CNG stations (red) and fast charging station (blue) and the number of households within 2 km's distance.

### System of public transportation

As seen above, there're only few profitable and attractive public transport lines and some of these operate only on traffic ours. Attractive lines include some core lines in the urban areas, connections between the biggest cities and interregional bus and train connections like Helsinki-Kouvola-Eastern Finland railway transport. Most of the public transport is supported by municipalities or state. The state support local and regional public transport and also transport arranged by Kela (National pension institute), which also finances social and healthcare transport arranges by regional healthcare organisations. In many cases the social and health care transport is arranged by taxis because of individual needs of the clients and sparse population structure. The first and

second grade education has centralized a lot, causing a great need for school transport. There're attempts to combine public transport, social and healthcare transport and school transport, but the optimization is in the beginning. Generally speaking, the majority of the population is dependent of the use of their own car. The only exceptions are the city centres of Kouvola and Kotka and some local transport corridors as well as some more densely built localities.

Kymenlaakso is located between Helsinki metropolitan area (1.7 million inhabitants) and St. Petersburg (5.0 million inhabitants). The location is exciting, and the region tries to take advantage of the location.

### **Bike-sharing system**

Cities of Kotka, Hamina, Kouvola has a bike-sharing system (city bike). The location of the stations is shown in the maps below. The system in all cities is run by the same local company, Kaakau Oy, the application is Donkey Republic. The pricing:

- season pass 15€/season. Includes 1h free biking in the beginning of each renting
- month member 9€/month. Includes unlimited number of rents under 1 h
- month member 18€/month. Includes unlimited number of rents under 12h.
- time-based pricing:

AIKA	HINTA
15 min	1.00 €
30 min	1.50 €
1 h	2.00€
4 h	5.00€
1 pv	12€

The rent-bike stations are located in the urban areas and therefore serve only part of the region. In the remote area cycling is not an option.

The locations of the rent-bike stations:



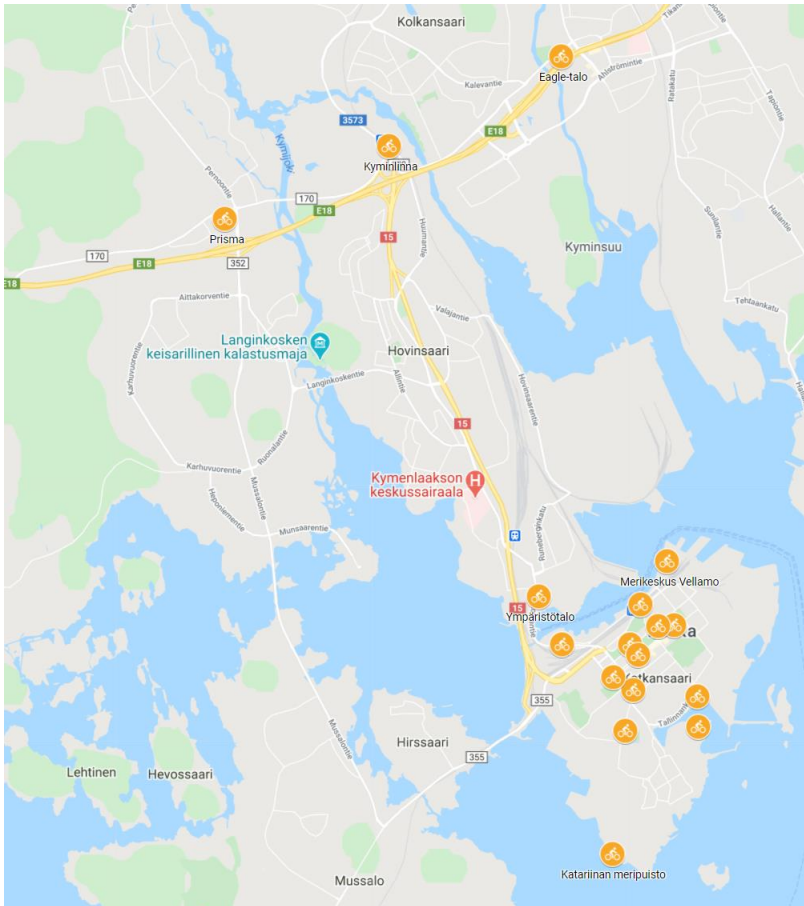


Figure 18. The bike stations in Kotka.

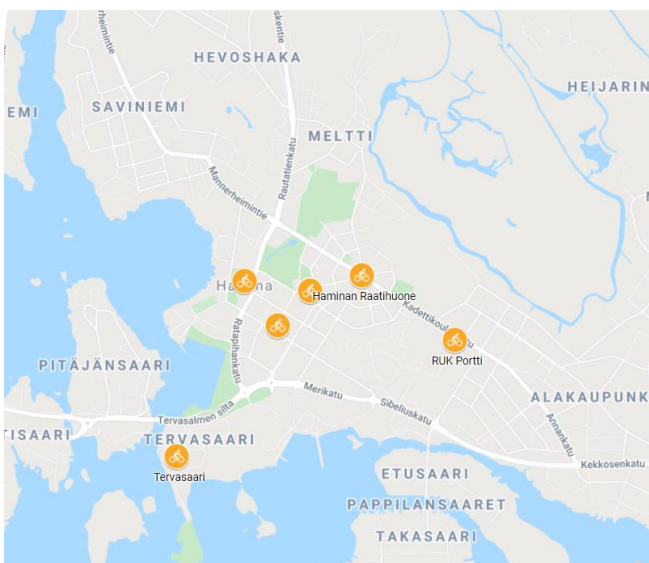


Figure 19. The bike stations in Hamina.



Figure 20. The bike stations in Kouvola.

### Call-a-bus-system

This has been tested in the region as a part of another project. The test period were rather short and there were some weaknesses found. We do not present detailed results here.

### Other

The core transport corridor between cities of Kotka and Kouvola offers cheap railway tickets: 3€ at Kotka-Kouvola track. This has proved to be an effective action to attract commuters. Crucial for that is the optimization of the time tables: the train and bus timetables are adjusted to working hours in big workplaces like hospitals. According to planning authorities, this has been the most efficient way to increase the amount of passengers.

### Whim Mobility as Services (Maas) Global

Whim is a web application created by Maas Global, designed to make everyday life easier without your own car. With the app you can find public city transport, city bikes, taxis and car hire in one

app on the same web page. The system is only used in urban areas and do not directly suitable in rural areas.

<https://whimapp.com/fi/>

<https://whimapp.com/history-of-maas-global/>

### Problems of mobility and accessibility of regions

Table 4. Main problems of mobility and accessibility of region

Region	The main problems of mobility
Kymenlaakso	<ul style="list-style-type: none"> <li>▪ Car dependency</li> <li>▪ New building activity is located outside of the existing spatial structure. There're no services or workplaces nearby, which causes need to get them from elsewhere</li> <li>▪ Number of population in villages is low which makes it difficult to arrange public transport</li> <li>▪ Lack of services or workplaces in villages and rural areas, which causes trips made mainly by cars</li> <li>▪ Ageing population. No driving licenses, but everyday mobility needs</li> <li>▪ Sparse population structure. Arranging public transport for many areas is impossible and/or expensive</li> <li>▪ Negative population trend and declining demand for public transport. No change to invest in public transport as the most money goes to maintenance of the existing mobility</li> <li>▪ Long distances for walking and cycling</li> </ul>

# Challenges of transportation models and recommendations for improving mobility offers in policy and planning documents

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## **Evaluation of different policy and planning documents, relevant for the case study region, towards statements concerning mobility and transportation in the region (important for WP4)**

The Government Programme is targeted to heavily reduce the use of fossil fuels and aims to low carbon society and circular economy.

The regional Development Plan and Carbon Free Kymenlaakso has the same goal, as well as the regional planning.

The ways to achieve the targets above are a combination of different actions, e.g. renewing the vehicle fleet, developing public transport, developing spatial structure more sustainable, using efficient and just taxation. The policy documents are evolving all the time and MARA work is one way to develop them.

The Kymenlaakso transport strategy 2035 is targeted for implementing the national and regional goals and guidelines to action.

Statements about the mobility/transport development towards policy makers (given recommendations will be confronted with the results of the gap analysis to examine how far the policy recommendation hold true and/or need revision)

Statements may strive:

- challenges for the region towards mobility offers
- binding aims/"Leitbilder" of land use planning and spatial and transport policy
- expert interviews regarding the status and implementation of policy recommendations and aims of planning documents

## Mobility needs in the region

During the summer 2020 two SYKE researchers and two university trainees produced analyses of mobility needs and patterns focusing to city of Kouvola region. Here we present some main findings with figures. Below figure (21) shows that long-distance commuting to metropolitan region has strongly increased in 15 years. Flows from major roads in directions of Helsinki, Lahti and Kotka have increased. Commuting from Lappeenranta has decreased (Fig. 22).

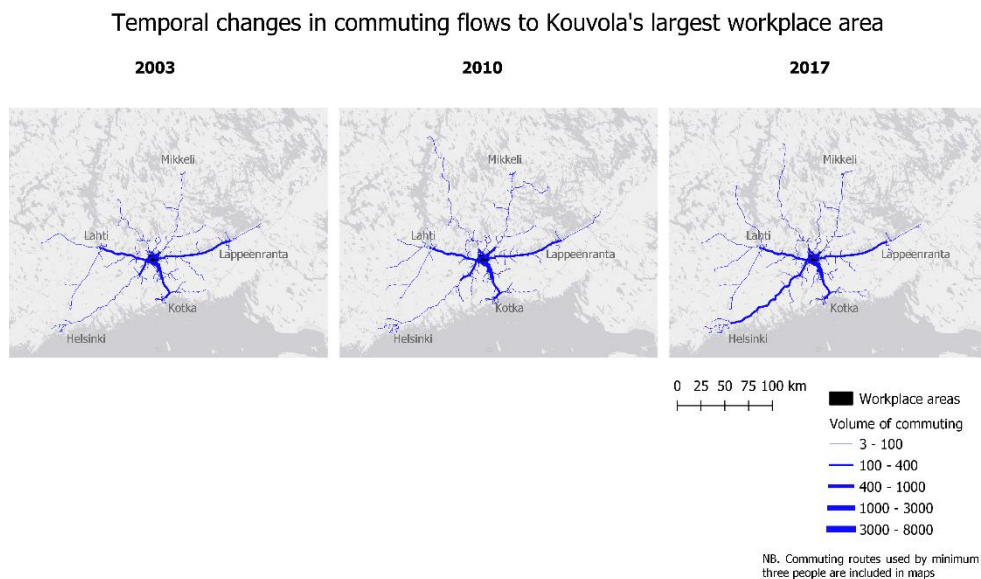


Figure 21. Temporal changes in commuting flows between 2003-2017 in the city of Kouvola. Data produced: Sonja Koski, SYKE.

### Change in commuting flows to Kouvola's largest workplace area 2003-2017

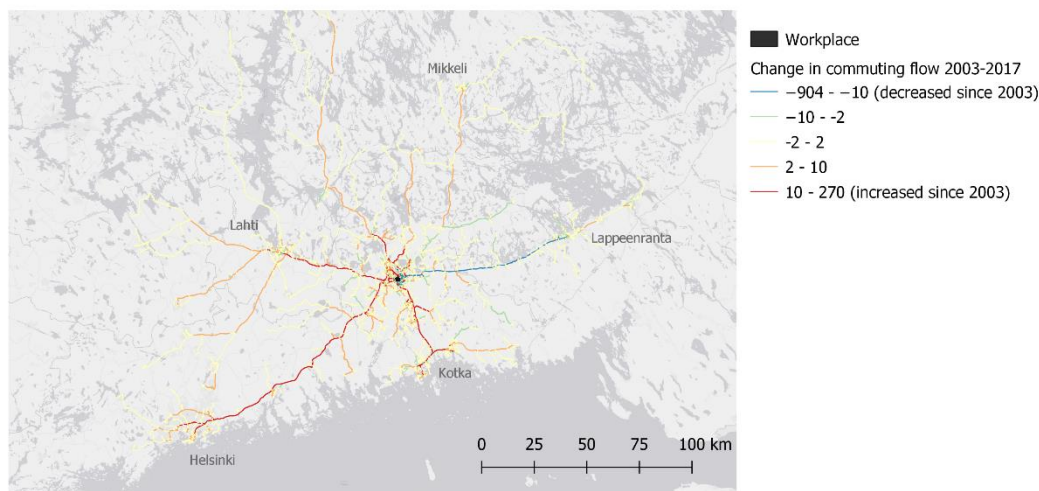


Figure 22. Change in commuting flows between 2003-2017 in the city of Kouvola. Data produced: Sonja Koski, SYKE.

There was a random sampling questionnaire sent for 10 000 residents in the Kymenlaakso region to ask mobility patterns and behaviours<sup>1</sup> in 2019. The survey was organized by the Regional Council of Kymenlaakso. Totally 1744 replied to the questionnaire. Most common mode of transportation was own car (65 %) for all travels (work, study, free time). Work and student trips dominated (44 %) and was much higher than averagely in Finland (25 %). More than one-third (31 %) biked or walked main distances. Share of bike was significantly higher (25 %) than averagely in Finland (8 %). 44 % of trips were less than 5 km long.

Those who travelled by own car were most satisfied about the transportation quality factors and less satisfied were residents using public transportation. Respondents were very unsatisfied (average score 1,9/5) with existing route network, timetables and shifts of buses during busy hours and weekends. Winter-time maintenance received lowest scores among all types of mode (own car, public transportation, biking and walking). Surprisingly, the quality factors of private car were considered most important mode that needs improvements and 65 % of respondents considered it

<sup>1</sup> see more, only in Finnish: <https://docplayer.fi/164141069-Kymenlaakson-kevennetty-liikkumistutkimus-2019-muu-kymenlaakso-iitti-pyhtaa-virolahti-miehikkala.html>

either important or very important, while less than half of respondents (47 %) considered that development of public transportation is important (Fig. 23).

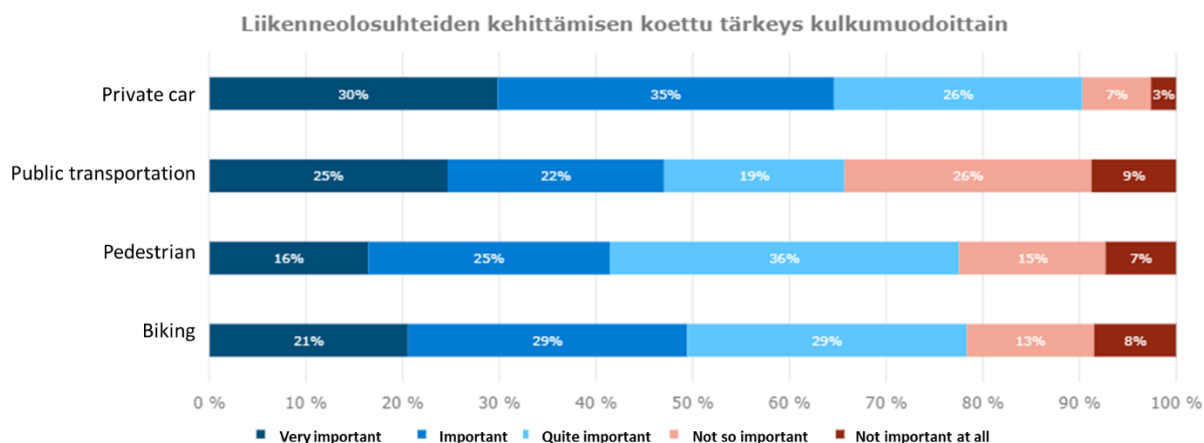


Figure 23. Importance of development of transportation quality factors for residents in Kymenlaakso region (Source: Regional Council of Kymenlaakso).

Table 5. Research methods used to assess behaviour and the needs of tourists and residents in Kymenlaakso region.

SYKE (Institution)	Methods applied																				
	Quantitative						Qualitative									Other					
	PAPI			CAWI			IDI			Case study			Desk research			Delphi method			Spatial information/ dynamic maps development and processing (including PPGIS)		
	T*	I*	A*	T	I	A	T	I	A	T	I	A	T	I	A	T	I	A	T	I	A
				X	X					X	X	X	X	X	X				X	X	X

\*"T" – tourists; "I"- inhabitants; "A" – authorities/tourists entities (e.g. tourist agencies), (other?)

## **Mobility needs of tourists and non-permanent residents**

SYKE made an online public participatory survey (PPGIS) in summer 2019 in Kymenlaakso. The query was a 'prototype' to support public participatory GIS use in MARA as an example. Of course, the results of the query were important for MARA aims in Kymenlaakso.

During the summer of 2019, SYKE produced and conducted a participatory survey of summer visitors and holidaymakers in the Kymenlaakso region. One aim of the survey was to get practical hints and guidelines to MARA partners for using public participatory GIS in their case studies, if found applicable. The survey was carried out by using commercial Maptionnaire: Internet based Public Participation GIS tool, which allowed locating the answers on the map. The survey could be answered either by computer, tablet or smart phone. The survey was open from the beginning of July to the middle of August.

The purpose of the survey was to identify the modes of transportation and demands of public transport among summer visitors (like vacationers, cottage owners & hotel guests). The survey included multiple choice, statement and mapping questions. The survey was designed in cooperation with the City of Kouvola and Kymenlaakso County authorities. Prior to the survey, the size of the target group was surveyed (e.g. number of leisure houses and hotel nights in 2017), the area was delimited and background information relevant to the survey was sought (e.g. current public transport, changes in public transport during 2000-2019).

Totally 381 persons took part in the survey. It is a good response for this kind of survey in Kymenlaakso. The highest response rate was in the first week. In this case, the average number of responses was several dozens per day. 65% of the respondents were women, 33% men and the rest did not want to tell their gender. Most of the respondents were 25-74 years old. The largest age group was 45-54 years (20% of the respondents). 53% of the respondents were employed or self-employed. Another large category was retired people, with 25% of the respondents.

The survey asked the reason for this visit to the Kymenlaakso area. By far, the most votes were received from relatives / friends (24%) and the summer cottage (23%), which contributes to the success of the survey targeting. The frequency of visits was also mapped. The majority (29%) of the respondents said they rarely visit the area (1-2 times a year or less).

Own car seems to be by far the most popular mode of transport (56%) among the respondents, which is not surprising in such remote rural areas where the public transport network may not be sufficient to meet one's own mobility needs. However, there was also some support for arriving by train (17%) and bus (12%). Also, public or private transport services in Kymenlaakso do not appear to be very active among respondents. We asked if visitors used regional or local public transportation or services. Trains, local buses and taxi services and local buses have been used to some extent, while rental car services and city bikes have been almost unused by respondents.



The development of public transport services in the Kymenlaakso area was clearly felt to be important or very important (63%) (Fig. 24). Only 5% of the respondents felt that development was not at all important or not very important. The survey also surveyed respondents' views on possible new modes of transport services that could be developed in the area. The most interesting new modes were ridesharing, electric cars to be borrowed and a "call a bus" services, defined as follows: New mode of transport service that combines the features of a taxi and a bus (Fig. 25). The charterer defines the pick-up location and destination, and the trip is linked to other rides in the same direction.

The aim of survey also was to map the mobility behavior of summer visitors in the Kymenlaakso region and the destinations they visited regularly or infrequently and what kind of mode of transportation they used to these destinations. The survey contained contains several items to locate regarding a person's basic needs or recreation (e.g. shopping, visits to cultural and natural sites).

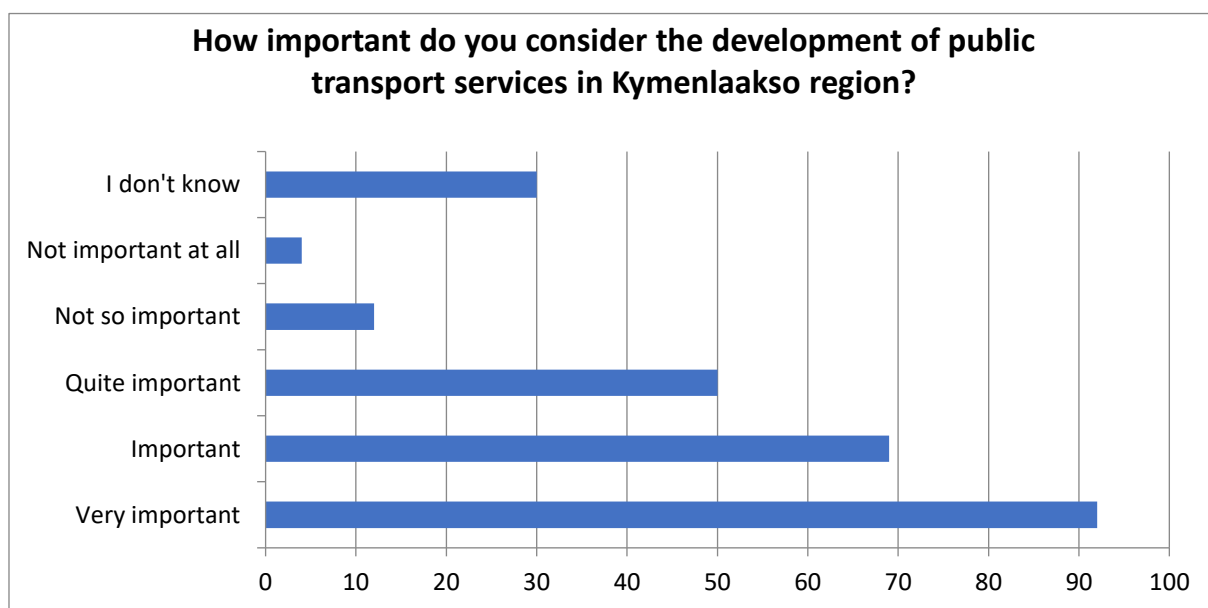


Figure 24. Importance of improvements of public transportation for tourists in the Kymenlaakso region. The value is numbers of respondents (N= 381).

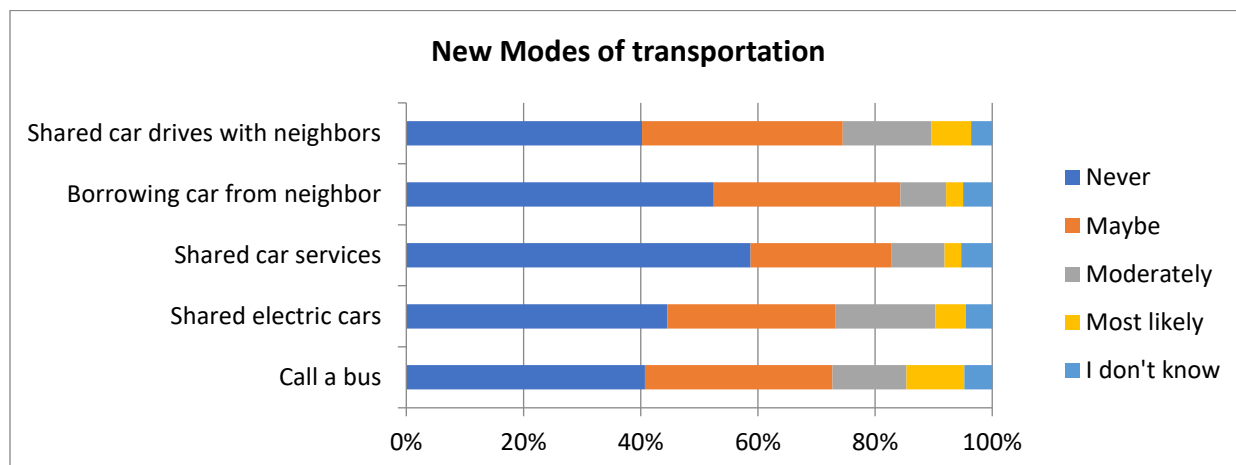


Figure 25. Interests to use of novel modes of transportation among tourists in the Kymenlaakso region (N= 381).

## Disparities between the current mobility needs and the existing mobility solutions

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One of the key challenge that causes disparities between mobility needs and solutions is the spatial structure in Kymenlaakso is scattering. New construction is located in the outskirts of the densely populated areas, far from services and workplaces. At the same time the amount of local services has declined, because the new services are located in places that are well accessible by cars. This means that the prerequisites for walking and cycling are worsening because the trips are lengthening. The land use planning hasn't always succeeded in guiding new land use into good locations for public transport. This has led to a situation where the public transport routes, timetables and travel times can't compete with cars in many areas. There's a negative spiral between spatial structure and transport system.

In the MARA project, we collected mobility needs of non-resident visitors by asking their current mobility behaviour by using internet-based mapping tool (e.g. public participation GIS). The Kymenlaakso region conducted an internet-based survey for residents in 2019 asking their current mobility behaviour and needs, to develop further the existing mobility solutions. Based on these results strongest mismatch related to public transportation services: existing routes and shifts do not satisfy the needs. It should be noted that the both questionnaires were made before Covid19 - pandemic, which have caused huge changes in mobility behaviour. People prefer using own or rented cars and have avoided public transportation. This has run public and private operators of long-distance, regional and city bus lines into the difficult situations. The long-term bus lines have been decreased or stopped functioning, and this has consequence of use of public transportation. The national train shifts have also been reduced.

# Innovative solutions to improve mobility in the region

## Using SYKE transport model for Strategic Transport Plan

One goal of SYKE’s case area was to support development of Kymenlaakso Transportation Strategy 2035 by demonstrating how different policy instrument influence on carbon emissions. SYKE’s transport model shows the power of different policy options for reducing GHG emissions. These results were introduced for regional policy-makers in the workshop organized in November 2020. An example of the consequences of different options from the transport model is presented below (Fig. X). The model does not measure exact results, but the power of selecting the right guiding tools. This is an innovative tool that has not yet used in Finland. Using the model, regional authorities can “test” their policy-goals with the supportive help from SYKE. The solutions are not provided by scientists, but needs strong consultation and guidance from researchers to make sure that parameters and assumptions used in the model are updated and based on regional data.

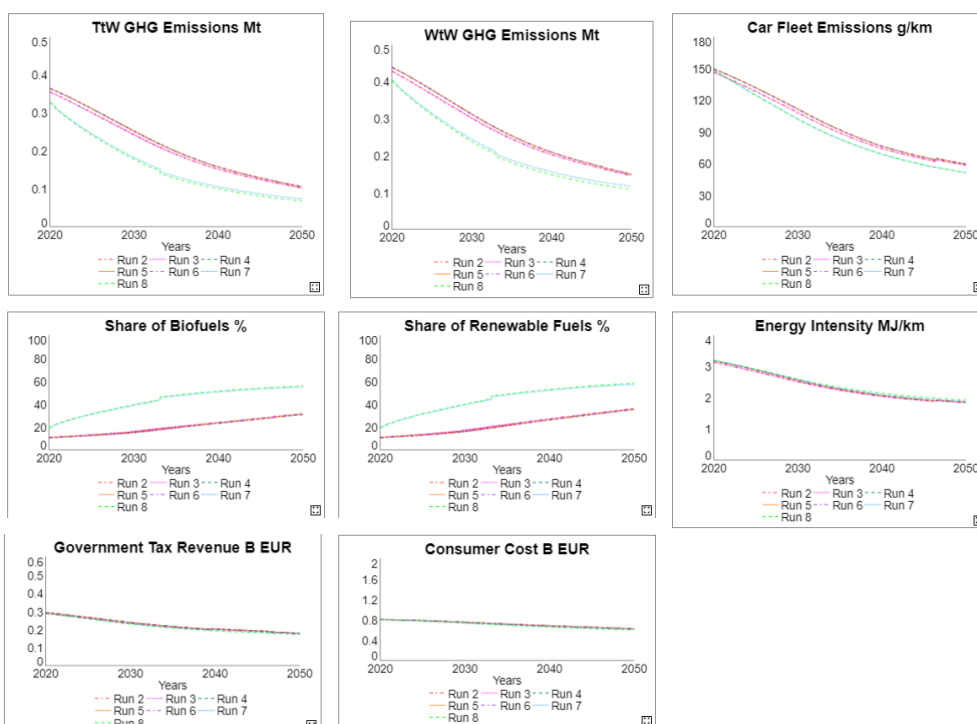


Figure 26. Results of SYKE transportation model shows consequences of different policy options to CO2 emission.

## Developing a transport model for Kymenlaakso region

SYKE has developed a transport model (SYKE transport model) and population and housing prediction model (KASSU), of which SYKE transport model is applied in regional use for the first time in Kymenlaakso. Also, the use of KASSU is in the very beginning and developing.

The aim of the use of the models are following:

- SYKE transport model is a tool for discussion and identification of the usability of different policy instruments related to achieving the future GHG levels. The use of the model supports the implementation of Carbon Free Kymenlaakso Programme.
- KASSU model is a tool for estimating the future and potential of different parts of Kymenlaakso. KASSU enables making regional and local population predictions and scenarios. It helps in finding out the most efficient land use planning strategies. In Kymenlaakso KASSU is used for:
  - Estimating the effect of changing the attractive shore locations for summer house use to permanent housing. One question is whether this will attract new inhabitants to those locations. If so, this would enable also better public transport, as well as new immigrants.
  - Scenarios made with KASSU are directed to rural areas and currently include two scenarios:
    - Trend scenario: The population trend during the last five years continues similarly from 2020 onwards.
    - After covid-19: Increased telework opportunities and digitalisation of work will increase the attraction of villages and other rural areas in Kouvola especially within families with small children and people in working age. The in-migration of these age groups begin to rise in rural area types from 2020 onwards.
  - Assessing future potential public transport demand especially in rural areas based on the above population scenarios.
  - Developing a regional development plan more realistically

The core methodology is to use models as tools for enabling the region to find out land use and transport system strategies and plans that enable more sustainable development: less car traffic, better services, high quality living environment, vital region and fluent daily life for everybody.

## Recommendations and operation plan for improved mobility offers

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The key goal of Finnish case study was to support strategic transportation planning of Kymenlaakso region and therefore we frame recommendations in the context of policy strategies identified by regional authorities (Table 6).

In the year 2021 SYKE will continue the regional analyses supporting strategic land-use and roadmap for carbon-neutral transportation. SYKE will use transportation model and results of KASSU population scenarios to offer recommendations how to develop sustainable transportation system in the region. We are planning to have at least 1-2 meeting with regional stakeholders. In addition, we have ordered a separate consult work to conduct detailed analyses of current and future mobility needs in the region based on SYKE's PPGIS survey and questionnaires conducted by the regional authorities. One aim of this work is to identify the influence of multi-locality to mobility needs. During Covid19 pandemic many has worked remote allowing spend more time in free-time houses or rent a hub or apartment in rural areas. This might have permanent influence on working and mobility behaviour at regional and national level.

Table 6. Strategic policy goals for carbon-neutral Kymenlaakso and how these goals replies the needs and demands of residents and tourists (incl. summer cottage owners) in the Kymenlaakso region.

Policy goals and mobility needs	Residents	Tourists
Developing the accessibility, attractiveness and functionality of public transportation in the region	Important almost for 50 % of respondents. Improvement of private car conditions received more weight.	Despite many arrived by car, majority gave support for development.
Improvement of pedestrian and biking routes in the region and supporting the use of them	Almost 30 % indicated to bike or walk, so there is urgent need for this action.	Especially in the city core regions and accessibility to touristic sites important (national parks) is important.
Analysing and mapping the potential Eastern train line from Helsinki region to Russia	This could benefit long-distance commuters whose proportion has increased in last 15 years.	This could benefit tourists and bring new fast connection from metropolitan region to Kymenlaakso.
Development of digital services to support local sustainable mobility and mobile local services	This would benefit residents living in remote areas where local services have disappeared.	This would benefit tourists staying longer periods in remote areas where local services have disappeared.
Prioritizing biking and walking in land-use and transportation planning	Almost 30 % indicated to bike or walk, so there is urgent need for this action.	Especially in the city core regions and accessibility to touristic sites important (national parks) is important.
Use of alternative fuels for petrol/ diesel: electric, biogas and biofuels	While majority prefers own car this would have major impact to personal level CO2 emissions. But this need national level policy strategies and economic income level is generally rather low compared e.g. to metropolitan region.	Tourists from other regions in Finland may prefer buy electric vehicles or biofuel - based and infrastructure for alternative fuels are crucial.
Creation of efficient logistics with land-use planning and digital technologies.	Not relevant for residents.	Not relevant for tourists.

## Summary

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The key objective of Finnish case was to support regional authorities to develop the Kymenlaakso transport strategy 2035, regional land use plan and roadmap for Carbon Free Kymenlaakso. In the MARA project, the focus was to emissions of transportation of the region by providing valuable information about population, mobility needs and developing innovative transportation model. SYKE's case research included (a) development of transportation model for the Kymenlaakso region to test impact of different policy goals to carbon emissions, (b) PPGIS survey for non-resident visitors to analyse their mobility behaviour and needs in the region, (c) producing spatial population prediction scenarios for 2050 to estimate future need for public transportation in rural areas in the city of Kouvola area. Most innovative part was the use of SYKE Transportation model together with spatial-based population scenarios for different areas along the urban-rural gradient. Both tools help planners and developers to improve their strategic goals to achieve socially equitable carbon-neutral Kymenlaakso region.