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Status-quo Assessment Report

Partner n. 3, Regional Council of Central Finland

Date 4.9.2023

Rev. 1

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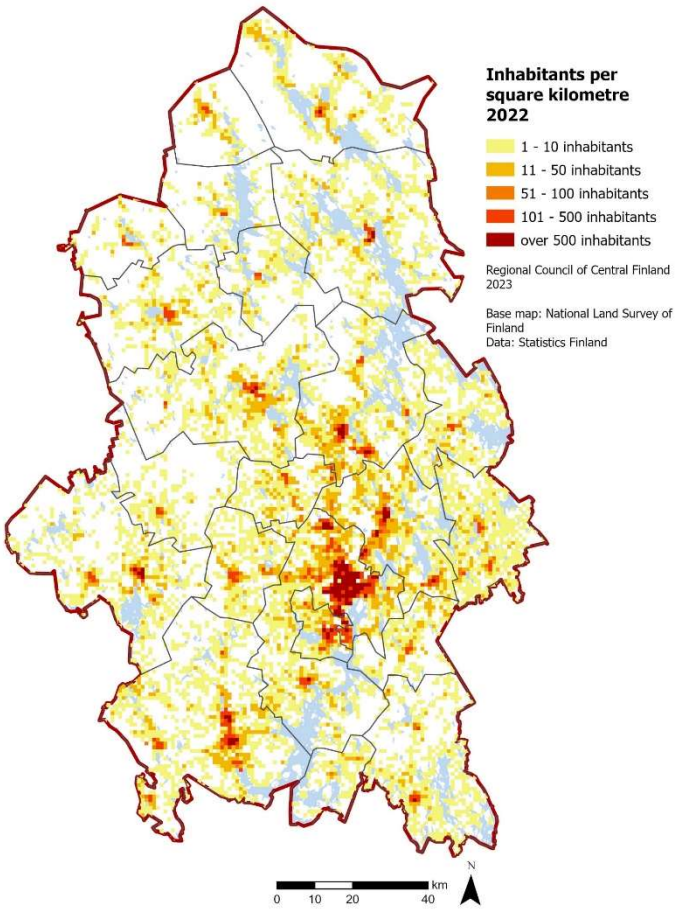
1. General description of Region and its Demography

1.1 Land area and population

Central Finland is one of Finland's 18 regions (19th is Åland autonomic region), made up of 22 municipalities. In Finland regions are NUTS3 level units. Regional councils are the main bodies promoting the interests of their regions and they also act as statutory joint municipal authorities. Working in cooperation with central government authorities, central cities, other municipalities and universities in their regions and other parties involved in regional development, regional councils are responsible for the regional development strategy and overall regional development.

Central Finland's population at the end of the 2022 was 272 437 inhabitants. The population is strongly concentrated in Jyväskylä subregion (189 399 inhabitants, 69,5 % of the region's population). According to the forecasts, Jyväskylä subregion will also attract residents in the coming years. According to Statistics Finland's projection Jyväskylä subregion will have 194 971 inhabitants in 2040 which would be 74,3 % of the whole region's population.



Compared to many partners Central Finland is very sparsely populated. Average population density is 17 inhabitants per square kilometre. In Jyväskylä average population density is 124,6 inhabitants/km^2.

Outside the Jyväskylä region depopulation and aging are in steady growth. The age structure of the population in Central Finland respects the structure of whole country.

In 2020 GDP per capita in Central Finland was 35 557,5€. The average size of the household in Central Finland is 1,91 persons. Mean disposable household income is 38 991 € (20 414 € per person compared to national 22 435 € per person). There is large variation between municipalities in Central Finland. In Luhanka, Muurame, Jyväskylä, Jämsä and Joutsa the disposable income per person is over 20 000 € while in Kivijärvi it is 17 607 € and in Kinnula 16 975 €.

Education indicator is 383 in Central Finland (national education indicator is 388). Education indicator is measured with the average length of the highest level of completed education per capita. The indicator of level of education can range from 150 to 800. If education indicator is 800, everyone holds a licentiate or doctorate level degree. The highest level is in Muurame (446,9) and Jyväskylä (433,9) while in Kinnula (265,9), Kyyjärvi (251,9) and Kivijärvi (237,7, the worst in Finland) the levels of education indicator are the lowest.

Finnish Environment Institute has produced urban-rural classification covering Finland. The regional classification is based on GIS data, and it makes possible to gather nationwide information on regional development in Finland.

There are seven different class of regional type. The urban areas are divided in the:

- Inner urban area. In Central Finland 22 % of population lives in this area which is only 0,14 % of the surface area of the region. Population density in inner urban area is 2247,1 inhabitants/km^2.
- Outer urban area. In Central Finland 24 % of population lives in this area. Population density in outer urban area is 722,2 inhabitants/km^2.
- Peri-urban area. In Central Finland 11 % of population lives in this area. Population density in peri-urban area is 52,2 inhabitants/km^2.

The rural areas are divided in the four classes:

- Local centres in rural areas. In Central Finland 14 % of population lives in this area. Local centres in rural areas cover only 0,48 % of the surface of the region. Population density in these centres is 421,3 inhabitants/km^2.

- Rural areas close to urban areas. In Central Finland 7 % of population lives in this area. Population density in these areas is 9,9 inhabitants/km^2.
- Rural heartland areas. In Central Finland 10 % of population lives in this area. Rural heartland areas cover approximately 14 % of the surface of the area. Population density in these areas is 10,6 inhabitants/km^2.
- Sparsely populated rural area. In Central Finland 12 % of population lives in this area. Central Finland is mostly sparsely populated rural area, and it covers over 72 % of the surface of the region. Population density in this area is only 2,3 inhabitants/km^2.

1.2 Municipalities

Jyväskylä is the main city in Central Finland and the 7th biggest city in Finland. Jyväskylä is home to about half of the region's population, with about third of its population consisting of students. Muurame with its 10 000 inhabitants is part of Jyväskylä sub-region. The population of Jyväskylä and Muurame are growing on average 1% annually.
The next biggest municipalities are Jämsä, Laukaa and Äänekoski, each with about 20 000 inhabitants and with Laukaa being the only one with a flat population rate development.
The rest of the municipalities are small rural communities with less than 10 000 inhabitants and with their population decreasing with a rate of -1% to -3% historically. Many of these municipalities have a high share of elderly population.

Municipality	Inhabitants	Employment ratio [%]	Average population change y-o-y 2013-2022
Hankasalmi	4 683	68	-2 %
Joutsa	4 263	72	-2 %
Jyväskylä	144 473	67	1 %
Jämsä	19 767	69	-1 %
Kannonkoski	1 311	67	-2 %
Karstula	3 774	70	-2 %
Keuruu	9 443	71	-1 %
Kinnula	1 581	68	-1 %
Kivijärvi	1 088	67	-2 %
Konnevesi	2 586	71	-1 %
Kyyjärvi	1 232	72	-2 %
Laukaa	18 788	76	0 %
Luhanka	703	71	-1 %
Multia	1 488	67	-2 %
Muurame	10 426	78	1 %
Petäjävesi	3 678	73	-1 %
Pihtipudas	3 873	71	-2 %
Saarijärvi	9 117	66	-1 %
Toivakka	2 387	75	0 %
Uurainen	3 634	77	0 %
Viitasaari	6 070	71	-2 %
Äänekoski	18 318	68	-1 %
TOTAL	**272 683**	**69**	0 %

Public sector is the main employer in Central Finland employing a third of the workforce. The next sector is industry with 14% of the jobs, followed by commerce and education. There are a few industrial hotspots with manufacturing, wood products and pulp & paper production with the biggest ones in Jyväskylä and Äänekoski.

2. Regional Mobility

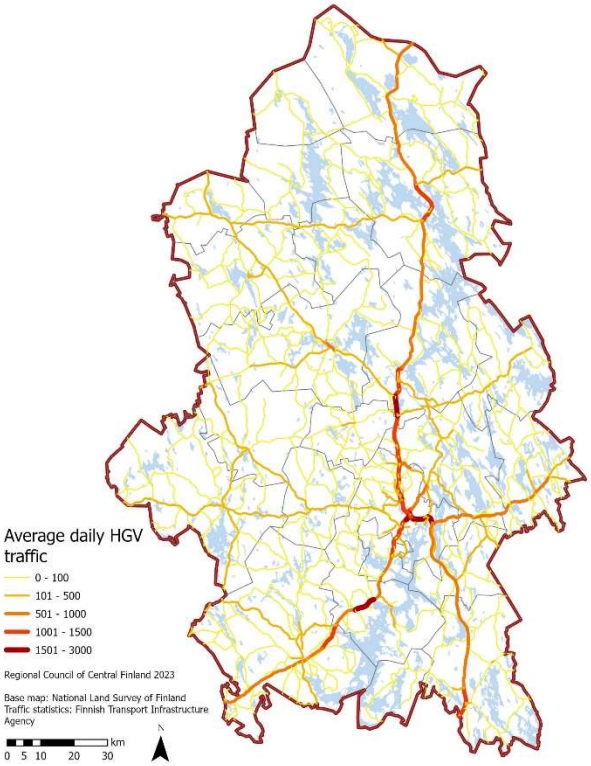
2.1 Main characteristics of local mobility

Central Finland is large and mainly sparsely populated area, and this creates unique characteristics of local mobility.

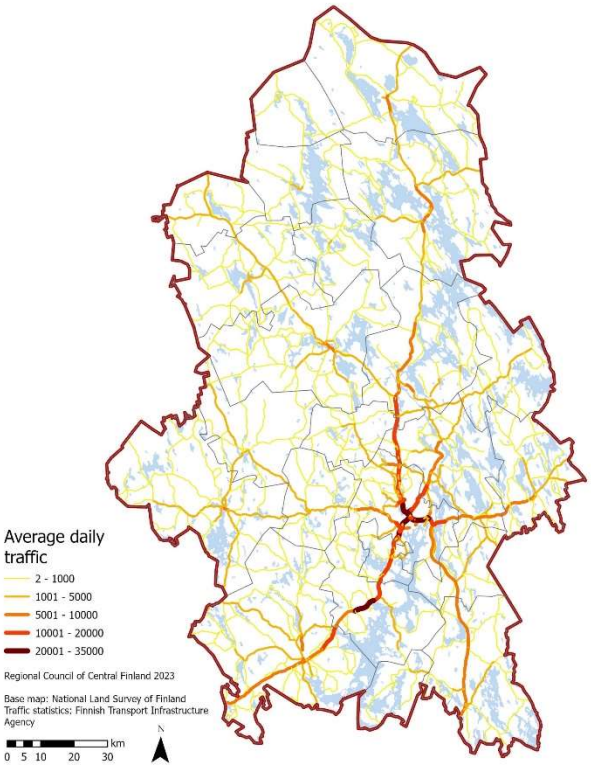
According to national mobility survey 2021 most trips in Finland were made for shopping, business and leisure. Both accounted for 31 % of all trips. Trips related to work or education accounted for 26 % of all trips. Most of the trips related to work, business or shopping were made by car.

Commuting over municipality borders is very common in Central Finland, about 25 % of persons employed work in another municipality than their home municipality. The heaviest commuting flows are between Laukaa, Jyväskylä and Muurame. Other main commuting flows take place between Jyväskylä and Äänekoski, and to lesser extent between the other neighbouring municipalities to and from Jyväskylä.

Figure: Main commuting traffic flows in Central Finland Source: Regional Council of Central Finland



Figures on the right: Average daily total and HGV traffic in Central Finland. Source: Regional Council of Central Finland



2.2 Transport system available in the region

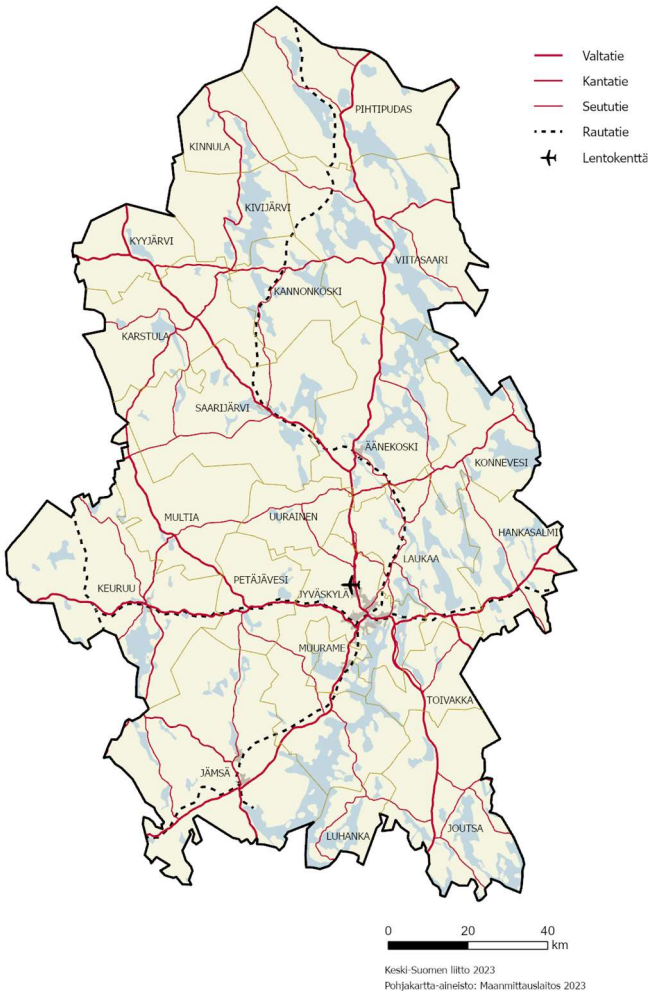
Jyväskylä hosts an airport and a national train station.

The small local airport has on average 2 commercial flights per day with an average passenger load factor varying between 5-21% in year 2022. There is no public transport to the airport, located 22 km from the centrum of Jyväskylä.

National trains between Kuopio and Tampere stop in Jämsä and Hankasalmi. Keuruu and Petäjävesi are the only municipalities reachable via a local train connection. There are existing train tracks to Laukaa, Äänekoski and Muurame but there is no local person train traffic on these rails currently.

Several main roads cross central Finland, making it one of the main traffic hubs of Finland. E75 road passes through central Finland, as well as main roads E63, 23, 18 and 13.

The waterways are used mainly for leisure and cruises at lakes are ran by private players. There is no long-distance public water traffic except from short connection routes.



2.2.1 Description and data on current bus fleet in city/area

The total bus fleet of Jyväskylä is planned be decarbonized by 2024. The first two electric busses have started trafficking in 2023 and the following 61 e-busses are expected to start trafficking by summer 2024. The local bus company already owns gas busses operating on biomethane, and according to the plan the remaining diesel buses will be fueled by biodiesel.

Publicly supported local bus traffic outside of Jyväskylä region is relying on diesel buses.

Frequent commercial bus traffic along the main roads passing through Central Finland are operated by several private companies, none of which operate other than diesel busses.

2.2.2 Description and data on other modes of e-mobility in the region (e.g. e-bicycles, e-taxis etc.)

Electric bicycles have increased their popularity in the recent years, especially due to government support for employers for providing e-bikes for their employees tax-free. On year 2022, 296 000 bicycles were sold in Finland, 17% of them e-bikes. Of the sold employee-benefit bicycles, 60% were e-bikes. According to bike retail and research, the employee benefit has increased sales of e-bikes significantly. Exact statistics on number of e-bikes or their usage in Central Finland is not available. There are currently no public charging points for e-bike batteries in Jyväskylä. A few private enterprises offer charging points for their employees. Due to safety regulations, charging points inside public spaces are not allowed.

Jyväskylä has a sustainability action plan called “Resource wise Jyväskylä” aiming to carbon neutrality by 2030. The plan defines goals for carbon neutral mobility in Jyväskylä sub-region relying on carbon neutral public transport, improving infrastructure for light transport modes and increasing number of public charging stations for EV’s. City’s own cars will also be gradually replaced by EV’s and biogas cars, which will be offered for public use at the times when they are not utilized by the employees of the city.

Äänekoski and Viitasaari are part of carbon neutral municipalities -network in Finland and are forming plans to decarbonize cities' own transport.

2.2.3 Description and data on road traffic in Central Finland

Due to sparsely populated areas, the number of passenger vehicles in Central Finland is relatively high. On average, there is one registered car per two inhabitants. Jyväskylä is the only municipality with a cars per inhabitant ratio less than 0,5 whereas all the other municipalities have a ratio of over 0,5 - meaning on average more than one car per two inhabitants. The number of cars includes also cars registered for companies, which on year 2022 was 28 443 cars.

Municipality	Share of workers with workplace in home municipality [%]	Share of the population living in other than in private houses [%]	Number of private cars in the municipality	Cars per inhabitant
Hankasalmi	59	5	2 689	0,57
Joutsa	68	14	2 350	0,55
Jyväskylä	84	64	64 920	0,45
Jämsä	79	28	11 742	0,59
Kannonkoski	60	6	784	0,60
Karstula	74	7	2 189	0,58
Keuruu	74	34	5 269	0,56
Kinnula	72	4	863	0,55
Kivijärvi	56	9	591	0,54
Konnevesi	58	8	1 502	0,58
Kyyjärvi	67	4	688	0,56
Laukaa	68	13	10 206	0,54
Luhanka	39	3	441	0,63
Multia	46	5	858	0,58
Muurame	57	22	5 702	0,55
Petäjävesi	29	10	2 119	0,58
Pihtipudas	38	7	2 028	0,52
Saarijärvi	76	21	5 193	0,57
Toivakka	71	2	1 381	0,58
Uurainen	36	5	1 999	0,55
Viitasaari	35	25	3 262	0,54
Äänekoski	81	34	10 073	0,55
TOTAL	73	**43**	**136 849**	**0,50**

Table: Mobility related key numbers of municipalities in Central Finland. Data source: Statistics bureau Finland, Municipalities key indicators and Traficom

There are 182 440 B-driver's licenses (1.7.2023) in Central Finland, which means that there are about 0,75 cars per driver's license. If company owned cars are excluded, the ratio is still 0,6 cars per driver's license.

Even though the number of registered cars has been in stable increase over the years, the absolute traffic flow in main roads of Central Finland has been decreasing for the past 5 years. However, according to forecasts traffic flows in the main roads, especially in TEN-T Road E-75, will be increasing again in the following years.

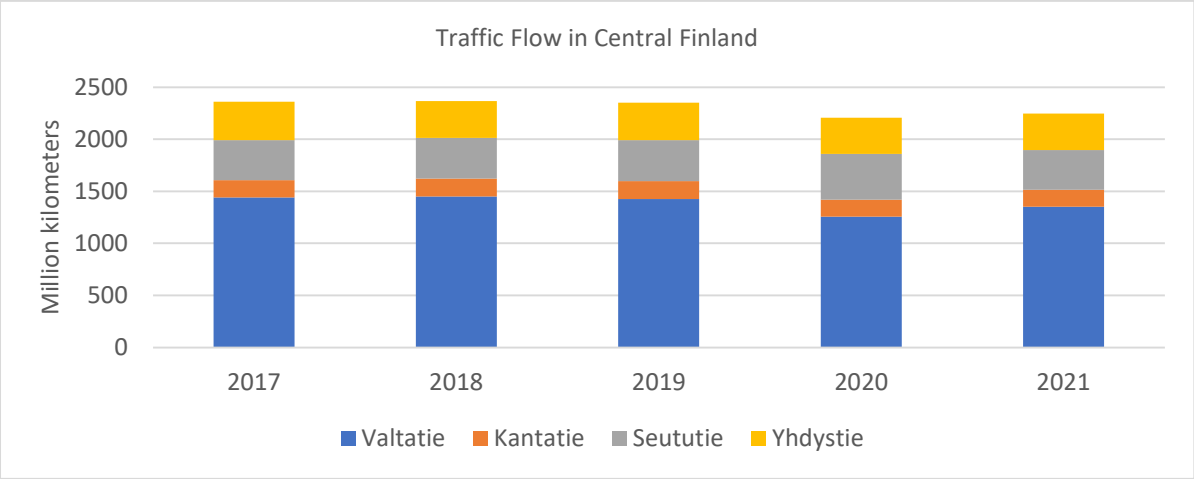
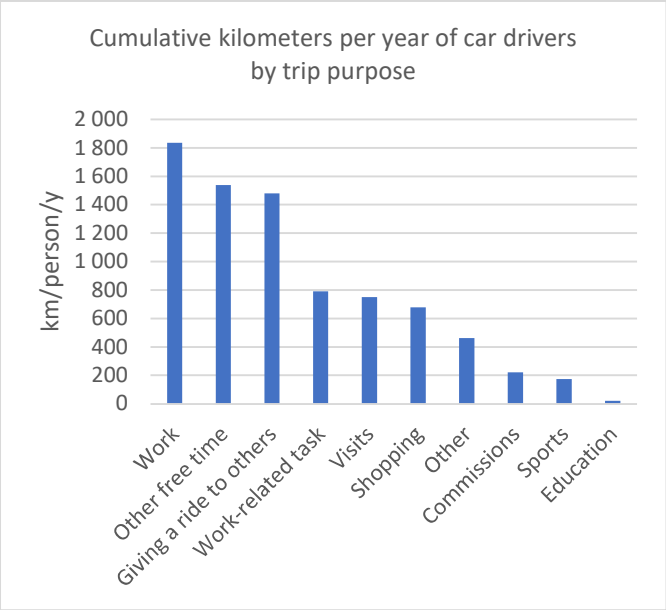
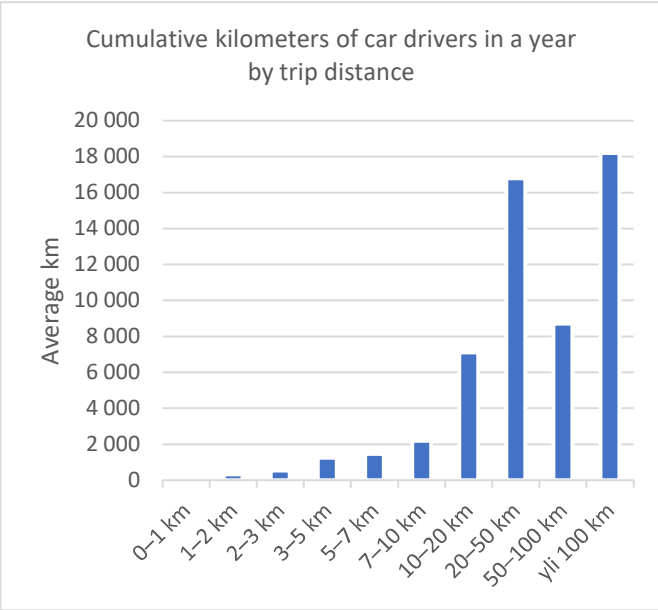
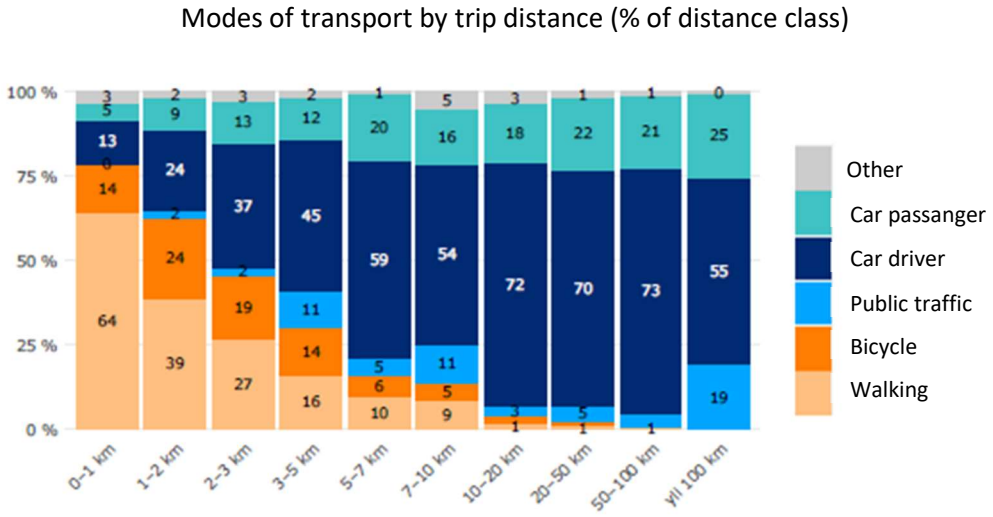


Figure: Traffic flow in main roads of Central Finland. Source: Traficom







Figures: Characteristics of private car travel in Central Finland. Data source: Traficom, Personnel traffic research 2021: Jyväskylä and surrounding areas (Jyväskylä, Muurame, Äänekoski, Laukaa, Petäjävesi, Toivakka, Hankasalmi)

The most kilometers of passenger car fleet in Central Finland are driven for work-related purposes and on kilometers between 10-50 kilometers. Other free time and giving ride to others (e.g. transporting kids to hobbies) are the second-most popular trip purposes for travelling by private car. Noteworthy is, that a high share of trips below 5 km are also done by car for example in trip distance category 3-5 kilometers, only 43% of the trips are done by other means than by private car.

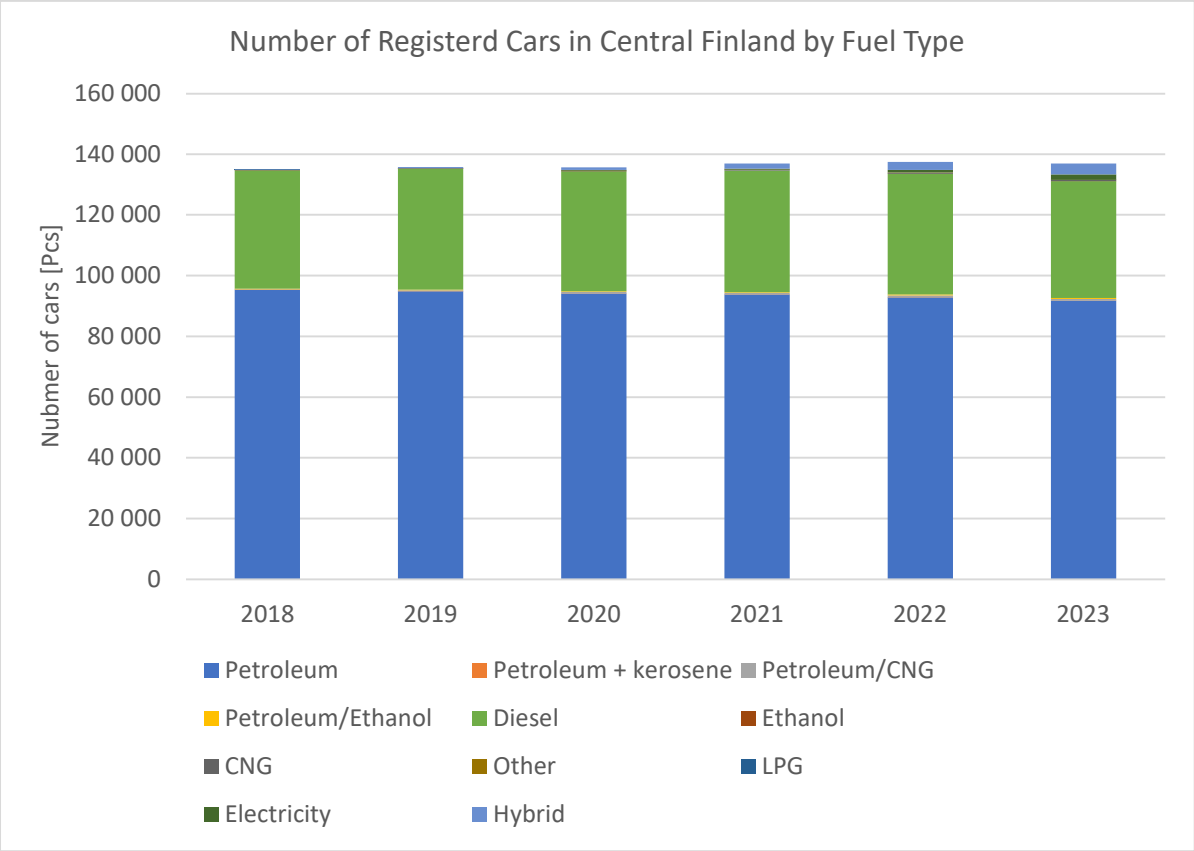


Figure: Registered cars in Central Finland by fuel Type. Source: Traficom

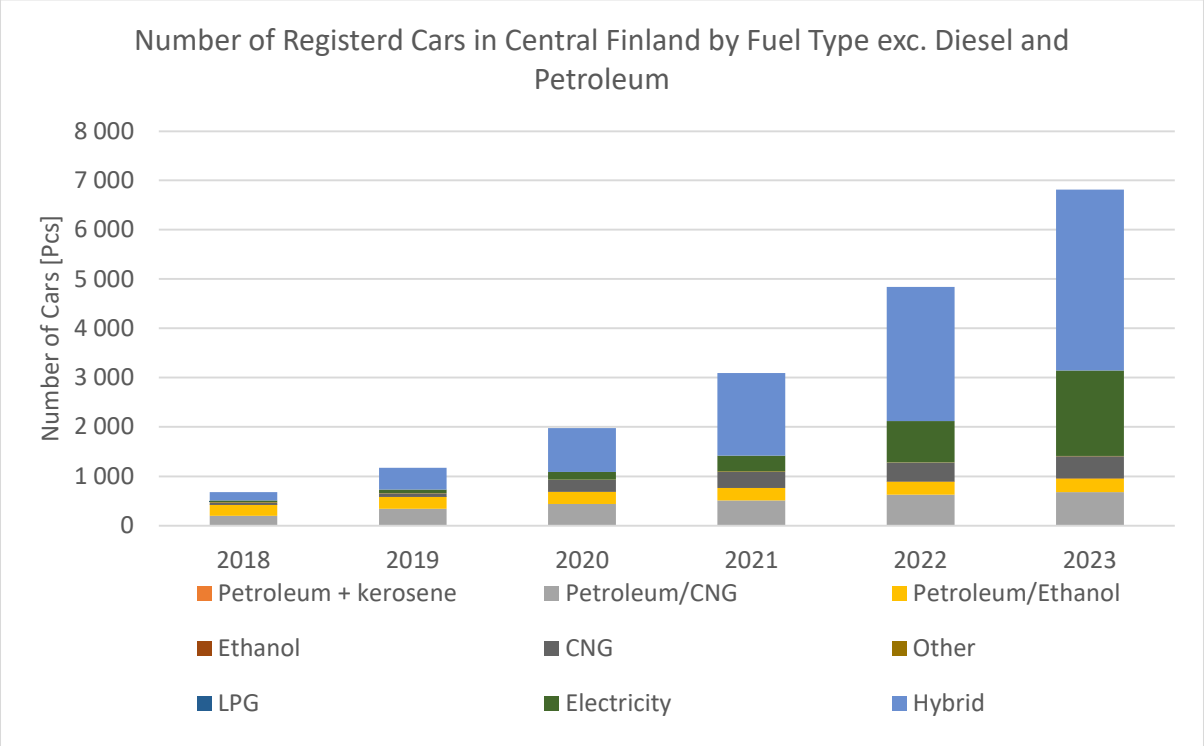


Figure: Passanger vehicles in Central Finland by fuel types other than petroleum and diesel. Source: Traficom

The relative share of electric cars including plug-in hybrids is 4 % (Q1/2023). The number of fully electric cars has over doubled for five years in a row, but the volume of fossil free vehicles would need to grow over 60% per year over seven years in order to decarbonize passenger vehicle fleet, in other words to grow from current 2 000 vehicles up to over 100 000.
The average age of cars in Central Finland on year 2022 was 14,1 years. With the current renewal rate, it would take about 17 years to replace the current petrol car fleet with non-fossil fuel powered cars.
On the other hand, it is known that the cumulative annual kilometers driven decrease with the age of the car, meaning that the most kilometers are run by new cars.

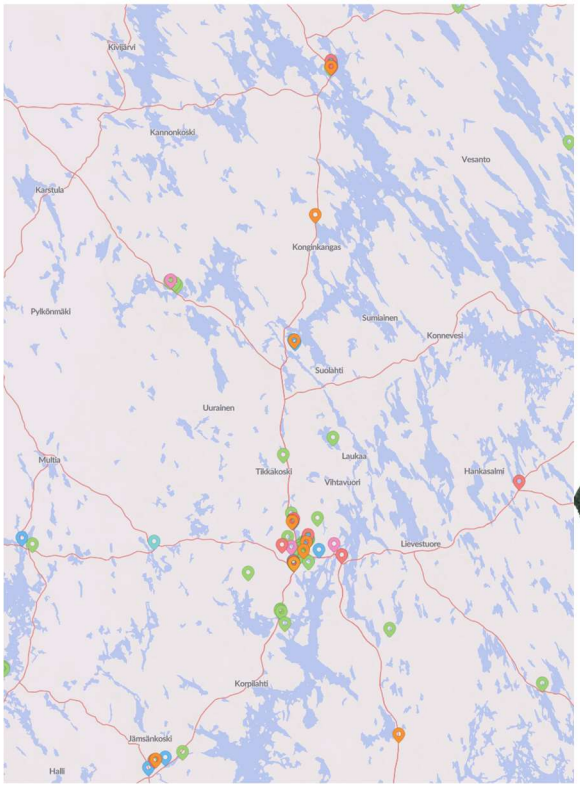
There were about 16 000 registered vans and 4200 trucks in central Finland at Q1/2023. Out of these, only 110 were not diesel or petroleum.

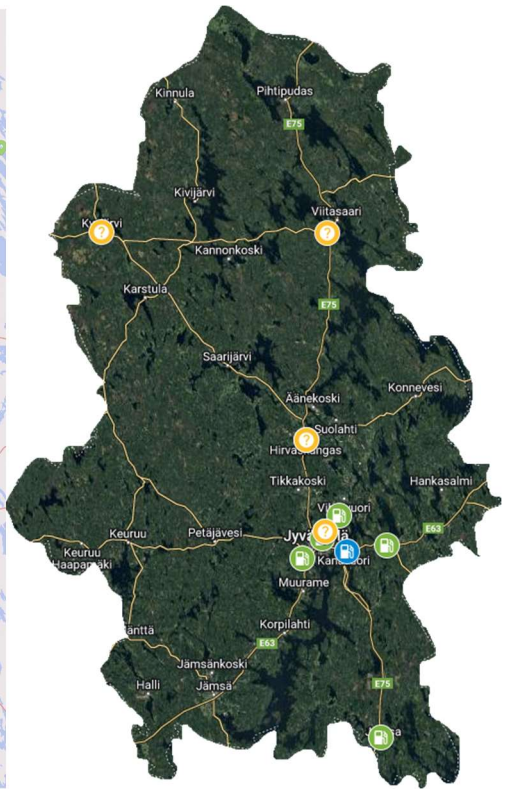
2.3 Description and data on charging and refueling infrastructures

The public EV charging infrastructure in Finland is mainly based on commercial players. Due to the demography and traffic characteristics in Central Finland, it is likely that charging of private EV's is mainly done at home overnight and irregularly on public or employer-owned charging stations. The public charging stations serve long-distance traffic along the main roads, as well as visits to Jyväskylä. There are 40 charging stations within 12 km radius from the centrum of Jyväskylä and about 30 elsewhere in the region. Slow charging is possible practically everywhere in Finland, as plugs for car heating are provided in all private and most public parking spaces intended for long periods of time.

There are 5 existing biomethane fuelling stations and 4 additional ones in planning in Central Finland.

A private hydrogen player has announced a setup of hydrogen fuelling station to Jyväskylä, estimated to be commissioned 2025.





Charts: Left: EV Charging locations in Central Finland. Source: sähköautoilijat ry / latauskartta.fi
Right: Biomethane existing and planned fuel stations. Source: kaasuautoilijat.fi

2.4 Emissions from mobility

Traffic makes up about a third of the greenhouse gas emissions in Central Finland. As electricity production and district heating are decreasing their emissions based on the already ongoing work, the relative share of emissions from traffic is increasing. Emissions from road traffic in Central Finland were about 550 kt/CO2e on year 2021. Mobile machinery (e.g. agricultural

machinery, forest machinery and mobile machinery at industrial sites) make up about 7% of the totality, 124 kt/CO2e. Traffic on water also creates minor emissions in Central Finland, 10 kt/CO2e per year, which is about 1% of the totality.

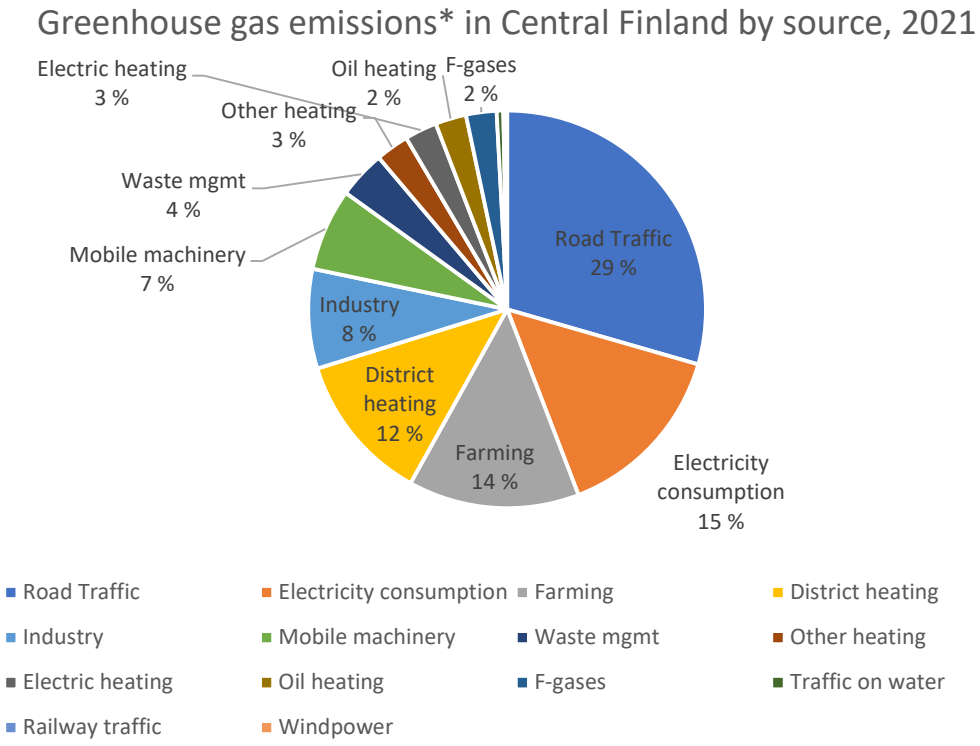


Figure 1 Greenhouse gas emissions in Finland 2021. Data source: www.carbonneutralfinland.fi; ALAS calculations

On national level according to 2021 data, passenger vehicles made up 54% of road traffic emissions; vans and trucks 41% and busses and other vehicles 5%.

3. Energy

3.1 Availability of renewable energy in the region

On year 2021, fossil fuels counted for 14% of total electricity production in Finland, renewables 53% and nuclear 33%. Of energy production in Central Finland (electricity and heat), share of renewables was 81% on year 2019, when the energy balance of Central Finland was last updated. After 2019, the region has seen considerable increase of wind power. On year 2022, there were 29 windmills in production in Central Finland, with capacity of 129 MW. On Q2/2023, 221 MW of additional wind power was under construction and 30+ windmill farms were in different stages of planning.

The high share of renewables in energy production in 2019 was partly due to a new pulp mill built to Äänekoski with excess bioenergy production. After year 2019, the use of peat and coal in combined heat and power production has continuously decreased and is expected to shrink close to zero by 2025. The biggest energy producer in the region, Alva, is aiming for carbon neutrality by 2030.

Solar energy production in Finland covered only 0,6% of total energy production on 2022, but the production is growing fast since 2021 in both small and industrial scale plant types. Most of the current production (635 MW) is small scale production whereas industrial scale (over 1MW plants) capacity was only 34 MW.

3.2 Regional energy market structure (e.g. energy production, electricity grids, transport of energy, energy delivery to customers, ownership and operation)

Medium-current electricity grid is owned by about 40 players with varying sizes. Local grid is always a mandate-based monopoly, and local grid owner has a responsibility to provide electricity for electricity consumers in their area with a reasonable cost. An individual user can buy their electricity from any producer, but always pays a charge for the local grid operator and electricity tax for the government. Main electricity grid is owned by state-owned Fingrid. Fingrid has been able to invest in the main grid with the phase of fast-increasing wind power, but some capacity challenges are emerging locally in case all announced wind power projects would be realized.

3.3 State of small-scale renewable energy production in the region

Data on small-scale energy production is not available publicly, or it is mixed with e.g. energy efficiency investments. Small-scale wind production is not feasible in many cases, as there is a lack of aftermarket for small-scale windmills. Some individual farms have invested or researched investing in wind energy.
Solar panels are becoming increasingly popular in private and commercial buildings and the installations increased significantly on 2020-2022. The economic downturn and decreased price of electricity had slowed down private investments on 2023.
The biggest farms and waste company in Central Finland have invested in biogas production, but the following investments farms would require centralized collection of biomasses. Research on the topic is ongoing.

3.4 Description of current state of Energy Communities

Energy communities are allowed only if they are behind one connection point to the local grid, and on one property. This means that energy communities exist on apartment buildings and in commercial properties owned by a single company.

Housing companies in shallow buildings have increasingly invested in solar panels. In high apartment buildings, installing the panels on the roof gets often too expensive. Housing companies are also increasingly offering charging stations for plug-in hybrids and EV's.

Solar panel investments in commercial buildings are also becoming more frequent. Practically all the biggest gas stations have installed solar panels, and panels are frequently seen at manufacturing companies' rooftops with high electricity consumption. Public sector with less capital for investments has been slower in the uptake, but some examples of installations of solar panel systems on public roofs have been realized.

1.1 Infrastructures as potential hubs

1.1.1 Buildings and other premises (public)

JAMK university of applied sciences Jyväskylä campus area
JAMK has installed solar panels for research use, but currently they are not used for power generation for the building. Students and employees have requested approval for charging their e-bike and e-scooter batteries in the building, but this has been denied due to safety concerns. A safe solution would be to charge the batteries outside of the building in locked cabins. In the same project, the solar panels could be changed to provide electricity in the building network, thus making JAMK a REC.

University of Jyväskylä
The university has an ambitious climate plan but currently no own renewables production or charging points for EV's or e-bikes / scooters. University is one of the biggest employers in Jyväskylä and will need to create incentives for reducing emissions from commuting of personnel and students.

1.1.2 Buildings and other premises (private)

Commercial Centre Seppä
Seppä is the newest shopping centre in Jyväskylä with modern parking facilities and a local hub with 2,8 million visitors annually. They also focus on sustainable solutions and have EV-charging available in the garage.

Housing companies
All Finnish apartment buildings are organized to housing companies with a legal opportunity to set up an energy community. Installations of EV charging stations as well as solar panels and other energy investments are supported, making housing companies the most potential backbone of Finnish REC's. The challenge is that the companies are small and not necessarily very active in researching and implementing new technology.

Hietaman nuorisoseurantalo, Äänekoski

A village house owned by a non-profit organization works as the event centrum in a rural village located about 11 km from the centrum on Äänekoski. The organization has invested in solar panels and is able to sell electricity to the grid from April to August. They would like to research opportunities to utilize the extra power not required for heating of the house for a public EV or e-bike charging station.

1.1.3 Park-and-ride parks

Park-and-ride system offers potential hubs where mobility and small-scale energy production could meet. The Central Finland Park & Ride strategy was published in 2021.

The park-and-ride system in Central Finland composes of park-and-ride parks for cars and bikes. Parks are categorized to four group based on service level of the parking place. Especially interesting localities are nationally, regionally, and locally significant park-and-ride parks. Small scale park-and-ride parks are small, and the service level is significantly lower compared to previous.

There are two nationally significant park-and-ride parks in Central Finland: Jyväskylä Travel Centre and Jyväskylä Airport. These places have over 100 parking places and charging stations for EV would be important for the sufficient service level. Regionally significant park-and-ride parks have about 30 to 100 parking places. Locally significant parks have about 10 to 30 parking places. The service level should be better than in ordinary stops, but parks mostly lean on surrounding services.

The strategy creates progress lines towards the year 2035. However, there are several questions which still need to be solved for example regarding the cooperation possibilities with transport operators and marketing and branding of park-and-ride system. Main questions in developing park-and-ride parks are also property ownership and the maintenance liability.

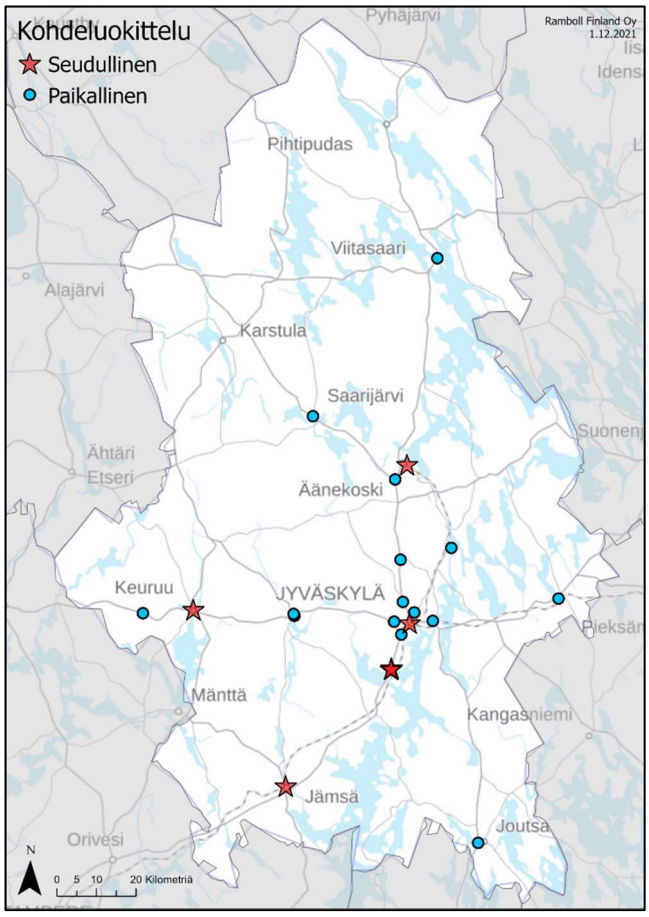


Figure 2 Nationally and regionally significant park-and-ride parks (red stars) and locally significant park-and-ride parks (blue dots). Source: The Central Finland Park & Ride Strategy 2021

4. Stakeholders

Steering Group Members

Organization	**Involvement**
Natural Resources Institute Finland	Research topics cover utilization of bio-based materials and relate to the project through hydrogen and biogas
Centre for Economic Development, Transport and Environment	Government organization responsible of several official processes relating to mobility and energy
Väre	Electricity provider with EV charging products
City of Äänekoski	Äänekoski has heavy traffic and they need to define how to decrease negative side-effects and emissions from the traffic
JAMK University of Applied Sciences	JAMK is a local developer in energy and traffic and also a potential hub
Rekka group	Heavy transport operator with strategic focus on sustainability
Keulink	Developer of converted electric trucks
City of Jyväskylä, Kangas project	Kangas is a new area in City of Jyväskylä designed for sustainability and wellbeing.

Other key stakeholders:

Organization	**Involvement**
City of Jyväskylä	Several common development areas relating to transport hubs (bus&train station; airport), renewable urban transport, hydrogen, city planning, park & ride, e-bike and e-scooter traffic and charging etc.
Finnish real estate federation	Research, advisory and lobbying for real estate owners

Local transport and logistics companies and vehicle sellers and repair shops	There is lack of knowledge on new transport modes in transport and logistics value chain
University of Jyväskylä	Potential hub with sustainability strategy

5. Legislative and financial environment in support to renewable energy initiatives

5.1 Legislation, regulations and land use planning

5.1.1 Renewable Energy Communities and Small-Scale Energy Production

EU-legislation on energy communities has not been fully implemented in Finland. Energy communities are allowed only, when they are behind one grid connection and on one premise, owned by a single legal entity. The only other legal energy communities are housing companies. All apartment buildings in Finland work as housing companies. Setting up an energy community to a housing company is a relatively simple process. The grid owners provide guidance, several also provide guidance and required forms at their website. The whole process takes a few months, including decision making process in the housing company and approval of the local grid operator. It has not been defined when virtual energy communities will be enabled in Finland.

Regulative process for installing solar panels on roofs of private and public buildings is also a relatively simple. Only an action permit is required from the municipality, except in the rare cases when the building is protected e.g. for historical reasons. The details of the installation are given to the grid operator and the energy producer makes a sales contract with a selected electricity provider of the sold electricity. The grid operator cannot refuse to connect the production facilities to the grid. When the technical installation is completed, a date is agreed with the grid operator to connect the panels to the grid.

New construction legislation is already partly implemented and partly under preparation. Energy efficiency of new and existing buildings will need to be improved. Solar panels can be used to improve the overall energy efficiency coefficient of buildings, enabling also old buildings to pass the new regulations.

5.1.2 Mobility

TEN-T Road E-75 crosses central Finland from South to North, with EU-level regulation for charging and refuelling infrastructure. There is no existing regulation requiring public charging outside of the main roads.
New public and private buildings are required to be prepared for providing EV charging in their parking spaces. The same legislation applies to major renovations of existing buildings.

Regulation for hydrogen distribution and fuelling systems is not yet existing and basic research on the materials, required safety procedures is ongoing.

Distribution obligation law will raise the requirement for bio-based fuel components on 2024 to 22,5% and on the following years, +1,5% every year.

5.2 Financial incentives etc.

5.2.1 Energy investments

There are several support mechanisms for energy investments for businesses, public sector, private households and apartment buildings.

ARA provides support for energy efficiency investments and EV charging infrastructure for private households and apartment buildings. Energy efficiency investments include e.g. heat pumps and solar panels. Supported EV charging for apartment buildings covers since the beginning of 2023 only Type 2 chargers with possibility for 2-way charging.

Finnish Energy Authority provides support for public biogas fuelling stations and EV charging stations of personal vehicles and heavy transport. The supported projects are defined through bidding of the providers.

Companies, municipalities and other legal entities (excluding private persons) can apply for energy aid from Business Finland. The support level is 50% for municipalities energy efficiency studies and 15-20% for investments to renewable energy. In

biofuel projects the aid level is 25 %. Bioplant projects can't use logs or pulpwood as a resource and applicants must also submit a plan for further processing and use of digestate.

Companies (especially small and medium-sized) can apply energy aid from Business Finland. Energy aid can be used for example for fuel distribution projects which are connected to production plant projects. However, funding is limited at most for one distribution station, and it should locate in the immediate vicinity of the production plant. In granting funds priority is given to novel solutions that have not yet been experimented with on a broad scale in Finland.

Ministry of Economic Affairs and Employment grants investment support for big demonstration projects for energy technology.

5.2.2 Mobility

Legislative status of biogas vehicles is unclear for the future. Currently biogas vehicles are not incentivized in the EU-legislation, as the emissions are calculated based on fossil methane emissions. This has also impacted on the availability of methane-fueled cars in the market. Some private players in Finland are anyhow still investing in building biogas distribution networks for traffic use, especially for heavy traffic. Currently the distribution network is not enough to support heavy transport throughout the country and the delivery times of the gas trucks is too long. Investment support for gas trucks will continue until end of 2024.

Vehicle scrapping support and EV purchase support are proven to increase renewal rate of old cars and share of EV's in new vehicles. Scrapping support has been realized in campaigns, last time 2021. EV purchase support for private vehicles ended at the end of 2022 but will continue until end of 2024 for vans and trucks.
For charging infrastructure, the law enabled peer-to-peer charging only for charging stations fulfilling Measuring Instruments Directive, practically installed only with ARA support to apartment buildings or to commercial charging stations due to its higher price. It is noteworthy that not all charging stations at apartment buildings use ARA support for investments, as in many cases slower charging stations are enough for the residents and don't necessarily require changes to the electricity infrastructure of the building.

6. S.W.O.T Analysis

Strengths	**Details**
Increasing local renewable energy production	New windmill projects Remaining potential in biogas
Biogas ecosystem	Strong research and implemented good practices in production and distribution of biogas Biogas fuelling stations
Road transport hub in Finland	TEN-T road E75 Several national main road cross the region
Strategic focus on sustainable lifestyle	Strategy of Central Finland and that of many municipalities, companies, education institutes and third sector players defines sustainability as one of the core values
Economic wellbeing	Financial possibilities for people and companies for investing to EV's and e-bikes
Weaknesses	
Sparsely populated areas	Building public charging / fuelling infrastructure to areas outside of the main traffic network is not economically sound for private players. Will this increase energy poverty in those regions?
Weaknesses	
Sparsely populated areas	Accessibility of remote areas with no public fuelling/charging
Demographic development	Share of elderly people in sparsely populated areas is rising and continued urbanization continues creating problems for services in ever more sparsely populated areas
National grid capacity in northern part of Central Finland	National grid in Pihtipudas area requires more capacity. New windmill capacity is planned before the grid maintenance works. The municipalities are looking into using hydrogen as storage.
Opportunities	

Increasing availability and options of electric cars	Number of available models in different segments (personnel vehicles, vans and trucks) is increasing constantly bringing fossil free mobility option available for more use cases
Tightening energy legislation	Fossil-based traffic system is becoming increasingly expensive while non-fossil-based alternatives are being incentivized increasing likelihood of new user segments switching to the new traffic ecosystem
Public charging points	EU Directives for charging and fuelling infrastructure for TEN-T network including biofuel fuelling and charging stations also for heavy traffic
Electricity production	Availability of cheap and renewable electricity in Finland
Sustainability goals	Ambitious climate neutrality goals on national, regional and municipality level and also in the private sector
Threats	
Low energy price and high share of renewables	Less incentives for small-scale production and distributed energy system
Challenges related to hydrogen economy	Would hydrogen be utilized for other purposes than transport? Is the cost structure supportive for utilization of hydrogen? Challenges related to technology and safety.
Biogas regulation	Use of biogas for transport is uneconomical due to taxation treating them equal with methane cars. This has reduced available models in the market.
Energy community legislation	Virtual energy communities not legally possible in Finland
Peer-to-peer charging	Peer-to-peer charging not possible to most charging station owners due to measurement instrument directive

7. READINESS MODEL INDICATOR RESULTS

Category	Challenge			
Mobility		**Indicator**	**Current level**	**Unit**
Personnel Vehicles	Low share of non-fossil based vehicles	Share of non-fossil based vehicles of registered cars in Central Finland	4 %	%
Personnel Vehicles	Number of non-fossil based fuelling / charging stations	Public fuelling / charging stations in urban areas and by main roads	67	pcs
Personnel Vehicles	Number of charging stations in housing companies	ARA-supported charging stations	590	Total number of supported charging stations by end of 2022
Personnel Vehicles	Number of non-fossil based fuelling / charging stations outside of urban areas and main roads	Public fuelling / charging stations outside of urban areas and main roads	3	pcs
Personnel Vehicles	Availability and price of biogas vehicles	Number of available new car models in Finnish market	2	models (both VW group)
Heavy transport	Number of non-fossil based vehicles	Number of non-fossil based vans	98	pcs

Heavy transport	Number of non-fossil based vehicles	Number of non-fossil based trucks	22	pcs
Heavy transport	Number of charging stations for heavy transport	Number of charging stations for heavy transport	0	pcs
Light EV's	Public charging points for batteries in e-bikes, scooters etc	Number of public charging points for batteries	0	pcs
Public transport	Share of car usage for short trips also on the area of frequent public transport	Share of car trips for trips under 5 km	18, 33, 50, 57	% pituusluokan matkoista (0-1 km, 1-2 km, 2-3 km, 3-5 km)
Public transport	Number of non-fossil busses	Number of non-fossil busses	4	pcs
Public transport	Fossil-free solutions for non-electrified tracks	Yes/no	No	
Public transport	Frequency and extend of public transport	Usage of public transport in urban area	7,27 million	Trips in Linkki-area
Park-and-ride parks	Availability of services at park-and-ride parking areas	Realization of park-and-ride policy	16	Number of park-and-ride areas
Energy Production				
Solar panels	Number of small-scale solar plants	Capacity and number of installations from Energiavirasto and / or network companies		All info not available yet
Wind power	Capacity of installed wind power	Capacity of installed wind power	129 MW, 29 windmills	
Legislation	Number of energy communities	Number of registered energy communities		
Energy communities	Number of other hubs	Number of other premises which can be defined as energy communties		Under research
Biogas	Production of biogas in the region	Production of biogas and biomethane for traffic use	Biogas 35 GWh/y, biomethane for sales 11 200 MWh/y	
Local hydrogen production	Supporting new openings and projects in development of local hydrogen economy	Number of projects	2	One published hydrogen fuelling station (Vireon) ja one decision on production (Veolia)

Legislation				
Energy communities	Adapting to EU Energy Communities directive to national regulation	Virtual energy communities enabled	No	
AFIR-directive	Status of alternative fuels infrastructure	% of fulfilment	Charging: Light vehicles 75%, heavy vehicles 0%; Hydrogen 0%	% of requirements for year 2025 fulfilled
Peer-to-peer charging	Measurement Instruments Directive	Number of service providers for peer-to-peer charging	0	
Biogas vehicles	Emission treatment for biogas vehicles	Fossil methane and biomethane emissions separated	No	