SWECO

REPORT

OSLO-STHLM 2.55 AB

Oslo-Stockholm Wider Socioeconomic Benefit Analysis 2040

PROJECT NUMBER 7002339000

SUMMARY

2017-07-31

STRATEGIC RAILWAY

SWECO

DOCUMENT INFORMATION

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Cover photo:	Brunsbergs bruk, a station on the single-track section of the Värmlandsbanan line, between Arvika and Kil. Photo: Rolf Granér

1 Summary

Sweco`s Conclusion

Sweco can conclude that the Oslo-Stockholm, 2.55 project has nearly reached socioeconomic balance, despite and thanks to the extensive expansion. The cost of the infrastructure expansion is estimated at 55 billion SEK at June 2016´s price level. The socioeconomic impacts are estimated at 67 billion SEK in at current price levels. Sweco has not been able to add in the freight benefits within the available timeline, but it´s clear that these added benefits are significant. The various benefits that this report describes will also be added.

The broad improvements in accessibility and capacity that Oslo-Stockholm 2.55 entails create major national and regional economic benefits. The project could therefore be prioritized, in its entirety or in stages, in the national railway infrastructure development plan.

Of particular interest is that producer benefits for railway transport companies are very positive over the long period of calculation in the report, and therefore there should be very significant market interest in further developing railway traffic.

Finally, Sweco estimates the conditions for developing an international agreement between Norway and Sweden to be very good, since significant benefits would arise in both countries. Both countries have experience of various forms of organizational, financial, and formal national and international agreements for the implementation of new infrastructure. It is therefore close at hand to suggest that the project be further developed between society and industry in both countries.

1.1 The Project

Sweco has on behalf of the *Oslo-Stockholm 2.55 AB*[1] company investigated the benefits created when a railway corridor between Oslo and Stockholm is rebuilt with double tracks along the entire route, as well as a short-cut section through the Värmland, Örebro and Mälardalen regions of Sweden so that travel between the capitols is shortened to a total of less than three hours. The goal for traveling between Oslo and Stockholm is two hours and 55 minutes, hence the name of the company and the project.[2]

The project included the following:

- Development of the purpose and the project objectives
- Assessment of actions and investment costs
- Suggestions for train traffic routes
- Analysis of accessibility improvements
- Analysis of travel time savings
- Analysis of the national economy

[1] The company is owned by the municipalities of Karlstad, Örebro and Västerås as well as Region Värmland, Region Örebro län and Region Västmanland.
[2] Throughout this report, the **project** and its suggested infrastructure improvements are referred to as Oslo-Stockholm 2.55, while the **company** behind it is referred to in its entirety as Oslo-Stockholm 2.55 **AB**.

- Analysis of real estate and housing market benefits
- Analysis of labor market benefits
- Analysis of business sector benefits
- Analysis of freight benefits
- Analysis of educational benefits
- Analysis of social benefits
- Analysis of integration benefits
- Analysis of environmental benefits
- Separate report of accessibility improvements (Sampers[3]) and socioeconomic effects (Samkalk[4])
- Preliminary external summary
- Unified final report

Sweco has analyzed the corridor´s impacts using the same method as was initiated by the Swedish Treaty (Sverigeförhandlingen) in 2015. This investigation alternative features a fully expanded conventional and modern railway with double tracks along the entire route, completed in 2040.

1.2 Purpose

The Oslo-Stockholm 2.55 AB company was created at the end of 2015 with the purpose of realizing a fast and dependable railway between Oslo and Stockholm with a total travel time under three hours (two hours and 55 minutes). This is to be achieved within reasonable means, through complementing the existing infrastructure and creating two short-cut sections of railway along the corridor. The Oslo-Stockholm railway is to be designed for speeds up to 250 km/hr and should provide additional capacity and function for traffic comprised of long, heavy freight trains.

1.3 The Objective

Through investments in railway infrastructure along the route, the objective of the Oslo-Stockholm 2.55 project is to enable faster, more robust, and more attractive travel between the metropolitan regions and the labor market regions located along the corridor. These investments will widen the labor markets for approximately 3.5 million people living in the area, strengthening business and university institutions along the route, which is part of the Nordic triangle.

1.4 Conditions

There is a great need for improved railway infrastructure with fast and frequent traffic along the line. Currently, the railways have a difficult task in taking market share from airline and highway traffic. Railway infrastructure investments significantly increase the market base. Travel times between all stations are shortened, waiting times are reduced as more trains are utilized, and newer and faster travel options are possible for everyone.

[3] Sampers is a national prognosis and analysis tool for commuter traffic, often various alternatives are studied (The Base Alternative is defined by the National Rail Administration, the Development Alternative includes investments in new short-cut routes and double tracks).
[4] Samkalk is a sub-module of Sampers for socioeconomic impacts of infrastructure investments.

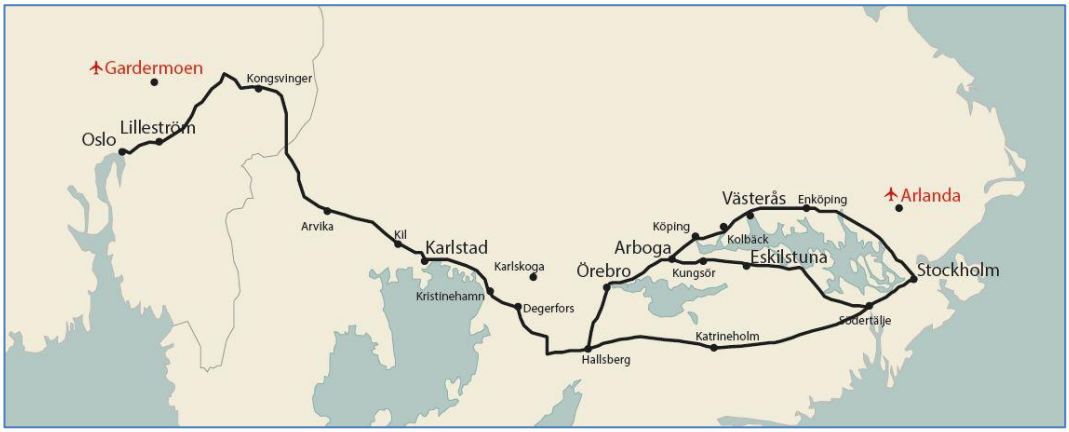

Figure 1. Current railway corridor Oslo-Stockholm. The route is over 570 km. Map: Sweco

Norway is Sweden's largest trading partner and the commodity industry in both countries demands robust and dependable railway freight. International freight transport within each country's transport sector is expected to continue to accelerate rapidly. The Värmlandsbanan line has reached full capacity at certain times of the day and the section between Kil and Karlstad is a bottleneck in the system.

1.5 Suggested Investments

Sweco´s investigation is based on a proposed railway expansion to be competed in 2040. The current railway line is approximately 570 km long, of which nearly 170 km is already comprised of modern double-track railway. Through new short-cuts, the line will be shortened by almost 80 km, as compared to the current route, which will then be shorter than the E18 highway. The new line also means that the market base is increasing.

Between Lilleström, Norway and Arvika, Sweden a new double-track railway line will be built as a short-cut route. The new railway line will be approximately 92 km long of which nearly two-thirds are on the Norwegian side of the border. In Sweden, on the section between Kristinehamn and Örebro, a new double-track railway, the Nobelbanan line, which will be approximately 70 km long including a new station between the cities of Karlskoga and Degerfors that will be built. Double-track lines need to be built between Arvika and Kristinehamn, as well as between Örebro and Västerås, on those sections that currently have single-track railway lines. Measure for increasing capacity are also required at some stations and freight terminals.

Connections to the Svealandsbanan line, the Västra stambanan line, the freight lines through Bergslagen, etc. will be retained. Through-traffic traveling via connections will also have shorter travel times on the section, which means that this infrastructure expansion will have large, widespread impacts on the railway traffic options within the Svealand region of Sweden as well as within Norway. With double-tracks along the entire corridor, capacity will increase and the current Värmlandsbanan line on both sides of the expanded corridor, can be used for freight traffic and interregional commuter traffic.

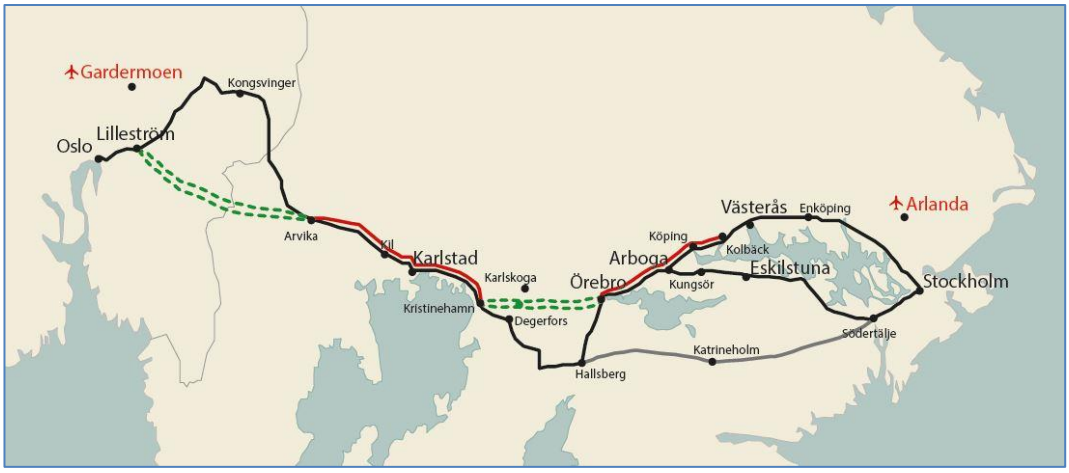

Figure 2. Suggested investments on the corridor. Green signifies new double-track lines, red signifies single-track additions for double-tracks and measures for capacity increase. Map: Sweco

The suggested investments are estimated at 55 billion SEK. Sixty percent of the investment costs are due to new double-track short-cuts between Lilleström and Arvika as well as between Kristinehamn and Örebro (the Nobelbanan line). The remaining 40 percent is made up of measures to be completed on the existing sections that currently lack double-tracks. Of the total, approximately 12 billion SEK amounts to investments on the Norwegian side of the border.

In the example below, Sweco has prioritized phased expansions on the Kil-Karlstad-Örebro-Kolbäck section. Double-tracks between Kil and Karlstad could be completed by 2030. The extension of the Mälarbanan line to Karlstad could be completed circa 2034. The continued expansion to and from Norway is dependent upon a double-track line between Arvika and Kil, and could be completed in its entirety to Lilleström in 2040.

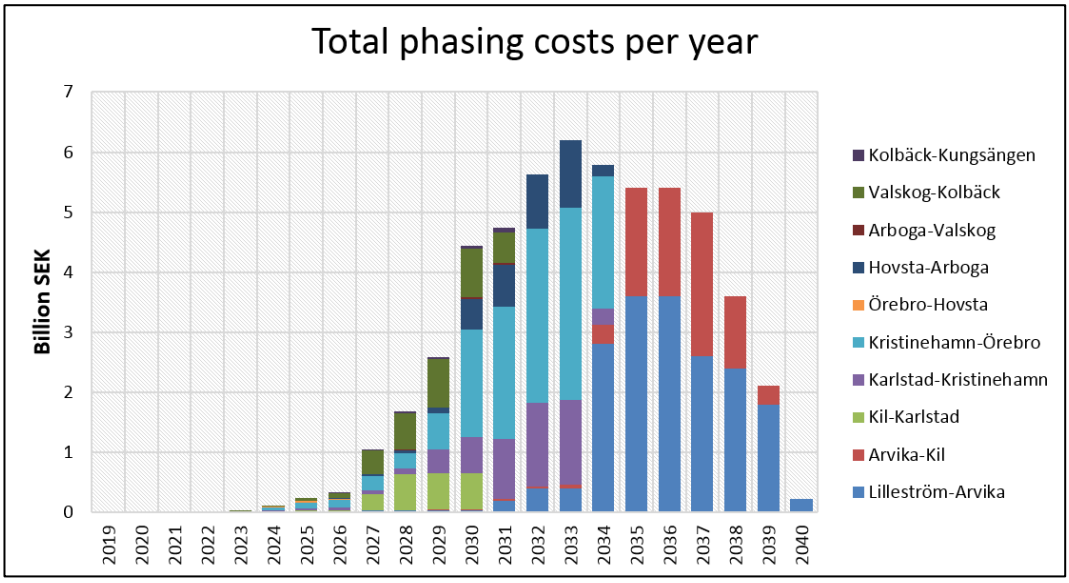

Figure 3. The diagram shows the yearly expansion costs divided among the various sections. The investments are first completed on the Swedish side. The new section from Lilleström-Arvika is included with construction commencing circa 2031.

1.6 At Present

The railway runs between two expansive metropolitan regions and through three overlapping and growing labor market regions situated in-between these: Karlstad, Örebro and Västerås. Along the corridor live approximately 3.5 million people as well as a great number of both nations´ schools of higher education. Oslo, Karlstad, Örebro, Västerås, Eskilstuna, as well as Stockholm are all large growth engines and nodes located at ideal distances for railway traffic along an approximately 500 km long corridor.

Currently, 1.4 million flights are taken between Oslo and Stockholm per year, which means there is already a large, and growing, basis of travelers between the metropolitan regions. Travel by train is comparatively very small, with 300,000 travelers per year. However, railway travel is also significantly slower than air travel. The current railway corridor does not follow the natural flow of the E18 highway corridor. The longer detours the train is required to take mean longer travel times, which further minimizes the market base.

In the large intermediate market, train travel has grown through regional investments in new railways traveling through the entire Mälardalen, Närke, Värmland and Oslo regions. However, these regions are not linked to one another in a competitive way for public transport, so a large part of commuting takes place by car and with limited regional enlargement effects.

1.7 Travel Goals and Traffic

Travel time goals for trips along the corridor have been created based upon a comparison of current travel times via train and car, supplied by the website Resrobot.se. Based upon this, two conditions were set:

- Interregional train travel times over 50 km shall be half as long as travel times by car.
- Regional train travel times under 50 km shall be 70% as long as travel times by car.

With these conditions, travel times via train between the larger cities along the corridor would be as shown in Figure 4.

TRAIN	Oslo	Karlstad	Örebro	Eskilstuna	Västerås	Stockholm
Oslo		01:17	01:50	02:20	02:17	02:55
Karlstad	01:17		00:35	01:22	01:17	01:35
Örebro	01:50	00:35		00:42	00:42	01:16
Eskilstuna	02:20	01:22	00:42		00:37	00:46
Västerås	02:17	01:17	00:42	00:35		00:42
Stockholm	02:55	01:35	01:16	00:46	00:42	

Figure 4. Travel time goals for the Oslo-Stockholm 2.55 project between larger cities along the corridor. Source: Sweco´s processing of values from Resrobot.se

The *Oslo-Stockholm 2.55 AB* company and Sweco have together created a goal within the benefit analysis for future train traffic, both regional and long-distance trains, on the corridor Oslo-Stockholm 2040. Traffic goals are based on assumptions regarding future traffic demands and have been accepted by SJ, the relevant regional associations, and public transport authorities in Värmland, Örebro and Västmanland municipalities.

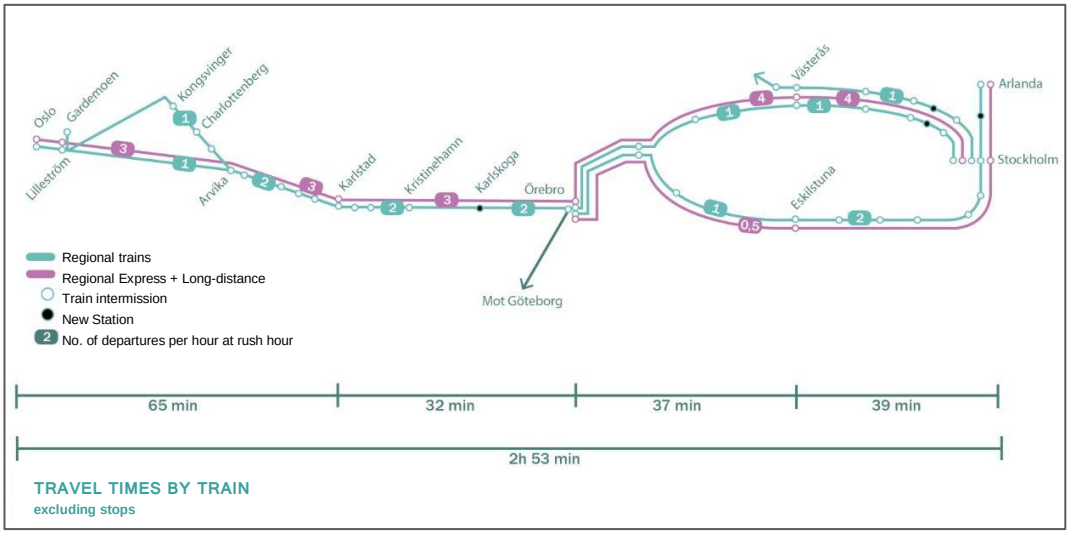

Figure 5. Image showing future train traffic goals. Illustrates the number of trains per hour under high-traffic times, as well as which train stops at each station. At the bottom, travel times are also shown. Source: Oslo-Sthlm 2.55 AB

Based on the desired traffic along the Oslo-Stockholm 2040 route along with the proposed infrastructure investments, Sweco has completed the below running time calculations and timetable analyses. The analysis includes regional trains as well as regional express and long-distance trains that traverse the route. The result is presented in Figure 6. The travel time goal for Oslo-Stockholm of two hours and 55 minutes has been achieved!

TRAIN 2016

Travel time in minutes	Oslo	Lilleström	Arvika	Karlstad	Örebro	Västerås	Stockholm C
Oslo	0	31	109	151	280	330	315
Lilleström	31		140	180	275	330	335
Arvika	110	160	0	50	160	260	230
Kil	164	195	30	23	115	210	185
Karlstad	151	195	60	0	100	140	180
Kristinehamn	190	220	85	20	70	160	138
Karlskoga/Degerf	205	160	115	45	50	145	120
Örebro	250	280	145	95	0	50	110
Västerås	340	370	195	140	50	0	55
Stockholm C	315	350	205	150	120	60	0

TRAIN 2040

Travel time in minutes	Oslo	Lilleström	Arvika	Karlstad	Örebro	Västerås	Stockholm C
Oslo	0	9	43	62	98	134	175
Lilleström	9	0	34	53	89	125	166
Arvika	43	34	0	32	68	104	144
Kil	67	58	23	8	44	80	121
Karlstad	62	53	32	0	35	72	112
Kristinehamn	82	73	52	20	29	65	105
Karlskoga/Degerf	93	84	63	30	18	54	95
Örebro	98	89	68	35	0	36	76
Västerås	134	125	104	72	36	0	40
Stockholm C	175	166	144	112	76	40	0

TRAIN 2040

Travel time in hours and minutes	Oslo	Lilleström	Arvika	Karlstad	Örebro	Västerås	Stockholm C
Oslo		00:09	00:43	01:02	01:38	02:14	02:55
Lilleström	00:09		00:34	00:53	01:29	02:05	02:46
Arvika	00:43	00:34		00:32	01:08	01:44	02:24
Karlstad	01:02	00:53	00:32		00:35	01:12	01:52
Örebro	01:38	01:29	01:08	00:35		00:36	01:16
Västerås	02:14	02:05	01:44	01:12	00:36		00:40
Stockholm C	02:55	02:46	02:24	01:52	01:16	00:40	

Figure 6. The results of running time calculations and timetable analyses for the expanded railway in 2040, compared to current traffic in 2016. The first table shows travel times in minutes today, without an investment in Oslo-Stockholm 2.55. Travel time improvements in the investigated alternative are shown by the middle and lower tables, showing travel times in minutes, or hours and minutes. The travel time goal between end stations of 2:55 has been achieved.

1.8 Travel Time Savings

With current infrastructure intact and lacking any further investments on the corridor until the year 2040, Sweco evaluates the amount of international train trips across the border to increase from approximately 290,000 per year currently to 385,000 per year in 2040. This assessment is based on no significant changes in tickets/routes being implemented either.

For the investigated alternative Oslo-Stockholm 2.55, a fully expanded, double-track railway with short-cuts, Swecos traffic prognosis calculations, using the analysis tool Sampers, along with our processed analyses from Norway, show that the amount of entering and exiting travelers[5] at the stations along the entire corridor between Oslo and Stockholm will increase by 34 percent, from approximately 65 million travelers per year to 87 million per year in 2040. This is an increase by a total of 11 million trips.

The amount of international train travel across the border is increasing and will reach 2,927,000 per year in 2040. This is equal to 8,000 train trips per day or 4,000 in each direction distributed between approximately 22 departures or 180 payments per departure, as an average over a year´s time.

The consumer surplus per municipality is calculated for regional travel as well as travel by train based on the national model. A summary of the consumer surplus per municipalities along the corridor are shown in Figure 7.

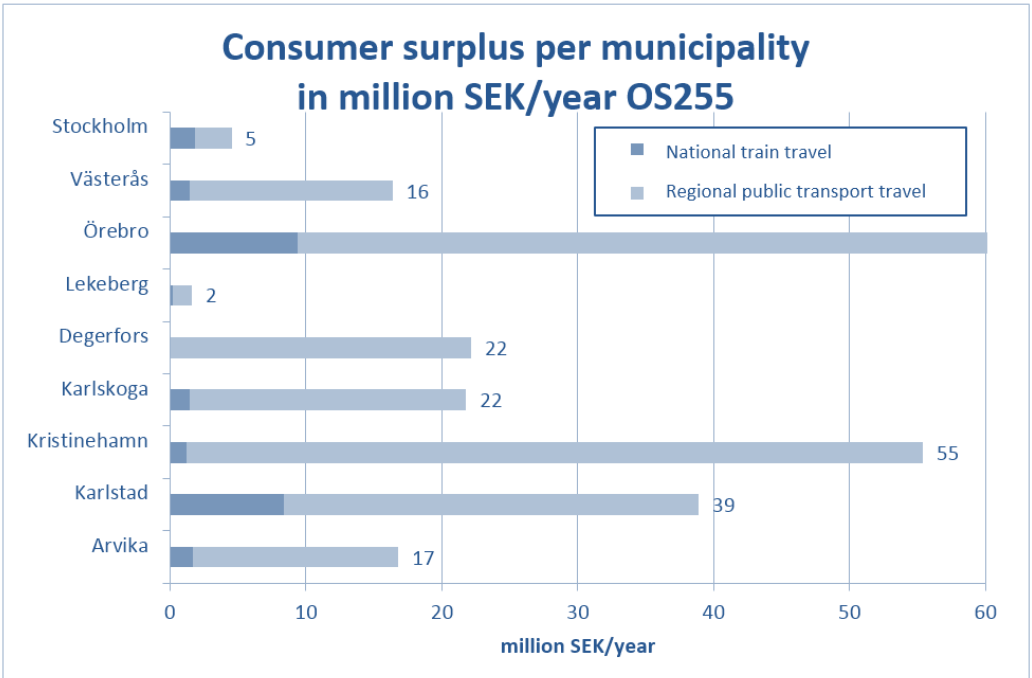

Figure 7. Consumer surplus per municipality in Sweden, shown in million SEK per year (forecast year 2040), distributed by national train travel and regional train travel at traffic as per Oslo-Stockholm 2.55.

1.9 Socioeconomic Benefits

The socioeconomic benefits for national travel in Sweden were created using the analytic tool Samkalk. Corresponding values for international travel to and from Norway on the line have been calculated manually with Samkalk´s arrangement for posts and parameters. These two calculations give the following results:

[5] Not unique travelers, even travelers changing trains were included.

Impact	Value Sweden, Million SEK	Value Norway, Million SEK	Total value, Million SEK
Producer Surplus	8,542	12,402	20,950
Budgetary Impacts	442	590	1,032
Consumer Surplus	23,492	15,483	38,975
External Impacts	408	3,791	4,199
O&M, reinvestments	168	1,846	2,014
Total	33,052	34,111	67,170

The socioeconomic impacts are thus valued at approximately 67.2 billion SEK in current value. Additional regional economic values and assessments of currently unquantifiable benefits are also presented in this report. These should be seen in relation to the proposed investments, which have been estimated at 55 billion SEK.

The proposed investments on the Oslo-Stockholm corridor will generate many benefits within several areas: housing, labor market, higher education, business, freight transport, the environment, people's social lives and for integration of newly arrived residents. The positive effects will benefit Sweden and Norway in various ways, as highlighted in this report.

1.10 Real Estate and Housing Market Benefits

One of today's major challenges is managing the housing shortage. The shortage has recently become accelerated, in part due to the large influx of refugees into Sweden. The fact that a railway connection between Oslo-Stockholm could also lead to increased housing construction is a benefit of national importance. The larger municipalities of Västerås, Örebro, and Karlstad are planning to jointly build about 90,000 new homes by 2045. This could increase by another 10,000 homes when Oslo-Stockholm is realized, according to municipal assessments. Other municipalities located along the new railway corridor will also contribute to increased housing construction. A current analysis of municipalities that have been finalized, shows that the municipalities of Lekeberg, Karlskoga, Degerfors, Kristinehamn and Arvika will build about 9,000 homes, of which more than 2,100 are the result of improved accessibility through the Oslo-Stockholm 2.55 project.

When residents in a municipality receive improved accessibility, transport costs fall, and the convenience and quality of commuting increases. This means that the attractiveness of living in the municipality increases and when more people want to live in a municipality, the demand for real estate increases. In this report, the municipalities' own assessments of the number of additional homes due to improvements in accessibility have been the basis for the estimated housing benefit. The report presents the results for each municipality and the total benefit, which also includes an estimated increase in the values of existing and additional homes that are planned to be built, regardless of the infrastructure expansion.

Housing impacts of Oslo-Stockholm 2.55
Summary for Arvika, Karlstad, Kristinehamn, Degerfors, Karlskoga, Lekeberg, Örebro and Västerås municipalities.

- New housing during 2017–2045 with Oslo-Stockholm 2.55: 106,096 units
- New housing during 2017–2045 without Oslo-Stockholm 2.55: 63,890 units
- New housing values affected by Oslo-Stockholm 2.55: 29,030 units
- Housing value increase with Oslo-Stockholm 2.55: 1,991–3,346 million SEK

1.11 Labor Market Benefits

As is included in this report, the accessibility improvements that the new public transport is likely to cause provides the basis for the expected impacts on the labor market due to the expansion of Oslo-Stockholm. Improved public transport provides differing impacts on workers who have access to cars and those who do not. Research shows that doubling accessibility, i.e. that workers within one region can reach twice as many workplaces within the same travel times, leads to a wage increase of up to four-five percent.

Table 1. Changes in wage sums in a region when accessibility doubles.[6]

Travel time	Impact on the region´s joint wage sum due to a doubling in accessibility
0–40 minutes	4–5 percent
40–80 minutes	1–2 percent
Over 80 minutes	Very weak or statistically uncertain

Oslo-Stockholm means, as previously described, further proximity to the Mälar region as well as increased accessibility across the border to Norway and the Oslo region. The opportunities for commuting and finding employment goes in both directions. Both for residents in Mälardalen and in the Oslo Region, it will be easier to find work in each region than it is today. The actual labor market benefits are therefore likely greater than shown in this report. It should be added, however, that commuting from Norway to Sweden happens significantly less than the reverse. The Norwegian economy is dependent upon Swedish labor and the new corridor facilitates this exchange between the countries.

[6] Andersson M: *"Närhet ger jobb. Produktivitetseffekter på arbetsmarknaden av förbättrade kommunikationer",* Southern Swedish Chamber of Commerce and Industry*, 2013*

Labor Market Impacts of Oslo-Stockholm 2.55

	Increase in no. of employment opportunities 2036-2045 without Oslo-Stockholm 2.55	Increase in no. of employment opportunities 2036-2045 with Oslo-Stockholm 2.55
Karlstad	~7,300	~9,300
Örebro	~15,700	~18,900
Västerås	~12,300	~12,800
Total	*35,300*	*41,000*

1.12 Business Sector Benefits

Companies benefit from improved accessibility in various ways. Basically, the effects include access to customers, skilled labor, and capital, i.e. the parameters that define the competitiveness of a company. With a transport system, companies can gather skilled labor and capital to produce a product or service, then process and distribute it to customers. The more efficient the transport system is, the greater the base of skilled labor and customers that can be reached for the same cost, and companies receive better opportunities for development. Correspondingly, the same level of production can be carried out at lower costs in terms of time, when accessibility is developed.

As industries receive differing benefits from increased accessibility, in the form of regional enlargement, the business structure for the Oslo-Stockholm corridor has been studied. This could be completed using various methods. This report presents several analyses that focus on the daytime population of various municipalities. The following parameters are highlighted:

- The amount of jobs in absolute numbers in 2015. The more people that are employed, the greater the industry´s importance for the municipality/region. Reported figures refer to daytime populations.
- The specialization ratio, the proportion of those employed within a specific industry in a municipality relative to the proportion of those employed within the same industry in the nation. A ratio of 1.10 means that this industry has greater than ten percent more people employed within the municipality than the average for Sweden, and indicates that the industry has favorable conditions within the municipality or region.
- The growth ratio is the number of employed persons within the industry in the municipality during 2008-2015. It is then divided by the corresponding growth at the national level. A ratio of 1.10 means that the industry has grown more than 10

percent faster in the municipality than in the nation as a whole. This industry is likely to have favorable conditions for continued development in the municipality and would benefit from improved accessibility.

Based on the definition of the gross regional product, GRP, it is both possible and logical to define and calculate business benefits as the sum of returns to business owners and lenders. Assuming that the balance of power between workers and employers is relatively even, the business benefits of an improved corridor between Oslo and Stockholm can be calculated based upon the ratio of the salary amount in today's GRP, and assuming that this ratio is unchanged. This is certainly a simplification, mainly since the relationship between salaries and financial returns for commercial businesses vary slightly between industries. However, the perspective and methods provide a reasonable and transparent assessment of business benefits.

Business benefits have been calculated at the municipal level according to Table 24.

Table 2. Business benefits in terms of returns for business owners and lenders. Values calculated at the 2017 price level.

	Salary portion of GRP (2014)	Increase in salary in 2045 with Oslo-Stockholm 2.55 (million SEK)	Increased business benefits in 2045 with Oslo-Stockholm 2.55 (million SEK)	Accumulated business benefits 2035–2045 (million SEK)
Karlstad	48 percent	185	200	1,040
Örebro	51 percent	157	151	1,350
Västerås	58 percent	27	20	170
Total		*Ca 370 Million SEK*	*Ca 370 Million SEK*	*Ca 2.6 Billion SEK*

Source: SCB salaries per municipalities, gross regional product (GRP) per municipalities, processed by Sweco

1.13 Freight Benefits

Freight traffic traveling along the Oslo-Stockholm corridor have a variety of transport tasks including docking at intermodal terminals for reloading to and from roadway transports, port terminals, as well as industrial terminals, energy terminals and loading terminals for raw materials, especially forestry. The systems are complex to describe at a general level. However, it is clear that a large need exists for more efficient, effective and robust freight traffic along the rail line.

Freight traffic on the railway affects various sections of the corridor in different ways. Traffic across the border is the most extensive here, after the Malmbanan line in northern Sweden, with around two million tons per year. On the Värmlandsbanan section, more than 20 freight trains run in different directions, and expansion possibilities are very limited using the current single tracks since the Värmlandsbanan line will handle both regional and long-distance passenger traffic.

The Swedish Transport Administration estimates in its prognoses that international freight traffic across the Norway-Sweden border could increase by approximately 35% until

2040, which Sweco believes to be a low estimate. Along that route travel the Arctic Rail Express trains between Oslo and Narvik, which are some of the EU´s fastest and longest express freight trains.

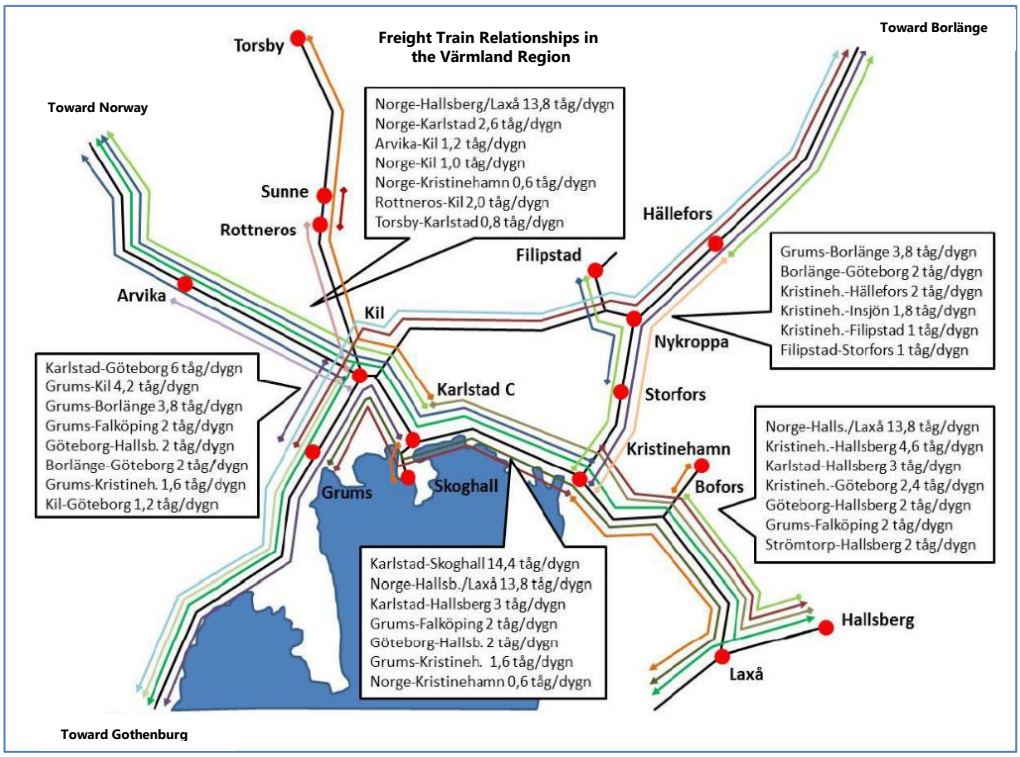

Figure 8. Freight-train relationships in the Värmland region of Sweden. Amount of trains per day (tåg/dygn) and their direction. Source: Region Värmland

The benefits of a fully expanded railway, including a high level of capacity, especially at night, are well known to transport buyers. The most important aspects are increased dependability and decreased vulnerability, which together lead to a more robust form of transport.

Railway performance has steadily increased during the past several decades with higher axle loads and longer train sets, leading to increased loading ability. Railways are increasingly competing with roadway transports of comparative performance, and this primarily benefits the transport buyers, which are constantly pushing for more effective and sustainable logistics in their transport flows. We have described freight benefits for the project as a synergy in which several cooperating factors will significantly streamline logistics flows and transport costs, see
Figure 9.

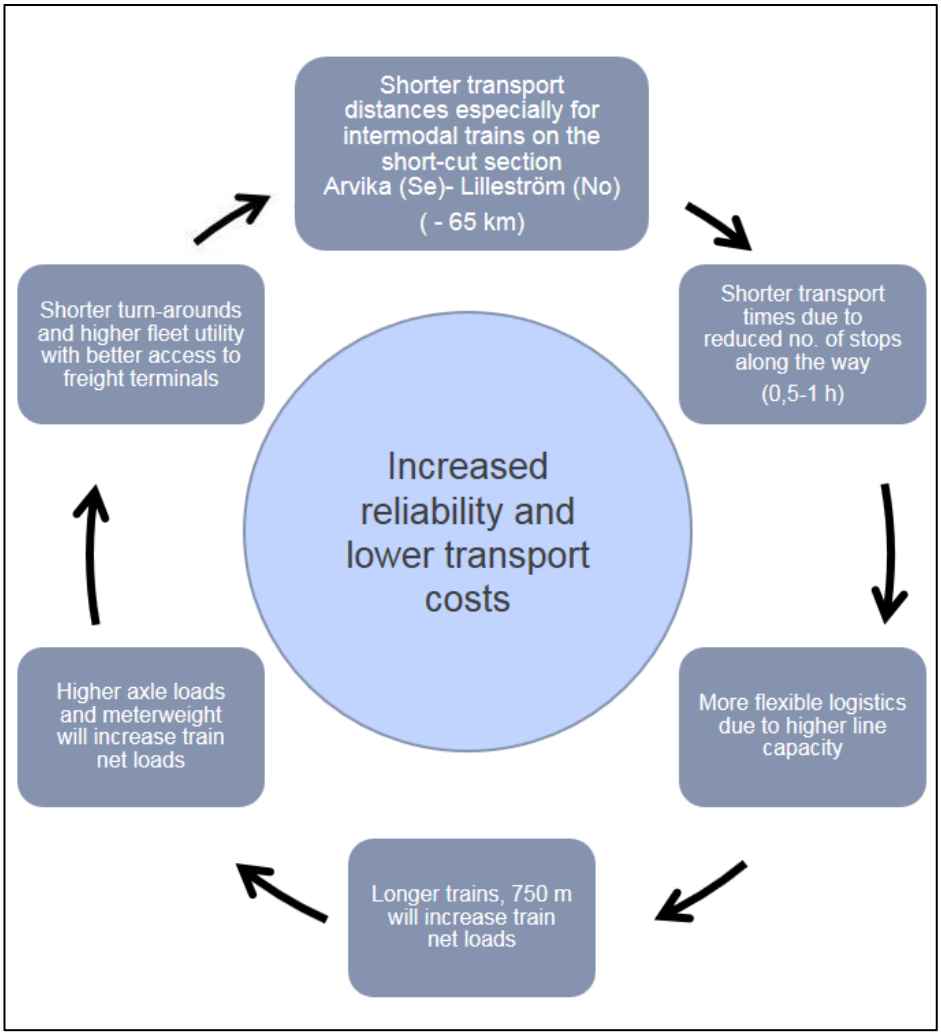

Figure 9. The Oslo-Stockholm 2.55 project includes several impacts which provide synergies for the competitiveness of railways with at least half of the transport costs. Source: Sweco.

1.14 Study Benefits

The study benefits of an improved connection between Oslo and Stockholm are described through three dimensions, or perspectives, which all have a clear connection. The *student perspective* focuses on the needs of students, the *business perspective,* in which secondary schools and universities along the route are regarded as highly specialized, internationally-focused organizations of knowledge, with the exact same needs that other businesses have for further development, and finally the *societal perspective* which describes how the region utilizes this higher education and research.

Study Impacts of Oslo-Stockholm 2.55
Oslo-Stockholm 2.55 will lead to more people receiving increased opportunities for higher education. Connecting the Mälar region of Sweden to Oslo, as well as other student cities, such as Uppsala, means that these are all within reach because of the Oslo-Stockholm 2.55 project, and it means that many these institutions of higher learning will be accessible to students, researchers, and staff.

1.15 Social Benefits

Social benefits mean that investments in infrastructure should provide benefits for as many people as possible. Investments in infrastructure should be inclusive, not exclusive, in nature and be based on human needs so as to provide for a functional daily life. Social benefits are created when infrastructure investments lead to more people improving their daily lives through better housing, improved educational and employment opportunities, and even through efforts to create a more equitable distribution of resources and to strengthen societal equality and gender equality.

The Oslo-Stockholm 2.55 project is assessed to generate several diverse social benefits. These have been described in detail, but not quantified in monetary terms.

Social Impacts of Oslo-Stockholm 2.55
The investment will improve many people´s ability to satisfy their basic needs, and this means that social capital can be strengthened. Confidence can be improved, exclusion reduced, and the amount of unhealthy people decline. People living in a municipality or region that see investments take place feel more satisfied and have increased confidence in the future.

1.16 Benefits for Integration

Those seeking asylum and new arrivals, like all other people, need community and security. They need to be able to reach their relatives and compatriots. Others may need treatment by qualified specialists after the tragedies of war and torture. These opportunities are improved through better transportation. Investments in fast, comfortable and robust train traffic provides asylum seekers and new arrivals opportunities to travel to meet their needs, without being forced to move into a large, metropolitan area, at the risk of ending up living in the segregated areas. Integration can thus be improved.

Improved public transport is expected to lead to increased housing construction in the impacted areas along the route. This can help reduce the housing shortage and to reduce distorted settlement patterns, which in the long-run may reduce segregation. Oslo-Stockholm 2.55 may produce positive effects in several areas which are referred to as the arenas of integration, including educational opportunities, employment opportunities, and participation in the community and sports.

Integration Impacts of Oslo-Stockholm 2.55
With improved public transport, asylum seekers and new arrivals can easily meet their specific needs, such as access to adequate medical care, without being forced to move to a large metropolitan area with the risk of living in a segregated area. This facilitates integration into society.

1.17 Environmental Benefits

Both Sweden and Norway have ambitious goals for reducing gas emissions that affect the climate. However, both countries have a long way to go in reaching these goals. Roadway traffic accounts for a large proportion of both countries' greenhouse gas emissions.

In order to reduce greenhouse gas emissions from roadway traffic, more energy-efficient vehicles and a larger share of renewable fuels are required. In addition, a transfer of both passengers and freight from roadway to railway is required. However, there is currently no major transfer of transport modes from cars and trucks to other modes underway, while engine and fuel efficiency improvements have more than compensated through increased transportation.

Transfer of travelers by car over to public transport
When major travel time reductions via public transport are shown to exist, there is a high potential for a transfer of travelers by car over to public transport. Swedish transport work via car in 2040 has been show through modelling to be reduced by approximately 134 million person kilometers per year through the expansion of Oslo-Stockholm 2.55. This reduction in transport work would reduce carbon dioxide by nearly 4,000 tons per year. Additionally, there is a potential for transferring Norwegian travel along the route as well.

Transfer of airline passengers to train travel
A summary from the Swedish Transport Administration shows that railways have a market share that is 13 percent of that of airlines along the route Oslo-Stockholm. This means that a large potential exists for the Oslo-Stockholm 2.55 project to transfer passengers from airline to train travel. International experience shows that a travel time of about three hours would expect a market share of approximately 60% for the railway route. If these values are used for Oslo-Stockholm, the number of train passengers would increase by about 700,000 people per year. For current emission levels, this would mean a reduction of nearly 41,000 tons of carbon dioxide per year.

At the same rate that air travel between Oslo and Stockholm is expected to increase, the number of passengers transferring from airline to train travel is expected to increase as well. The calculations models that have been completed with assistance from Sampers, show that the amount of air travel within Sweden will decrease by about 38,000 in 2040 if the Oslo-Stockholm 2.55 project is completed. This would mean nearly 2,000 tons less carbon dioxide emissions per year.

Transfer of freight traffic from truck to train
The positive climate effects of transferring freight traffic from trucks to trains are great. For example, transporting one ton of freight, while at the same time limiting carbon dioxide

emissions to less than one kilogram of carbon dioxide, a truck could drive nearly 20 km, a ship over 200 km, and a train driven by non-fossil fuel electricity could drive nearly 9,000 km.

In the freight transport chapter of this report, the benefits of the Oslo-Stockholm 2.55 project for freight transported via railway are described. Several benefits are cited, such as shorter transport routes, increased loading capacity, shorter circulation times, potential for increased frequency, as well as increased flexibility and robustness. All together, these impacts provide a multiplier effect for the railway as a transport mode, and thereby show great potential for transferring freight transport from trucks to trains with positive climate effects thus.

The Oslo-Stockholm 2.55 project will also positively contribute to regional environmental goals set by Region Värmland, Region Örebro län and Region Västmanland, in Sweden.