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2. ANNEX 2: Description of baseline and target scenario, methods used to analyse and predict energy system developments and GHGs

1. Context of scenario development

1.1. Changes in Latvia's energy sector

Energy is one of the sectors directly affecting national economic growth and accounts for a significant share of total costs in certain sectors, in particular the manufacturing industry. The most important factor for industrial growth is and will be the sustainable lowest possible energy price, including safety and quality, while energy, including roughing and transport, is one of the sectors with a full impact on consumer demand.

Unlike the EU, Latvia's primary energy consumption is dominated by RES and liquid fossil fuels, and Latvia's final energy consumption is also much higher than the EU average. Households and agricultural, forestry and fisheries activities have a higher share of final energy consumption by sector in Latvia.

High electricity and natural gas prices and the geopolitical situation in 2022 had a significant impact on energy consumption in all sectors of the economy in Latvia. Latvia, in cooperation with Lithuania and Estonia, took the necessary political and practical steps to stop commercial trade in natural gas and electricity with Russia. Given that in the past up to 95 % of natural gas and 10-20 % of electricity imports into Latvia came from third countries, this rapid change required significant adaptations for both industry and user. In 2022, electricity prices and availability of technologies contributed to the development of microgeneration in Latvia, which continued in 2023. 13.9 MW, then by the end of 2023, the capacity of micro-generators and SES reached 319 MW. In both 2022 and 2023, there was also a significant increase in the requested capacity for large-capacity power plants, leading to the maximum capacity of the electricity transmission network in 2023 (6.1 GW of technical requirements now issued).

Similarly, high natural gas prices contributed to the replacement of the resource used in the CSA and in individual heating – CSA traders are moving to biomass, while individual heating increased the use of heat pumps and electricity in the heating of buildings. In addition, it should be borne in mind that, in some cases, CSA traders also used diesel instead of natural gas to reduce costs.

1.2. Extension of the analytical base

Compared to the current plan, the updated[1]Plan gives significantly greater weight to estimates of the effectiveness of the measures. This is done taking into account the availability, quality of data and information available to stakeholders (both sectoral policy makers and industry associations) on the performance of the action and related costs. The continuous development of the Plan is intended to further complement and expand the quantitative assessment, as it is in this way that the most effective transformation pathway for Latvian society can be found together.

At its meeting on 03/12/2019, a Council[2] was established by Cabinet Order No 609 "On the National Energy and Climate Council" to ensure a coordinated, integrated and sustainable national policy to address energy and climate issues, and three Council meetings have been

1https://polsis.mk.gov.lv/documents/6645
2https://likumi.lv/ta/id/311155-par-nacionalo-energetikas-un-klimata-padomi

held since its establishment. Within the Council, a 5 Sectoral Expert Task Force was set up in 2022 to identify policies and measuresi3.

The issues of use of RES, promoting energy efficiency, transport energy, as well as the development of energy security and internal energy market policies in general fall within the remit of the KEM, while energy efficiency of buildings, as well as common housing, innovation, competitiveness issues fall under the competence of the MoE. Sectoral ministries are also implementing measures to improve resource efficiency in their sectors. GHG emission reductions of which: For thepurpose of volume, the policy is developed by the KEM in cooperation with the MoE, the MoU, the MoA and other line ministries, and the KEM coordinates the implementation of this policy. On the other hand, the competent authority for education and science in Latvia is the IRM. The competences of the line ministries are reserved to theMinistry4.

1.3. Macroeconomic context

While the COVID-19 pandemic and the geopolitical situation in the region have a negative impact on the economy, the medium-term economic challenges already identified in policy planning documents, such as the need to increase Latvia's exports and productivity of goods and services, remain unchanged. Similarly, initiatives previously launched by the EC, such as the Green Deal and digitalisation, remain. Macroeconomic forecasts have been drawn up in line with Latvia's structural policy objectives as set out in Latvia's policy planningdocument5. It also analyses the processes that determine the development of the globaleconomy6.

Table 1: Macroeconomic projections up to 2050 (annual average, %)

	2011-2019	2020-2021	2022-2030	2031-2040	2041-2050
Population	—1,1	—07	—0,7	—0,4	0,0
GDP at current prices	6,0	3,6	5,7	4,0	3,1
GDP at constant prices	3,3	0,4	2,5	2,2	1,5
Private consumption at current	5,0	0.6	6,3	4,0	3,1
Private consumption at constant	2,6	—1.5	2,7	2,2	1,5

The macroeconomic forecast includes the impacte of both COVID-19 and Russia's invasion of Ukraine7.

2. Description of the baseline scenario and measures included

The objectives and objectives set out in the national planning documents are also taken into account when developing the Baseline Scenario. The following planning documents are being examined and included:

- NAP2027;
- Latvia's National Reform Programme – Europe 2020 – implementation of thei-th strategy8;
- VPP2027;

3https://www.em.gov.lv/lv/nacionala-energetikas-un-klimata-padome-un-tas-darba-grupas
4https://likumi.lv/doc.php?id=207119; https://likumi.lv/doc.php?id=74746; https://likumi.lv/doc.php?id=74749; https://likumi.lv/doc.php?id=79100; https://likumi.lv/doc.php?id=228051
5https://pkc.gov.lv/lv/valsts-attistibas-planosana/latvijas-ilgtspejigas-attistibas-strategija; https://pkc.gov.lv/lv/nap2027; https://www.em.gov.lv/lv/industriala-politika
6Information from the EC, OECD, IMF, Global Economic Forum, Oxford Economics, The Economist etc. on the trend of the global economy has not been updated.
7 Available at: https://op.europa.eu/en/publication-detail/-/publication/96c2ca82-e85e-11eb-93a8-01aa75ed71a1/language-en/format-PDF/source-219903975
8 https://tap.mk.gov.lv/doc/2019_04/EMzino_12042019_NRP.711.pdf

- LIAS2030;
- Information report "Latvia's strategy to achieve climate neutrality by 2050".

The calculation of the baseline takes into account the9 impact of the European Union (EU) Emissions Trading System (ETS).

The baseline scenario (with existing measures -WEM) is based on*the* integrated report on policies, measures and GHG projections submitted to the EC in 2023, based on the requirements set out in Article 18 of Regulation 2018/1999 and updates to the projections based on the 2024 GHG inventory at sectoral level. Changes in GHG emissionsand CO2 removals in 2 030 are based on GHG inventory vestural data for 2024. Baseline projections take into account insights into economic and demographic developments, sectoral developments, fossil fuel prices, CO2prices and policies. GHG emissions in Latvia are projected for 2023. — 2050 Latvia's GHG emission projections until 2 050 are based on a long-term macroeconomic forecast developed by the EM.

GHG emissions and CO2removals of all sectors have been calculated in accordance with the guidelines of the Intergovernmental Panel on Climate Change (IPCC) and activity data submitted by sectoral ministries in accordance with Annex 5 to Cabinet Regulation No 675 of 25 October 2022 on the establishment and maintenance of greenhouse gas inventory systems, forecasting systems and systems for reporting on climate change adaptation.

2.1. Energy

Energy System Development Forecasts

Latvia's energetic (energy and transport sector) development price analysis, prediction of GHG emissions was based on the broad TIMES model used in studies of the energetic and environmental system in theworld10. Times-Latvia 11 is an optimisation model, which is illustrated by the development of the Latvian energetic industry at the Nacional level over a period of 50 years. The model used is a dynamic optimisation*model for demand driven*, i.e. by optimising the energy-environment system described, all energy end-patient sectors are provided with energy to meet energy services.

The development of the energy sector is long-term by a large influence of mera reduction policies and measures to increase energy efficiency, energy saving and increasing the share of RES. The changes affect both energy-emergies and the parties. Part of this change is due to policy measures, while other developments in del technologies and energy and turmoil markets are changing.

The end-to-end energy night is not only determined by planoted energy-effect measures, but also by predicted economic developments. In line with the demography forecast, Latvia's population is set to continue declining in the medium and long term. Tacu, whereas onera buttic privatisation growth is predicted for 2030 and 2050 for Latvia's mayoral farming, it is expected that the residential area per inhabitant will increase and, consequently, the heating area of the commune for the residential mice. On the other hand, it is not necessary to say that the rules for the construction of new yards impose higher energy efficiency requirements and will also rebuild the ou.

The economic scenario until 2050 does not imply a change in the structure of economic sectors, compared to the current situation. TA will get close to what is happening. The development of Straujak is an expectation of the high and intermediate high tech industry – gum, pharmaceuticals, electronics, etc. – comparable high growth rates are also predicted by the

9 https://www.consilium.europa.eu/lv/infographics/fit-for-55-eu-emissions-trading-system/ and https://eur-lex.europa.eu/legal-content/LV/TXT/PDF/?uri=CELEX:32003L0087
10 Times model: https://iea-etsap.org/index.php/etsap-tools/model-generators/times
11exploded FEI

largest coal-trade sector.

The number of cars created on the cold population in Latvia is lagging behind the EU environment, then the increase in the number of cars and the circulation (pkm) of parasiers is expected to increase until 2030.

The forecast of prices of fuels and fuels is based on the projections 12 13 (for oil, coal and gas) of the EC extract and recommended prices. The indicative trajectories of the EC have been used to establish price forecasts for Latvia, without prejudice to Latvia's up-to-date prices and interchange links between the price of the types of hammy.

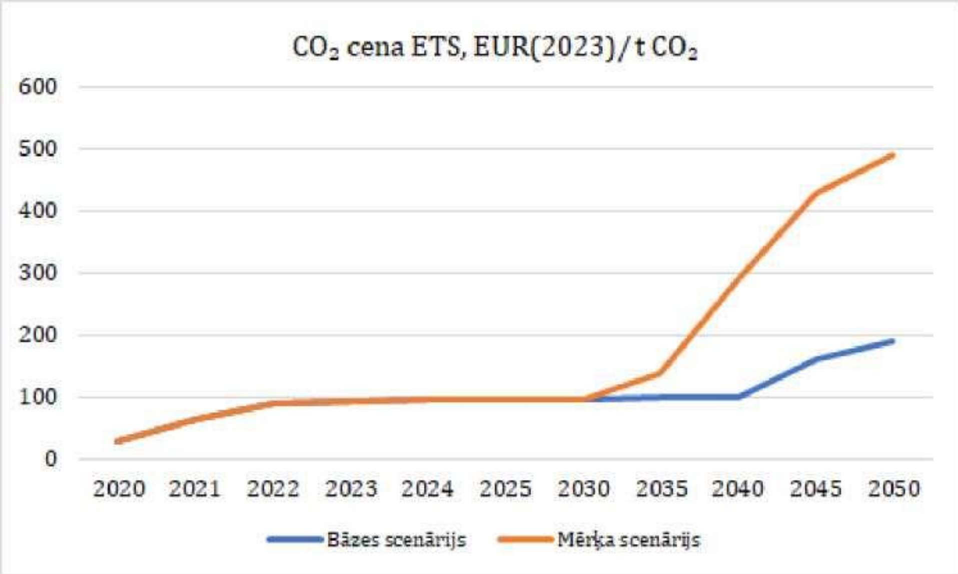


Figure 1. ETS$_{CO2}$ price projections modelleds[13]

The TIMES-Latvia model used for the Scenary Model is a*bottom-up optimisation*model and, therefore, the price of the least-dazadaco technology is an important entry parameter for the modelling of the energetic system and a set of technologies. Some internationally recognised sources of literature were used as the basis for the price of technology (investment, explosion and dietary fiches and variable prices) (data bubbles of models used by the EC, PRIMES 14 model of its number, catalogue of Danian energetic agentur techologistss 15etc.), which:

the information was carried out in extraordinary cases, in accordance with the conditions of Latvia.

GHG emission projections

Decarbonisation dimension

While not sharing the action contributing to reducing GHG emissions from both the EU ETS and non-ETS activities, the overall GHG emissions of the energy sector are considered.

The modelling of the energy sector and the prediction of GHG emissions include sectors such as the energetics sector, the grinding industry and the berry sector, the other sectors that include the heating of esco (small combustion facilities, the public sector and the mass economy), as well as the use of fuel in agriculture, forestry and fisheries, and air emissions.

The basal scenarie for the Energetic Development Model has been created without "implemented policies and measures" and "implemented policies and measures" as of 01/01/2023.

12'*Recommended parameters for reporting on GHG projections in 2025*', EC, 2024.
13'*Recommended parameters for reporting on GHG projections in 2025*', EC, 2024.
14PRIMES model (Price-Induced Market Equilibrium System).
15*Technology Data – Energy Plants for Electricity and District heating generation*. First published August 2016 by the Danish Energy Agency and Energinet, Internet: http://www.ens.dk/teknologikatalog

The main strands of the battle scension are Sadi:

- Increasing the energy efficiency of residential trees, which includes investment support programmes for the renewal of multi-dwellings and privatisations, an information programme for citizens;
- The sector of the investment support programme to promote energy efficiency and the use of HEs;
- An investment support programme for the central heat year system;
- An investment support programme to increase energy efficiency at national and local level;
- Introduction of energy management systems and investment support programmes to reduce GHG emissions by the public sector;
- Investment support programmes for the introduction of technologies of a single apartment, two apartments and queues;
- Energy management requirements/systems for large businesses and large paternates;
- Investment support programme for solar PV technology;
- Development of electric vehicles infrastructure;
- Support programmes for electric vehicles;
- Multi-modal development of public transport infrastructure.
- The development of green and zero-emission public transport;
- Electricalisation of sections of the Latvian railroad network, use of battery electric trains in cross-roads.

The GHG emissions projections for the energetic sector of the aprekinata cluster are 34.6 % lower than the 2005 GHG emission reductions occur in all sectors.

Energy without the transport sector

In 2030, the GHG emissions energetics sector are 66.6 %lower than 2005. It is noted that the trend in the EU ETS system would change the trend in the EU ETS system.

Crushing is a thing for a pare from the use of fossil chimney to AE, the main biomass, as well as measures to increase energy efficiency, and the replacement of the chimney with electricity where this is feasible and economically viable. TA’s effective prediction of GHG emissions in 2 030 in the roughing and growing sector is 73.6 % lower than in 2005. In 2005, the main measures for increasing the energy efficiency of trees in the commercial and public sectors and the economy, as well as measures for replacing fossil chambers with AE and for the substituting of electricity in the economy. In 2030, the GHG emissions of Aprekinata are 24.6 % lower than 2005.

As GHG emission reduction targets are set for the non-ETS sector, looking at non-ETS energy (small energy (energy sectors below 20 MW) and small combustion plants in the commercial and public sectors and households, as well as the use of fuels in agriculture, forestry and fisheries, it can be concluded that the estimated GHG emissions of the non-ETS energy sector in 2 030 are 33 % lower than 2005 levels.

Transportation

Latvia’s road transport spele plays a more important role in the parcels of parasiers and freight and thus sees the largest part of the energy pool for transport and accounts for 97 % of the overall GHG emissions from transport in 2022. On the one hand, the number of transport, the number of road transport vehicles is predicted to generate mobility until 2030 (passport circulation and freight circulation), while on the other hand Latvia is forecast to replace the carine used by Latvia into a more efficient and environmentally friendly way, as well as an increase in the number of EVs. The further development of the network of electric power stations for road transport, both through the support programme and the privatisation investment, and the support programme for ETLs for government, public transport and for the privatisation. There is no basse scension in the parcels of buttical public transport. The basal scenarcase does not require any change in the requirement for biofuel blended fossil fuels. Projections of GHG emissions from the Aprekinata Pool for the transport sector for a basse price in 2 030 are 2.3 % lower than 2005.

2.2. RPPI

In the RPPI sector, *MS Excel* databases are used to calculate GHG emission projections and GHG emissions are calculated according to 2006 CPPS guidelines. GHG projections emissions from the RPPI include CO_2, CH_4, N_2O and fluorinated GHG emissions (hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6)) from several sub-sectors.

The baseline scenario includes impacts from the following measures:

- Regulation (EU) No 517/2014 of the European Parliament and of the Council on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006;
- Directive 2006/40/EC of the European Parliament and of the Council of 17 May 2006 relating to emissions from air conditioning systems in motor vehicles and amending Council Directive 70/156/EEC.

In the baseline scenario, the total emissions of the RPPI sector in 2030 show a 120 % increase in the sector against 2005. However, this increase is due to an increase in emissions from the mineral industry and F-gas use sectors from 2005 to 2022. In the non-ETS industrial processes and product use sector, GHG emissions increase is 59 %.

2.3. Agriculture

Emission projections are based on primary activity data provided by the MoA in cooperation with the LBTU. The baseline econometric scenario model for the analysis of the Latvian agricultural sector (LASAM) is used to generate Latvia's agricultural activity data. Econometric models calculate livestock numbers, crop areas and yields, as well as nitrogen fertiliser consumption. The use of organic fertilisers, the distribution of manure management systems is estimated according to an algorithm developed by scientists at the LBTU Technical Faculty, based on long-term observations and detailed research into technological progress, as well as data from surveys of biogas plants. The GHG emissions of the agricultural sector are calculated in accordance with the 2006 CPPS Guidelines.

The baseline calculations are based on estimates of activity data provided by sectoral ministries (e.g. cattle numbers, nitrogen in livestock manure by livestock species, co-production of agricultural crops, etc.). The activity data to be submitted for the Baseline scenario is prepared in accordance with the GHG inventory preparation requirements.

The baseline scenario includes impacts from the following measures:

- Contribute to the development of food ration plans and improvements in feed quality;
- Promote the listening of herbs for the purpose of wet sequestration of rotations;
- Promote and support the establishment of courts and precise organic messaging soils;
- Support for meslossan planosan;
- Reconstruction and development of Melioracy systems on arable land;
- Promoting biologic dairy farming;
- Promote and support the use of precision inorganic wet-glass cocks;
- Promote the production and use of biogases and biomethans.

Total agricultural GHG emissions in 2030 have increased by 23 % compared to 2 005 in the 2030 baseline scenario. GHG emissions from agriculture increased for livestock intestinal fermentation processes (5 %), agricultural soils (41 %), liming and urea use (above 100 %, but the proportion of these sub-sectors is relatively low) compared to 2005. By contrast, GHG emissions in 2030 have decreased in the manure management sector (24 %) compared to 2005.

2.4. Waste and wastewater management

The waste management sector includes waste management and waste water management. The estimation of GHG emissions from waste disposal, incineration and composting uses emission calculation methods from the 2006 CPPS Guidelines. Estimates from the National Waste Management Plan 2 021 are used when estimating the quantities of landfilled, incinerated and composted waste. —2028, assuming that Latvia will meet its waste management targets. GDP and population projections are used to determine the potential amount of waste generated. Activity data is used: amount of waste landfilled, amount of methane recovered from landfills and landfills. The composted amount is forecast according to changes in the amount of waste disposed of.

The estimation of GHG emissions from waste water management also uses emission calculation methods from 2006 CPPS guidelines, population and GDP projections, as well as existing trends in waste water management, i.e. population distribution according to the type and degree of treatment applied to the waste water concerned, the amount of sewage sludge produced, the proportion of sludge anaerobically managed, the proportion of the population treated with more intensive treatment, the long-term evolution of GHG emissions from industrial waste water. There are no measures that manage the Notekuden Dunu 2024 plan. —2027
The baseline scenario includes impacts from the following measures:

- Increase the parstradiance of biologically protected waste;
- Pilot projects in regional landfills to improve the effects of waste skirosion;
- The implementation and improvement of the split textile extraction system;
- Increasing the Duna share of Atudenoto drainage.

Increasing the preparation of biologic waste for parstrade results in savings of 36 kt CO_2 eq. 2030 to 100 kt CO_2 eq. 2040
In the baseline scenario, the waste sector will reduce GHG emissions by 40 % in 2030 compared to 2005 GHG emissions in the bio-recycling subsector (87 %) compared to 2005. By contrast, GHG emissions will have decreased in 2030 for waste disposal (-38 %) and waste water treatment and disposal (59 %).

2.5. LULUCF sector

FRM is the main source of land use and carbon stock change data. In addition, data from the Rural Register, forest fire data from the State Forest Service and SUGD data on beam fires and data on production, exports and imports of wood products published by EUROSTAT are used to characterise economic activity. Activity data (e.g. afforested area by tree species and forest types, potential increase in stock by tree species and types of forest, care of young stands by forest types and prevailing species, etc.) are prepared from the sectoral ministry in accordance with Part VI of Cabinet Regulation No 675.

The baseline scenario includes impacts from the following measures:

- Use of leguminous crops in agriculture while the area of the leguminous crops is maintained in 2015. — At the level of 2020;
- The establishment of Auguludarzu, ensuring that there will be no reduction in the area of the crop;
- Restoration and modernisation of the Melioracy systems of agricultural and Meza land without any reduction in the area of existing melioreto lands;

- Afforestation carried out until 2020;
- Nursery fellings, with the area of young stands remaining on average in 2017-2022;
- Natural disturbance restoration of forest generations (fires, wind gas);
- Vesturic cubic sites recultivaca16.

In addition to the measures listed in the aprekinos, agriculture uses subsequent production techniques that do not reduce the load of the soil charcoal, use of its passport plants, Zala fallow before winter, use of permeable crops.

For the 2030 LULUCF sector, a 123 % reduction in CO2removals compared to 1990 is projected under the Basel Scenario. The main sources of emissions from the sector's 2030 bus organic soil Meza land, arable land, grass, tillage areas, former and esosaian cup sites.

GHG emissions from cropland, grassland, wetlands and construction have decreased since 1990. This is largely due to land-use change – afforestation of green and arable land with organic soils, as well as a decrease in the total area of peat and peat soils on arable and grassland due to the mineralisation of organic matter. There has been a continued increase in carbon stock in forest land between 1990 and 2020, but the rate of carbon accumulation in the forest ecosystem has decreased compared to 1990.

The reduction ofCO2 removals from 1990 contributed to changes in stands, which significantly increased the overall volume and availability of wood resources and increased the role of natural mortality in carbon circulation in the forest ecosystem. The intensity of the use of wood resources is characterised by the percentage of available resources used; it has fluctuated between 3.0 % and 4.4 % for the main uses and between 2.1 % and 2.9 % of the volume of timber resources available for harvesting in a given year (the logging fund) in accordance with the legal provisions in force.

On the other hand, the measure 'Recultivation of historic peat extraction sites' provides for the restoration of historical peat extraction sites of 12 100 ha by means of the recultivation of these areas. This includes not only afforestation or renaturalisation activities, but also other activities to reduce GHG emissions, such as paludiculture cultivation, rewetting of bog ecosystem, breeding of big cranberries and bilberries, building water bodies with socio-economic and environmental benefits. When implementing the activities to be supported under the measure, the total estimated GHG emission reduction will amount to 42 398 t CO 2 eq/g.

3. Description of the target scenario and measures included

Measures to achieve the objectives are included in Chapter 3 of the Plan. For each measure, GHG emissions savings or removals increase in kt CO_2 eq have been assessed. The target scenario takes into account baseline policies and measures, already planned policies and measures, as well as policies and measures submitted by sectoral ministries to achieve the objectives.

3.1. Energy

On the basis of planoted policies and measures, the price of mercques increases the use of HE in all sectors and the implementation of energy efficiency measures. The merku scenarie for a large part of the bause scenarie is a plantised additional financing and, as a result, these measures are implemented with a higher intensity. This concerns, in particular, the refurbishment of residential and public-sector trees and measures to increase energy efficiency. In addition, Sadi's activities have been included in the scenarie of merchandise:

16 In line with the Just Parking Spatial Plan https://likumi.lv/ta/id/334018-par-taisnigas-parkartosanas- Territorial Plan

- The establishment of a milk quality of between 1.7 and 2.8 GWh of annual energy to undergo energy audits and implement at least 3 of the recommendations set out therein;
- To determine the amount of energy-reducing milk for the public body (1.9 % reduction per year);
- In addition to a bause scenar, 3 % of the renovated annual area of merkim for the national eak extends it with public eak renewals of 3 % merki a year;
- Promote the installation of heat cost allocators, thermostats, individual heat counters, including as part of support programmes;
- Attaching caravans, multi-dwelling trees or non-residential racks/bucks to an effective CSAS;
- The Biometana production and feed-in gaze network programme and the annual determination of a 3 % AE share of milk for natural gas traders;
- Increasing the production capacity of HEs and improving their energy efficiency, the operational programme for individual pasteria for the mass economy, energy community;
- Operational programme for CSAS operators to increase RES production capacity and improve their energy efficiency, to increase the number of electricity and to upgrade CSAS networks;
- Determine the milk content of the annual reduction in intensity of GHG emissions in 2030 (14.5 %) and annual GHG emissions reduction;
- Optimisation of the public transport system, the creation of a single electronic system for public transport biles;
- An operational programme for the scaling up of zero-emission light-passer vehicles to extend the existing support to the year of zero-emission vehicles for privatised persons, economic operators, courts and inter-governmental bodies, including municipalities;
- Operational programme for the installation of Udenraz refuelling points, supporting the deployment of the udenraz refuelling point at the volumes required by EU law, as well as supporting the established refuelling point and the government's capturing of udenraz public transport vehicles
- Operational programme for the provision of new electric trains, new battery electric trains;
- Activities to ensure a competitive and environmentally friendly TEN-T railway network to implement the extension of the electric area and the improvement of the zero-emission railway infrastructure infrastructure in Riga node and Riga-Tukums line.

<u>Forecast of energy consumption</u>

Energy efficiency dimension

The predicted final energy end-paterin merka scension, excluding a non-energetic need and including the pather of international aboardation, is 8.0 % lower than that in 2022 Aprekinata's final energy pasteur is predicted to be 15.6 % and 12.1 % for del planots for energy efficiency measures for the renewal of eccles, the largest reduction in energy consumption in 2030 vs. 2022 is 15.6 % and 12.1 % respectively. The projected increase in production in the period up to 2030 is fully compensated by energy efficiency measures and an effective energy pasteur in 2030 is 10.2 % lower than in 2022. Aprekinata forecasts also predict a marginal energy path for reducing transport (2.5 %), driven by the use of electric transport plasters and the use of rail transport plasters in commuting.

The effect of the projection is that the main energy sectors are pasteurised by the 2030 bus transport and meadow farms, which are responsible for 31.4 % and 25.7 % of the final energy end of the pool respectively. Rubbing is 22.3 % and the commercial and public sector 13.8 % and the remaining pain for agricultural and forestry needs.

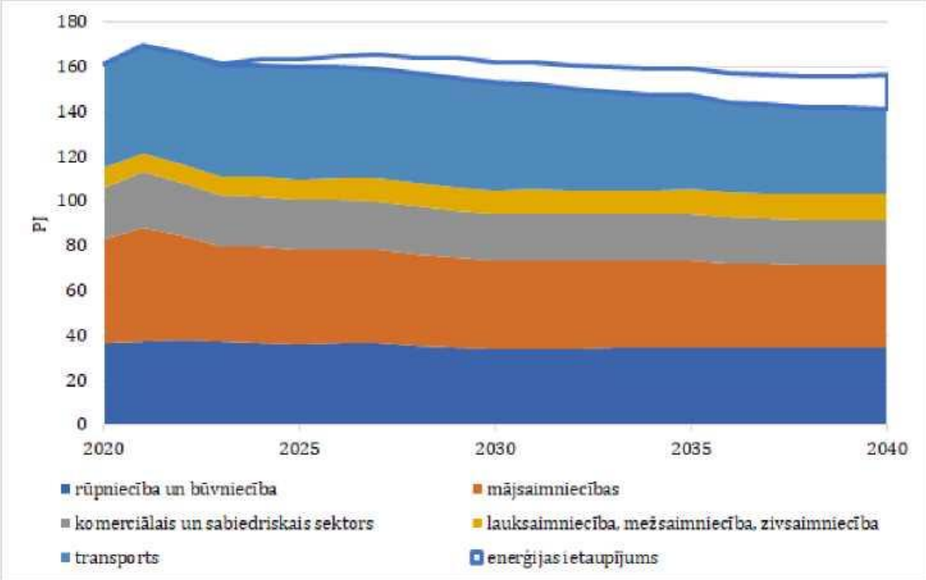


Figure 2: Calculated final energy consumption Target by sector up to 2040[17](PJ)

The price of merchandise on 2030 is divided by the total energy end is increasing by 4.2 percentage points compared to 2022, as the scenarium envisages the use of wells of electricity, replacing the casnam, transport, mass economy, rupture and commercial and public sectors. The results of the Modeleta Mercury show that the staggered energy efficiency measures at the end-patients lead to 9.7 PJ energy savings (see Figure 4) in 2030. This means that without the measures, energy end-to-end but more than 9.7 PJ is higher.

Latvia also secures economic growth in relatively energy-intensive industries, woodtrade and cement production. Without this industry, it could be expected that the final energy end-patient decreases more rapidly. The expected high economic growth rates share the benefits of the EJI's compmpense planies from increasing energy efficiency. One of the energy-efficient descriptions is the energy intensity ratio and the GDP or added value sector. Creating the veracity of the aprekinata so indicators alters the merka scenarius, the improvement of technology and the implemented energy efficiency measures decoupled economic development from the energy pather.

Table 2: Energy intensity of final energy and industrial sector Target Scenario (MJ/EUR(2015))

		2020	2025	2030
Target scenario	Final energy intensity	6,2	5,2	4,4
Target scenario	Final energy intensity of the industrial sector	7,9	6,7	5,6

Without prejudice to the measures to improve energy efficiency at end-patients, as well as measures in the energy sector and the transport of energy, the common primary energy pasteur, not including a non-energetic need, and including the international accumulation of fuel, are consistent with the results of the model of mercque scenar; in 2030, it is 7.3 % less that in 2022 I would be the type of fossil chamber, whereby oil products and natural gas, the clue, will reduce the primaro energy source to 2030 compared to 2022. By contrast, all types of HE will be divided up. The Winter is growing and the solar energy divides the pool of primaro resources, followed by biomass.

[22] Exhaust FEI

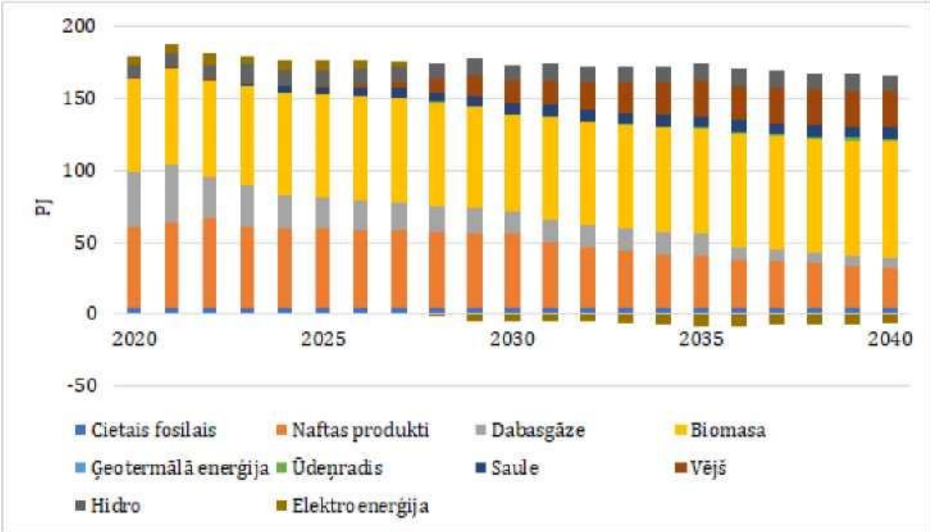


Figure 3 Calculated primary energy consumption by type Target scenario up to 2040[18](PJ)

The use of electricity plastic as a substitute for casnable and fuel, the price of the merchandise determines that in 2030 the pater of electricity is 19.4 % higher than in 2022. The electricity pasteur is growing fastest in the transport sector, where fuel pasteur for road and rail transport is replaced by electricity. Nakosie's strongest growth is expected in the Maiculture sector.

[22] Exhaust FEI

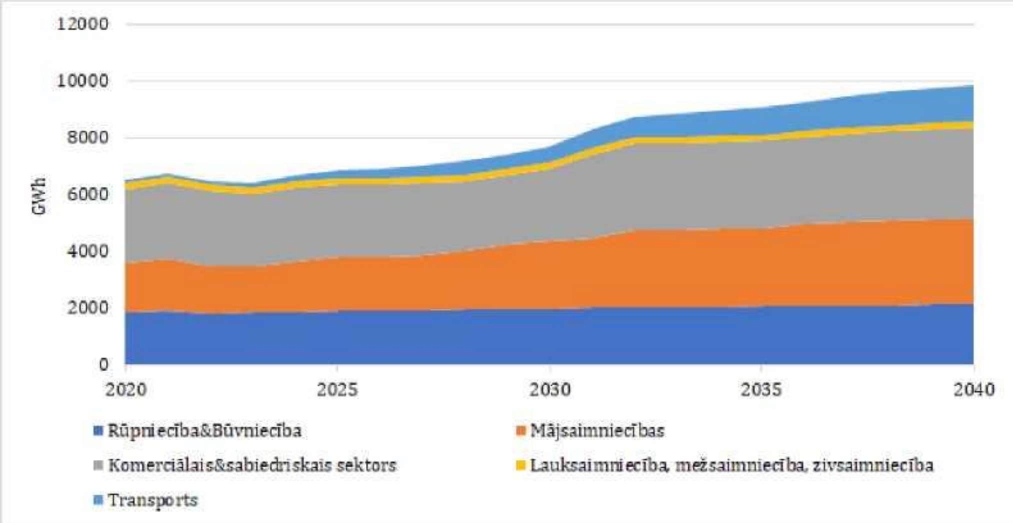


Figure 4 Projected electricity consumption by sector in the target scenario (GWh)[19]

Forecasts for the development of the use of RES

In 2022, the total energy end-to-end has already reached 43.3 %, which is the tremendous elevation among EU Member States. Three years of pedestions have led to the use of AE. Here, MINET can reduce the cost of solar PV technologies, the rapid rise in electricity and natural gas prices and the geo-political situation with the Russian invasion of Ukraine.

By taking into account the economically available RES potential and planated measures to support the use of familial forms of RES (vegear energy, solar energy, biomass, biogase), AE shares the total final energy endpaterina merku scension to 62 % by 2030.

Figure 5 For the target scenario, the calculated AE consumption by type (left-axle – PJ[20]) and the trajectory of the calculated share of AE in total final energy consumption (right-axis) over the period up to 2040.

In order to reach the AE part of the final energy mix, 62 % in 2030, it is necessary to increase all types of AE (RES-E), CSAS and camper (RES-H&C) and transport fuels (RES-T).

[19] Exhausted FEI
[20] Exhaust FEI

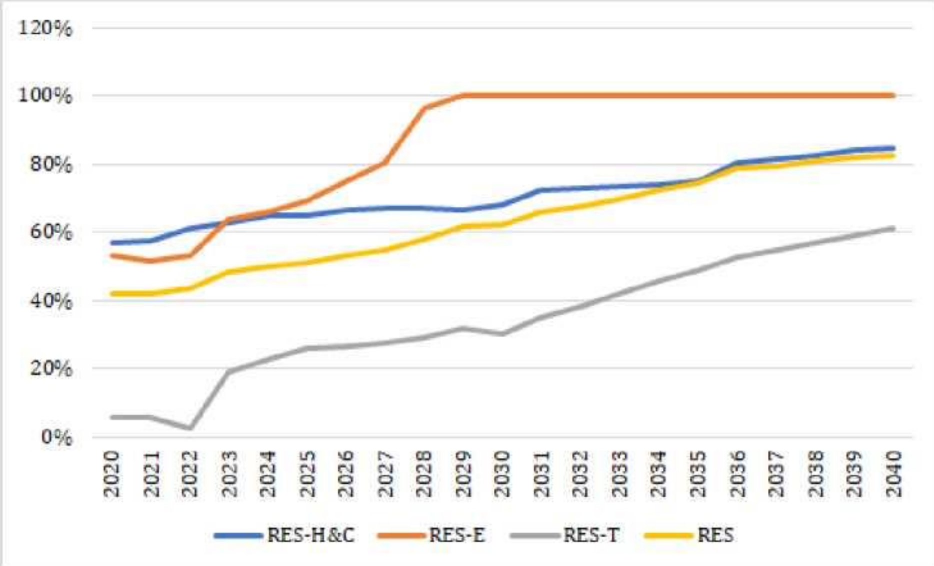


Figure 6 Calculated trajectories for the share of AE in total final energy consumption and sectors.

TA Therefore that electricity is not spelt butical to the decarbonisation of all sectors, then the mercque scenarium increases butically in the proportion of power destroyed by AE. The increase is due to solar PV and flush power at the wind station. In 2030, the share of wasted electricity from AE can reach almost 100 %. This is provided by hydropower plants, all types of biomass co-generation plants, wind power plants and solar PV. If the amount of electricity from power plants using biomass decreases in 2030 compared to 2022, the amount of power plant fired by the wind power plant and solar PV will increase rapidly in the build-up of new capacities in del.

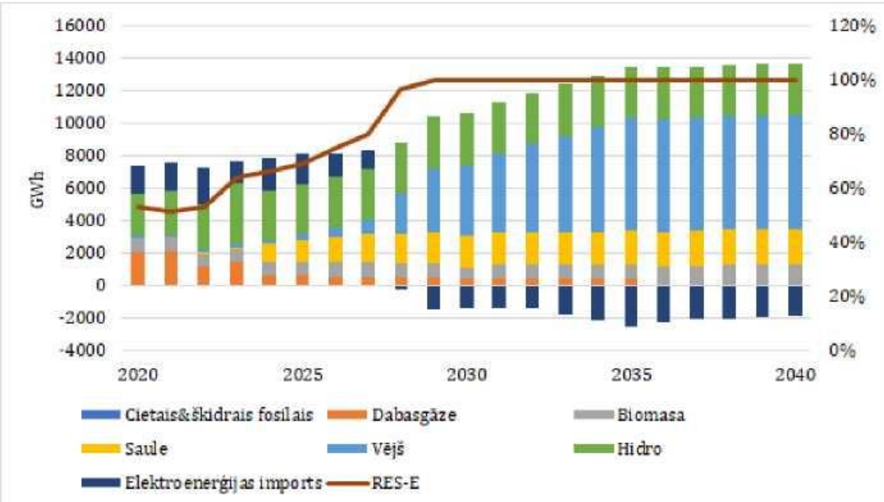


Figure 7: Calculated composition of electricity supply and trajectory for the share of AE in electricity[21] (left-hand scale – GWh, right-hand scale – %)

In 2030, wind power can account for the highest proportion of AE littered electricity, followed by solar PV and hydropower (see Nacosoo space). It is true that uncertainty about the development of solar PV projects and, in particular, the wind turbine will be embodied in terms that may be affected by a number of arrests, legislative changes, the results of the assessment of the environmental impact of projects, the social acceptance of projects and others.

[21] Exhaust FEI

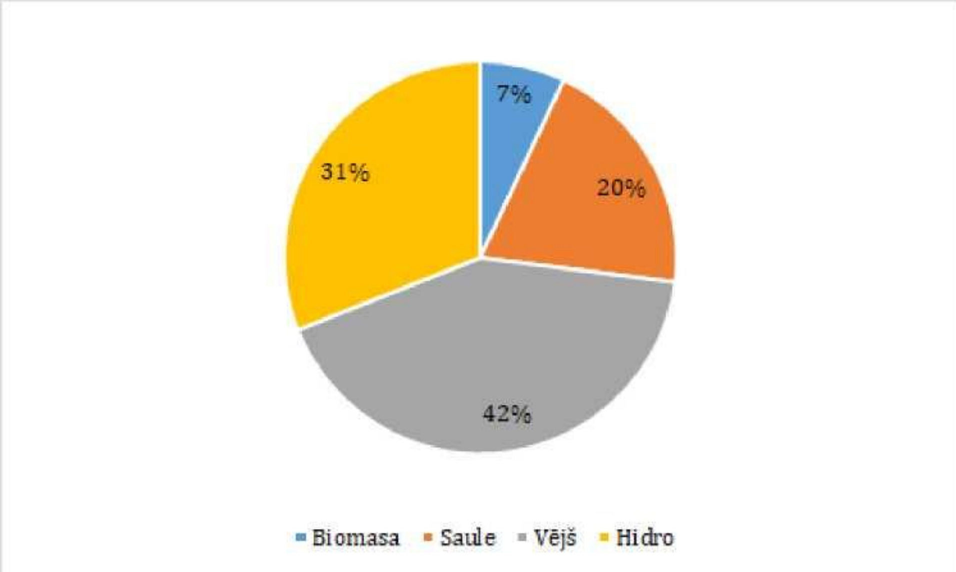


Figure 8: Breakdown of electricity produced from AE by type in 2030.

By 2030, the use of AE in CSAS and individual heat year will also increase and the share of AE (RES-H&C) reaches 68 %. Hard biomass is found in Dominejoso daa, but the proportion of solar energy and heat scrubs will increase slightly by the total AE.

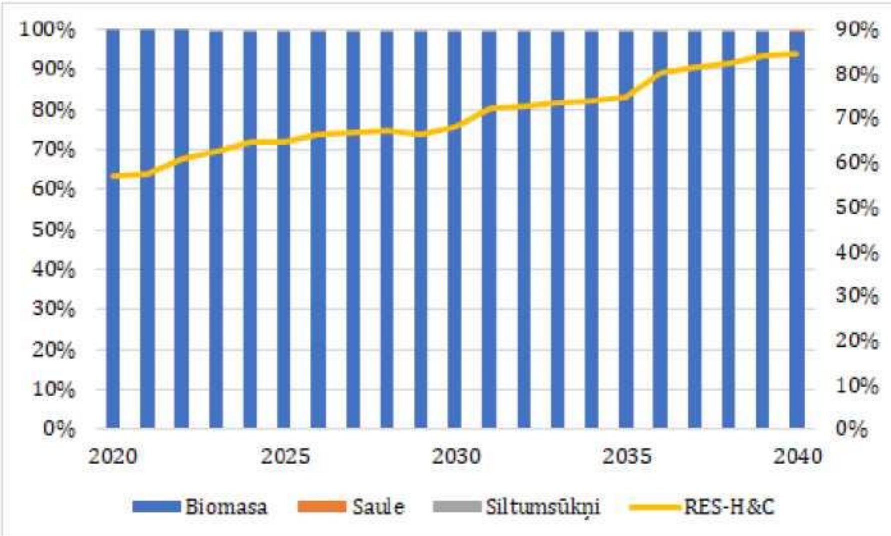


Figure 9: Calculated AE structure (left-hand scale) and AE share trajectory (right-hand scale) for heating and cooling (RES-H&C)

According to the mercque scenarie, there will be a significant increase in the use of HEs in the transport sector, the main focus on advanced biofuels and biometry and electricity, as well as on the extremities of the sector, to increase the paerin of udenraz. In 2030, the share of RES-effective transport path AE increases from 0.9 % in 2022 to 6.5 % in 2030. The share of Aprekinatie AE in transport (RES-T) reaches 30 % in 2030.

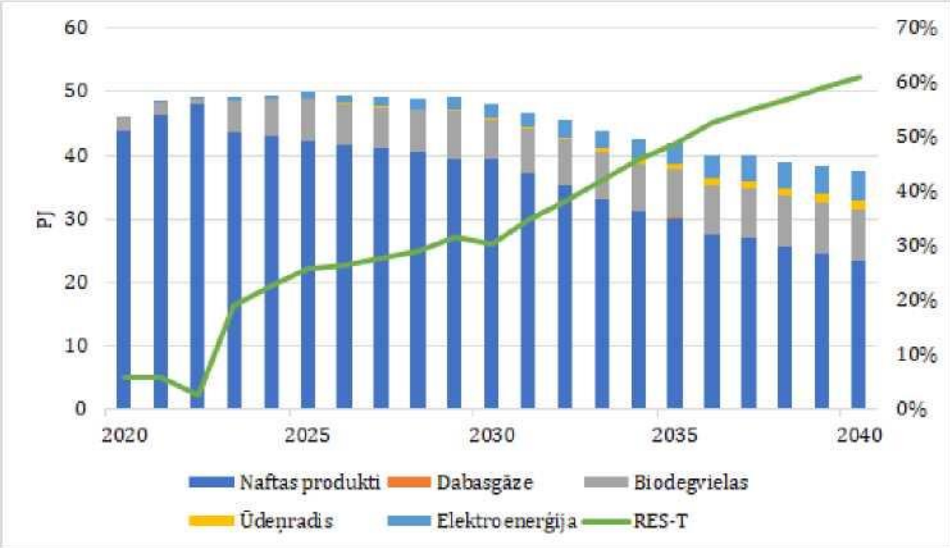


Figure 10: Calculated composition of fuels consumed in the transport sector and trajectory for the estimated share of AE in the transport sector[22] (left-axle – PJ, right axle – %)

It is noted that the scenarie of merchandise provides for the EC to expand the existing ETS with a 'new ETS' (ETS2), including the extension of trees and road transport beyond 2025, using a higher estimate of the price of CO_2 recommended by the EC as a result of a battle scension in 2030, and the price of ETS2 system CO_2 is also identical to the existing ETS.

The Aprekinata Pool Energetics, including the transport sector, forecast GHG emissions for the 2030 price range is 42.3 % lower than 2005.

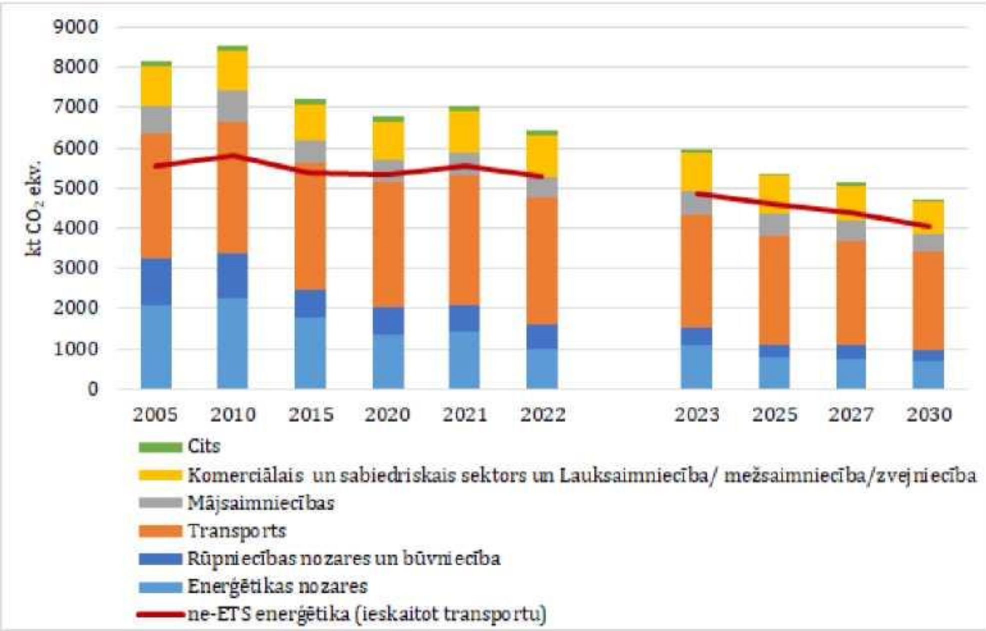


Figure 11: Calculated projections of GHG emissions in energy Target scenario (kt CO 2eq)

The Planotie measures reduce GHG emissions by 11.8 % in 2030 to a basse scenario.

Energy sector (without transport)

In addition to the power generation of AE capacity and the installation of heat shields and boilers, CSAS reduces GHG emissions from the energetic industry, which is 41.2 % lower than the basse scenario in 2030. In addition to energy efficiency measures, residential trees and applied energy-efficiency milk to a public structure reduce GHG emissions for commercial and public sectors and the economy by 0.7 % vs. basal scenario in 2030. The total Energetic without

[22] Exhaust FEI

transport GHG emissions in 2030 is 54.7 % lower than in 2005.

Transport sector

The transport sector makes the greatest contribution to the comparator of reducing GHG emissions. Merka scenary GHG emissions in 2 030 are 19.43 % less than a battle scension. The contribution to the reduction of GHG emissions is the use of advanced biofuels and electricity plasters in road transport (privata and public) and the use of the well of non-motorised transport by reducing the use of light-duty vehicles, as well as increasing the use of cross-roads by rail by reducing the use of passenger cars and buses for the use of parasier parishes in road transport. The GHG emissions of the transport sector in 2 030 are 21.2 % less than in 2005.

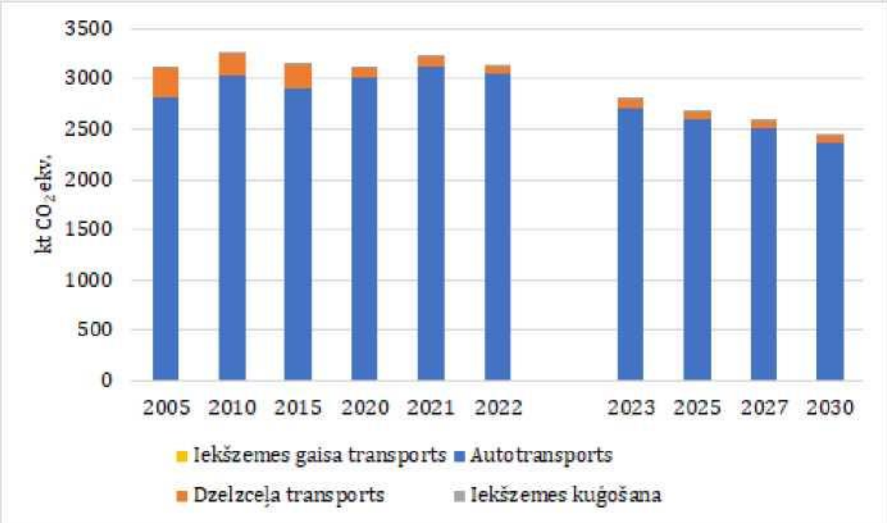


Figure 12. Transport GHG emissions 2005 — 2030 (Objective scenario) (kt CO_2 eq.)

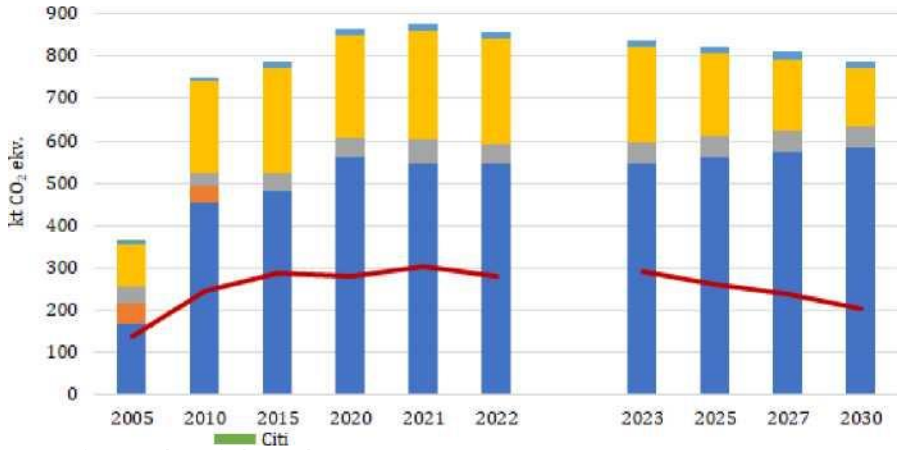
3.2. RPPI

The scenarie of mercques captures the impact of the following measures:

- Regulation (EU) 2024/573 of the European Parliament and of the Council of 7 February 2024 on fluorinated greenhouse gasoil, amending Directive (EU) 2019/1937 and repealing Regulation (EU) No 517/2014;
- Intensificeta Directive 2006/40/EC of the European Parliament and of the Council (17 May 2006) relating to emissions from the air conditioning system of motor vehicles and amending Council Directive 70/156/EEC.

In 2030, the non-ETS RPPI sector will increase GHG emissions by 45.7 % compared to 2005 and the NECP measure is 8.6 % lower compared to the basal price.

1000



Manufacture and use of other products
Products used to replace ODS
Non-energy fuels and use of solvents
Metals industry
Mineral industry
non-ETS industrial processes and product use

Figure 13: GHG emissions of the RPPI sector 2005 — 2030 (Objective scenario) (kt CO_2 eq.)

3.3. Agriculture

The 2030 GHG emissions in the agricultural sector will increase by 21.5 % compared to the 2024 GHG inventory in 2005. By contrast, compared to the Baseline scenario, there is a 0.8 % reduction in the Target scenario. ‘

The mercque scenarie will reduce N_2O emissions from agricultural soils by 10 %, with the effect of reducing GHG emissions through the LULUCF measure ‘Complete organic plant asazosana melioreth agricultural land’. Other additional measures are not defined by the agricultural sector.

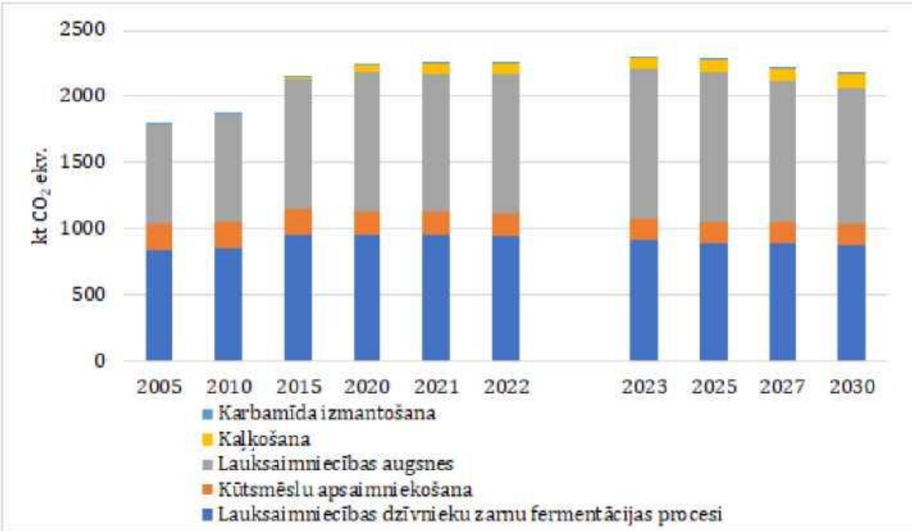


Figure 14: Agricultural sector GHG emissions 2005 — 2030 (Objective scenario) (kt CO_2 eq.)

3.4. Waste and wastewater management

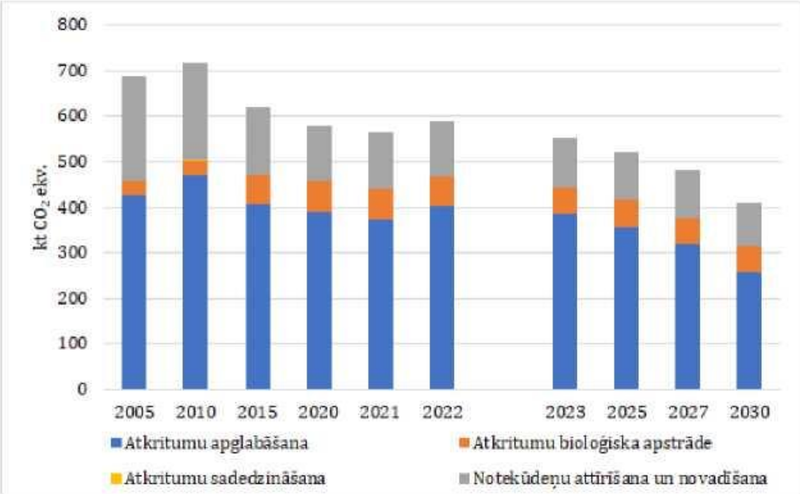
The objective scenario includes impacts from the following measures:

- Increase the parstradiance of biologically protected waste;
- Pilot projects in regional landfills to improve the effects of waste skirosion;
- The implementation and improvement of the split textile extraction system;

- Amount of municipal waste landfilled (% of municipal waste generated) 10 % per 2035;
- Measures to raise public awareness and strengthen capacitance;
- The increase in the proportion of the Duna of the Atudenoto drainage channel corresponds to the Notekuden Duna Management Plan 2024. — 2027
- There are no measures for the price of the billuden management sector, the wallc merku scenarium being the same as the basal price.

Measures to reduce waste raisining (information and education of the population) lead to GHG savings of 4.48 kt CO_2 eq. 2030 to 58 kt CO_2 eq. 2040 vs. basal scenarium.

In the target scenario, the waste sector will reduce GHG emissions by 40.4 % in 2030 compared to 2005. On the other hand, the mercque scenario is a 1.0 % reduction compared to the Baseline.



15.attēls. GHG emissions of the waste and wastewater management sectors 2005 — 2030 (Objective scenario) (kt CO_2 eq.)

3.5. LULUCF sector

Achieving the climate-neutrality objective by 2030 and 2050 requires measures that deliver both short and long-term effects for the second half of the 21st century. The most important measures to achieve the short-term (2030) targets are the afforestation of organic soils by restoring the habitats of the parmitro forest, biochar cultivation of arable land and woody strips.

The mercque scenary is designed in **line with biodiversity conservation objectives**. The measures provided for by the merku scenarie make a long-term contribution to the achievement of climate ambitions and are aimed at sustainable land management, the maintenance of the charcoal shaving function, and the reduction of the land's vulnerability to natural disturbances. TACs u, when implementing the measures envisaged by the LULUCF sector, **also** in terms of their size and implementation, are likely to imply butical weights of GHG emissions and*CO2 removals*. The timing of the measures, their emissions and removal weights, as well as their colonies, may have an impact and do not correspond to the ambitions of reigniting LULUCF-sector periods, the tisac will make a butical contribution to reducing emissions in the long term andincreasing CO_2 removals. This justifies the impact of the measures implemented by the LULUCF sector to be captured over long-term, perennial, ten-gases.

As a result of the introduction of aid measures, the maximum will ensure that the measures taken by the LULUCF sector do not have a negative impact on other policies (e.g., landscape, biologic diversity in the number of habitats, etc.).

Mineral fertilisers (nitrogen and complex nitrogen and phosphorous fertilisers) are applied to low-II-IV forest stands in dry and outdoors, bringing fertiliser after care felling. Each year, the fertilisation area depends on the size and distribution of care felling by forest types and bonitas, an average of 4.2 thousand ha per year over the period 2026-2030, the GHG emission reduction potential of these areas in 2030-0.22 Mt CO_2 eq. and 0.44 Mt CO2eq in2050.

Wood ash is used in peatlands (forests with drained organic soils) where the lack of phosphorus, potassium and sometimes other elements are often present in medium-age or adult groves. Ash is used after mating and the use of ash is limited both by the availability of suitable felling, the amount of ash produced and the use of ash by agriculture. On average between 2026 and 2030, the use of wood ash is 4.4 thousand ha/year according to the tick scenario. The GHG emission reduction potential for these areas is 0.25 MtCO_2 by 2030 and 0.43 Mt CO_2 by 2050.

The target scenario assumes that over the period 2026-2030 80 cold ha of organic plants are afforested, the number of soils is subject to activities to restore parmitro Meza habitats to 40 cold ha. By 2030, the measure will lead to a reduction of 2.35Mt CO2-eq. GHG emissions, and a reduction of emissions of at least 28.7Mt CO2-eq by 2050 compared to the Basise Scenario. The growth of Merktiec Meza, by restoring Latvia's typical parmitro meza habitats, can also be implemented in developed peat fields. Calculations assume that afforestation with subsequent rewetting is implemented over an area of 6 thousand ha in 2026-2030. The total GHG emission reduction potential of this measure is 0.16Mt CO2eq by 2030 and 1.42 Mt CO_2 -eq. by 2050.

Targeted afforestation of less valuable agricultural land is the most important measure to achieve the long-term objective of climate neutrality after 2050. Aprekinos adds 75 ha of less productive agricultural land between 2026 and 2030. The faster this process takes place, the greater the contribution of afforested areas to reducing GHG emissions. By implementing within a maximum of 5 years, this measure will reduce GHG emissions by 0.83 million ton CO_2 by 2030, 19.3 million ton CO_2 in 2050 and ensure an increasing reduction in GHG emissions beyond 2050.

Apmezos ana (both plant measures and less gratuous lands) is modelled on a plantation assembly with a word density of 1500 sticks per hectare, with a regenerative or galvanised pruning taking place at the age of 60, when the trees reach the rocks of the pre-bush. For both non-coniferous and coniferous trees, there are 2 sets of pruning.

The risk of natural disturbances does not result in environmental growth and mortality, but we cannot capture it in numbers compared to the theoretical idealo situation. The risks are also unmtuous with a conservative approach to the assessment of the costs of the measures carried out by the MoA.

Wet improvement is a measure to be implemented in forests with mineral soil that periodically suffers from excessive moisture. Calculations assume that the hydrological regime of forests with mineral soils of 80 thousand ha is improved through the implementation of this measure in 2026-2030. This measure will reduce GHG emissions by 1.04 million ton CO_2 by 2030 and 11.7 million CO_2 by 2030 and replace non-productive forests by 11.7 Million CO_2 by 2050 as an important measure to increase CO_2 sequestration potentiala for the long-term duration of Meza's land. that a 10 cold ha non-productive growth shall be restored by 2030, providing an additional CO_2 removal corresponding to 0.46 ton CO_2 by 2030 and 1.54 ton CO_2 by 2050.

Outside forest lands, cemeter measures are planned. Woodland strips, known as beaways, implement a variety of ecosystem services, including reducing nutrient inputs to reservoirs, reducing the negative impact of drought and wind on agricultural land, reducing the risk of erosion and the spread of beam fires, acting as living environments and corridors for different animal species, and providing a significant GHG emission reduction effect. The hake scenario foresees 22 thousand ha of wood plantations under this measure 2026. — Ensuring a reduction in GHG emissions of 0.20 Mt$_{CO2}$ by 2030 and 8.8 Mt CO_2 by 2050. The installation of I rotation coppice is a solution which at the same time allows for a rapid increase in CO2$_{sequestration}$ of plant biomass and a greater impact on the energetic sector. The installation of rotation coppice I on an area of 15 thousand ha of agricultural land can provide a GHG emission reduction of 0.36 Mt CO_2 -eq until 2030 and 0.90 Mt CO_2 by 2050. Significant GHG emission reductions outside forest land can also be achieved on pastures of a group of trees below 0.1 ha. The total area affected by the measure is around 150 thick ha, with ligneous seedlings of 15 thousand ha in 2026. — 2030.The total expected GHG emission reduction effect by 2030 is 0.03 million tonnes of CO_2 and 3.9 million tonnes of CO_2 by 2050.

The reform of Meza's land takes place only for measures related to the settlement of organic soils and less gratuitous agricultural land, as well as perennial woody plantations where the life cycle is longer than 15 years. If short rotation plantations are set up, the way the land is used will not change – it remains agricultural land.

Important measures to achieve the 2030 targets, which will reduce GHG emissions by at least 1.09 million tonnes of CO_2 by 2030, are the establishment of a wood chemical processing plant for the processing of the less valuable logs currently exported and the creation of a new particle board production rough.

The use of biochar or torificeta wood for soil enriching organic matter can be ensured by agricultural land with the highest GHG emission reductions. Aprekinos dam, which imports biools or torificeto woods, or uses the current exportable fractions of wood, hardwood pulpwood and Meza biocurinamo, wallc sis, do not increase GHG emissions from Meza's land. The use of biochar and torificeta wood for soil improvement will lead to a reduction of GHG emissions by 3.53 million ton CO_2 by 2030 and will also reduce nutrient leaching from low agricultural use and reduce drought and heat-related risks to farming.

The AGM model and sustainable forestry assumptions (early and sufficiently intensive care and restoration) have been used for all Meza management and settlement activities, assessing the cumulative effects of different measures. The assessment of the implementation of the measures includes risks of natural disturbances, but additional constraints may arise from restrictions on economic activity, which reduces the area used to implement climate change mitigation measures.

One of the preconditions for achieving the climate neutrality objectives is not to increase peat extraction compared to the Guidelines for the Sustainable Use of Kudere 2020. — 2030 target amount (1.2 milliont) and parallel searching for new and equally effective substrate components.

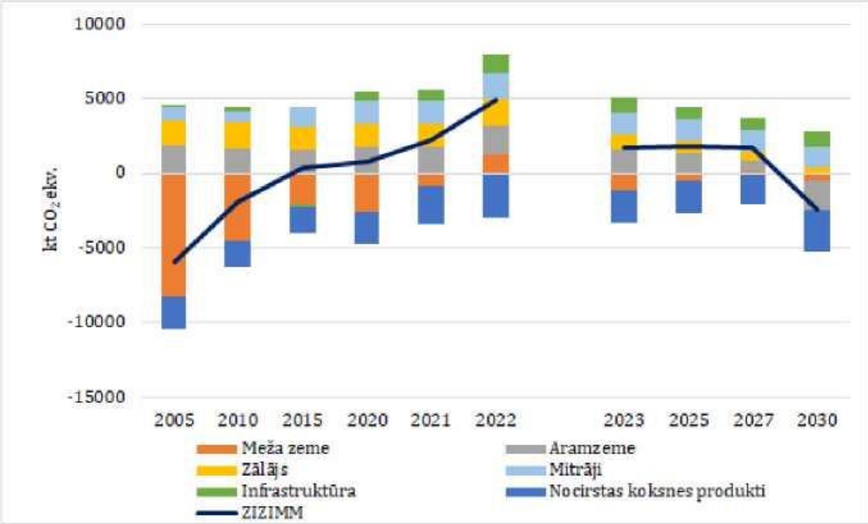


Figure 16: GHG emissions of the LULUCF sector 2005-2030 (Objective scenario) (kt CO 2eq)

4. Methods used to establish the target scenario

4.1. Method used to analyse energy scenarios

The TIMES model widely used in research into the energy and environmental system in Latvia was used to develop and analyse the development scenarios of the Latvian energy sector. TIMES- Latvia[23] is an optimisation model showing the evolution of Latvia's energy sector over a 50-year period at national level. The results obtained depend on the input parameters and the modification of the algorithm of the model used. The main paradigms of the model are the ideal market *(competitive partial performance)* and technological developments throughout the period under consideration *(perfect foresight)*.

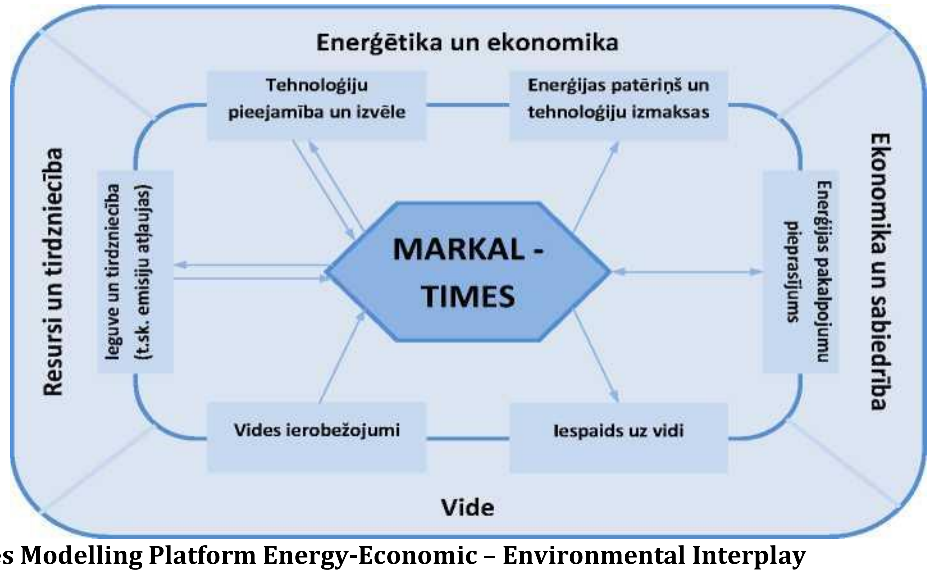


Figure 17: Times Modelling Platform Energy-Economic – Environmental Interplay

The TIMES-Latvia model describes Latvia's energy supply and consumption system – from energy service demand [energy service *demands] to the subsequent*stages of the final consumption and transformation sector, to the supply of primary energy (acquisition, import and export of local resources, etc.). The modelled system is described by the (current and future) capabilities of energy resources and technologies characterised by technical, economic and environmental parameters. One system integrates

[23] FEI

energy users and the energy supply side, thus interacting with each other. The real solution of the model brings together many different combinations of energy resources and technologies, but the solution is the combination of the lowest total costs found through optimisation, e.g. using the simplex method.

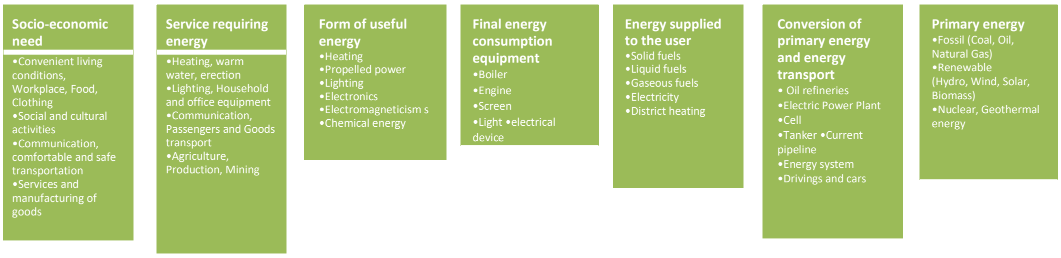


Figure 18: From consumer needs to energy resource

Model input information is a forecast of energy prices, a description of technologies and energy resources, as well as*energy service demands*, such as heated space or tonne-kilometres of freight transported, reflecting the need for an appropriate amount of energy.
Times-Latvia, as an energy and environmental system analysis tool, ensures that multi-faceted analyses are carried out in which possible alternative energy supply chains, technologies and emission reduction options in the future are described alongside the existing Latvian energy structure.

The model uses the energy reference system concept linking energy demand, resources, technologies and market goods (energy carriers, emissions) in a single system. Different energy suppliers, process, transformations and consumer technologies compete in the final energy consumer market to meet useful energy demand. The model chooses the optimal structure of the energy system for each period, minimising costs, taking into account different constraints.

The TIMES-ED modification has been used to model the NECP development scenarios. Using the flexible demand modelling method in the TIMES-Latvia model, demand for energy service may decrease or increase if final energy costs increase or decrease accordingly. If costs decrease due, for example, to energy efficiency, consumption responds to an increased demand for an energy service.

In the model, the base year (2022) is calibrated to the CSP energy balance:

- Final energy consumption – industry, services, households, agriculture, transport;
- Losses – electricity and heat networks, natural gas system;
- Production processes – production of biodiesel and bioethanol, charcoal and peat briquettes;
- Conversion sector – power plants (separately distributed 3 large HES), CHP plants (separately distributed in Riga 3 CHP) and boiler plants.

The trade balance determines the prices of imported and exported energy sources. The rates of energy and emissions taxes are set in accordance with laws and regulations.

Total national final energy consumption is described in the model by sector (industry, agriculture, services, households, transport and agriculture, forestry and fisheries) and subsectors (e.g. transport and industry) corresponding to the breakdown of the energy resources balance. For certain sectors (e.g. households, services, road transport) for which no further breakdown is given in the energy mix, energy consumption is further broken down by type of energy service, such as heating, cooking, lighting (households and services), buses, cars and trucks (road).

The model used is a dynamic optimisation model of*demand driven*, i.e. by optimising the described energy-environment system, all energy end-user sectors are provided with energy to meet the different needs – energy services reflected in the model in the form of useful energy demand. As energy demand is directly linked to economic development, future demand for energy services (useful energy) has been calculated using the projected macro-economic parameters – value added in terms of population, GDP, sectors and subsectors, and dynamics of changes in private consumption – as output parameters.

The evolution of energy prices is one of the main factors influencing energy consumption trends, as the price the energy user is willing to pay shows how much energy resources they want to consume and how much it is worth investing in improving the efficiency of technologies to provide an energy service. Price forecasts are an input parameter in the model.

Price projections for fuel types are calculated using EC price projections (for oil, coal and gas). These international institutions' forecast trajectories are used to calculate price forecasts for Latvia, taking into account Latvia's current prices and the interrelations between fuel prices.

The modelling of the energy system takes into account all existing taxes with rates assumptions about their future development. In addition to the projections, the EC forecasts for CO_2 price in[24] the ETS system up to 2050 is also taken into account.

4.2. Method used to analyse the scenarios for the RPPI sector

GHG emission projections in industrial processes are calculated using a *top-down* accounting model. The model shall include both the projection of activity data and the calculation of GHG emissions. For the calculation of GHG emissions, the emission factors of the latest inventory submitted are used, which are constant over the forecasted period. On the other hand, the required activity data are forecast on the basis of historical data and macroeconomic parameters describing the development of a given sector (value added or industrial production index).

A similar approach is also used to calculate the use of products (fluorinated gases and solvents) using a *top-down* method. The calculation of emissions has been carried out in accordance with the 2006 IPCC guidelines and adapted to forecast calculations.

The use of F-gases is forecast taking into account:

- the population, the number of households and the number of refrigeration equipment used (refrigerators and freezers);
- the evolution of the servicing sector and the volume of stationary refrigeration appliances used therein;
- change in the number of vehicles that determine the quantity of air-conditioning systems used in motor vehicles.

4.3. Method used to analyse agricultural scenarios

Emission projections are based on primary activity data prepared by the MoA in cooperation with the LBTU. The Latvian *Agricultural Sector Analysis Model (LASAM) is used to generate Latvian* agricultural activity data. LASAM provides forecasts for milk yields, cattle, sheep, goats, pigs, poultry, horses and crop production indicators based on the principles of single factor regression analysis. LASAM also calculates the use of nitrogen fertilisers in the agricultural sector. The basic data for the calculations under the model are derived from the CSP, EUROSTAT, household consumption balances and the Agricultural Data Centre. Exogenous price forecasts up to 2 025 are compiled from the EC Directorate-General for Agriculture and Rural Development and the Food and Agriculture Organisation of the United Nations, as further forecast by the LBTU. The macroeconomic forecasts are extracted from the EM projection values.

Forecasts of secondary data, including the spread of manure management system, nitrogen

[24] '*Recommended parameters for reporting on GHG projections in 2025*', EC, 2004.

release of livestock, use of organic fertilisers, nitrogen and nitrogen content of crop residues, are carried out by LBTU experts on the basis of the predefined project 'Establishment of a national system for greenhouse gas accounting and reporting on policies, measures and projections' within the framework of the EEA Grant Programme 2009-2014, within the framework of the National Climate Policy of the EEA Grant Programme, which (1) developed an algorithm to calculate the breakdown of manure systems; based on the size of the herd and the technologies used, (2) information on the amount of nitrogen excreted by animals has been compiled and recommendations have been drawn up for calculating its GHG emissions on the basis of the animal feeding plans and animal productivity applied, (3) on the basis of the calculation of the breakdown of manure systems, the appropriate organic fertiliser output has been determined, (4) aggregated information on the nitrogen content of the residue studies carried out under Latvian conditions, determining the most appropriate factors for calculating emissions from winter wheat crops. The methodological approach used to predict the distribution of manure management is available in the scientificliterature25. Projections of managed organic soils are provided by Silava.

Projections of GHG emissions from the agricultural sector in Latvia are calculated in accordance with the 2006 CPPS Guidelines.

4.4. Method used for the analysis of the LULUCF part of the Target Scenario

The main source of data on land use and carbon stock changes is Forest Resource Monitoring (MRM). Other data sources and research data are used as complementary information, for quality assurance purposes as well as for the provision of activity data on sources not covered by the FRM programme and other statistical data sources.

FRM and research data are used to estimate time series of areas, gross growth, mortality and timber production. The methodology for calculating GHG emission projections for the LULUCF sector is consistent with the methodology used for the 2024 GHG inventory. An AGM model has been used to predict the risks of growth, economic activity and natural disturbances in the Base Scenario and to implement the climate change mitigation scenario, which also uses the definition of Latvia's forest reference leveli262728. The calculations assume that the blockages of the mechanics are at the level of the existing ones.

4.4.1. Forest land

The calculation of carbon stock changes and GHG emissions in forest lands is based on activity data provided by FRM (area, living biomass and dead wood) and forest level I monitoring data

25(1)Farm manure amount calculation using statistical data in Latvia/J. Priekulis, A. Aboltins, A. laurs, L. Melece. Agronomy Research. — Vol. 16(4) (2018), pp. 1830-1836.
(2)Amount of nitrogen in cattle manure/Elita Aplocina, Aivars Aboltins, Juris Priekulis. 15th International scientific conference "Engineering for rural development": proceedings, Jelgava, Latvia, May 25-27, 2016, Vol.15, p. 375-380 3)Feed digestibility and manure nutrients/Elita Aplocina, Lilya Degola, Juris Priekulis, Aiga trup. Steps to sustainable livestock: first announcement – international conference: Abstracts book, Bristol, UK, 12nd-15th January 2016/University of Bristol. — Bristol, 2016. — ID. 131, p. 111
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26 Lazdins, A., Snepsts, G., Petaja, G., & Karklina, I. (2019). Verification of applicability of forest growth model AGM in design of forestry projections for National Forest reference level. Rural Development, 289-294. https://doi.org/10.15544/RD.2019.065
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(soil organic carbon). The areas of organic soils in forest land are shown according to the distribution structure of forest stands types. National statistics (Central Statistical Bureau, State Forest Service) have been used to assess emissions related to forest fires.

4.4.2. Arable land and grassland

The area of arable land has been assessed using remote sensing data based on FRM data. Changes in carbon stocks in living and dead biomass are based on the activity data provided by FRM. The areas of organic soils on arable land are determined according to the results of the studym[27.28.]

4.4.3. Wetland

The total area of managed wetlands is shown according to the results of the 2020 study inm29, including 31.62 thousand ha of peat extraction area, which includes peat fields and the impact of the extraction of peat in the case of recultivation. GHG emissions from soil are calculated using study resultss30, excluding CH_4 emissions from drainage ditches.

4.5. Method used to analyse waste and waste water management scenarios

4.5.1. Waste disposal

Two separate calculations of the 2006 CPSP waste model were used in the calculations. One unmanaged sites (closed landfills) and one managed (for landfills since 2002). For the unmanaged landfills, the standard first-degree degradation method was used, as no detailed information is available on the composition of the landfilled waste. Other factors are included in the IPCC guidelines by default.

For managed waste disposal facilities, the first-degree 'waste by composition' method used in the 2006 CPSP waste model was used. The composition of the waste is based on the 2011 SIA Virsma study 'Determination of the fraction of biodegradable organic carbon in landfilled waste'. This composition of waste has been applied until 2015 and from 2016 onwards, it uses waste from annual reports of landfills.

Information from operators on collected CH4 landfills is usedto predict emissions.

Table 3: Average waste composition in landfills in Latvia 1990 — 2015 (%)

	Paper	Plastics	Organisation (food, hygiene waste, other organisation)	Wood	Textiles and rubber	Minerals (ceramic)	Glass	Metallic
National average	6,40	8,54	47,90	2,11	3,35	8,69	20,64	2,36

Data on the composition of waste are provided in the annual landfill accounts. The calculation is made for 2 types of waste streams:

- Landfilled waste in disposal cells after sorting (data collected from landfill accounts);
- Waste directly disposed of (without sorting).

4.5.2. Composting

The projected emissions of CH_4 and N_2O from composting are calculated in accordance with the 2006 CPPS Guidelines. The emission factors are multiplied by the quantities of composted waste. The amount of composted waste in households is forecast in line with population changes, while industrial compostable volumes are forecast to follow the trend between 2003 and 2020. From 2022, industrially composted waste is forecast to be up to 100 000 tonnes in relation to

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29Lazdins, A., Butlers, A., & Lupikis, A. (2019). Contribution of LIFE Restore project to improve activity data for accounting greenhouse gas emissions due to management of wetlands. Sustainable and Responsible Management and Re-Use of Degraded Peatlands in Latvia, 23.

30Lazdins, A., & Lupikis, A. (2019). Life Restore project contribution to the greenhouse gas emission accounts in Latvia. In A. Priede & A. Gancone (Eds.), Sustainable and responsible after-use of peat extraction areas (pp. 21-52. The Baltic coast.

information on direct investments in waste management companies in Latvia.

4.5.3. Wastewater management

The following approaches were used to forecast activity data to assess expected GHG emissions in the wastewater sector:

- CH_4 for emissions from the municipal/commercial waste water management subsector:
- national population projections;
- the expected distribution of the national population by type and level of treatment, based on historical trends and the requirements of the directives;
- Projections for the production of sewage sludge based on its correlation with the average annual production of sewage sludge by humans and the historical trend in the proportion of anaerobic sludge.
- N_2O for emissions from the municipal/commercial waste water management subsector:
- The estimated population of the country served by state-of-the-art centralised treatment plants, based on historical trends;
- It was assumed that the time of the middle-merin protein paterin bus was constant;
- CH_4 and N_2O emissions from the industrial waste water management subsector
  emission projections were extrapolated from historical emission trends in this subsector. Based on projected activity data, emission projections were calculated in accordance with the 2006 CPPS Guidelines. Country-specific emission factors were used to calculate CH_4 emissions, whereas for N_2O emissions standard emission factors were used.