Interreg Baltic Sea Region

Co-funded by the European Union

ENERGY TRANSITION
Energy Equilibrium

Savivaldybių mastu CO_2 mažinimu grindžiama energijos pusiausvyra

(Carbon driven energy equilibrium at the municipal scale)

Farida Dzenajavičienė / Rimantas Bakas
Lietuvos energetikos institutas

https://interreg-baltic.eu/project/energy-equilibrium/

Konferencija „Šilumos energetika-2025“, LEI, 2025-03-13

Energy Equilibrium (Energijos pusiausvyra)

Trukmė
01/2023 – 12/2025

Visas biudžetas
1 997 687.92 €

ES finansavimas (80 %)
1 598 150.31 €

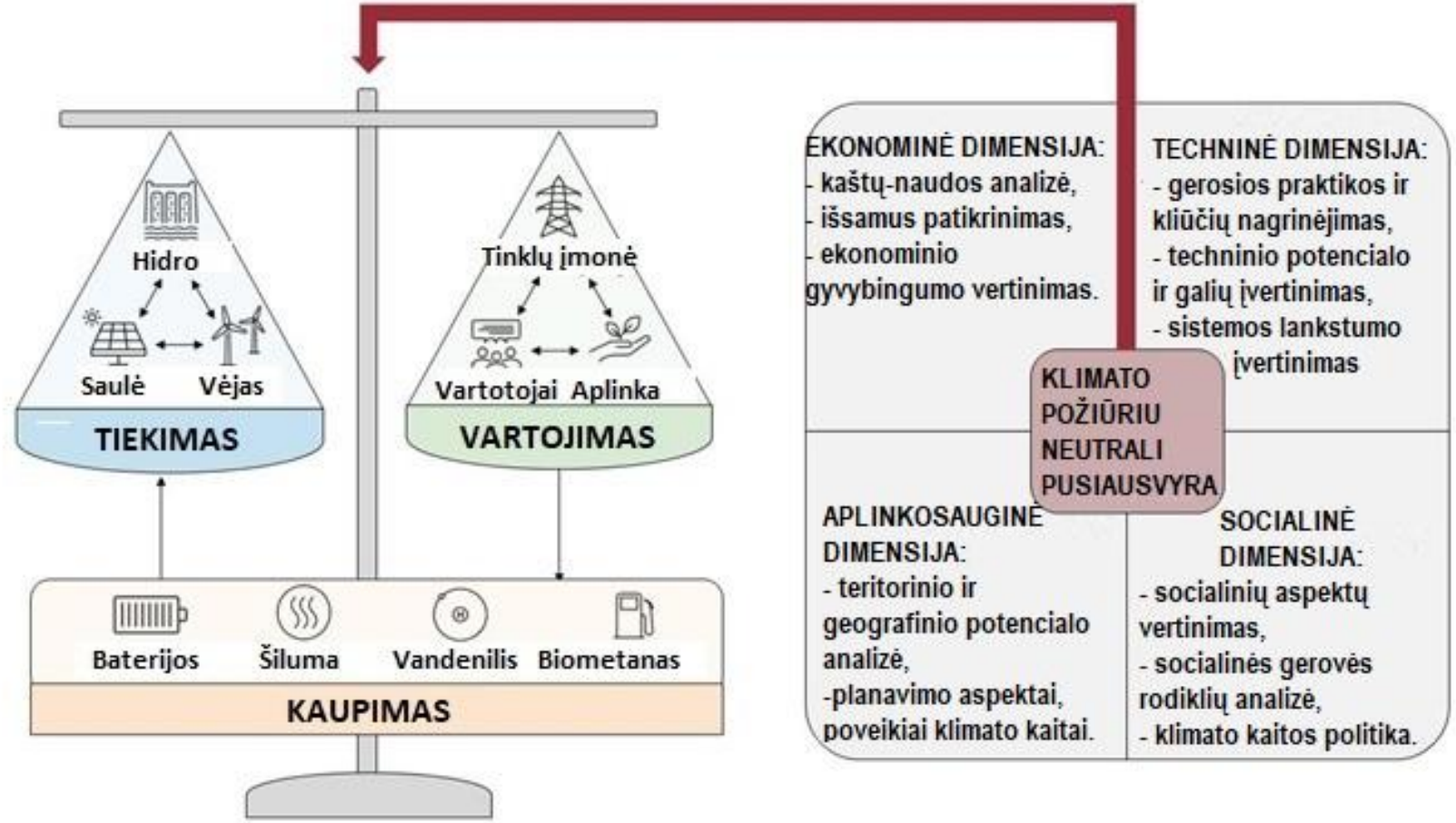
Bendrasis projekto tikslas

Projekto metu sukurta **Energijos pusiausvyros platforma** - interaktyvi ir lengvai pritaikoma priemonė, padedanti savivaldybėms ir energijos tiekėjams **priimti sprendimus**, susijusius su efektyvių veiksmų planų kūrimu, siekiant paspartinti vietinių AEI panaudojimą regione, daugiausia dėmesio skiriant pakankamos **energijos kaupimo infrastruktūros** plėtrai regionuose.

Projekte dalyvauja: Latvijos, Lietuvos, Lenkijos, Švedijos, Vokietijos ir Suomijos moksliniai ekspertai bei savivaldybės.
Lietuvą atstovauja Lietuvos energetikos institutas ir **Tauragės savivaldybė**.

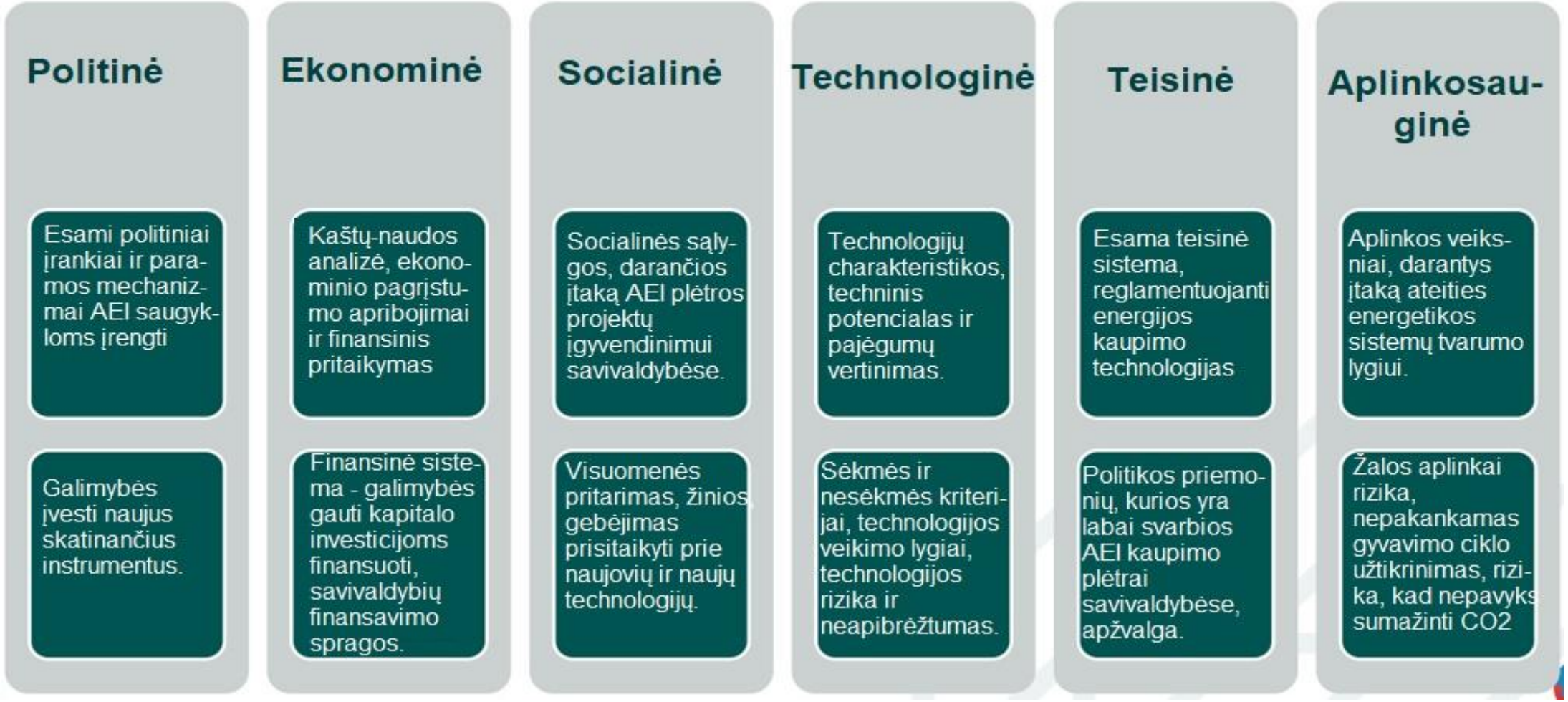
Energy Equilibrium (Energijos pusiausvyra)

- Bendrasis projekto tikslas



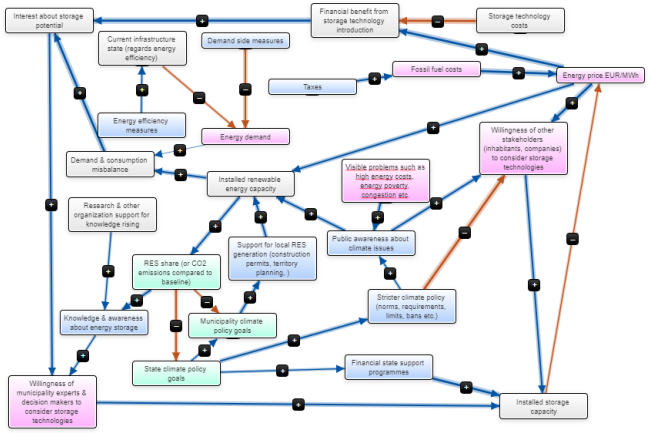
Energy Equilibrium (Energijos pusiausvyra)

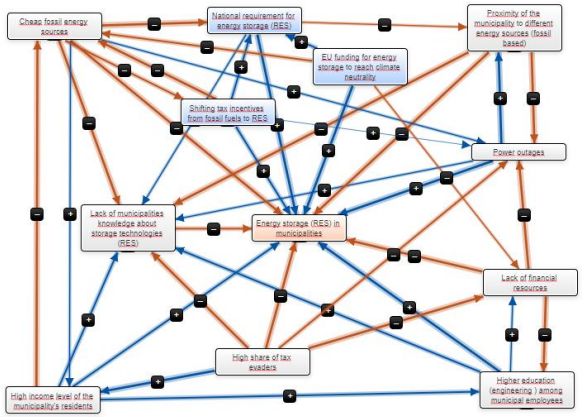
- Paruošta PESTLE analizė

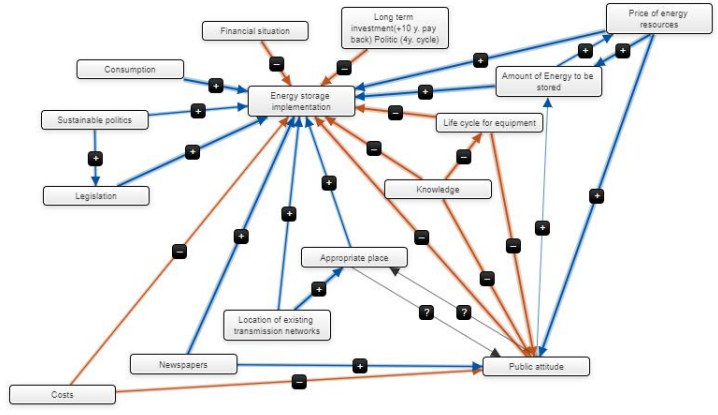


Energy Equilibrium (Energijos pusiausvyra)

- Savivaldybės energetikos sistemos pusiausvyros nustatymui buvo kuramas Dinaminis modelis (matematinis sistemos vaizdas, kuriame atsižvelgiama į jos elgesį kaip laiko funkciją).
- Šie modeliai naudojami sudėtingų sistemų, tokių kaip elektros grandinės, valdymo sistemos, ryšių tinklai ir daugelis kitų, elgsenai numatyti ir analizuoti.







Energetikos ekspertų, mokslininkų ir savivaldybių darbuotojų įtakojančių faktorių ir jų sąveikos modeliai

Energy Equilibrium (Energijos pusiausvyra)

Pagrindiniai procesą įtakojantys faktoriai

1. Energijos saugyklos įgyvendinimas
2. Žinios, pažintis su problema
3. Energijos poreikis
4. Energijos infrastruktūra (gamyba, perdavimas, paskirstymas)
5. Energijos kaina
6. Technologinės sąnaudos
7. Finansinė nauda
8. Noras ir pasirengimas prisitaikyti
9. Klimato ir energetikos tikslai
10. Politika – mokesčiai
11. Politika – parama
12. Politika – žinios, informavimas
13. Energijos perteklius
14. Energetinė priklausomybė ir patikimumas
15. Finansavimo prieinamumas (be paramos)
16. Ekstremalių aplinkybių atsiradimas
17. Gyventojų nuomonė
18. Technologiniai sprendimai
19. Poveikis aplinkai
20. Teritorijos prieinamumas
21. Kita...

Kiekvienas šių faktorių dar turi visą eilę papildymų

Lūkesčiai:

- ***Paprasta naudoti tiek vietos valdžios institucijoms, tiek įmonėms, tiek gyventojams,***
- *Veiks visos funkcijos,* ***platforma veiks gimtąja kalba****, kuria galėtų naudotis visi suinteresuoti asmenys;*
- ***Vietos valdžios institucijos turi būti tikros, kad rezultatai atitiks lūkesčius.***

Energy Equilibrium (Energijos pusiausvyra)

- Platformos pirmasis prototipas: exchange.iseesystems.com/public/testlearntestsagain/energy-equilibrium/index.html#page1

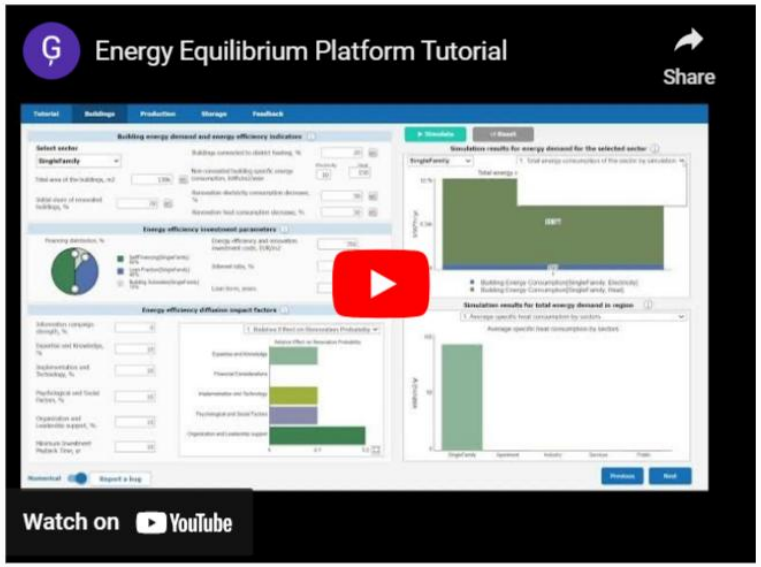
Energy Equilibrium Platform

The aim of the Energy Equilibrium Platform is to support municipalities and energy suppliers in decision-making related to the development of efficient action plans to accelerate local RES utilization in the region, including development of sufficient energy storage infrastructure.

The Energy Equilibrium Platform offers:

- Energy sector modeling for development of long-term energy policies
- Optimal renewable energy strategy identification
- Expansion of local renewable energy potential through storage solutions
- Simulation of energy development scenarios for low-carbon systems

How to use the platform?



This platform is developed in the scope of Energy Equilibrium #C027 project which is funded by Interreg BSR program.

Start without importing data

Import data

Energy Equilibrium (Energijos pusiausvyra)

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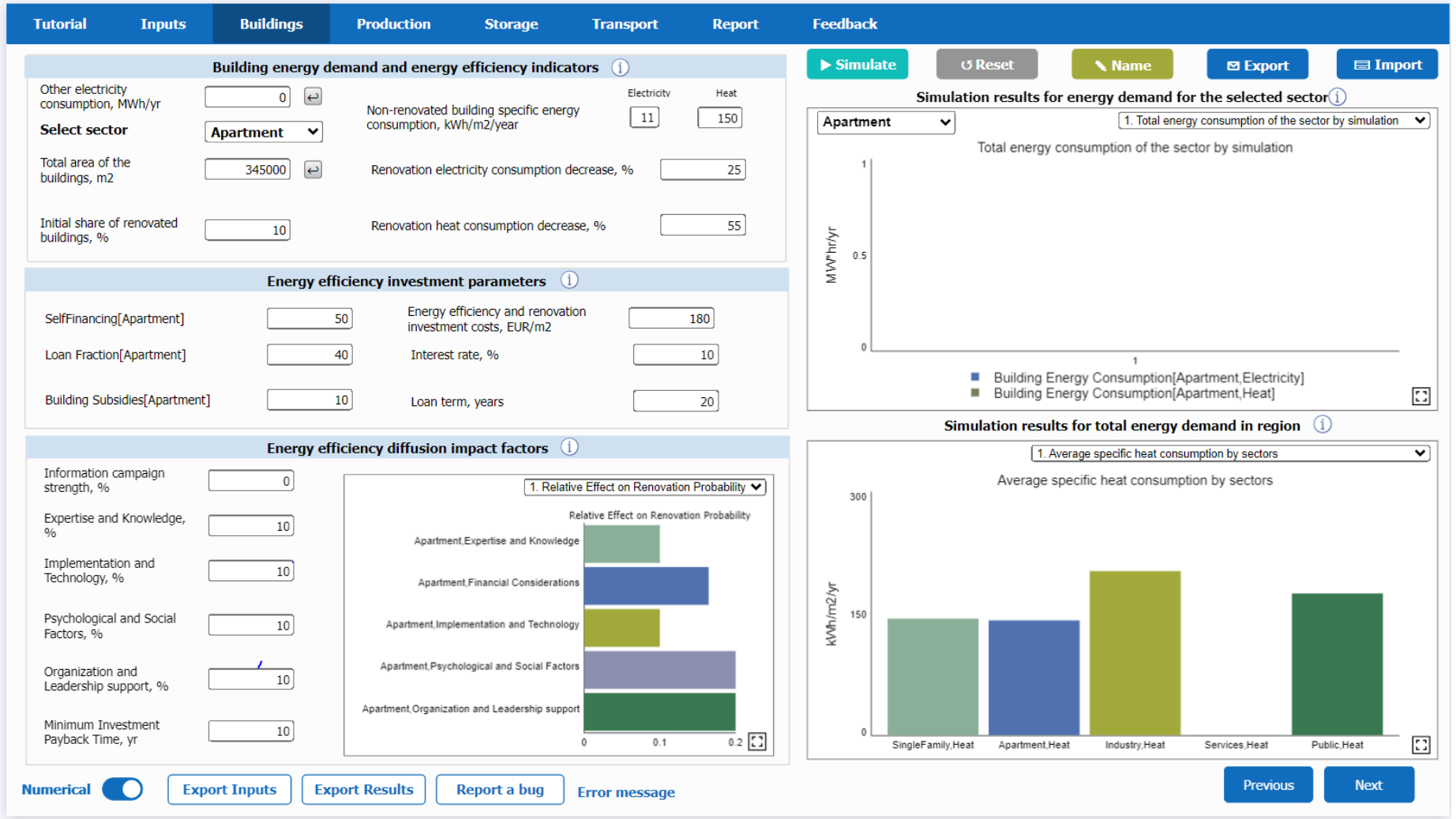

Energy Equilibrium (Energijos pusiausvyra)

Trūkumai

5 Challenges

The creators of the platform have done a huge job and most of the platform operates great. However, municipalities encountered some challenges when applying the platform to their real needs (some are related to limitations of the model assumption or economic parameters, other to computer system capacity – some improvements of model might be necessary). The challenges mentioned by municipalities are listed below:

- *"Judging by the purchase costs and the fact that buses using RES are not cheaper in operation, there is no financial incentives, it is more a matter of confidence and political will. In the case of Gulbene Municipality almost all heat energy is produced from wood (wood chips in district heating, wood pellets and firewood). We expect that nothing will change to a large extent in the next 10 years, and wood will be used mainly for heating. All the electricity produced in Gulbene district is produced from RES, however, its total amount is too small to cover all the demand (approx. 11.3 GWh/year of fossil fuels is imported)."*
- *"Calculations show that we need more RES (15 MWe) to reach 100 % of RES share in electricity in Gulbene region (91,5 % in 2050). There is no payback time for such a big investment in storage systems (1,000 MWh). If we try to lower the tariff, payback time for renovation will be longer."*
- *"The translation into national languages would be very helpful. Though there are possibilities to use the Google translate application, this is not the best choice, as not all users are using Google Chrome and not all institutions allow using apps. Though most specialists know English, not in all sectors (technical, economic, management), thus it would be good to have all terms to be clear."*
- *"Not all measure units on graphs are clear: K and B, maybe are clear for mathematicians, but not for other professionals. Besides, measure units are also not always clearly seen in the graphs. Titles and figures should be clear."*
- *"There is no need to show all simulations – showing the final result for each estimate would be the better option."*
- *"The use of multi-optional scenarios is complicated and does not always work e.g. growth of public electric buses means a reduction of the inventory of old diesel ones in everyday activities, but they can be used e.g. renting only; the same is true in the change of private electric car parks, however, this cannot be done. Some re-estimates of the full car park can be done automatically with regard to global trends. A similar situation is in the heating sector, where the new biomass boiler (wood chips or pellets) can replace the old boilers, burning fossil or other solid fuels, however, it is not clear how to do this."*
- *"Though there is a possibility to combine storage with generation sources, this combination of the boiler with water tank heat storage had no effect. Does not show the need for water tank storage for biomass boilers, though such boilers need storage for improvement of operation efficiency, especially during peak hours and during fast changes of temperature during winter periods."*
- *"No possibility to assess the effect of battery use in the transport sector."*
- *"Simulation results for the entire system could be in separate window and engulf all measures in all the rest pages."*
- *"I am not sure, whether the results obtained are reasonable in all cases."*
- *"I do not understand why the boiler has such effect on the share of renewable energy in the municipality. I thought that an installation of 80 MW solar park would affect the share of renewable energy more than it did (it did not affect it at all)."*
- *"It was interesting that the information campaign did influence the renewable energy share, albeit small."*
- *"Most of the diagrams did not change with the different scenarios, and I do not know why. The challenge was that I did not have enough knowledge to know why the results were what they were. In the stage of the project, we are in now, I think I need more guidance to understand how different renewable energy sources affect the system."*
- *"Scenario export does not work (changes not included)."*
- *"Results are debatable and unverifiable (in the sense of understanding and checking the built-in algorithms)."*
- *"No biogas and biomethane CHP plant options (correct calorific values (LHV), renewable energy status)."*
- *"No report generator (which makes it extremely difficult to use the Platform)."*
- *"Too many options, sometimes unclearly named – instead of fewer of them, for the real use, but proven."*
- *"Desired list of configurations, sorted by net present cost, as quasi-optimization (for more complex cases, scenarios)."*
- *"The list of heat sources needs to be supplemented, as it does not include many traditional individual sources that currently exist in municipalities and whose description is necessary to determine the current energy balance of the municipality. There are no oil sources (used e.g. in many public utility facilities in rural areas without access to the gas network in Poland), coal boilers (which operate only for heat production and are difficult to enter as CHP Extraction Coal) or heating using tiled stoves (which can be fired with coal or biomass), etc."*
- *"The use of pull-down menus (of course widely used, which is justified in the case of single options) does not allow for a quick review of scenarios/concepts (I suggest designer and developer check out the professional energy programs – quasi-graphic solutions) and it is quite easy to make mistakes, especially for more complex scenarios."*
- *"It should be possible to independently introduce several groups of sources of the same type but differing in e.g. technical condition and lifetime. This is necessary when new sources replace some of the old, ineffective sources that will be taken out of service, leaving some sources of a given group that are characterized by better technical parameters. In any case, it should be possible to isolate from a group of input sources of one type that part of them that will be withdrawn from use as a result of the appearance of new sources."*
- *"This situation also occurs in the case of sources operating in the heating system. It is not clear, for example, how to model a variant when some of the coal-fired boilers in the heating system (whose technical lifetime has not yet ended) are replaced with new sources, and the remaining coal-fired sources remain, but are subject to modernization which involves limiting their installed power)."*
- *"Import of previously exported files does not work properly. After importing the input data, for example, the previously entered areas of individual consumer groups and, in some cases, the data of heat sources are reset to zero."*
- *"Calculations in the "Total energy consumption by sector" section and energy balances in the "Production" part should be refined, as there are inconsistencies and different results regarding total consumption and energy consumed."*

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Kontaktai:

Koordinatorius – Dace Lauka, Rygos technikos universitetas

Lietuvos energetikos institutas - Farida Dzenajavičienė, Farida.Dzenajaviciene@lei.lt
Rimantas Bakas Rimantas.Bakas@lei.lt

Tauragės rajono savivaldybė – Agnė Petrošiūte, Andrius Laucius