The Long Road to Nowhere: Population, Transportation and Home Working in Bergen

Thesis submitted in partial fulfillment of the requirements for Master of Philosophy in System Dynamics from the University of Bergen

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1. Executive Summary

Along the way to becoming fossil-free by 2030, the city of Bergen in Norway has set a number of ambitious sub-goals which are available to read in the Kommune's Grønn Strategi 2016 document. Many of these involve plans to reduce fossil fuel transport emissions by various means - such as encouraging green travel modes and public transport, whilst discouraging fossil fuel car use. Many of these "T goals" are examined in the following chapters.

This study aimed to investigate the travel behaviour of Bergen's citizens, and to what extent an increase in homeworking might interact with this behaviour - in ways that might help or hinder the movement to climate friendly travel solutions.

As part of it, a system dynamics model of the city's constituent areas (called Bydeler) along with their aggregated travel links was constructed in order to best observe endogenous behaviour.

Some of the chief findings of this study are underlined as follows.

- The real hurdle to any environmental plan is population growth as this increases the gross number of trips and emissions therein

- Any plan that looks to investigate travel behaviour must look at population distributions.

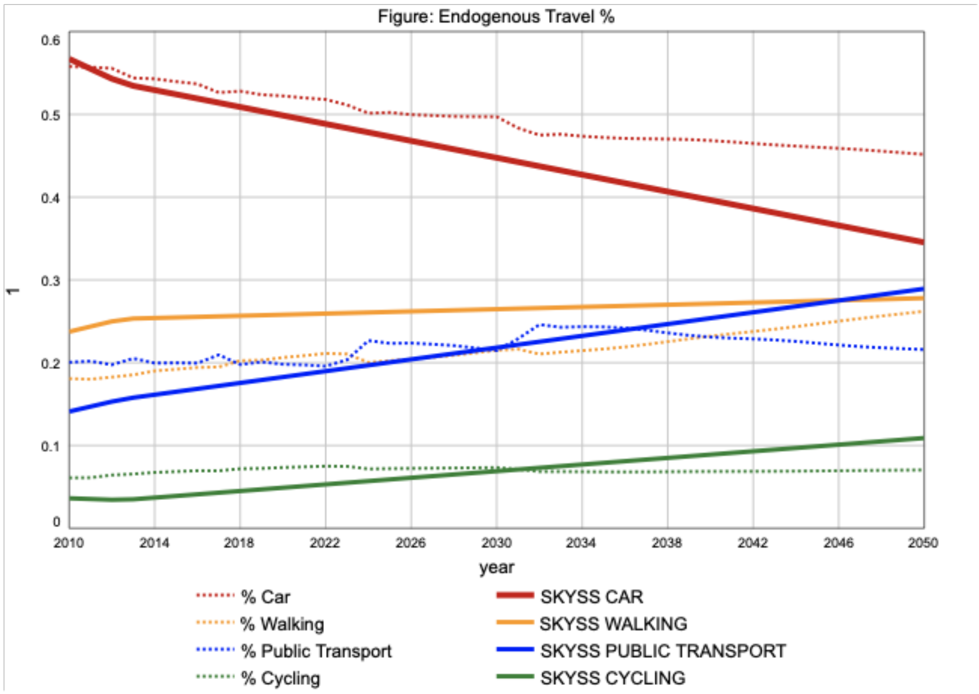
- A more even population distribution is likely to lead to more green-based transport based on the idea of proximity to work and services.

- The natural, default behaviour of the population is towards more even distribution but a combination of contingent, historical factors slows, if not wholly reverses this behaviour.
    - Making jobs more equally distributed could be a solution to this issue.

- Under current conditions, the model indicates a limit to the percentage of car trips that can be replaced by public transport or other means. This may partially be explained by capacity limits in the public transport system.

  The graph below illustrates both the model's reference mode behaviour set against very rudimentary predictions based off of official statistics from Skyss - the Kommune's travel authority. In the graph the percentage of trips being carried out by various means is shown. In the case of historical data, this is present until 2020, after which a prediction from linear regression is shown for reference.

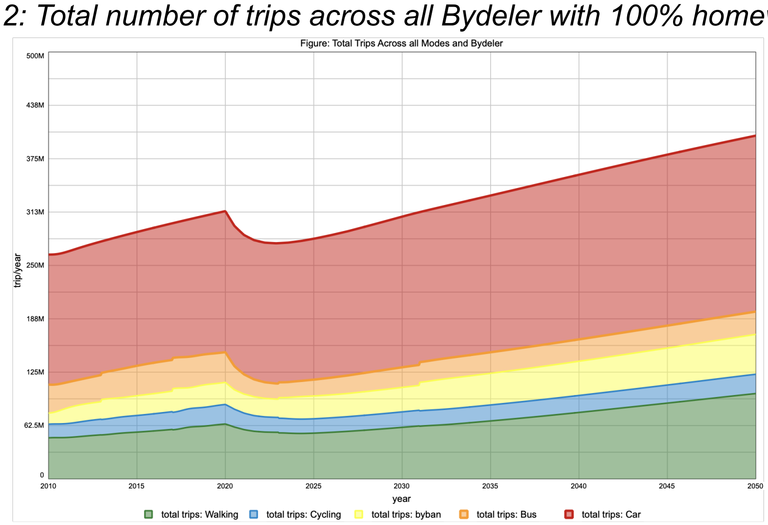
Figure 1: Endogenous Travel Percentages and Approximate Linear Regression Trends from Official Skyss Data



- Using the model as a tool for policy analysis, we can look at potential outcomes from increased homeworking. It would seem that whilst homeworking does not significantly change behaviour it does at least reduce overall trip numbers for a significant period of time and this is obviously environmentally beneficial.

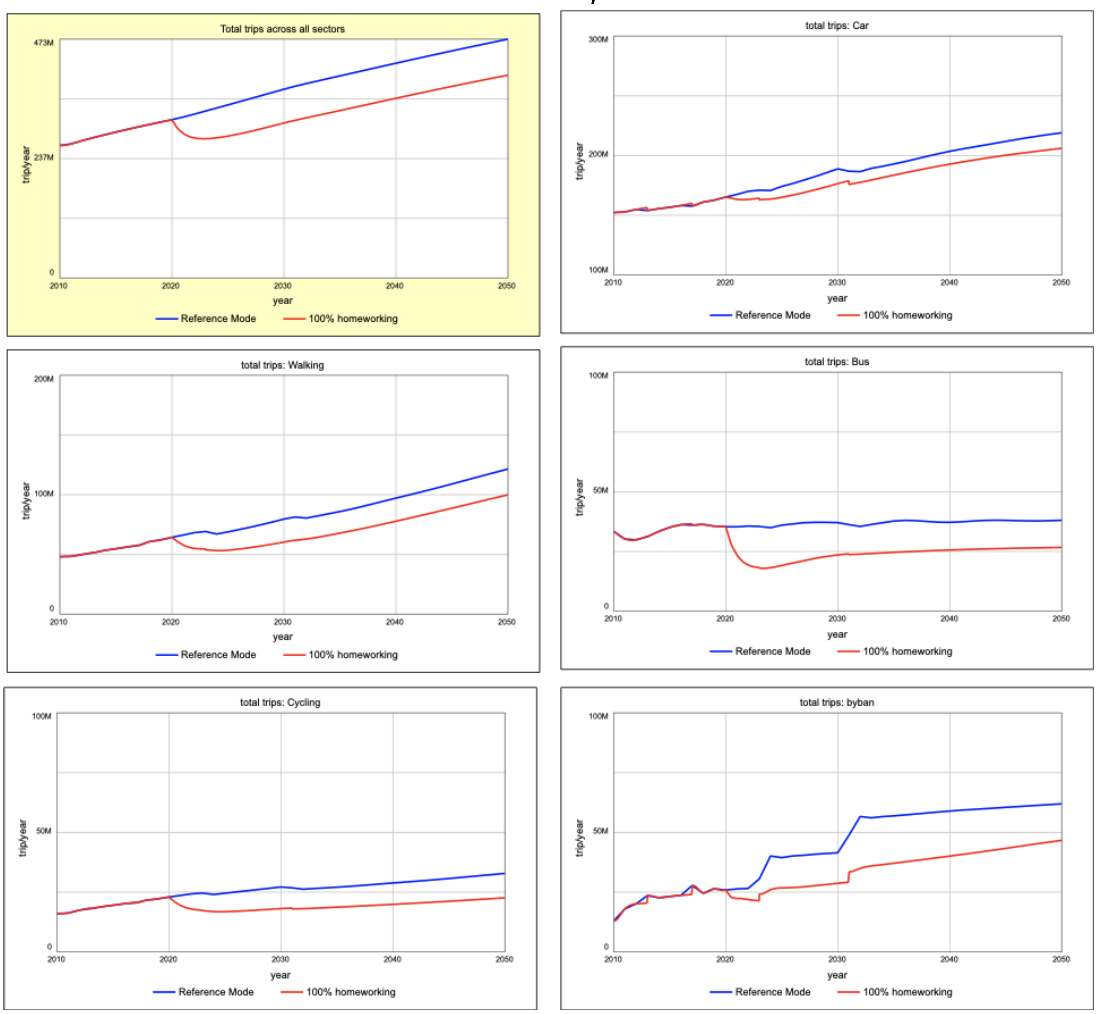
  The graph below displays a calculation of the total number of trips across all Bydeler in the city and is colour-coded to indicate transport mode. It displays the outcome of 100% of jobs in the city becoming homeworking jobs. Whilst this is clearly extreme it is useful to more clearly illustrate a potential maximum amount of trips that can be avoided in cases of homeworking trends. NB: This does not take into account the effects of international migration which may be significant.

Figure 2: Total number of trips across all Bydeler with 100% homeworking



- The graph below displays a range of different travel metrics in order to illustrate the potential impact of homeworking - again using the most extreme case for clarity. The red line helps to illustrate the difference that such a policy could have on travel modes and would seem to indicate a proportionately larger impact on green travel measures than car travel.

Figure 3: Total trips across all Bydeler with homeworking at 20% (reference mode) and 100% compared



2. Introduction:Reference Modes

With climate change edging closer to the forefront of political life in recent years even local governments like Bergen's are beginning to put in place real, meaningful targets and policies to reduce their carbon footprint.

These are perhaps best encapsulated by the city's 2016 Green Strategy (or Grønn Strategi[1]) document which sets out the goal of Bergen to become fossil free by 2030. Along with this main goal are a series of equally ambitious sub goals which will be discussed in due course throughout this study.

Many of these goals concern travel and lessening reliance on fossil fuels in commuting and this forms a background against which to build and test a system dynamics model of the issues involved. Each will be discussed in more depth as we go on but for now the two main thrusts of this thesis will be in examining population distribution and travel mode behaviours - and, by extension, what, if any, the interactions between the two are.

Population

According to Norwegian Official Statistics (SSB)[2], Bergen's population has been growing at a steady rate for some time from just over 250,000 in 2010 to just over 280,000 in 2020. Figures are given in the table below:

Figure 4: Bergen Population by Bydeler 2010-2020 (Source: SSB)

Bergen Population by Bydeler (SSB Statistics)									
	Bergenhus	Årstad	Fyllingsdalen	Laksevåg	Ytrebyggda	Åsane	Arna	Fana	Total
2010	37,900	36800	28800	37900	25300	39200	12500	37800	256200
2011	38,500	37400	28800	38600	25700	39500	12700	38300	259600
2012	39,000	38000	28900	39000	26400	39700	12900	39200	263000
2013	39,700	39000	29000	39400	26700	39800	13200	40100	266900
2014	40,600	39900	29200	39600	27000	40100	13500	40900	270700
2015	41,300	40400	29300	39900	27100	40600	13700	41600	273800
2016	41,800	40700	29500	40000	27600	41000	13800	42000	276300
2017	42,000	40700	29500	40200	28100	41200	13800	42200	277700
2018	42,100	41200	29800	39900	28400	41300	14000	42400	279100
2019	42,300	41400	30000	40000	28900	41400	13800	42700	280600
2020	42,800	42200	30100	40400	29300	41600	13800	43100	283400

In addition, "the City of Bergen's own prognoses indicate that the population will exceed 325,000 in 2030 and 355,000 in 2040." - Grønn Strategi 2016. For this study it was decided to divide the city into its constituent Bydeler. These are illustrated below:

Figure 5: Bergen's Bydeler Source: www.bergenbyarkiv.no

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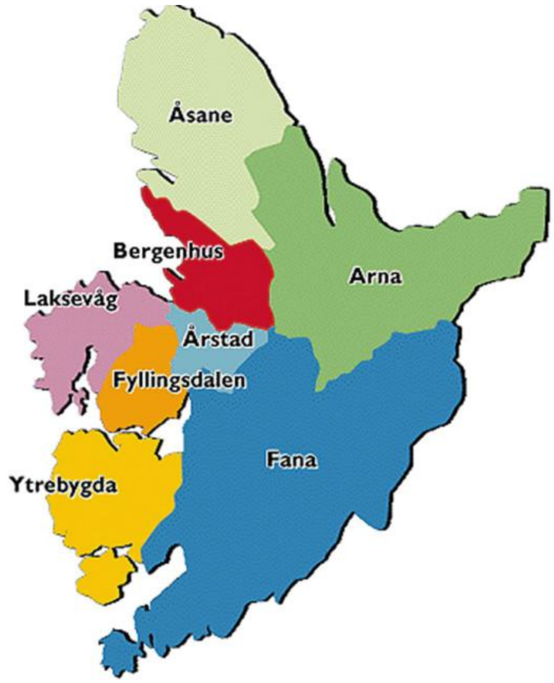
[1] https://www.bergen.kommune.no/hvaskjer/tema/gronn-strategi

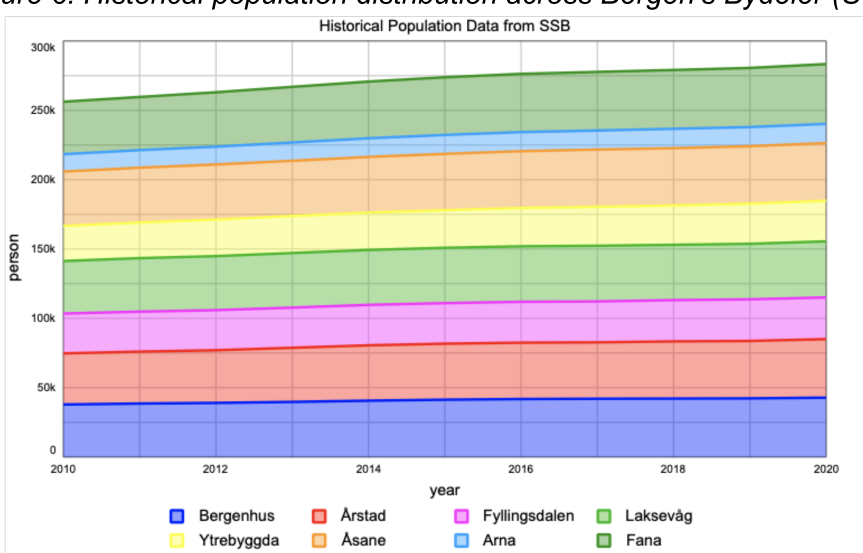
[2] https://www.ssb.no/statbank/table/10826/tableViewLayout2/

Travel



Although the Bydeler consist of areas of substantially varying sizes (and therefore population densities), as Figure 6 shows, the population distribution of these has remained relatively stable for the most part over the past 10 years. However, as we shall see, there are legitimate reasons to believe that this may not last. Part of this study will entail looking at the population distribution of the city and examining what potential conclusions may be drawn about it and the implications for traffic and travel and commuting behaviour - the underlying conjecture to be tested here being that, where people live affects how they travel but how.

Figure 6: Historical population distribution across Bergen's Bydeler (SSB)

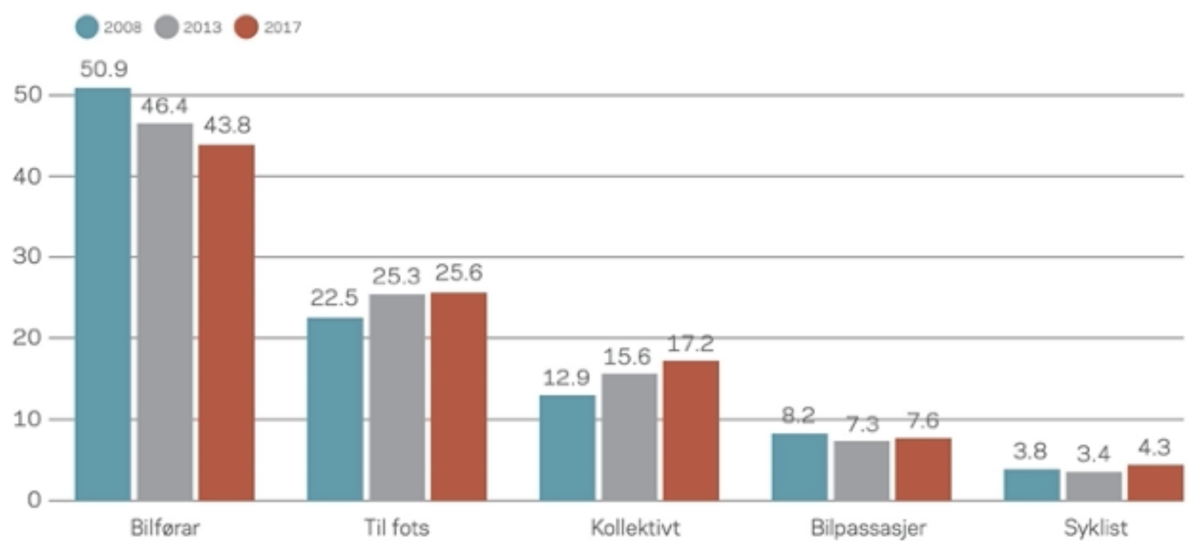


Travel

Once we have examined where populations are set to disperse to, we can begin to make inferences about how this might affect the travel systems of Bergen and the uptake of different transport modes.

Currently, car travel is the largest travel mode in the city. This is despite concerted efforts by Skyss - the region's overall travel operator - to reduce the percentage of trips taken by car through measures such as tolls, and most notably the introduction of the Byban light rail. These have not been without success as the graph below demonstrates. The percentage of trips taken by car has decreased and that of public transport options like buses and Byban have increased.

Figure 7: Travel Mode Percentages from Official Skyss Statistics 2010-2017[3]



Figur 2. Reisemiddelfordeling for Bergen kommune.

It should be noted that as of 2020 all of Bergen's bus fleet have apparently been overhauled meaning that they are fully electric[4]. This means that we can discount any first hand emissions from them or the Byban which is also electric.

Walking has seen a notable increase along with public transport options, but cycling percentages seem to be stubbornly low and still well below the Kommune's own targets as shown in the graph below from the Grønn Strategi.

Figure 9: Travel Mode % Historical and Target (Source: Grønn Stratego 2016)

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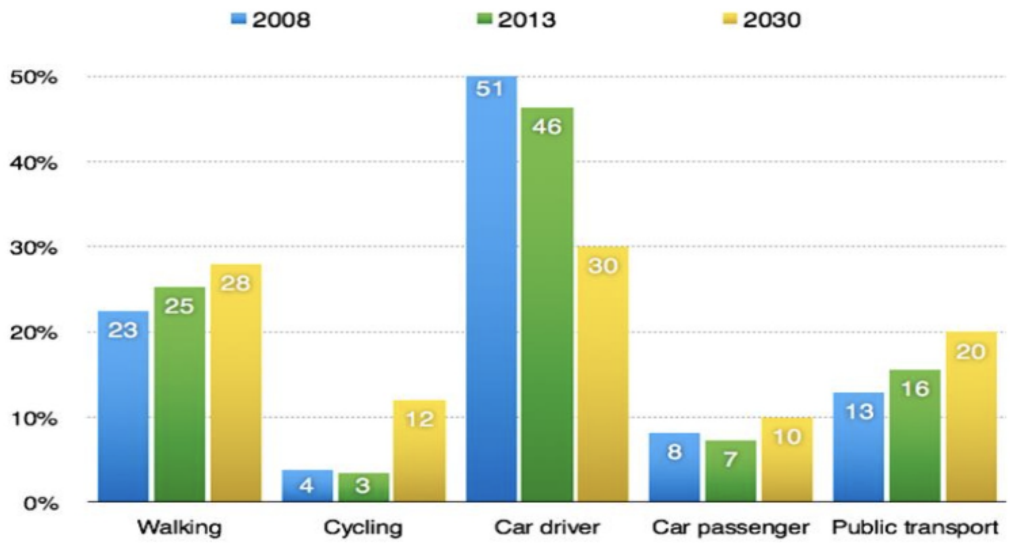
[3] Note that in the model car drivers and passengers have been combined. There may also be a margin of error in the statistics that causes the numbers to sum to slightly under 100%. Source:Skyss 2019 KOLLEKTIVSTRATEGI FOR HORDALAND ÅRSRAPPORT: https://www.skyss.no/rapportar

[4] https://www.electrive.com/2020/12/02/bergen-launches-fossil-fuel-free-bus-network/

Figure 5.4 Travel habits survey for Bergen 2013, with breakdown in 2008 and 2013 and possible breakdown for 2030



Whether this positive change in car vs public transport mode percentages can be maintained is one of the focal points of this study along with the possible impact that homeworking might have on the situation if it is to continue at higher rates than historically.

Anthropogenic climate change is seen by many as being the largest challenge facing the planet in the 21st century. Like any large project, a significant amount of coordination must be balanced with individual action and innovation. Norway's position offers a unique opportunity in many senses. Bergen’s goal of being fossil-free by 2030, is both a laudable end in itself, as well as a potentially vital chance for other cities to explore the resultant learnings.

3. Research Question

Problem Statement

The city of Bergen has set stringent climate-friendly targets in a number of areas - transport being a key one of these. But it is not necessarily clear what drives the transport behaviour of the population of Bergen. System dynamics may be able to give insight into this problem. Additionally a new phenomenon has been coming more present since the Covid-19 pandemic: homeworking. It is not yet whether this is a completely temporary change in working practices or if it is here to stay. It is even less clear how it might interact with the aforementioned issues of population distribution, transport behaviour, urban planning and a city's climate goals.

Research Question

Initially, the first part of the research question can be formulated as;

"What would be the endogenous effects of an increase in home working on the transportation and urban planning systems of Bergen?"

At first glance, this may seem an odd, even trivial subject, so before proceeding it will be necessary to give some of the discussion behind the research question.

During this process the intention is to build a system dynamics model that can sufficiently replicate the endogenous behaviour of the population and transportation systems of the city of Bergen. Ideally, the end goal of this study is that any learning may help better inform:

- Transport Planning in Bergen
- Provide the first iteration of a general model template that can be applicable to other cities.
- Provide insights

As part of this endeavor it was also deemed necessary to examine:

"The causes and effects of population migration within urban areas and their effect on transportation demands."

To call this an ancillary or secondary research question might be misleading. It is hard to say which of the two should have primacy. Though obviously the latter is a much larger and arguably important question, it must therefore be subject to more aggregations in the modelling process.

3.1 Background discussion:

3.1.1 Why ‘The Need for Speed’?

From a *very* broad and simplified overview the relationship between transport, economic growth and emissions in Bergen, or indeed, any city, could be generalised as such:

1. Greater economic activity drives up travel activity - through various means to be discussed.
2. These increased travel requirements result in more journeys which increase emissions of unwanted pollutants.
3. Anti Emissions intervention (typically from Government) is then deemed necessary.
4. Depending on the nature of the intervention, not just travel behaviour but economic activity will be affected (either negatively or positively depending on the intervention).

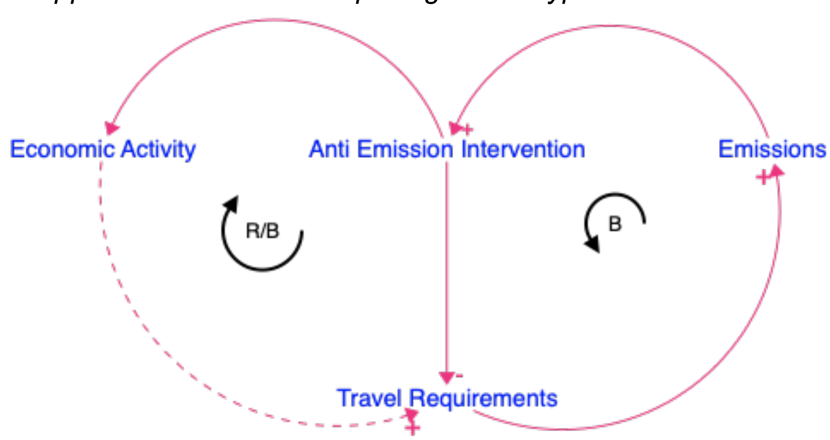
Thus far there has been a great deal of technological development that has the potential to decrease the emissions created by travel requirements (electric vehicles, hydrogen fuels, etc), thereby decreasing the strength of the link between travel and emissions.

Otherwise, anti-emission Intervention usually focuses on reducing the journeys taken. For example, higher taxes on petrol fuels de-incentivises car travel, in the hope of reducing journeys taken - or, simply journeys taken by this method.

A simplified Causal Loop Diagram may help to illustrate some of the basic thinking behind these links. Probably the most contentious element of this simple generalisation and CLD’s in figure 10 is the link between Anti-Emission Intervention (AEI) and Economic Activity. This relates mostly to the consequences of AEI - both desired and undesired.

If we look again at petrol taxes, these may reduce journeys, but may arguably come at an overall economic price or with undesirable side effects beyond that of just reduced disposable income for drivers. For example; drivers might elect to travel by a different transport method, one that the system is unprepared for capacity wise.

Figure 10: Approximate Causal Loop Diagram of Typical Emissions Interventions



Again, the situation is a great deal more nuanced, and many holes can be poked in this CLD, but it's purpose is not intended to be a thorough and complete conceptualisation of all policy interventions. It is rather a means to make a point: That there possibly exists a relation in the system that has hitherto not been explored as thoroughly as others by the Kommune. It is meant to only be a brief illustration of the general system so as to better situate this thesis in it.

3.1.2 A Possible Lateral-Thinking Solution?

So, what if we go back to arguably the main 'inflow' to emissions here: Travel requirements. Furthermore, that 'economic activity drives up the frequency and distance of journeys.'

What if there was a way to simplify things somewhat by simply decreasing the strength of the relation between Economic Activity and Travel Requirements? This search for a potential lateral-thinking solution to the problem of reducing emissions whilst preserving economic activity is one of the central motivations behind this thesis project.

3.1.3. Where does Policy Come in?

Several policies have been explored in Bergen contemporaneously:

Bybanen

An above-ground light-rail system that currently links Bergen centre with the city's airport. Such a route takes in a considerable part of the city's population along the route. Further expansions are planned for the future.

Hand in hand with this has been longer term city planning to make Byban stations the centre of mini-hubs throughout the city.

Tolls

Termed 'Bompenger' in Norwegian, these are a number of toll booths scattered across major routes around the city. They function in much the same way that similar schemes have in other countries[5]. The idea being that the charges dis-incentivise travel with fossil fuel vehicles in the city centre as there are exemptions or reduction for Green-fuel cars. The tolls have been a source of contention in Bergen, even to the extent that local, single-issue political parties have sprung up against them, winning considerable votes[6].

Cycling Incentivisation

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[5] https://www.sciencedirect.com/science/article/pii/S235214651630062X and https://link.springer.com/chapter/10.1007/978-3-540-77150-0_5

[6] https://valgresultat.no/vestland/bergen?type=ko&year=2019

The city has made a number of investments into making commuting more cyclist friendly[7]. Bike hire schemes are now becoming more prevalent as in other urban centres in Europe.

It is interesting to see to what extent planners have consciously or unconsciously considered the theme of reducing travel requirements (either through home working or otherwise) considering the interest in 'mini-hubs' based around Bybanen stations. This leaves one to consider a number of sub-questions:

- To what extent is this overriding policy in sync with the sub-policies listed above?

- What would be some of the endogenous knock-on effects of these interventions, and how would they be affected by an decrease in overall travel requirements?

The 2030 Strategy

It is worth noting here the specifics of the city's plans going forward. Particularly notable here is the *Green Strategy(Grønn Strategi)*'s various goals - specifically the *T Goals* that relate to transport behaviours. These will be examined in further detail later, but they cover a range of potential metrics against which to measure the city's progress towards a more environmentally friendly transport network.

In any rigorous system dynamics model, we subject the model to a variety of tests, one of which being 'extreme conditions' testing. From a certain point of view, this can be seen as another purpose of this thesis: to subject the various green policy interventions to an extreme condition that planners may not have fully allowed for - that of an increase in home working and a potentially large decrease or reorientation in transport requirements.

Homeworking

As relates to home working specifically, the recent Covid-19 pandemic has been hugely disruptive to a wide range of man-made systems, but for the purposes of this thesis, one side effect is particularly relevant.

Although a trend towards homeworking was already present in much of the industrialised world, the pandemic has likely increased the speed of the trend. Homeworking offers significant advantages on paper.

Employers need not expend as much resources on real estate for offices, and may well save on a multitude of other costs, whilst modern communication technology allows for meetings and team work to be continued without significant loss of productivity - prima facie. Employees can potentially benefit from reduced commuting, easier access to family and home comforts and a more flexible work environment.

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[7] https://www.toi.no/getfile.php/1350645-1561110487/Publikasjoner/T%C3%98I%20rapporter/2019/1697-2019/1697-2019_Summary.pdf

These are particularly pertinent for urban areas. In many areas of advanced economies large employers compete for central locations in order to facilitate easier access for employees and clients (among other reasons). At the same time, populations are seemingly locked in a no-win situation of living decisions. As demand for more central property goes up, rents increase, forcing many to balance an easier commute and access to the advantages of urban centres with the affordable housing and the advantages of distance from urban areas. Homeworking offers a potentially advantageous third option for employees - again, on paper.

With this in mind it seems reasonable to assume that homeworking will, to some degree, continue to increase. To that end it would be prudent to at least consider the impact of this on future travel behaviour even if it is limited to mere conjectural, extreme condition-style scenarios.

But, before relegating this to an entirely abstract exercise it is worth noting that something akin to this mode of thinking is present in the Mini-Hubs planning of Bergen. The, at least, implicit idea presumably being that by building services around Bybanen stops, the city can replicate some of the advantages to inner-city living at a higher distance from the city centre.

3.2 Question Summary

An exploratory model will be built in order to examine the consequences of a decrease in travel requirements on the overall transport system of Bergen on top of the natural population fluctuations between the city's Bydeler. The model addresses the following question:

"What are the endogenous effects of population movements on Bergen's transport system and how would an increase in home working affect the requirements on the transportation and urban planning systems of Bergen?"

In effect this subjects some of the various green policy interventions - such as the city's 2030 strategy - to an extreme conditions test.

4. Model Overview and Discussion

As stated, the most significant aspect of the study is an exploratory model of population movements and transport modalities - and some of the potential ramifications thereof. What follows therefore is a discussion of several key elements:

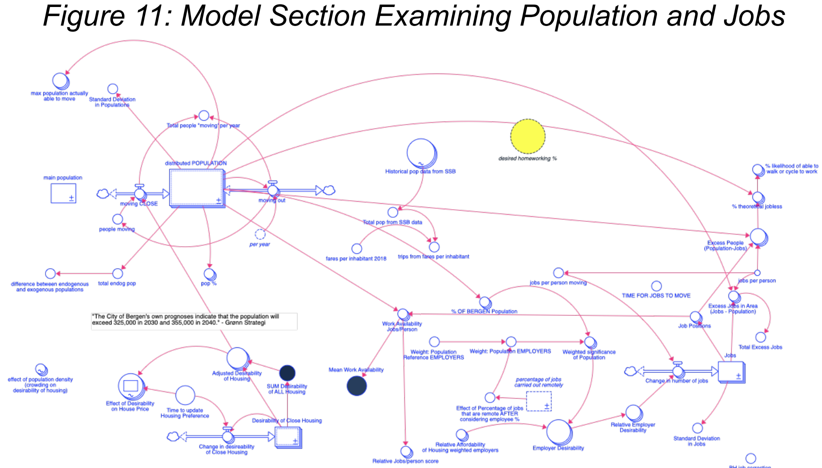
- The effects associated with different transport solutions on population distribution and transport behaviour
- Direct positive and negative impacts of such solutions on the transport network
- Indirect positive and negative impacts on other aspects of city infrastructure.
- A look at the key relations involved in the transport network:
    - Endogenous factors that affect the public's transport preferences
    - A system-wide evaluation and modelling of these
- An examination of more radical solutions involving hitherto exogenous variables and behaviour modification.

4.0 Time Horizon

The time horizon of the model was extended beyond both the city's fossil free goal of 2030 and the available projections of the city's population in 2040 to 2050. This is perhaps excessive in some regards, but it also helps to 'bake in' an element of extreme condition testing into the model by looking at the extreme long term trends in behaviour in the model.

In reality it is highly likely that any policy insights beyond 2040 or even 2030 are liable to be speculative in the extreme given the potential and unpredictable nature of technological development in the next few years. Figure 11 below displays an element of the study's modelling of population as relates to both jobs and housing. As we shall see, there is an important interaction between these 3 topics that unlines much of the travel behaviour in the model.

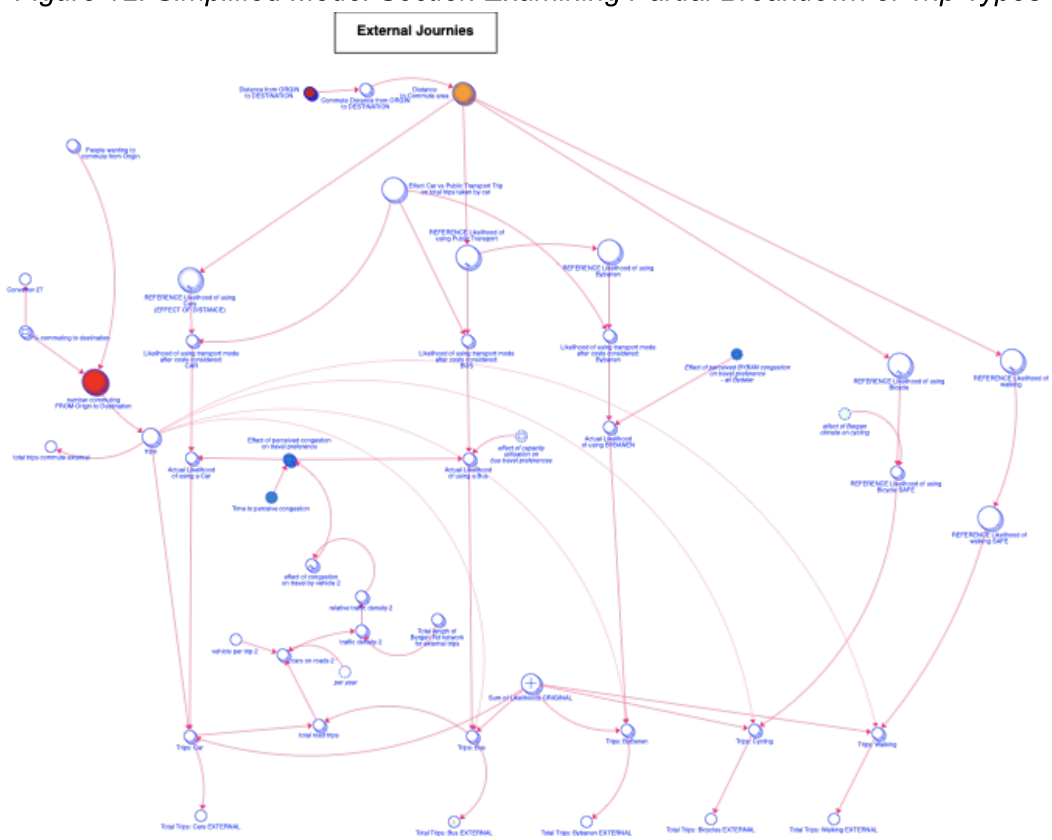
Figure 11: Model Section Examining Population and Jobs



4.1 The Transport Network

Of significant help in this project has been TØI's *Norwegian Transport Survey*. At time of writing the latest release of this survey is now several years old (2013/14). But it nevertheless offers some of the most useful information on travel habits available for Norway. The results of a new, more recent survey are apparently on the verge of being released, but were not available at the time of writing.

Figure 12: Simplified Model Section Examining Partial Breakdown of Trip Types



As the figure above displays, the transport modes that will be examined are Cars, Buses, Byban Light Rail, Cycling and Walking. Together these form the majority of commuting methods in Bergen.

4.1.1 Out to Sea: A Note on Sea Travel

One aspect of the transport network that may be conspicuous by its absence in this thesis is that of water-based transport. For a city with such a maritime history as Bergen, this is perhaps a glaring omission, however, I consider it a necessary if regrettable compromise at this level of detail as it has several key differences that separate it from other modes of metropolitan transport.

First and foremost is the fact that almost no one, even in Bergen lives in the Sea. An obvious point perhaps, but one that has non-trivial implications. Even the most remote mountainous house in Bergen will still have the possibility of having some form of service near it. Even if only in a remote hypothetical situation, it is possible that a Rema 1000, a new bus stop, or perhaps an entirely new neighbourhood might be built nearby, thus increasing the number of services nearby. However, there are no houses along sea-routes.

Furthermore, unlike say, a car driver, those using sea-routes for frequent commutes will likely be using them in combination with some other mode of transport in order to reach the necessary docking station and continue their journey on the other side. Thus, less is lost in omitting boat travel than might first appear. It is nevertheless an oversight that should be corrected in a more comprehensive model.

4.2 Housing

Whilst it may seem tangential to focus so much on housing, it is in fact an important contributor to transport systems whilst at the same time transport systems can have documentable effects on housing prices[8]. *Housing and population density dictates the demands on, and therefore distribution of the transport network.* Because of this, it is wise to study housing and population distribution in order to avoid transport system inefficiencies and maximise the emissions-reducing potential of various public and private options.

What motivates people to move is a subject of considerable debate. Furthermore, there seems to be no answers to the question that allows for easy implementation into this, or any other model. Nevertheless, furtive attempts must and have been made. Of significant help here was *Niedomysl's 2011 paper How Migration Motives Change over Migration Distance*[9]. Over short distances it seems migration is chiefly affected by housing and social reasons. For better or worse these have been approximately contextualised here as 'Affordability' and 'Services' in the manner to be discussed.

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[8] Jędrzej Gadziński, Adam Radzimski,
The first rapid tram line in Poland: How has it affected travel behaviours, housing choices and satisfaction, and apartment prices?,
Journal of Transport Geography,
Volume 54,
2016,
Pages 451-463,
ISSN 0966-6923,
https://doi.org/10.1016/j.jtrangeo.2015.11.001.
(https://www.sciencedirect.com/science/article/pii/S0966692315002033)

[9] Thomas Niedomysl (2011) How Migration Motives Change over Migration Distance: Evidence on Variation across Socio-economic and Demographic Groups, Regional Studies, 45:6, 843-855, DOI: 10.1080/00343401003614266

4.2.1 How dense are people?

Concentric vs Bydeler

At first, the model was conceived concentrically. That is, in its first iteration the city was divided into inner, outer and intermediate sections each with their own respective properties - literally and figuratively.

However, despite the added complexity that it created, further iterations of the model used each of Bergen's Bydeler as array elements.

There are advantages and disadvantages to both approaches. A concentric model, whilst in some ways more easily understood, is greatly more aggregated. Not only that, but attempts to put more detail into the model are likely destined to extenuate such distortions that the model produces - for instance by adding more sections to the model. Concentric models are likely to create interest (and perhaps interesting behaviour) along the penumbra of their rings and it is tempting to attempt to add more detail into the model by adding further radial sections - and this was actively considered - but this I believe to be misguided.

If say, a large portion of Bergen's population were to move to Asane, this would be represented as an increased population density in a particular concentric ring of the model, equally distributed along North, South, East and West of the city - rather than in one Bydeler.

On the other hand, if populations did move concentrically, this would be at least partly described by a Bydeler-style model. The reverse is not necessarily the case.

A concentric model is akin to attempting to describe a 3D object on 2D paper. The reality is that populations and their needs do not fluctuate in an orderly line along a city's radius. They spread and coagulate in messy, seemingly random patterns. Patterns which this project is attempting to make some semblance of sense of.

That is not to say that we have nothing to gain by concentric conceptions of urban environments. Population density for instance is still an incredibly useful metric both in and of itself and also as a proxy for other indicators. Of significant help in this project was the paper of Bertuad and Malpezzi - "The Spatial Distribution of Population in 48 World Cities: Implications for Economies in Transition" which looks at the population density of a variety of global cities.

One thing that the paper identifies which can be relevant for such models as this, is the existence of identifiable patterns in population density across cities in vastly distant locations. There is often - though not always - a non-linear relation between population density and distance from urban centres. What's more is that along the way there seem to be potential inflection points in the curve.

Concentric thinking has also not been wholly abandoned. In many instances it has been relied upon to provide placeholder data and relations between variables where no official data was found, or where the trade off between greater detail and model opacity was deemed inefficient.

For example, when calculating many of the internal variables of the Bydeler, they were aggregated as discrete circular areas. For instance in calculating the internal commuting distances of inhabitants. Whilst it might be conceivably possible to tally and model the commute lengths of each inhabitant a sufficient aggregate of this was presented thus:

Publicly available data on the area of the Bydeler was taken and it's radius was taken to be an average commuting distance of those who worked inside the Bydeler. The reasoning behind this was that it was a way to relate the length of a worker's journey with the size of the Bydeler.

For this reason, population density has been viewed as a variable in much the same way that population distribution has. This will be discussed later.

The hope is that by dividing the city into its constituent Bydeler it allows for a more rigorous way to evaluate the relations between them and give a more reliable accounting of their needs relative to each other. This is also more likely to be of use to authorities in both Bergen and beyond as few if any cities are divided concentrically by authorities. Bydeler in this instance can stand for any internally demarcated boundary that is deemed relevant.

With this established, we need to look at the mechanisms by which households move from one zone to another. There are two stages to this: the technical modelling aspects of this and the human motivations behind them. The latter will be developed in 4.2.4, the former will be examined now.

4.2.2 Desirability: "The Free Movement of Peoples'

In the model, the distribution of the population is handled by the relative desirability of each Bydel - relative that is, to each other.

This desirability function is subdivided into different elements each of which is also relativised among each Bydel. These elements are as follows:

- **Affordability**
- **Crowding**
- **Services**
- **Travel convenience**
- **Jobs**

Jobs will be discussed separately as the model handles them slightly differently.

One should note that Desirability supervenes over the four subfactors. That is, I take them to be constituent aspects of desirability. By extension, these are taken to encapsulate as many of the different factors that might cause people to voluntarily move from one area to another as possible.

The model intends to account for a number of scenarios that individuals and households may face through these different elements.

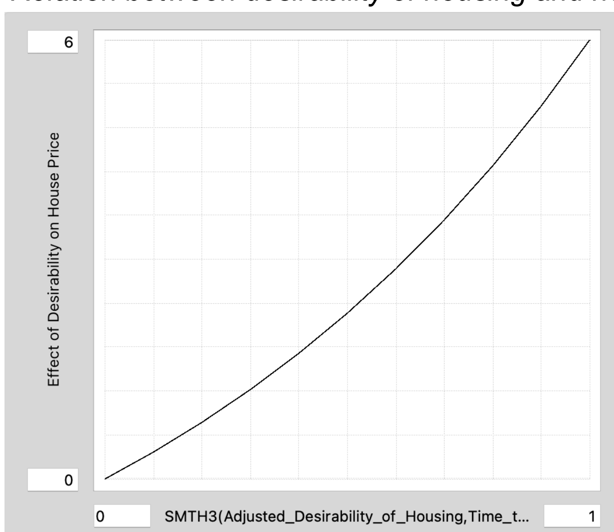
Affordability

As the number of people in an area increases, the capacity utilisation of the housing stock will increase, decreasing the available housing and increasing housing prices - effectively a balancing loop.

Whilst we are all familiar with the basic idea of supply and demand, the exact relation between population density and house prices is not a universal law that is portable across cultures, countries or even counties. Thus, aggregation is necessary.

The conceptualisation behind this was based on a number of studies, the most useful of which was Deloitte's 2017 Property Index[10]. There was also a degree of calibration to allow for closer adherence to reference modes. The end result is shown in the graph below: that there is non-linear relationship whereby a 100% increase in *relative* desirability creates a sixfold increase in house prices.

Figure 13: Relation between desirability of housing and house prices



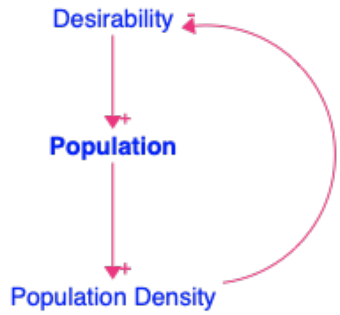
Crowding

This is essentially taken to be an increase in the population density of an area. In general, Bergen's population density is relatively low compared to notoriously highly urbanised

[10] An online version can be found here: https://www2.deloitte.com/content/dam/Deloitte/at/Documents/real-estate/at-property-index-2018.pdf

metropolitan areas around the world[11], but there are still instanstances of higher and lower density[12]. Furthermore, it is context which is most important and therefore relative density that is most likely to inform population movement patterns in Bergen.

Figure 14: Causal Loop Diagram of Housing Desirability and population Density



The simple causal loop diagram in Figure 14 above displays the following relations. At high enough levels population density and crowding will act as a deterrent to some inhabitants who will prefer to move to areas of lower population density. There are two supplementary thoughts which may need to be argued here:

- Population density is not attractive:

  It is not immediately obvious that people are attracted to low population density. In fact it is even tempting to believe the opposite given the exponential increase in population density towards the centre of many urban areas. However, what attracts people to such areas is not the population density directly, but rather the cultural and work opportunities that these areas present. This in turn causes the density to increase. So it is legitimate to presume that people are not attracted to population density prima facie.

  Additionally, these effects of population density are important enough and distinct enough that we can and should represent them separately – as we shall see in services and job availability.

- High population density is (not?) repellant:

  But as to the opposite; people being repelled by higher population density. This is again not a direct relation but rather a result of ancillary issues that follow alongside higher population density.

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[11] Official SSB figures (https://www.ssb.no/en/statbank/table/01222) indicate Bergen's population density to be around 600 people per km2 - compare this with areas of New York which reach over 5,000 people per km2 (https://www.census.gov/programs-surveys/popest/technical-documentation/research/evaluation-estimates/2020-evaluation-estimates/2010s-totals-metro-and-micro-statistical-areas.html)

[12] (https://www.ssb.no/statbank/table/10826/) For example, Bergenhus' population density is over 4000 people per km2 compared to around 100 in Arna.

> With higher population density comes increased social problems. This is not merely idle conjecture, but is something that is documented by the increase in social spending that such areas display – for instance in the paper *Population Growth, Density and the Costs of Providing Public Services*, *by Helen F. Ladd*.[13] There is also considerable debate around how population density might be correlated with negative social aspects like crime, as in *Harries, K. (2006). Property crimes and violence in United States*[14].
>
> Though it is perhaps not the clearest way to formulate it, in this sense we can take higher population density to be a proxy variable for the negative impacts of high population density. Even though it is these negative impacts, rather than population density by itself that will act as the repelling force.

Services

As the number of services in an area increases, the perceived convenience of living there increases. At the very least we can admit that services, facilities or amenities are a consideration for populations when deciding where to live. The paper *Understanding the Importance of Urban Amenities: A Case Study from Auckland by Natalie Allen (2015)* was of considerable help in the regard[15].

Services will be in more detail discussed later, but here it is intended as a near catch-all term. For instance, even the most misanthropic and isolationist of us require food, medical care, and so on. Ceteris Paribus, given the chance to live in an area with no food shops versus one with a variety from which to find the best deals and freshest ingredients, most people will choose the latter.

However, if this happens, the population in said zone will increase, again, causing it to become more crowded, less affordable and hence, less desirable. This is thus a further balancing mechanism.

Travel Convenience

Convenience, however, also encapsulates travel time and this is treated as separate to services. The rationale for this is that, when weighing up a potential place to live, people may well look at the trade off of affordability with ease of commute, or the proximity to particular services, but we will look at commute times separately to services and there are indications that proximity to light rail systems similar to the Bybanen serve to increase not just its use, but also the desirability and therefore pricing of housing in the vicinity - as noted by Gadziński and

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[13] Population Growth, Density and the Costs of Providing Public Services, by Helen F. Ladd in Urban Studies, Vol. 29, No. 2, 1992, pp. 273-295. http://www.ncsociology.org/sociationtoday/v21/review2.htm#:~:text=At%20very%20low%20density%20levels,population%20through%20lower%20service%20levels.

[14] Harries, K. (2006). Property crimes and violence in United States: An analysis of the influence of population density. *UMBC Faculty Collection*.

[15] Allen, Natalie. (2015). Understanding the Importance of Urban Amenities: A Case Study from Auckland. Buildings. 5. 85-99. 10.3390/buildings5010085.

Radzimski in *The first rapid tram line in Poland: How has it affected travel behaviours, housing choices and satisfaction, and apartment prices? (2016)*[16].

Commuting is not a place we go to pick up an item, or have an experience, it *is* an experience. Furthermore, it is typically a drudging one that we wish to avoid, or shorten - even in such scenic cities as Bergen.

By comparison, we might view affordability as a limitation on our being able to have particular items or experiences from a financial perspective. Commuting here would represent a time limitation on our ability to have particular items or experiences.

Finally, as rare as it may be, the model does not necessarily fully account for forced, or coerced relocation. That said, to a limited extent, it may in fact do so, if we view a collapse in someone's financial status as a drop in an area's affordability, relative to themselves. Again, one can say that this is a small, marginal number of cases that it is ok to ignore, but it should be noted that the phenomenon is not trivial - especially if we wish to fully account for extreme conditions testing.

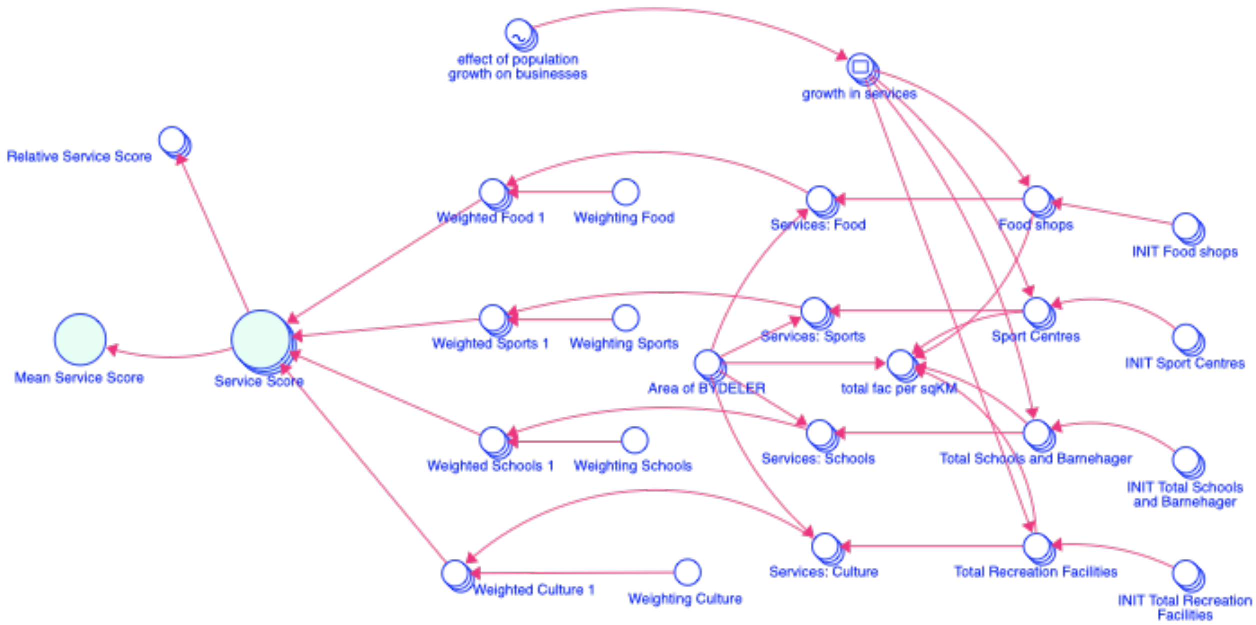
4.2.3. Services: A Closer Look

Services or facilities come in a number of different shapes and sizes. Here they have been categorised under four general headings:

- Food shops
- Sports
- Schools
- Recreation

Figure 15: Isolated Model Structure of Services

[16] Jędrzej Gadziński, Adam Radzimski,
The first rapid tram line in Poland: How has it affected travel behaviours, housing choices and satisfaction, and apartment prices?,
Journal of Transport Geography,
Volume 54,
2016,
Pages 451-463,
ISSN 0966-6923,
https://doi.org/10.1016/j.jtrangeo.2015.11.001.
(https://www.sciencedirect.com/science/article/pii/S0966692315002033)



The model structure above shows how these are then weighted both by area and by user preference. In the first instance this is to ensure that the distribution of services is taken into account. It is not how many services an area has that matters for our purposes so much as the *service density.* This gives a more intuitive feel for how convenient it is to access services in an area. In this sense the model and the thinking behind it is not too dissimilar from projects like *Fisher, Pollakowski and Zabel; Amenity-based housing affordability indexes (2009)*[17] which sought to find a new schema for affordability which encapsulated factors like schooling, population density and employment among others.

Importantly, the model also allows for us to weigh the relative importance of these services. This is for a number of reasons:

- Greater interactivity in the model which allows for third parties to test intuitions and hypotheses.
- People may well value different services differently. We may find that schools are less important to households than ease of food shopping when it comes to deciding where to live.
- Future proofing: Discussion on how to improve the model will be left to later chapters but this is perhaps the first stage in including potential *demographic* impacts on population movement - perhaps via arrays.
- By having multiple weights, we increase the complexity of the model. But importantly this also allows scope for calibration using Stella's in built capabilities as well.

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[17] Fisher, L. M., Pollakowski, H. O., & Zabel, J. (2009). Amenity-based housing affordability indexes. *Real Estate Economics*, *37*(4), 705-746.

Food Shops

Previously, the example of food shops was given to explore the meaning of 'services' in the model. However, as stated, 'services' is intended to be a much broader term, encapsulating a range of different human wants and needs. Because these are themselves so broad and varied, no list is likely to be wholly exhaustive, and the best it can aspire to here is perhaps to be exhausting.

To avoid confusion and potential misuse of terminology, the words 'services' or 'facilities' have been intentionally used to differentiate this from the term 'amenities' which is often found in the relevant literature. It seems that amenities are particularly difficult to narrow down into a conclusive list - though there are obviously cases of significant overlap. There is even discussion of negative amenities such as pollution or lack of access to forrest[18] such as in *Li, Wei, Yu, and Tian, Amenity, accessibility and housing values in metropolitan USA (2016)*. For comparison, the closest thing to negative amenities in this model would be the proxy measure of crowding.

However, perhaps the least controversial element to include here would seem to be food amenities of the type mentioned above. To this I would add ancillary shopping facilities such as pharmacies and a small selection of different local stores - though these take a lower precedence overall than food.

Sports

Norwegian society in particular lays greater stress on exercise and sports facilities than others. In fact, in the Kommune's Kommuneplanens arealdel 2018[19], they are some of the only amenities explicitly singled out as planning priorities[20] with others merely listed as 'tjenester' or 'services.' Given their specific cultural importance - and their interaction with other facilities it was felt that these should be modelled separately.

Schools

Family services are also to be considered if we are to group them under the general heading of 'social factors.' For these I take it to mean chiefly schools for dependent children. There have

[18] Han Li, Yehua Dennis Wei, Zhou Yu, Guang Tian,
Amenity, accessibility and housing values in metropolitan USA: A study of Salt Lake County, Utah,
Cities,
Volume 59,
2016,
Pages 113-125,
ISSN 0264-2751,
https://doi.org/10.1016/j.cities.2016.07.001.
(https://www.sciencedirect.com/science/article/pii/S0264275116302888)

[19] https://www.bergen.kommune.no/hvaskjer/tema/kommuneplanens-arealdel-2018

[20] Alongside graveyards curiously - if my translation skills are not too lacking. Whilst these are important parts of human life (or rather, death), I take it to be intuitive that people are not highly motivated to change their nightly resting place on the basis of their intended eternal resting place.

been various studies that show the effect that school *quality* can have on house prices - which can be taken as somewhat of a proxy for ‘desirability’ in literature outside this model. For example *Black “Do Better Schools Matter?” (1999)*[21] found that a 5% increase in primary schools’ test scores might lead to a 2.1% increase in housing prices. Given the added complications involved in assessing school quality across multiple age ranges it was decided to substitute quantity as this was a) more immediately measurable and b) indicative, or a potential proxy of a variety of other related services in the area.

There are 240 Barnehage in Bergen, seemingly fairly equally distributed amongst the Bydeler of the city[22]. Given the differing population distribution among the different areas of Bergen, this implies potential disparities in their distribution among the population.

There are around 85 schools for older children in Bergen. These are again roughly evenly distributed among the Bydeler[23]. Universities present a different prospect. Many students will choose to leave their hometown in order to experience university level education in a new locale - again, something not out of line with Niedomysl’s 2011 findings. However, this will remove them from the system and as such we may disregard them for the purposes of this study. Generally speaking, those university students in Bergen will be treated as other households, their ‘commute’ and ‘employment’ being lumped in with other inhabitants’. This is done with the proviso that Bergen’s student population is considerable, and this may itself create issues with the model to be resolved.

Recreation Facilities

Recreation facilities are probably the closest category to ‘miscellaneous’ here, at status which conceals their potential significance. What should be less up for debate is that recreation facilities are a driver of in-migration - even if defining them is notoriously difficult. *Ulrich-Schad, in Recreational amenities, rural migration patterns, and the Great Recession (2015)* examines the effect of recreation amenities on migration in the US finding that even in rural areas, they are clearly a draw[24].But as literature like this indicates, definition of what counts as a recreation facility can be problematic enough. Then, once decided, a count of said facilities can be just as difficult. Thus a proxy was needed. As an indicator value, a count of galleries was made. This is again not an uncontroversial choice, but once that is justified thus:

The service needed to be easily countable and for this, it must be highly visible and easily searchable. A comprehensive count of every bar, restaurant and music venue would have been far more difficult to achieve. It would also have its own issues aside from what exactly counts as

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[21] Black, S. (1999). “Do Better Schools Matter? Parental Valuation of Elementary Education”. Quarterly Journal of Economics, 114(2):577–599

[22] https://www.bergen.kommune.no/omkommunen/avdelinger/barnehager - though it is worth nothing that while most areas have around 30 Barhage, Arna has only 10.

[23] https://www.bergen.kommune.no/omkommunen/avdelinger/skoler

[24] Ulrich-Schad, J. D. (2015). Recreational amenities, rural migration patterns, and the Great Recession. Population and Environment, 37(2), 157-180.

a recreational, or cultural venue? What if they are only temporary or have since been shut down from underuse?

Galleries are few enough in number that they are easily counted, and are more often than not a stable cultural entity, seldom moving or shutting down. They are also frequented by a broader demographic range from school children up to retirees - as opposed to dance halls which might only be popular with particular age ranges.

Choosing galleries for this purpose does leave one open to accusations of cultural favouritism or even elitism. Both are legitimate concerns. To the first, I would counter that any choice will fall afoul of this criticism and that perhaps for other cities, a different reference point might be more appropriate. To the latter I would respond with: 'yes.' To a certain extent, this is even desirable.

The thinking here is that something like a gallery in a community represents the visible surface of a much larger iceberg underneath. If an area the size of a Bydel has a gallery, it is highly likely to have a number of other cultural and recreational facilities in addition - either as more or less direct tributaries of the gallery, such as gift shops and cafes or wholly distinct from it, such as music venues, arcades, parks or cinemas. In any event, galleries can themselves range from small, community-run affairs to national, state-sponsored giants, so there is still considerable room for interpretation as to what constitutes a 'gallery'. To more fully represent this aspect, and also to avoid mathematical errors associated with a zero value, Bydeler without a gallery were upgraded to having a count of 'one' - thereby allowing their numbers to grow, even if only nominally, in tandem with population.

Finally, transport itself may be considered a service, though given its central role in this thesis it deserves a more in-depth conceptualisation than the aforementioned.

4.2.4. Jobs: A Closer Look

Along with services, jobs require perhaps a little more detail than some of the above factors. Jobs are clearly important and there is debate as to whether jobs or amenities have the greater effect in spurring migration. For example *Greenwood and Hunt,* in *Jobs versus amenities in the analysis of metropolitan migration (1989)*, count them as a higher priority in migration than amenities[25]. Again, the structure of the model is such that it can allow users to stipulate their own weighting to these various factors, but given the importance attached to jobs, this was perhaps the most complex aspect of the model. Ultimately a conceptualisation was used that

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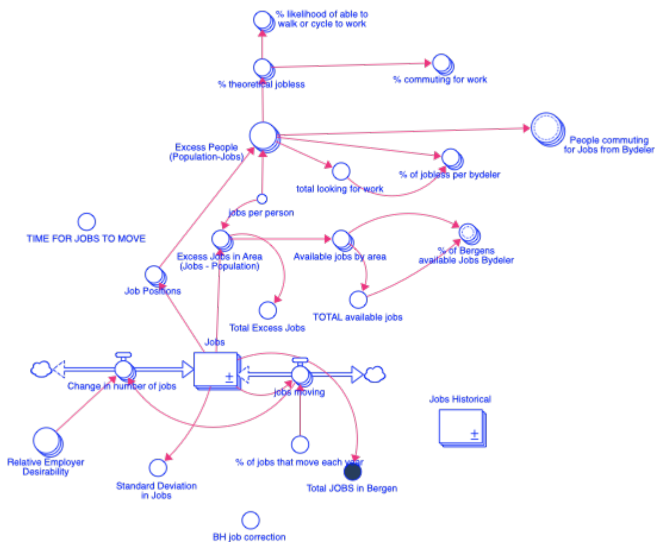
[25] Michael J. Greenwood, Gary L. Hunt,
Jobs versus amenities in the analysis of metropolitan migration,
Journal of Urban Economics,
Volume 25, Issue 1,
1989,
Pages 1-16,
ISSN 0094-1190,
https://doi.org/10.1016/0094-1190(89)90040-5.
(https://www.sciencedirect.com/science/article/pii/0094119089900405)

relied on Stella's calibration capabilities relative to statistical data on population movement data from SSB - as will be discussed later.

Figure 16: Isolated model structure of jobs



The model is not designed to endogenise economic growth as this is subject to so many factors outside the control of the inhabitants and authorities of the Bydeler - anything from normal growth cycles to widespread internally triggered economic downturn.

Because of this, a decision was made to link jobs and population growth in a 1-1 relation. This effectively entails that there is a job available to everyone in Bergen and makes no distinctions between the skill level or education required for jobs as this is outside the purview of this study.

A central idea is that jobs will not necessarily be evenly allocated across Bydeler and because of this, there will be a balancing mechanism created. All other things being equal, workers will move from an area of low job availability to higher job availability.

So, people are attracted to jobs. So far so good. But how are jobs allocated among the Bydeler?

Businesses and employers are roughly taken to be motivated by the same things as their employees, though perhaps in different ways and to different extents. Separate weightings are also for employer's preferences, though the conceptualisation is slightly different.

- **Affordability.**
  For example, employers are just as likely to be price conscious about where they locate as people are. In this sense, the price of housing is a reasonable enough indicator of general property prices in an area for commercial spaces as well.

- **Services:**
  Services are also likely to be a consideration when moving offices or hiring staff. For instance, in *Bringing business clusters into the mainstream of economic development (1997)*, Rosenfeld notes that business clusters require the support of local *social*

infrastructure to start and maintain their growth[26]. All other things being equal, would a company prefer to be located near to where their employees can access food and health facilities? Would they prefer to invest in hiring new staff in an area with other businesses and potential B2B customers or one that is isolated? Tech companies for instance are well known to cluster together.

- **Travel Convenience:**
  Travel is another significant factor behind office location. Many companies choose to locate themselves centrally in urban areas because it is presumed (among other things) that this will offer the easiest access to transportation for staff who may be located in disparate parts of the city. A central location allows for a way to balance the needs and travel inconvenience of said staff as fairly, evenly and/or consistently as possible.

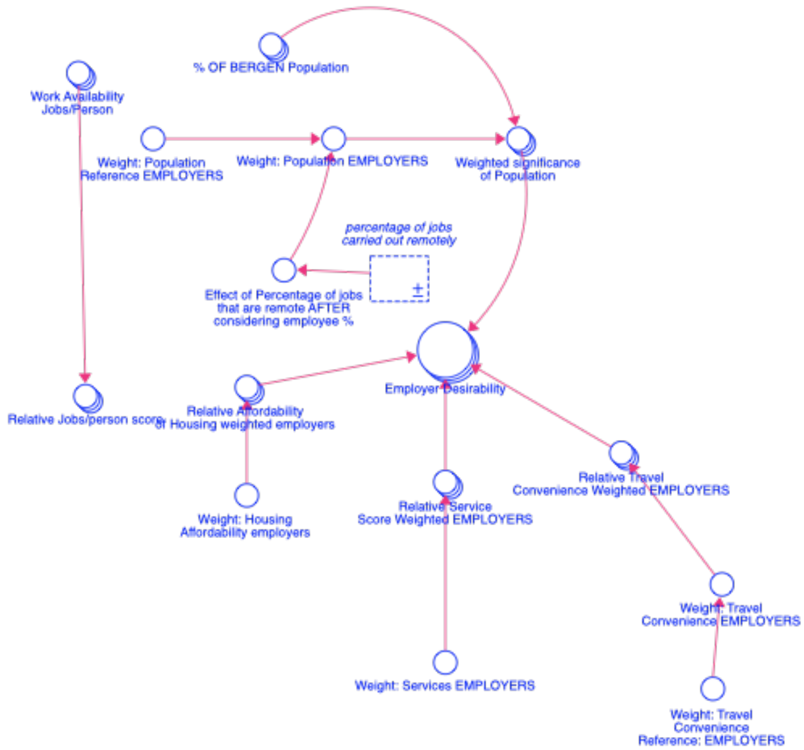
- **Population:**
  A central location will also more often than not offer the easiest access to another resource: people. This means both in terms of potential staff and potential clients and customers. Again, Rosenfeld notes that rural areas - with low population densities - lack the scale to support business clusters. Whilst we should not dwell too much on the concept of the 'business cluster,' it is worth digressing briefly to say that these are more likely to be smaller, or newer firms. It has been established that smaller firms are responsible for more job creation than larger ones - for example in the report *Do SMEs create more and better jobs?* by *de Kok, Vroonhof, Verhoeven, Timmermans, Kwaak, Snijders, and Westhof (2011).*[27] These types of firms are typically more mobile as well, though the model conceptualisation is not meant to exclude larger firms.

  This is the only aspect where a Bydel's *employer* desirability significantly differs from a Bydel's *employee* desirability.

Figure 17: Isolated Desirability structure for Employers

[26] Rosenfeld, S. A. (1997). Bringing business clusters into the mainstream of economic development. *European planning studies*, *5*(1), 3-23.

[27] Jan de Kok, Paul Vroonhof Wim Verhoeven, Niek Timmermans Ton Kwaak, Jacqueline Snijders Florieke Westhof: Do SMEs create more and better jobs? https://ec.europa.eu/growth/sites/default/files/docs/body/do-smes-create-more-and-better-jobs_en.pdf



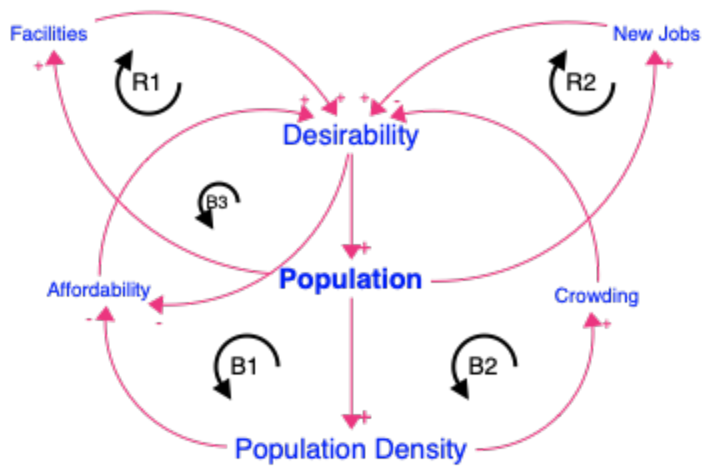
For employers, there is no such reticence to be located in high population areas, quite the opposite. They also have no qualms about population density. The only consideration may be a demographic one as certain business may decide to locate nearer to their intended customer demographic[28] but this is a level of complexity too far for this particular study.

However, employers may have a reluctance to be located in excessively expensive areas for fear of rents impacting profits. Thus there is scope for an area's high population - and therefore high population density - negatively impacting employment opportunities via an increase in housing prices. So there is an (admittedly weak) balancing mechanism at play even here.

4.2.5 Further Conclusions

Figure 18: Causal Loop Diagram of the Major relations in people's desire to move

[28] I take this as being obvious enough by itself. There is a reason why high street betting shops and payday loan companies are located more frequently in poorer areas whilst artisan and high price boutiques compete for space near luxury apartments.



The above CLD displays most of the key loops affecting the desirability of an area in the model and consists of a number of loops explicated below. Travel convenience is also a factor but this is a slightly separate issue to be dealt with in the next section. As we can see, it is a mix of both balancing and reinforcing loops. The hope is that these seem intuitive, yet not something that we are conscious of in our everyday thinking. They are all relations that would behove city planners to have at the forefront of their minds.

As an area's population increases so does its population density (as it's area cannot). This increase in population density results in fewer houses and there reduces affordability whilst increasing crowding[29]. Both of these serve to decrease desirability and are thereby balancing loops (B1 and B2) for population as now fewer people will move to the area.

However, with a higher population, more facilities and services are needed. They are also more likely to be located there as there is either a voting public to demand them or a consumer base to buy them. New jobs then flow into the area as there is the population and services to facilitate them. These are then the reinforcing loops R1 and R2 that compete with B1 and B2. As an aside, B3 represents market forces - that desirability alone is enough to make any commodity more expensive.

The strength of each loop is subject to circumstance, yet the speed of them is something that we can comment on with a little more certainty. Generally speaking, in most cities, the balancing loops will act faster than the reinforcing ones. Markets are quite responsive to demand and without intervention, house and rental prices can increase well out of reach of many[30].

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[29] New houses may be built, but these are done so much more slowly that populations are typically able to move.

[30] "Barriers to homeownership are particularly high in London where – even with a 10% deposit – only one-in-three young adults could borrow enough to purchase one of the cheapest homes in their local area. Back in 1996, if they had borrowed 4½ times their salary, 90% of young adults in London could have done so." https://ifs.org.uk/publications/13471

Likewise, crowding can be quite reactive and there is an interesting interplay between B2 and R1. Further research can examine this link in more detail, but in some senses, we may describe crowding as the inability of services to cater to populations appropriately, or in the way that said populations expect. Hence it is the fact that populations and therefore crowding can increase faster than service capacity can be increased to deal with it. Let us give a trivialised example.

A cinema in an area can seat 50 people but is only ever 50% full, seating 25 people in each showing As such word spreads of the available seating, extra lounging and slouching ability and so on. Were the population to increase such that now 35 or 40 people turn up, this would not be a serious crowding issue, though long-time regulars might bemoan the new arrivals. If however, the population were to increase drastically - perhaps as the result of a large company locating its new headquarters in the area causing more people to move within easy commuting distance - then there would be no correlatively fast way to increase capacity at the cinema. People would begin going to the cinema from the moment they move into an area, whereas the cinema cannot simply add more seats to an already packed room. More floors would need to be added, perhaps extra land purchased, planning permission approved, construction would inevitably be delayed and so on.

Again, this is a rather trivial example, and one can poke holes wherever one sees fit, but the core points remain: populations if they are mobile and typically faster than the support apparatus that they rely on. It does not take a huge leap in imagination to see the problems when we extend this thinking to larger populations and say social services or government-funded infrastructure.

Relatives vs Absolutes

We can also see that there is an interesting interplay between relative values and absolutes in the loops. Both the reinforcing loops can be seen in somewhat concrete terms: there is a countable number of facilities (provided we are thorough enough in our definitions of them) and there is a countable number of jobs (leaving aside issues of unpaid, or undisclosed work).

However, even if we take into account ratios such as the Sykeplier index[31] or various Deloitte[32] accounting methods, 'affordability' is much more grey area. It is also culturally affected - with different populations and demographics willing to take on different levels of financial sacrifice or debt for a given good. This is even more so with 'Crowding' as the precise needs of populations can vary widely and the extent to which they can tolerate these needs not being met will vary depending on the need and depending on the population.

Exceptions and 'Just Deserts'

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31 A measure of affordability of housing in Norway - normalised to a "typical" nurse's wages. https://eiendomnorge.no/aktuelt/blogg/sykepleierindeksen-h1-2020

32 https://www2.deloitte.com/content/dam/Deloitte/at/Documents/real-estate/at-property-index-2018.pdf

It should be noted that there are interesting counterexamples to these loops which indicate that there may be more complex issues at play. Though they may perhaps be limited to more extreme cases, there are still worthy points to be made here.

There are examples of extreme crowding where the urban population continues to increase: Tokyo, Manila, Mumbai or Mexico City to name just a few.

There are also examples of areas with low population density which are extremely expensive. For example, the oftentimes near-abandoned, stately and aristocratic homes in various parts of London[33].

One might think of this as a case where the population density and crowding has become so low that it completely overpowers other loops, but yet it seems like this cannot be the whole story. If this was the case, then Antarctica, with its low population density would be the most expensive and desirable place on Earth (although given the prohibitive cost of South Pole construction and the state of humanity in 2021, perhaps it should be).

This may point to some sort of deficit in the model conceptualisation of facilities that is difficult to point to. For instance, it may be that in cases of extreme wealth, services and facilities become private and therefore internalised. To take our fictional cinema example a step further, it may be that a mansion in an exclusive area contains a cinema in its basement.

However, perhaps the most likely explanation is that certain areas simply have an allure that defies easy or systematic categorisation. This might be their historical significance, cultural heritage, proximity to the government in the case of capital cities, or simply being considered a 'trendy' place to live. These are factors that can only be partly encapsulated by the model. Though they might be special or marginal cases they are still significant and a reminder that humans are not wholly rational actors who will slavishly follow researchers' decisions rules, no matter how logical.

Intervention Points

Nevertheless, the model and the above CLD still have merit. They can for instance direct authorities to potential points of influence and precautionary measures.

Depending on the authorities' taste for market intervention, Affordability and Crowding could be accelerated or decelerated by things like rent caps, stamp duty - taxes on house sales, legislation on living standards, or by direct investment in housing schemes both public and private. Likewise when granting planning permission for either offices or housing it would be prudent to plan ahead for the level of services required and be mindful of the delays inherent in creating ancillary infrastructure.

Alternatively, this could lead to new ways of thinking. Homeworking is perhaps one potential reaction to some of these forces as workers try to balance their housing and service wants

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[33] For example, the infamous 'Billionaires Row': https://www.forbes.com/sites/emanuelemidolo/2019/08/20/ghost-house-on-londons-billionaires-row-sells-for-20m/?sh=4d6717da423a

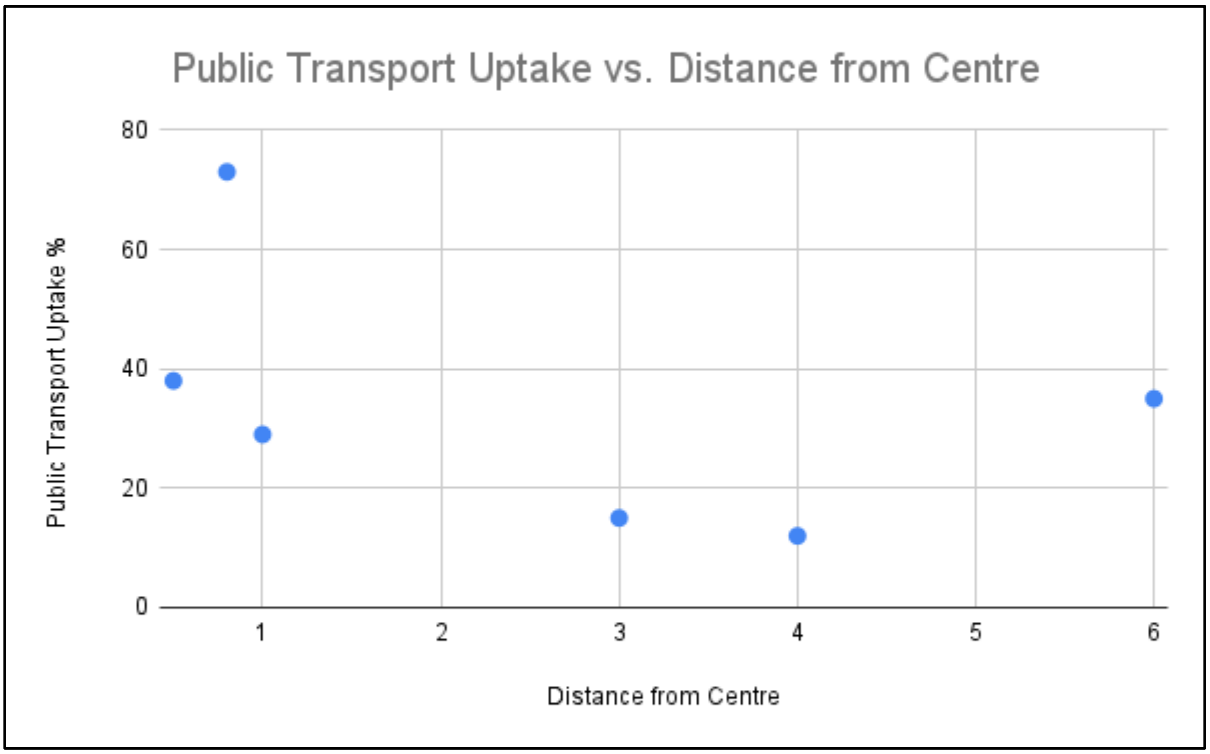
against travel commitments and affordability. Service provision might be the easiest of intervention points. Perhaps there might be others: online or mobile services - such as for example video GP appointments - could help deliver services faster, helping to ease short term crowding.

4.3 Unifying Transport and Housing

4.3.1 Relation Between Distance and Transport Mode

The following chart is an excerpt of data from the paper *"Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike - Ray Pritchard and Yngve Frøyen[34]"*.

Figure 19: Public Transport uptake and distance using data from Pritchard and Frøyen



The paper examines commuting from a more concentric point of view of city planning, looking at how changes in office locations affected travel mode habits. Whilst the paper does not directly deal with the relation between population centre and work, given that in all the cities it deals with the population is more dense and numerous in the centre, we can make a fair assumption that a move towards the centre is likely to mean a move towards more of the employees' homes.

[34] Pritchard, R., Frøyen, Y. Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike. Eur. Transp. Res. Rev. 11, 14 (2019). https://doi.org/10.1186/s12544-019-0348-6

Pritchard and Frøyen themselves reference a number of similar studies - and these populate the data in their own models. The data was not entirely complete so some reverse engineering has been made. Essentially, only 3 of the offices examined listed both the distance before and after their move (others simply showed the change in distance) - thus the data set is admittedly limited. That said, they do appear to show a potential non-linear relation between the percentage of employees using public transport and their commute distance that can be tested.

Whilst the COVID-19 pandemic has undoubtedly been disruptive, it has also revealed a potential lateral thinking solution to the issues of transport.

Most modelling of transport systems and reforms will seek to adjust endogenous variables within the system in order to modify behaviour. Doing so effectively adjusts loop dominance in the various feedback loops that occur in the system - whether this is done on the basis of specific analysis or through some alternative conceptualisation.

The contention of this study was to examine whether there were real dividends to be reaped from more radical interruption of the system. There is a real possibility that the implementation of policies like Mini-Hubs and homeworking has the potential to be far more effective in reducing direct emissions from transport than many of the strategies named in the Grønn Strategi[35].

4.3.2 Road Network Capacity

Carrying capacity - or the overuse of it is often one of the more effective ways to limit behaviour. However, indications are that whilst this might be effect (if not the most popularity-gathering) policy in Bergen, the city's traffic network seems larger sufficient for the time being[36]. This made the calibration of an inflection point in the traffic density and the carrying capacity of the road network significantly harder to calculate and normalise to. Whilst extremely open to criticism, a proxy was chosen using SSB statistics on traffic density[37]. Road traffic volumes over-all peaked

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[35] This is not to say that this will not merely cause a shift to emissions from other areas - such as household energy consumption from homeworkers.

[36] Jon Inge Lian,
The Oslo and Bergen toll rings and road-building investment – Effect on traffic development and congestion,
Journal of Transport Geography,
Volume 16, Issue 3,
2008,
Pages 174-181,
ISSN 0966-6923,
https://doi.org/10.1016/j.jtrangeo.2007.08.004.
(https://www.sciencedirect.com/science/article/pii/S0966692307000865)

[37] The closest thing to an inflection point in the traffic density data from SSB indicates that it hit a max in 2007, decreasing after. In the absence of better data this is assumed as a proxy for the density at which people are turn-off of road travel.

in several years, the first being 2009. After this, passenger car traffic decreases consistently. In the absence of more appropriate data this has been deemed an indicator of maximum traffic volume.

Whilst this historical behaviour is more likely down to say, petrol prices or other phenomena it does indicate the largest amount of traffic that Bergen's road network has thus far seen, thus if traffic volumes increase about the 2009 level it is likely to be at the very least noticeable to the city's commuters and impact their decision making, causing them to be more reticent to travel on the cities roads either by bus or by private car.

4.3.3 Bybanen Capacity

If we are to model the road network capacity, even approximately, consistency dictates that we should do the same for the Byban. Here statistics on capacity were a little more forthcoming.

Official estimations from Skyss and SSB indicate that the Byban has between 40 000 and 60 000 passengers registered as using the network each day. When we look at the stated capacity of each Byban carriage, and the number of departures each day, we can more accurately see the typical capacity utilisation of the network.

Historically the Byban has run at approximately 30% capacity when aggregated over a year. Whilst this may seem low, it is actually in line with many other public transport systems[38] and takes into account peak demand during commuting hours. With a higher capacity utilisation the Byban will become less attractive to commuters. In fact most literature states that capacity utilisation and passenger load factors are likely the most important factors that passengers use to assess their travel preferences in relation to public transport. A nonlinear curve was used as this seemed to best represent commuter behaviour. The exact nature of this relation is likely contingent on local culture and the presence of alternatives, so it is hard to present a one-size fits all relation.

Additionally, the Byban is currently subject to two further stages of expansion. The first of these is due to be completed around 2022/23 and will extend availability of services to Fyllingsdalen. The second of these expansions is due around ten years later and will add Åsane to the list of Bydeler with a Byban connection. Both of these have been accounted for in the model by using a time-triggered step function to 'allow' commuters to weigh up the choice between their previous transport modes and the newly accessible Byban.

Such expansions will also have the capability of adding to the capacity of the network - provided it is properly supported. It was heartening to see that a relatively accurate prediction of required (and actual) Byban tram purchases for the 2022 expansion was possible using the model.

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[38] This is not unusual as it leaves space for peak hour demand. https://www.centreforcities.org/reader/getting-moving/what-role-does-transport-play-in-densifying-city-centres/ Also: https://www.researchgate.net/publication/337120268_Standardization_of_the_capacity_utilization_factor_of_urban_public_transport_fleet

4.3.4 What a Trip

Something which will become very significant in the next sections and when looking at results is the multiple interpretations of the seemingly innocuous word 'trip.' In theory the concept is simple enough, we all know what it means, surely?

In reality there is significant overlap and obfuscation in regards to the terms 'trip, passenger, tickets,' and so on. An example will help to illustrate this.

The TØI travel survey indicated that people take on average 3.26 trips per day[39]. However when people respond to such surveys they view both the outgoing and return journeys as constituting parts of the same single trip. Additionally, there is no necessary or universal time demarcation between the two. A trip to pick up a parcel from a drop off point is one trip, a 3 week holiday to Barbados is one trip. However each of these may consist of multiple different phases. The holiday requires a car drive to the airport, perhaps an internal shuttle bus, and the flight itself. In the same vein a seemingly simple trip to a service or a commute might consist of multiple different buses, or a combination of Byban, bus and walking.

Most publicly available data on the other hand will involve some kind of official tallying procedures. Skyss has indeed released reports on the various methods that can be used to do this and has in fact refined it over the years[40]. These typically involve using the description 'passengers' but these correspond to bodies on a bus or tickets purchased. They make no distinction as to whether this body is on it's first bus of a 3-mode one-way trip or on it's return journey of a simple, single-Byban commute. Short of prohibitively extensive surveying or surveillance, there is currently no way for this paper to track these - at least, not feasibly.

With this a certain amount of estimation, investigation and common sense calculation is necessary to make results align intuitively - and these will have to vary on a case by case basis. This will be examined further in 5.1.2.

For the most part the model has attempted to balance these two notions of the word 'trip.' It does so in a way that regards an outbound and return commute as two discrete trips. However, the model construction dictates that only one transport mode can be attributed to each of these trips. Thus the theoretical underpinning of the model dictates that the main transport mode is the one that will be recorded. Thus it is expected that it will under-represent public transport modes to a certain degree. This is most likely in the case of buses as opposed to Byban. The Byban currently has only one line available so whilst there is little to no scope for switching from one 'line' to another.

4.3.5 Active Travel: Walking and Cycling

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[39] https://www.toi.no/publications/2013-14-national-travel-survey-key-results-article32972-29.html

[40] For example see the 2013 report from COWI: https://www.skyss.no/globalassets/strategiar-og-fagstoff/fagrapportar-og-utgreiingar/2015/rapport-passasjertelling-bybanen-2013-endelig.pdf

As a final point it is worth noting a culturally significant factor specific to Norway and Bergen that may skew results. The relation between a commute distance and whether someone chooses to walk or cycle has been mapped out as academically rigorously as possible given the literature available and the need to calibrate the model to reproduce reference behaviour. It is nevertheless likely that walking and cycling will be overrepresented in results.

This is for the reasons already mentioned but also because surveying such as TØI's travel survey may not make sufficiently the difference between walking/cycling as a mode of transport to something or somewhere and as an activity in and of itself. The former is within the scope of this paper, the latter is not. However, this distinction is unlikely to have been in the forefront of respondents in 2014.

Given the notoriously wet weather of the Vestland region it is likely that predispositions towards cycling as a commute method will be reduced, even in comparison to Oslo - the source of the relation information.

Tangentially related to this is new disruptions to the transport sector. The increase in the number of rentable electric scooters in the centre of Bergen may seem trivial, but their success is anything but. These only appeared in 2020 so no statistical data is yet available on them. Even categorising them could prove contentious. Whilst they may prove to be a short lived fad, there is also the possibility for them to become a statistically significant travel modality.

4.4 Model Validation

Whilst model validation has been looked at to some degree in the preceding sections - and will be touched on in following sections - there remains some discussion to be had here.

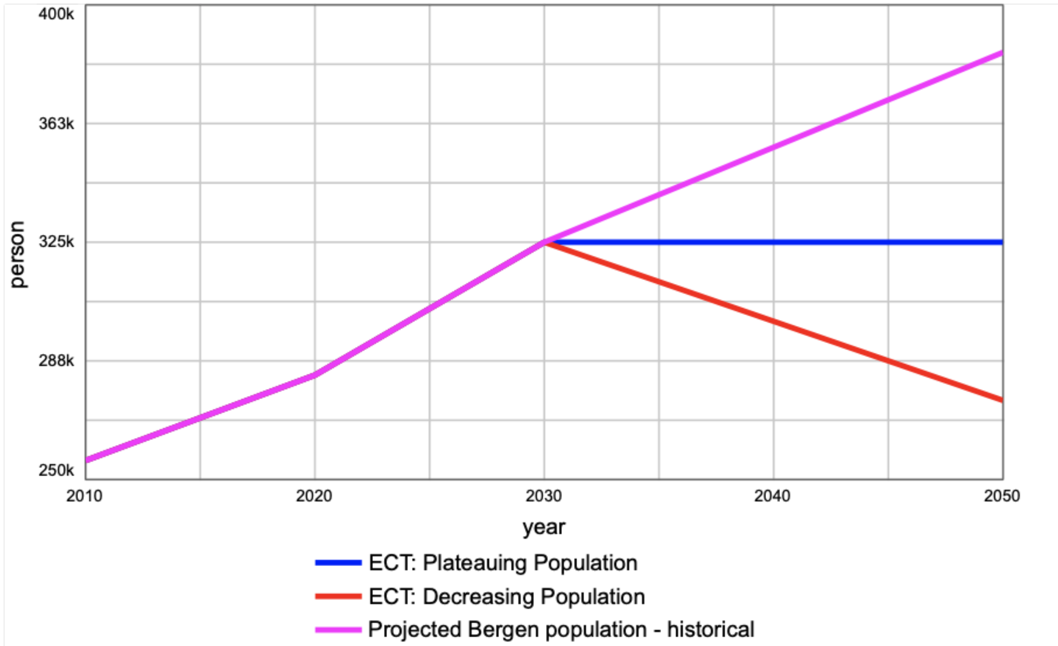
There are a number of tests that we can subject the model to. Perhaps the most widely recognised are those proposed by *Yaman Barlas* in *"Formal aspects of model validity and validation in system dynamics (1996)."*[41] In addition to material covered in previous chapters, what follows should give a more complete overview of structural, parameter and behavioural testing.

4.4.1 Population

Perhaps one of the first things that we can do to look at model validity is examine behaviour under different population projections. The graph below displays the populations used for the different test runs with the population variously decreasing, plateauing, or continuing to increase from 2030 - the last of these is the reference mode as it uses official projections from the Kommune's Grønn Strategi.

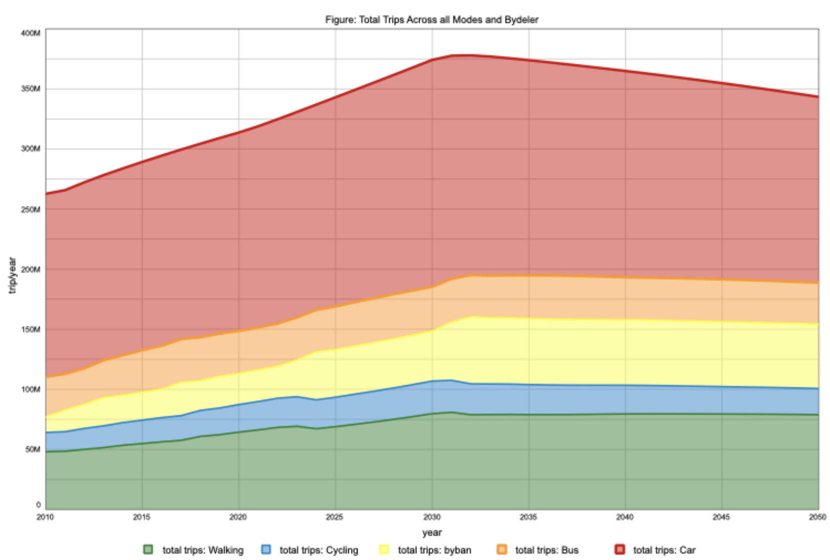
[41] Barlas, Y. (1996). Formal aspects of model validity and validation in system dynamics. System Dynamics Review: The Journal of the System Dynamics Society, 12(3), 183-210. https://onlinelibrary.wiley.com/doi/10.1002/(SICI)1099-1727(199623)12:3%3C183::AID-SDR103%3E3.0.CO;2-4

Figure 20: Population Projections for different Extreme Conditions Test Runs



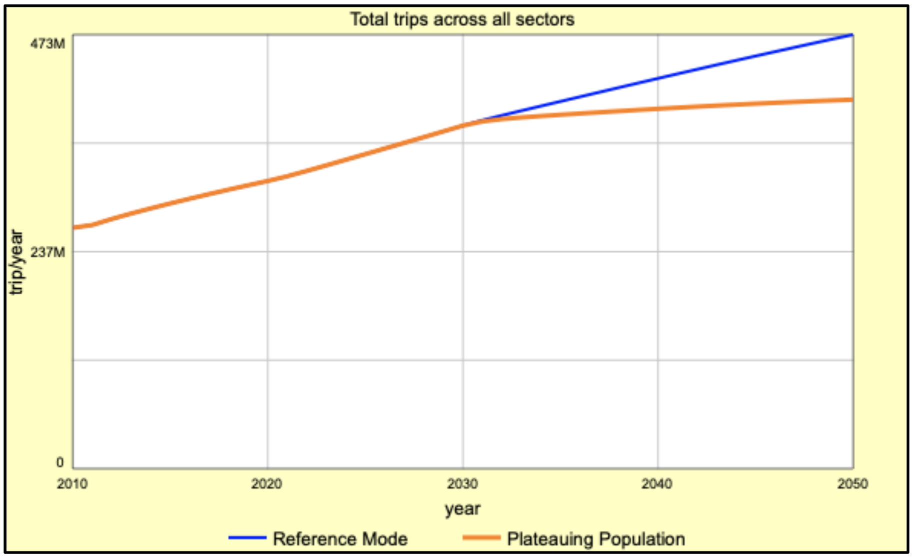
We would expect trip numbers to follow along the same lines as population as - without homeworking - the number of trips per person remains constant. If we look at total trips in the case of a decreasing population in the graph below, we see that this situation holds:

Figure 21: Total Trips across all Transport Modes: Population Decreasing



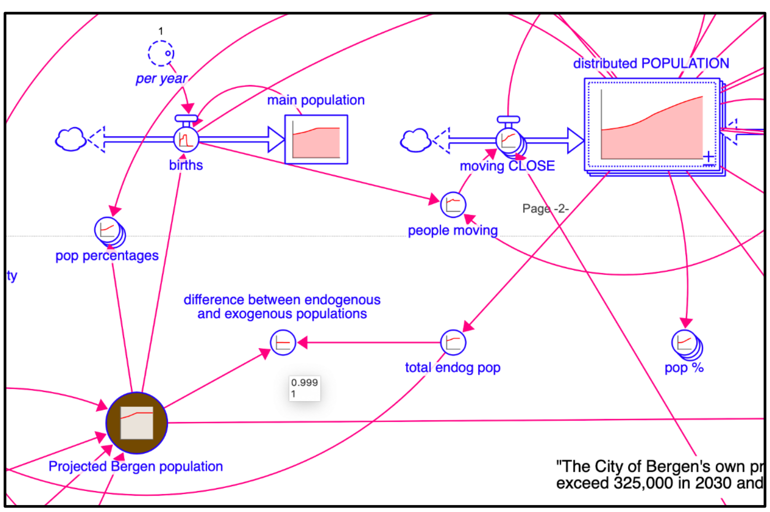
There is a slight complication if we look at plateauing population. Here we see that trips actual increase though at a very decreased pace.

Figure 22: Total Trips across all Transport Modes: Population Plateauing



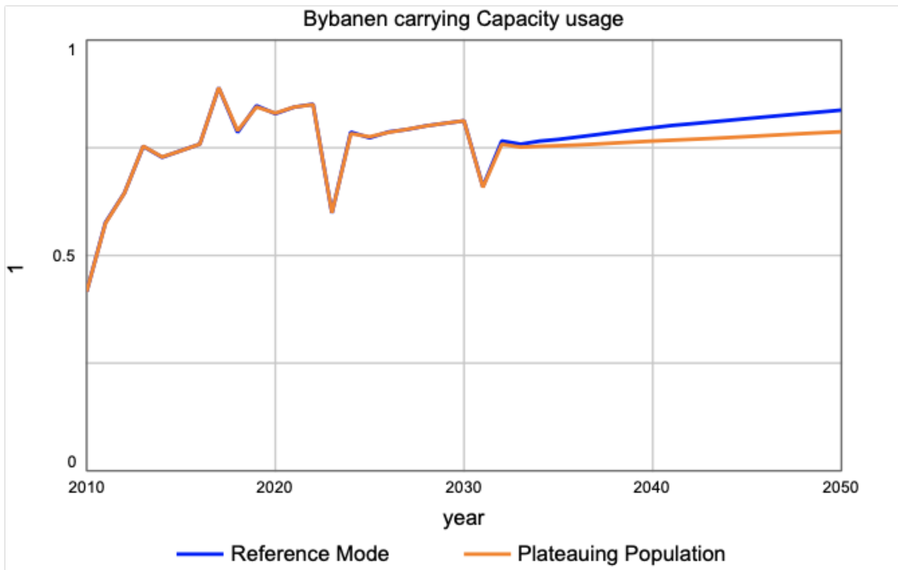
This is due to a technicality in the population sector. Because of the need to separate the population into separate stocks in order to calculate the distribution of people among the Bydeler, there is a minor difference between the projected population and the model's population. This is only small - less than 1 thousandth of a percent, it is enough that trips do not show as completely flat in line with the population. For the purposes of this study, this was deemed an acceptable margin of error for the trade off of being able to more simply calculate population distributions and other variables.

Figure 23: Close up of model Population structure with percentage difference between populations highlighted.



As might be expected a lower population produces favourable travel mode results. This is due to the fact that with fewer people there is an across-the-board percentage drop in total trips. Thus, as the largest trip mode, Car Trips are reduced most, percentage wise. Ancillary to this is the fact that with fewer people and fewer trips, public transport capacity (as shown in the graph below) is lower making it a more attractive prospect for the commuters who remain.

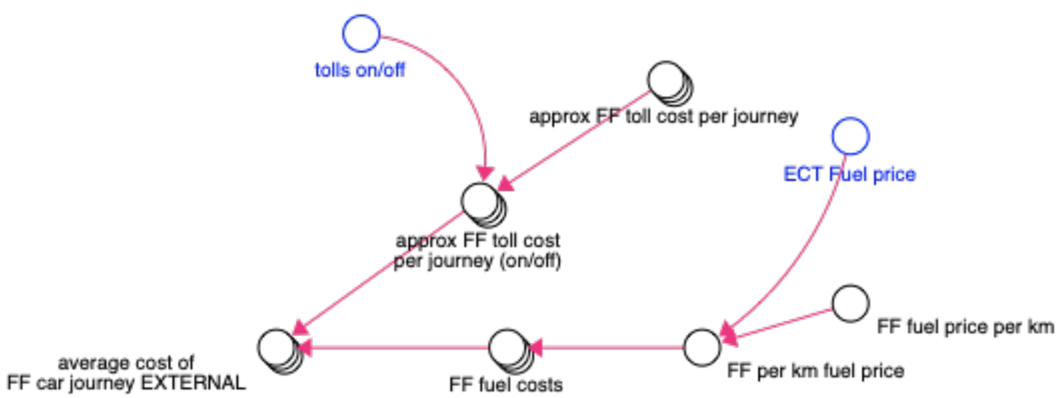
Figure 24: Bybanen Capacity Usage Reference Population and Plateauing Population Compared



4.4.2 Fuel Pricing

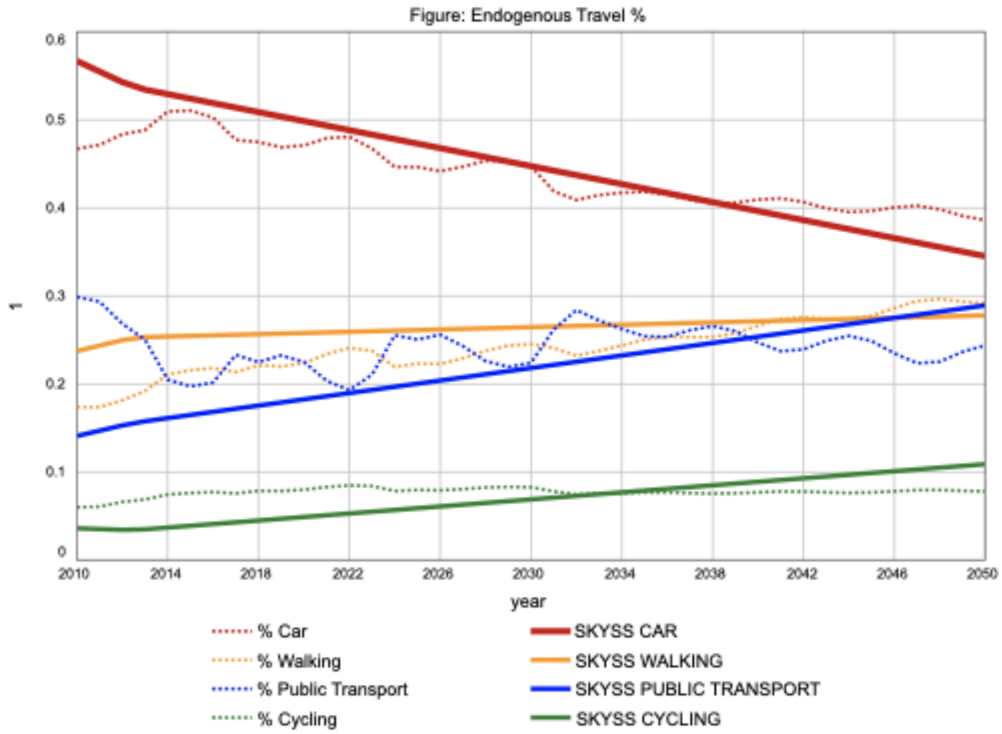
We can also examine the consequences of extreme rises in fuel prices for fossil fuel vehicles. Such incidents are not impossible given fluctuations in worldwide oil prices at various times of crises - even if Norway itself is a large oil exporter itself.

Figure 25: Close up of model Population structure highlighting Fuel Price Calculations



A simple series of tests can be run by multiplying the per km fuel cost by any factor we wish. For the purposes of an extreme condition test, the fuel cost was multiplied by a factor of 20. One would expect this to push car trip percentages significantly lower. In addition, the closest equivalent travel modes - buses and the Byban - would be expected to increase to compensate. We can see this exact behaviour in the outset of the graph below.

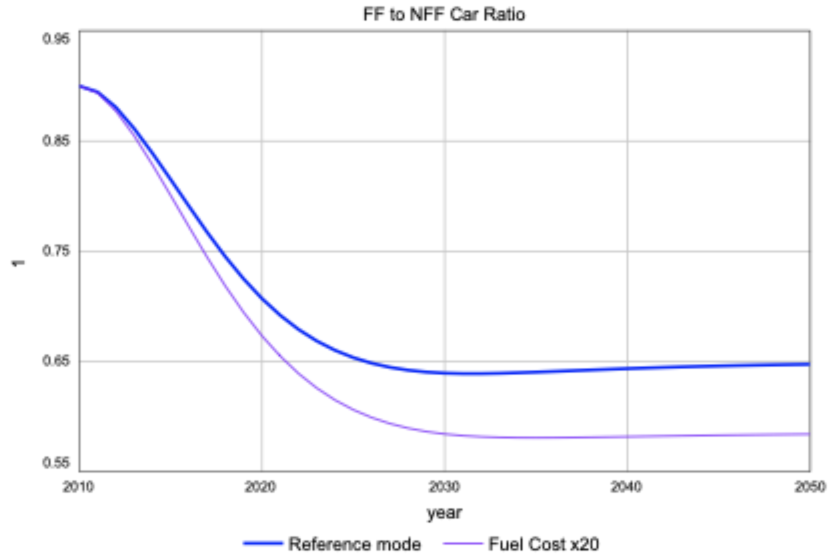
Figure 26: Endogenous and predicted travel mode percentages across Bergen. Extreme fuel costs



What we also see is an almost immediate oscillatory behaviour in both car and public transport modes. This is again because of capacity constraints. Due to crowding on public transport, some commuters switch back to cars, despite the cost, whereas a smaller percentage may switch to walking.

If this behaviour does not seem extreme enough it is worth considering another aspect of car travel; fuel type. The graph below displays what percentage of cars across Bergen are fossil fuel (FF) cars.

Figure 27: Percentage of Cars in Bergen Running on Fossil Fuel: Reference and Extreme fuel Costs Compared.



As we can see, the effect of higher fossil fuel prices is to accelerate the move from fossil fuel to non-fossil fuel (NFF) cars such as electric cars. It does this by increasing the annual running cost of FF cars - in addition to things like tolls for example. This, when added to the purchase cost and spread out over a car's lifetime, gives an approximate schema for how consumers evaluate costs.

A weight can be attached to either aspect, which affects how strong the impact of things like fuel cost increases, reductions in e-car production costs, changes in government subsidy. Thus an increase in fuel cost, even of this magnitude is still somewhat diluted by the other factors that influence car drivers purchasing decisions.

As an aside, under both runs the FF car percentage eventually bottoms out. Some studies have indicated that without intervention this is likely to occur - though predicting and exact level is difficult[42]. The exact extent to which the public with embrace electric or hydrogen cars is not a strong focus of the study, so there may be considerable margin for error here. However there are sufficient variables in place to test different hypotheses if desired.

4.4.3 Extended Timeline and Capacity Oscillations

One of the other ways we can look at model validity is to check the behaviour of the model under extended timelines. For instance, given that the population is set to increase linearly but capacities such as the size of the Bydeler, road and transport networks are held constant, we would expect to see some form of capacity limitation that results in oscillatory behaviour.

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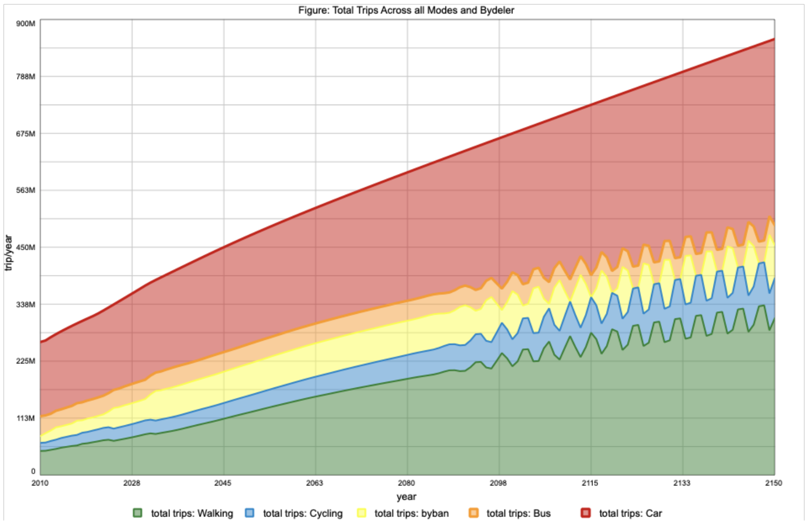
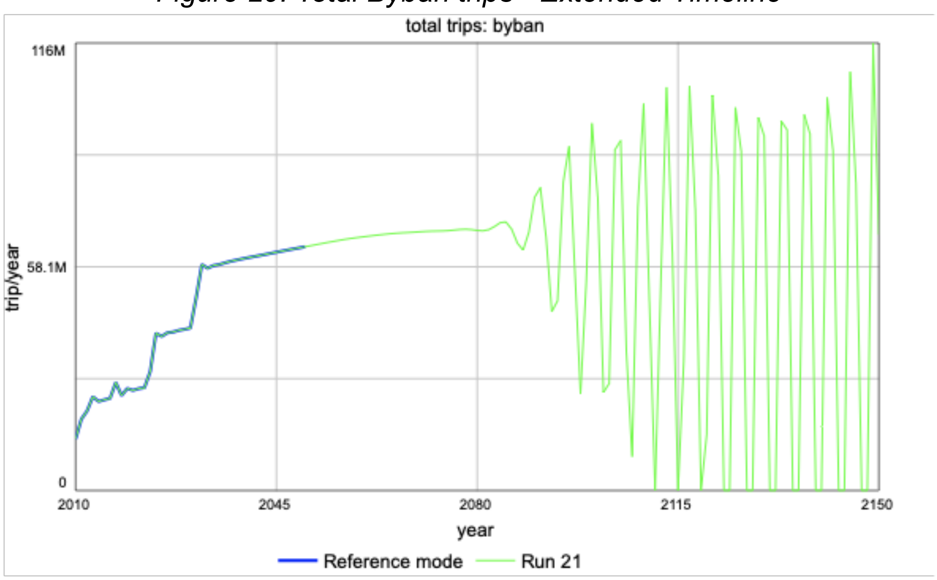
[42] *Regional utbredelse av elbiler i Norge fram mot 2030 - Hebib, Amar; Strandhagen, Stig Carlson: Norwegian University of Life Sciences, Ås (2015)* https://nmbu.brage.unit.no/nmbu-xmlui/bitstream/handle/11250/294849/Hebib%26Strandhagen2015.pdf?sequence=1&isAllowed=y

Figure 28: all trips under extended timeline



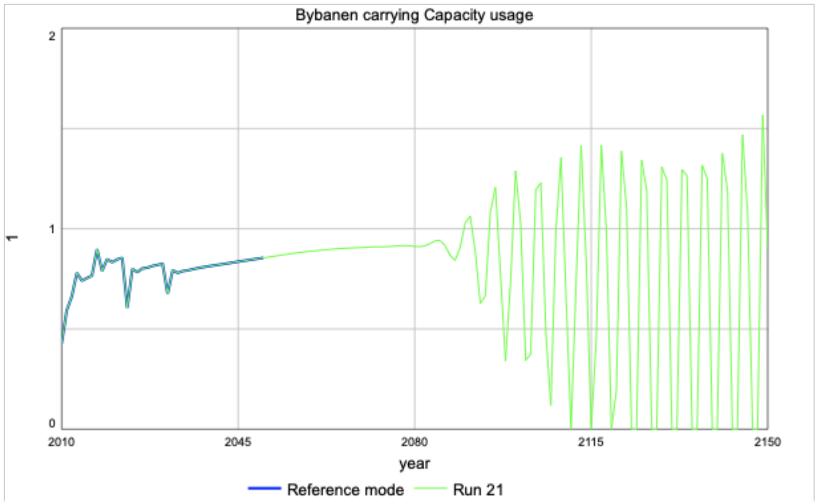
Under reference mode conditions this occurs around 50 years after the end of the intended limit of the model. What this indicates is travelers abandoning one form of transport due to overcrowding only to then create the same problem in another mode of transport. They then return to the original mode and the cycle starts anew. This is most spectacularly displayed in Byban trips, shown below. Here, the graph shows that around 2090, oscillations in the number of Byban trips per year begins to really take off.

Figure 29: Total Byban trips - Extended Timeline



If we look at the capacity utilisation of the Byban, we see the reason for this:

Figure 30: Byban Capacity Utilisation - Extended Timeline



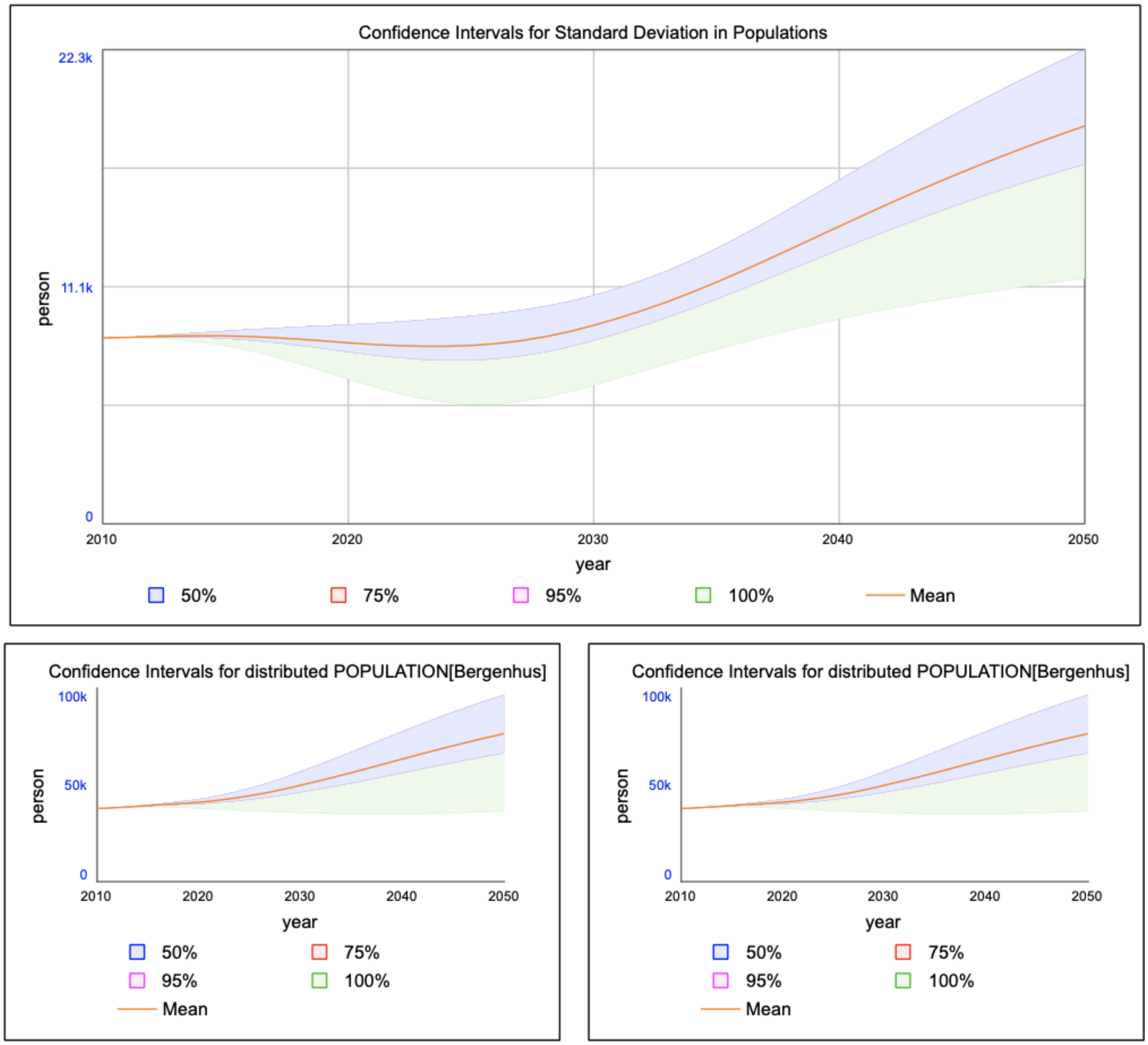
This indicates a sensitivity around an inflection point of around 90% capacity usage, which is in line with model calibrations based on the typical max capacity usage of urban transport systems being around 70-80% as indicated by Alhusseini and Pulyanova[43].

4.4.4 Extreme Condition Testing: Weighting

We can also use extreme conditions to test how sensitive certain aspects of the model are to assumptions and calibrations. For example, the graphs below show the result of an extreme weighting in population moving preferences towards avoiding crowding - whereby the weighting for crowding is set to 1.0. Also plotted are confidence intervals for the values of arguably the Bydeler most sensitive to different weightings: Bergenhus located centrally, and Arna which is one of the more isolated Bydel.

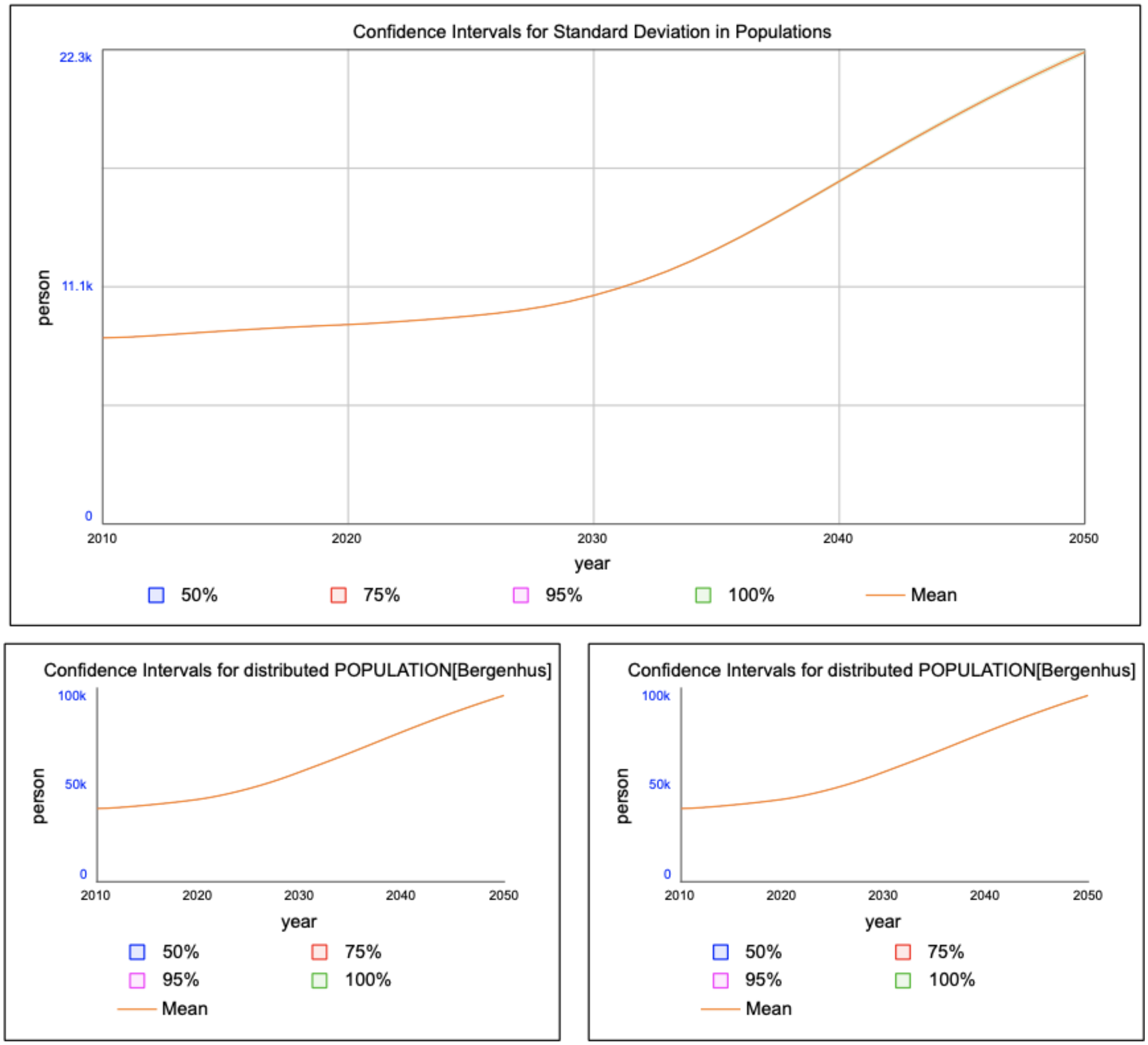
Figure 31: Confidence Intervals for Population Standard Deviation - whole of Bergen as well as Bergenhus and Arna populations. Crowding weighting = 1.0

[43] Fadeev, A & Fomin, Ye & Alhusseini, Sami & Pulyanova, Kristina & Voevodin, E. (2019). Standardization of the capacity utilization factor of urban public transport fleet. IOP Conference Series: Materials Science and Engineering. 632. 012020. 10.1088/1757-899X/632/1/012020.



We can see that the model is particularly sensitive in the weighting of crowding. By contrast, if we look at something like the weighting that employers attribute to population distribution when deciding job allocation we see that the relationship that this has to population sizes in Bergen's Bydeler is extremely weak.

Figure 32: Confidence Intervals for Population Standard Deviation - whole of Bergen as well as Bergenhus and Arna populations. Weight: Population Reference EMPLOYERS = 1.0



This should be in line with expectations. This is because something like the weighting attributed to crowding feeds - more - directly into the population's moving preferences via relative housing desirability. On the other hand the decisions of employers in deciding where to locate jobs affects only a small subset of the population (10% to be exact) and this is then further diluted by the weighting that the population ascribes to job availability.

Thus, if the model is working correctly then were we to *also* increase the weighting that populations give to job availability, we should see a more significant increase in the confidence values in these graphs than we otherwise would do with *just* an increase the the weighting that populations give to job availability.

Figure 33: Confidence Intervals for Population Standard Deviation - whole of Bergen as well as Bergenhus and Arna populations. Weight: Population Reference EMPLOYERS = 1.0 AND Weight Job Reference = 1.0

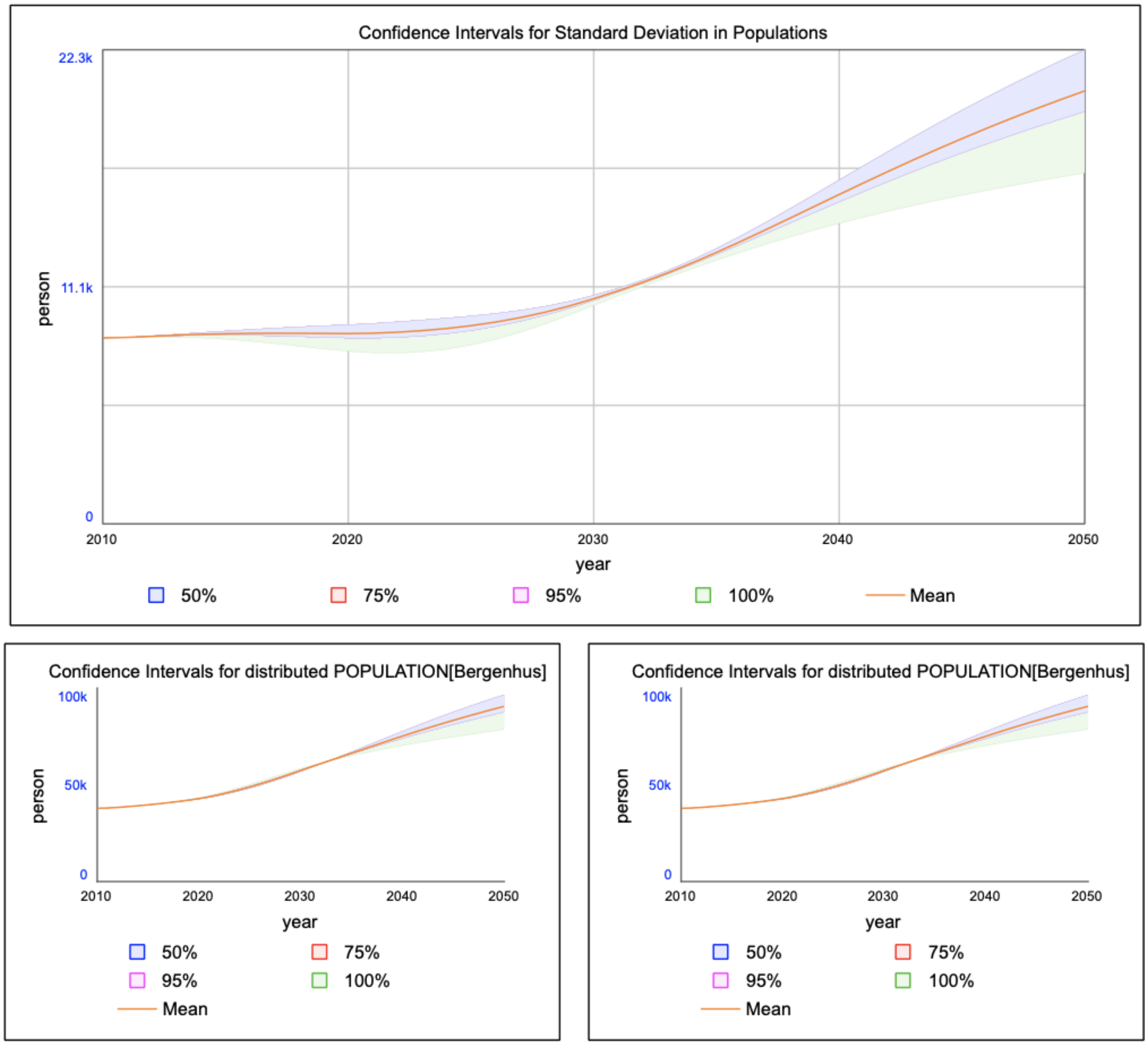


Figure 34: Confidence Intervals for Population Standard Deviation - whole of Bergen as well as Bergenhus and Arna populations. Weight: Population Reference EMPLOYERS = 0.1 AND Weight Job Reference = 1.0

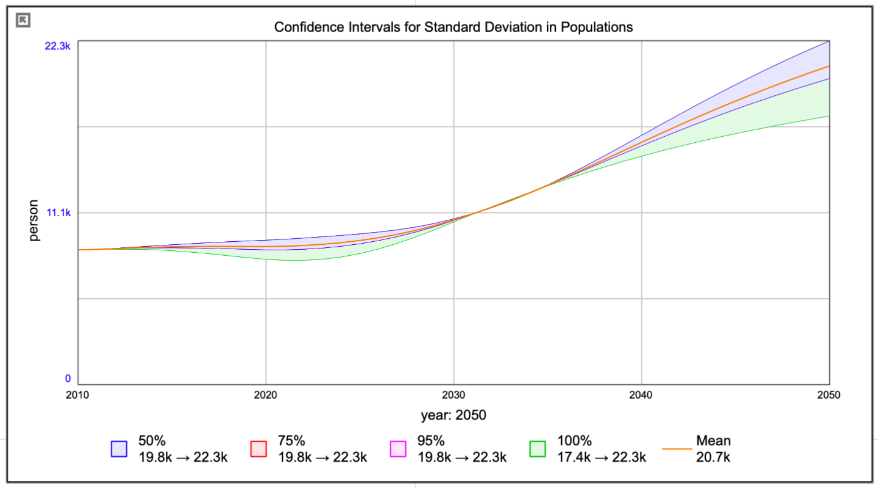
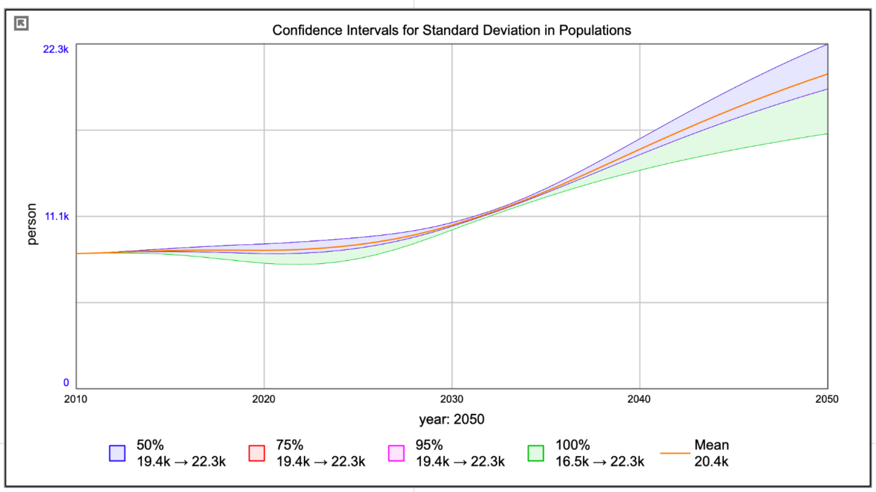


Figure 35: Confidence Intervals for Population Standard Deviation - whole of Bergen as well as Bergenhus and Arna populations. Weight: Population Reference EMPLOYERS = 1.0 AND Weight Job Reference = 1.0



The difference between the runs is slight, as one would expect, but it is still present and is most evident if we look at the 100% boundary.

4.5.1 Calibration and Coherence: Reference mode (2010-2020)

Before moving on to a discussion of model results, we must examine the model's coherence to such real-world data as is available.

As is often the case many of the more in-depth statistics are difficult to find and must be replaced either by proxies or by rational deduction. However, a certain number of the more important, top level variables are available. Against these we can calibrate the model to best suit previous trends and make educated suppositions as to implications of different scenarios.

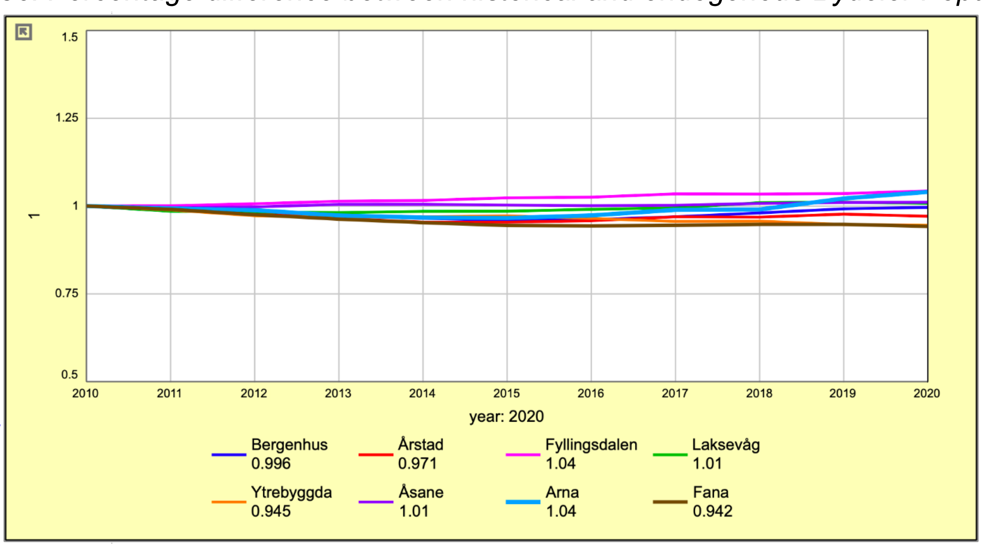
4.5.1 Population

Population statistics for the relevant Bydeler are readily available from SSB and have been used to initiate the arrayed population stocks at the model's outset - 2010. It is worth noting that official statistics also include an extra category of 'unidentified Bydel' which were not included. However, this number is negligible given the overall level of aggregation already present.

From here calibration was undertaken using Stella's optimisation features. Specifically, this was done to ascertain approximately what weights should be attributed to the different desirability factors (Facilities, Travel Convenience, Crowding, Affordability and Job Availability). Both employee and employer weights were used in the optimization runs.

Weights were computed and then balanced manually in order to ensure a reasonable fit with the travel reference mode in addition to the population distribution reference mode.

Figure 36: Percentage difference between historical and endogenous Bydeler Populations



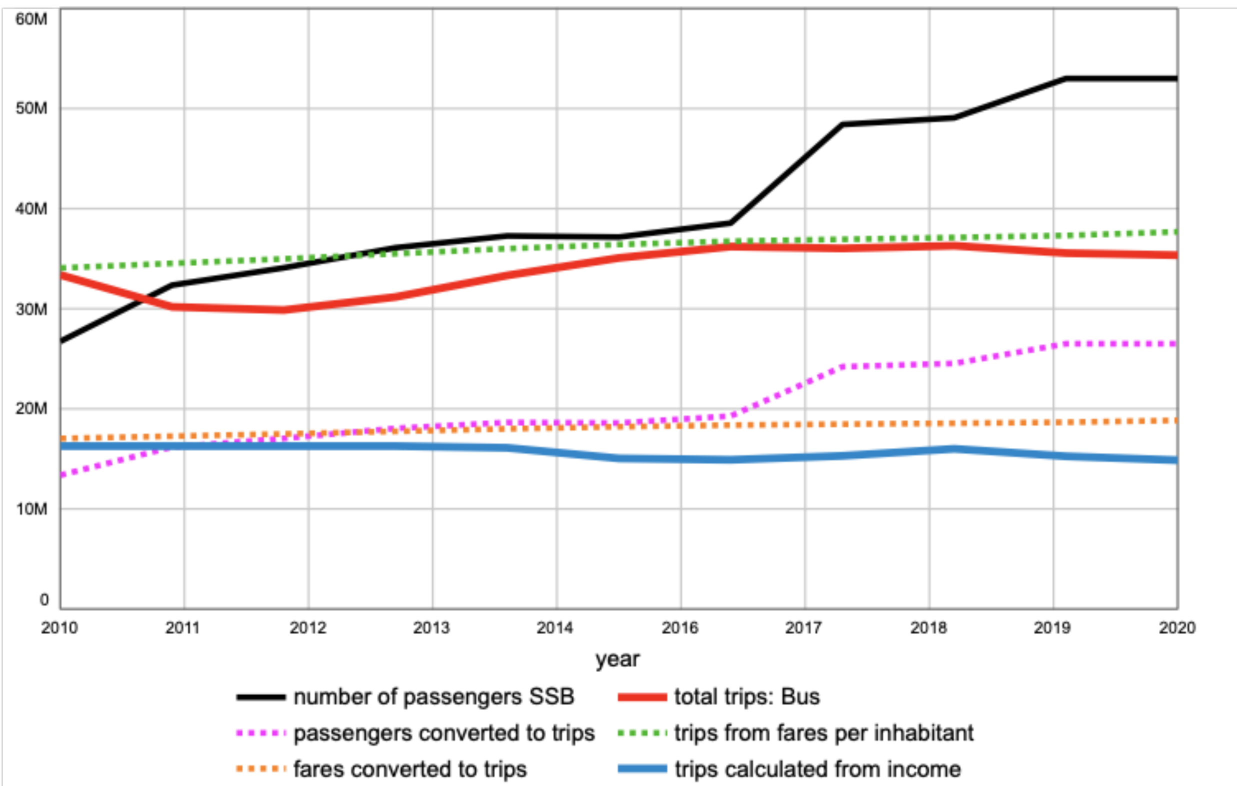
As is visible from the figures underneath the above graph, the largest endogenous overestimation of population comes from Arna, whereas the largest percentage underestimation of population comes from Fana.

4.5.2 Travel Modes

Finding an accurate reference mode for travel behaviour proved somewhat more problematic chiefly because of the ambiguities around what constitutes a 'trip.'

At first sight, bus trips would seem to show a large discrepancy between official statistics and the model calculations. However this points to an important difference in how statistics are collected, what constitutes 'trips' and the difficulties in measuring them. The graph below shows a comparison of different computation methods from official statistics. The line in red is from the model calculations.

Figure 37a: Number of Bus Trips according to different sources and calculations



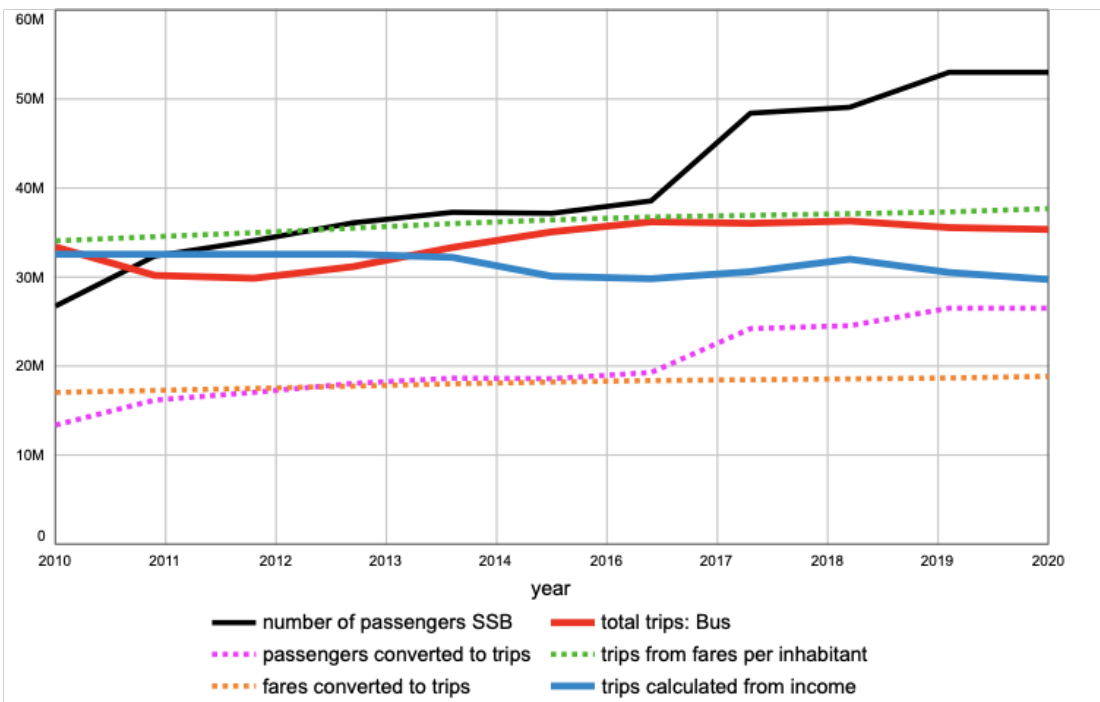
First let us examine the bold lines:

- **Black Line:** The official number of passengers from SSB statistics. Although this may include buses from outside the model's scope of the 8 Bydeler.
- **Red Line:** The total number of bus trips generated by the model across all Bydeler when the model is calibrated to replicate housing reference behaviour in the years 2010 to 2020.
- **Blue Line:** If we take the income from ticket sales in the Skyss annual reports and then divide them by the cost of a single ticket we would in theory get a rough idea of the number of tickets sold. There are issues with this as many tickets purchased will not be

single tickets but longer-period passes. Therefore if anything we should expect this method to undercalculate the number of trips.

There is no detailed breakdown of ticket sales available online from which to calculate the percentages of trips which are taken with their far cheaper season-pass counterparts. However if we take the rough (and highly unscientific) method of dividing historical ticket prices in half to mimic the effect of season-pass discounts we get the following line:

Figure 37b: Number of Bus Trips according to different sources and calculations



Looking at this method of calculating discrete trips we see that it adheres much more closely to the model's calculations.

Next, the dotted lines:

- **Green dotted line:** This represents the number of fares per inhabitant as given by SSB[44] multiplied by the population of Bergen.
- **Orange dotted line**: The previous measure may overstate the number of trips as a singular bus ticket is valid for any number of trips by either bus or Byban so long as they fall within a 90 minute time frame. Therefore this line is a simple division of the fares per inhabitant by 2 in order to account for fares potentially covering both an outbound and a return 'trip.' Of all the measures so far used this is the one that most closely resembles the endogenous behaviour of the model.

44 https://www.ssb.no/en/statbank/table/06673

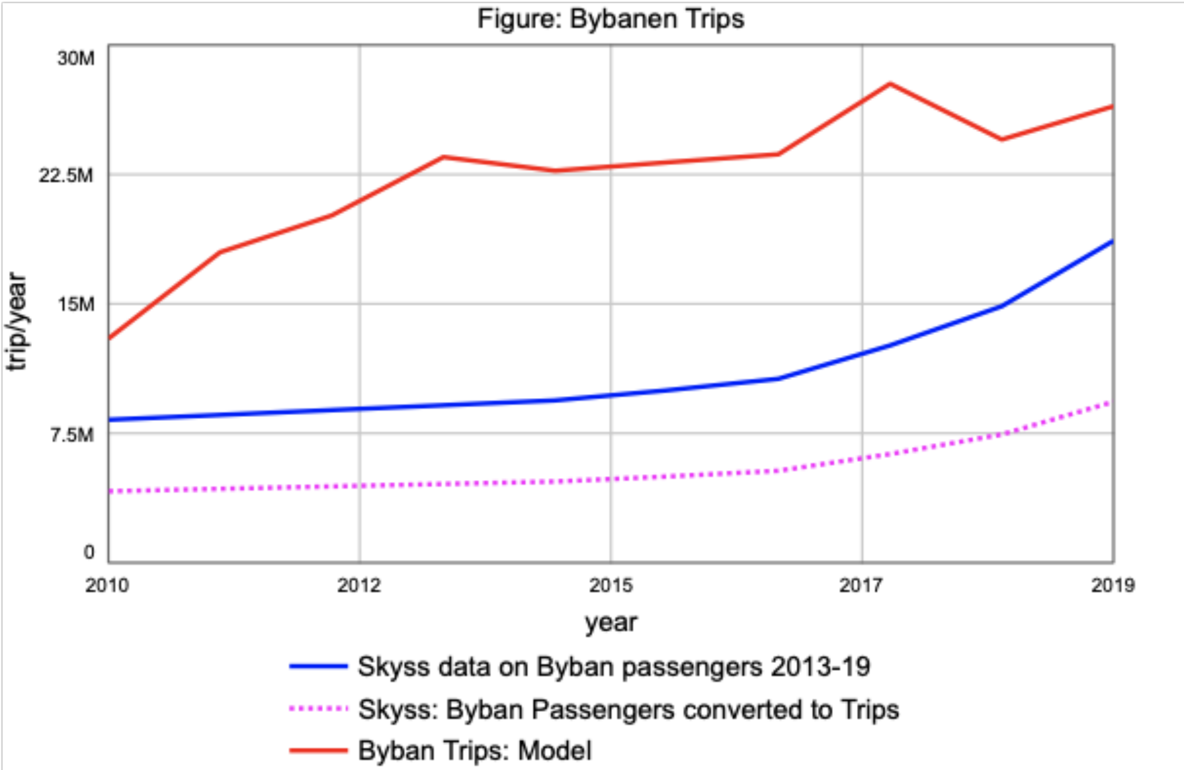
- **Purple dotted line:** The same conjecture underpins this calculation which this time takes the SSB passenger count as falling afoul of the same issue and divides it by 2.

In each case but one we can see the number of bus trips (however one categorises them) increasing over time. The only exception here is with the ‘Trips Calculated from Income.’ There is reason to be sceptical about this though.

Firstly the downward trend is relatively slight when compared to say, that of the total passenger numbers from SSB. Secondly whilst every attempt was made to divide the year total income by the correct contemporary fare amount, the fact is that this is a blunt tool.

In reality, many people will buy monthly or semi-annual passes to save money and the prices of these will change differently to the price of the standard single 90-minute ticket. There was also a large overhaul of ticket prices throughout the wider Bergen region in 2018 that may have affected travel behaviour inside the Bydeler. Here ticket prices were significantly reduced and the number of charging zones streamlined. Both of these will mean that the ‘average ticket price’ will actually be significantly lower than that of a single ticket. Finally a downward shift may be indicative of different purchasing behaviour rather than necessarily travel behaviour. There may be exogenous reasons why more of one type of ticket is bought than the other. For example, the extension of the Byban to Flesland Airport may mean that more tourists or new arrivals purchase more single fares rather than the far cheaper six-monthly counterpart. This would increase the weighting of ticket sales in favour of more expensive single fares. The effect of this would be to make trips seem less numerous than they in fact were as total income from ticket sales is now divided by a larger number. Finally there are signs that fare-skipping may be becoming more and more present on the network which will work to depress the overall total amount of income from bus and Byban tickets.

Figure 38: Number of Byban Trips according to different sources



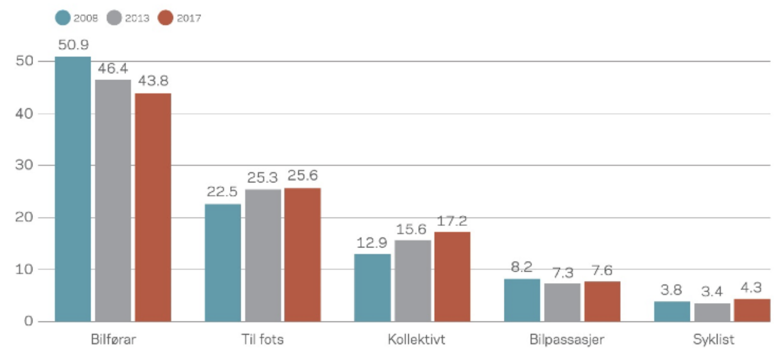
As previously stated, since its creation the Byban has seen its usage rise to around 40 000 to 60 000 passengers per day. Because there is only one Byban line as of 2021, there is no opportunity for interchange or for taking multiple busses for one trip, as such, it is likely that the model's calculation of 'trips' is closer to the passenger number calculated by Skyss.

With that said, the model seems to overestimate the number of Byban trips considerably - at least at the beginning as we will cover later. Whilst this could well be due to an unresolved calibration error in the model, from a conceptual standing it could be indicative of the model not taking into account the growing pains of a new transport mode. For instance, the city's inhabitants may not have seen the need to use the Byban at first if their daily commute was already handled by other means. Secondly, it might be presumptuous to assume that the Byban network was fully formed from the beginning, with no teething problems like delays, reduced running time or capacity whilst drivers were trained or carriages purchased and put into service.

Travel Mode Percentages

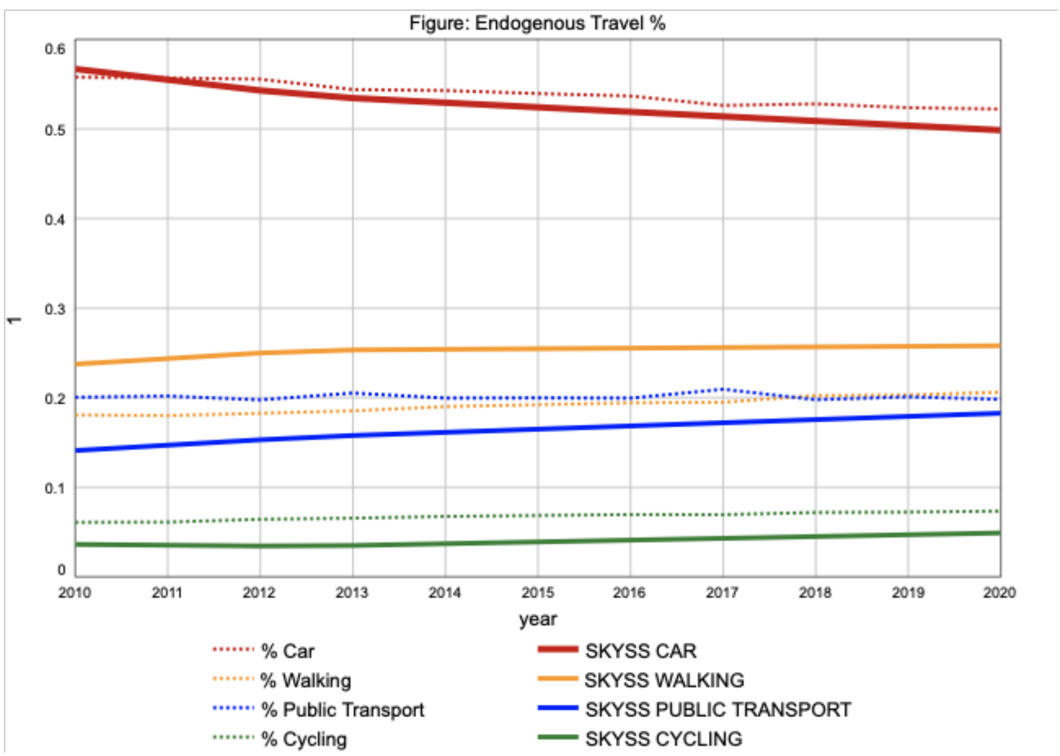
Nevertheless, with these caveats, we can still examine the percentage of trips divided among cars, public transport, cycling and walking.

Figure 39: Travel Mode Percentages: Car, Walking, Public Transport, Car Passenger, Cycling Source: Skyss 2020 Annual Report



Figur 2. Reisemiddelfordeling for Bergen kommune.

Figure 40: Travel Mode Percentages: Model vs Skyss



Again one can see that cycling seems to be consistently overrepresented by the model despite calibration attempts. Both Walking and Public Transport modes, despite starting lower and higher than their historical counterparts at the start, seem to begin to align themselves with the reference mode's general behaviour. In each case, the key behaviour seems to be mostly replicated to within acceptable margins.

We may also find an explanation for the lower uptake in walking in the additional percentages taken up by cycling. In addition, as mentioned elsewhere it is likely that official estimations of walking may be slightly conceptually different from the model's and that they may take into account some of the city's leisure activities such as mountain climbing and trail walking.

5.RESULTS

5.1 Comparison: Business as Usual 2010-2050

5.1.1 Model Estimates vs Official Estimates

Population (2010-2050)

Using the official figures of Bergen's population as a starting point we can see how the population of the respective Bydeler develop over time according to the model structure given. What is apparent is that Bergenhus and Årstad will begin to outgrow the other areas to a significant extent.

Figure 41: Endogenously Generated Bydeler Population

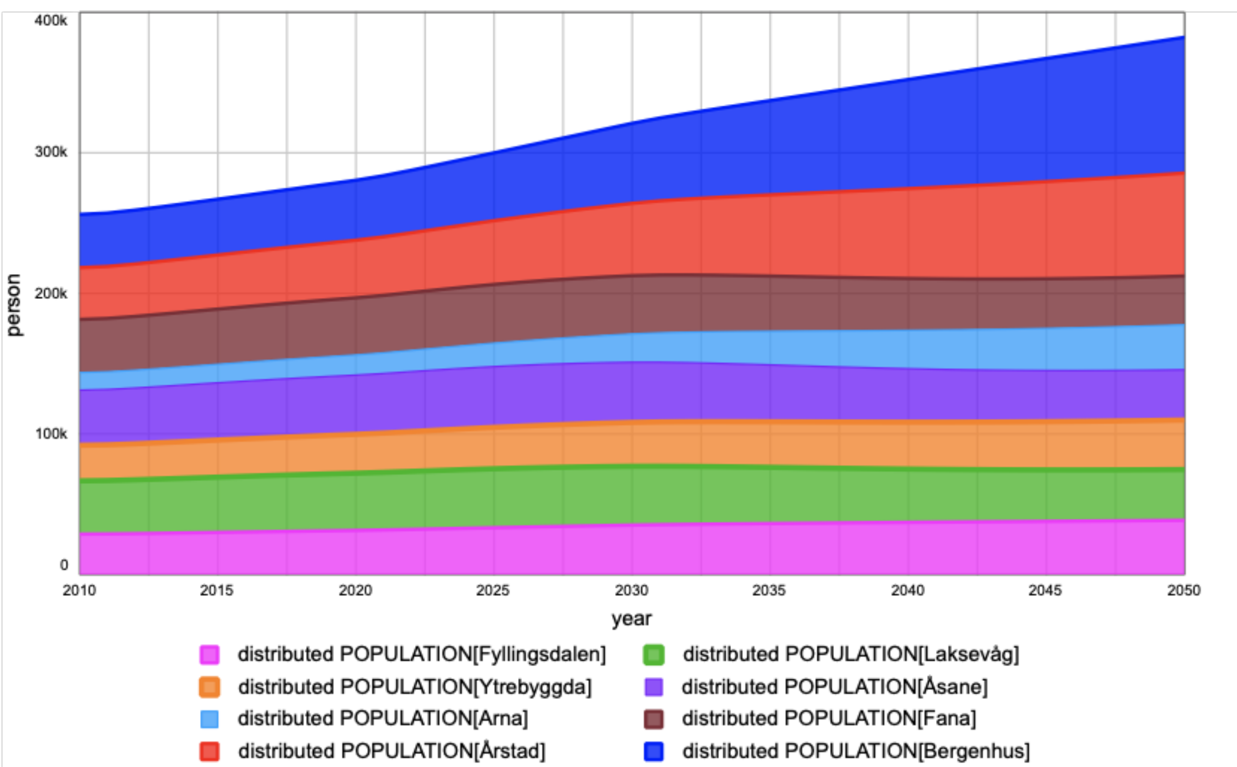
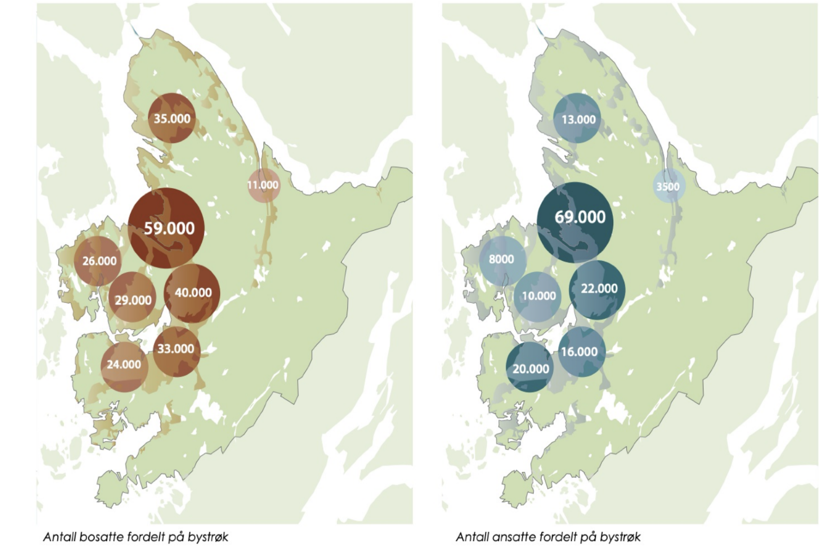


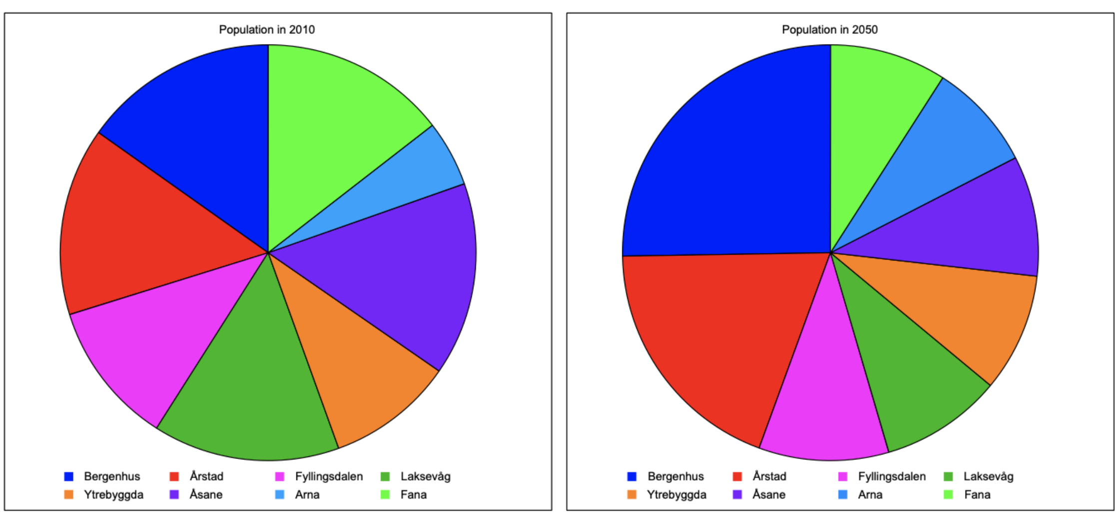
Figure 42: Inhabitants (left) and Employees (Right) in 2030. Source: Bergen Kommuneplanens Arealdel 2018 Planbeskrivelse



Whilst there is difficulty in giving an exact overlap in figures, this would seem to suggest that the development, at least until 2030, is reasonably in-line with Bergen Kommune's own estimates as illustrated above.

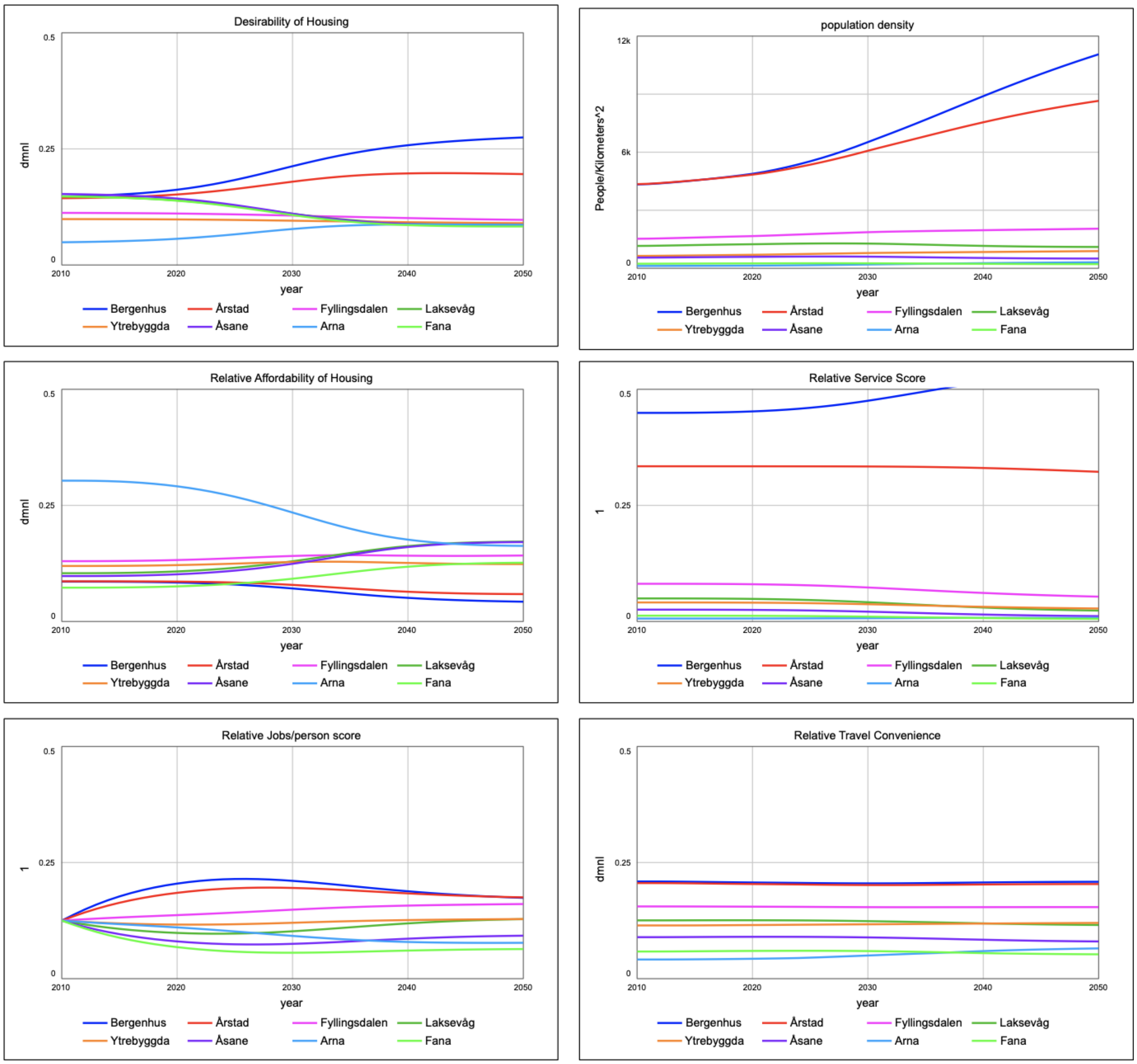
So far, so good, but what are the implications for this? As of 2010 Bergen's population was relatively evenly spread between Bydeler. This implies that the population of Bergen will actually become less dispersed over time and more concentrated in the central areas, with Bergenhus and Årstad being the largest percentage beneficiaries of the change.

Figure 43: Change in Population Distribution %



If this is indeed a correct assessment, it would not be wholly out of character for an industrialised city. We can look at the different inputs as to why these areas might be more attractive than others.

Figure 44: Endogenous desirability and inputs of housing choices (unweighted)



Of the above graphs all of them except population density represent normalised, unweighted scores relative to each respective Bydel. When combined over time these feed into the overall desirability of an area as indicated by the top left graph. It is this that determines where the stipulated mobile percentage of Bergen's population moves to each year.

Significant Balancing and Reinforcing Feedback Loops

The others show generally intuitive behaviour that one would expect. Market forces dictate that areas become less affordable as they become more desirable, providing a balancing mechanism. All things being equal, as populations increase, services should locate themselves there. The more services there are in an area the more attractive they become, providing a reinforcing mechanism. Similarly, larger concentrations of people create jobs out of the services they require and the income they have to dispose of. Again, all other things being equal, employers would likely rather settle in areas with higher populations and therefore access to potential customers and employees.

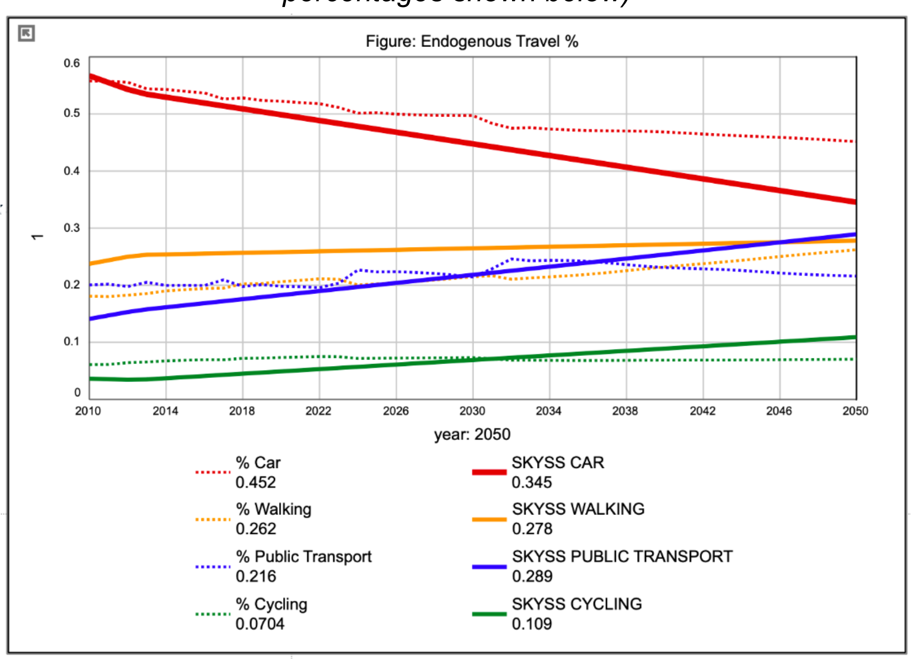
Of these, Travel Convenience is clearly the most stable as the Bydeler themselves cannot move. The only way it can be affected here is as a result of how many jobs and services are located in an area, making them possible to be walked or cycled to.

That the populations of Bergenhus and Årstad continue to grow despite their increasing population density and decreasing affordability is a testament to the relatively high weighting attached to their strengths: job availability and services.

Travel percentages

But the main impact that we want to examine is what effect this distribution could have on travel behaviour. The graph below shows the model results with dotted lines. From 2010 to 2020, historical figures from Skyss have been used to populate the full-line data. After this, simplistic linear regression has been used to extrapolate percentages after 2020.

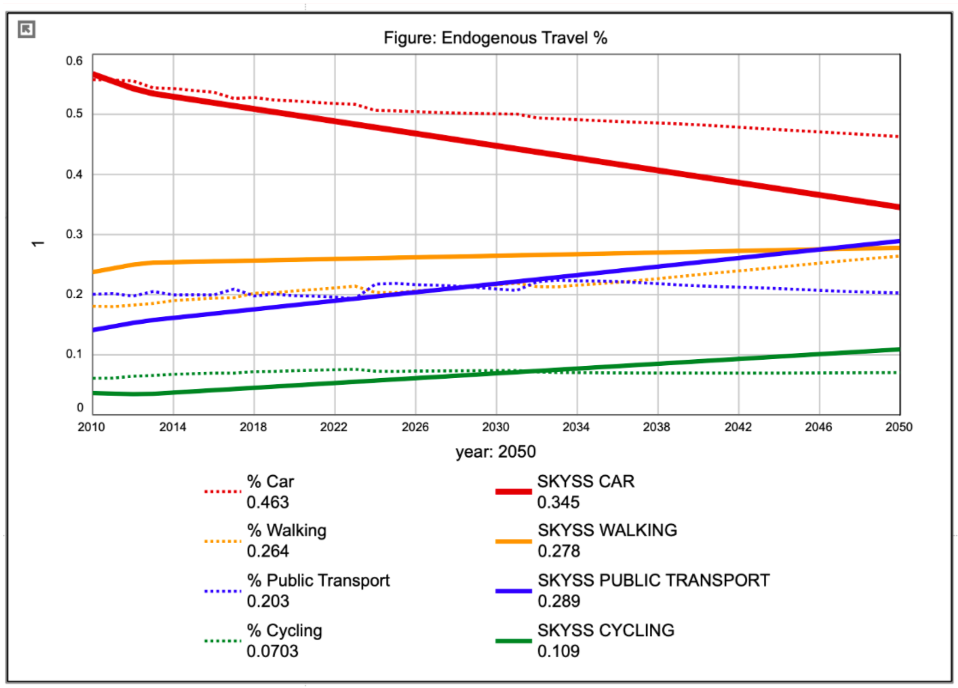
Figure 45: Endogenous and predicted travel mode percentages across Bergen. (2050 percentages shown below)



What this is intended to show, aside from the margin for error generated by the model, is the difference between a linear and a non-linear interpretation of the data. It is probable that the policies used thus far will eventually have diminishing returns without further exogenous factors. This is likely to occur as interventions come up against limits to capacity or the willingness of citizens to adapt. This is not to say that current policy has been ineffective or misplaced, in fact, it is likely to be quite the opposite.

The graph below shows a run of the model with the expansion of the Byban network removed. We can see that the percentage of public transport journeys dips below 20% by 2050. As travel by walking and cycling remain relatively similar, the difference is mostly accounted for by car journeys.

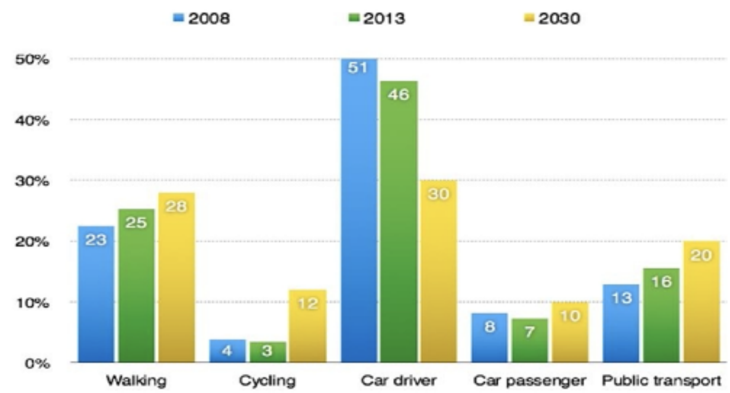
Figure 46: Endogenous and predicted travel percentages across Bergen - with no Byban expansion (2050 percentages shown below)



It is also intended to show how trends in population distribution can affect the transport modes that people choose by affecting the distance they must commute to both jobs and services.

Figure 47: Predicted Travel Habits: Green Strategy

Figure 5.4 Travel habits survey for Bergen 2013, with breakdown in 2008 and 2013 and possible breakdown for 2030



A significant aspect of the model is the extent to which we might be able to use it to examine likely outcomes of interventions - both current and hypothetical - and track them against Bergen's current goals and expectations. The figure above comes from the Kommune's Green Strategy document released in 2018 and shows a number of tough targets for 2030. The graph below shows the model development over time of this same metric and indicates that the Kommune will miss the 2030 targets.

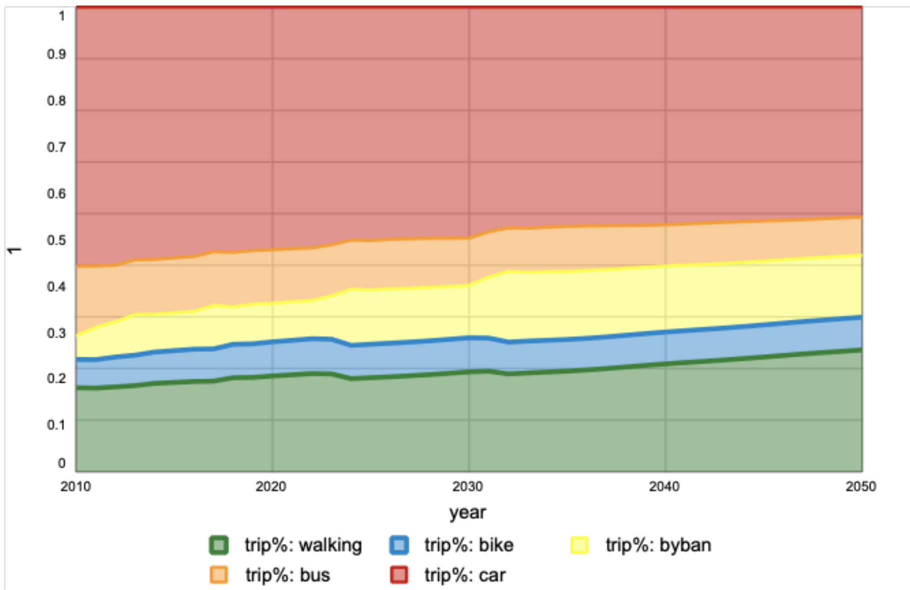
- Car travel does decrease, but the speed of progress becomes difficult to maintain, with percentages seemingly bottoming out at between 50% and 40%.

- Cycling also remains stubbornly constant at it's low levels.

- Public transport uptake - provided the capacity increases of the Byban remain - continues to rise until around 2030. The Byban steadily takes up more of the share of public transport trips over this time.

- However, as the population spreads, to be closer to work and services, growth in walking begins to outstrip public transport by the early 2040's. This is not to say that there is not learning to be taken from this though.

Figure 48: Endogenous travel percentages across Bergen



5.2 Tolls

One of the more commonly used though less popular measures that the city has used to control private vehicle use has been tolls. Stationed at various points across the city, these charge cars a certain amount depending on their fuel category - with less polluting electric vehicles being charged far less than petrol or diesel vehicles.

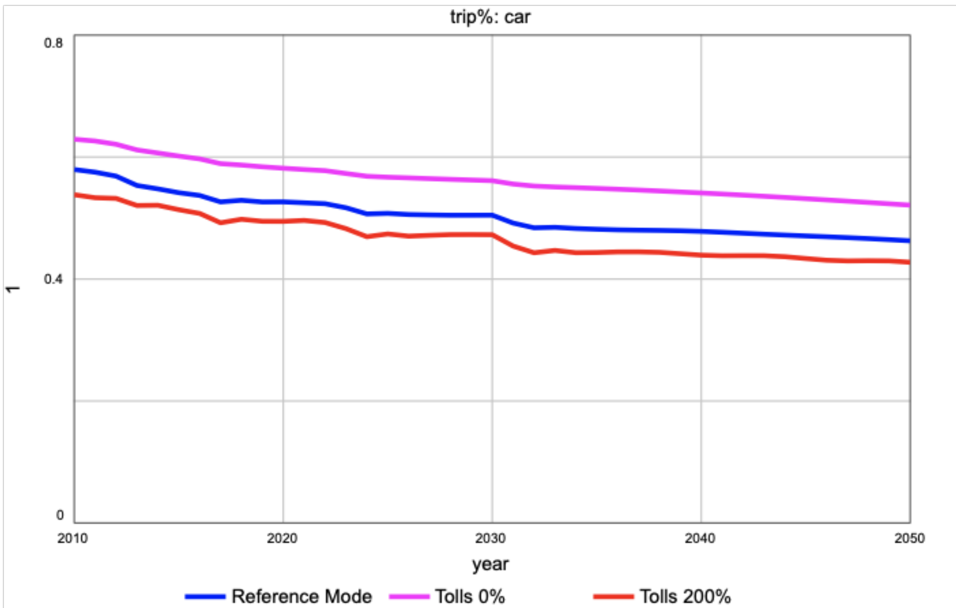
5.2.1 Effect on Trips

Modelling precisely how this affects behaviour is not necessarily simple, but the process can be rationalised. For instance if we look at tolls as contributing to the overall trip cost associated with a journey. All of these add to the overall cost of car ownership (of which the most significant part is the original purchase price). When annualised by spreading this cost over a car lifetime we can reach a figure which is at least remotely comparable to the yearly price of public transport for that same commuter. Fortunately the latter is made significantly simpler by the Skyss ticketing system where fares are valid across all public transport platforms.

Consumers and commuters do not view the transport modes as equivalent though. Research would seem to show that, on balance, commuters prefer the car as a transport mode[45]. Furthermore, it is unlikely that they will factor in the cost of the car purchase many years ago when weighing up which transport option to take. For that reason a converter was added to offset the purchase price in the cost tally of public vs private car transport inorder to replicate the psychological aspect and balance the trip costs more evenly.

Tolls perform an important function in this decision making process by increasing the per-trip cost of car travel. The following graph shows the isolated effect of tolls at current levels, double their current level and at 0.

Figure 49: Effect of Tolls on % Trips taken by Car



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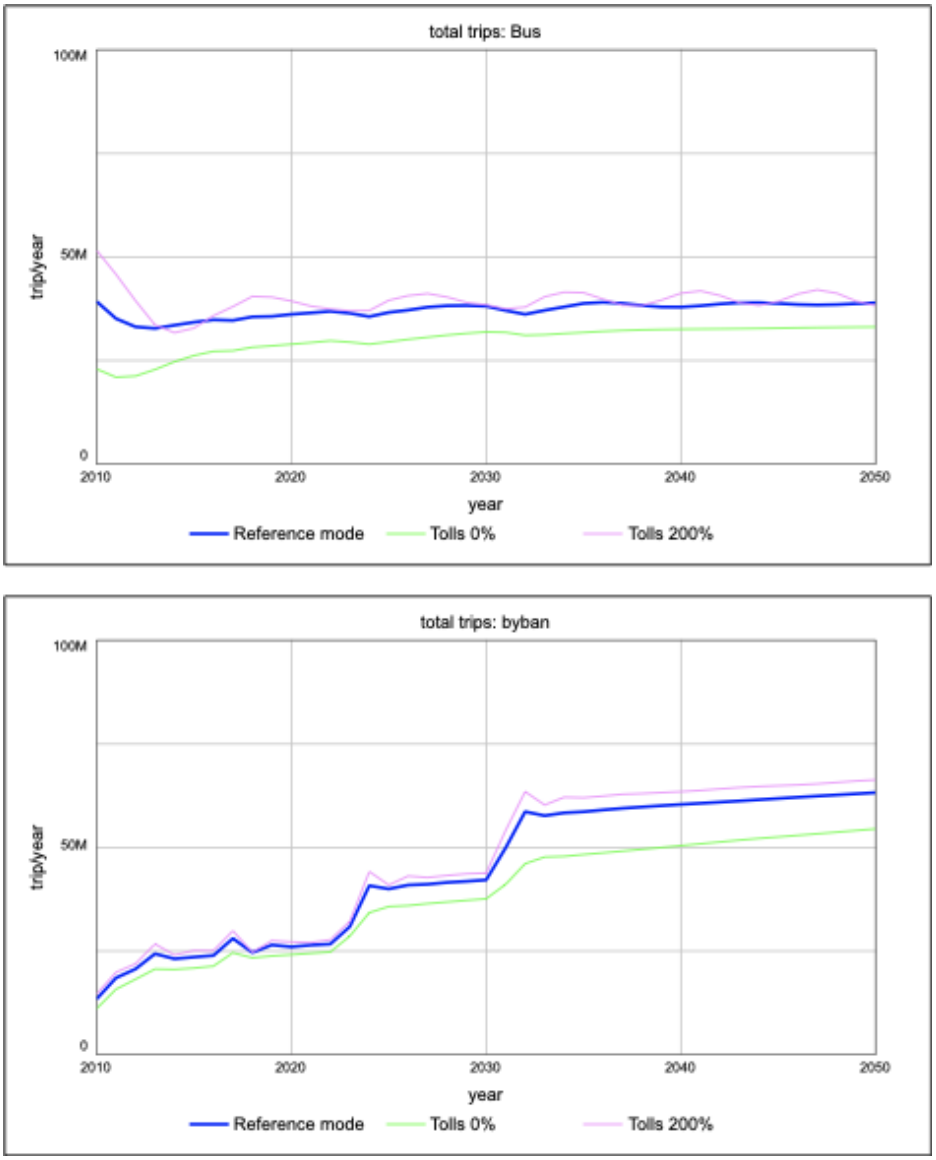
[45] Lars Eriksson, Margareta Friman, Tommy Gärling,
Perceived attributes of bus and car mediating satisfaction with the work commute,
Transportation Research Part A: Policy and Practice,
Volume 47,
2013,
Pages 87-96,
ISSN 0965-8564,
https://doi.org/10.1016/j.tra.2012.10.028.
(https://www.sciencedirect.com/science/article/pii/S096585641200167X)
Interestingly, Guiver examines the discourse around buses and finds that whilst users might feel positive about them in the abstract on a systematic level, when it comes to their experience as a user, they typically use more favourable language when discussing cars: J.W. Guiver,
Modal talk: Discourse analysis of how people talk about bus and car travel,
Transportation Research Part A: Policy and Practice,
Volume 41, Issue 3,
2007,
Pages 233-248,
ISSN 0965-8564,
https://doi.org/10.1016/j.tra.2006.05.004.
(https://www.sciencedirect.com/science/article/pii/S0965856406000565)

The effectiveness of tolls seems strong, but it is worth noting that they seem to have diminishing returns in terms of their effectiveness in reducing car travel and, more importantly, increasing public transport usage - as is perhaps more easily seen in the graphs below;

Figure 50: Effect of different toll rates on public transport trips



Tolls also create significant opposition among the population of Bergen. Whilst it might be possible to model the level of this discontent (provided it followed rational principles like percentage of disposable income for example), it is less easy to model the effect of this discontent endogenously.

Tolls may however be useful in altering purchasing behaviour of fossil-fuel vs non-fossil fuel vehicles by feeding into the total annual costs of car ownership.

5.2.2 Effect on Car Purchasing

Studies have shown that peripheral costs exactly like tolls can be a significant factor in the type of car that people purchase. For example in *Hebib and Strandhagen, Regional Distribution of Electric Vehicles in Norway Towards 2030 (2016),* over 50% of respondents to a survey answered that they would not buy an e-car without toll exemptions[46].

The figures 51 below show the effect of differing toll amounts on car ownership across the whole city. In light of Hebib and Strandhagen's findings it is notable that the effect on total cars is minimal in comparison to the breakdown of the vehicle type. An increase in tolls does reduce overall car ownership, but not significantly. Whilst it may be likely that the model is underplaying the effect of tolls on car ownership it does point to a significant insight that tolls are not as strong an influencer on purchasing likelihood. However they may be more effective on purchasing behaviour when it comes to car type - although not necessarily in desirable ways.

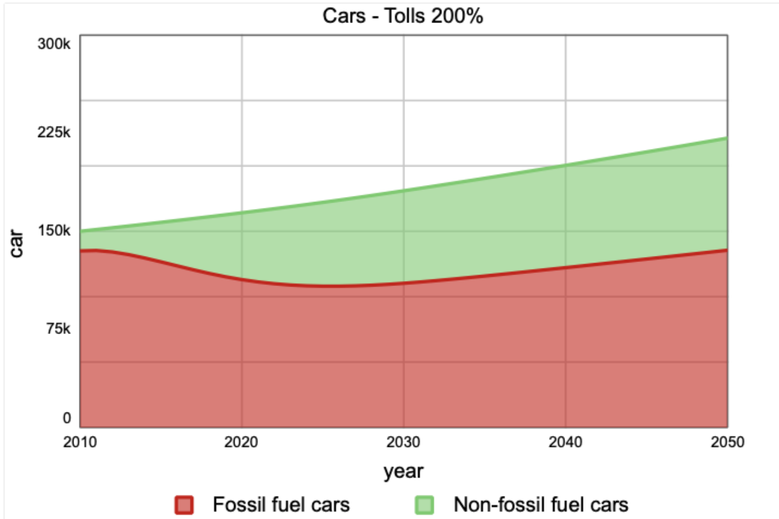
The reason for this is that tolls dis-incentivise car use for trips, which is clearly desirable. However they have an interesting counter effect because of this.

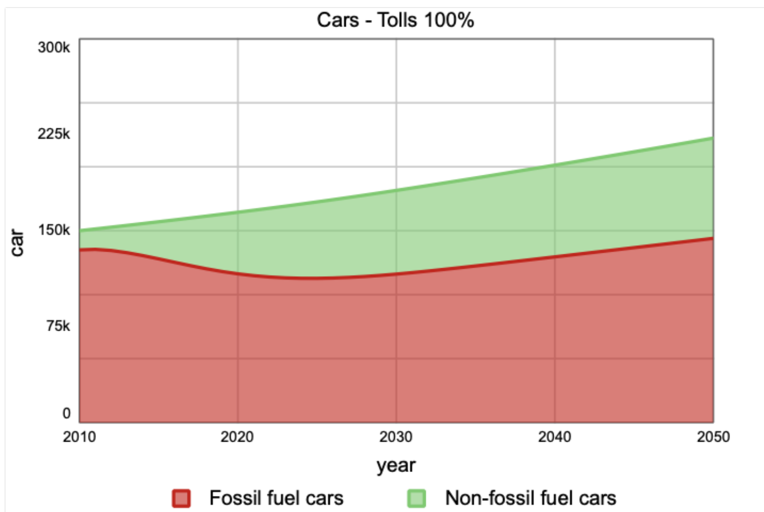
In the model a purchase car's cost is made up of its average purchase price plus the approximate costs of the trips taken. Tolls clearly contribute to the latter, whereas taxes etc contribute to the former. Due to a car's reduced usage, the percentage of this purchase cost leans more heavily to its purchase price. Fossil fuel cars are generally cheaper in this regard and therefore the balance of purchasing shifts more in their favour. For the average car driver, the thought process would be "I want a car, but considering how much I'm going to use it, I don't want to pay extra for an electric version right now."

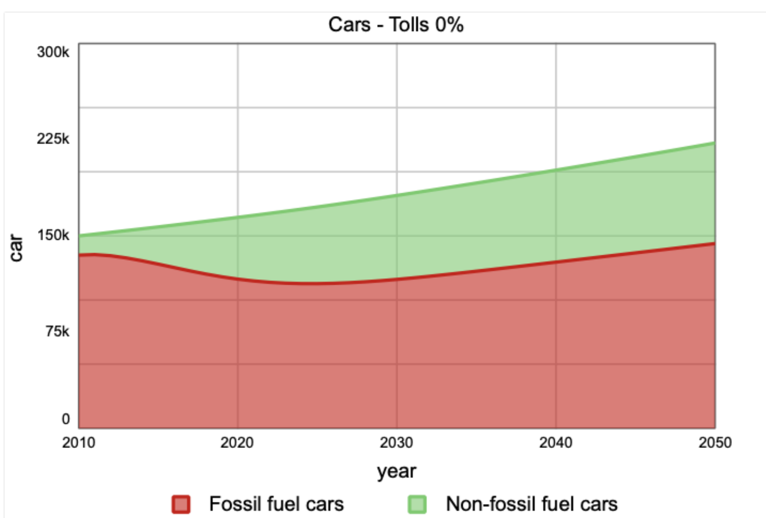
This may seem like bad news, but clearly there are conceptual omissions in the model due to time dedicated elsewhere. Consumers may be environmentally conscious in their purchasing decisions, e-cars may be desirable in their own right - with the brand fetishism of a Telsa competing with that of say a BMW. Electronic or non-fossil fuel cars are also likely to be ever more affordable as time rolls on and government interventions at the national level are likely to enhance this. For instance by increasing road tax disparities or petrol taxes - both of which are largely outside the influence of the Kommune and the purview of this study. Therefore whilst some effort has been made to conceptualise this in the model, it is extremely crude.

Figure 51: Cars owned by Fuel Type - Comparison across Toll amounts

[46] https://nmbu.brage.unit.no/nmbu-xmlui/bitstream/handle/11250/294849/Hebib%26Strandhagen2015.pdf?sequence=1&isAllowed=y


Cars - Tolls 200%
300k
225k
150k
75k
0
car
2010
2020
2030
2040
2050
year
Fossil fuel cars
Non-fossil fuel cars


Cars - Tolls 100%
300k
225k
150k
75k
0
car
2010
2020
2030
2040
2050
year
Fossil fuel cars
Non-fossil fuel cars


Cars - Tolls 0%
300k
225k
150k
75k
0
car
2010
2020
2030
2040
2050
year
Fossil fuel cars
Non-fossil fuel cars

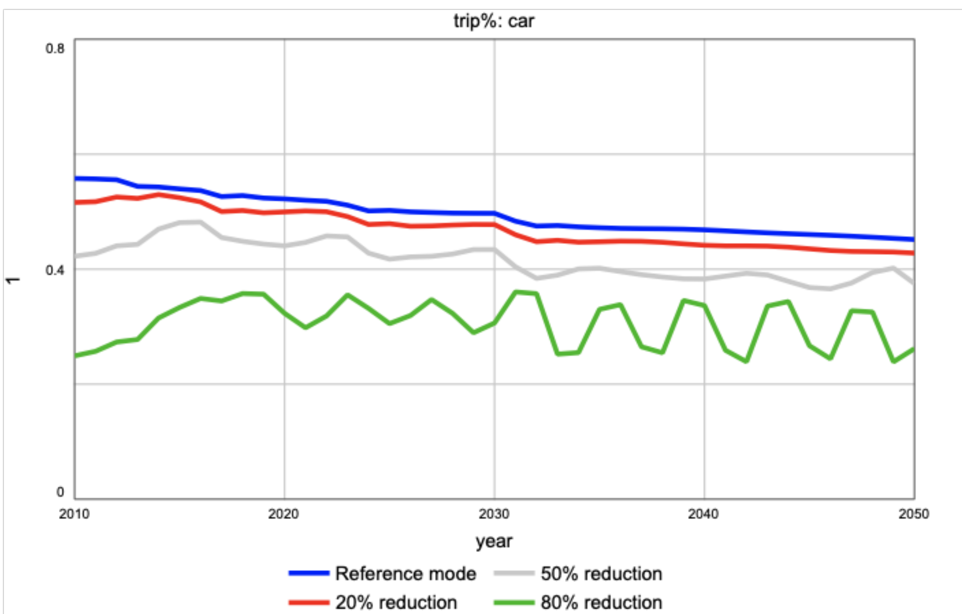
5.3 Ticket Subsidies

Another option that the Kommune potentially has at its disposal is subsidising trip costs for public transport. In practise it already does this to an extent - depending on how one interprets who foots the bill. Skyss' annual reports show an improving financial outlook but one that still runs at a deficit reliant on government subsidy. Whether profitability is a laudable aim for Skyss is outside the purview of this study, but it is worth looking at the idea of ticket subsidies.

In essence this policy intervention would function much like tolls, but simply run in the opposite direction. Here ticket prices for buses and the Byban would be reduced, making the per-trip cost of using a car higher by comparison.

The below graph shows an indication of the effect that ever greater reductions in the annual Skyss Pass price would have on car trips. The current price is around 8000 NOK.

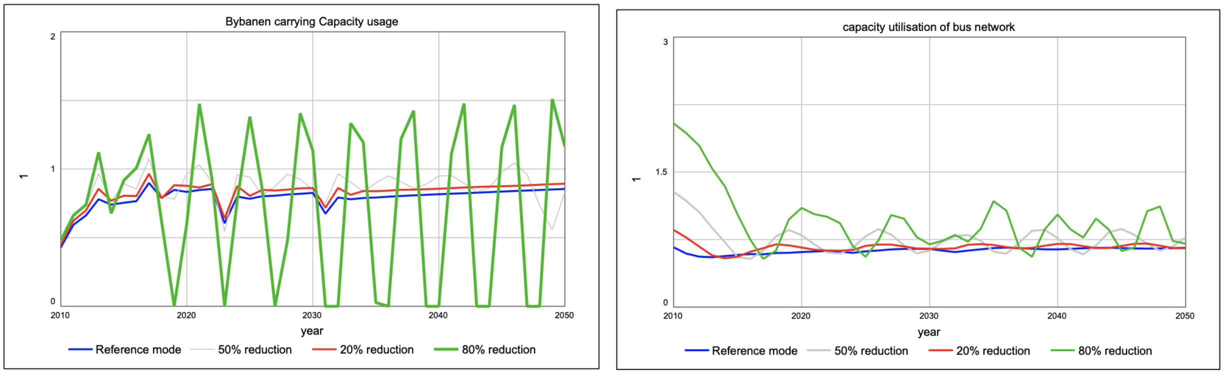
Figure 52: Different Annual Skyss Pass Prices and Car Trip %



As can be seen the policy would be effective though would eventually result in progressively greater returns until oscillations become present[47]. This is because public transport such as buses and the Byban would eventually begin to run into capacity constraints. In both cases the result would be much higher costs incurred by the Kommune - both to subsidise the ticket prices and also to increase capacity to account for it. As the graph below indicates,the trips will in fact begin to oscillate at this level as passengers are turned away by the crowding on the public transport systems.

[47] Successive runs with different integration methods confirmed this to not merely be an isolated DT issue.

Figure 53: Bybanen and Bus carrying Capacity usage



5.4 T Goals

A key component of the Kommune's green strategy is a number of transport (T) goals, each intended to help reduce the city's pollution output. They concern a number of different travel aspects some of which are not strictly relevant to this study - such as water transport and shipping - however it would be pertinent to discuss them here. Those most relevant have been highlighted.

Green Strategy 2016 Goals:

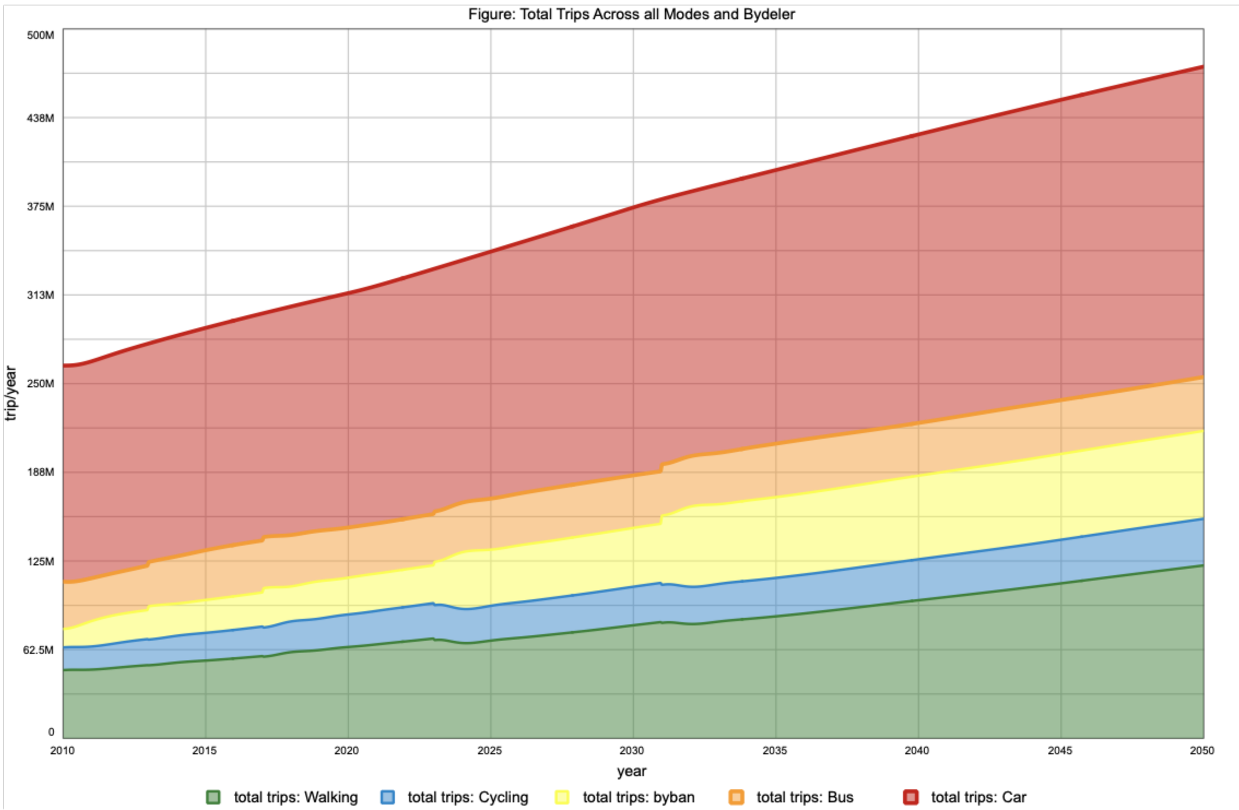
- **T1; Reduce passenger car traffic in Bergen by at least 10% by 2020 and 20% by 2030 compared with 2013.**
- **T2: Introduce zero-emission zones in parts of Bergen city centre by 2020 and make the whole city centre a zero-emission zone by 2030.**
- **T3: All growth in passenger traffic is to be in the form of walking, cycling, public transport and the use of unoccupied car seats.**
- T4: The City of Bergen shall support public transport by means of an active polity to improve traffic conditions for public transport and facilitate park-and-ride facilities for cars and bicycles.
- **T5: The capacity of vehicles on the roads shall be better utilised. The goal is to double the number of passengers per car during rush hours by 2020.**
- T6: Bergen shall promote shared mobility. One goal is to reduce the number of cars per household in Bergen – from 1.35 to 1 car per household by 2025.

- **T7: Bergen shall provide good access to renewable fuel (charging stations, hydrogen filling stations and biofuel filling stations) for vehicles and machinery in the city.**
- **T8: The City of Bergen shall encourage people to choose environmentally friendly vehicles. Zero-emission vehicles shall always have more favourable conditions than other vehicles.**
- **T9: The City of Bergen shall promote fossil-free public transport by 2020.**

T1: Reduce passenger car traffic in Bergen by at least 10% by 2020 and 20% by 2030 compared with 2013.

It should be apparent how difficult this target is. Under business as usual scenarios covered by the model, the Kommune falls well short of this target as the graph below illustrates.

Figure 54:Total Trips per Year Across all Modes and Bydeler



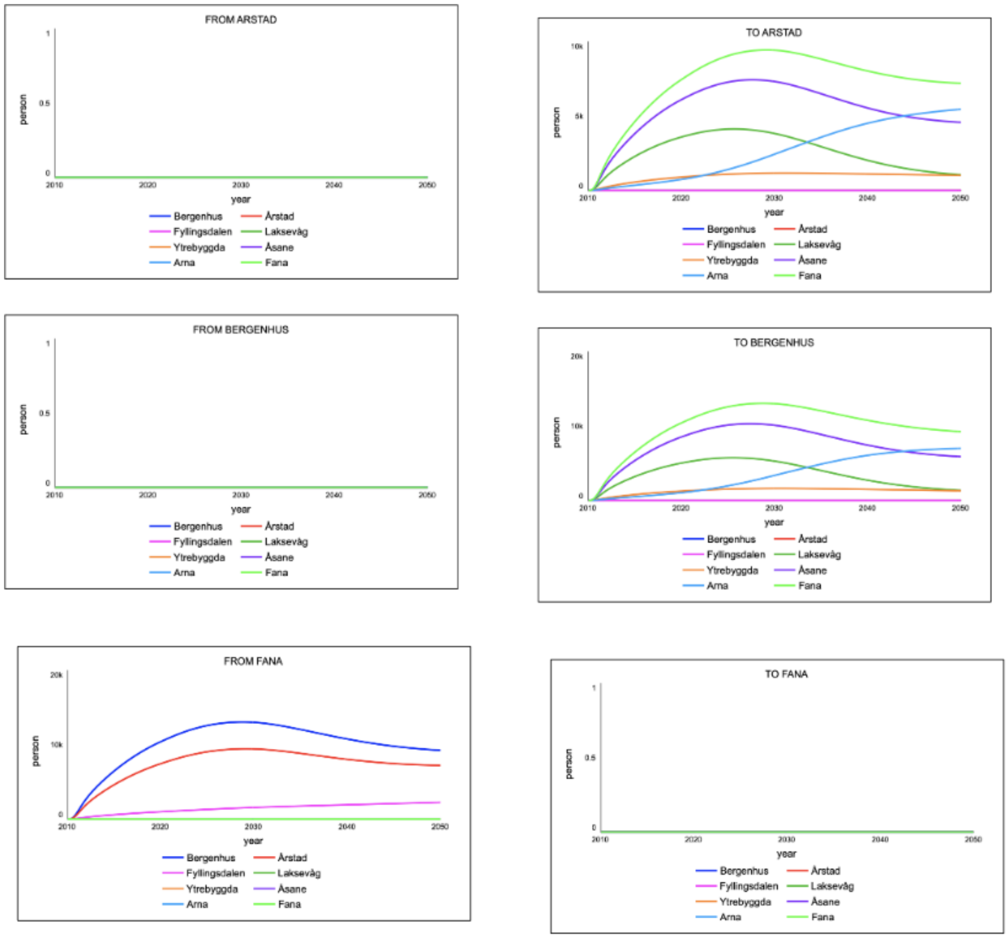
However this is not through lack of effort or wise intervention. It is simply a brute fact of population growth. Whilst the population estimations here are just that: estimations, they are founded on official statistics and it is reasonable to suppose that just by virtue of the enlarged population, larger numbers of car trips will inevitably be made. In fairness to the Kommune, the model makes no distinction here between driver and passenger. So that is to say that a car with 1 driver and 3 passengers will count as 4 car trips under this counting method. Because of that we can examine the number of cars purchased and see how this tallies with the overall number of car trips.

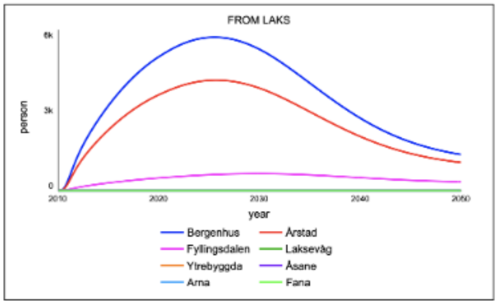
T2: Introduce zero-emission zones in parts of Bergen city centre by 2020 and make the whole city centre a zero-emission zone by 2030.

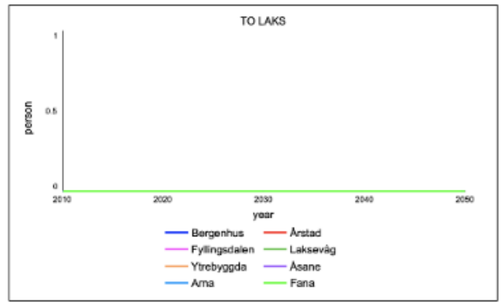
Here once again we take Bergenhus to be functionally equivalent to the city centre. A major obstacle to this goal is the attractiveness of the city centre to employers. With this being the case the vast majority of commuting occurs between Bergenhus and the surrounding areas.

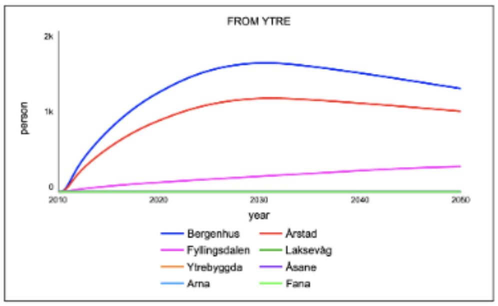
But this is also the case for services as well. Current estimates place Årstad and Bergenhus as far and away the highest rated Bydeler service score wise. This means that even non-commute travel is largely dominated by trips to one of these two Bydeler.

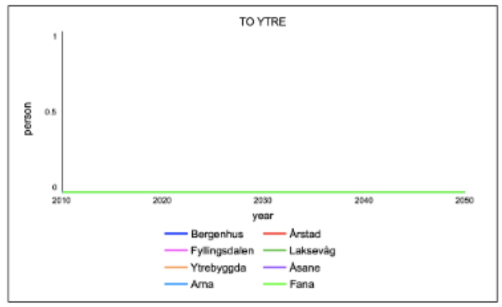
Figure 55: Endogenous: People travelling from and to given Bydeler

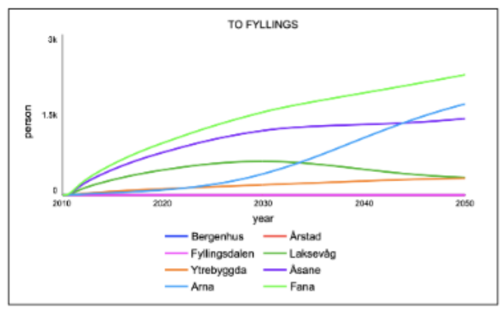


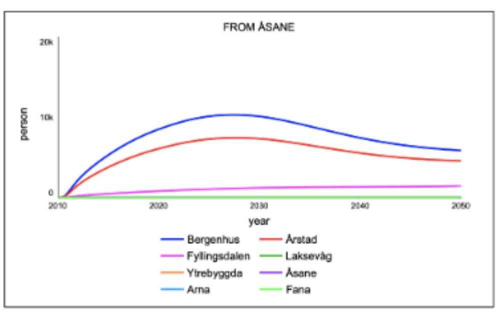


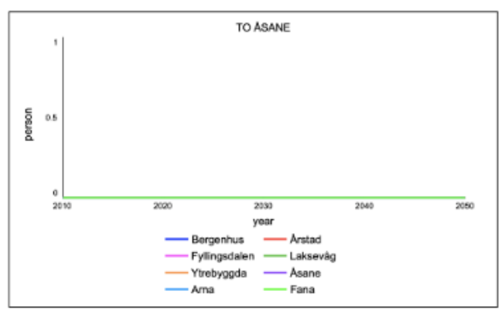


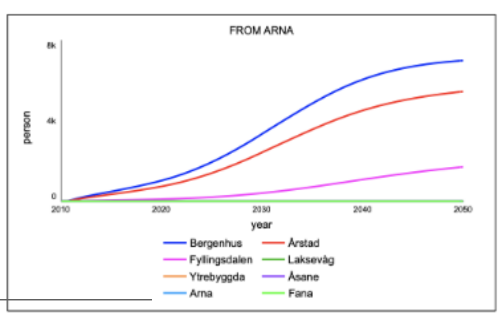


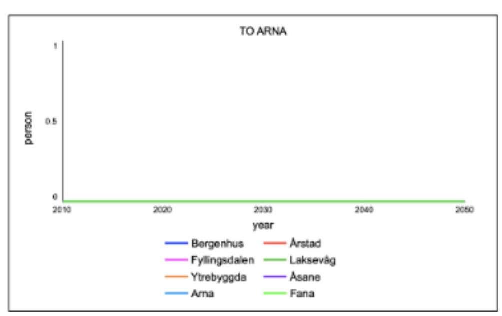












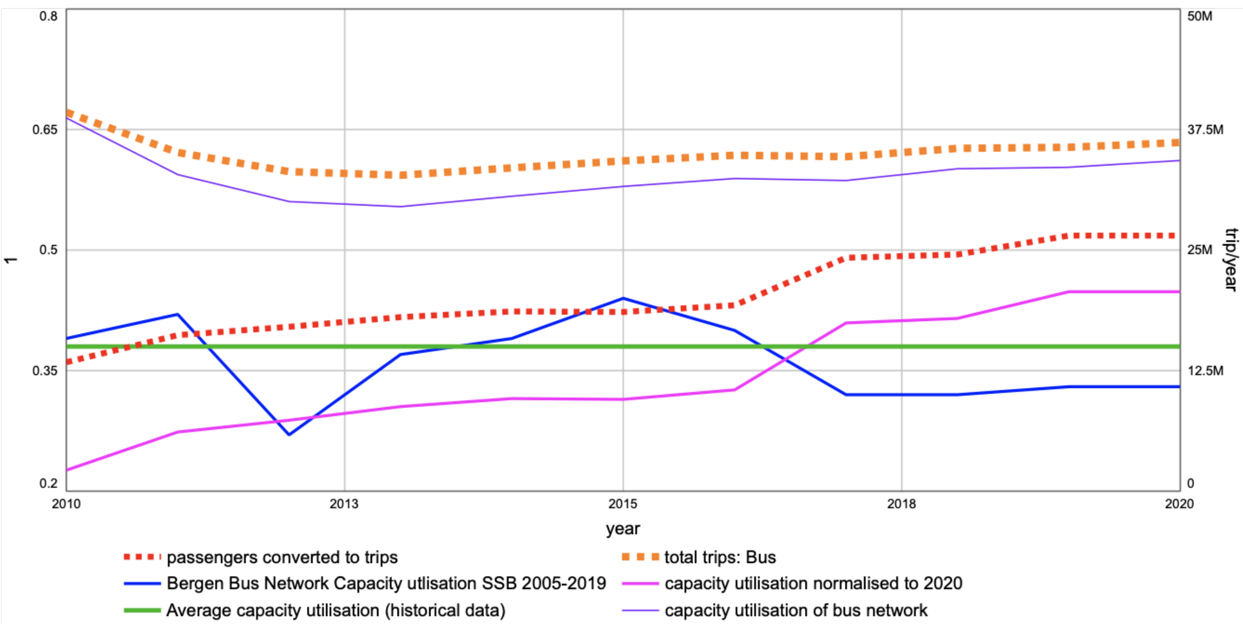
[48]

[48] The graphs are available in more detail in the model.

The above graphs display the outflow and inflow traffic over time into each Bydel. As we ca see there is little if any outflow traffic from Bergenhus and Årstad. On the other hand, almost all inflow traffic goes directly to those Bydeler.

This entails that if the Kommune wishes Bergenhus to be traffic free, it will have chosen the most difficult and disruptive Bydeler to attempt. Whilst the Byban may be able to service many, especially after its expansion, many more will be forced to rely on buses, stretching their capacity and sowing even greater discontent. Others may simply have no practical way to journey to Bergenhus other than by car. In these cases, they would either have to find work and services elsewhere, or make alternative provision.

Figure 56: Endogenous and Historical data comparison: Bus Trips and Capacity Utilisation



This alternative provision will likely be disruptive in it's own right. For example it may simply lead to further crowding around the surrounding areas, an increase in parking costs as people commute as far towards the centre as they can before changing transport mode.

Alternatively, if the traffic-free zone is imposed by further tolls, it will essentially act as a flat, potentially regressive tax on those who live in more remote areas and who cannot use alternative travel methods.

T3: All growth in passenger traffic is to be in the form of walking, cycling, public transport and the use of unoccupied car seats.

The difficulties raised with T1 also apply here, with the greatest challenge to the strategy being not necessarily altering public behaviour patterns, but altering them enough to outweigh the increase in commuting created by more or less uncontrollable exogenous factors like population growth.

T5: The capacity of vehicles on the roads shall be better utilised. The goal is to double the number of passengers per car during rush hours by 2020.

Whilst this timeframe has now past, it may still be worth examining. This goal would be functionally equivalent to the cars per inhabitant decreasing by 50% in the time frame. So if there is one car for each inhabitant, there would ultimately be 0.5 - indicating some degree of car sharing. This is not an exact measurement by any means and does not take into account the propensity to collect cars for families to have more than one. It also does not make a significant distinction between the type of cars being used - with no clear demarcation between electric, hydrogen or fossil fuel vehicles.

T7: Bergen shall provide good access to renewable fuel (charging stations, hydrogen filling stations and biofuel filling stations) for vehicles and machinery in the city.

This specific goal is not one that has been covered in great depth by the model, but at least some general comments about capacity requirements can be made. For example, the model is able to make general comments about the balance of fossil fuel cars vs non fossil fuel (largely electric) vehicles. With an x % increase in non-fossil fuel vehicles we can assume a linear x % increase in the 'demand' for charging stations. However there is likely to be a decidedly non-linear increase in the number of charging stations required to service this demand.

For instance, for most journeys, most E-car owners charge their cars at home and seldom make trips long enough to need out of home charging. Furthermore as car batteries become more efficient, charging will become less frequently required. Therefore, whilst E-car ownership may rise 50%, the number of charging stations may only increase by 25% or even less.

T8: The City of Bergen shall encourage people to choose environmentally friendly vehicles. Zero-emission vehicles shall always have more favourable conditions than other vehicles.

Whilst this is one of the less specific targets mentioned it does also give us an insight into future policy restrictions. For example, we can infer from this that if tolls were to remain, or increase, then E-cars would be charged at a lower rate than their fossil fuel counterparts - even if only by a nominal amount. As discussed, despite reservations about the thoroughness of the model in this respect, care should be taken if this is the stated goal of the tolls policy. It is likely that the most intuitive and effective policy instrumentation (taxation or subsidy) will only be in the hands of national rather than regional governments.

T8 also gives a rough idea of a hierarchy of preferences; the less polluting a vehicle or mode of transport is, the more it should be prioritised in any future policy interventions.

6. Homeworking

With this in mind, it is time now to look at a potential intervention that has not been a part of official policy. Homeworking has increased drastically in the wake of Covid-19 and its effects have been felt in almost every part of society.

At the time of writing, there are still relatively few official statistics available as to the impact of homeworking, quarantines and so forth. Therefore a certain amount of speculation and inference has been required in mapping some of the relations. As it is a situation that is still developing and new statistics are published every day, it is highly likely that by the time this study is finished, new data may come to light that contradicts its findings. It is with this proviso that we must continue.

Research and surveying from the Pew Research Centre held that already 20% of jobs were carried out remotely before the pandemic. By October 2020, 71% of workers surveyed were working remotely and 54% responded that they would like to return to this following the pandemic[49]. Given that recent events have shown that 54% is not only feasible, but implementable in a matter of weeks if not days, it is fair to assume that homeworking levels could rise to such levels again in the future - albeit with more preparation and lead-in time.

It may be some time before companies abandon high-rise offices, if they ever do, but it is entirely possible that some early adopters make the transition as soon as the next few years. Nevertheless for the foreseeable future it is likely that homeworking will increase even if only by increments - for example workers being able to take a certain number of days a week for home working purposes.

What this means is that we can draw a number of fair conclusions:

- Future homeworking percentages could be as high as 75% in the future, but a range of 20 to 50% is more likely.
- Furthermore, when represented as a percentage, this can aggregate those who work fully from home and those who work partly from home and partly from the office.

It will require some degree of speculation to gauge the effect of such home working percentages but we already know:

- That pre-2020 transport levels can function as a 20% homeworking base rate.
- Such statistics as are available for 2020 may give a preliminary indication as to the effect of 70+% levels of homeworking.
- The rate is unlikely to pass below this 20% unless other conditions change.

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[49] https://www.pewresearch.org/social-trends/2020/12/09/how-the-coronavirus-outbreak-has-and-hasnt-changed-the-way-americans-work/psdt_12-09-20_covid-work-00-0/

6.1 Linear or Nonlinear?

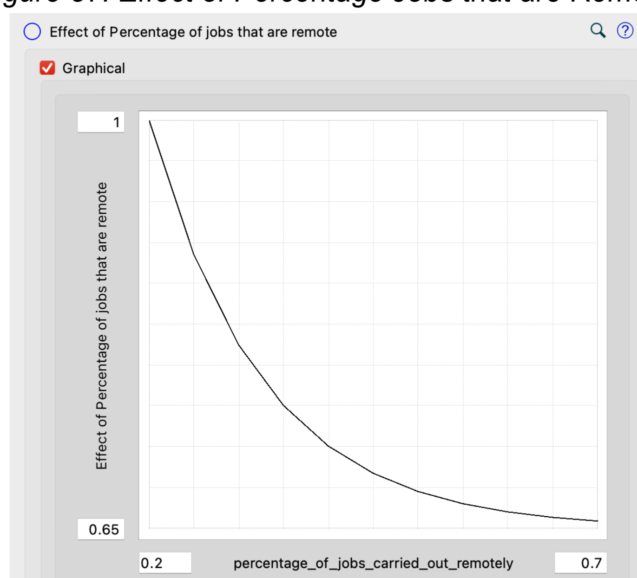
But is the relationship linear or nonlinear? Indications from literature such as Pritchard and Frøyenare that the relationship will likely be non-linear. This is because trips to central areas tend to create distractions or additional, micro-trips. For example, if one is commuting to work in the centre, one may decide to grab some food shopping on the way home. Encapsulating this in the model has proven impractical, but this does at least give us some indication of the relationship here.

As for the nature of this nonlinearity, that is a separate question. However, let us think about the non-linear relationships that we have seen previously. As we noted before, there are some trips which simply necessitate a car, that simply can be done with a Byban or bus. In the same way we can assume that some trips will still be unavoidable.

For example: A GP appointment can be conducted online, and perhaps there could be mechanisms put in place for delivering medicines, but if someone needs more specific testing, such as an MRI or CT scan, this is something that can only be done by leaving the house and going to the hospital.

As such, in the absence of concrete data, we can legitimately assume that there are diminishing returns to the numbers of trips reduced in a number of subject areas.

Figure 57: Effect of Percentage Jobs that are Remote



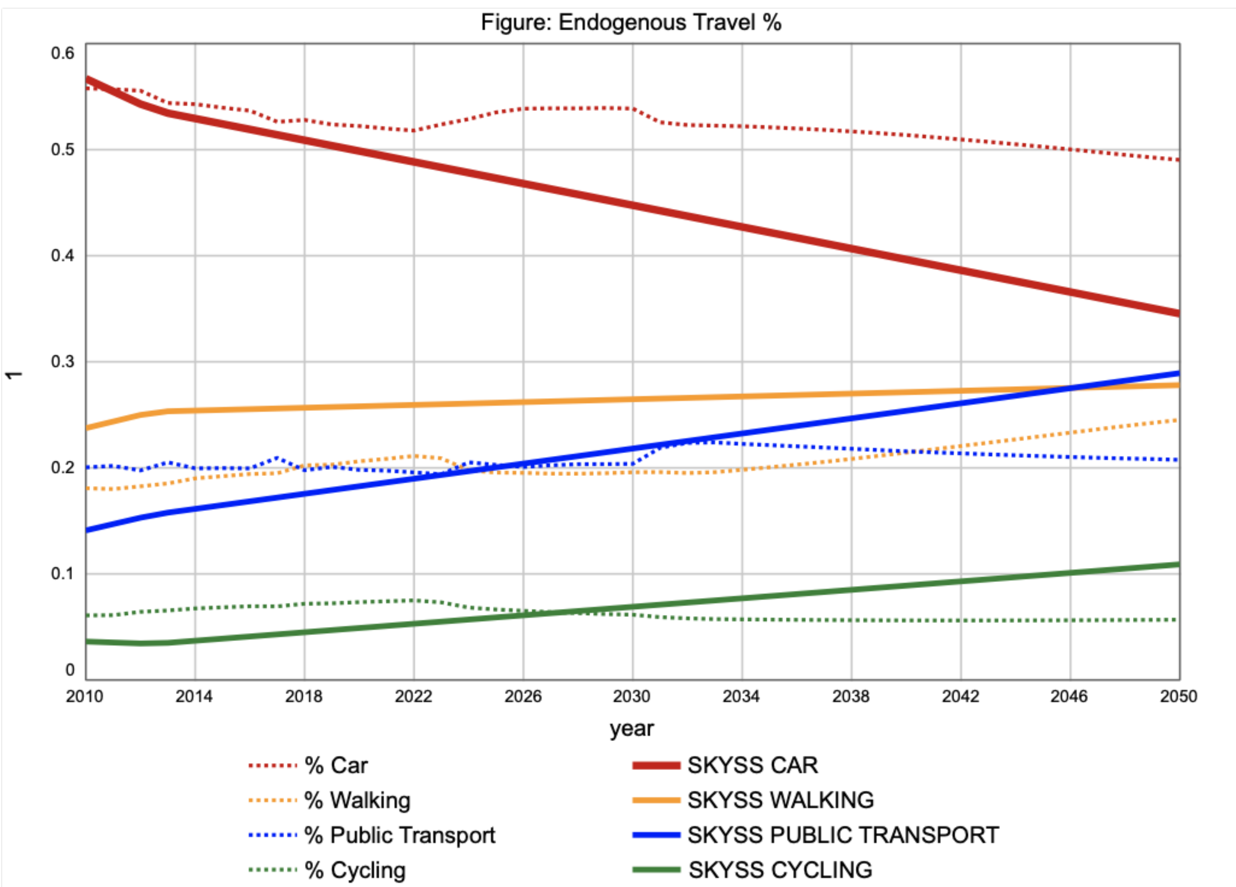
6.2 Impact on Transport Sectors

Although the difficulties in finding like-for-like figures have already been established, it appears that there is some data from the Skyss 2020 report that is applicable. Conveniently, all transport forms seem to have been roughly equally affected, with both Byban and buses showing a 35% decrease in passenger numbers from 2019 to 2020.

There are issues with this figure. The pandemic was not a steady phenomenon with home working restrictions coming and going. Furthermore, the time series does not match up neatly in the sense that 2019 = no homeworking and 2020 = all homeworking. It is likely that the reduction in public transport as a result of homeworking was in fact potentially even higher than this 35% figure indicates. On the other hand, car journeys may have replaced many hitherto public transport journeys. So the 35% figure is a flawed but nevertheless good ballpark figure from which to start.

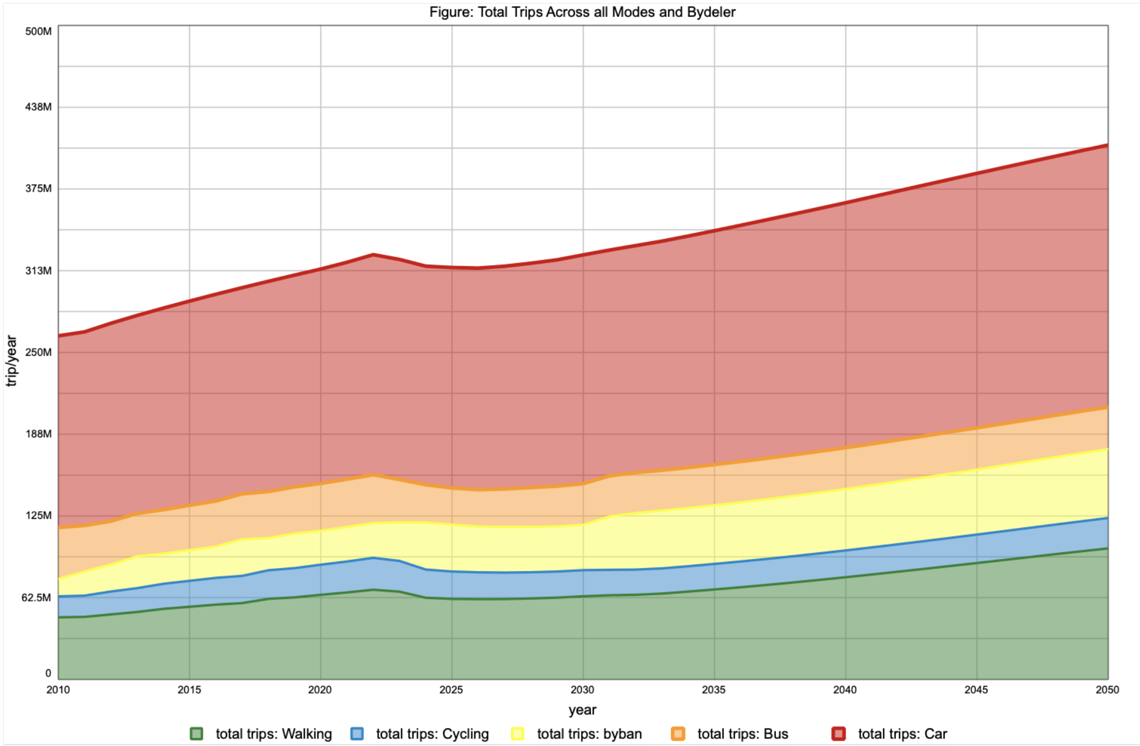
The model assumes a generous 5 year adjustment period for the implementation of home working practices. The model also assumes that only commuting journeys will be affected. In practise it may be that there are knock on effects of homeworking that either increase or decrease other trips but this is purely speculative and the conditions of Covid-19 have not been a good gauge of this.

Figure 58: Impact of 50% Homeworking from 2020 on Travel Mode %



First, the bad news. The policy seems to lead to an increase in the percentage of journeys made by car and a decrease in those made by public transport and green alternatives. However, this is not the whole story.

Figure 59: Impact of 50% Homeworking from 2020 on Total Trips



What occurs is, predictably, a significant drop in journeys overall - including those by car. The travel mode most affected would seem to be buses, though the difference is negligible.

What is notable here though is that unlike in the events of Covid-19, no one transport mode is significantly affected more than others due to a perception of ‘safety.’ People do not avoid buses and Byban trips because they are unsafe, they avoid all transport modes more or less equally because they are unnecessary.

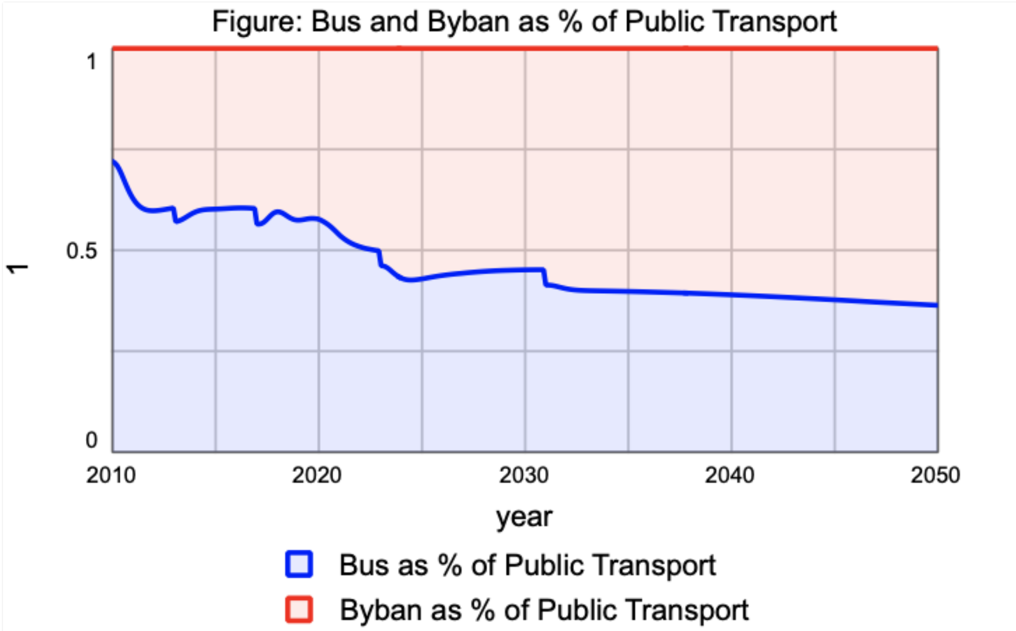
The percentage differences in how transport modes are affected is therefore a function of population distribution - and hence the distance from such jobs and services that must be traveled to.

For example, setting aside Bergen for the moment:

If a large portion of the population is located in an area which is at an optimal distance for bus travel, then bus travel will be more more impacted throughout the whole system due to the distribution of the population.

Back to Bergen: another factor at play is also the proportion of Byban to bus travel. This is something that has been shifting slowly but steadily along with the extension of the lines to other Bydeler, the increased capacity of the Byban due to its extension, and the changing distribution of Bergen’s population.

Figure 60: Buses and Byban as a % of public Transport Trips



It is likely these factors, more than any other that explain why buses are more affected. Again, whilst the difference is negligible, it is noticeable and an examination of the behaviour helps elucidate the model structure as well as the resulting behaviour.

6.3 Indirect impacts on Population

Homeworking not only has direct implications for the number of trips that people make, it also has potential implications for the kinds of housing decisions they make. These may be more subtle, and may well take longer to reveal themselves, but it is worth seeing if there are systematic and significant changes to population behaviour as a result of widespread homeworking. As before, the model examines the issue primarily through jobs:

6.3.1 Employees

With commutes now no longer (or at least, less) prevalent and/or necessary, we may assume that the weights with which employees make housing decisions will be affected.

So far these have included:

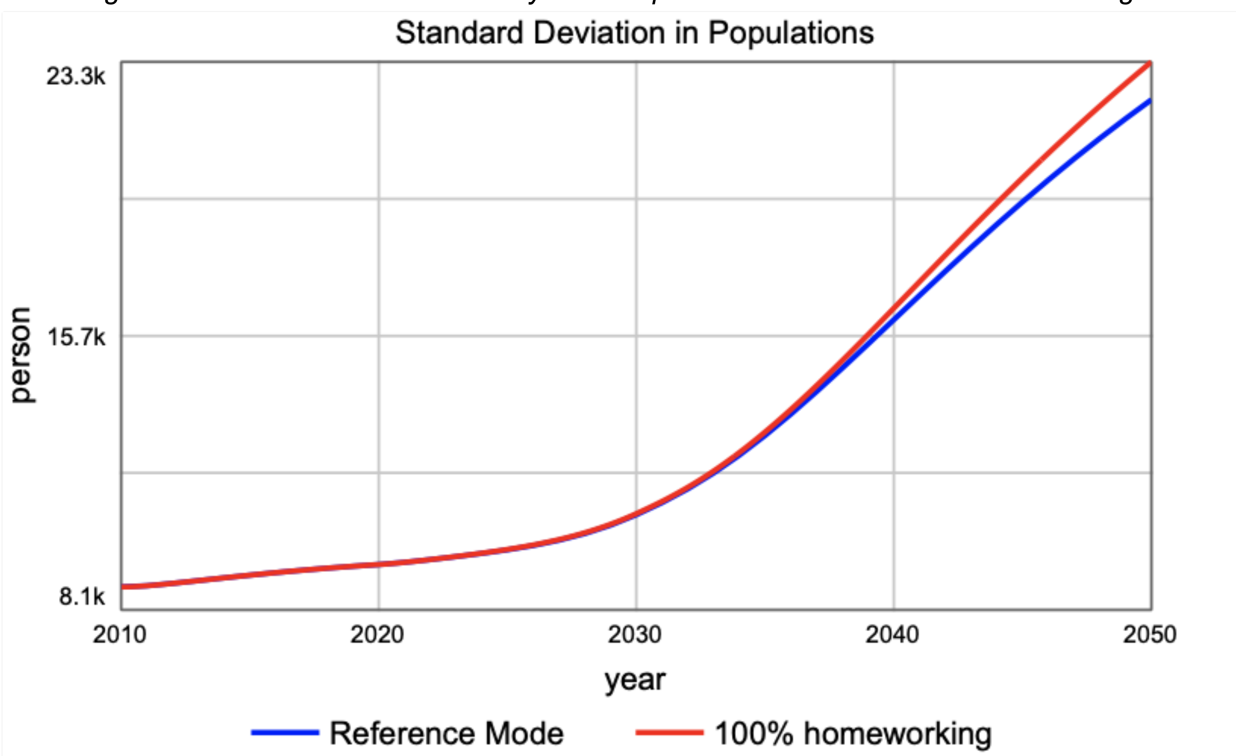
- Affordability
- Crowding
- Service Density
- Job Availability
- Travel Convenience

It is perhaps easiest to examine these in reverse. With travel no longer as frequently required - if at all - less attention need be paid to travel convenience. One can presumably live almost anywhere so long as one has access to the communications equipment that is now all but ubiquitous in the modern era.

In the same vein, the availability of jobs in the area matters less if one can work remotely. The issue is more one of whether employers will be willing to allow homeworking. This is something to examine separately, but indications are that they are with a recent Mercer report stating that 82% of employers would be willing to expand their home working options in light of recent events[50].

As for the remaining weights, these are not directly affected by home working, but instead see their significance rise proportionately to how the others fall. It is not so much that the number of services in an area matters more to you now that you can world from home, it is more that proximity to work matters less.

Figure 61: Standard Deviation in Bydeler Populations with different home working %



Despite this it appears that the effect on population distribution is extremely limited, with only the highest value creating a perceptible difference to the over all trend. Either the forces pushing towards the densification of certain Bydeler are simply too strong, or the effect of home working is simply too weak.

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50 https://www.mercer.com/our-thinking/career/the-new-shape-of-work-is-flexibility-for-all-global.html

6.3.2 Employers

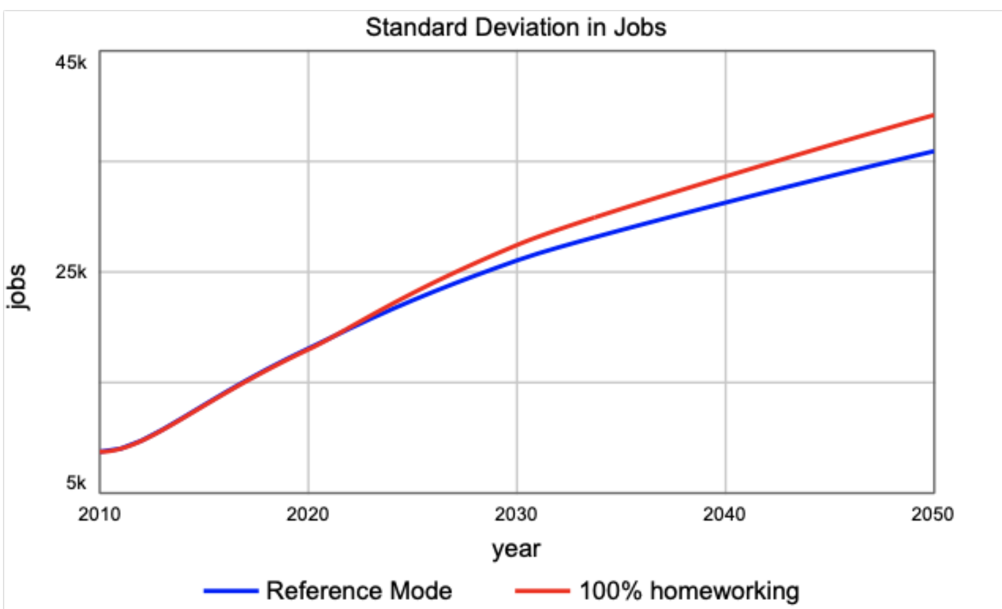
For employers the situation is similar in many ways. However, care has been taken to blunt the effects in relation to employers' preferences for large population centres. That is for a number of reasons.

Firstly, not all employers will be equally affected by homeworking - service industries for example will still need chefs and waiters. To account for all of this would likely make the model even more cumbersome than it already is so we must aggregate the effect.

Secondly, even if this is not the case, businesses will still potentially want to locate to be near customers and infrastructure. So, in an effort to approximate this, the effect of homeworking was multiplied by the fraction of jobs which are themselves able to be worked from home. This ensues a more or less linear relationship between the percentage of jobs in the local economy which are remote-working, and how much that effect plays into the decision making of employers.

Perhaps counterintuitively, we see that businesses and employers are much less reticent to move than employees in light of homeworking requirements.

Figure 62: Standard Deviation in Bydeler Jobs with different home working %



6.4 Valuable Breathing Space?

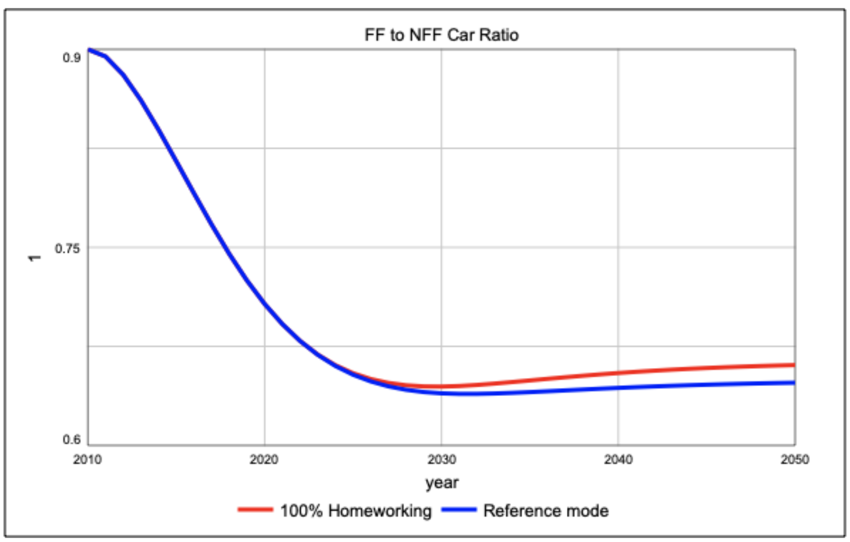
One thing that it might be valuable to examine is the combined effect of switching to home working along with e-car use. As has been seen in section 4.4.2, there is already a preexisting trend towards greater e-car purchasing in Bergen.

It may be that the greatest benefit of homeworking may be felt thus:

It has already been established that home working does not significantly alter travel mode behaviour in Bergen as these are set by a multitude of other factors. What it does do is reduce the overall number of trips meaning that if - the admittedly unrealistic figure - of 100% home working were put in place in 2020, it could be up to 10 years before total trips re-reach their 2020 levels. In the meantime, e-car ownership will have risen. This means that in comparison to the reference mode, when trips do reach their previous levels, fewer trips will have been taken in 2020-2030 when cars were more likely to run on fossil fuel. Furthermore, when trip numbers increase again, they will do so with a slightly cleaner fleet of cars, a greater percentage of which will be e-cars.

The graphs below display the difference in the percentages of fossil-fuel cars owned and the emissions created by the two scenarios. As we can see there is a problem with this scenario.

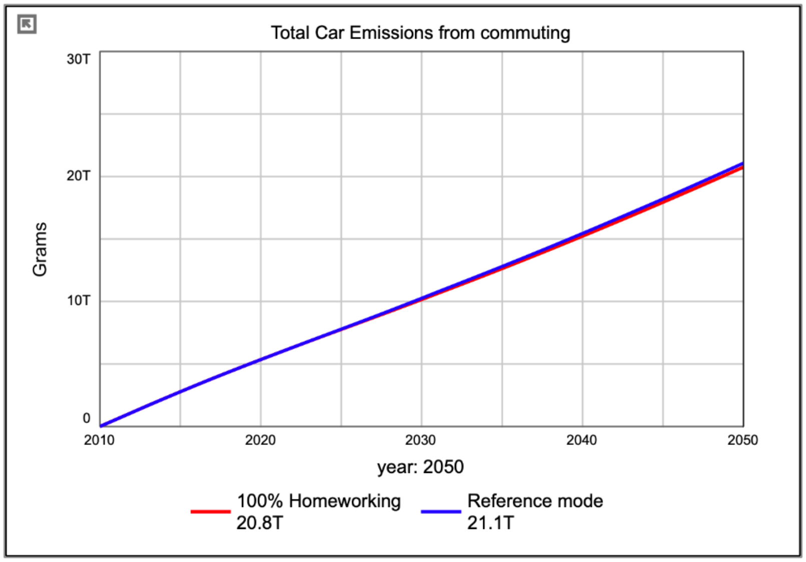
Figure 63: FF to Non-FF Car ratio under Reference Mode and 100% Home working Conditions



	FF to NFF Car Ratio
2010	0.9
2020	0.707
2030	0.639
2040	0.644
Final	0.647

Because there are fewer trips needed in the intervening years, the annual cost of owning a FF car is less than it otherwise would be - fewer trips means less money spent on fuel. Therefore there is now less of a cost incentive to switch to e-cars. However, as the graph below shows there may still be a residual benefit, even if it is not as marked as we might hope.

Figure 64: Total Emissions from 20% and 100% Homeworking scenarios. 2050 Values Shown below.

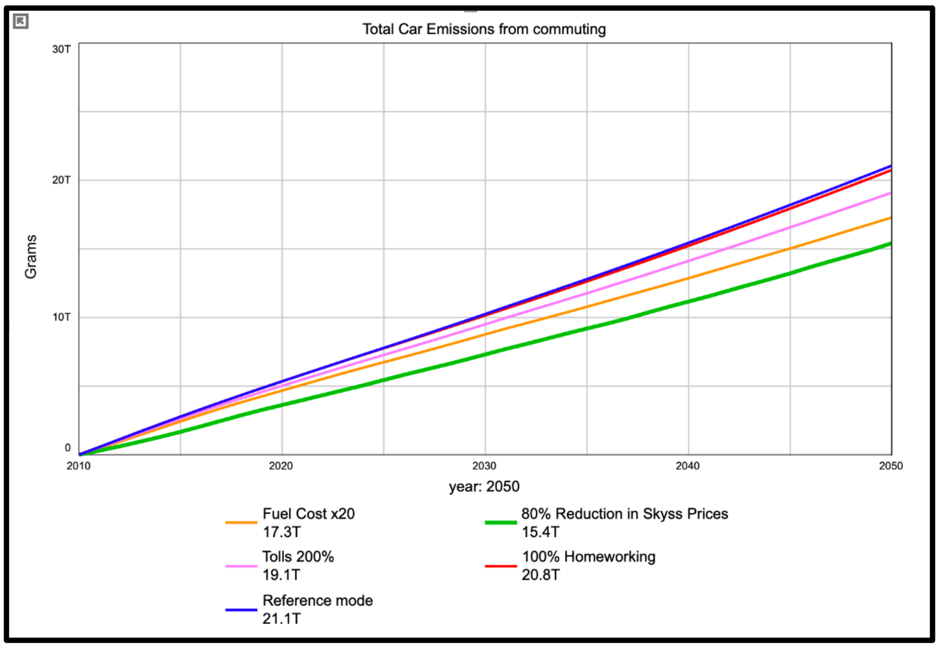

Total Car Emissions from commuting
30T
20T
10T
0
Grams
2010
2020
2030
2040
2050
year: 2050
100% Homeworking
20.8T
Reference mode
21.1T

7. Conclusions

Whilst many of the behaviour alterations thus far examined may not be as strong as policy makers might wish we can at least get an indication for the possible effectiveness of different policy interventions. The graph below gives a very rough calculation of the potential ‘emissions savings’ from most of the solutions discussed.

Please note that extreme values have been shown so as to make the relative effectiveness as clear as possible - whilst the negative consequences of each have been examined elsewhere.

Figure 65: Emissions outcomes of different extreme interventions (2050 values shown below)



Even if the end results of extreme policies are not themselves extreme, that does not mean that there is no valid learning to be taken from the model as developed.

The natural move towards greener transport modes.

- population becomes more evenly distributed due to crowding. After a delay, jobs follow. This emphasises close range transport modes more and cars less.
- But increased public trans capacity is necessary to facilitate this movement.
- The behavioural change takes decades if not centuries and needs to be sped up?

All other things being equal, there should be a natural move towards greener transport modes. This is because many of the underlying mechanisms behind population distribution create a more evenly spread population. This is based on the thought that rational agents would maximise their utility by moving as close as practically possible to work to minimise commute times and this would result in an accelerating feedback loop drawing more people into the surrounding area. The end result is that workers, on average, gradually end up closer to their work. This reduced distance causes them to choose greener transport options like walking or cycling.

However, in this as in many instances, all things are not equal.

The fact is that there are many contingent factors that mean that this oscillation will rarely if ever occur in any city. This can be in the distribution of services, the natural geography of the city and the cultural value that populations place on different aspects of city life (transport time, proximity to services, affordability and crowding). For instance, central areas of cities will usually see the highest density of services. In Bergen as in no doubt other cities, these are concentrated so heavily in the centre, that other areas can scarcely compete on these terms.

The statement ‘all things being equal’ inherently ignores a great number of significant complications - not least, demographics as has been discussed. Nevertheless, there is a valid lesson to learn here. Namely, that interventions that help to equalise the spread of populations throughout different Bydeler are likely to yield environmental gains. For instance, policy interventions that help more businesses to locate jobs in areas with higher populations might help reduce commuting outflows from those areas. In short, jobs follow people and people follow jobs.

These changes though take decades not days and policymakers, the public and even the environment itself, may not be willing or able to wait that long. Speaking of policy makers, throughout all of this a keen eye must be kept on the capacity of public services. This is likely something that they are aware of already, but it bears repeating.

Homeworking

Homeworking offers an interesting interruption to the status quo. Whilst it may seem to have potentially transformative effects if expanded far enough, indications from this study indicate otherwise. On a city-wide level, homeworking does not seem to lead to drastic changes in behaviour in and of itself. That is not to say that it’s potential effects are not considerable and worthy of note, merely that they do not fundamentally alter system behaviour. Homeworking can reduce overall journeys and this can have positive effects for pollution in the short term but does not change the overriding behavioural trends.

A significant drop in trips required would go a long way towards achieving the various environmental aims that cities may have. As we have seen, the real driver of transportation requirements in the long run is population. Even if only by reducing the number of trips that people take, homeworking can offer an - albeit temporary - respite. Furthermore, as previously hinted at, the temporary drop in trips can be taken as an opportunity to speed the implementation of other solutions - such as greater e-car uptake.

That aside it is worth remembering that home working by itself may help hit short term environmental goals but does so at great financial cost to public services that rely on the ticket revenue. This may endanger investment in capacity expansion leading to capacity utilization problems in the longer run. As we have seen, with growing population continuous expansion of capacity is needed to keep public

Furthermore, we should be conscious that this study has looked only at the city-wide level. The impact of wide scale homeworking may well have larger consequences for national and international migration patterns.

Current Policy.

The Kommune's current policy on green cars and buses has seemingly been effective and should continue if possible.

The continued expansion of the Byban would seem to be in line with the goal of not only providing greater accessibility to green transport, but also in providing the kinds of services that will enable populations to be more evenly distributed.

This is important as throughout the next 20 to 30 years and beyond, the main hurdle to overcome is in fact not necessarily population behaviour but population growth. Put simply more people mean more trips. Sadly even extensive changes in working practises such as homeworking seem unlikely to fundamentally alter this behaviour, they may only serve to provide a momentary respite. It is rather a more equal distribution of jobs and services that aids green transport modes, but this has a long, if not indefinite time frame as discussed.

The fact that the model does not allow for large changes in behaviour is likely evidence of its veracity. Large population changes typically take time unless historically significant exogenous forces - like wars, natural disasters - are at play.

Extreme solutions such as free public transport are possible, and to an extent their impact is computable, but they will likely be exceedingly and prohibitively costly. This is both in terms of lost income, but also in the extreme amounts of investment into additional capacity and transportation routes that would need to be added in order to eliminate private car travel to marginal levels.

7.1 Model Limitations

Although the limitations of the model have been discussed as openly as possible throughout the study, there still remains a number of issues that require attention. These are themselves topics for further study or simply things that must be borne in mind by readers.

Je ne sais quoi or 'Stickability'

Whilst great efforts have been made to quantify the desirability of the various Bydeler in as transparent and scientific a way as possible, there still exists an element of the indefinable in something which is as soft a concept as ‘desirability.’

Even though some areas may have empirically measurable advantages over others, people will still move in unexpected areas for contingent reasons that are not easy to predict. When looking at services, it may be that an area has a larger number of services but that one particular service in another area is more widely known or well regarded. A more thorough examination of the issue could therefore take into account quality as well as quantity of services.

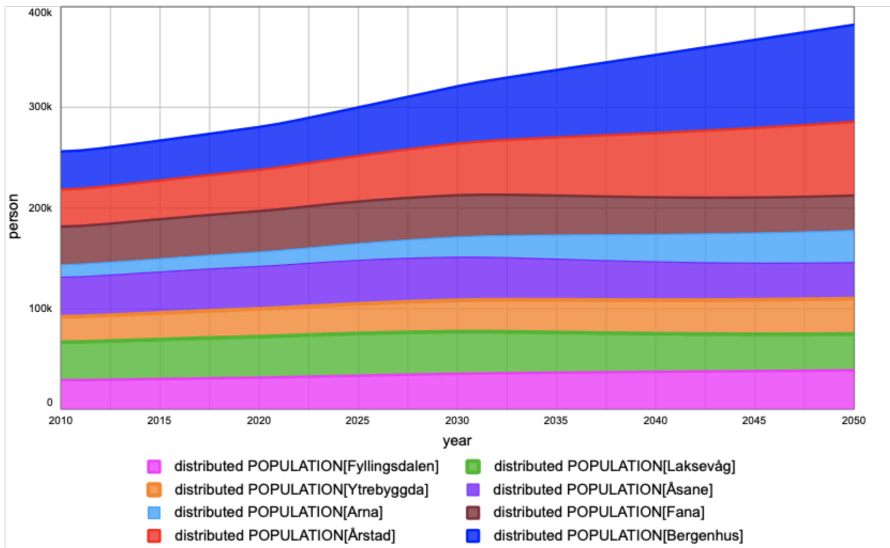
There still remains the problem that some special, intangible quality may be missed. There was some attempt to model this using a weight pertaining to a Bydeler’s proximity to the city centre, but this was ultimately abandoned. It might also be the case that certain areas have conditions that make them easier or more difficult to leave than others. This ‘stickability’ might mean that populations become less mobile once they move to an area - say perhaps unknown contingent factors make it more expensive and therefore more difficult to save up for a rental or mortgage deposit. It may simply be that we fall afoul of the eternal problem that humans seem to behave irrationally and refuse to wholly follow rational models of behaviour.

Down to atoms? Fana and Arna

There are always issues with aggregation - even if aggregation is necessary, even desirable. But this has affected two Bydeler more than most. As shown by the figure below by 2050, Arna’s population will be roughly equal to Fana’s, which will have shrunk slightly.

Only time will tell if this is eventually the case, but even a cursory look at the situation would imply that this is less likely than the model implies. The behaviour in the model is due to the excessively large area of Fana. for example: The model’s aggregation methods require that it consider’s Fana’s services spread over this vast area and therefore its service score suffers. In actuality, Fana’s situation is more akin to Årstad. It’s population is concentrated in a relatively small area of the Bydel, coincidentally along much of the Byban line.

Figure 66: Population Distribution across Bergen Bydeler



So why not simply reduce the area of Fana in the model? This has after all been done with areas that include sea and water. The problem is that this becomes somewhat of a wedge issue. Water, or coast acts as a relatively easy to identify natural barrier. The mountains which constitute much of Fana are less so. If a new building can be built just to the previous border of inhabited land and 1m high up the mountain, then why not 2? And so on. The issue seems to affect Arna almost in reverse making it more desirable than intuitively it would seem. This is especially so when one considers that there are no plans to extend the Byban significantly into Arna.

Ultimately it was decided that it was better to leave these potential inaccuracies in the model and confront them openly, than to attempt to unduly alter variables any more than might already be the case.

One obvious solution to this would be to split the city into smaller sections to enable more granular detail and differences to be observed. The concept of this is entirely correct. Should the model or something similar to it ever be used in other cities then this is certainly possible. However, at some point, gathering information on ever smaller subsections of administrative areas becomes prohibitively difficult and impractical. Nevertheless: Would more zones in the model better allow for an investigation of the 'bunching up' side-effects of zonal transport systems? It seems highly likely.

Trips

As mentioned previously, there is a greater than hoped for ambiguity in the language around 'trips.' this has been covered already but it's influence on the model outcomes means that it casts a long shadow on many of the potential learnings from the model.

In addition, the effects of urban rush hour have been aggregated into overall capacity considerations throughout the model. But there is an argument to be made for including this in any further iterations to see if more detailed modelling of the road network is fruitful.

Jobs

Although it has already been mentioned, it bears repeating that the model's conception of employers is intended to be a means to an end, rather than an accurate representation of actual job distribution in Bergen. Once again, the effect of economic growth and job creation is tangential at best to the model purview. Nevertheless jobs, or rather the type of jobs - their pay and skill/educational requirements are greatly intertwined with demographic properties of populations...

Demographics

Last but by no means least is the issue of demographics. Arguably the most glaring omission from any model that seeks to examine population movements, demographics play a huge part in both migration and transport requirements. Younger generations are typically more mobile, families typically have more income available for cars and housing. Single people are more likely to seek out certain areas than others, education levels affect the type of jobs available to a person, their disposable income and their living and lifestyle preferences.

As may be apparent already the complexities involved in the model are enough to generate enough endogenous problems. Demographic arrays would be yet more difficult. The added complexity and noise of the data might also serve to obfuscate trends and behaviour patterns could be more difficult to discern. Nevertheless it is an important omission and one that is always going to be glaring unless addressed.

7.2 Further Research

The model and study have attempted to delve into a number of topics related to bergen's environmental strategy. However, there are a number of different avenues that have become apparent throughout this thesis which may yield interesting findings if examined further.

Displaced emissions

Which the goal of being fossil free is laudable, it only examines the direct emissions of the city and not those caused elsewhere by the city's actions. (For example the pollution generated by production of e-cars.)

- What might a potential model or policy that included indirect emissions look like? Would it be radically different than what has already been suggested?
- How feasible even is it to model something of such complexity?
- Would it be possible to insert such a model into this one, or to others?

Separately, in the case of home working, the population may use far more electricity than previously simply by virtue of being spread across separate, discrete buildings rather than efficient offices. How would this compare to previous arrangements?

Applicability of different forms of modelling.

A system dynamics approach has been used throughout this study, but would other approaches yield different learnings? For instance, agent based modelling may be more relevant to some of the issues described, perhaps an ideal solution would be some amalgamation of the 2?

Other Social Impacts

Whilst aggregation has been necessary in this study we should also be mindful of the fact that not all people are affected equally by different policies and conditions. As has been mentioned, there is the glaring omission of demographics in the model, but there may also be social omissions in policy thinking.

For instance: does home working increase inequality? It would seemingly be higher, or manager level and non-physical jobs that are mostly affected. Would certain minorities therefore be more left out than others by such a widespread social change. Does homeworking increase or decrease the hours worked and/or worker efficiency? What then are the implications for mental health and burnout or staff training and development?

These questions may be peripheral to this study, but an argument can be made that they should be central to those that follow.

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9. Appendices

	Equation	Properties	Units	Documentation	Annotation
Top-Level Model:					
Cars[Bydeler](t)	Cars[Bydeler](t - dt) + (Cars_Purchasing_2[Bydeler] - Scrapping_of_Cars[Bydeler]) * dt	INIT Cars[Bydeler] = 150000/8	Car	Total cars in Bergen = 150000 150000/8 for the 8 areas of the model	
Desirability_of_Close_Housing[Bydeler](t)	Desirability_of_Close_Housing[Bydeler](t - dt) + (Change_in_desireability_of_Close_Housing[Bydeler]) * dt	INIT Desirability_of_Close_Housing[Bydeler] = pop_percentages	dmnl		
distributed_POPULATION[Bydeler](t)	distributed_POPULATION[Bydeler](t - dt) + (moving_CLOSE[Bydeler] - moving_out[Bydeler]) * dt	INIT distributed_POPULATION[Bydeler] = HISTORY(historical_data_on_pops, STARTTIME)	person	*1.18 is to make up figures to official stats on Bergen population size.	
"distributed_POPULATION_1_{BACKUP}"[Bergenhus](t)	"distributed_POPULATION_1_{BACKUP}"[Bergenhus](t - dt)	INIT "distributed_POPULATION_1_{BACKUP}"[Bergenhus] = 59000*1.17	person	*1.18 is to make up figures to official stats on Bergen population size.	

"distributed_POPULATION_1_{BACKUP}"[Årstad](t)	"distributed_POPULATION_1_{BACKUP}"[Årstad](t - dt)	INIT "distributed_POPULATION_1_{BACKUP}"[Årstad] = 40000*1.17			
"distributed_POPULATION_1_{BACKUP}"[Fyllingsdalen](t)	"distributed_POPULATION_1_{BACKUP}"[Fyllingsdalen](t - dt)	INIT "distributed_POPULATION_1_{BACKUP}"[Fyllingsdalen] = 29000*1.17			
"distributed_POPULATION_1_{BACKUP}"[Laksevåg](t)	"distributed_POPULATION_1_{BACKUP}"[Laksevåg](t - dt)	INIT "distributed_POPULATION_1_{BACKUP}"[Laksevåg] = 26000*1.17			
"distributed_POPULATION_1_{BACKUP}"[Ytrebyggda](t)	"distributed_POPULATION_1_{BACKUP}"[Ytrebyggda](t - dt)	INIT "distributed_POPULATION_1_{BACKUP}"[Ytrebyggda] = 24000*1.17			
"distributed_POPULATION_1_{BACKUP}"[Åsane](t)	"distributed_POPULATION_1_{BACKUP}"[Åsane](t - dt)	INIT "distributed_POPULATION_1_{BACKUP}"[Åsane] = 35000*1.17			

"distributed_POPULATION_1_{BACKUP}"[Arna](t)	"distributed_POPULATION_1_{BACKUP}"[Arna](t - dt)	INIT "distributed_POPULATION_1_{BACKUP}"[Arna] = 11000*1.17			
"distributed_POPULATION_1_{BACKUP}"[Fana](t)	"distributed_POPULATION_1_{BACKUP}"[Fana](t - dt)	INIT "distributed_POPULATION_1_{BACKUP}"[Fana] = 16000*1.17			
Electric_Cars[Bydeler](t)	Electric_Cars[Bydeler](t - dt) + (Purchasing_of_Electric_Cars[Bydeler] - Ecar_scrapping[Bydeler]) * dt	INIT Electric_Cars[Bydeler] = Cars*0.1	car	(43000+39849)/115000 https://www.ssb.no/en/statbank/table/11823/ https://www.ssb.no/en/statbank/table/11823/tableViewLayout1/ 11823: Registered vehicles, by region, type of fuel, contents and year Personbil (inc RR Calculations)	
FF_Cars[Bydeler](t)	FF_Cars[Bydeler](t - dt) + (Purchasing_of_FF_Cars[Bydeler] - FF_Car_Scrapping[Bydeler]) * dt	INIT FF_Cars[Bydeler] = Cars*0.9	car	(43000+39849)/115000 https://www.ssb.no/en/statbank/table/11823/	

Jobs[Bydeler](t)	Jobs[Bydeler](t - dt) + (Change_in_number_of_jobs[Bydeler] - jobs_moving[Bydeler]) * dt	INIT Jobs[Bydeler] = distributed_POPULATION/ jobs_per_person	jobs	https://www.ssb.no/en/statbank/table/09890/tableViewLayout1/	
Jobs_Historical[Bergenhus](t)	Jobs_Historical[Bergenhus](t - dt)	INIT Jobs_Historical[Bergenhus] = 70000	jobs		
Jobs_Historical[Årstad](t)	Jobs_Historical[Årstad](t - dt)	INIT Jobs_Historical[Årstad] = 22000			
Jobs_Historical[Fyllingsdalen](t)	Jobs_Historical[Fyllingsdalen](t - dt)	INIT Jobs_Historical[Fyllingsdalen] = 10000			
Jobs_Historical[Laksevåg](t)	Jobs_Historical[Laksevåg](t - dt)	INIT Jobs_Historical[Laksevåg] = 8000			
Jobs_Historical[Ytrebyggda](t)	Jobs_Historical[Ytrebyggda](t - dt)	INIT Jobs_Historical[Ytrebyggda] = 20000			
Jobs_Historical[Åsane](t)	Jobs_Historical[Åsane](t - dt)	INIT Jobs_Historical[Åsane] = 13000			
Jobs_Historical[Arna](t)	Jobs_Historical[Arna](t - dt)	INIT Jobs_Historical[Arna] = 3500			

Jobs_Historical[Fana](t)	Jobs_Historical[Fana](t - dt)	INIT Jobs_Historical[Fana] = 16000			
km_driven_externally[Bydeler, Bydeler](t)	km_driven_externally[Bydeler, Bydeler](t - dt) + (km_driven_per_year_internally_1[Bydeler, Bydeler]) * dt	INIT km_driven_externally[Bydeler, Bydeler] = 0	km		
km_driven_internally[Bydeler](t)	km_driven_internally[Bydeler](t - dt) + (km_driven_per_year_internally[Bydeler]) * dt	INIT km_driven_internally[Bydeler] = 0	km		
main_population(t)	main_population(t - dt) + (births) * dt	INIT main_population = HISTORY(Projected_Bergen_population, STARTTIME)	person		
Perceived_Buyer_preference_ratio[Bydeler](t)	Perceived_Buyer_preference_ratio[Bydeler](t - dt) + (Updating_of_Buyer_Preference_Ratio[Bydeler]) * dt	INIT Perceived_Buyer_preference_ratio[Bydeler] = 0.9	dmnl		
percentage_of_jobs_carried_out_remotely(t)	percentage_of_jobs_carried_out_remotely(t - dt) + (change_in_homeworking) * dt	INIT percentage_of_jobs_carried_out_remotely = 0	dmnl		

Total_Car_Emissions_from_commuting(t)	Total_Car_Emissions_from_commuting(t - dt) + (Emissions_per_Year) * dt	INIT Total_Car_Emissions_from_commuting = 0	Grams		
births	(Projected_Bergen_population-main_population)/per_year		people/year		
Cars_Purchasing_2[Bydeler]	Scrapped_Cars_Replaced + Purchasing_of_cars		car/Years		
Change_in_desireability_of_Close_Housing[Bydeler]	(Desirability_of_Housing-Desirability_of_Close_Housing)/Time_to_update_Housing_Preference		Per Year		
change_in_homeworking	(desire_hmw_2020-percentage_of_jobs_carried_out_remotely)/time_to_adjust_homeworking_%		per year		
Change_in_number_of_jobs[Bydeler]	((jobs_per_person_moving+SUM(jobs_moving))*Relative_Employer_Desirability) {SMTH3(jobs_per_person_moving*Relative_Employer_Desirability, TIME_FOR_JOBS_TO_MOVE)}		jobs/year		
Ecar_scrapping[Bydeler]	Electric_Cars/average_car_lifetime_1		car/Years		
Emissions_per_Year	km_driven_by_FF_cars*CO2_per_km		Grams/Years		

FF_Car_Scrapping[Bydeler]	FF_Cars/ average_car_lifetime_1		car/ Years		
jobs_moving[Bydeler]	("%_of_jobs_that_move_each_year" *Jobs)/per_year		jobs/year		
km_driven_per_year_internally[Bydeler]	Km_traveled_for_comuting_internally+km_driven_for_services_internally		Kilometers/Years		
km_driven_per_year_internally_1[Bydeler, Bydeler]	Km_traveled_Externally+total_km_driven:_external_services		Kilometers/Years		
moving_CLOSE[Bydeler]	(people_moving*Adjusted_Desirability_of_Housing) {(Adjusted_Desirability_of_Housing*((moving_out)-SUM(distibruted_POPULATION)))/ Time_to_move_home} {MIN(max_population_actually_able_to_move, Population_wanting_to_move-distibruted_POPULATION)/ Time_to_move_home}		people/ year		
moving_out[Bydeler]	("%_of_population_actually_willing_to_move"*distributed_POPULATION)/per_year		people/ year		
Purchasing_of_Electric_Cars[Bydeler]	Cars_Purchasing* "%_of_cars_purchased_that_are_Electric"		car/ Years		

Purchasing_of_FF_Cars[Bydeler]	Cars_Purchasing*"%_of_cars_purchased_that_are_FF"		car/Years		
Scrapping_of_Cars[Bydeler]	Cars/average_car_lifetime		car/Years		
TOTAL_km_Driven_per_year	total_internal_km_driven_per_year+total_external_km_driven_per_year		Kilometers/Years		
Updating_of_Buyer_Preference_Ratio[Bydeler]	(Indicated_Buyer_preference_ratio-Perceived_Buyer_preference_ratio)/Time_to_update_Buy_Preference_Ratio		Per Year		
"trip/person.yr"	commuting_trips_per_person+"Non-commute_trips_per_person_per_year"		trip/person/year		
"%_change_in_Estations_required"[Bydeler]	((Estations_required/INIT(Estations_required))*100)-100		dmnl		
"%_commuting_externally"[Bydeler]	MAX(0, "%_commuting_FOR_SERVICES"*-1)		1		
"%_commuting_FOR_SERVICES"[Bydeler]	normalised_relative_service_attractiveness_of_area/total_service_score		1		
"%_commuting_for_work"[Bydeler]	"%_theoretical_jobless"		1		
"%_commuting_internally"[Bydeler]	MAX(0, "%_commuting_FOR_SERVICES")		1		
"%_commuting_to_destination"[Bydeler]	SMTH3("%_of_Bergens_available_Jobs_Bydeler", 1)		dmnl		DELAY CONVERTER

"%_days_of_rain_per_year"	240/365		1	https://www.lifeinnorway.net/bergen-weather/#:~:text=On%20average%2C%20Bergen%20'enjoys',365%20days%20of%20the%20year.	
"%_difference_between_historical_and_endog_pop"[Bydeler]	distributed_POPULATION/historical_data_on_pops		1		
"%_likelihood_of_able_to_walk_or_cycle_to_work"[Bydeler]	1-"%_theoretical_jobless"		1	In theory if an area's jobs = population then all inhabitants should be able to commute to work without significant use of auto transport	
"%_OF_BERGEN_Population"[Bydeler]	distributed_POPULATION/Projected_Bergen_population		1		
"%_of_bergen's_population_density"[Bydeler]	population_density/SUM(population_density)		1		
"%_of_Bergens_available_Jobs_Bydeler"[Bydeler]	SAFEDIV(Available_jobs_by_area, TOTAL_available_jobs,0)		dmnl		
"%_of_cars_purchased_that_are_Electric"[Bydeler]	1-Perceived_Buyer_preference_ratio		dmnl	22000/115000 https://www.ssb.no/en/statbank/table/11823/tableViewLayout1/	
"%_of_cars_purchased_that_are_FF"[Bydeler]	Perceived_Buyer_preference_ratio		dmnl	(43000+39849)/115000 https://www.ssb.no/en/statbank/table/11823/	
"%_of_cars_that_are_FF"	SUM(FF_Cars)/SUM(Cars)		1		
"%_of_jobless_per_bydeler"[Bydeler]	"Excess_People_(Population-Jobs)"/total_looking_for_work		1		

"%_of_jobs_that_move_each_year"	0.1		1	Variable chosen to equal population movement percentage	
"%_of_population_actually_willing_to_move"	0.1		dmnl	https://www.movebuddha.com/blog/moving-industry-statistics/#sources https://www.census.gov/topics/population/migration/guidance/calculating-migration-expectancy.html extrapolated from US Survey: 0.1	
"%_of_scrapped_cars_replaced"[Bydeler]	"%_people_still_using_cars" {1}		dmnl		
"%_people_still_using_cars"[Bydeler]	1-likelihood_of_relying_on_other_other_transport_options_vs_purchasing_a_car		1		
"%_public_transport"	trip%:_bus+trip%:_byban		1		
"%_theoretical_jobless"[Bydeler]	"Excess_People_(Population-Jobs)"/distributed_POPULATION		1		
"%_travel_to_destination"[Bydeler]	"%_commuting_externally"		dmnl		
"/per_car"	1		1/car		
"/trip"	1		trip		
"/trip_1"	1		trip		
"1"	1		1		

Actual_Likelihood_of_using_a_Bus[Bydeler, Bydeler]	Likelihood_of_using_transport_mode_after_costs_considered:_BUS*Effect_of_perceived_congestion_on_travel_preference*effect_of_capacity_utilisation_on_bus_travel_preferences		1		
Actual_Likelihood_of_using_a_Bus_1[Bydeler, Bydeler]	Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2*Effect_of_perceived_congestion_on_travel_preference_1*effect_of_capacity_utilisation_on_bus_travel_preferences		1		
Actual_Likelihood_of_using_a_Bus_INTERNAL[Bydeler]	Likelihood_of_using_transport_mode_after_costs_considered:_BUS_1*Effect_of_perceived_congestion_on_travel_preference_INTERNAL*effect_of_capacity_utilisation_on_bus_travel_preferences		1		
Actual_Likelihood_of_using_a_Bus_INTERNAL_1[Bydeler]	Likelihood_of_using_transport_mode_after_costs_considered:_BUS_3*Effect_of_perceived_congestion_on_travel_preference_INTERNAL_1*effect_of_capacity_utilisation_on_bus_travel_preferences		1		

Actual_Likelihood_of_using_a_Car[Bydeler, Bydeler]	Effect_of_perceived_congestion_on_travel_preference * Likelihood_of_using_transport_mode_after_costs_considered:_CAR		1		
Actual_Likelihood_of_using_a_Car_1[Bydeler, Bydeler]	Effect_of_perceived_congestion_on_travel_preference_1 * Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2		1		
Actual_Likelihood_of_using_a_Car_INTERNAL[Bydeler]	Effect_of_perceived_congestion_on_travel_preference_INTERNAL * Likelihood_of_using_transport_mode_after_costs_considered:_CAR_1		1		
Actual_Likelihood_of_using_a_Car_INTERNAL_1[Bydeler]	Effect_of_perceived_congestion_on_travel_preference_INTERNAL_1 * Likelihood_of_using_transport_mode_after_costs_considered:_CAR_3		1		
Actual_Likelihood_of_using_BYBANEN[Bydeler, Bydeler]	MAX(0, Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen * "Effect_of_perceived_BYBAN_congestion_on_travel_preference_-_all_Bydeler")		1		

Actual_Likelihood_of_using_BYBANEN_2[Bydeler, Bydeler]	MAX(0, Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2 * "Effect_of_perceived_BYBAN_congestion_on_travel_preference_-_all_Bydeler")		1		
Actual_Likelihood_of_using_BYBANEN_3[Bydeler]	MAX(0, Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_3 * "Effect_of_perceived_BYBAN_congestion_on_travel_preference_-_all_Bydeler")		1		
Actual_Likelihood_of_using_BYBANEN_INTERNAL[Bydeler]	MAX(0, Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_1 * "Effect_of_perceived_BYBAN_congestion_on_travel_preference_-_all_Bydeler")		1		
"Additional_Tax/ Subsidy_on_FF_car"	0		dmnl		
"Additional_Tax/ Subsidy_on_NFF_car"	0		dmnl		
Adjusted_costs_of_social_services[Bydeler]	effect_of_population_density_on_public_service_costs *"likely_breakdown_of_social_services_costs_across_bydeler_in_2019/20"		NOK/yr		

Adjusted_costs_of_social_services_total	SUM(Adjusted_costs_of_social_services)		NOK/yr		
Adjusted_Desirability_of_Housing[Bydeler]	Desirability_of_Close_Housing/ SUM_Desirability_of_ALL_Housing		dmnl		

Affordability_of_Housing[Bydeler]	house_price_to_wage_ratio		dmnl	Originally a further graphical function was added here which related the wage to house price ratio to real dimensions. For example: a non linear relation where: If house prices were almost infinitesimally smaller than annual wages, people would buy at least two and, in the reverse, if house prices were ten times the average wage, no one would buy any houses. However this was abandoned in favour of a simpler, relative equation. This takes into account the market's natural ability to find solutions. For example, if housing everywhere became universally unaffordable (say, many hundrends of times a person's annual salary), no doubt different credit arrangements would be made by either public or private intervention to stop a city becoming a ghost town. What this approaches loses in accuracy in this specific case, it makes up for in cross-cultural usability.	

Affordability_of_Housing_1[Bydeler]	GRAPH(house_price_to_wage_ratio) Points: (0.00, 2.000), (0.666666666667, 1.56042672805), (1.33333333333, 1.21401534642), (2.00, 0.941865173448), (2.66666666667, 0.728710380048), (3.33333333333, 0.562266350795), (4.00, 0.432683790825), (4.66666666667, 0.332094791157), (5.33333333333, 0.254237016858), (6.00, 0.194143950383), (6.66666666667, 0.147890716638), (7.33333333333, 0.11238644688), (8.00, 0.085205415577), (8.66666666667, 0.0644503179101), (9.33333333333, 0.0486420558555), (10.00, 0.0366312777775)		dmnl		GF EXTRAPOLATED
Aggregated_likelihood_of_using_a_car_across_all_Bydeler[Bydeler]	likelihood_of_using_a_car_accounting_for_distance*effect_cost_of_journey_on_likelihood_of_using_a_car_vs_public_transport		dmnl		

Annual_Car_Journey_Costs[Bydeler]	(trips_per_car_lifetime*"Trip-Weighted_Average_Cost_of_Journeys"/"/per_car")/per_year		NOK/yr		
Annual_Cost_of_Car[Bydeler]	(AVERAGE_COST_OF_CAR/average_car_lifetime)+Annual_Car_Journey_Costs		nok/year		
Annual_Cost_of_Skyss_Pass	8000 {4000*2}		nok/year		
Annual_Normal_Carrying_capacity_of_BYBANEN	total_capacity_per_year/person_per_trip		trip/year	Max number of vehicles at once	
Annual_Normal_Carrying_capacity_of_BYBANEN_INTERNAL[Bydeler]	(50000*365)/8		trips	Max number of vehicles at once	
Annual_Reference_Cost_of_Car[Bydeler]	"REF_TRIP_COST_(SPREAD)_EXTERNAL"		nok/year		
Annual_Reference_Cost_of_Car_1[Bydeler]	"REF_TRIP_COST_(SPREAD)_INTERNAL"		nok/year		
approx_FF_toll_cost_per_journey[Bydeler]	((56+51+75+123)/4)		nok/trip	https://www.miljoloftet.no/detteerMiljoloftet/Bompenger/ofte-stilte-sporsmal-og-svar/	
"approx_FF_toll_cost_per_journey_(on/off)"[Bydeler]	approx_FF_toll_cost_per_journey * "tolls_on/off"		nok/trip	https://www.miljoloftet.no/detteerMiljoloftet/Bompenger/ofte-stilte-sporsmal-og-svar/	
Area_of_BYDELER[Bergenhus]	8.73{26.58 with sea}*ECT:_Area_checking		Square Kilometers		
Area_of_BYDELER[Årstad]	8.47{14.78 with sea}*ECT:_Area_checking				

Area_of_BYDELER[Fyllingsdalen]	18.84*ECT:_Area_checking				
Area_of_BYDELER[Laksevåg]	32.72*ECT:_Area_checking				
Area_of_BYDELER[Ytrebyggda]	39.61*ECT:_Area_checking				
Area_of_BYDELER[Åsane]	71.01*ECT:_Area_checking				
Area_of_BYDELER[Arna]	102.44*ECT:_Area_checking				
Area_of_BYDELER[Fana]	159.7*ECT:_Area_checking				
"Arstad_-_Fana_2013"	0+STEP(1, 2013) {Nesttun – Lagunen 2013}		1		
"Asane_Arna_nok/_square_km"	33500		NOK/ square meter	https://www.krogsveen.no/prisstatistikk/bergen-fana https://bonansa.no/index.html%3Fp=5419.html	
Available_jobs_by_area[Bydeler]	MAX(0, "Excess_Jobs_in_Area_(Jobs_-_Population)")		jobs		
average_capacity_utilisation_historical_until_2019	0.38		1		
Average_Car_fuel_consumption	9		km/l	https://fcr-ccc.nrcan-rncan.gc.ca/en c. 12L/100 km =0.12L/km = 8.3km/L 9km/l	

average_car_lifetime	8		yr	various interenet sources use 8 years as general gauge: https://www.cashcarsbuyer.com/whats-the-average-lifespan-of-a-car/ (Due to the division by dmnl variable Stella does not seem to recognise the 'yr' unit. Switching to the suggested unit actually increases unit warnings)	
average_car_lifetime_1	average_car_lifetime		yr	various interenet sources use 8 years as general gauge: https://www.cashcarsbuyer.com/whats-the-average-lifespan-of-a-car/ (Due to the division by dmnl variable Stella does not seem to recognise the 'yr' unit. Switching to the suggested unit actually increases unit warnings)	
Average_commute_distance_EXTERNAL[Bydeler]	IF Distance_to_Commute_area[Bydeler,Bydeler] > 0 THEN MEAN(Distance_to_Commute_area) ELSE MEAN(Distance_to_Commute_area)		km		
Average_commute_distance_EXTERNAL_1[Bydeler]	MEAN(Distance_to_Commute_area_1)		km		
Average_commute_distance_EXTERNAL_services[Bydeler]	Average_commute_distance_EXTERNAL_1		km		
AVERAGE_COST_OF_CAR	(average_cost_of_NFF+average_cost_of_FF_car)/2		nok		

Average_cost_of_car_journey_INTERNAL[Bydeler]	Weighted_Average_cost_of_car_journey_INTERNAL		nok/trip		
Average_cost_of_car_spread_out_over_trip[Bydeler]	(AVERAGE_COST_OF_CAR/ trips_per_car_lifetime)/per_car		nok/trip		
average_cost_of_Electric_Car_journey_EXTERNAL[Bydeler]	Electric_other_costs+Electric_fuel_costs+Electric_toll_cost_per_journey+maintainance_cost_per_trip_Electric_Car		NOK/trip		
average_cost_of_Electric_Car_journey_INTERNAL[Bydeler]	Electric_other_costs_1+Electric_fuel_costs_1+Electric_toll_cost_per_journey_1+maintainance_cost_per_trip_Electric_Car_1		NOK/trip		
average_cost_of_FF_car	"average_pre-tax_cost_of_FF_car_1"*(1+"Additional_Tax/ Subsidy_on_FF_car")		nok		
average_cost_of_FF_car_journey_EXTERNAL[Bydeler]	FF_fuel_costs+"approx_FF_toll_cost_per_journey_(on/ off)"+FF_other_costs+maintainance_cost_per_trip_FF_Car		nok/trip		
average_cost_of_FF_car_journey_INTERNAL[Bydeler]	FF_fuel_costs_1+ FF_toll_cost_per_journey_1+FF_other_costs_1+maintainance_cost_per_trip_FF_Car_1		nok/trip		

average_cost_of_NFF	("average_pre-tax/ subsidy_cost_of_NFF_car"*(1+"Additional_Tax/ Subsidy_on_NFF_car"))*reduced_costs_of_Ecar_manufacturing		nok		
"average_cost_of_public_transport_journey_(HISTORICAL_DATA)"	390		nok/trip		
Average_distance_between_facilities[Bydeler]	(SQRT(Average_distribution_of_facilities))*2		km	average distance between services adjusted for density (*2 to indicate return journeys) - shows unit warning due to Stella being unable to resolve distance equation	
Average_distance_to_commute_internal[Bydeler]	Distance_to_Commute_INTERNAL		km		
Average_distance_to_destination_EXTERNAL[Bydeler]	SUM(Distance_to_Commute_area[*,Bydeler])/7		km	Average Distance from each area to this one: Average of the Weighted Sum of distances from each area to this one. That is, weighted by the number of people travelling to them.	
Average_distribution_of_facilities[Bydeler]	(1/ total_fac_per_sqKM)		Kilometers^2/ Facilities	spacing = spacing = √(1 / density)	

Average_Home_size[Bergenhus]	95		square meter	https://relocation.no/expat-communities/relocation-to-norway/#:~:text=A%20normal%20size%20of%20a,bedroom%20flat%20is%2080%20sqm. " A normal size of a 4 bedroom house with 2 baths is 200 sqm. A master bedroom is 14 sqm. An average size on a 2 bedroom flat is 80 sqm." Figures as an average from: https://www.ssb.no/en/statbank/table/04301/tableViewLayout1/	
Average_Home_size[Årstad]	97				
Average_Home_size[Fyllingsdalen]	125				
Average_Home_size[Laksevåg]	116				
Average_Home_size[Ytrebyggda]	156				
Average_Home_size[Åsane]	133				
Average_Home_size[Arna]	139				
Average_Home_size[Fana]	149				

Average_Home_size_1[Bydeler]	Reference_Average_Home_size		square meter	https://relocation.no/expat-communities/relocation-to-norway/#:~:text=A%20normal%20size%20of%20a,bedroom%20flat%20is%2080%20sqm. " A normal size of a 4 bedroom house with 2 baths is 200 sqm. A master bedroom is 14 sqm. An average size on a 2 bedroom flat is 80 sqm."	

average_journeys_per_person_day	3.26		trip/ person/ day	https://www.toi.no/getfile.php/1339538-1422949335/Publikasjoner/T%C3%98I%20rapporter/2014/1383-2014/1383-2014-sum.pdf "In 2013/14 the population undertook an average of 3.26 trips per day. This includes 10 per cent that do not travel in the course of an average day. There is a slight decrease from 2009 in the percentage that do not travel. The average trip is 14,5 km, an increase from 2009, and lasts for 24 minutes. The average length travelled per day by each person is 47,2 km, spending 78 minutes again an increase from 2009. Compared to the beginning of the 1990ties both daily travel distance and travel time have increased, from 32,0 km to 47,2 km per day and from 60 to 78 minutes per day. The majority of the trips are short, 39 percent is shorter than three km, while 28 percent is 10 km or longer."	

"Average_number_of_Trips_per_year_(capacity_effected0"	nominal_Average_number_of_Trips_per_year*effect_of_track_conversion_on_capacity		route/year	https://www.miljoloftet.no/detteerMiljoloftet/Bompenger/ofte-stilte-sporsmal-og-svar/ 300 per day	
"average_pre-tax_cost_of_FF_car_1"	350000		nok	https://www.mobilityhouse.com/int_en/knowledge-center/cost-comparison-electric-car-vs-petrol-which-car-costs-more-annually	
"average_pre-tax/subsidy_cost_of_NFF_car"	"average_pre-tax_cost_of_FF_car_1"*1.3		nok	https://www.mobilityhouse.com/int_en/knowledge-center/cost-comparison-electric-car-vs-petrol-which-car-costs-more-annually	
Average_Price_of_Housing[Bydeler]	Reference_Average_Price_of_Housing*Effect_of_Desirability_on_House_Price		NOK		
AVERAGE_PURCHASE_CAR_COST	average_cost_of_FF_car+average_cost_of_NFF*ratio_of_FF_to_NFF_cars_purchase_cost		NOK		
average_total_trips_per_person_per_year	average_journeys_per_person_day*"days/yr"		trip/People/Years		
average_travelling_distances_per_bydeler[Bydeler]	(Distance_to_Commute_INTERNAL_services+Average_commute_distance_EXTERNAL_services+Average_distance_to_commute_internal+Average_commute_distance_EXTERNAL)/4		km		

Average_weighted_cost_of_Car_Trip[Bydeler]	"Trip-Weighted_Average_Cost_of_Journeys"		nok/trip		
"Bergen_Bus_Network_Capacity_utlisation_SSB_2005-2019"	GRAPH(TIME) Points: (2005.00, 0.41), (2006.00, 0.42), (2007.00, 0.39), (2008.00, 0.43), (2009.00, 0.39), (2010.00, 0.39), (2011.00, 0.42), (2012.00, 0.27), (2013.00, 0.37), (2014.00, 0.39), (2015.00, 0.44), (2016.00, 0.4), (2017.00, 0.32), (2018.00, 0.32), (2019.00, 0.33)		1	https://www.ssb.no/en/statbank/table/06673	
Bergen_MEAN_wage_to_housing_ratio	MEAN(Housing_to_Wage_ratio)		1		
"Bergenhus_&_Arstad_nok/_square_km"	55500		NOK/ square meter	https://www.krogsveen.no/prisstatistikk/bergen-fana https://bonansa.no/index.html%3Fp=5419.html	
BH_job_correction	700		jobs		
bus_as_%_of_PT	trip%:_bus/"%_public_transport"		1		

bus_income_historical_Skyss	GRAPH(TIME) Points: (2013.000, 472084000.0), (2014.000, 499260000.0), (2015.000, 526554000.0), (2016.000, 551555000.0), (2017.000, 566158000.0), (2018.000, 592174000.0), (2019.000, 579802000.0)		nok	https://www.skyss.no/rapportar	

				https://www.sustainable-bus.com/electric-bus/88-yutong-e12-will-convert-a-large-part-of-bergen-bus-fleet-to-electricity/#:~:text=Yutong%20ready%20for%20Bergen&text=The%20model%2C%20named%20Yutong%20E12,and%20422%20kWh%20battery%20capacity. https://app.powerbi.com/view?r=eyJrIjoiODViNDQwMDktZDEwZS00ZjcxLWE1MTQtMmJlYjM3Mjg2MTYzIiwidCI6ImQ0MWNhYWE5LWE0MWEtNGUwZi05YmY2LTA1Y2QxZjQ4ZDI3MSIsImMiOjh9&pageName=ReportSection29c534e1690a17de5778 https://www.sustainable-bus.com/news/132-buses-in-bergen-now-run-on-electricity-or-renewable-energy/ Number of buses: 132 spread across 27 lines (25 minus Bybanen and hospital/station) 285 full-time drivers The vehicles are expected to run a total of 5.7 million kilometres a year, reducing CO2 emissions by around 85% over the life of the contract and making quality of life even better for Bergen's nearly	

byban_as_%_of_PT	trip%:_byban/"%_public_transport"		1		
Byban_capacity_utilisation_as_compared_to_2020	Bybanen_carrying_Capacity_usage/INIT(Bybanen_carrying_Capacity_usage)		1		

				The expansion of the Bybanen network will significantly increase capacity from 17km to 27.8km then to 40.3km therefore *1.63 in 2023 and *2.37 in 2031 Strekning Antall km Antall holdeplasser Kostnad Status Bygge- trinn 1 Sentrum – Nesttun 9,8 15 2,25 mrd (løpende kroner) Åpnet juni 2010 Bygge-trinn 2 Nesttun – Lagunen 3,6 5 1,35 mrd (løpende kroner) Åpnet juni 2013 Bygge-trinn 3 Lagunen – Bergen Lufthavn 3,6 7 3,6 mrd (løpende kroner) Åpnet april 2017 Bygge-trinn 4 Sentrum – Fyllings-dalen 10,8 9 6,2 mrd (Tall hentet fra Prop 11S) Bygge-start 2018. Antatt ferdig 2022/	

				The expansion of the Bybanen network will significantly increase capacity from 17km to 27.8km then to 40.3km therefore *1.63 in 2023 and *2.37 in 2031 Strekning Antall km Antall holdeplasser Kostnad Status Bygge- trinn 1 Sentrum – Nesttun 9,8 15 2,25 mrd (løpende kroner) Åpnet juni 2010 Bygge-trinn 2 Nesttun – Lagunen 3,6 5 1,35 mrd (løpende kroner) Åpnet juni 2013 Bygge-trinn 3 Lagunen – Bergen Lufthavn 3,6 7 3,6 mrd (løpende kroner) Åpnet april 2017 Bygge-trinn 4 Sentrum – Fyllings-dalen 10,8 9 6,2 mrd (Tall hentet fra Prop 11S) Bygge-start 2018. Antatt ferdig 2022/	

Bybanen_carrying_Capacity_usage	total_trips:_byban/Annual_Normal_Carrying_capacity_of_BYBANEN		1		
Capacity_per_bus_1	50		person/bus/trip	https://www.sustainable-bus.com/electric-bus/88-yutong-e12-will-convert-a-large-part-of-bergen-bus-fleet-to-electricity/#:~:text=Yutong%20ready%20for%20Bergen&text=The%20model%2C%20named%20Yutong%20E12,and%20422%20kWh%20battery%20capacity. 34 seats rounded to 50 inc those standing	

				https://www.sustainable-bus.com/electric-bus/88-yutong-e12-will-convert-a-large-part-of-bergen-bus-fleet-to-electricity/#:~:text=Yutong%20ready%20for%20Bergen&text=The%20model%2C%20named%20Yutong%20E12,and%20422%20kWh%20battery%20capacity. {34 seats rounded to 50 inc those standing} "" On weekdays, Bybanen has over 300 daily departures in both directions. Frequency: Departures every 5 minutes during rush hour. The capacity is equivalent to around 90 buses per hour in rush hour. The light rail currently has between 40,000 and 50,000 passengers on a normal weekday. Average speed for the bus lines in Bergen (bus lines 2, 3, 4 and 5) is 23.2 km / h. The light rail currently has 28 light rail cars that are 42 meters long. The carriages have a capacity of 285 passengers, 105 of which are seats.	

capacity_step_up	0+STEP(Bybanen_2023_Expansion, 2023)		1		
capacity_utilisation_normalised_to_2020	passengers_converted_to_trips/ max_bus_journey_capacity_2020		1		
capacity_utilisation_of_bus_network	total_trips:_Bus/ max_bus_journey_capacity_2020		1		
car_trips_per_person_per_year	total_trips:_Car/ total_endog_pop		trip/ person/ year		
"car/ population"[Bydeler]	Cars/ Potential_Driving_population		car/ person		
Carrying_capacity_of_road_network_between_1[Bydeler, Bydeler]	100000		trips	Max number of vehicles at once	
cars_on_the_rd[Bydeler]	vehicles_used_per_trip*people_travelling		car		
cars_on_the_rd_1[Bydeler]	vehicles_used_per_trip*people_travelling_3		car		
cars_on_the_rd_external_commuting[Bydeler, Bydeler]	people_travelling_1[@1,@2]*vehicles_used_per_trip[@1]		car		
cars_on_the_rd_external_commuting_1[Bydeler, Bydeler]	people_travelling_2[@1,@2]*vehicles_used_per_trip[@1]		car		
Cars_Purchasing[Bydeler]	Cars_Purchasing_2		car/ Years		
change_in_ptu[Bydeler]	GRAPH(Converter_24) Points: (0.1300, 3.170), (0.3300, 1.930)		1		GF EXTRAPOLATED
Charging_stations_required_per_Electric_car	0.2		Estation/ Car		

CO2_per_km	250		g/km	https://fcr-ccc.nrcan-rncan.gc.ca/en Taken as a rough average of all cars (filtered for most well known consumer brands). No CSV file available so an approximate midpoint found. It also takes the assumption that as a northern country with similar amounts of high contrast between urban and rural areas that driving behaviour will be approximately similar.	
CO2_per_L_Petrol	9000		g/l	This assumes the average gasoline vehicle on the road today has a fuel economy of about 22.0 miles per gallon and drives around 11,500 miles per year. Every gallon of gasoline burned creates about 8,887 grams of CO2. https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle	
Combined_external_car_trips	Total_Trips:_Cars_EXTERNAL+Total_Trips:_Cars_EXTERNAL_Services		trip/year		
Combined_internal_car_trips_1	Total_Trips:_Cars_INTERNAL+Total_Trips:_Cars_INTERNAL_Services		trip/year		

Combined_likelihood_of_being_able_to_walk_or_cycle_to_services[Bydeler]	(REFERENCE_Likelihood_of_walking_INTERNAL_services+REFERENCE_Likelihood_of_using_Bicycle_INTERNAL:_Services)		1		
Combined_likelihood_of_being_able_to_walk_or_cycle_to_work[Bydeler]	(REFERENCE_Likelihood_of_using_Bicycle_INTERNAL+REFERENCE_Likelihood_of_walking_INTERNAL)		dmnl		
Commute_Distance_from_ORGIN_to_DESTINATION[Bydeler, Bydeler]	Distance_from_ORGIN_to_DESTINATION		km		
Commute_Distance_from_ORGIN_to_DESTINATION_1[Bydeler, Bydeler]	Distance_from_ORGIN_to_DESTINATION_1		km		
commute_per_person_endog	total_commutes/total_endog_pop		trip/person/year		
commuting_trips_per_person	referance_average_commute_total_trips_per_person_per_year*(Effect_of_Percentage_of_jobs_that_are_remote) {52*2*5}		trip/People/Years		

				Strekning Antall km Antall holdeplasser Kostnad Status Bygge- trinn 1 Sentrum – Nesttun 9,8 15 2,25 mrd (løpende kroner) Åpnet juni 2010 Bygge-trinn 2 Nesttun – Lagunen 3,6 5 1,35 mrd (løpende kroner) Åpnet juni 2013 Bygge-trinn 3 Lagunen – Bergen Lufthavn 3,6 7 3,6 mrd (løpende kroner) Åpnet april 2017 Bygge-trinn 4 Sentrum – Fyllings-dalen 10,8 9 6,2 mrd (Tall hentet fra Prop 11S) Bygge-start 2018. Antatt ferdig 2022/ 2023 Bygge-trinn 5 Sentrum – Åsane 12,5 13 8 mrd (Tall hentet fra Prop 11S) Trasé-vedtak 31. januar 2017. Plan-oppstart 2018. Antatt ferdig 2031 https:// www.miljoloftet.no/	

Construction_cost_per_sq_m	56500		nok/ square meter	https://norwaytoday.info/finance/housing-construction-in-norway-almost-halved-this-year/#:~:text=Norwegian%20homes%20now%20cost%20an,the%20lowest%2C%20with%20NOK%2044%2C100. Norwegian homes now cost an average of NOK 56,500 per square metre, up 6 % from last year. The most expensive is in Oslo with NOK 85,900 per square metre. The price per square meter in Southern Norway is the lowest, with NOK 44,100.	
Converter_1[Bydeler, Bydeler]	Trips:_Bus*Distance_to_Commute_area		Kilometers*trip/ Years		
Converter_23	total_internal_km_driven_per_year/ total_external_km_driven_per_year		1		
Converter_24[Bydeler]	1-(Average_distance_between_facilities/ (INIT(Average_distance_between_facilities)))		1		
Converter_25	MEAN("Internal_average_commuting_distance_of_Bydeler_(Radius)")		km		
Converter_29	SUM("non-commuting_trips")		trip/year		
Converter_31	total_trips:_Car/"person/car"/"trip/ person.yr"		car		

correction_to_historical_data	1		1		
"Cost_ratio_of_Skyss/Car"[Bydeler]	Annual_Cost_of_Skyss_Pass/Annual_Reference_Cost_of_Car		dmnl		
"Cost_ratio_of_Skyss/ Car_INTERNAL"[Bydeler]	Annual_Cost_of_Skyss_Pass/Annual_Reference_Cost_of_Car_1		dmnl		
costs_of_Ecar_manufacturing_over_time	GRAPH(TIME) Points: (2016.00, 1.0000), (2017.00, 0.950737806404), (2018.00, 0.91118266768), (2019.00, 0.879421820562), (2020.00, 0.853919409442), (2021.00, 0.833442217177), (2022.00, 0.817000030551), (2023.00, 0.803797756647), (2024.00, 0.793196974635), (2025.00, 0.784685063726), (2026.00, 0.77785041443), (2027.00, 0.7723625244), (2028.00, 0.767956016375), (2029.00, 0.764417805356), (2030.00, 0.761576794481)		dmnl		
daily_commuter_capacity	total_capacity_per_year/"day/year"		people/day		
"day/year"	365		day/year		
days_in_year	365		1/year		
"days/yr"	365		day/yr		

departures_per_day	60		bus	calculated by looking at the Skyss routes and averaging the number of departures per weekday across 5 routes	
Desirability_of_Housing[Bydeler]	("Relative_Jobs/person_score_Weighted"+Relative_Affordability_of_Housing_weighted+Relative_Travel_Convenience_Weighted+Relative_Service_Score_Weighted+Weighted_Effect_of_crowding_on_housing_desirability_of_housing+effect_of_relative_dist_on_desireability)/6 {"Relative_Jobs/person_score_Weighted" *Relative_Affordability_of_Housing_weighted *Relative_Travel_Convenience_Weighted *Relative_Service_Score_Weighted *Weighted_Effect_of_crowding_on_housing_desirability_of_housing}		dmnl		
desire_hmw_2020	0.2+STEP(desired_homeworking_%_point_increase, 2020)		1		
desired_homeworking_%_point_increase	0		dmnl		
difference_between_endogenous_and_exogenous_populations	Projected_Bergen_population/total_endog_pop		1		
Distance_from_city_centre[Bergenhus]	0		km		

Distance_from_city_centre[Årstad]	5				
Distance_from_city_centre[Fyllingsdalen]	7				
Distance_from_city_centre[Laksevåg]	8				
Distance_from_city_centre[Ytrebyggda]	15				
Distance_from_city_centre[Åsane]	10				
Distance_from_city_centre[Arna]	10				
Distance_from_city_centre[Fana]	25				
Distance_from_ORGIN_to_DESTINATION[Bergenhus, Bergenhus]	0		km		
Distance_from_ORGIN_to_DESTINATION[Bergenhus, Årstad]	5				
Distance_from_ORGIN_to_DESTINATION[Bergenhus, Fyllingsdalen]	7				
Distance_from_ORGIN_to_DESTINATION[Bergenhus, Laksevåg]	8				
Distance_from_ORGIN_to_DESTINATION[Bergenhus, Ytrebyggda]	15				
Distance_from_ORGIN_to_DESTINATION[Bergenhus, Åsane]	10				
Distance_from_ORGIN_to_DESTINATION[Bergenhus, Arna]	10				
Distance_from_ORGIN_to_DESTINATION[Bergenhus, Fana]	25				

Distance_from_ORGIN_to_DESTINATION[Årstad, Bergenhus]	5				
Distance_from_ORGIN_to_DESTINATION[Årstad, Årstad]	0				
Distance_from_ORGIN_to_DESTINATION[Årstad, Fyllingsdalen]	9				
Distance_from_ORGIN_to_DESTINATION[Årstad, Laksevåg]	9				
Distance_from_ORGIN_to_DESTINATION[Årstad, Ytrebyggda]	12				
Distance_from_ORGIN_to_DESTINATION[Årstad, Åsane]	15				
Distance_from_ORGIN_to_DESTINATION[Årstad, Arna]	22				
Distance_from_ORGIN_to_DESTINATION[Årstad, Fana]	20				
Distance_from_ORGIN_to_DESTINATION[Fyllingsdalen, Bergenhus]	7				
Distance_from_ORGIN_to_DESTINATION[Fyllingsdalen, Årstad]	9				
Distance_from_ORGIN_to_DESTINATION[Fyllingsdalen, Fyllingsdalen]	0				
Distance_from_ORGIN_to_DESTINATION[Fyllingsdalen, Laksevåg]	6				
Distance_from_ORGIN_to_DESTINATION[Fyllingsdalen, Ytrebyggda]	8				

Distance_from_ORGIN_to_DESTINATION[Fyllingsdalen, Åsane]	18				
Distance_from_ORGIN_to_DESTINATION[Fyllingsdalen, Arna]	25				
Distance_from_ORGIN_to_DESTINATION[Fyllingsdalen, Fana]	25				
Distance_from_ORGIN_to_DESTINATION[Laksevåg, Bergenhus]	8				
Distance_from_ORGIN_to_DESTINATION[Laksevåg, Årstad]	9				
Distance_from_ORGIN_to_DESTINATION[Laksevåg, Fyllingsdalen]	6				
Distance_from_ORGIN_to_DESTINATION[Laksevåg, Laksevåg]	0				
Distance_from_ORGIN_to_DESTINATION[Laksevåg, Ytrebyggda]	11				
Distance_from_ORGIN_to_DESTINATION[Laksevåg, Åsane]	17				
Distance_from_ORGIN_to_DESTINATION[Laksevåg, Arna]	30				
Distance_from_ORGIN_to_DESTINATION[Laksevåg, Fana]	30				
Distance_from_ORGIN_to_DESTINATION[Ytrebyggda, Bergenhus]	15				
Distance_from_ORGIN_to_DESTINATION[Ytrebyggda, Årstad]	12				

Distance_from_ORGIN_to_DESTINATION[Ytrebyggda, Fyllingsdalen]	8				
Distance_from_ORGIN_to_DESTINATION[Ytrebyggda, Laksevåg]	11				
Distance_from_ORGIN_to_DESTINATION[Ytrebyggda, Ytrebyggda]	0				
Distance_from_ORGIN_to_DESTINATION[Ytrebyggda, Åsane]	26				
Distance_from_ORGIN_to_DESTINATION[Ytrebyggda, Arna]	25				
Distance_from_ORGIN_to_DESTINATION[Ytrebyggda, Fana]	25				
Distance_from_ORGIN_to_DESTINATION[Åsane, Bergenhus]	10				
Distance_from_ORGIN_to_DESTINATION[Åsane, Årstad]	15				
Distance_from_ORGIN_to_DESTINATION[Åsane, Fyllingsdalen]	18				
Distance_from_ORGIN_to_DESTINATION[Åsane, Laksevåg]	17				
Distance_from_ORGIN_to_DESTINATION[Åsane, Ytrebyggda]	26				
Distance_from_ORGIN_to_DESTINATION[Åsane, Åsane]	0				
Distance_from_ORGIN_to_DESTINATION[Åsane, Arna]	11				

Distance_from_ORGIN_to_DESTINATION[Åsane, Fana]	40				
Distance_from_ORGIN_to_DESTINATION[Arna, Bergenhus]	10				
Distance_from_ORGIN_to_DESTINATION[Arna, Årstad]	22				
Distance_from_ORGIN_to_DESTINATION[Arna, Fyllingsdalen]	25				
Distance_from_ORGIN_to_DESTINATION[Arna, Laksevåg]	30				
Distance_from_ORGIN_to_DESTINATION[Arna, Ytrebyggda]	25				
Distance_from_ORGIN_to_DESTINATION[Arna, Åsane]	11				
Distance_from_ORGIN_to_DESTINATION[Arna, Arna]	0				
Distance_from_ORGIN_to_DESTINATION[Arna, Fana]	30				
Distance_from_ORGIN_to_DESTINATION[Fana, Bergenhus]	25				
Distance_from_ORGIN_to_DESTINATION[Fana, Årstad]	20				
Distance_from_ORGIN_to_DESTINATION[Fana, Fyllingsdalen]	25				
Distance_from_ORGIN_to_DESTINATION[Fana, Laksevåg]	30				
Distance_from_ORGIN_to_DESTINATION[Fana, Ytrebyggda]	25				

Distance_from_ORGIN_to_DESTINATION[Fana, Åsane]	40				
Distance_from_ORGIN_to_DESTINATION[Fana, Arna]	30				
Distance_from_ORGIN_to_DESTINATION[Fana, Fana]	0				
Distance_from_ORGIN_to_DESTINATION_1[Bergenhus, Bergenhus]	0		km		
Distance_from_ORGIN_to_DESTINATION_1[Bergenhus, Årstad]	5				
Distance_from_ORGIN_to_DESTINATION_1[Bergenhus, Fyllingsdalen]	7				
Distance_from_ORGIN_to_DESTINATION_1[Bergenhus, Laksevåg]	8				
Distance_from_ORGIN_to_DESTINATION_1[Bergenhus, Ytrebyggda]	15				
Distance_from_ORGIN_to_DESTINATION_1[Bergenhus, Åsane]	10				
Distance_from_ORGIN_to_DESTINATION_1[Bergenhus, Arna]	10				
Distance_from_ORGIN_to_DESTINATION_1[Bergenhus, Fana]	25				
Distance_from_ORGIN_to_DESTINATION_1[Årstad, Bergenhus]	5				

Distance_from_ORGIN_to_DESTINATION_1[Årstad, Årstad]	0				
Distance_from_ORGIN_to_DESTINATION_1[Årstad, Fyllingsdalen]	9				
Distance_from_ORGIN_to_DESTINATION_1[Årstad, Laksevåg]	9				
Distance_from_ORGIN_to_DESTINATION_1[Årstad, Ytrebyggda]	12				
Distance_from_ORGIN_to_DESTINATION_1[Årstad, Åsane]	15				
Distance_from_ORGIN_to_DESTINATION_1[Årstad, Arna]	22				
Distance_from_ORGIN_to_DESTINATION_1[Årstad, Fana]	20				
Distance_from_ORGIN_to_DESTINATION_1[Fyllingsdalen, Bergenhus]	7				
Distance_from_ORGIN_to_DESTINATION_1[Fyllingsdalen, Årstad]	9				
Distance_from_ORGIN_to_DESTINATION_1[Fyllingsdalen, Fyllingsdalen]	0				
Distance_from_ORGIN_to_DESTINATION_1[Fyllingsdalen, Laksevåg]	6				
Distance_from_ORGIN_to_DESTINATION_1[Fyllingsdalen, Ytrebyggda]	8				

Distance_from_ORGIN_to_DESTINATION_1[Fyllingsdalen, Åsane]	18				
Distance_from_ORGIN_to_DESTINATION_1[Fyllingsdalen, Arna]	25				
Distance_from_ORGIN_to_DESTINATION_1[Fyllingsdalen, Fana]	25				
Distance_from_ORGIN_to_DESTINATION_1[Laksevåg, Bergenhus]	8				
Distance_from_ORGIN_to_DESTINATION_1[Laksevåg, Årstad]	9				
Distance_from_ORGIN_to_DESTINATION_1[Laksevåg, Fyllingsdalen]	6				
Distance_from_ORGIN_to_DESTINATION_1[Laksevåg, Laksevåg]	0				
Distance_from_ORGIN_to_DESTINATION_1[Laksevåg, Ytrebyggda]	11				
Distance_from_ORGIN_to_DESTINATION_1[Laksevåg, Åsane]	17				
Distance_from_ORGIN_to_DESTINATION_1[Laksevåg, Arna]	30				
Distance_from_ORGIN_to_DESTINATION_1[Laksevåg, Fana]	30				
Distance_from_ORGIN_to_DESTINATION_1[Ytrebyggda, Bergenhus]	15				

Distance_from_ORGIN_to_DESTINATION_1[Ytrebyggda, Årstad]	12				
Distance_from_ORGIN_to_DESTINATION_1[Ytrebyggda, Fyllingsdalen]	8				
Distance_from_ORGIN_to_DESTINATION_1[Ytrebyggda, Laksevåg]	11				
Distance_from_ORGIN_to_DESTINATION_1[Ytrebyggda, Ytrebyggda]	0				
Distance_from_ORGIN_to_DESTINATION_1[Ytrebyggda, Åsane]	26				
Distance_from_ORGIN_to_DESTINATION_1[Ytrebyggda, Arna]	25				
Distance_from_ORGIN_to_DESTINATION_1[Ytrebyggda, Fana]	25				
Distance_from_ORGIN_to_DESTINATION_1[Åsane, Bergenhus]	10				
Distance_from_ORGIN_to_DESTINATION_1[Åsane, Årstad]	15				
Distance_from_ORGIN_to_DESTINATION_1[Åsane, Fyllingsdalen]	18				
Distance_from_ORGIN_to_DESTINATION_1[Åsane, Laksevåg]	17				

Distance_from_ORGIN_to_DESTINATION_1[Åsane, Ytrebyggda]	26				
Distance_from_ORGIN_to_DESTINATION_1[Åsane, Åsane]	0				
Distance_from_ORGIN_to_DESTINATION_1[Åsane, Arna]	11				
Distance_from_ORGIN_to_DESTINATION_1[Åsane, Fana]	40				
Distance_from_ORGIN_to_DESTINATION_1[Arna, Bergenhus]	10				
Distance_from_ORGIN_to_DESTINATION_1[Arna, Årstad]	22				
Distance_from_ORGIN_to_DESTINATION_1[Arna, Fyllingsdalen]	25				
Distance_from_ORGIN_to_DESTINATION_1[Arna, Laksevåg]	30				
Distance_from_ORGIN_to_DESTINATION_1[Arna, Ytrebyggda]	25				
Distance_from_ORGIN_to_DESTINATION_1[Arna, Åsane]	11				
Distance_from_ORGIN_to_DESTINATION_1[Arna, Arna]	0				
Distance_from_ORGIN_to_DESTINATION_1[Arna, Fana]	30				
Distance_from_ORGIN_to_DESTINATION_1[Fana, Bergenhus]	25				

Distance_from_ORGIN_to_DESTINATION_1[Fana, Årstad]	20				
Distance_from_ORGIN_to_DESTINATION_1[Fana, Fyllingsdalen]	25				
Distance_from_ORGIN_to_DESTINATION_1[Fana, Laksevåg]	30				
Distance_from_ORGIN_to_DESTINATION_1[Fana, Ytrebyggda]	25				
Distance_from_ORGIN_to_DESTINATION_1[Fana, Åsane]	40				
Distance_from_ORGIN_to_DESTINATION_1[Fana, Arna]	30				
Distance_from_ORGIN_to_DESTINATION_1[Fana, Fana]	0				
Distance_to_Commute_area[Bydeler, Bydeler]	Commute_Distance_from_ORGIN_to_DESTINATION		km		
Distance_to_Commute_area_1[Bydeler, Bydeler]	Commute_Distance_from_ORGIN_to_DESTINATION_1		km		
Distance_to_Commute_INTERNAL[Bydeler]	"Internal_average_commuting_distance_of_Bydeler_(Radius)"[Bydeler]		km		
Distance_to_Commute_INTERNAL_1[Bydeler]	{"Internal_average_commuting_distance_of_Bydeler_(Radius)_1"[Bydeler]} Average_distance_between_facilities		km		
Distance_to_Commute_INTERNAL_services[Bydeler]	Distance_to_Commute_INTERNAL_1		km		

"driver/car"	1		people/ car		
"Economic_Activity_(%_increase_in_GDP)_1"	GRAPH(TIME) Points: (2020.00, 1.0000), (2022.66666667, 1.0500), (2025.33333333, 1.1000), (2028.00, 1.1500), (2030.66666667, 1.2000), (2033.33333333, 1.2500), (2036.00, 1.3000), (2038.66666667, 1.3500), (2041.33333333, 1.4000), (2044.00, 1.4500), (2046.66666667, 1.5000), (2049.33333333, 1.5500), (2052.00, 1.6000), (2054.66666667, 1.6500), (2057.33333333, 1.7000), (2060.00, 1.7500)		dmnl	Norway 312 566 318 564 324 153 329 328 335 086 340 909 346 969 353 301 359 901 366 768 373 870 381 181 388 679 396 354 404 201 412 221 420 421 428 813 437 409 446 228 455 288 464 611 474 216 484 122 494 346 504 905 515 808 527 055 538 642 550 563 562 817 575 329 588 084 601 067 614 265 627 666 641 341 655 287 669 503 684 001 698 800 713 926 729 408 745 271 761 539 from OECD long term forecasts: https://data.oecd.org/gdp/gdp-long-term-forecast.htm represents nearly a doubling of GDP 2020-2060. Have estimated a more conservative 1.75 range.	
"Economic_Activity_(OVERALL)"	"Economic_Activity_(%_increase_in_GDP)_1"*"GDP_increase/decrease_testing"		dmnl		
ECT_Fuel_price	1		1		
ECT_vs_Historical	1		1		
ECT:_Area_checking	1		1		

ECT:_Decreasing_Population	GRAPH(TIME) Points: (2010.00, 256000), (2020.00, 283000), (2030.00, 325000), (2040.00, 300000)		person	"The City of Bergen's own prognoses indicate that the population will exceed 325,000 in 2030 and 355,000 in 2040." - Grønn Strategi	GF EXTRAPOLATED
ECT:_Plateauing_Population	GRAPH(TIME) Points: (2010.00, 256000), (2020.00, 283000), (2030.00, 325000), (2040.00, 325000)		person	"The City of Bergen's own prognoses indicate that the population will exceed 325,000 in 2030 and 355,000 in 2040." - Grønn Strategi	GF EXTRAPOLATED
Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car[Bydeler, Bydeler]	effect_of_cost_ratio_on_trip_mode_selection_EXTERNAL[Bydeler]		dmnl		
Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1[Bydeler, Bydeler]	effect_of_cost_ratio_on_trip_mode_selection_EXTERNAL[Bydeler]		dmnl		
Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL[Bydeler]	effect_of_cost_ratio_on_trip_mode_selection_1[Bydeler]		dmnl		
Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1[Bydeler]	effect_of_cost_ratio_on_trip_mode_selection_EXTERNAL		dmnl		

effect_cost_of_journey_on_likelihood_of_using_a_car_vs_public_transport[Bydeler]	GRAPH("average_cost_of_public_transport_journey_(HISTORICAL_DATA)"/ Average_weighted_cost_of_Car_Trip) Points: (0.000, 0.000), (0.100, 0.33583091167), (0.200, 0.560945103841), (0.300, 0.7118436595), (0.400, 0.812993986277), (0.500, 0.880797077978), (0.600, 0.926246849528), (0.700, 0.956712742486), (0.800, 0.977134641257), (0.900, 0.99082384938), (1.000, 1.000)		dmnl		
effect_of_Bergen_climate_on_cycling	1-percentage_reduction_in_cycling_due_to_rainy_days		1		

effect_of_bus_capacity_utilisation_on_travel_preferences	GRAPH(capacity_utilisation_of_bus_network) Points: (0.0000, 2.000), (0.0750, 1.98164769876), (0.1500, 1.95426928251), (0.2250, 1.91342548497), (0.3000, 1.85249369906), (0.3750, 1.76159415596), (0.4500, 1.62598797255), (0.5250, 1.423687319), (0.6000, 1.12189020768), (0.6750, 0.67166182334), (0.7500, 0.000)		1	It is considered [2] that the capacity utilization factor during peak periods for the most intense parts of the route should be in the range from 0.7 to 0.8, and no more than 0.3 (30% of the vehicle capacity utilization) on average per day of transport operation. https://www.researchgate.net/publication/337120268_Standardization_of_the_capacity_utilization_factor_of_urban_public_transport_fleet	

				"One of the most important indicators determining the public transport service quality is the capacity utilization factor of transport fleet. This parameter also determines the economic efficiency of transport: it is desirable for the carrier that the value of the capacity utilization factor takes on the greatest value. On the contrary, for a passenger it is preferable not to overfull the capacity of transport vehicle. In this regard, when analyzing the performed traffic operation, it is necessary to establish the availability of reserves for increasing the efficiency of the capacity utilization for transport fleet without compromising the quality of transport service.....The upper limit of the capacity utilization factor for the round trip along the route during peak periods is about 0.4, i.e. the average number of passengers in a vehicle for the round trip is significantly lower than the transport fleet's nominal capacity." https://www.researchgate.net/publication/337120268_Standardization_of_the_capacity_utilization_factor_of_urban_public_transport_fleet	

effect_of_capacity_utilisation_on_bus_travel_preferences	SMTH3(effect_of_bus_capacity_utilisation_on_travel_preferences, time_to_perceive_cap_utilisation, 0.9)		1		DELAY CONVERTER
effect_of_congestion_on_travel_by_vehicle[Bydeler]	GRAPH(relative_traffic_density) Points: (0.000, 1.0000), (0.200, 0.993117887035), (0.400, 0.982850980942), (0.600, 0.967534556865), (0.800, 0.944685137146), (1.000, 0.910597808483), (1.200, 0.859745489708), (1.400, 0.783882744625), (1.600, 0.670708827881), (1.800, 0.501873183753), (2.000, 0.2500)		1		

effect_of_congestion_on_travel_by_vehicle_1[Bydeler]	GRAPH(relative_traffic_density_1) Points: (0.000, 1.0000), (0.200, 0.993117887035), (0.400, 0.982850980942), (0.600, 0.967534556865), (0.800, 0.944685137146), (1.000, 0.910597808483), (1.200, 0.859745489708), (1.400, 0.783882744625), (1.600, 0.670708827881), (1.800, 0.501873183753), (2.000, 0.2500)		1		
effect_of_congestion_on_travel_by_vehicle_2[Bydeler, Bydeler]	GRAPH(relative_traffic_density_2) Points: (0.000, 1.0000), (0.200, 0.993117887035), (0.400, 0.982850980942), (0.600, 0.967534556865), (0.800, 0.944685137146), (1.000, 0.910597808483), (1.200, 0.859745489708), (1.400, 0.783882744625), (1.600, 0.670708827881), (1.800, 0.501873183753), (2.000, 0.2500)		1		

effect_of_congestion_on_travel_by_vehicle_3[Bydeler, Bydeler]	GRAPH(relative_traffic_density_3) Points: (0.000, 1.0000), (0.200, 0.993117887035), (0.400, 0.982850980942), (0.600, 0.967534556865), (0.800, 0.944685137146), (1.000, 0.910597808483), (1.200, 0.859745489708), (1.400, 0.783882744625), (1.600, 0.670708827881), (1.800, 0.501873183753), (2.000, 0.2500)		1		
effect_of_cost_ratio_on_trip_mode_selection_1[Bydeler]	GRAPH("Cost_ratio_of_Skyss/Car_INTERNAL") Points: (0.000, 0.000), (0.100, 0.33583091167), (0.200, 0.560945103841), (0.300, 0.7118436595), (0.400, 0.812993986277), (0.500, 0.880797077978), (0.600, 0.926246849528), (0.700, 0.956712742486), (0.800, 0.977134641257), (0.900, 0.99082384938), (1.000, 1.000)		dmnl		GF EXTRAPOLATED

effect_of_cost_ratio_on_trip_mode_selection_EXTERNAL[Bydeler]	GRAPH("Cost_ratio_of_Skyss/Car") Points: (0.000, 0.000), (0.100, 0.33583091167), (0.200, 0.560945103841), (0.300, 0.7118436595), (0.400, 0.812993986277), (0.500, 0.880797077978), (0.600, 0.926246849528), (0.700, 0.956712742486), (0.800, 0.977134641257), (0.900, 0.99082384938), (1.000, 1.000)		dmnl		
Effect_of_Desirability_on_House_Price[Bydeler]	GRAPH(SMTH3(Adjusted_Desirability_of_Housing, Time_to_update_Housing_Preference)) Points: (0.000, 0.000), (0.100, 0.367242147361), (0.200, 0.773107488515), (0.300, 1.22165806021), (0.400, 1.71738310734), (0.500, 2.26524401279), (0.600, 2.87072395264), (0.700, 3.53988277364), (0.800, 4.27941764219), (0.900, 5.0967300718), (1.000, 6.000)		1		DELAY CONVERTER

Effect_of_economic_growth_on_service_density	GRAPH("Economic_Activity_(OVERALL)") Points: (1.000, 1.00669285092), (1.050, 1.01098694263), (1.100, 1.01798620996), (1.150, 1.02931223075), (1.200, 1.04742587318), (1.250, 1.07585818002), (1.300, 1.11920292202), (1.350, 1.18242552381), (1.400, 1.26894142137), (1.450, 1.3775406688), (1.500, 1.500), (1.550, 1.6224593312), (1.600, 1.73105857863), (1.650, 1.81757447619), (1.700, 1.88079707798), (1.750, 1.92414181998), (1.800, 1.95257412682), (1.850, 1.97068776925), (1.900, 1.98201379004), (1.950, 1.98901305737), (2.000, 1.99330714908)		dmnl		

"Effect_of_perceived_BYBAN_congestion_on_travel_preference_-_all_Bydeler"	SMTHN(Effect_of_BYBANEN_Capacity_utilisation_on_Byban_Travel_preferences, Time_to_perceive_BYBAN_congestion_INTERNAL_1, 3, 1) {SMTHN(Effect_of_BYBANEN_Capacity_utilisation_on_Travel_preferences_1, Time_to_perceive_congestion_1, 3, 1)}		dmnl		DELAY CONVERTER
Effect_of_perceived_congestion_on_travel_preference[Bydeler, Bydeler]	(SMTHN(effect_of_congestion_on_travel_by_vehicle_2, Time_to_perceive_congestion, 3, 1)) {SMTHN(Effect_of_Road_Capacity_utilisation_on_Travel_preferences, Time_to_perceive_congestion, 3, 1)}		dmnl		DELAY CONVERTER
Effect_of_perceived_congestion_on_travel_preference_1[Bydeler, Bydeler]	(SMTHN(effect_of_congestion_on_travel_by_vehicle_3, Time_to_perceive_congestion_1, 3, 1)) {SMTHN(Effect_of_Road_Capacity_utilisation_on_Travel_preferences, Time_to_perceive_congestion, 3, 1)}		dmnl		DELAY CONVERTER

Effect_of_perceived_congestion_on_travel_preference_INTERNAL[Bydeler]	(SMTHN(effect_of_congestion_on_travel_by_vehicle, Time_to_perceive_congestion_INTERNAL, 3, 1)) {SMTHN(Effect_of_Road_Capacity_utilisation_on_Travel_preferences, Time_to_perceive_congestion, 3, 1)}		dmnl		DELAY CONVERTER
Effect_of_perceived_congestion_on_travel_preference_INTERNAL_1[Bydeler]	(SMTHN(effect_of_congestion_on_travel_by_vehicle_1, Time_to_perceive_congestion_INTERNAL_1, 3, 1)) {SMTHN(Effect_of_Road_Capacity_utilisation_on_Travel_preferences, Time_to_perceive_congestion, 3, 1)}		dmnl		DELAY CONVERTER

Effect_of_Percentage_of_jobs_that_are_remote	GRAPH(percentage_of_jobs_carried_out_remotely) Points: (0.2000, 1.0000), (0.2500, 0.884612016112), (0.3000, 0.807265137441), (0.3500, 0.755417974169), (0.4000, 0.720663781298), (0.4500, 0.697367349133), (0.5000, 0.681751283651), (0.5500, 0.671283521919), (0.6000, 0.664266771392), (0.6500, 0.659563302857), (0.7000, 0.656410473611)		dmnl	20% homeworking before cv19 71% during 54% after	
Effect_of_Percentage_of_jobs_that_are_remote_AFTER_considering_employee_%	Effect_of_Percentage_of_jobs_that_are_remote*percentage_of_jobs_carried_out_remotely		1		

"effect_of_population_density_(crowding_on_desirability_of_housing)"[Bydeler]	GRAPH(population_density) Points: (0, 2.000), (400, 1.50548006905), (800, 1.17399344618), (1200, 0.951791317868), (1600, 0.802844776992), (2000, 0.703002924855), (2400, 0.636076929934), (2800, 0.591215093938), (3200, 0.561143305968), (3600, 0.540985583671), (4000, 0.527473458333)		1	Seems to be an inflection point at around 40 people per hectare: file:///Users/richardruston/Downloads/The_Spatial_Distribution_of_Population_in_48_World%20(1).pdf 40ppl/1hect= 0.4/sq km	GF EXTRAPOLATED
effect_of_population_density_on_public_service_costs[Bydeler]	GRAPH(population_density) Points: (700.0, 1.01524235999), (730.0, 1.02980857147), (760.0, 1.05673034702), (790.0, 1.10286437795), (820.0, 1.17254235847), (850.0, 1.2600), (880.0, 1.34745764153), (910.0, 1.41713562205), (940.0, 1.46326965298), (970.0, 1.49019142853), (1000.0, 1.50475764001)		1	http://www.ncsociology.org/sociationtoday/v21/review2.htm#:~:text=At%20very%20low%20density%20levels,population%20through%20lower%20service%20levels. Density is expressed as "population per square mile (kilometer)" or "housing units per square mile (kilometer)." To determine population per square kilometer, multiply the population per square mile by .3861. Takes 2019 Bergen pop density as a base rate	GF EXTRAPOLATED

effect_of_population_growth_on_businesses[Bydeler]	GRAPH(distributed_POPULATION/(INIT(distributed_POPULATION))) Points: (1.000, 1.000), (1.100, 1.100), (1.200, 1.200), (1.300, 1.300), (1.400, 1.400), (1.500, 1.500), (1.600, 1.600), (1.700, 1.700), (1.800, 1.800), (1.900, 1.900), (2.000, 2.000)		dmnl		GF EXTRAPOLATED
effect_of_relative_dist_on_desireability[Bydeler]	(1-relative_distance_from_city)*Weight:_Centrality		1		
Effect_of_Road_Capacity_utilisation_on_Travel_preferences_1[Bydeler, Bydeler]	GRAPH(total_road_trips_1/Carrying_capacity_of_road_network_between_1) Points: (0.000, 2.000), (0.100, 1.34064009207), (0.200, 0.898657928234), (0.300, 0.602388423824), (0.400, 0.403793035989), (0.500, 0.270670566473), (0.600, 0.181435906579), (0.700, 0.12162012525), (0.800, 0.0815244079567), (0.900, 0.0546474448946), (1.000, 0.0366312777775)		dmnl		

effect_of_track_conversion_on_capacity	length_of_track/ INIT(length_of_track)		1		

				64 riders at VUT was surveyed late in 1991 in relation to their riding patterns caused by weather changes, etc. The data thus is reported, not actual patterns, and the two different surveys do give slightly different pictures, though the data are not strictly compatible. For example, about 25% of riders reported changing to an alternative commuting mode on days of `poor' (not defined) weather, while the observed bike count gave erratic results. `Heavy rain' on some days resulted in a 50% reduction in bikes parked, yet made almost no apparent difference on others. However, the questionnaire gave no categorisation of the elements, thus permitting no expressions of the degree of an element necessary to force a change. The author's observations suggest that the condition of the weather in the early morning (initial commuting time) is possibly the key factor. In other words, if it is suitable to ride to the university in the morning, the return trip is not highly considered. The riders were asked if they had any readily available commuting means in the case of expected adverse	

Effect_of_Weighted_cost_on_Indicated_Buyer_preference[Bydeler]	GRAPH(weighted_cost_of_FF_vs_NFF) Points: (0.000, 1.000), (0.200, 0.670320046036), (0.400, 0.449328964117), (0.600, 0.301194211912), (0.800, 0.201896517995), (1.000, 0.135335283237), (1.200, 0.0907179532894), (1.400, 0.0608100626252), (1.600, 0.0407622039784), (1.800, 0.0273237224473), (2.000, 0.0183156388887)		dmnl		
Electric_fuel_costs[Bydeler]	Electric_Fuel_Costs_per_Trip		NOK/trip		
Electric_fuel_costs_1[Bydeler]	Electric_Fuel_Costs_per_Trip_1		NOK/trip		
Electric_Fuel_Costs_per_Trip[Bydeler]	Electric_fuel_price*km_per_trip		NOK/trip		
Electric_Fuel_Costs_per_Trip_1[Bydeler]	Electric_fuel_price_1*km_per_trip_1		NOK/trip		

				"Battery charging is free at a rapidly growing number of publicly funded charging stations.2" Bjart Holtsmark, Anders Skonhoft, The Norwegian support and subsidy policy of electric cars. Should it be adopted by other countries?, Environmental Science & Policy, Volume 42, 2014, Pages 160-168, ISSN 1462-9011, https://doi.org/10.1016/j.envsci.2014.06.006. (http://www.sciencedirect.com/science/article/pii/S1462901114001208) ----- Previously: https://www.globalpetrolprices.com/Norway/gasoline_prices/ c. 15 nok per liter https://www.carsguide.com.au/car-advice/fuel-efficiency-explained-29488#:~:text=Anything%20that%20is%20listed%20as,considered%20to%20be%20pretty%20good.&text=The%20first%20(and%20most%20common,in%20order%20to%20travel%20100km.	

				"Battery charging is free at a rapidly growing number of publicly funded charging stations.2" Bjart Holtsmark, Anders Skonhoft, The Norwegian support and subsidy policy of electric cars. Should it be adopted by other countries?, Environmental Science & Policy, Volume 42, 2014, Pages 160-168, ISSN 1462-9011, https://doi.org/10.1016/j.envsci.2014.06.006. (http://www.sciencedirect.com/science/article/pii/S1462901114001208) ----- Previously: https://www.globalpetrolprices.com/Norway/gasoline_prices/ c. 15 nok per liter https://www.carsguide.com.au/car-advice/fuel-efficiency-explained-29488#:~:text=Anything%20that%20is%20listed%20as,considered%20to%20be%20pretty%20good.&text=The%20first%20(and%20most%20common,in%20order%20to%20travel%20100km.	

Electric_other_costs	20 {parking etc}		NOK/trip	https://www.mobilityhouse.com/int_en/knowledge-center/cost-comparison-electric-car-vs-petrol-which-car-costs-more-annually Hyundai IONIQ Electro Trend Hyundai i30 1.4 T-GDI Trend DCT Maintenance and servicing 552 € 744 €	
Electric_other_costs_1	20 {parking etc}		NOK/trip	https://www.mobilityhouse.com/int_en/knowledge-center/cost-comparison-electric-car-vs-petrol-which-car-costs-more-annually Hyundai IONIQ Electro Trend Hyundai i30 1.4 T-GDI Trend DCT Maintenance and servicing 552 € 744 €	

Electric_toll_cost_per_journey[Bydeler]	5		NOK/trip	Bjart Holtsmark, Anders Skonhoft, The Norwegian support and subsidy policy of electric cars. Should it be adopted by other countries?, Environmental Science & Policy, Volume 42, 2014, Pages 160-168, ISSN 1462-9011, https://doi.org/10.1016/j.envsci.2014.06.006. (http://www.sciencedirect.com/science/article/pii/S1462901114001208) https://www.miljoloftet.no/detteerMiljoloftet/Bompenger/ofte-stilte-sporsmal-og-svar/	
Electric_toll_cost_per_journey_1[Bydeler]	0		NOK/trip	Bjart Holtsmark, Anders Skonhoft, The Norwegian support and subsidy policy of electric cars. Should it be adopted by other countries?, Environmental Science & Policy, Volume 42, 2014, Pages 160-168, ISSN 1462-9011, https://doi.org/10.1016/j.envsci.2014.06.006. (http://www.sciencedirect.com/science/article/pii/S1462901114001208)	

Employer_Desirability[Bydeler]	{(Relative_Service_Score_Weighted_EMPLOYERS+Relative_Affordability_of_Housing_weighted_employers+Relative_Travel_Convenience_Weighted_EMPLOYERS+Weighted_significance_of_Population)/4} (Relative_Service_Score_Weighted_EMPLOYERS+ Weighted_significance_of_Population+Relative_Affordability_of_Housing_weighted_employers+Relative_Travel_Convenience_Weighted_EMPLOYERS)/4		1		
Estations_required[Bydeler]	Electric_Cars*Charging_stations_required_per_Electric_car		Estation		
"Excess_Jobs_in_Area_(Jobs_-_Population)"[Bydeler]	(Jobs-(distributed_POPULATION/ jobs_per_person))		jobs		
"Excess_People_(Population-Jobs)"[Bydeler]	(distributed_POPULATION-(Job_Positions*jobs_per_person))		person		
"Fana_-_Ytre_2017"	0+STEP(1, 2017) {Lagunen – Bergen Lufthavn 2017}		1		
"fana_nok/ _square_km"	41705		NOK/ square meter	https:// www.krogsveen.no/ prisstatistikk/bergen-fana https://bonansa.no/ index.html%3Fp=5419.html	

fares_converted_to_trips	trips_from_fares_per_inhabitant/2		trip/year		
fares_per_inhabitant_2018	133		trip/person/year	https://www.ssb.no/en/statbank/table/06673	
FF_fuel_costs[Bydeler]	FF_fuel_price_per_km*km_per_trip		NOK/trip		
FF_fuel_costs_1[Bydeler]	FF_fuel_price_per_km_1*km_per_trip_1		NOK/trip		
FF_fuel_price_per_km	ECT_Fuel_price*FF_fuel_price_per_km_historical		NOK/km	https://www.globalpetrolprices.com/Norway/gasoline_prices/ c. 15 nok per liter https://www.carsguide.com.au/car-advice/fuel-efficiency-explained-29488#:~:text=Anything%20that%20is%20listed%20as,considered%20to%20be%20pretty%20good.&text=The%20first%20(and%20most%20common,in%20order%20to%20travel%20100km. 16.5km per liter rounded down to 15 for older stock etc 15nok/15km (per l) = 1 OR https://norwaytoday.info/everyday/petrol-taxes-60-pct/	

FF_fuel_price_per_km_1	1		NOK/km	https://www.globalpetrolprices.com/Norway/gasoline_prices/ c. 15 nok per liter https://www.carsguide.com.au/car-advice/fuel-efficiency-explained-29488#:~:text=Anything%20that%20is%20listed%20as,considered%20to%20be%20pretty%20good.&text=The%20first%20(and%20most%20common,in%20order%20to%20travel%20100km. 16.5km per liter rounded down to 15 for older stock etc 15nok/15km (per l) = 1 OR https://norwaytoday.info/everyday/petrol-taxes-60-pct/	

FF_fuel_price_per_km_historical	1		NOK/km	https://www.globalpetrolprices.com/Norway/gasoline_prices/ c. 15 nok per liter https://www.carsguide.com.au/car-advice/fuel-efficiency-explained-29488#:~:text=Anything%20that%20is%20listed%20as,considered%20to%20be%20pretty%20good.&text=The%20first%20(and%20most%20common,in%20order%20to%20travel%20100km. 16.5km per liter rounded down to 15 for older stock etc 15nok/15km (per l) = 1 OR https://norwaytoday.info/everyday/petrol-taxes-60-pct/	
FF_other_costs	20 {parking etc}		NOK/trip	https://www.mobilityhouse.com/int_en/knowledge-center/cost-comparison-electric-car-vs-petrol-which-car-costs-more-annually	
FF_other_costs_1	20*2 {parking etc}		NOK/trip	https://www.mobilityhouse.com/int_en/knowledge-center/cost-comparison-electric-car-vs-petrol-which-car-costs-more-annually	
FF_to_NFF_Car_Ratio	SUM(FF_Cars)/SUM(Cars)		1		

FF_toll_cost_per_journey_1[Bydeler]	50		nok/trip		
Food_shops[Bydeler]	INIT_Food_shops*growth_in_services		Facilities		
"Fyllingsdalen_&_Laksevåg_nok/_square_km"	37500		NOK/ square meter	https://www.krogsveen.no/prisstatistikk/bergen-fana https://bonansa.no/index.html%3Fp=5419.html	
"GDP_increase/decrease_testing"	1		1		
Gross_operating_expenditure_on_public_services_in_Bergen_in_2019	44700000		NOK/yr	https://www.ssb.no/en/statbank/table/12362/tableViewLayout1/	
growth_in_services[Bydeler]	SMTH3(effect_of_population_growth_on_businesses, 2)		dmnl		DELAY CONVERTER
historical_%[Bydeler]	historical_data_on_pops/SUM(historical_data_on_pops)		1		
Historical_average_usage_of_Byban	(50000*365)/2		trip/year	estimates of byban passengers per day range from 40-60000 so 50000 has been chosen as a mid point. To convert passnegers to 'trips' these have been /2 to account for each ticket registered actually being one person taking an out and a return trip.	
historical_capacity_utilisation	(Historical_average_usage_of_Byban/(total_capacity_per_year))*person_per_trip		1		

historical_data_on_pops[Bergenhus]	GRAPH(TIME) Points: (2001.00, 31530.0), (2002.00, 32083.0), (2003.00, 32493.0), (2004.00, 32629.0), (2005.00, 33079.0), (2006.00, 33963.0), (2007.00, 34729.0), (2008.00, 35967.0), (2009.00, 37073.0), (2010.00, 37851.0), (2011.00, 38544.0), (2012.00, 39005.0), (2013.00, 39707.0), (2014.00, 40606.0), (2015.00, 41329.0), (2016.00, 41775.0), (2017.00, 41998.0), (2018.00, 42126.0), (2019.00, 42270.0), (2020.00, 42790.0), (2021.00, 42804.0)		person		GF EXTRAPOLATED

historical_data_on_pops[Årstad]	GRAPH(TIME) Points: (2001.00, 33853.0), (2002.00, 33966.0), (2003.00, 33967.0), (2004.00, 34125.0), (2005.00, 34082.0), (2006.00, 34513.0), (2007.00, 34877.0), (2008.00, 35406.0), (2009.00, 36350.0), (2010.00, 36843.0), (2011.00, 37440.0), (2012.00, 37977.0), (2013.00, 39047.0), (2014.00, 39906.0), (2015.00, 40364.0), (2016.00, 40663.0), (2017.00, 40677.0), (2018.00, 41226.0), (2019.00, 41399.0), (2020.00, 42223.0), (2021.00, 42386.0)				

historical_data_on_pops[Fyllingsdalen]	GRAPH(TIME) Points: (2001.00, 28407.0), (2002.00, 28363.0), (2003.00, 28246.0), (2004.00, 28368.0), (2005.00, 28206.0), (2006.00, 28232.0), (2007.00, 28253.0), (2008.00, 28285.0), (2009.00, 28288.0), (2010.00, 28760.0), (2011.00, 28844.0), (2012.00, 28911.0), (2013.00, 28973.0), (2014.00, 29195.0), (2015.00, 29267.0), (2016.00, 29493.0), (2017.00, 29504.0), (2018.00, 29796.0), (2019.00, 30020.0), (2020.00, 30071.0), (2021.00, 30204.0)				

historical_data_on_pops[Laksevåg]	GRAPH(TIME) Points: (2001.00, 35222.0), (2002.00, 35518.0), (2003.00, 35775.0), (2004.00, 35928.0), (2005.00, 35918.0), (2006.00, 36143.0), (2007.00, 36378.0), (2008.00, 36651.0), (2009.00, 37115.0), (2010.00, 37857.0), (2011.00, 38565.0), (2012.00, 38959.0), (2013.00, 39362.0), (2014.00, 39584.0), (2015.00, 39908.0), (2016.00, 40020.0), (2017.00, 40151.0), (2018.00, 39858.0), (2019.00, 40046.0), (2020.00, 40409.0), (2021.00, 40518.0)				

historical_data_on_pops[Ytrebyggda]	GRAPH(TIME) Points: (2001.00, 20267.0), (2002.00, 20745.0), (2003.00, 21411.0), (2004.00, 21776.0), (2005.00, 22391.0), (2006.00, 23345.0), (2007.00, 23683.0), (2008.00, 24044.0), (2009.00, 24760.0), (2010.00, 25326.0), (2011.00, 25710.0), (2012.00, 26352.0), (2013.00, 26722.0), (2014.00, 26955.0), (2015.00, 27144.0), (2016.00, 27619.0), (2017.00, 28139.0), (2018.00, 28385.0), (2019.00, 28943.0), (2020.00, 29279.0), (2021.00, 29875.0)				

historical_data_on_pops[Åsane]	GRAPH(TIME) Points: (2001.00, 37631.0), (2002.00, 37587.0), (2003.00, 37814.0), (2004.00, 37907.0), (2005.00, 38332.0), (2006.00, 38276.0), (2007.00, 38300.0), (2008.00, 38487.0), (2009.00, 38802.0), (2010.00, 39186.0), (2011.00, 39534.0), (2012.00, 39730.0), (2013.00, 39796.0), (2014.00, 40146.0), (2015.00, 40577.0), (2016.00, 40979.0), (2017.00, 41241.0), (2018.00, 41312.0), (2019.00, 41446.0), (2020.00, 41629.0), (2021.00, 41788.0)				

historical_data_on_pops[Arna]	GRAPH(TIME) Points: (2001.00, 12030.0), (2002.00, 12087.0), (2003.00, 12059.0), (2004.00, 12117.0), (2005.00, 12021.0), (2006.00, 12010.0), (2007.00, 12063.0), (2008.00, 12231.0), (2009.00, 12376.0), (2010.00, 12546.0), (2011.00, 12680.0), (2012.00, 12862.0), (2013.00, 13210.0), (2014.00, 13458.0), (2015.00, 13662.0), (2016.00, 13758.0), (2017.00, 13751.0), (2018.00, 13972.0), (2019.00, 13795.0), (2020.00, 13820.0), (2021.00, 13899.0)				

historical_data_on_pops[Fana]	GRAPH(TIME) Points: (2001.00, 31669.0), (2002.00, 32596.0), (2003.00, 33261.0), (2004.00, 34172.0), (2005.00, 34789.0), (2006.00, 35318.0), (2007.00, 36002.0), (2008.00, 36336.0), (2009.00, 36951.0), (2010.00, 37821.0), (2011.00, 38317.0), (2012.00, 39216.0), (2013.00, 40087.0), (2014.00, 40871.0), (2015.00, 41584.0), (2016.00, 41975.0), (2017.00, 42236.0), (2018.00, 42392.0), (2019.00, 42653.0), (2020.00, 43139.0), (2021.00, 43557.0)				
historical_jobs_%_in_Bydel_2011[Bydeler]	JOBS:_Historical_2011/ SUM(JOBS:_Historical_2011)		1		

Historical_pop_data_from_SSB[Bergenhus]	GRAPH(TIME) Points: (2001.00, 31530.0), (2002.00, 32083.0), (2003.00, 32493.0), (2004.00, 32629.0), (2005.00, 33079.0), (2006.00, 33963.0), (2007.00, 34729.0), (2008.00, 35967.0), (2009.00, 37073.0), (2010.00, 37851.0), (2011.00, 38544.0), (2012.00, 39005.0), (2013.00, 39707.0), (2014.00, 40606.0), (2015.00, 41329.0), (2016.00, 41775.0), (2017.00, 41998.0), (2018.00, 42126.0), (2019.00, 42270.0), (2020.00, 42790.0), (2021.00, 42804.0)		person	https://www.ssb.no/statbank/table/10826/tableViewLayout2/	

Historical_pop_data_ from_SSB[Årstad]	GRAPH(TIME) Points: (2001.00, 33853.0), (2002.00, 33966.0), (2003.00, 33967.0), (2004.00, 34125.0), (2005.00, 34082.0), (2006.00, 34513.0), (2007.00, 34877.0), (2008.00, 35406.0), (2009.00, 36350.0), (2010.00, 36843.0), (2011.00, 37440.0), (2012.00, 37977.0), (2013.00, 39047.0), (2014.00, 39906.0), (2015.00, 40364.0), (2016.00, 40663.0), (2017.00, 40677.0), (2018.00, 41226.0), (2019.00, 41399.0), (2020.00, 42223.0), (2021.00, 42386.0)				

Historical_pop_data_from_SSB[Fyllingsdalen]	GRAPH(TIME) Points: (2001.00, 28407.0), (2002.00, 28363.0), (2003.00, 28246.0), (2004.00, 28368.0), (2005.00, 28206.0), (2006.00, 28232.0), (2007.00, 28253.0), (2008.00, 28285.0), (2009.00, 28288.0), (2010.00, 28760.0), (2011.00, 28844.0), (2012.00, 28911.0), (2013.00, 28973.0), (2014.00, 29195.0), (2015.00, 29267.0), (2016.00, 29493.0), (2017.00, 29504.0), (2018.00, 29796.0), (2019.00, 30020.0), (2020.00, 30071.0), (2021.00, 30204.0)				

Historical_pop_data_ from_SSB[Laksevåg]	GRAPH(TIME) Points: (2001.00, 35222.0), (2002.00, 35518.0), (2003.00, 35775.0), (2004.00, 35928.0), (2005.00, 35918.0), (2006.00, 36143.0), (2007.00, 36378.0), (2008.00, 36651.0), (2009.00, 37115.0), (2010.00, 37857.0), (2011.00, 38565.0), (2012.00, 38959.0), (2013.00, 39362.0), (2014.00, 39584.0), (2015.00, 39908.0), (2016.00, 40020.0), (2017.00, 40151.0), (2018.00, 39858.0), (2019.00, 40046.0), (2020.00, 40409.0), (2021.00, 40518.0)				

Historical_pop_data_from_SSB[Ytrebyggda]	GRAPH(TIME) Points: (2001.00, 20267.0), (2002.00, 20745.0), (2003.00, 21411.0), (2004.00, 21776.0), (2005.00, 22391.0), (2006.00, 23345.0), (2007.00, 23683.0), (2008.00, 24044.0), (2009.00, 24760.0), (2010.00, 25326.0), (2011.00, 25710.0), (2012.00, 26352.0), (2013.00, 26722.0), (2014.00, 26955.0), (2015.00, 27144.0), (2016.00, 27619.0), (2017.00, 28139.0), (2018.00, 28385.0), (2019.00, 28943.0), (2020.00, 29279.0), (2021.00, 29875.0)				

Historical_pop_data_from_SSB[Åsane]	GRAPH(TIME) Points: (2001.00, 37631.0), (2002.00, 37587.0), (2003.00, 37814.0), (2004.00, 37907.0), (2005.00, 38332.0), (2006.00, 38276.0), (2007.00, 38300.0), (2008.00, 38487.0), (2009.00, 38802.0), (2010.00, 39186.0), (2011.00, 39534.0), (2012.00, 39730.0), (2013.00, 39796.0), (2014.00, 40146.0), (2015.00, 40577.0), (2016.00, 40979.0), (2017.00, 41241.0), (2018.00, 41312.0), (2019.00, 41446.0), (2020.00, 41629.0), (2021.00, 41788.0)				

Historical_pop_data_from_SSB[Arna]	GRAPH(TIME) Points: (2001.00, 12030.0), (2002.00, 12087.0), (2003.00, 12059.0), (2004.00, 12117.0), (2005.00, 12021.0), (2006.00, 12010.0), (2007.00, 12063.0), (2008.00, 12231.0), (2009.00, 12376.0), (2010.00, 12546.0), (2011.00, 12680.0), (2012.00, 12862.0), (2013.00, 13210.0), (2014.00, 13458.0), (2015.00, 13662.0), (2016.00, 13758.0), (2017.00, 13751.0), (2018.00, 13972.0), (2019.00, 13795.0), (2020.00, 13820.0), (2021.00, 13899.0)				

Historical_pop_data_from_SSB[Fana]	GRAPH(TIME) Points: (2001.00, 31669.0), (2002.00, 32596.0), (2003.00, 33261.0), (2004.00, 34172.0), (2005.00, 34789.0), (2006.00, 35318.0), (2007.00, 36002.0), (2008.00, 36336.0), (2009.00, 36951.0), (2010.00, 37821.0), (2011.00, 38317.0), (2012.00, 39216.0), (2013.00, 40087.0), (2014.00, 40871.0), (2015.00, 41584.0), (2016.00, 41975.0), (2017.00, 42236.0), (2018.00, 42392.0), (2019.00, 42653.0), (2020.00, 43139.0), (2021.00, 43557.0)				

historical_trip_capacity_buses	number_of_passengers_SSB+(number_of_passengers_SSB*(1-"Bergen_Bus_Network_Capacity_utlisation_SSB_2005-2019"))		trip		
HMW_STATS	1		1	https://www.pewresearch.org/social-trends/2020/12/09/how-the-coronavirus-outbreak-has-and-hasnt-changed-the-way-americans-work/psdt_12-09-20_covid-work-00-0/ 20% homeworking before cv19 71% during 54% after	
house_price_to_wage_ratio[Bydeler]	Income/(Average_Price_of_Housing/time_to_pay_off_housing)		1		
Housing_to_Wage_ratio[Bydeler]	"Price_of_Housing_CLOSE_(yearly_spread)"/Income		dmnl		

Income	565000 {(40000*12)-160000}		NOK/ year	https://www.ssb.no/en/arbeid-og-lonn/statistikker/lonnansatt c 50 000 per month - tax https://skattekalkulator2018.app.skatteetaten.no/?aar=2020&alder=32&alderEF&kommune&locale=nb_NO&sivilstand=UGIFT&tolvdelVedArbeidsoppholdINorge=12&tolvdelVedArbeidsoppholdINorgeEF=12&vilHaTolvdel=true	
income_from_tickets:_byban	GRAPH(TIME) Points: (2013.000, 130582000.0), (2014.000, 116942000.0), (2015.000, 129783000.0), (2016.000, 140178000.0), (2017.000, 145055128.0), (2018.000, 162860000.0), (2019.000, 203189000.0)		NOK/ year		
Indicated_Buyer_preference_ratio[Bydeler]	weighted_cost_of_FF_vs_NFF {Effect_of_Weighted_cost_on_Indicated_Buyer_preference*reference_buyer_preference_ratio}		1		
INIT_Food_shops[Bergenhus]	28		Facilities	Taken from approximate map count of 4 main supermarket chains in Bergen.	
INIT_Food_shops[Årstad]	21				

INIT_Food_shops[Fyllingsdalen]	9				
INIT_Food_shops[Laksevåg]	10				
INIT_Food_shops[Ytrebyggda]	10				
INIT_Food_shops[Åsane]	12				
INIT_Food_shops[Arna]	4				
INIT_Food_shops[Fana]	14				
init_pops[Bydeler]	HISTORY(distributed_POPULATION, 2020)		person		
INIT_Sport_Centres[Bergenhus]	2		Facilities		
INIT_Sport_Centres[Årstad]	2				
INIT_Sport_Centres[Fyllingsdalen]	1				
INIT_Sport_Centres[Laksevåg]	1				
INIT_Sport_Centres[Ytrebyggda]	1				
INIT_Sport_Centres[Åsane]	1				
INIT_Sport_Centres[Arna]	1				
INIT_Sport_Centres[Fana]	1				

INIT_Total_Recreation_Facilities[Bergenhus]	15		Facilities	Approximate count of Galleries - by internet search. A gallery will most likely have a cafe, a bar or a resturant attached, there will likely be shops inside or nearby - ie there are more likely to be services beyond the needs of simple human maintenance. Many areas have no galleries and so to avoid 0*economic activity, they have been rounded to one.	
INIT_Total_Recreation_Facilities[Årstad]	2				
INIT_Total_Recreation_Facilities[Fyllingsdalen]	1				
INIT_Total_Recreation_Facilities[Laksevåg]	1				
INIT_Total_Recreation_Facilities[Ytrebygda]	1				
INIT_Total_Recreation_Facilities[Åsane]	1				
INIT_Total_Recreation_Facilities[Arna]	1				
INIT_Total_Recreation_Facilities[Fana]	1				
INIT_Total_Schools_and_Barnehager[Bergenhus]	31		Facilities		
INIT_Total_Schools_and_Barnehager[Årstad]	35				
INIT_Total_Schools_and_Barnehager[Fyllingsdalen]	31				

INIT_Total_Schools_and_Barnehager[Laksevåg]	31				
INIT_Total_Schools_and_Barnehager[Ytrebyggda]	31				
INIT_Total_Schools_and_Barnehager[Åsane]	31				
INIT_Total_Schools_and_Barnehager[Arna]	10				
INIT_Total_Schools_and_Barnehager[Fana]	31				
"Initial_%_of_cars_that_are_FF_(2019_stats)"	0.9		dmnl	(43000+39849)/115000 https://www.ssb.no/en/statbank/table/11823/ https://norwaytoday.info/finance/towards-a-world-record-in-bergen-every-fifth-car-will-soon-be-electric/	
"Internal_average_commuting_distance_of_Bydeler_(Radius)"[Bydeler]	(SQRT(Area_of_BYDELER/PI))*2		km	This is the radius of Bydeler - times by 2 for return journey indication	
"Internal_average_commuting_distance_of_Bydeler_(Radius)_1"[Bydeler]	SQRT(Area_of_BYDELER/PI)		km	This is the area	
Job_Positions[Bydeler]	Jobs{69000}		jobs		
jobs_per_person	1		people/jobs		
jobs_per_person_moving	births/jobs_per_person		jobs/year		
JOBS:_Historical_2011[Bergenhus]	22849		jobs	https://www.ssb.no/en/statbank/table/09890/tableViewLayout1/	
JOBS:_Historical_2011[Årstad]	19872				

JOBS:_Historical_2011[Fyllingsdalen]	14766				
JOBS:_Historical_2011[Laksevåg]	20535				
JOBS:_Historical_2011[Ytrebyggda]	13903				
JOBS:_Historical_2011[Åsane]	20752				
JOBS:_Historical_2011[Arna]	6414				
JOBS:_Historical_2011[Fana]	20297				
km_driven_by_FF_cars	TOTAL_km_Driven_per_year*"%_of_cars_that_are_FF"		Kilometers/Years		
km_driven_for_services_internally[Bydeler]	(Distance_to_Commute_INTERNAL_1/"/trip")*Trips:_Car_INTERNAL_1		Kilometers/Years		
km_per_trip[Bydeler]	average_travelling_distances_per_bydeler/"/trip"		km/trip		
km_per_trip_1[Bydeler]	"Internal_average_commuting_distance_of_Bydeler_(Radius)"/"/trip_1"		km/trip		
Km_traveled_Externally[Bydeler, Bydeler]	(Trips:_Car*Distance_to_Commute_area)/"/trip"		Kilometers/Years		
Km_traveled_for_comuting_internally[Bydeler]	(Trips:_Car_INTERNAL*Distance_to_Commute_INTERNAL)/"/trip"		Kilometers/Years		
l_petrol_used	km_driven_by_FF_cars/Average_Car_fuel_consumption		Liters/Years		

length_of_track	length_of_track_pre_2020+length_of_track_post_2022+length_of_track_post_2031		km		
length_of_track_post_2022	0+STEP(10.8, 2023)		km		
length_of_track_post_2031	0+STEP(12.5, 2031)		km		
length_of_track_pre_2020	9.8+3.6+3.6		km		
Lifetime_cost_of_FF_trips[Bydeler]	((average_cost_of_FF_car_journey_EXTERNAL+average_cost_of_FF_car_journey_INTERNAL)/2) *trips_per_car_lifetime {((trips_per_car_lifetime+average_cost_of_FF_car_journey_INTERNAL)/ 2)*average_cost_of_FF_car_journey_EXTERNAL} {average_cost_of_FF_car_journey_EXTERNAL}		NOK/car		
Lifetime_cost_of_NFF_trips[Bydeler]	((average_cost_of_Electric_Car_journey_EXTERNAL+average_cost_of_Electric_Car_journey_INTERNAL)/2)*trips_per_car_lifetime		NOK/car		
likelihood_of_relying_on_other_other_transport_options_vs_purchasing_a_car[Bydeler]	SMTHN(Aggregated_likelihood_of_using_a_car_across_all_Bydeler, time_taken_to_weigh_up_car_purchasing_decision, 3)		dmnl		DELAY CONVERTER

likelihood_of_using_a_car_accounting_for_distance[Bydeler]	GRAPH("Trip-Weighted_Average_car_distance_commuted_by_people_in_Bydeler") Points: (0.0, 0.000), (10.0, 0.0612070245601), (20.0, 0.128851248086), (30.0, 0.203609676702), (40.0, 0.28623051789), (50.0, 0.377540668798), (60.0, 0.478453992107), (70.0, 0.589980462274), (80.0, 0.713236273698), (90.0, 0.849455011967), (100.0, 1.000)		1		
Likelihood_of_using_transport_mode_after_costs_considered:_BUS[Bydeler, Bydeler]	REFERENCE_Likelihood_of_using_Public_Transport * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)		1		
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_1[Bydeler]	REFERENCE_Likelihood_of_using_Busses * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL)		1		
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Bergenhus, Bergenhus]	0		1		

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Bergenhus, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Bergenhus, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Bergenhus, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Bergenhus, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Bergenhus, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Bergenhus, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Bergenhus, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Årstad, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Årstad, Årstad]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Årstad, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Årstad, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Årstad, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Årstad, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Årstad, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Årstad, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fyllingsdalen, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fyllingsdalen, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fyllingsdalen, Fyllingsdalen]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fyllingsdalen, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fyllingsdalen, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fyllingsdalen, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fyllingsdalen, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fyllingsdalen, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Laksevåg, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Laksevåg, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Laksevåg, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Laksevåg, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Laksevåg, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Laksevåg, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Laksevåg, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Laksevåg, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Ytrebyggda, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Ytrebyggda, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Ytrebyggda, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Ytrebyggda, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Ytrebyggda, Ytrebyggda]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Ytrebyggda, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Ytrebyggda, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Ytrebyggda, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Åsane, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Åsane, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Åsane, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Åsane, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Åsane, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Åsane, Åsane]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Åsane, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Åsane, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Arna, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Arna, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Arna, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Arna, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Arna, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Arna, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Arna, Arna]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Arna, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fana, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fana, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fana, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fana, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fana, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fana, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fana, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2 * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_2[Fana, Fana]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_BUS_3[Bydeler]	REFERENCE_Likelihood_of_using_Busses_INT * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1)		1		
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Bergenhus, Bergenhus]	0		1	- shows unit error due to '0' used to avoid double counting	
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Bergenhus, Årstad]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Bergenhus, Fyllingsdalen]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Bergenhus, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Bergenhus, Ytrebyggda]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Bergenhus, Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Bergenhus, Arna]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Bergenhus, Fana]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car) * "Arstad_-_Fana_2013"				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Årstad, Bergenhus]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Årstad, Årstad]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Årstad, Fyllingsdalen]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Årstad, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Årstad, Ytrebyggda]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Årstad, Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Årstad, Arna]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Årstad, Fana]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car) * "Arstad_-_Fana_2013"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fyllingsdalen, Bergenhus]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fyllingsdalen, Årstad]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fyllingsdalen, Fyllingsdalen]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fyllingsdalen, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fyllingsdalen, Ytrebyggda]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fyllingsdalen, Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fyllingsdalen, Arna]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fyllingsdalen, Fana]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car) *Bybanen_2023_Expansion				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Laksevåg, Bergenhus]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Laksevåg, Årstad]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Laksevåg, Fyllingsdalen]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Laksevåg, Laksevåg]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Laksevåg, Ytrebyggda]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Laksevåg, Åsane]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Laksevåg, Arna]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Laksevåg, Fana]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Ytrebyggda, Bergenhus]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car) * "Fana_-_Ytre_2017"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Ytrebyggda, Årstad]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car) * "Fana_-_Ytre_2017"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Ytrebyggda, Fyllingsdalen]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Ytrebyggda, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Ytrebyggda, Ytrebyggda]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Ytrebyggda, Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Ytrebyggda, Arna]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Ytrebyggda, Fana]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car) * "Arstad_-_Fana_2013" * "Fana_-_Ytre_2017"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Åsane, Bergenhus]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Åsane, Årstad]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Åsane, Fyllingsdalen]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Åsane, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Åsane, Ytrebyggda]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Åsane, Åsane]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Åsane, Arna]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Åsane, Fana]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Arna, Bergenhus]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Arna, Årstad]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Arna, Fyllingsdalen]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Arna, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Arna, Ytrebyggda]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Arna, Åsane]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Arna, Arna]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Arna, Fana]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fana, Bergenhus]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car) * "Arstad_-_Fana_2013"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fana, Årstad]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car) * "Arstad_-_Fana_2013"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fana, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car) * Bybanen_2031_Expansion				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fana, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fana, Ytrebyggda]	REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fana, Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fana, Arna]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen[Fana, Fana]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_1[Bergenhus]	REFERENCE_Likelihood_of_using_Bybanen_NTERNAL * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL)		1	- shows unit error due to '0' used to avoid double counting	
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_1[Årstad]	REFERENCE_Likelihood_of_using_Bybanen_NTERNAL * Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_1[Fyllingsdalen]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen_NTERNAL * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL)				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_1[Laksevåg]	0 * REFERENCE_Likelihood_of_using_Bybanen_NTERNAL * Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_1[Ytrebygda]	REFERENCE_Likelihood_of_using_Bybanen_NTERNAL * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL) * "Fana_-_Ytre_2017"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_1[Åsane]	REFERENCE_Likelihood_of_using_Bybanen_NTERNAL * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL) *Bybanen_2031_Expansion				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_1[Arna]	0* REFERENCE_Likelihood_of_using_Bybanen_NTERNAL * Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_1[Fana]	"Arstad_-_Fana_2013" * REFERENCE_Likelihood_of_using_Bybanen_NTERNAL * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Bergenhus, Bergenhus]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered		1	- shows unit error due to '0' used to avoid double counting	
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Bergenhus, Årstad]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Bergenhus, Fyllingsdalen]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Bergenhus, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Bergenhus, Ytrebyggda]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * "Fana_-_Ytre_2017"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Bergenhus, Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Bergenhus, Arna]	0 * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * (0)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Bergenhus, Fana]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * "Arstad_-_Fana_2013"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Årstad, Bergenhus]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Årstad, Årstad]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Årstad, Fyllingsdalen]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Årstad, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Årstad, Ytrebyggda]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * "Fana_-_Ytre_2017"				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Årstad, Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Årstad, Arna]	0 * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * (0)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Årstad, Fana]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * "Arstad_-_Fana_2013"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fyllingsdalen, Bergenhus]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fyllingsdalen, Årstad]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fyllingsdalen, Fyllingsdalen]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fyllingsdalen, Laksevåg]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fyllingsdalen, Ytrebyggda]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fyllingsdalen, Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fyllingsdalen, Arna]	0 * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * (0)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fyllingsdalen, Fana]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered *Bybanen_2023_Expansion				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Laksevåg, Bergenhus]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Laksevåg, Årstad]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Laksevåg, Fyllingsdalen]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Laksevåg, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Laksevåg, Ytrebyggda]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Laksevåg, Åsane]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Laksevåg, Arna]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Laksevåg, Fana]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Ytrebyggda, Bergenhus]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * "Fana_-_Ytre_2017"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Ytrebyggda, Årstad]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * "Fana_-_Ytre_2017"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Ytrebyggda, Fyllingsdalen]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Ytrebyggda, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Ytrebyggda, Ytrebyggda]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Ytrebyggda, Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Ytrebyggda, Arna]	0 * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * (0)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Ytrebyggda, Fana]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * "Fana_-_Ytre_2017"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Åsane, Bergenhus]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Åsane, Årstad]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Åsane, Fyllingsdalen]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Åsane, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Åsane, Ytrebyggda]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Åsane, Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Åsane, Arna]	0 * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * (0)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Åsane, Fana]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered *Bybanen_2031_Expansion				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Arna, Bergenhus]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Arna, Årstad]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Arna, Fyllingsdalen]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Arna, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Arna, Ytrebyggda]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Arna, Åsane]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Arna, Arna]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Arna, Fana]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fana, Bergenhus]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fana, Årstad]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fana, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fana, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fana, Ytrebyggda]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * "Fana_-_Ytre_2017"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fana, Åsane]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fana, Arna]	0 * REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * (0)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_2[Fana, Fana]	REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered * "Arstad_-_Fana_2013"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_3[Bergenhus]	REFERENCE_Likelihood_of_using_Bybanen_int * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1)		1	- shows unit error due to '0' used to avoid double counting	

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_3[Årstad]	REFERENCE_Likelihood_of_using_Bybanen_int * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_3[Fyllingsdalen]	Bybanen_2023_Expansion * REFERENCE_Likelihood_of_using_Bybanen_int * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_3[Laksevåg]	0 * REFERENCE_Likelihood_of_using_Bybanen_int * Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_3[Ytrebygda]	REFERENCE_Likelihood_of_using_Bybanen_int * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1) * "Fana_-_Ytre_2017"				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_3[Åsane]	Bybanen_2031_Expansion * REFERENCE_Likelihood_of_using_Bybanen_int * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_3[Arna]	0 * REFERENCE_Likelihood_of_using_Bybanen_int * Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1				
Likelihood_of_using_transport_mode_after_costs_considered:_Bybanen_3[Fana]	REFERENCE_Likelihood_of_using_Bybanen_int * (1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1) * "Arstad_-_Fana_2013"				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Bergenhus, Bergenhus]	0		1		
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Bergenhus, Årstad]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Bergenhus, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Bergenhus, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Bergenhus, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Bergenhus, Åsane]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Bergenhus, Arna]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Bergenhus, Fana]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Årstad, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Årstad, Årstad]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Årstad, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Årstad, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Årstad, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Årstad, Åsane]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Årstad, Arna]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Årstad, Fana]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fyllingsdalen, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fyllingsdalen, Årstad]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fyllingsdalen, Fyllingsdalen]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fyllingsdalen, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fyllingsdalen, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fyllingsdalen, Åsane]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fyllingsdalen, Arna]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fyllingsdalen, Fana]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Laksevåg, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Laksevåg, Årstad]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Laksevåg, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Laksevåg, Laksevåg]	0				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Laksevåg, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Laksevåg, Åsane]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Laksevåg, Arna]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Laksevåg, Fana]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Ytrebyggda, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Ytrebyggda, Årstad]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Ytrebyggda, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Ytrebyggda, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Ytrebyggda, Ytrebyggda]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Ytrebyggda, Åsane]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Ytrebyggda, Arna]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Ytrebyggda, Fana]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Åsane, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Åsane, Årstad]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Åsane, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Åsane, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Åsane, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Åsane, Åsane]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Åsane, Arna]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Åsane, Fana]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Arna, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Arna, Årstad]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Arna, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Arna, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Arna, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Arna, Åsane]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Arna, Arna]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Arna, Fana]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fana, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fana, Årstad]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fana, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fana, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fana, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fana, Åsane]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fana, Arna]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR[Fana, Fana]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_1[Bydeler]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)_INTERNAL" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL)		1		
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Bergenhus, Bergenhus]	0		1		
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Bergenhus, Årstad]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Bergenhus, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Bergenhus, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Bergenhus, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Bergenhus, Åsane]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Bergenhus, Arna]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Bergenhus, Fana]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Årstad, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Årstad, Årstad]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Årstad, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Årstad, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Årstad, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Årstad, Åsane]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Årstad, Arna]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Årstad, Fana]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fyllingsdalen, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fyllingsdalen, Årstad]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fyllingsdalen, Fyllingsdalen]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fyllingsdalen, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fyllingsdalen, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fyllingsdalen, Åsane]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fyllingsdalen, Arna]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fyllingsdalen, Fana]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Laksevåg, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Laksevåg, Årstad]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Laksevåg, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Laksevåg, Laksevåg]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Laksevåg, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Laksevåg, Åsane]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Laksevåg, Arna]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Laksevåg, Fana]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Ytrebyggda, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Ytrebyggda, Årstad]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Ytrebyggda, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Ytrebyggda, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Ytrebyggda, Ytrebyggda]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Ytrebyggda, Åsane]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Ytrebyggda, Arna]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Ytrebyggda, Fana]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Åsane, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Åsane, Årstad]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Åsane, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Åsane, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Åsane, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Åsane, Åsane]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Åsane, Arna]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Åsane, Fana]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Arna, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Arna, Årstad]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Arna, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Arna, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Arna, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Arna, Åsane]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Arna, Arna]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Arna, Fana]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fana, Bergenhus]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fana, Årstad]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fana, Fyllingsdalen]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fana, Laksevåg]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fana, Ytrebyggda]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fana, Åsane]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fana, Arna]	"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_2[Fana, Fana]	0				
Likelihood_of_using_transport_mode_after_costs_considered:_CAR_3[Bydeler]	"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)_INTERNAL_1" * (Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_INTERNAL_1)		1		

likelihood_sum_check	Actual_Likelihood_of_using_BYBANEN_INTERNAL[Bergenhus] + Actual_Likelihood_of_using_a_Bus_INTERNAL[Bergenhus] + Actual_Likelihood_of_using_a_Car_INTERNAL[Bergenhus] + REFERENCE_Likelihood_of_using_Bicycle_INTERNAL[Bergenhus] + REFERENCE_Likelihood_of_walking_INTERNAL[Bergenhus]		1		SUMMING CONVERTER
"likely_breakdown_of_social_services_costs_across_bydeler_in_2019/20"[Bydeler]	Gross_operating_expenditure_on_public_services_in_Bergen_in_2019*INIT("%_of_bergen's_population_density")		NOK/yr		

				The expansion of the Bybanen network will significantly increase capacity from 17km to 27.8km then to 40.3km therefore *1.63 in 2023 and *2.37 in 2031 Strekning Antall km Antall holdeplasser Kostnad Status Bygge- trinn 1 Sentrum – Nesttun 9,8 15 2,25 mrd (løpende kroner) Åpnet juni 2010 Bygge-trinn 2 Nesttun – Lagunen 3,6 5 1,35 mrd (løpende kroner) Åpnet juni 2013 Bygge-trinn 3 Lagunen – Bergen Lufthavn 3,6 7 3,6 mrd (løpende kroner) Åpnet april 2017 Bygge-trinn 4 Sentrum – Fyllings-dalen 10,8 9 6,2 mrd (Tall hentet fra Prop 11S) Bygge-start 2018. Antatt ferdig 2022/	

MAIN_bybanen_info	1		1	On weekdays, Bybanen has over 300 daily departures in both directions. Frequency: Departures every 5 minutes during rush hour. The capacity is equivalent to around 90 buses per hour in rush hour. The light rail currently has between 40,000 and 50,000 passengers on a normal weekday. Average speed for the bus lines in Bergen (bus lines 2, 3, 4 and 5) is 23.2 km / h. The light rail currently has 28 light rail cars that are 42 meters long. The carriages have a capacity of 285 passengers, 105 of which are seats. https://www.miljoloftet.no/detteerMiljoloftet/Bompenger/ofte-stilte-sporsmal-og-svar/	
maintainance_cost_per_trip_Electric_Car	(maintainance_cost_per_yr_Electric_Car)/commuting_trips_per_person		nok/trip		
maintainance_cost_per_trip_Electric_Car_1	(maintainance_cost_per_yr_Electric_Car_1)/commuting_trips_per_person		nok/trip		

maintainance_cost_per_trip_FF_Car	(maintainance_cost_per_yr_FF_Car)/ commuting_trips_per_person		nok/trip		
maintainance_cost_per_trip_FF_Car_1	(maintainance_cost_per_yr_FF_Car_1)/ commuting_trips_per_person		nok/trip		
maintainance_cost_per_yr_Electric_Car	5900		NOK/ person/ year	https://www.mobilityhouse.com/int_en/knowledge-center/cost-comparison-electric-car-vs-petrol-which-car-costs-more-annually	
maintainance_cost_per_yr_Electric_Car_1	5900		NOK/ person/ year	https://www.mobilityhouse.com/int_en/knowledge-center/cost-comparison-electric-car-vs-petrol-which-car-costs-more-annually	
maintainance_cost_per_yr_FF_Car	8200		NOK/ person/ year	https://www.mobilityhouse.com/int_en/knowledge-center/cost-comparison-electric-car-vs-petrol-which-car-costs-more-annually	
maintainance_cost_per_yr_FF_Car_1	8200		NOK/ person/ year	https://www.mobilityhouse.com/int_en/knowledge-center/cost-comparison-electric-car-vs-petrol-which-car-costs-more-annually	
max_bus_journey_capacity_2020	(max_capacity_per_year/ person_per_trip)		trip/year		
max_capacity_per_year	days_in_year*max_daily_capcity_2020		people/ year		

max_daily_capcity_2020	Capacity_per_bus_1*total_daily_bus_trips		person		
max_population_actually_able_to_move[Bydeler]	distributed_POPULATION*"%_of_population_actually_willing_to_move"		person		
Mean_Affordability_of_Housing	SUM(Affordability_of_Housing)/8		1		
mean_pop_desnity_of_bergen	MEAN(population_density)		People/ Kilometers^2		
Mean_refernece_housing_price	MEAN(Reference_Average_Price_of_Housing)		NOK		
Mean_Service_Score	MEAN(Service_Score)		Facilities / Kilometers^2		
Mean_Work_Availability	SUM("Work_Availability_Jobs/ Person")/8		jobs/ People		
nominal_Average_number_of_Trips_per_year	(300*365)		route/ year	https://www.miljoloftet.no/detteerMiljoloftet/Bompenger/ofte-stilte-sporsmal-og-svar/ 300 per day	
"Non-commute_trips_per_person_per_year"	1.26*2*365		trip/ person/ year	total trips per day = 3.26 so 3.26*2 commutes. - 2 for commuting	
"non-commuting_trips"[Bydeler, Bydeler]	number_travel_FROM_Origin_to_Destination_1*"Non-commute_trips_per_person_per_year"		trip/year		
normalised_relative_service_attractiveness_of_area[Bydeler]	Service_Score-Mean_Service_Score		Facilities /Square Kilometers		

NOTES_ON_CAPACITY	1627.3*1000000		km	1627.3*1000000 Peak km travelled in 2007 https://www.ssb.no/en/statbank/table/12579/tableViewLayout1/ 626km of roads in Bergen https://www.ssb.no/en/statbank/table/11814/tableViewLayout1/ Traffic density formula Traffic density is a second fundamental characteristic of any road. It tells you how significant is the congestion of cars on the road. If the density reaches its maximum, the flow drops to zero, as a traffic jam is formed. The density is measured as the number of vehicles m that occupy a segment of a road of a length L. To calculate it, simply divide these two values: density = m / L	
number_commuting_FROM_Origin_to_Destination[Bergenhus, Bergenhus]	0*"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Bergenhus]		person		

number_commuting_FROM_Origin_to_Destination[Bergenhus, Årstad]	"%_commuting_to_destination"[Årstad]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Bergenhus, Fyllingsdalen]	"%_commuting_to_destination"[Fyllingsdalen]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Bergenhus, Laksevåg]	"%_commuting_to_destination"[Laksevåg]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Bergenhus, Ytrebyggda]	"%_commuting_to_destination"[Ytrebyggda]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Bergenhus, Åsane]	"%_commuting_to_destination"[Åsane]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Bergenhus, Arna]	"%_commuting_to_destination"[Arna]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Bergenhus, Fana]	"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Bergenhus]				

number_commuting_FROM_Origin_to_Destination[Årstad, Bergenhus]	"%_commuting_to_destination"[Bergenhus]*People_wanting_to_commute_from_Origin[Årstad]				
number_commuting_FROM_Origin_to_Destination[Årstad, Årstad]	0*"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Årstad, Fyllingsdalen]	"%_commuting_to_destination"[Fyllingsdalen]*People_wanting_to_commute_from_Origin[Årstad]				
number_commuting_FROM_Origin_to_Destination[Årstad, Laksevåg]	"%_commuting_to_destination"[Laksevåg]*People_wanting_to_commute_from_Origin[Årstad]				
number_commuting_FROM_Origin_to_Destination[Årstad, Ytrebyggda]	"%_commuting_to_destination"[Ytrebyggda]*People_wanting_to_commute_from_Origin[Årstad]				
number_commuting_FROM_Origin_to_Destination[Årstad, Åsane]	"%_commuting_to_destination"[Åsane]*People_wanting_to_commute_from_Origin[Årstad]				
number_commuting_FROM_Origin_to_Destination[Årstad, Arna]	"%_commuting_to_destination"[Arna]*People_wanting_to_commute_from_Origin[Årstad]				
number_commuting_FROM_Origin_to_Destination[Årstad, Fana]	"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Årstad]				

number_commuting_FROM_Origin_to_Destination[Fyllingsdalen, Bergenhus]	"%_commuting_to_destination"[Bergenhus]*People_wanting_to_commute_from_Origin[Fyllingsdalen]				
number_commuting_FROM_Origin_to_Destination[Fyllingsdalen, Årstad]	"%_commuting_to_destination"[Årstad]*People_wanting_to_commute_from_Origin[Fyllingsdalen]				
number_commuting_FROM_Origin_to_Destination[Fyllingsdalen, Fyllingsdalen]	0*"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Fyllingsdalen, Laksevåg]	"%_commuting_to_destination"[Laksevåg]*People_wanting_to_commute_from_Origin[Fyllingsdalen]				
number_commuting_FROM_Origin_to_Destination[Fyllingsdalen, Ytrebyggda]	"%_commuting_to_destination"[Ytrebyggda]*People_wanting_to_commute_from_Origin[Fyllingsdalen]				
number_commuting_FROM_Origin_to_Destination[Fyllingsdalen, Åsane]	"%_commuting_to_destination"[Åsane]*People_wanting_to_commute_from_Origin[Fyllingsdalen]				
number_commuting_FROM_Origin_to_Destination[Fyllingsdalen, Arna]	"%_commuting_to_destination"[Arna]*People_wanting_to_commute_from_Origin[Fyllingsdalen]				

number_commuting_FROM_Origin_to_Destination[Fyllingsdalen, Fana]	"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Fyllingsdalen]				
number_commuting_FROM_Origin_to_Destination[Laksevåg, Bergenhus]	"%_commuting_to_destination"[Bergenhus]*People_wanting_to_commute_from_Origin[Laksevåg]				
number_commuting_FROM_Origin_to_Destination[Laksevåg, Årstad]	"%_commuting_to_destination"[Årstad]*People_wanting_to_commute_from_Origin[Laksevåg]				
number_commuting_FROM_Origin_to_Destination[Laksevåg, Fyllingsdalen]	"%_commuting_to_destination"[Fyllingsdalen]*People_wanting_to_commute_from_Origin[Laksevåg]				
number_commuting_FROM_Origin_to_Destination[Laksevåg, Laksevåg]	0*"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Laksevåg, Ytrebyggda]	"%_commuting_to_destination"[Ytrebyggda]*People_wanting_to_commute_from_Origin[Laksevåg]				
number_commuting_FROM_Origin_to_Destination[Laksevåg, Åsane]	"%_commuting_to_destination"[Åsane]*People_wanting_to_commute_from_Origin[Laksevåg]				

number_commuting_FROM_Origin_to_Destination[Laksevåg, Arna]	"%_commuting_to_destination"[Arna]*People_wanting_to_commute_from_Origin[Laksevåg]				
number_commuting_FROM_Origin_to_Destination[Laksevåg, Fana]	"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Laksevåg]				
number_commuting_FROM_Origin_to_Destination[Ytrebyggda, Bergenhus]	"%_commuting_to_destination"[Bergenhus]*People_wanting_to_commute_from_Origin[Ytrebyggda]				
number_commuting_FROM_Origin_to_Destination[Ytrebyggda, Årstad]	"%_commuting_to_destination"[Årstad]*People_wanting_to_commute_from_Origin[Ytrebyggda]				
number_commuting_FROM_Origin_to_Destination[Ytrebyggda, Fyllingsdalen]	"%_commuting_to_destination"[Fyllingsdalen]*People_wanting_to_commute_from_Origin[Ytrebyggda]				
number_commuting_FROM_Origin_to_Destination[Ytrebyggda, Laksevåg]	"%_commuting_to_destination"[Laksevåg]*People_wanting_to_commute_from_Origin[Ytrebyggda]				
number_commuting_FROM_Origin_to_Destination[Ytrebyggda, Ytrebyggda]	0*"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Bergenhus]				

number_commuting_FROM_Origin_to_Destination[Ytrebyggda, Åsane]	"%_commuting_to_destination"[Åsane]*People_wanting_to_commute_from_Origin[Ytrebyggda]				
number_commuting_FROM_Origin_to_Destination[Ytrebyggda, Arna]	"%_commuting_to_destination"[Arna]*People_wanting_to_commute_from_Origin[Ytrebyggda]				
number_commuting_FROM_Origin_to_Destination[Ytrebyggda, Fana]	"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Ytrebyggda]				
number_commuting_FROM_Origin_to_Destination[Åsane, Bergenhus]	"%_commuting_to_destination"[Bergenhus]*People_wanting_to_commute_from_Origin[Åsane]				
number_commuting_FROM_Origin_to_Destination[Åsane, Årstad]	"%_commuting_to_destination"[Årstad]*People_wanting_to_commute_from_Origin[Åsane]				
number_commuting_FROM_Origin_to_Destination[Åsane, Fyllingsdalen]	"%_commuting_to_destination"[Fyllingsdalen]*People_wanting_to_commute_from_Origin[Åsane]				
number_commuting_FROM_Origin_to_Destination[Åsane, Laksevåg]	"%_commuting_to_destination"[Laksevåg]*People_wanting_to_commute_from_Origin[Åsane]				

number_commuting_FROM_Origin_to_Destination[Åsane, Ytrebyggda]	"%_commuting_to_destination"[Ytrebyggda]*People_wanting_to_commute_from_Origin[Åsane]				
number_commuting_FROM_Origin_to_Destination[Åsane, Åsane]	0*"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Åsane, Arna]	"%_commuting_to_destination"[Arna]*People_wanting_to_commute_from_Origin[Åsane]				
number_commuting_FROM_Origin_to_Destination[Åsane, Fana]	"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Åsane]				
number_commuting_FROM_Origin_to_Destination[Arna, Bergenhus]	"%_commuting_to_destination"[Bergenhus]*People_wanting_to_commute_from_Origin[Arna]				
number_commuting_FROM_Origin_to_Destination[Arna, Årstad]	"%_commuting_to_destination"[Årstad]*People_wanting_to_commute_from_Origin[Arna]				
number_commuting_FROM_Origin_to_Destination[Arna, Fyllingsdalen]	"%_commuting_to_destination"[Fyllingsdalen]*People_wanting_to_commute_from_Origin[Arna]				
number_commuting_FROM_Origin_to_Destination[Arna, Laksevåg]	"%_commuting_to_destination"[Laksevåg]*People_wanting_to_commute_from_Origin[Arna]				

number_commuting_FROM_Origin_to_Destination[Arna, Ytrebyggda]	"%_commuting_to_destination"[Ytrebyggda]*People_wanting_to_commute_from_Origin[Arna]				
number_commuting_FROM_Origin_to_Destination[Arna, Åsane]	"%_commuting_to_destination"[Åsane]*People_wanting_to_commute_from_Origin[Arna]				
number_commuting_FROM_Origin_to_Destination[Arna, Arna]	0*"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_commuting_FROM_Origin_to_Destination[Arna, Fana]	"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Arna]				
number_commuting_FROM_Origin_to_Destination[Fana, Bergenhus]	"%_commuting_to_destination"[Bergenhus]*People_wanting_to_commute_from_Origin[Fana]				
number_commuting_FROM_Origin_to_Destination[Fana, Årstad]	"%_commuting_to_destination"[Årstad]*People_wanting_to_commute_from_Origin[Fana]				
number_commuting_FROM_Origin_to_Destination[Fana, Fyllingsdalen]	"%_commuting_to_destination"[Fyllingsdalen]*People_wanting_to_commute_from_Origin[Fana]				
number_commuting_FROM_Origin_to_Destination[Fana, Laksevåg]	"%_commuting_to_destination"[Laksevåg]*People_wanting_to_commute_from_Origin[Fana]				

number_commuting_FROM_Origin_to_Destination[Fana, Ytrebyggda]	"%_commuting_to_destination"[Ytrebyggda]*People_wanting_to_commute_from_Origin[Fana]				
number_commuting_FROM_Origin_to_Destination[Fana, Åsane]	"%_commuting_to_destination"[Åsane]*People_wanting_to_commute_from_Origin[Fana]				
number_commuting_FROM_Origin_to_Destination[Fana, Arna]	"%_commuting_to_destination"[Arna]*People_wanting_to_commute_from_Origin[Fana]				
number_commuting_FROM_Origin_to_Destination[Fana, Fana]	0*"%_commuting_to_destination"[Fana]*People_wanting_to_commute_from_Origin[Bergenhus]				
number_of_buses_2020	136		bus	https://www.sustainable-bus.com/news/keolis-wins-a-contract-for-bergen-bus-fleet-on-renewable-energy/	
number_of_buses_SSB:_Data_here_seems_unreliable?	GRAPH(TIME) Points: (2005.000, 371.0), (2006.000, 351.0), (2007.000, 347.0), (2008.000, 347.0), (2009.000, 360.0), (2010.000, 386.0), (2011.000, 427.0), (2012.000, 465.0), (2013.000, 520.0), (2014.000, 616.0)		1	Data here seems unreliable? https://www.ssb.no/en/statbank/table/06672/tableViewLayout2/	
Number_of_byban_cars	28		bus	https://www.miljoloftet.no/detteerMiljoloftet/Bompenger/ofte-stilte-sporsmal-og-svar/	

number_of_byban_cars_needed_to_maintain_2020_capacity	(trips_per_byban_car_per_year/INIT(trips_per_byban_car_per_year))*Number_of_byban_cars		bus	Keolis has been present in Norway since 2010. With this new contract, its presence in the country will increase to around 500 employees. Keolis operates the Bergen light rail network since 2010, which is 20 kilometres long and counts 28 trams. The contract was recently renewed for another eight years and now includes maintenance in addition to operations. The success of this light rail network has encouraged the public transport authority to develop plans for further expansions, with firm plans for a northern line and a new extension to the western line due to open in 2022, Keolis explains in a press release. Between 12 and 14 new trams will be added to the network. https://www.sustainable-bus.com/news/keolis-wins-a-contract-for-bergen-bus-fleet-on-renewable-energy/	

number_of_passengers_SSB	GRAPH(TIME) Points: (2005.00, 28143000.0), (2006.00, 28557000.0), (2007.00, 28024000.0), (2008.00, 27386000.0), (2009.00, 26794000.0), (2010.00, 26732000.0), (2011.00, 32351000.0), (2012.00, 34087000.0), (2013.00, 36094000.0), (2014.00, 37275000.0), (2015.00, 37160000.0), (2016.00, 38556000.0), (2017.00, 48408000.0), (2018.00, 49073000.0), (2019.00, 53000000.0)		trip	https://www.ssb.no/en/statbank/table/06672/tableViewLayout2/	
number_travel_FROM_Origin_to_Destination_1[Bergenhus, Bergenhus]	0*"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Bergenhus]		person		
number_travel_FROM_Origin_to_Destination_1[Bergenhus, Årstad]	"%_travel_to_destination"[Årstad]*People_wanting_to_travel_from_Origin[Bergenhus]				
number_travel_FROM_Origin_to_Destination_1[Bergenhus, Fyllingsdalen]	"%_travel_to_destination"[Fyllingsdalen]*People_wanting_to_travel_from_Origin[Bergenhus]				

number_travel_FROM_Origin_to_Destination_1[Bergenhus, Laksevåg]	"%_travel_to_destination"[Laksevåg]*People_wanting_to_travel_from_Origin[Bergenhus]				
number_travel_FROM_Origin_to_Destination_1[Bergenhus, Ytrebyggda]	"%_travel_to_destination"[Ytrebyggda]*People_wanting_to_travel_from_Origin[Bergenhus]				
number_travel_FROM_Origin_to_Destination_1[Bergenhus, Åsane]	"%_travel_to_destination"[Åsane]*People_wanting_to_travel_from_Origin[Bergenhus]				
number_travel_FROM_Origin_to_Destination_1[Bergenhus, Arna]	"%_travel_to_destination"[Arna]*People_wanting_to_travel_from_Origin[Bergenhus]				
number_travel_FROM_Origin_to_Destination_1[Bergenhus, Fana]	"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Bergenhus]				
number_travel_FROM_Origin_to_Destination_1[Årstad, Bergenhus]	"%_travel_to_destination"[Bergenhus]*People_wanting_to_travel_from_Origin[Årstad]				
number_travel_FROM_Origin_to_Destination_1[Årstad, Årstad]	0*"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Bergenhus]				
number_travel_FROM_Origin_to_Destination_1[Årstad, Fyllingsdalen]	"%_travel_to_destination"[Fyllingsdalen]*People_wanting_to_travel_from_Origin[Årstad]				
number_travel_FROM_Origin_to_Destination_1[Årstad, Laksevåg]	"%_travel_to_destination"[Laksevåg]*People_wanting_to_travel_from_Origin[Årstad]				

number_travel_FROM_Origin_to_Destination_1[Årstad, Ytrebyggda]	"%_travel_to_destination"[Ytrebyggda]*People_wanting_to_travel_from_Origin[Årstad]				
number_travel_FROM_Origin_to_Destination_1[Årstad, Åsane]	"%_travel_to_destination"[Åsane]*People_wanting_to_travel_from_Origin[Årstad]				
number_travel_FROM_Origin_to_Destination_1[Årstad, Arna]	"%_travel_to_destination"[Arna]*People_wanting_to_travel_from_Origin[Årstad]				
number_travel_FROM_Origin_to_Destination_1[Årstad, Fana]	"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Årstad]				
number_travel_FROM_Origin_to_Destination_1[Fyllingsdalen, Bergenhus]	"%_travel_to_destination"[Bergenhus]*People_wanting_to_travel_from_Origin[Fyllingsdalen]				
number_travel_FROM_Origin_to_Destination_1[Fyllingsdalen, Årstad]	"%_travel_to_destination"[Årstad]*People_wanting_to_travel_from_Origin[Fyllingsdalen]				
number_travel_FROM_Origin_to_Destination_1[Fyllingsdalen, Fyllingsdalen]	0*"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Bergenhus]				
number_travel_FROM_Origin_to_Destination_1[Fyllingsdalen, Laksevåg]	"%_travel_to_destination"[Laksevåg]*People_wanting_to_travel_from_Origin[Fyllingsdalen]				

number_travel_FROM_Origin_to_Destination_1[Fyllingsdalen, Ytrebyggda]	"%_travel_to_destination"[Ytrebyggda]*People_wanting_to_travel_from_Origin[Fyllingsdalen]				
number_travel_FROM_Origin_to_Destination_1[Fyllingsdalen, Åsane]	"%_travel_to_destination"[Åsane]*People_wanting_to_travel_from_Origin[Fyllingsdalen]				
number_travel_FROM_Origin_to_Destination_1[Fyllingsdalen, Arna]	"%_travel_to_destination"[Arna]*People_wanting_to_travel_from_Origin[Fyllingsdalen]				
number_travel_FROM_Origin_to_Destination_1[Fyllingsdalen, Fana]	"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Fyllingsdalen]				
number_travel_FROM_Origin_to_Destination_1[Laksevåg, Bergenhus]	"%_travel_to_destination"[Bergenhus]*People_wanting_to_travel_from_Origin[Laksevåg]				
number_travel_FROM_Origin_to_Destination_1[Laksevåg, Årstad]	"%_travel_to_destination"[Årstad]*People_wanting_to_travel_from_Origin[Laksevåg]				
number_travel_FROM_Origin_to_Destination_1[Laksevåg, Fyllingsdalen]	"%_travel_to_destination"[Fyllingsdalen]*People_wanting_to_travel_from_Origin[Laksevåg]				
number_travel_FROM_Origin_to_Destination_1[Laksevåg, Laksevåg]	0*"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Bergenhus]				
number_travel_FROM_Origin_to_Destination_1[Laksevåg, Ytrebyggda]	"%_travel_to_destination"[Ytrebyggda]*People_wanting_to_travel_from_Origin[Laksevåg]				

number_travel_FROM_Origin_to_Destination_1[Laksevåg, Åsane]	"%_travel_to_destination"[Åsane]*People_wanting_to_travel_from_Origin[Laksevåg]				
number_travel_FROM_Origin_to_Destination_1[Laksevåg, Arna]	"%_travel_to_destination"[Arna]*People_wanting_to_travel_from_Origin[Laksevåg]				
number_travel_FROM_Origin_to_Destination_1[Laksevåg, Fana]	"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Laksevåg]				
number_travel_FROM_Origin_to_Destination_1[Ytrebyggda, Bergenhus]	"%_travel_to_destination"[Bergenhus]*People_wanting_to_travel_from_Origin[Ytrebyggda]				
number_travel_FROM_Origin_to_Destination_1[Ytrebyggda, Årstad]	"%_travel_to_destination"[Årstad]*People_wanting_to_travel_from_Origin[Ytrebyggda]				
number_travel_FROM_Origin_to_Destination_1[Ytrebyggda, Fyllingsdalen]	"%_travel_to_destination"[Fyllingsdalen]*People_wanting_to_travel_from_Origin[Ytrebyggda]				
number_travel_FROM_Origin_to_Destination_1[Ytrebyggda, Laksevåg]	"%_travel_to_destination"[Laksevåg]*People_wanting_to_travel_from_Origin[Ytrebyggda]				
number_travel_FROM_Origin_to_Destination_1[Ytrebyggda, Ytrebyggda]	0*"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Bergenhus]				

number_travel_FROM_Origin_to_Destination_1[Ytrebyggda, Åsane]	"%_travel_to_destination"[Åsane]*People_wanting_to_travel_from_Origin[Ytrebyggda]				
number_travel_FROM_Origin_to_Destination_1[Ytrebyggda, Arna]	"%_travel_to_destination"[Arna]*People_wanting_to_travel_from_Origin[Ytrebyggda]				
number_travel_FROM_Origin_to_Destination_1[Ytrebyggda, Fana]	"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Ytrebyggda]				
number_travel_FROM_Origin_to_Destination_1[Åsane, Bergenhus]	"%_travel_to_destination"[Bergenhus]*People_wanting_to_travel_from_Origin[Åsane]				
number_travel_FROM_Origin_to_Destination_1[Åsane, Årstad]	"%_travel_to_destination"[Årstad]*People_wanting_to_travel_from_Origin[Åsane]				
number_travel_FROM_Origin_to_Destination_1[Åsane, Fyllingsdalen]	"%_travel_to_destination"[Fyllingsdalen]*People_wanting_to_travel_from_Origin[Åsane]				
number_travel_FROM_Origin_to_Destination_1[Åsane, Laksevåg]	"%_travel_to_destination"[Laksevåg]*People_wanting_to_travel_from_Origin[Åsane]				
number_travel_FROM_Origin_to_Destination_1[Åsane, Ytrebyggda]	"%_travel_to_destination"[Ytrebyggda]*People_wanting_to_travel_from_Origin[Åsane]				
number_travel_FROM_Origin_to_Destination_1[Åsane, Åsane]	0*"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Bergenhus]				

number_travel_FROM_Origin_to_Destination_1[Åsane, Arna]	"%_travel_to_destination"[Arna]*People_wanting_to_travel_from_Origin[Åsane]				
number_travel_FROM_Origin_to_Destination_1[Åsane, Fana]	"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Åsane]				
number_travel_FROM_Origin_to_Destination_1[Arna, Bergenhus]	"%_travel_to_destination"[Bergenhus]*People_wanting_to_travel_from_Origin[Arna]				
number_travel_FROM_Origin_to_Destination_1[Arna, Årstad]	"%_travel_to_destination"[Årstad]*People_wanting_to_travel_from_Origin[Arna]				
number_travel_FROM_Origin_to_Destination_1[Arna, Fyllingsdalen]	"%_travel_to_destination"[Fyllingsdalen]*People_wanting_to_travel_from_Origin[Arna]				
number_travel_FROM_Origin_to_Destination_1[Arna, Laksevåg]	"%_travel_to_destination"[Laksevåg]*People_wanting_to_travel_from_Origin[Arna]				
number_travel_FROM_Origin_to_Destination_1[Arna, Ytrebyggda]	"%_travel_to_destination"[Ytrebyggda]*People_wanting_to_travel_from_Origin[Arna]				
number_travel_FROM_Origin_to_Destination_1[Arna, Åsane]	"%_travel_to_destination"[Åsane]*People_wanting_to_travel_from_Origin[Arna]				
number_travel_FROM_Origin_to_Destination_1[Arna, Arna]	0*"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Bergenhus]				

number_travel_FROM_Origin_to_Destination_1[Arna, Fana]	"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Arna]				
number_travel_FROM_Origin_to_Destination_1[Fana, Bergenhus]	"%_travel_to_destination"[Bergenhus]*People_wanting_to_travel_from_Origin[Fana]				
number_travel_FROM_Origin_to_Destination_1[Fana, Årstad]	"%_travel_to_destination"[Årstad]*People_wanting_to_travel_from_Origin[Fana]				
number_travel_FROM_Origin_to_Destination_1[Fana, Fyllingsdalen]	"%_travel_to_destination"[Fyllingsdalen]*People_wanting_to_travel_from_Origin[Fana]				
number_travel_FROM_Origin_to_Destination_1[Fana, Laksevåg]	"%_travel_to_destination"[Laksevåg]*People_wanting_to_travel_from_Origin[Fana]				
number_travel_FROM_Origin_to_Destination_1[Fana, Ytrebyggda]	"%_travel_to_destination"[Ytrebyggda]*People_wanting_to_travel_from_Origin[Fana]				
number_travel_FROM_Origin_to_Destination_1[Fana, Åsane]	"%_travel_to_destination"[Åsane]*People_wanting_to_travel_from_Origin[Fana]				
number_travel_FROM_Origin_to_Destination_1[Fana, Arna]	"%_travel_to_destination"[Arna]*People_wanting_to_travel_from_Origin[Fana]				
number_travel_FROM_Origin_to_Destination_1[Fana, Fana]	0*"%_travel_to_destination"[Fana]*People_wanting_to_travel_from_Origin[Bergenhus]				

over_all_difference_with_ref_mode	MEAN("%_difference_between_historical_and_endog_pop")		1		
passengers_converted_to_trips	(number_of_passengers_SSB/2)/per_year		trip/year		
passengers_per_trip_capacity	285		person/route	https://www.miljoloftet.no/detteerMiljoloftet/Bompenger/ofte-stilte-sporsmal-og-svar/	
People_commuting_for_Jobs_from_Bydeler[Bydeler]	"Excess_People_(Population-Jobs)"		person		
People_commuting_INTERNAL[Bydeler]	MAX(0, Jobs*jobs_per_person)		person		
People_commuting_INTERNAL_SERVICES[Bydeler]	distributed_POPULATION*"%_commuting_internally"		person		
people_moving	births+SUM(moving_out)		people/year		
people_travelling[Bydeler]	Trips:_Car_INTERNAL*person_per_trip*per_year		person		
people_travelling_1[Bydeler, Bydeler]	per_year*person_per_trip *Trips:_Car[Bydeler, Bydeler]		person		
people_travelling_2[Bydeler, Bydeler]	per_year*person_per_trip *Trips:_Car_1[Bydeler, Bydeler]		person		
people_travelling_3[Bydeler]	Trips:_Car_INTERNAL_1*person_per_trip*per_year		person		
People_wanting_to_commute_from_Origin[Bydeler]	MAX(0, "Excess_People_(Population-Jobs)")		person		
People_wanting_to_travel_from_Origin[Bydeler]	distributed_POPULATION		person		

per_car	1		car		
per_person	1		person		
per_year	1		yr		
percentage_of_population_above_18	0.8 {https://www.statista.com/statistics/586378/total-population-by-age-group-in-norway/#:~:text=This%20statistic%20shows%20the%20population,roughly%201.6%20and%201.7%20million. https://www.populationpyramid.net/norway/2020/ }		dmnl		
percentage_reduction_in_cycling_due_to_rainy_days	"%_days_of_rain_per_year"*(1-effect_of_weather_on_cycling)		1		
person_per_trip	1		person/trip		
"person/car"	total_endog_pop/Total_Cars		people/car		
POLICY_AND_TRIPS_CONTROL	1		1		
pop_%[Bydeler]	distributed_POPULATION/SUM(distributed_POPULATION)		1		
pop_percentages[Bydeler]	distributed_POPULATION/Projected_Bergen_population		1		
population_density[Bydeler]	distributed_POPULATION/Area_of_BYDELER		People/Kilometers^2		

Potential_Driving_population[Bydeler]	percentage_of_population_above_18*distributed_POPULATION		person		
"Price_of_Housing_CLOSE_(yearly_spread)"[Bydeler]	Average_Price_of_Housing/ time_to_pay_off_housing		NOK/ year		
Projected_Bergen_population	{"Projected_Bergen_population_-_historical"} IF ECT_vs_Historical = 1 THEN "Projected_Bergen_population_-_historical" ELSE IF ECT_vs_Historical = 2 THEN ECT:_Plateauing_Population ELSE IF ECT_vs_Historical = 3 THEN ECT:_Decreasing_Population ELSE "Projected_Bergen_population_-_historical"		person	"The City of Bergen's own prognoses indicate that the population will exceed 325,000 in 2030 and 355,000 in 2040." - Grønn Strategi	
"Projected_Bergen_population_-_historical"	GRAPH(TIME) Points: (2010.00, 256000), (2020.00, 283000), (2030.00, 325000), (2040.00, 355000)		person	"The City of Bergen's own prognoses indicate that the population will exceed 325,000 in 2030 and 355,000 in 2040." - Grønn Strategi	GF EXTRAPOLATED
Purchasing_of_cars[Bydeler]	Reference_Purchasing_of_Cars*likelihood_of_relying_on_other_other_transport_options_vs_purchasing_a_car		car/ Years		
ratio_of_FF_to_NFF_cars_purchase_cost	(average_cost_of_FF_car/ average_cost_of_NFF)		dmnl		

"ratio_of_FF/ Electric_per_journey _cost"[Bydeler]	average_cost_of_ Electric_Car_jour ney_EXTERNAL/ average_cost_of_ FF_car_journey_ EXTERNAL		1		
"ratio_of_FF/ Electric_per_journey _cost_1"[Bydeler]	average_cost_of_ Electric_Car_jour ney_INTERNAL/ average_cost_of_ FF_car_journey_I NTERNAL		1		
Ratio_of_Lifetime_tri p_costs[Bydeler]	Lifetime_cost_of_ NFF_trips/ Lifetime_cost_of_ FF_trips		dmnl		
"Reduced_costs_of_ car_manufacturing_o n/off"	1		dmnl		
reduced_costs_of_E car_manufacturing	IF "Reduced_costs_ of_car_manufactu ring_on/off" = 1 THEN "Reduced_costs_ of_car_manufactu ring_on/ off"*costs_of_Ecar _manufacturing_o ver_time ELSE 1		dmnl		
"REF_TRIP_COST_(SPREAD)_EXTERN AL"[Bydeler]	(Weighted_Avera ge_cost_of_car_jo urney*reference_t rips_per_yr)		nok/year		
"REF_TRIP_COST_(SPREAD)_INTERNA L"[Bydeler]	(Average_cost_of _car_journey_INT ERNAL*reference _trips_per_yr)		nok/year		
referance_average_c ommute_total_trips_p er_person_per_year	520 {52*2*5}		trip/ People/ Years		
Reference_%_able_t o_walk_or_cycle_to_ work_or_services	SUM(walking&cyc ling_combined)		dmnl		

Reference_Average_Home_size	100		square meter	https://relocation.no/expat-communities/relocation-to-norway/#:~:text=A%20normal%20size%20of%20a,bedroom%20flat%20is%2080%20sqm. " A normal size of a 4 bedroom house with 2 baths is 200 sqm. A master bedroom is 14 sqm. An average size on a 2 bedroom flat is 80 sqm."	
Reference_Average_Price_of_Housing[Bergenhus]	Average_Home_size*"Bergenhus_&_Arstad_nok/_square_km"		NOK	Also: https://www.norges-bank.no/contentassets/0ad19e1098324a3d8b88854e35623586/2018-10-20-charts.pdf	
Reference_Average_Price_of_Housing[Årstad]	Average_Home_size*"Bergenhus_&_Arstad_nok/_square_km"				
Reference_Average_Price_of_Housing[Fyllingsdalen]	"Fyllingsdalen_&_Laksevåg_nok/_square_km"*Average_Home_size				
Reference_Average_Price_of_Housing[Laksevåg]	"Fyllingsdalen_&_Laksevåg_nok/_square_km"*Average_Home_size				
Reference_Average_Price_of_Housing[Ytrebyggda]	"Fyllingsdalen_&_Laksevåg_nok/_square_km"*Average_Home_size				
Reference_Average_Price_of_Housing[Åsane]	"Asane_Arna_nok/_square_km"*Average_Home_size				
Reference_Average_Price_of_Housing[Arna]	"Asane_Arna_nok/_square_km"*Average_Home_size				

Reference_Average_Price_of_Housing[Fana]	Average_Home_size*"fana_nok/_square_km"				
reference_commute_trips_per_car_per_year[Bydeler]	commuting_trips_per_person*"driver/car"		trip/Car/Years		
reference_desired_cars[Bydeler]	Potential_Driving_population*reference_number_of_cars_desired_per_driving_adult		car		
REFERENCE_Likelihood_of_using_Bicycle[Bydeler, Bydeler]	GRAPH(Distance_to_Commute_area) Points: (1.000, 0.2000), (2.000, 0.134707718301), (3.000, 0.0978359835986), (4.000, 0.0770138468222), (5.000, 0.0652552088456), (6.000, 0.0586148928901), (7.000, 0.0548649861342), (8.000, 0.0527473458333)		dmnl	Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike Ray Pritchard* and Yngve Frøyen ALSO https://sustainabilityinfo.com/transportation/what-is-the-average-speed-for-urban-cycling/ "On average, urban cycling has a speed of 19-26 km/h or 12-16 mph" Therefore one hour commute would be around 20km	

REFERENCE_Likelihood_of_using_Bicycle_1[Bydeler, Bydeler]	GRAPH(Distance_to_Commute_area_1) Points: (1.000, 0.2000), (2.000, 0.112943624402), (3.000, 0.0637813114648), (4.000, 0.0360184624296), (5.000, 0.0203402784608), (6.000, 0.0114865238535), (7.000, 0.00648664817896), (8.000, 0.00366312777775)		dmnl	Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike Ray Pritchard* and Yngve Frøyen ALSO https://sustainabilityinfo.com/transportation/what-is-the-average-speed-for-urban-cycling/ "On average, urban cycling has a speed of 19-26 km/h or 12-16 mph" Therefore one hour commute would be around 20km	GF EXTRAPOLATED

REFERENCE_Likelihood_of_using_Bicycle_INTERNAL[Bydeler]	GRAPH(Distance_to_Commute_INTERNAL) Points: (1.000, 0.2000), (2.000, 0.134707718301), (3.000, 0.0978359835986), (4.000, 0.0770138468222), (5.000, 0.0652552088456), (6.000, 0.0586148928901), (7.000, 0.0548649861342), (8.000, 0.0527473458333)		dmnl	Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike Ray Pritchard* and Yngve Frøyen ---- https://sustainabilityinfo.com/transportation/what-is-the-average-speed-for-urban-cycling/ "On average, urban cycling has a speed of 19-26 km/h or 12-16 mph" Therefore one hour commute would be around 20km	GF EXTRAPOLATED
REFERENCE_Likelihood_of_using_Bicycle_INTERNAL_weather[Bydeler]	REFERENCE_Likelihood_of_using_Bicycle_INTERNAL*effect_of_Bergen_climate_on_cycling		1		

REFERENCE_Likelihood_of_using_Bicycle_INTERNAL:_Services[Bydeler]	GRAPH(Distance_to_Commute_INTERNAL_1) Points: (0.000, 0.2000), (0.800, 0.136424685258), (1.600, 0.0997948414801), (2.400, 0.0786900233494), (3.200, 0.0665301749202), (4.000, 0.0595241010983), (4.800, 0.0554874495986), (5.600, 0.0531616740295), (6.400, 0.0518216445526), (7.200, 0.0510495670474), (8.000, 0.0506047233449)		dmnl	Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike Ray Pritchard* and Yngve Frøyen ALSO https://sustainabilityinfo.com/transportation/what-is-the-average-speed-for-urban-cycling/ "On average, urban cycling has a speed of 19-26 km/h or 12-16 mph" Therefore one hour commute would be around 20km	
"REFERENCE_Likelihood_of_using_Bicycle_INTERNAL:_Services_w/ weather"[Bydeler]	REFERENCE_Likelihood_of_using_Bicycle_INTERNAL:_Services*effect_of_Bergen_climate_on_cycling		1		
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Bergenhus, Bergenhus]	0		1		
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Bergenhus, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_SAFE[Bergenhus, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Bergenhus, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Bergenhus, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Bergenhus, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Bergenhus, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Bergenhus, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Årstad, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Årstad, Årstad]	0				

REFERENCE_Likelihood_of_using_Bicycle_SAFE[Årstad, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Årstad, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Årstad, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Årstad, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Årstad, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Årstad, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fyllingsdalen, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fyllingsdalen, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fyllingsdalen, Fyllingsdalen]	0				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fyllingsdalen, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fyllingsdalen, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fyllingsdalen, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fyllingsdalen, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fyllingsdalen, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Laksevåg, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_SAFE[Laksevåg, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Laksevåg, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Laksevåg, Laksevåg]	0				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Laksevåg, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Laksevåg, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Laksevåg, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Laksevåg, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Ytrebyggda, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_SAFE[Ytrebyggda, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Ytrebyggda, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Ytrebyggda, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Ytrebyggda, Ytrebyggda]	0				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Ytrebyggda, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Ytrebyggda, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Ytrebyggda, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Åsane, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_SAFE[Åsane, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Åsane, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Åsane, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Åsane, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Åsane, Åsane]	0				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Åsane, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Åsane, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Arna, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_SAFE[Arna, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Arna, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Arna, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Arna, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Arna, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Arna, Arna]	0				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Arna, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fana, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fana, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fana, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fana, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fana, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fana, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fana, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_SAFE[Fana, Fana]	0				

REFERENCE_Likelihood_of_using_Bicycle_safe_1[Bergenhus, Bergenhus]	0		dmnl	https://sustainabilityinfo.com/transportation/what-is-the-average-speed-for-urban-cycling/ "On average, urban cycling has a speed of 19-26 km/h or 12-16 mph" Therefore one hour commute would be around 20km	
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Bergenhus, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Bergenhus, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Bergenhus, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Bergenhus, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Bergenhus, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_safe_1[Bergenhus, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Bergenhus, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Årstad, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Årstad, Årstad]	0				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Årstad, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Årstad, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Årstad, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Årstad, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_safe_1[Årstad, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Årstad, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fyllingsdalen, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fyllingsdalen, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fyllingsdalen, Fyllingsdalen]	0				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fyllingsdalen, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fyllingsdalen, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fyllingsdalen, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fyllingsdalen, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fyllingsdalen, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Laksevåg, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Laksevåg, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Laksevåg, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Laksevåg, Laksevåg]	0				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Laksevåg, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Laksevåg, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_safe_1[Laksevåg, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Laksevåg, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Ytrebyggda, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Ytrebyggda, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Ytrebyggda, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Ytrebyggda, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Ytrebyggda, Ytrebyggda]	0				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Ytrebyggda, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_safe_1[Ytrebyggda, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Ytrebyggda, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Åsane, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Åsane, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Åsane, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Åsane, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Åsane, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Åsane, Åsane]	0				

REFERENCE_Likelihood_of_using_Bicycle_safe_1[Åsane, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Åsane, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Arna, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Arna, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Arna, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Arna, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Arna, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_safe_1[Arna, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Arna, Arna]	0				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Arna, Fana]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fana, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fana, Årstad]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fana, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fana, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fana, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				

REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fana, Åsane]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fana, Arna]	MAX(0, REFERENCE_Likelihood_of_using_Bicycle_1*effect_of_Bergen_climate_on_cycling)				
REFERENCE_Likelihood_of_using_Bicycle_safe_1[Fana, Fana]	0				
REFERENCE_Likelihood_of_using_Bicycle_vs_not_travelling_INTERNAL_ORIGINAL[Bydeler]	GRAPH(TIME) Points: (0.00, 1.000), (2.00, 0.670320046036), (4.00, 0.449328964117), (6.00, 0.301194211912), (8.00, 0.201896517995), (10.00, 0.135335283237), (12.00, 0.0907179532894), (14.00, 0.0608100626252), (16.00, 0.0407622039784), (18.00, 0.0273237224473), (20.00, 0.0183156388887)		dmnl	https://sustainabilityinfo.com/transportation/what-is-the-average-speed-for-urban-cycling/ "On average, urban cycling has a speed of 19-26 km/h or 12-16 mph" Therefore one hour commute would be around 20km	

REFERENCE_Likelihood_of_using_Busses[Bydeler]	GRAPH(Distance_to_Commute_INTERNAL) Points: (0.00, 0.8000), (2.50, 0.536256036829), (5.00, 0.359463171294), (7.50, 0.24095536953), (10.00, 0.161517214396), (12.50, 0.108268226589), (15.00, 0.0725743626315), (17.50, 0.0486480501002), (20.00, 0.0326097631827), (22.50, 0.0218589779578), (25.00, 0.014652511111)		dmnl		GF EXTRAPOLATED
REFERENCE_Likelihood_of_using_Busses_INT[Bydeler]	GRAPH(Distance_to_Commute_INTERNAL_1) Points: (0.00, 0.8000), (2.50, 0.602192027621), (5.00, 0.46959737847), (7.50, 0.380716527147), (10.00, 0.321137910797), (12.50, 0.281201169942), (15.00, 0.254430771974), (17.50, 0.236486037575), (20.00, 0.224457322387), (22.50, 0.216394233468), (25.00, 0.210989383333)		dmnl		GF EXTRAPOLATED

REFERENCE_Likelihood_of_using_Bybanen[Bydeler, Bydeler]	REFERENCE_Likelihood_of_using_Public_Transport		dmnl	https://www.intelligenttransport.com/transport-articles/1146/bybanen-the-bergen-light-rail-system/#:~:text=The%20line%20is%20double%2Dtrack,400%20meters%20to%201%2C200%20meters. Average speed 28 km/h (17 mph) Top speed 70 km/h (43 mph) System length 20.4 km (12.7 mi)	
REFERENCE_Likelihood_of_using_Bybanen_int[Bydeler]	GRAPH(Distance_to_Commute_INTERNAL_1) Points: (0.00, 0.8000), (2.50, 0.602192027621), (5.00, 0.46959737847), (7.50, 0.380716527147), (10.00, 0.321137910797), (12.50, 0.281201169942), (15.00, 0.254430771974), (17.50, 0.236486037575), (20.00, 0.224457322387), (22.50, 0.216394233468), (25.00, 0.210989383333)		dmnl	https://www.intelligenttransport.com/transport-articles/1146/bybanen-the-bergen-light-rail-system/#:~:text=The%20line%20is%20double%2Dtrack,400%20meters%20to%201%2C200%20meters. Average speed 28 km/h (17 mph) Top speed 70 km/h (43 mph) System length 20.4 km (12.7 mi)	GF EXTRAPOLATED

REFERENCE_Likelihood_of_using_Bybanen_NTERNAL[Bydeler]	GRAPH(Distance_to_Commute_INTERNAL) Points: (0.00, 0.8000), (2.50, 0.536256036829), (5.00, 0.359463171294), (7.50, 0.24095536953), (10.00, 0.161517214396), (12.50, 0.108268226589), (15.00, 0.0725743626315), (17.50, 0.0486480501002), (20.00, 0.0326097631827), (22.50, 0.0218589779578), (25.00, 0.014652511111)		dmnl	https://www.intelligenttransport.com/transport-articles/1146/bybanen-the-bergen-light-rail-system/#:~:text=The%20line%20is%20double%2Dtrack,400%20meters%20to%201%2C200%20meters. Average speed 28 km/h (17 mph) Top speed 70 km/h (43 mph) System length 20.4 km (12.7 mi)	GF EXTRAPOLATED
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Bergenhus, Bergenhus]	0		dmnl	https://www.intelligenttransport.com/transport-articles/1146/bybanen-the-bergen-light-rail-system/#:~:text=The%20line%20is%20double%2Dtrack,400%20meters%20to%201%2C200%20meters. Average speed 28 km/h (17 mph) Top speed 70 km/h (43 mph) System length 20.4 km (12.7 mi)	

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Bergenhus, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Bergenhus, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Bergenhus, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Bergenhus, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Bergenhus, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Bergenhus, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Bergenhus, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Årstad, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Årstad, Årstad]	0				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Årstad, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Årstad, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Årstad, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Årstad, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Årstad, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Årstad, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fyllingsdalen, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fyllingsdalen, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fyllingsdalen, Fyllingsdalen]	0				

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fyllingsdalen, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fyllingsdalen, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fyllingsdalen, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fyllingsdalen, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fyllingsdalen, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Laksevåg, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Laksevåg, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Laksevåg, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Laksevåg, Laksevåg]	0				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Laksevåg, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Laksevåg, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Laksevåg, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Laksevåg, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Ytrebyggda, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Ytrebyggda, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Ytrebyggda, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Ytrebyggda, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Ytrebyggda, Ytrebyggda]	0				

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Ytrebyggda, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Ytrebyggda, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Ytrebyggda, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Åsane, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Åsane, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Åsane, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Åsane, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Åsane, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Åsane, Åsane]	0				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Åsane, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Åsane, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Arna, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Arna, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Arna, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Arna, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Arna, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Arna, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Arna, Arna]	0				

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Arna, Fana]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fana, Bergenhus]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fana, Årstad]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fana, Fyllingsdalen]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fana, Laksevåg]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fana, Ytrebyggda]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				

REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fana, Åsane]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fana, Arna]	REFERENCE_Likelihood_of_using_Public_transport_2*(1-Effect_Car_vs_Public_Transport_Trip_on_total_trips_taken_by_car_1)				
REFERENCE_Likelihood_of_using_Bybanen_Services_after_costs_considered[Fana, Fana]	0				

	GRAPH(Distance_to_Commute_area) Points: (0.00, 0.2000), (0.625, 0.211786248381), (1.25, 0.223870867061), (1.875, 0.236261409319), (2.50, 0.248965619648), (3.125, 0.261991438592), (3.75, 0.275347007713), (4.375, 0.289040674676), (5.00, 0.303080998469), (5.625, 0.31747675475), (6.25, 0.332236941337), (6.875, 0.347370783826), (7.50, 0.362887741362), (8.125, 0.378797512548), (8.75, 0.395110041509), (9.375, 0.411835524107), (10.00, 0.428984414312), (10.625, 0.44656743074), (11.25, 0.464595563348), (11.875, 0.483080080306), (12.50, 0.502032535039), (13.125, 0.521464773447), (13.75, 0.541388941312), (14.375, 0.561817491889), (15.00, 0.582763193685),				

"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)_INTERNAL"[Bydeler]	GRAPH(Distance_to_Commute_INTERNAL) Points: (0.00, 0.1000), (2.50, 0.142844917192), (5.00, 0.19019587366), (7.50, 0.242526773692), (10.00, 0.300361362523), (12.50, 0.364278468159), (15.00, 0.434917794475), (17.50, 0.512986323591), (20.00, 0.599265391588), (22.50, 0.694618508377), (25.00, 0.8000)		dmnl	https://www.toi.no/publications/the-traffic-in-the-largest-norwegian-cities-today-and-in-the-next-five-to-ten-years-article27724-29.html	GF EXTRAPOLATED
"REFERENCE_Likelihood_of_using_Cars_(EFFECT_OF_DISTANCE)_INTERNAL_1"[Bydeler]	GRAPH(Distance_to_Commute_INTERNAL_1) Points: (0.00, 0.2000), (2.50, 0.236724214736), (5.00, 0.277310748852), (7.50, 0.322165806021), (10.00, 0.371738310734), (12.50, 0.426524401279), (15.00, 0.487072395264), (17.50, 0.553988277364), (20.00, 0.627941764219), (22.50, 0.70967300718), (25.00, 0.8000)		dmnl	https://www.toi.no/publications/the-traffic-in-the-largest-norwegian-cities-today-and-in-the-next-five-to-ten-years-article27724-29.html	GF EXTRAPOLATED

"REFERENCE_Likelihood_of_using_Cars_vs_Not_travelling_(EFFECT_OF_DISTANCE)_1"[Bydeler, Bydeler]	GRAPH(Distance_to_Commute_area_1) Points: (0.00, 0.1000), (2.50, 0.155086322104), (5.00, 0.215966123277), (7.50, 0.283248709032), (10.00, 0.357607466101), (12.50, 0.439786601918), (15.00, 0.530608592896), (17.50, 0.630982416046), (20.00, 0.741912646328), (22.50, 0.864509510771), (25.00, 1.0000)		dmnl	https://www.toi.no/publications/the-traffic-in-the-largest-norwegian-cities-today-and-in-the-next-five-to-ten-years-article27724-29.html	GF EXTRAPOLATED

	GRAPH(Distance_to_Commute_area) Points: (0.00, 0.8000), (0.50, 0.753869807832), (1.00, 0.71128627338), (1.50, 0.67197671664), (2.00, 0.635689422244), (2.50, 0.602192027621), (3.00, 0.571270035084), (3.50, 0.542725438309), (4.00, 0.516375454426), (4.50, 0.492051353576), (5.00, 0.46959737847), (5.50, 0.448869747009), (6.00, 0.429735731585), (6.50, 0.412072809175), (7.00, 0.395767876774), (7.50, 0.380716527147), (8.00, 0.366822380272), (8.50, 0.353996466172), (9.00, 0.342156655209), (9.50, 0.331227132171), (10.00, 0.321137910797), (10.50, 0.311824385624), (11.00, 0.303226918294), (11.50, 0.295290455664), (12.00, 0.287964177278),				

REFERENCE_Likelihood_of_using_Public_transport_2[Bydeler, Bydeler]	GRAPH(Distance_to_Commute_area_1) Points: (0.00, 0.8000), (2.50, 0.602192027621), (5.00, 0.46959737847), (7.50, 0.380716527147), (10.00, 0.321137910797), (12.50, 0.281201169942), (15.00, 0.254430771974), (17.50, 0.236486037575), (20.00, 0.224457322387), (22.50, 0.216394233468), (25.00, 0.210989383333)		dmnl		GF EXTRAPOLATED
REFERENCE_Likelihood_of_walking[Bydeler, Bydeler]	GRAPH(Distance_to_Commute_area) Points: (0.00, 1.0000), (1.00, 0.676913645115), (2.00, 0.460342384835), (3.00, 0.315170327674), (4.00, 0.217858587635), (5.00, 0.152628577572), (6.00, 0.108903594224), (7.00, 0.0795938613727), (8.00, 0.0599469598988), (9.00, 0.0467772479983), (10.00, 0.037949326111)		dmnl	Average walking speed = 5 km/hr Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike Ray Pritchard* and Yngve Frøyen ALSO Therefore 1 hour commute would be 5 km	GF EXTRAPOLATED

REFERENCE_Likelihood_of_walking_1[Bydeler, Bydeler]	GRAPH(Distance_to_Commute_area_1) Points: (0.00, 1.0000), (1.11111111111, 0.648356780661), (2.22222222222, 0.422890044697), (3.33333333333, 0.278325195353), (4.44444444444, 0.185633049098), (5.55555555556, 0.126200662757), (6.66666666667, 0.0880937821983), (7.77777777778, 0.0636603977196), (8.88888888889, 0.0479941907689), (10.00, 0.037949326111)		dmnl	Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike Ray Pritchard* and Yngve Frøyen ALSO Average walking speed = 5 km/hr Therefore 1 hour commute would be 5 km	GF EXTRAPOLATED
REFERENCE_Likelihood_of_walking_INTERNAL[Bydeler]	GRAPH(Distance_to_Commute_INTERNAL) Points: (0.00, 1.0000), (1.00, 0.676913645115), (2.00, 0.460342384835), (3.00, 0.315170327674), (4.00, 0.217858587635), (5.00, 0.152628577572), (6.00, 0.108903594224), (7.00, 0.0795938613727), (8.00, 0.0599469598988), (9.00, 0.0467772479983), (10.00, 0.037949326111)		dmnl	Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike Ray Pritchard* and Yngve Frøyen //// Average walking speed = 5 km/hr Therefore 1 hour commute would be 5 km	

REFERENCE_Likelihood_of_walking_INTERNAL_services[Bydeler]	GRAPH(Distance_to_Commute_INTERNAL_1) Points: (1.000, 1.0000), (1.900, 0.676913645115), (2.800, 0.460342384835), (3.700, 0.315170327674), (4.600, 0.217858587635), (5.500, 0.152628577572), (6.400, 0.108903594224), (7.300, 0.0795938613727), (8.200, 0.0599469598988), (9.100, 0.0467772479983), (10.000, 0.037949326111)		dmnl	Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike Ray Pritchard* and Yngve Frøyen ALSO Average walking speed = 5 km/hr Therefore 1 hour commute would be 5 km	GF EXTRAPOLATED
REFERENCE_Likelihood_of_walking_INTERNAL_services_1[Bydeler]	GRAPH(1+1) Points: (0.000, 1.0000), (0.800, 0.670320046036), (1.600, 0.449328964117), (2.400, 0.301194211912), (3.200, 0.201896517995), (4.000, 0.135335283237), (4.800, 0.0907179532894), (5.600, 0.0608100626252), (6.400, 0.0407622039784), (7.200, 0.0273237224473), (8.000, 0.0183156388887)		dmnl	Location, location, relocation: how the relocation of offices from suburbs to the inner city impacts commuting on foot and by bike Ray Pritchard* and Yngve Frøyen ALSO Average walking speed = 5 km/hr Therefore 1 hour commute would be 5 km	GF EXTRAPOLATED

REFERENCE_Likelihood_of_walking_SAFE[Bergenhus, Bergenhus]	0		dmnl	Average walking speed = 5 km/hr Therefore 1 hour commute would be 5 km	
REFERENCE_Likelihood_of_walking_SAFE[Bergenhus, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Bergenhus, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Bergenhus, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Bergenhus, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Bergenhus, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Bergenhus, Arna]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Bergenhus, Fana]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Årstad, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Årstad, Årstad]	0				
REFERENCE_Likelihood_of_walking_SAFE[Årstad, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking)				

REFERENCE_Likelihood_of_walking_SAFE[Årstad, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Årstad, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Årstad, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Årstad, Arna]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Årstad, Fana]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fyllingsdalen, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fyllingsdalen, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fyllingsdalen, Fyllingsdalen]	0				
REFERENCE_Likelihood_of_walking_SAFE[Fyllingsdalen, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fyllingsdalen, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fyllingsdalen, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking)				

REFERENCE_Likelihood_of_walking_SAFE[Fyllingsdalen, Arna]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fyllingsdalen, Fana]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Laksevåg, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Laksevåg, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Laksevåg, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Laksevåg, Laksevåg]	0				
REFERENCE_Likelihood_of_walking_SAFE[Laksevåg, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Laksevåg, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Laksevåg, Arna]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Laksevåg, Fana]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Ytrebyggda, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking)				

REFERENCE_Likelihood_of_walking_SAFE[Ytrebyggda, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Ytrebyggda, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Ytrebyggda, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Ytrebyggda, Ytrebyggda]	0				
REFERENCE_Likelihood_of_walking_SAFE[Ytrebyggda, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Ytrebyggda, Arna]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Ytrebyggda, Fana]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Åsane, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Åsane, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Åsane, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Åsane, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking)				

REFERENCE_Likelihood_of_walking_SAFE[Åsane, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Åsane, Åsane]	0				
REFERENCE_Likelihood_of_walking_SAFE[Åsane, Arna]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Åsane, Fana]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Arna, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Arna, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Arna, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Arna, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Arna, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Arna, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Arna, Arna]	0				

REFERENCE_Likelihood_of_walking_SAFE[Arna, Fana]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fana, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fana, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fana, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fana, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fana, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fana, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fana, Arna]	MAX(0, REFERENCE_Likelihood_of_walking)				
REFERENCE_Likelihood_of_walking_SAFE[Fana, Fana]	0				
REFERENCE_Likelihood_of_walking_vs_Not_travelling_INTERNAL_1[Bydeler]	GRAPH(1+0) Points: (0.000, 0.950), (4.000, 0.100), (8.000, 0.040)		dmnl	Average walking speed = 5 km/hr Therefore 1 hour commute would be 5 km	GF EXTRAPOLATED

REFERENCE_Likelihood_of_walking_vs_Not_travelling_INTERNAL_original[Bydeler]	GRAPH(1+0) Points: (0.000, 1.000), (0.500, 0.670320046036), (1.000, 0.449328964117), (1.500, 0.301194211912), (2.000, 0.201896517995), (2.500, 0.135335283237), (3.000, 0.0907179532894), (3.500, 0.0608100626252), (4.000, 0.0407622039784), (4.500, 0.0273237224473), (5.000, 0.0183156388887)		dmnl	Average walking speed = 5 km/hr Therefore 1 hour commute would be 5 km	GF EXTRAPOLATED
REFERENCE_Likelihood_of_walking_vs_safe_1[Bergenhus, Bergenhus]	0		dmnl	Average walking speed = 5 km/hr Therefore 1 hour commute would be 5 km	
REFERENCE_Likelihood_of_walking_vs_safe_1[Bergenhus, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Bergenhus, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Bergenhus, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Bergenhus, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking_1)				

REFERENCE_Likelihood_of_walking_vs_safe_1[Bergenhus, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Bergenhus, Arna]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Bergenhus, Fana]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Årstad, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Årstad, Årstad]	0				
REFERENCE_Likelihood_of_walking_vs_safe_1[Årstad, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Årstad, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Årstad, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Årstad, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Årstad, Arna]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Årstad, Fana]	MAX(0, REFERENCE_Likelihood_of_walking_1)				

REFERENCE_Likelihood_of_walking_vs_safe_1[Fyllingsdalen, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fyllingsdalen, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fyllingsdalen, Fyllingsdalen]	0				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fyllingsdalen, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fyllingsdalen, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fyllingsdalen, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fyllingsdalen, Arna]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fyllingsdalen, Fana]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Laksevåg, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Laksevåg, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Laksevåg, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking_1)				

REFERENCE_Likelihood_of_walking_vs_safe_1[Laksevåg, Laksevåg]	0				
REFERENCE_Likelihood_of_walking_vs_safe_1[Laksevåg, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Laksevåg, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Laksevåg, Arna]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Laksevåg, Fana]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Ytrebyggda, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Ytrebyggda, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Ytrebyggda, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Ytrebyggda, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Ytrebyggda, Ytrebyggda]	0				
REFERENCE_Likelihood_of_walking_vs_safe_1[Ytrebyggda, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking_1)				

REFERENCE_Likelihood_of_walking_vs_safe_1[Ytrebyggda, Arna]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Ytrebyggda, Fana]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Åsane, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Åsane, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Åsane, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Åsane, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Åsane, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Åsane, Åsane]	0				
REFERENCE_Likelihood_of_walking_vs_safe_1[Åsane, Arna]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Åsane, Fana]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Arna, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking_1)				

REFERENCE_Likelihood_of_walking_vs_safe_1[Arna, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Arna, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Arna, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Arna, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Arna, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Arna, Arna]	0				
REFERENCE_Likelihood_of_walking_vs_safe_1[Arna, Fana]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fana, Bergenhus]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fana, Årstad]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fana, Fyllingsdalen]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fana, Laksevåg]	MAX(0, REFERENCE_Likelihood_of_walking_1)				

REFERENCE_Likelihood_of_walking_vs_safe_1[Fana, Ytrebyggda]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fana, Åsane]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fana, Arna]	MAX(0, REFERENCE_Likelihood_of_walking_1)				
REFERENCE_Likelihood_of_walking_vs_safe_1[Fana, Fana]	0				
reference_number_of_cars_desired_per_driving_adult	1.5		car/ person		
Reference_Persons_per_home	2.06		person/ house	KPA 2019	
Reference_Purchasing_of_Cars[Bydeler]	((reference_desired_cars-Cars)/ time_to_purchase_vehicle) +Scrapped_Cars_Replaced		car/ Years		
reference_trips_per_yr	commuting_trips_per_person*per_person		trip/ Years		
REFErNECE_MODE ?	1		1	https://www.miljodirektoratet.no/tjenester/klimagassutslipp-kommuner/?area=662&sector=4	
Relative_Affordability_of_Housing[Bydeler]	Affordability_of_Housing/ SUM(Affordability_of_Housing)		dmnl		
Relative_Affordability_of_Housing_weighted[Bydeler]	Weight:_Housing_Affordability*Relative_Affordability_of_Housing		1		

Relative_Affordability_of_Housing_weighted_employers[Bydeler]	Weight:_Housing_Affordability_employers*Relative_Affordability_of_Housing		1		
relative_crowding_effect[Bydeler]	("effect_of_population_density_(crowding_on_desirability_of_housing)"/ SUM("effect_of_population_density_(crowding_on_desirability_of_housing)"))		1		
relative_distance_from_city[Bydeler]	Distance_from_city_centre/ SUM(Distance_from_city_centre)		1		
Relative_Employer_Desirability[Bydeler]	Employer_Desirability/ SUM(Employer_Desirability)		1		
"Relative_Jobs/ person_score"[Bydeler]	"Work_Availability_Jobs/Person"/ SUM("Work_Availability_Jobs/ Person") {"Work_Availability_Jobs/Person"/ Mean_Work_Availability}		1		
"Relative_Jobs/ person_score_Weighted"[Bydeler]	"Relative_Jobs/ person_score"*Weight:_Jobs		1		
Relative_Service_Score[Bydeler]	Service_Score/ SUM(Service_Score) {Service_Score/ Mean_Service_Score}		1		
Relative_Service_Score_Weighted[Bydeler]	Relative_Service_Score*Weight:_Services		1		

Relative_Service_Score_Weighted_EMPLOYERS[Bydeler]	Relative_Service_Score*Weight:_Services_EMPLOYERS		1		
relative_traffic_density[Bydeler]	traffic_density/(HISTORY(traffic_density, 2009))		1	The closest thing to an inflection point in the traffic density data from SSB indicates that it hit a max in 2009, decreasing after. In the absence of better data this is assumed as a proxy for the density at which people are turn-off of road travel. https://www.ssb.no/en/statbank/table/12579/chartViewLine/	
relative_traffic_density_1[Bydeler]	traffic_density_1/(HISTORY(traffic_density_1, 2009))		1	The closest thing to an inflection point in the traffic density data from SSB indicates that it hit a max in 2009, decreasing after. In the absence of better data this is assumed as a proxy for the density at which people are turn-off of road travel. https://www.ssb.no/en/statbank/table/12579/chartViewLine/	
relative_traffic_density_2[Bydeler, Bydeler]	traffic_density_2/(HISTORY(traffic_density_2, 2009))		1	The closest thing to an inflection point in the traffic density data from SSB indicates that it hit a max in 2009, decreasing after. In the absence of better data this is assumed as a proxy for the density at which people are turn-off of road travel. https://www.ssb.no/en/statbank/table/12579/chartViewLine/	

relative_traffic_density_3[Bydeler, Bydeler]	traffic_density_3/(HISTORY(traffic_density_3, 2009))		1	The closest thing to an inflection point in the traffic density data from SSB indicates that it hit a max in 2009, decreasing after. In the absence of better data this is assumed as a proxy for the density at which people are turn-off of road travel. https://www.ssb.no/en/statbank/table/12579/chartViewLine/	
Relative_Travel_Convenience[Bydeler]	walking&cycling_combined/Reference_%_able_to_walk_or_cycle_to_work_or_services		dmnl		
Relative_Travel_Convenience_Weighted[Bydeler]	Relative_Travel_Convenience*Weight:_Travel_Convenience		dmnl		
Relative_Travel_Convenience_Weighted_EMPLOYERS[Bydeler]	Relative_Travel_Convenience*Weight:_Travel_Convenience_EMPLOYERS		dmnl		
routes_as_of_2020	54		trip	calculated by looking at the Skyss routes and averaging the number of departures per weekday across 5 routes	
Scrapped_Cars_Replaced[Bydeler]	(Scrapping_of_Cars)*"%_of_scrapped_cars_replaced"		car/Years		
Sentrum_–_Nesttun_2010	0+STEP(1, 2010)		1		
Service_Score[Bydeler]	Weighted_Food_1+Weighted_Sports_1+Weighted_Schools_1+Weighted_Culture_1		Facilities/Kilometers^2		

Services:_Culture[Bydeler]	Total_Recreation_Facilities/ Area_of_BYDELER		Facilities / Kilometers^2		
Services:_Food[Bydeler]	Food_shops/ Area_of_BYDELER		Facilities / Kilometers^2		
Services:_Schools[Bydeler]	Total_Schools_and_Barnehager/ Area_of_BYDELER		Facilities / Kilometers^2		
Services:_Sports[Bydeler]	Sport_Centres/ Area_of_BYDELER		Facilities / Kilometers^2		

single_fare_price	GRAPH(TIME) Points: (2013.000, 29.000), (2014.000, 31.000), (2015.000, 35.000), (2016.000, 37.000), (2017.000, 37.000), (2018.000, 37.000), (2019.000, 38.000), (2020.000, 39.000)		nok/trip	https://dinside.dagbladet.no/reise/na-blir-det-dyrere-a-reise-kollektivt/70616280 https://www.ba.no/nyheter/prisokning-400-prosent/s/1-41-6691385 https://e24.no/privatoekonomi/i/dOGa01/skrur-opp-kollektivprisene https://www.bt.no/nyheter/okonomi/i/OEn6l/lavere-rabatter-paa-flere-billetter 27 2012 29 2013 31 2014 35 2015 37 2016 37 2017 37 2018 38 2019 39 2020 https://www.nrk.no/vestland/buss-revolusjon_-prisen-halveres-flere-steder-1.13930227 https://www.nrk.no/vestland/mange-har-slutta-a-betala-pa-bussen-_-i-bergen-snik-ein-av-tre-1.15348187	
SKYSS_CAR	GRAPH(TIME) Points: (2008.000, 0.591), (2012.500, 0.537), (2017.000, 0.514)		1		GF EXTRAPOLATED

SKYSS_CYCLING	GRAPH(TIME) Points: (2008.000, 0.038), (2012.500, 0.034), (2017.000, 0.043)		1		GF EXTRAPOLATED
"Skyss_data_on_Byban_passengers_2013-19"	GRAPH(TIME) Points: (2013.000, 9125000.0), (2014.000, 9406000.0), (2015.000, 9987000.0), (2016.000, 10655000.0), (2017.000, 12591000.0), (2018.000, 14862000.0), (2019.000, 18655000.0)		trip/year		GF EXTRAPOLATED
SKYSS_PUBLIC_TRANSPORT	GRAPH(TIME) Points: (2008.000, 0.129), (2012.500, 0.156), (2017.000, 0.172)		1		GF EXTRAPOLATED
SKYSS_WALKING	GRAPH(TIME) Points: (2008.000, 0.225), (2012.500, 0.253), (2017.000, 0.256)		1		GF EXTRAPOLATED
Skyss:_Byban_Passengers_converted_to_Trips	"Skyss_data_on_Byban_passengers_2013-19"/2		trip/year		
Sport_Centres[Bydeler]	INIT_Sport_Centres*growth_in_services		Facilities		
Standard_Deviation_in_Jobs	STDDEV(Jobs)		jobs		
Standard_Deviation_in_Populations	STDDEV(distributed_POPULATION)		person		

stats?	1		1	https://toi.brage.unit.no/toi-xmlui/bitstream/handle/11250/2597151/Engebretsen_10.1016_j.jtrangeo.2017.05.013.pdf?sequence=2&isAllowed=y	
SUM_Desirability_of_ALL_Housing	SUM(Desirability_of_Close_Housing)		dmnl		
sum_FF_cars	SUM(FF_Cars)		car		
sum_NFF_Cars	SUM(Electric_Cars)		car		
Sum_of_Likelihoods_INTERNAL[Bydeler]	Actual_Likelihood_of_using_BYBANEN_INTERNAL[Bydeler] + Actual_Likelihood_of_using_a_Bus_INTERNAL[Bydeler] + Actual_Likelihood_of_using_a_Car_INTERNAL[Bydeler] + REFERENCE_Likelihood_of_walking_INTERNAL[Bydeler] + REFERENCE_Likelihood_of_using_Bicycle_INTERNAL_weather[Bydeler]		1		SUMMING CONVERTER

Sum_of_Likelihoods_INTERNAL_1[Bydeler]	Actual_Likelihood_of_using_a_Car_INTERNAL_1[Bydeler] + Actual_Likelihood_of_using_a_Bus_INTERNAL_1[Bydeler] + "REFERENCE_Likelihood_of_using_Bicycle_INTERNAL:_Services_w/weather"[Bydeler] + Actual_Likelihood_of_using_BYBANEN_3[Bydeler] + REFERENCE_Likelihood_of_walking_INTERNAL_services[Bydeler]		1		SUMMING CONVERTER
Sum_of_Likelihoods_ORIGINAL[Bydeler, Bydeler]	Actual_Likelihood_of_using_BYBANEN[Bydeler,Bydeler] + Actual_Likelihood_of_using_a_Bus[Bydeler,Bydeler] + REFERENCE_Likelihood_of_using_Bicycle_SAFE[Bydeler,Bydeler] + REFERENCE_Likelihood_of_walking_SAFE[Bydeler, Bydeler] + Actual_Likelihood_of_using_a_Car[Bydeler, Bydeler]		1		SUMMING CONVERTER

Sum_of_Likelihoods_ORIGINAL_1[Bydeler, Bydeler]	REFERENCE_Likelihood_of_using_Bicycle_safe_1[Bydeler,Bydeler] + REFERENCE_Likelihood_of_walking_vs_safe_1[Bydeler,Bydeler] + Actual_Likelihood_of_using_BYBANEN_2[Bydeler,Bydeler] + Actual_Likelihood_of_using_a_Bus_1[Bydeler,Bydeler] + Actual_Likelihood_of_using_a_Car_1[Bydeler, Bydeler]		1		SUMMING CONVERTER
theoretical_max_capacity:_number_of_people_transportable_at_once	Capacity_per_bus_1*number_of_buses_2020		person/trip		
TIME_FOR_JOBS_TO_MOVE	2		year		
time_taken_to_weigh_up_car_purchasing_decision	average_car_lifetime		years		
time_to_adjust_home working_%	10		year		
time_to_pay_off_housing[Bydeler]	25		Years		
Time_to_perceive_BYBAN_congestion_INTERNAL_1	1		year		
time_to_perceive_cap_utilisation	5		yr		
Time_to_perceive_congestion	1		year		
Time_to_perceive_congestion_1	1		year		
Time_to_perceive_congestion_INTERNAL	1		year		

Time_to_perceive_congestion_INTERNAL_1	1		year		
time_to_purchase_vehicle	average_car_lifetime		yr		
Time_to_update_Buy_Preference_Ratio	average_car_lifetime_1*0.5		year	A more precise smoothing/information delay may be appropriate here, but may have been more technically complex than required. For simplicity's sake we assume here that people will begin to update their preferences about vehicle type and potential next purchase well before their current vehicle requires replacing - as larger purchases such as vehicles will require longer lead up times and considerations as to market changes.	
Time_to_update_Housing_Preference	5		Years		
"tolls_on/off"	1		1		
TOTAL_available_jobs	SUM(Available_jobs_by_area)		jobs		
total_capacity_per_year	"Average_number_of_Trips_per_year_(capacity_effected0"*passengers_per_trip_capacity		people/ year		
Total_Car_Trips_ALL	Combined_external_car_trips+Combined_internal_car_trips_1		trip/year		
Total_Cars	SUM(Cars)		car		
total_commutes	total_commutes_internal+total_trips_commute_external		trip/year		

total_commutes_internal	SUM(trips_INTERNAL)		trip/year		
total_daily_bus_trips	routes_as_of_2020*departures_per_day*correction_to_historical_data		bus*trip		
total_endog_pop	SUM(distributed_POPULATION)		person		
total_endogenous_area_of_bergen	SUM(Area_of_BYDELER)		Square Kilometers		
Total_Excess_Jobs	SUM("Excess_Jobs_in_Area_(Jobs_-_Population)")		jobs		
total_external_km_driven_per_year	SUM(km_driven_per_year_internally_1)		Kilometers/Years		
total_Fac[Bydeler]	SUM(Food_shops[*]) + SUM(Sport_Centres[*]) + SUM(Total_Schools_and_Barnehager[*]) + SUM(Total_Recreation_Facilities[*])		Facilities		SUMMING CONVERTER
total_fac_per_sqKM[Bydeler]	(Sport_Centres + Food_shops + Total_Schools_and_Barnehager + Total_Recreation_Facilities)/ Area_of_BYDELER		Facilities /Square Kilometers		
total_internal_km_driven_per_year	SUM(km_driven_per_year_internally)		Kilometers/Years		
Total_JOBS_in_Bergen	SUM(Jobs)		jobs		
total_km_driven:_external_services[Bydeler, Bydeler]	Distance_to_Commute_area_1*Trips:_Car_1/"/trip"		Kilometers/Years		

Total_length_of_Bergen_Rd_network[Bydeler]	(114+344+640)/8		km	https://www.ssb.no/en/statbank/table/13229/tableViewLayout1/ Municipal Roads = 640km	
Total_length_of_Bergen_Rd_network_for_external_trips[Bergenhus, Bergenhus]	1		km	https://www.ssb.no/en/statbank/table/13229/tableViewLayout1/ Municipal Roads = 640km per bydeler = 640km/8 /2 when double arrayed to avoid double counting hence 640/16	
Total_length_of_Bergen_Rd_network_for_external_trips[Bergenhus, Årstad]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Bergenhus, Fyllingsdalen]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Bergenhus, Laksevåg]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Bergenhus, Ytrebyggda]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Bergenhus, Åsane]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Bergenhus, Arna]	40				

Total_length_of_Bergen_Rd_network_for_external_trips[Bergenhus, Fana]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Årstad, Bergenhus]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Årstad, Årstad]	1				
Total_length_of_Bergen_Rd_network_for_external_trips[Årstad, Fyllingsdalen]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Årstad, Laksevåg]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Årstad, Ytrebyggda]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Årstad, Åsane]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Årstad, Arna]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Årstad, Fana]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fyllingsdalen, Bergenhus]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fyllingsdalen, Årstad]	40				

Total_length_of_Bergen_Rd_network_for_external_trips[Fyllingsdalen, Fyllingsdalen]	1				
Total_length_of_Bergen_Rd_network_for_external_trips[Fyllingsdalen, Laksevåg]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fyllingsdalen, Ytrebyggda]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fyllingsdalen, Åsane]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fyllingsdalen, Arna]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fyllingsdalen, Fana]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Laksevåg, Bergenhus]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Laksevåg, Årstad]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Laksevåg, Fyllingsdalen]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Laksevåg, Laksevåg]	1				
Total_length_of_Bergen_Rd_network_for_external_trips[Laksevåg, Ytrebyggda]	40				

Total_length_of_Bergen_Rd_network_for_external_trips[Laksevåg, Åsane]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Laksevåg, Arna]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Laksevåg, Fana]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Ytrebyggda, Bergenhus]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Ytrebyggda, Årstad]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Ytrebyggda, Fyllingsdalen]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Ytrebyggda, Laksevåg]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Ytrebyggda, Ytrebyggda]	1				
Total_length_of_Bergen_Rd_network_for_external_trips[Ytrebyggda, Åsane]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Ytrebyggda, Arna]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Ytrebyggda, Fana]	40				

Total_length_of_Bergen_Rd_network_for_external_trips[Åsane, Bergenhus]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Åsane, Årstad]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Åsane, Fyllingsdalen]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Åsane, Laksevåg]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Åsane, Ytrebyggda]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Åsane, Åsane]	1				
Total_length_of_Bergen_Rd_network_for_external_trips[Åsane, Arna]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Åsane, Fana]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Arna, Bergenhus]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Arna, Årstad]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Arna, Fyllingsdalen]	40				

Total_length_of_Bergen_Rd_network_for_external_trips[Arna, Laksevåg]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Arna, Ytrebyggda]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Arna, Åsane]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Arna, Arna]	1				
Total_length_of_Bergen_Rd_network_for_external_trips[Arna, Fana]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fana, Bergenhus]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fana, Årstad]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fana, Fyllingsdalen]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fana, Laksevåg]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fana, Ytrebyggda]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fana, Åsane]	40				

Total_length_of_Bergen_Rd_network_for_external_trips[Fana, Arna]	40				
Total_length_of_Bergen_Rd_network_for_external_trips[Fana, Fana]	1				
total_looking_for_work	MAX(1, SUM("Excess_People_(Population-Jobs)"))		person		
"Total_people_\"moving'_per_year"	SUM(moving_CLOSE)-SUM(moving_out)		people/year	This actually represents births, but is here taken to simply be the increase in population across Bergen's Bydeler	
total_pop_density_of_all_Bergen	total_endog_pop/total_endogenous_area_of_bergen		People/Kilometers^2		
Total_pop_from_SSB_data	SUM(Historical_pop_data_from_SSB)		person		
Total_Public_Transport_Trips	total_trips:_Bus + total_trips:_byban		trip/year		SUMMING CONVERTER
Total_Recreation_Facilities[Bydeler]	INIT_Total_Recreation_Facilities*growth_in_services		Facilities		
total_road_trips[Bydeler, Bydeler]	Trips:_Car+Trips:_Bus		trip/year		
total_road_trips_1[Bydeler, Bydeler]	Trips:_Car_1+Trips:_Bus_1		trip/year		
total_road_trips_INTERNAL[Bydeler]	Trips:_Car_INTERNAL+Trips:_Bus_INTERNAL		trip/year		
total_road_trips_INTERNAL_1[Bydeler]	Trips:_Car_INTERNAL_1+Trips:_Bus_INTERNAL_1		trip/year		
Total_Schools_and_Barnehager[Bydeler]	INIT_Total_Schools_and_Barnehager*growth_in_services		Facilities		

total_service_score	SUM(Service_Score)		Facilities/Square Kilometers		
Total_trips_across_all_sectors	total_trips:_Car + total_trips:_Bus + total_trips:_byban + total_trips:_Walking + total_trips:_Cycling		trip/year		SUMMING CONVERTER
total_trips_commute_external	SUM(trips)		trip/year		
Total_Trips:_Bicycles_EXTERNAL	SUM(Trips:_Cycling)		trip/year		
Total_Trips:_Bicycles_EXTERNAL_1	SUM(Trips:_Cycling_1)		trip/year		
Total_Trips:_Bicycles_INTERNAL	SUM(Trips:_Cycling_INTERNAL)		trip/year		
Total_Trips:_Bicycles_INTERNAL_1	SUM(Trips:_Cycling_INTERNAL_1)		trip/year		
total_trips:_Bus	Total_Trips:_Bus_EXTERNAL + Total_Trips:_Bus_INTERNAL + Total_Trips:_Bus_INTERNAL_1 + Total_Trips:_Bus_EXTERNAL_1		trip/year		SUMMING CONVERTER
Total_Trips:_Bus_EXTERNAL	SUM(Trips:_Bus)		trip/year		
Total_Trips:_Bus_EXTERNAL_1	SUM(Trips:_Bus_1)		trip/year		
Total_Trips:_Bus_INTERNAL	SUM(Trips:_Bus_INTERNAL)		trip/year		
Total_Trips:_Bus_INTERNAL_1	SUM(Trips:_Bus_INTERNAL_1)		trip/year		

total_trips:_byban	Total_Trips:_Bybanen_EXTERNAL + Total_Trips:_Bybanen_INTERNAL + Total_Trips:_Bybanen_INTERNAL_1 + Total_Trips:_Bybanen_EXTERNAL_1		trip/year		SUMMING CONVERTER
Total_Trips:_Bybanen_EXTERNAL	SUM(Trips:_ByBanen)		trip/year		
Total_Trips:_Bybanen_EXTERNAL_1	SUM(Trips:_ByBanen_1)		trip/year		
Total_Trips:_Bybanen_INTERNAL	SUM(Trips:_ByBanen_INTERNAL)		trip/year		
Total_Trips:_Bybanen_INTERNAL_1	SUM(Trips:_ByBanen_INTERNAL_1)		trip/year		
total_trips:_Car	Total_Trips:_Cars_EXTERNAL + Total_Trips:_Cars_INTERNAL + Total_Trips:_Cars_INTERNAL_Services + Total_Trips:_Cars_EXTERNAL_Services		trip/year		SUMMING CONVERTER
Total_Trips:_Cars_EXTERNAL	SUM(Trips:_Car)		trip/year		
Total_Trips:_Cars_EXTERNAL_Services	SUM(Trips:_Car_1)		trip/year		
Total_Trips:_Cars_INTERNAL	SUM(Trips:_Car_INTERNAL)		trip/year		
Total_Trips:_Cars_INTERNAL_Services	SUM(Trips:_Car_INTERNAL_1)		trip/year		

total_trips:_Cycling	Total_Trips:_Bicycles_EXTERNAL + Total_Trips:_Bicycles_INTERNAL + Total_Trips:_Bicycles_INTERNAL_1 + Total_Trips:_Bicycles_EXTERNAL_1		trip/year		SUMMING CONVERTER
total_trips:_Walking	Total_Trips:_Walking_EXTERNAL + Total_Trips:_Walking_INTERNAL + Total_Trips:_Walking_INTERNAL_1 + Total_Trips:_Walking_EXTERNAL_1		trip/year		SUMMING CONVERTER
Total_Trips:_Walking_EXTERNAL	SUM(Trips:_Walking)		trip/year		
Total_Trips:_Walking_EXTERNAL_1	SUM(Trips:_Walking_2)		trip/year		
Total_Trips:_Walking_INTERNAL	SUM(Trips:_Walking_1)		trip/year		
Total_Trips:_Walking_INTERNAL_1	SUM(Trips:_Walking_3)		trip/year		
traffic_density[Bydeler]	MAX(0.01, cars_on_the_rd/ Total_length_of_Bergen_Rd_network)		car/ Kilometers		
traffic_density_1[Bydeler]	MAX(0.01, cars_on_the_rd_1/ Total_length_of_Bergen_Rd_network)		car/ Kilometers		
traffic_density_2[Bydeler, Bydeler]	MAX(0.01, cars_on_the_rd_external_commuting/ Total_length_of_Bergen_Rd_network_for_external_trips)		car/ Kilometers		

traffic_density_3[Bydeler, Bydeler]	MAX(0.01, cars_on_the_rd_external_commuting_1/ Total_length_of_Bergen_Rd_network_for_external_trips)		car/ Kilometers		
trip%:_bike	total_trips:_Cycling/ Total_trips_across_all_sectors		1		
trip%:_bus	total_trips:_Bus/ Total_trips_across_all_sectors		1		
trip%:_byban	total_trips:_byban/ Total_trips_across_all_sectors		1		
trip%:_car	total_trips:_Car/ Total_trips_across_all_sectors		1		
trip%:_walking	total_trips:_Walking/ Total_trips_across_all_sectors		1		
"Trip-Weighted_Average_car_distance_commuted_by_people_in_Bydeler"[Bydeler]	"Trip-Weighted_Average_car_distance_commuted_INTERNAL"+"Trip-Weighted_Average_car_distance_commuted_EXTERNAL"		km		
"Trip-Weighted_Average_car_distance_commuted_EXTERNAL"[Bydeler]	Average_commute_distance_EXTERNAL* SAFEDIV(Combined_external_car_trips, Total_Car_Trips_ALL, 0)		km		

"Trip-Weighted_Average_car_distance_commuted_INTERNAL"[Bydeler]	"Internal_average_commuting_distance_of_Bydeler_(Radius)" * SAFEDIV(Combined_internal_car_trips_1, Total_Car_Trips_ALL, 0)		km		
"Trip-Weighted_Average_Cost_of_Journeys"	Weighted_Average_cost_of_car_journey_EXTERNAL +Weighted_Average_cost_of_car_journey_EiNTERNAL		NOK/trip		
"trip/Car/yr"[Bydeler]	total_trips:_Car/Cars		trip/Car/Years		
trips[Bydeler, Bydeler]	number_commuting_FROM_Origin_to_Destination*commuting_trips_per_person		trip/year		
trips_calculated_from_income	bus_income_historical_Skyss/(single_fare_price)		trip		
"trips_from_byban_income/ticket_price"	income_from_tickets:_byban/(single_fare_price)		trip/year		
trips_from_fares_per_inhabitant	Total_pop_from_SSB_data*fares_per_inhabitant_2018		trip/year		
trips_INTERNAL[Bydeler]	People_commuting_INTERNAL*commuting_trips_per_person		trip/year		
trips_INTERNAL_1[Bydeler]	People_commuting_INTERNAL_SERVICES*"Non-commute_trips_per_person_per_year"		trip/year		

trips_per_byban_car_per_year	"Average_number_of_Trips_per_year_(capacity_effected0"/ Number_of_byban_cars*per_year		route/ bus		
trips_per_car_lifetime[Bydeler]	average_car_lifetime*"trip/Car/yr"		trip/car		
Trips:_Bus[Bydeler, Bydeler]	MAX(0, trips)*(SAFEDIV(Actual_Likelihood_of_using_a_Bus, Sum_of_Likelihoods_ORIGINAL, 0)) {MAX(0, (Actual_Likelihood_of_using_a_Bus/ Sum_of_Likelihoods_ORIGINAL))*trips}		trip/year		
Trips:_Bus_1[Bydeler, Bydeler]	MAX(0, "non-commuting_trips") *SAFEDIV(Actual_Likelihood_of_using_a_Bus_1, Sum_of_Likelihoods_ORIGINAL_1, 0) {MAX(0, "non-commuting_trips") *(SAFEDIV(Actual_Likelihood_of_using_a_Bus_1, Sum_of_Likelihoods_ORIGINAL_1, 1))} {MAX(0, (Actual_Likelihood_of_using_a_Bus/ Sum_of_Likelihoods_ORIGINAL))*trips}		trip/year		
Trips:_Bus_INTERNAL[Bydeler]	MAX(0, (Actual_Likelihood_of_using_a_Bus_INTERNAL/ Sum_of_Likelihoods_INTERNAL))*trips_INTERNAL		trip/year		

Trips:_Bus_INTERNAL_1[Bydeler]	MAX(0, (Actual_Likelihood_of_using_a_Bus_INTERNAL_1/ Sum_of_Likelihoods_INTERNAL_1))*trips_INTERNAL_1		trip/year		
Trips:_ByBanen[Bydeler, Bydeler]	MAX(0, trips)*(SAFEDIV(Actual_Likelihood_of_using_BYBANEN, Sum_of_Likelihoods_ORIGINAL, 0))		trip/year		
Trips:_ByBanen_1[Bydeler, Bydeler]	MAX(0, "non-commuting_trips")*(SAFEDIV(Actual_Likelihood_of_using_BYBANEN_2, Sum_of_Likelihoods_ORIGINAL_1, 0))		trip/year		
Trips:_ByBanen_INTERNAL[Bydeler]	MAX(0, (Actual_Likelihood_of_using_BYBANEN_INTERNAL/ Sum_of_Likelihoods_INTERNAL))*trips_INTERNAL		trip/year		
Trips:_ByBanen_INTERNAL_1[Bydeler]	MAX(0, (Actual_Likelihood_of_using_BYBANEN_3/ Sum_of_Likelihoods_INTERNAL_1))*trips_INTERNAL_1		trip/year		

Trips:_Car[Bydeler, Bydeler]	MAX(0, trips)*(SAFEDIV(Actual_Likelihood_of_using_a_Car, Sum_of_Likelihoods_ORIGINAL, 0)) {MAX(0, (Actual_Likelihood_of_using_a_Car/ Sum_of_Likelihoods_ORIGINAL))*trips}		trip/year		
Trips:_Car_1[Bydeler, Bydeler]	MAX(0, "non-commuting_trips") * {MAX(0, (Actual_Likelihood_of_using_a_Car_1/ Sum_of_Likelihoods_ORIGINAL_1)) } SAFEDIV(Actual_Likelihood_of_using_a_Car_1, Sum_of_Likelihoods_ORIGINAL_1, 0) {MAX(0, "non-commuting_trips") *(SAFEDIV(Actual_Likelihood_of_using_a_Car_1, Sum_of_Likelihoods_ORIGINAL_1, 1))} {MAX(0, (Actual_Likelihood_of_using_a_Car/ Sum_of_Likelihoods_ORIGINAL))*trips}		trip/year		
Trips:_Car_INTERNAL[Bydeler]	MAX(0, (Actual_Likelihood_of_using_a_Car_INTERNAL/ Sum_of_Likelihoods_INTERNAL))*trips_INTERNAL		trip/year		

Trips:_Car_INTERNAL_1[Bydeler]	MAX(0, (Actual_Likelihood_of_using_a_Car_INTERNAL_1/ Sum_of_Likelihoods_INTERNAL_1))*trips_INTERNAL_1		trip/year		
Trips:_Cycling[Bydeler, Bydeler]	MAX(0, trips)*(SAFEDIV(MAX(0, REFERENCE_Likelihood_of_using_Bicycle_SAFE), Sum_of_Likelihoods_ORIGINAL, 0)) {MAX(0, (REFERENCE_Likelihood_of_using_Bicycle_vs_not_travelling/ Sum_of_Likelihoods_ORIGINAL))*trips}		trip/year		
Trips:_Cycling_1[Bydeler, Bydeler]	MAX(0, "non-commuting_trips") * SAFEDIV(REFERENCE_Likelihood_of_using_Bicycle_safe_1, Sum_of_Likelihoods_ORIGINAL_1, 0) {MAX(0, (REFERENCE_Likelihood_of_using_Bicycle_vs_not_travelling/ Sum_of_Likelihoods_ORIGINAL))*trips}		trip/year		
Trips:_Cycling_INTERNAL[Bydeler]	MAX(0, (REFERENCE_Likelihood_of_using_Bicycle_INTERNAL_weather/ Sum_of_Likelihoods_INTERNAL))*trips_INTERNAL		trip/year		

Trips:_Cycling_INTERNAL_1[Bydeler]	MAX(0, ("REFERENCE_Likelihood_of_using_Bicycle_INTERNAL:_Services_w/ weather"/ Sum_of_Likelihoods_INTERNAL_1))*trips_INTERNAL_1		trip/year		
Trips:_Walking[Bydeler, Bydeler]	MAX(0, trips)*(SAFEDIV(MAX(0, REFERENCE_Likelihood_of_walking_SAFE), Sum_of_Likelihoods_ORIGINAL, 0)) {MAX(0, (REFERENCE_Likelihood_of_walking_vs_Not_travelling/ Sum_of_Likelihoods_ORIGINAL))*trips}		trip/year		
Trips:_Walking_1[Bydeler]	MAX(0, (REFERENCE_Likelihood_of_walking_INTERNAL/ Sum_of_Likelihoods_INTERNAL))*trips_INTERNAL		trip/year		

Trips:_Walking_2[Bydeler, Bydeler]	MAX(0, "non-commuting_trips") * SAFEDIV(REFERENCE_Likelihood_of_walking_vs_safe_1, Sum_of_Likelihoods_ORIGINAL_1, 0) {MAX(0, (REFERENCE_Likelihood_of_walking_vs_Not_travelling/ Sum_of_Likelihoods_ORIGINAL))*trips}		trip/year		
Trips:_Walking_3[Bydeler]	MAX(0, (REFERENCE_Likelihood_of_walking_INTERNAL_services/ Sum_of_Likelihoods_INTERNAL_1))*trips_INTERNAL_1		trip/year		
vehicles_used_per_trip[Bydeler]	"car/population"		car/ person		
walking&cycling_combined[Bydeler]	(Combined_likelihood_of_being_able_to_walk_or_cycle_to_services + Combined_likelihood_of_being_able_to_walk_or_cycle_to_work) /2		1		
Weight:_Centrality	0		1	n/a	
Weight:_Crowding	0.04 {0.04}		1	Weight extrapolated from US Survey: 0.7	
Weight:_Housing_Affordability	0.01		1	Weight extrapolated from US Survey: 0.5	
Weight:_Housing_Affordability_employers	0.1 {0.1}		1		

Weight:_Jobs	Weight:_Jobs_Reference*(Effect_of_Percentage_of_jobs_that_are_remote)		dmnl		
Weight:_Jobs_Reference	0.03{0.03}		dmnl	Weight extrapolated from US Survey: 0.6	
Weight:_Population_EMPLOYERS	Weight:_Population_Reference_EMPLOYERS*Effect_of_Percentage_of_jobs_that_are_remote_AFTER_considering_employee_%		DMNL		
Weight:_Population_Reference_EMPLOYERS	0.1		DMNL		
Weight:_Services	0.06{0.06}		1	Weight extrapolated from US Survey: 0.5	
Weight:_Services_EMPLOYERS	0.7 {0.7}		1		
Weight:_Travel_Convenience	Weight:_Travel_Convenience_Reference*Effect_of_Percentage_of_jobs_that_are_remote		dmnl		
Weight:_Travel_Convenience_EMPLOYERS	Weight:_Travel_Convenience_Reference:_EMPLOYERS*Effect_of_Percentage_of_jobs_that_are_remote		dmnl		
Weight:_Travel_Convenience_Reference	0.01		dmnl	Weight extrapolated from US Survey: 0.2	
Weight:_Travel_Convenience_Reference:_EMPLOYERS	1 {1}		dmnl		
Weighted_Average_cost_of_car_journey[Bydeler]	(weighted_average_FF_journey_cost+weighted_average_NFF_journey_cost)/2		nok/trip		

Weighted_Average_cost_of_car_journey_EiNTERNAL	MEAN(Weighted_Average_cost_of_car_journey_INTERNAL)*(Combined_internal_car_trips_1/ Total_Car_Trips_ALL)		NOK/trip		
Weighted_Average_cost_of_car_journey_EXTERNAL	MEAN(Weighted_Average_cost_of_car_journey)*(Combined_external_car_trips/ Total_Car_Trips_ALL)		NOK/trip		
Weighted_Average_cost_of_car_journey_INTERNAL[Bydeler]	(weighted_average_FF_journey_cost_1+weighted_average_NFF_journey_cost_1)/2		nok/trip		
weighted_average_FF_journey_cost[Bydeler]	average_cost_of_FF_car_journey_EXTERNAL*"%_of_cars_purchased_that_are_FF"		nok/trip		
weighted_average_FF_journey_cost_1[Bydeler]	average_cost_of_FF_car_journey_INTERNAL*"%_of_cars_purchased_that_are_FF"		nok/trip		
weighted_average_NFF_journey_cost[Bydeler]	average_cost_of_Electric_Car_journey_EXTERNAL*(1-"%_of_cars_purchased_that_are_FF")		NOK/trip		
weighted_average_NFF_journey_cost_1[Bydeler]	average_cost_of_Electric_Car_journey_INTERNAL*(1-"%_of_cars_purchased_that_are_FF")		NOK/trip		

weighted_cost_of_FF_vs_NFF[Bydeler]	(ratio_of_FF_to_NFF_cars_purchase_cost*"weighting_of_fuel_to_purchase_cost_in_decision_making_1_=_ALL_PURCHASE_0_=_ALL_TRIP") + (Ratio_of_Lifetime_trip_costs*(1-"weighting_of_fuel_to_purchase_cost_in_decision_making_1_=_ALL_PURCHASE_0_=_ALL_TRIP"))		1		
Weighted_Culture_1[Bydeler]	Services:_Culture*Weighting_Culture		Facilities / Kilometers^2		
Weighted_Effect_of_crowding_on_housing_desirability_of_housing[Bydeler]	Weight:_Crowding*relative_crowding_effect		dmnl		
Weighted_Food_1[Bydeler]	Services:_Food*Weighting_Food		Facilities / Kilometers^2		
Weighted_Schools_1[Bydeler]	Services:_Schools*Weighting_Schools		Facilities / Kilometers^2		
Weighted_significance_of_Population[Bydeler]	"%_OF_BERGEN_Population"*Weight:_Population_EMPLOYERS		1		
Weighted_Sports_1[Bydeler]	Services:_Sports*Weighting_Sports		Facilities / Kilometers^2		
Weighting_Culture	0.2 {0.2}		1		
Weighting_Food	{0.5}0.5		1		

"weighting_of_fuel_to_purchase_cost_in_decision_making_1_=_ALL_PURCHASE_0_=_ALL_TRIP"	0.5		dmnl	Assumed value: This takes as an assumption that car buyers typically place far more emphasis on the purchase cost than the fuel costs.	
Weighting_Schools	0.1		1		
Weighting_Sports	0.2 {0.2}		1		

				Rolling stock Main article: Stadler Variobahn Tram 201 being delivered at Kronstad on 8 December 2009, the morning after it arrived in Bergen In 2007, the Planning Office ordered 12 Variobahn trams from Stadler Rail, with an additional four on option. The first tram arrived on 7 December 2009, and was used for testing in the months leading up to the opening. Before the opening, three more trams were in place.[39] The trams are 32.180 m (105.58 ft) long and 2.65 meters (8 ft 8 in) wide, weighing 35.7 tonnes (35.1 long tons; 39.4 short tons). They have five articulated sections, and are expandable with another two modules to a length of 42 meters (138 ft), should higher capacity be necessary. All stations are built for extended trams.[33] There is a slightly elevated driver's cab at each end. Eight motors provide a total of 360 kW (480 hp) for three bogies. This allows a maximum speed of 70 km/h (43 mph), limited to 50 km/h (31 mph) in city streets and 25 km/h (16 mph) in the depots. Acceleration is 1.25 m/s2 (4.13 ft/s2), and they are capable of operating on a 7.0% gradient.	

"Work_Availability_Jobs/Person"[Bydeler]	Job_Positions/ distributed_POPULATION		jobs/ People		

Total	Count	Including Array Elements
Variables	622	6999
Sectors	22	
Stocks	14	147
Flows	18	172
Converters	590	6680
Constants	130	501
Equations	478	6351
Graphicals	60	956
Macro Variables	1780	
Run Specs		
Start Time	2010	
Stop Time	2050	
DT	1/64	
Fractional DT	TRUE	
Save Interval	1	
Sim Duration	0	
Time Units	year	
Pause Interval	0	
Integration Method	Euler	
Keep all variable results	TRUE	
Run By	Run	
Calculate loop dominance information	FALSE	

Array Dimension	Indexed by	Elements
Bydeler	Label (8)	Bergenhus Årstad Fyllingsdalen Laksevåg Ytrebyggda Åsane Arna Fana