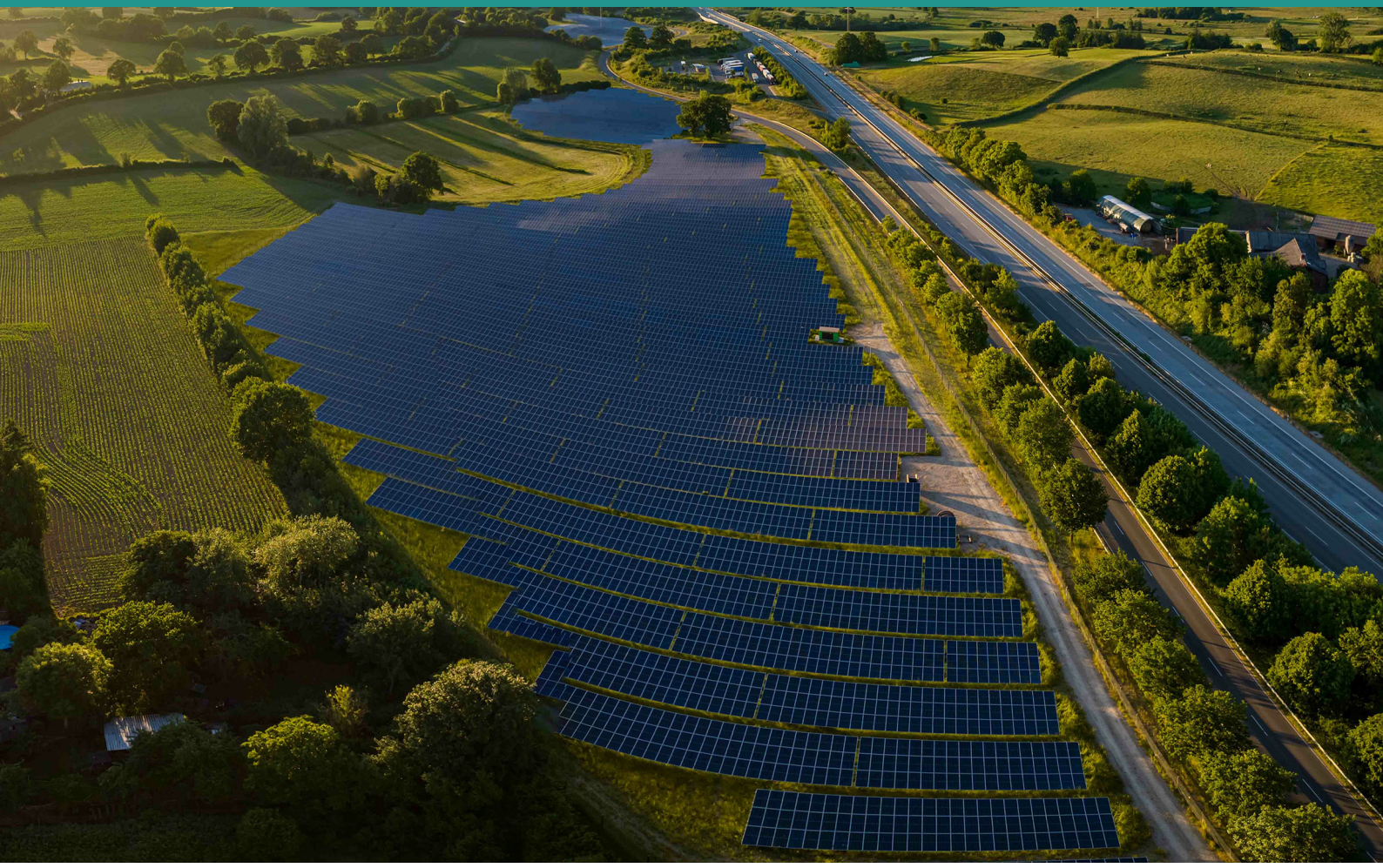
Energy and Climate Modelling and Energy System Integration in Latvia

Final Report

Technical Support Instrument

Supporting reforms in 27 Member States



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CONTENTS

1 Introduction

This is the final report for the project **"Energy and Climate Modelling and Energy System Integration in Latvia"** for the Latvian government the funded by the European Union via the Technical Support Instrument, in cooperation with the Directorate General for Structural Reform Support of the European Commission The project has been developed in collaboration with Trinomics, Riga Technical University (RTU) and E3Modelling (E3M).

This report summarises the performed activities within the scope of the project and provides corresponding recommendations for further actions, including evaluation and monitoring of project outcomes. The report includes:

- ✓ A summary on the activities carried out during the implementation of the project;
- ✓ The challenges encountered and the way they were overcome;
- ✓ The results of the monitoring indicators for the implementation of the project;
- ✓ The lessons learnt and recommendations;
- ✓ Communication materials.

2 Summary of activities conducted

Below we list the main objectives of the assignment and provide an overview of all tasks, activities and deliverables completed, based on the Terms of Reference and as set out in the Inception Report (see Annex 1).

2.1 Project implementation

The specific objective of this assignment was to assist the Latvian Ministry of Economics (MoE) and other public stakeholders to develop a modelling tool for the Latvian Climate and Energy Strategies and Plans, TIMES, as well as to develop a CGE model, also to be employed in the development of the Climate and Energy Strategies and Plans.

The new models should support the Latvian energy transition plans, their implementation and their monitoring, in order to achieve a carbon neutral economy at least-cost and in a timely manner, in coordination with the EU and other Member States, within the framework of the Governance of the Energy Union.

In order to reinforce the modelling capacity of the Latvian authorities so they can support these objectives, the team has focused on:

- Introducing new technologies and processes (carbon capture and storage, nuclear power), and providing updated parameters for existing ones, such as district heating, energy storage and other forecasted to 2050;
- Implementing an appropriate time and geographical resolution;
- Discussing and verifying input data and assumptions used in the modelling process;

- Improving the representation of the power sector, including with respect to demand response, self-consumption, and electric interconnections;
- Improving the representation of the (evolution of) the vehicle fleet and transport modal shifts;
- Developed a customised CGE model specific for the Latvian economy using the latest available EUROSTAT and national statistics featuring dynamic simulations until 2050;
- Established a soft link between the energy system and economic models.

The project consisted on 5 deliverables, including the inception report (Deliverable 1) and this report (Deliverable 5) as depicted in the following figure.

Table 2-1 Overview of main deliverables and their submission dates

Milestone	Planned	Draft	Final
D1 - Inception report	[]	[]	[]
First progress report	[]	[]	- (no comments received)
Second progress report	[]	[]	- (no comments received)
D2.0 - Prospective technology study for all sectors in Latvia	[] Update: []	[] []	[]
D2 - Report and model files to a new TIMES model	[]	[] (report) [] (model files)	[]
D3.0 - Report 'Explore and evaluate alternative approaches in CGE modelling'	[]	Main findings presentation made on []	[]
D3 - Improved evaluation of macro-economic impacts (report and model files)	[]	[] (report) [] (model alpha version)	[]
Third progress report	- (with submission of interim invoice)	[]	- (no comments received)
D4 - Report and modelling results on energy system integration	[]	[]	[]
D5 - Final report, communication material & manual for model/trainings	[]	[]	[]

All key deliverables are submitted via a shared Sharepoint folder. All other documents - in particular meeting presentations, work plans and timelines, technical meeting supporting documents, meeting minutes/high-level takeaways – have been shared with the beneficiary (MoE) and its partners (IPE and LU) on an ongoing basis by email.

2.1.1 Overview of main activities

The table below provides an overview of the main activities performed as part of each of the key deliverables (2-5).

Table 2-2 Summary of activities performed under deliverables 2 – 5

Deliverable	Main activities	Outputs
2: TIMES model	- Determined the optimal boundaries of the model in time, sectoral scope and space - Defined the reference energy system for non-energy sectors as well as emission projections - Included new infrastructure/technology development pathways in the model Reference Energy System - Reflected planned infrastructure and capacity developments - Assessed need for additional tools - Compilation of all model edits and update of model files - Verification and sensitivity analysis of model input data and assumptions - Calibration, final testing and benchmarking - Translation, verification and inclusion of WEM and WAM policies into the model (link to DLV4)	Report & model files
3: CGE model and soft link	- Assessed approach to soft-linkage used by other countries - Proposed soft-linking methodology - Proposed approach for bottom-up representation of power generation - Developed recommendations and mechanisms for regular updating of input data - Organised a stakeholder seminar on the Latvian CGE model and methodology for soft linking the TIMES and CGE model - Compilation of all model edits and update of model files - Final testing and benchmarking	Report & model files
4: Energy system integration pathway and policy roadmap, and scenarios	- Overview of main trends and Latvian policies and strategies - Described the main trends emerging from the analysis of the baseline - Estimate the potential contribution and role of different sectors in meeting the climate neutrality goal (self-optimisation) - Proposed a number of concrete policies and investments to reduce energy use and emissions in different sectors - Analysed the impacts of the different energy and climate policies proposed - Proposed an energy system integration pathway for Latvia, including policy roadmap for achieving the pathway - Developed WEM and WAM scenarios - Organised a stakeholder seminar on the energy system integration pathway and policy roadmap	Report & results files
5: User manual and training material	- Preparation of user manual and training materials - Ad-hoc training meetings during the different tasks and final training sessions - Preparation of communication material - Final reporting	User manuals, training slides, report

2.1.2 Project monitoring indicators

The project monitoring indicators were proposed in the inception report. They were assessed continuously throughout the project, and used for progress reporting. In particular, the level of completion (expressed as a % of completed task), and a traffic light indicator with qualitative description of any risks, issues and actions being taken to resolve issues, was used.

Table 2-3 Project progress indicators

Indicator	Value	Comment
No. of project reports approved*	10 / 10	NA
No. of Steering Committee meetings conducted	4 / 4	NA
Status deliverable 1	100% completed	NA
Status deliverable 2	100% completed	NA
Status deliverable 3	100% completed	NA
Status deliverable 4	100% completed	NA
Status deliverable 5	100% completed	NA

**See Table 2-1.*

2.1.3 Meetings

The following table lists the meetings that took place as part of this assignment, which involved DG REFORM, the beneficiary and the consultants.

Table 2-4 List of key meetings and their dates*

Milestone	When
Contract start	[]
Kick off meeting	[]
Inception report meeting	[]
TIMES technical meetings (including Baseline harmonisation meetings and including with stakeholders)	[] []
CGE technical meetings	[] []
Bilateral meeting Trinomics (Mr. [] - Mr. [])	[]
Trilateral meeting (client (EC) - Beneficiary (MoE) - Project Lead (Trinomics))	[]
First steering committee meeting	[] (rescheduled from [])
DLV4 meetings	[] (kick-off-meeting) [] (ad-hoc meeting 1) [] (ad-hoc meeting 2 - WAM scenario) [] (ad-hoc meeting 3 – Baseline and WAM scenario) [] (ad-hoc meeting 4 –WAM scenario results) [] (Discussion on comments to DLV4 report draft 1/2) [] (Discussion on comments to DLV4 report draft 2/2 (transport sector))
Second steering committee meeting	[]

Milestone	When
DLV3 stakeholder seminar	[]
CGE model + soft-link Training 1	[]
Third steering committee meeting	[]
DLV1-3 closing meeting	[]
TIMES-LV Trainings (onsite)	[]
DLV4 stakeholder seminar	[]
CGE model + soft-link Training 2	[] and []
Fourth steering committee meeting	[]
CGE model + soft-link Training 3	[]

*Coordination meetings planned for [], [] and [] replaced by bi-weekly technical coordination meetings (rows 4 and 5).

In addition, the project team has held bilateral meetings with Latvian stakeholders in the context of DLV4 (see table below).

Table 2-5 Stakeholders interviewed in the framework of Deliverable 4

Key stakeholder	Contact name and title	Email address	Interview date
Ministry of Agriculture	[]	[]	[]
Ministry of Transport	[]	[]	[]
Ministry of Finance	[]	[]	[]
Conexus	[]	[]	[]
AST	[]	[]	[]

2.1.4 Deliverables

The main deliverables as required in the ToR are listed in Table 2-1 (see section 2.1 "Project implementation"), along with their planned date and submission dates. Insights on any delays were provided in progress reports over the course of the project (third and last progress report from []).

The main deliverables can be found in the annex.

2.1.5 Trainings

The table below presents an overview of the training activities carried out on both models over the course of the project.

Table 2-6 Detailed summary of training activities

Deliverable	Training session	Topic(s)	Date and number of hours	Number and affiliation of participants	In-person
DLV2: TIMES model	1	VEDA2.0 Model Management System Introduction & Basic Principles	[] 1 hour	1	Yes
	2	Introduction to TIMES Latvia model technical structure	[] 1 hour	1	Yes

Deliverable	Training session	Topic(s)	Date and number of hours	Number and affiliation of participants	In-person
	3	Practical task on TIMES Latvia model features	[] 2 hours	1	Yes
DLV3: CGE model and soft link	1	Introduction to GAMS and to GEM-E3-LV model	[] 6 hours	5	No (online)
	2	Technical meetings on GEM-E3-LV model exercises and reporting	[] [] 6 hours	5	No (online)
	3	Practical steps on Soft-liking the GEM-E3-LV model with the TIMES Latvia model	[] 4 hours	6	No (online)

2.2 Results and observable impacts

This section aims to assess the **project results, and observable impacts** using the results, and impact indicators proposed in the inception report to the extent that it is possible. Results are understood as deliverables and related activities, while impacts refer to the longer term effect of implementing the results.

2.2.1 Indicators for monitoring project results

The indicators for monitoring project results are linked to the two project outcomes stated in the ToR:

- **Outcome 1:** Adoption of an improved modelling system and analytical framework for long term energy and climate planning in Latvia
- **Outcome 2:** Adoption of an updated National Energy and Climate Plan including detailed planning that enables cost-effective investments in infrastructure for energy system integration.

The following table includes project result indicators, organised according to the original aims for each deliverable.

Table 2-7 Indicators to monitor project results per deliverable

Project result indicators	Details
Deliverable 2:	
Number of new and improved infrastructures/technologies: 28	A database of new and improved technologies has been developed, taking into account the proposed TIMES Latvia structure and reference energy system. It includes **16 new technologies for energy production** which are not yet used in Latvia, including, novel heat pump technologies, nuclear power, micro-cogeneration, biomass gasification and energy storage. In addition, **3 different carbon capture and storage technologies** have been introduced within the technologies database. The transport sector includes **9 advanced technologies for future passenger and freight transport** development.
Reflection of energy savings and energy efficiency into the model	The model includes **15 energy efficient technologies for the residential sector and commercial sector** for more efficient heating, refrigeration, lighting and cooking. The modelling of residential and commercial **building insulation has been improved** through more accurate cost assumptions based on renovation rates.
Inclusion of disaggregated energy demand data and split of energy demand of the tertiary sector into space heating, hot water, cooling, lighting, electrical appliances	The tertiary sector includes the private and public service sectors and has been **divided into 7 sub-sectors** based on building classification and floor areas available. Resource consumption for all commercial sub-sectors has been **divided into 10 end-use processes** – heating, cooling, cooking, lighting, public lighting, refrigeration, ventilation, water heating, office equipment and other.
Several new data sources added	In total, **20 data sources and 10 scientific publications have been used** to identify the future and advanced technologies
Deliverable 3:	
Functionality of the CGE model	The GEM-E3-LV model is a full system CGE model that details the operation of the Latvian economy and its interaction with the Rest of the World. The model is recursive dynamic with five-year time steps until 2050 and features 41 economic activities (plus 10 power generation technologies) with a focus on energy technologies. The model is able to capture the interaction of the energy system with the economy through a series of channels: capital/investment requirements, multiplier effects, impact on prices and productions costs, competitiveness, labour market and employment and impacts on households' disposable income.
Soft linking between the CGE and TIMES	GEM-E3-LV features a stand-alone Excel-based routine that allows its linkage with the TIMES energy system model. A procedure has been developed allowing for the two models to interact. The key steps of this procedure are: i) Harmonisation of common variables, ii) sectoral mapping/concordance, iii) provision of GDP, population, household income and sectoral production from GEM-E3-LV to TIMES, iv) Provision of fuel mix, electricity prices, energy purchases and associated investments by economic activity and for households from TIMES to GEM-E3-LV, v) Iteration until a convergence is achieved.
Deliverable 4:	
Credibility of the results	Overall, the expected outcomes of the set of policies and measures proposed show that energy use and carbon emissions decrease, but also that more efforts will be needed to achieve the targets. This is in line with expectations, although there may still be issues at policy level or at the level of the single parameters. The results provided in the final draft are sufficiently robust even if some single parameters or indicators appear to follow somewhat unrealistic trends. These should be improved as the model continues to be used.
Deliverable 5:	
Number of DLVs documented	5 (DLVs 1 to 5)
Number of trainings performed	5
Number of users employing TIMES /CGE models	The CGE model is currently operated by the University of Latvia and two users have been trained.
Number of studies employing TIMES /CGE models	No known studies to date except for the reports delivered as part of this project. Indicator worth continuing monitoring after project end.

2.2.2 *Indicators for monitoring project impacts*

Indicators to monitor project impacts should be defined in accordance to the impact categories proposed in the ToR, namely increasing the levels and quality of investments in the green transition in Latvia, based on an improved analytical underpinning of its energy and climate planning and policymaking.

Therefore, going forward, we suggest the following indicators to monitor project impacts:

- Number of users employing TIMES
- Number of users employing the CGE model
- Use of TIMES in the NECP update
- Use of the CGE model in the NECP update
- Number of studies/publications employing TIMES
- Number of studies/publications employing the CGE model

3 Recommendations and lessons learnt

The implementation of the project provided a number of interesting insights and lessons we feel are valuable to record and take forward.

3.1 Recommendations for further actions concerning the development and application of the TIMES and the CGE models

This section summarises the recommendations for the Latvian authorities that could facilitate and complement the implementation of the project's results, increase the project's impact, and contribute to the successful development and application of the TIMES and the CGE model.

3.1.1 TIMES Latvia

General recommendations

- **Ensuring easy access to model files and further dissemination of the TIMES Latvia open-source model** would allow for continuous improvement and more agile development of the model in the future. It would allow researchers and students to further develop or focus on certain aspects as part of their research, improving the solutions and data availability.
- **Continued discussions on input data and assumptions with main stakeholders** would allow for avoiding uncertainties such as implementation times for large-scale energy facilities, investments and maintenance costs, efficiency etc. The current assumptions are mainly based on available data sources from other countries and may not fully accurately represent the existing situation in Latvia.

Improvements in technologies represented within the model

- **Additional technologies for the residential sector** could include "wet" appliances (washing machines, driers, dishwashers) allowing a more accurate analysis of potential energy demand. However, input data on these technologies would be necessary.
- **More detailed representations of cooling processes.** As for now, only individual electricity-driven cooling is represented within the model. In the future, district cooling could also be implemented in Latvia resulting in lower primary energy needs in commercial buildings.
- **Additional waste heat sources from commercial buildings** could be included as improved technologies within the model. For now, the Times Latvia model only includes the option to recover heat from industrial processes, but additional heat savings could be gained by utilising waste heat flows from cooling processes in the commercial sector. Efficiency improvements and related costs should be determined to include other types of waste heat processes in the model.
- **Detailed characteristics of industrial processes in different sectors.** The Times Latvia model presents a general production process in the industry sector without sector-specific requirements (e.g. drying, melting, boiling). With additional research and assessments, the existing general processes could be described with more detailed availability, efficiency and cost parameters.

Improvement of power transmission system modelling

- **Improving the power transmission system by developing additional power trading regions** would allow more accurate modelling of future electricity imports and export with neighbouring countries. It would require identifying the future energy sector development trends in other Baltic States, Nordic and Central European countries and adding new regions in the TIMES Latvia model.

- **Improve the power transmission sub-model** with verified technical and economic assumptions including the capacity limitations described in the represented time slices. Discuss the future investment costs, variable and fixed maintenance costs with the TSO and ETSO. More accurately define the necessary additional investments in the power grid when large penetration of renewable power is reached.
- **Verify the obtained power sector results with other energy sector modelling tools which use hourly resolution** for energy demand and production alignment. Currently, the TIMES Latvia model uses 12 different time slices which may result in uncertainties for power sector balancing. Additional time slices could also be introduced directly in the TIMES Latvia model which will require additional information on the power demand of different sectors.

Improvements to the sectoral interlinkages of the model

- **Additional storage and Power-to-X technologies could be added to the technology database.** Currently, several technology solutions are not included within the model (e.g. hydro storage, power-to-ammonia). The technology catalogue should be supplemented.
- **The inclusion of non-energy sectors in the TIMES Latvia model by detailed end-use processes** and main emission sinks and uptakes would allow to forecast the total greenhouse gas emissions in Latvia and determine the interconnections with the energy sector.
- **Inclusion of biofuel production processes.** Currently, the existing and potential biofuel refineries for modern biofuels are not included within the model in detail. The processes could include representing the input fuels, investments, production costs and efficiency.
- **Introduction of soft-linkage with other types of models**, for example, agriculture model, forestry model, system-dynamics waste model, and TIMES bioeconomy model which would allow identifying feedback loops with processes and policies of other sectors.

Improvements in policy modelling

- **More detailed assessments on behavioural-driven energy savings** (e.g. more efficient agriculture, production of goods) can be used to improve the modelling process. Energy efficiency is represented in TIMES via technology substitution, which involves using a more efficient technology or process to produce the same energy service. However, besides cost, other typical motivations for technology change and potential energy efficiency improvements exist which are not directly modelled in TIMES.
- **Inclusion of other energy efficiency measures for building energy efficiency** such as smart thermostats for indoor air temperature control. In the current version, the energy demand for space heating can be only reduced by building insulation.
- **Revise limitations for new district heating connections.** Due to the lack of spatial distribution of heat consumers there are certain limitations for new connections to district heating networks to represent that not all the buildings are located in densely populated areas. However, the existing limitations could be revised through more precise assessments.

Improvements to gas network modelling

- **Implementation of gas storage process and LNG terminals** could be beneficial. The existing version of the model does not specify the available capacities of gas terminals and storage. Therefore, there are no limitations on gas availability.
- **Incorporating physical dimensions of the gas network**, such as length, diameters and pressure, together with other infrastructure, such as pumps, connection points, etc. These processes would allow to model the costs of maintaining the gas infrastructure more accurately.

- To develop additional gas trading regions to improve the import/export characterisation of natural gas (and other gases if present in the pipeline).
- The process for hydrogen and biomethane blending could be improved by more precise blending limitations, attributed costs, and efficiencies.

3.1.2 GEM-E3-LV

Improvements of model dynamics

- **Empirical estimation** and revision of firms' investment decisions so as to better reflect the reality of Latvian firms.
- **Enrich the model with more processes by technology** to increase the substitution possibilities and adjustment process of firms in adopting new technologies.
- **Introduce capital vintages** (currently only two vintages exist) allowing for better accounting of stranded assets and investment requirements.

Improvements of social dimensions

- **Introduce multiple types of households** to account for distributional implications. This will allow to introduce different behaviour and consumption patterns by income decile. As a result, the impact of policies regarding energy poverty, the ability of poor households to finance their energy efficiency expenditures and government subsidies to specific income groups can be analysed in a greater detail.
- I**ncrease the number of occupations** per economic activity so as to better understand the labour market implications of the alternative set of policies.

Improvements of the model mechanisms

- **Endogenize** agents' decisions regarding energy efficiency, renewable and power generation. In the current version, the GEM-E3-LV model receives this information via the soft-link with the TIMES Latvia model. This extension will allow the model to run standalone.

Increasing the sectoral dimensions of model

- **Increase the representation of energy products**. The GEM-E3-LV model includes 9 energy products. Further disaggregation can be beneficial. A separate representation of Electricity and Heat, that are currently in a single aggregated sector, will improve the modelling results and the soft-link with the TIMES Latvia model.
- **Disaggregate the construction sector**. Currently the GEM-E3-LV model has a construction sector that meets the demand of all construction activities. Different construction activities have different sectoral requirements (i.e., buildings construction activities have different production processes to wind installation construction activity). A further disaggregation of the construction sector based on the different construction activities will allow for a better accounting of economic and employment impacts on the Latvian economy.

Improvements in policy modelling

- **Identify and include taxes** that are affected by the energy transition and that are not modelled in the current version of the model (e.g. vehicle circulation taxes).
- **Identify and include policy indicators** in the report to be quantified for each scenario.

3.2 Relevant best practices, lessons learned, and recommendations for future projects in the other Member States

This section focuses on lessons learned and recommendations for future projects in other Member States.

Use progress meetings for quick status updates and bilateral meetings to address specific issues

General progress and Steering Committee meetings are good for assessing progress, but not for solving specific issues. Specific meetings with smaller teams to address specific technical issues are more effective in making progress. A balance between regularly planned update/catch-up meetings with the beneficiary and ad-hoc meetings when specific issues arise also enhances effectiveness.

Clearly define roles and responsibilities during the inception phase

At times, the lack of clearly defined responsibilities (e.g. with regards to final decision on modelling issues and data/assumptions to be used) has resulted in unexpected additional work and delays. In the future, role definition and decision-making responsibilities (between the beneficiary and the contractor, and between the different entities constituting the beneficiary team) should be clarified at the start of the assignment.

The involvement of different stakeholders, on the beneficiary's side, was very beneficial for the development of the models and the overall implementation of the project. However, the motivation to participate in the discussions and provide the necessary feedback and information/data differed among the involved stakeholders. In the future, the potential roles of involved stakeholders and their responsibilities should be defined at the start of the assignment. In addition, the main beneficiary (the responsible Ministry) should stand ready to provide a final decision/solution to any open issue between its partner and the contractor.

Allowing for flexibility on final reporting for each deliverable

While the team strived to provide the reports as originally planned, the nature of the work often required for flexibility with reporting. Given the need for merging the different modelling updates, revisions were needed in earlier reports, leading to a delay in the submission of the final reports for the deliverables. This include clarifying upfront, when possible, the number of scenarios and scenario versions to be run, especially when the goal of the project is to hand-over the complete modelling system to the beneficiary, who can then change and test scenarios as much as desired.

4 Communication Materials

4.1 Short project description

Energy and Climate Modelling and Energy System Integration in Latvia

The project consisted in providing Latvian authorities and research organizations with modelling tools which would provide an improved analytical capability of its energy and climate planning and policymaking. More specifically, the team (Trinomics, RTU and E3M) developed Latvian TIMES and CGE models to support long-term energy and climate planning in Latvia, as well as a decarbonisation pathway which enables cost-effective investments in infrastructure for energy system integration. The new models will support the Latvian energy transition plans, their implementation and monitoring, to achieve a carbon neutral economy at least-cost and in a timely manner, in coordination with the EU and other Member States, within the framework of the Governance of the Energy Union.

This project is funded by the European Union via the Technical Support Instrument and implemented by Latvia's Ministry of Economics, in cooperation with the European Commission.

4.2 Social media text

The below two tweets (under 280 characters each) are proposed:

Tweet 1:
Under TSI 2022, the European Commission has provided support to the Latvian Ministry of Economics to strengthen the green transition in Latvia through climate and macroeconomic modelling. Delivered by Trinomics, E3Modelling and Riga Technical University, the project took place between October 2022 and March 2023.

Tweet 2:
The project has enhanced the analytical and modelling capacity of the Ministry and its technical partners and provided inputs for the update of the country's National Energy and Climate Plan. Climate actions in the Latvian energy sector were developed and evaluated to meet net-zero targets by 2050.

4.3 Visual materials

No on-site meetings took place over the course of the project due to Covid restrictions in late 2021-early 2022. As a result, no photos/pictures were taken by the contractor. In case the beneficiary does not have any other pictures to suggest, we suggest to use report covers as visuals, or visuals presenting each of the 2 models.

5 Annex

- Annex 1, Deliverable 1 - Inception Report - see below links:
  - Inception Report: []_REVISED_InceptionReport.pdf
  - Folder DLV1: []_RevisedIR
- Annex 2, Deliverable 2 - Reports *Prospective technology study for all sectors in Latvia* and *Scope* ('DLV2 report 1'), *structure and functionality of TIMES Latvia model* ('DLV2 report 2') - see below links:
  - DLV2 report 1: FINAL-Prospective technology study for all sectors in Latvia.pdf
  - DLV2 report 2: DLV2Report-F.pdf
  - Folder DLV2: DLV2
- Annex 3, Deliverable 3 – Reports *Explore and evaluate alternative approaches in CGE modelling* ('DLV3 report 1'), *The GEM-E3-LV model* ('DLV3 report 2') and *DLV2-DLV3 common report: Definition of the Baseline (WEM) scenario in the TIMES and CGE models* ('DLV2-3 common report') - see below links:
  - DLV3 report 1: D31_CGEReview_E3M_[].pdf
  - DLV3 report 2: DLV3Report-F.pdf
  - Folder DLV3: DLV3
  - DLV2-3 common report: DLV2-3CommonReport-F.pdf
  - Folder DLV2-3: DLV2-3CommonReportBaseline
- Annex 4, Deliverable 4 – Report *Energy system integration pathway and policy roadmap* - see below links:
  - DLV4 report: System Intergration pathway in Latvia - DLV 4 Report - Final.docx
  - Folder DLV4: DLV4
- Annex 5, Deliverable 5 – Report *Final Report* and Training material and user manuals – see below links:
  - DLV5 report (this report): []_DLV5 report-F.docx
  - Training material and user manual:
    - TIMES-LV:
      - Training agenda: []_Training_agenda.docx
      - User manual: TIMES Latvia user guide [].pdf
    - GEM-E3-LV:
      - Training material (folder): Training material
      - User manual: UserGuide-GEME3LV_[][].pdf
  - Folder DLV5: DLV5

Note: All above-mentioned reports and folders are accessible via the Shared Folder SHARED FOLDER PT-CLIENT.

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