1. Identification

Call	Date of submission
C1	26/04/2022

1.1. Full name of the project

Independence from fossil sourced fuel via novel Biogas-Hydrogen-Biomethanation system

85 / 250 characters

1.2. Short name of the project

IndiGas

7 / 20 characters

1.3. Programme priority

3. Climate-neutral societies

1.4. Programme objective

3.3 Smart green mobility

1.6. Project duration

Contracting start	22/09/2022	**Contracting end**	31/12/2022
Implementation start	01/01/2023	**Implementation end**	31/12/2025
		Duration of implementation phase (months)	36
Closure start	01/01/2026	**Closure end**	31/03/2026

1.7. Project summary

The main challenge is the transition from fossil to renewable resources for the transport sector of the Baltic Sea region (BSR). This includes challenges that are related to more efficient hydrogen production from renewable sources, storage of hydrogen, the production of biogas from residues, and strengthening and stabilization of the transport sectors and other sectors requiring biomethane. An important step towards independence from fossil resources is to improve local bioenergy pathways in BSR. The project aims to evaluate the potential of using biomethane for the energy sector in the BSR and more specifically in transport. Project target groups are local and national public authorities, small and medium enterprises in the agriculture sector, renewable energy sector and transport sector. Business support organizations and research institutions also will be targeted in this project to enhance the biofuels importance for developing new technologies. Preparing and piloting new solutions will help to boost the development of the bioenergy and transport sector. The involvement, continuation and development of biogas plants contribute significantly to the sustainable development of rural areas in the BSR that are rich in bioresources. Research and project implementation will not only contribute to the improvement of the technological system but will also lead to future policy documents that will guide the development of the sectors and the objectives of the European Green Deal.

1,500 / 1,500 characters

1.8. Summary of the partnership

The leading partner, Riga Technical University (RTU), will develop an innovative wood ash biotrickling filter for an efficient biomethanation process. RTU researchers will also model the potential of the developed biogas-hydrogen-biomethanation system for its implementation in the Baltic Sea region in order to promote independence from fossil resources in the transport and energy sectors.
Biogas and hydrogen are required to ensure the biomethanation process. Therefore, the project partner from the University of Tartu (UT) will develop an innovative solution to improve the electrolysis process and fuel cell design.
Project partner from Vytautas Magnus University (VMU) will develop solutions for the improvement of the biogas production process, integration of hydrogen injection, and integration of the novel biomethanation system into existing biogas plant designs.
Competences of RTU, UT and VMU in respective fields of research are demonstrated by published papers, developed pilot systems and local and international projects that their researchers have participated in.
Local municipalities representatives are also involved in the project (Association of Municipalities of Tartu County, Riga, Preili and Gulbene Municipalities, The Ministry of Environmental Protection and Regional Development of Latvia). The involvement of public authorities will ensure the development and dissemination of relevant recommendations for local economies and will promote the implementation of the novel biomethanation system in the Baltic Sea region.
Biogas and agricultural companies and their associations are also involved (Ltd. ZAAO, Latvian Biogas Association, UAB Addeco, Latvian Bioenergy Association, Lithuanian Biogas Association). Agricultural farms generate most of the biomass needed for biogas production, and often these enterprises produce biogas themselves. The insight of biogas companies into the possibilities of integrating the novel system into the existing biogas plants is very important for accurate modeling of the novel biomethanation system potential.
Renewable energy producers are also supporting the development of this project (JSC Ekotiklai, Latvian Wind Energy Association, Biopower Plant Development Cluster). Off-peak renewable energy is a major source of hydrogen production. Thus, the involvement of energy producers will facilitate the development of up-to-date recommendations and evaluate the possibilities of integration of the novel biomethanation system into the existing natural gas, transport, and energy infrastructure.
With scientific institutions, public authorities, enterprises and NGOs involved as partners or associated organizations, this project has attracted representatives from all of the relevant target groups. Partners are aware that BSR is highly dependent on natural gas imports and, given the current geopolitical situation, the introduction of new solutions, where transport and energy needs are met using local biomass, is urgent.

2,994 / 3,000 characters

1.11. Project Budget Summary

Financial resources [in EUR]		Preparation costs	Planned project budget
ERDF	ERDF co-financing	0.00	824,000.00
	Own contribution ERDF	0.00	206,000.00
	ERDF budget	0.00	1,030,000.00
NO	NO co-financing	0.00	0.00
	Own contribution NO	0.00	0.00
	NO budget	0.00	0.00
NDICI	NDICI co-financing	0.00	0.00
	Own contribution NDICI	0.00	0.00
	NDICI budget	0.00	0.00
RU	RU co-financing	0.00	0.00
	Own contribution RU	0.00	0.00
	RU budget	0.00	0.00
TOTAL	**Total Programme co-financing**	0.00	824,000.00
	Total own contribution	0.00	206,000.00
	Total budget	0.00	1,030,000.00

2. Partnership

2.1. Overview: Project Partnership

2.1.1 Project Partners

No.	LP/PP	Organisation (English)	Organisation (Original)	Country	Type of partner	Legal status	Partner budget in the project	Active/inactive	
								Status	from
1	LP	Riga Technical University	Rīgas Tehnsikā Universitāte	LV	Higher education and research institution	a)	470,000.00 €	Active	22/09/2022
2	PP	Vytautas Magnus University Agriculture Academy	Vytauto Didžiojo Univeriteto Žemes Ūkio Akademija	LT	Higher education and research institution	a)	230,000.00 €	Active	22/09/2022
3	PP	University of Tartu	Tartu Ülikool	EE	Higher education and research institution	a)	230,000.00 €	Active	22/09/2022
4	PP	ZAAO - Northern Vidzeme waste management system	ZAAO - Ziemeļvidzemes atkritumu apsaimniekošanas sistēma	LV	Large enterprise	a)	20,000.00 €	Active	22/09/2022
5	PP	The Association of Municipalities of Tartu County	Tartumaa Omavalitsuste Liit	EE	Regional public authority	a)	40,000.00 €	Active	22/09/2022
6	PP	Latvian Biogas Association	Latvijas biogāzes asociācija	LV	NGO	a)	40,000.00 €	Active	22/09/2022

2.1.2 Associated Organisations

No.	Organisation (English)	Organisation (Original)	Country	Type of Partner
AO 1	Latvian Bioenergy Association	Latvijas Bioenerģijas asiociācija	LV	NGO
AO 2	Preili Municipality	Preiļu novada pašvaldība	LV	Local public authority
AO 3	Riga municipality agency	Rīgas pašvaldība	LV	Local public authority
AO 4	Latvian Wind Energy Association	Latvijas Vēja enerģijas asociācija	LV	NGO
AO 5	Gulbene Municipality	Gulbenes novada pašvaldība	LV	Local public authority
AO 6	The Ministry of Environmental Protection and Regional Development of the Republic of Latvia	Vides Aizsardzības un reģionālās attīstības ministrija	LV	National public authority
AO 7	Lithuanian Biogas Association	Lietuvos bioduju asociacija	LT	NGO
AO 8	Biopower Plant Development Cluster	Biojėgainių vystymo klasteris	LT	Business support organisation
AO 9	Ltd. Addeco	UAB Addeco	LT	Small and medium enterprise
AO 10	JSC Ekotikslai	UAB Ekotikslai	LT	Small and medium enterprise

2.2 Project Partner Details - Partner 1

LP/PP Lead Partner

Partner Status Active

Active from 22/09/2022 **Inactive from**

Partner name:

Organisation in original language Rīgas Tehnsikā Universitāte

27 / 250 characters

Organisation in English Riga Technical University

25 / 250 characters

Department in original language	Vides Aizsardzības un Siltuma Sistēmu Institūts (47 / 250 characters)
Department in English	Institute of Energy Systems and Environment (43 / 250 characters)

Partner location and website:

Address	Azenes st. 12/1 (15 / 250 characters)	**Country**	Latvia
Postal Code	LV-1048 (7 / 250 characters)	**NUTS1 code**	Latvija
Town	Riga (4 / 250 characters)	**NUTS2 code**	Latvija
Website	https://videszinatne.rtu.lv/ (28 / 100 characters)	**NUTS3 code**	Rīga

Partner ID:

Organisation ID type	Unified registration number (Vienotais reģistrācijas numurs)
Organisation ID	90000068977
VAT Number Format	LV + 11 digits
VAT Number	**N/A** ☐ LV90000068977 (13 / 50 characters)
PIC	999920718 (9 / 9 characters)

Partner type:

Legal status	a) Public	
Type of partner	Higher education and research instituti	University faculty, college, research institution, RTD facility, research cluster, etc.
Sector (NACE)	72.19 - Other research and experimental development on natural sciences and engineering	

Partner financial data:

Is your organisation entitled to recover VAT related to the EU funded project activities? No

Role of the partner organisation in this project:

The leading partner and project promoter are Riga Technical University (RTU). The project will be implemented by the RTU department Institute of Energy Systems and Environment (RTU IESE). The main development objectives of IESE are to provide a material, the technical and scientific bases for the development of Latvian science in the fields of environment and energy. The project applicant, RTU, has a long-term experience in research project management, supervision, and quality management, and is successfully implementing at least 50 nationally significant programs annually The IESE scientific staff regularly improves their knowledge and experience through various events of qualification increase. IESE has 5 modern laboratories.
Partner will ensure qualitative and timely delivery of the project's milestones and results, effective management and communication of the project's Team as well as dialogue with the Funding institution.

943 / 1,000 characters

Has this organisation ever been a partner in the project(s) implemented in the Interreg Baltic Sea Region Programme?

○ Yes ○ No

State aid relevance

For the partner type selected, the Programme sees a medium to high risk for implementing State aid relevant activities. If the partner is of the opinion that its activities are not State aid relevant, it can ask the MA/JS for a plausibility check on the State aid relevance. Does the partner want to do this?

○ Yes ○ No

2.2 Project Partner Details - Partner 2

LP/PP	Project Partner
Partner Status	Active
Active from	22/09/2022
Inactive from	

Partner name:

Organisation in original language	Vytauto Didžiojo Univeriteto Žemes Ūkio Akademija (49 / 250 characters)
Organisation in English	Vytautas Magnus University Agriculture Academy (46 / 250 characters)
Department in original language	ŽEMĖS ŪKIO INŽINERIJOS IR SAUGOS KATEDRA (40 / 250 characters)
Department in English	Department of Agricultural Engineering and Safety (49 / 250 characters)

Partner location and website:

Address	Studentų str. 15, Akademija, Kaunas district (44 / 250 characters)	**Country**	Lithuania
Postal Code	LT-52261 (8 / 250 characters)	**NUTS1 code**	Lietuva
Town	Kaunas district (15 / 250 characters)	**NUTS2 code**	Vidurio ir vakarų Lietuvos regionas
Website	https://zua.vdu.lt/ (19 / 100 characters)	**NUTS3 code**	Kauno apskritis

Partner ID:

Organisation ID type	Legal person's code (Juridinio asmens kodas)
Organisation ID	111950396
VAT Number Format	LT + 9 digits
VAT Number	N/A ☐ LT119503917 (11 / 50 characters)
PIC	n/a (3 / 9 characters)

Partner type:

Legal status	a) Public	
Type of partner	Higher education and research instituti	University faculty, college, research institution, RTD facility, research cluster, etc.
Sector (NACE)	72.19 - Other research and experimental development on natural sciences and engineering	

Partner financial data:

Is your organisation entitled to recover VAT related to the EU funded project activities? No

Role of the partner organisation in this project:

To increase the quality of the resulting biomethane, it is needed that the biogas produced has a high methane content. The team led by Kęstutis Navickas from Vytautas Magnus University; Faculty of Agricultural Engineering will be developing an innovative technology to increase the CH4 content with stable operation. Two streams – biogas and hydrogen after gas cleaning will be pumped into biomethantation reactor. Vytautas Magnus university (VMU) is holding a leading position in Lithuania regarding environmental engineering and climate change technologies. The VMU has strong cooperation with national stakeholders, including biogas production sector players. In cooperation with several companies many innovative technologies were developed and integrated in energy sector. VMU Biogas Laboratory is one of the most modern laboratory at Baltic sea region for biogas process investigation equiped accordingly to realize planned activities.

942 / 1,000 characters

Has this organisation ever been a partner in the project(s) implemented in the Interreg Baltic Sea Region Programme?

○ Yes ○ No

State aid relevance

For the partner type selected, the Programme sees a medium to high risk for implementing State aid relevant activities. If the partner is of the opinion that its activities are not State aid relevant, it can ask the MA/JS for a plausibility check on the State aid relevance. Does the partner want to do this?

○ Yes ○ No

2.2 Project Partner Details - Partner 3

LP/PP Project Partner

Partner Status Active

Active from 22/09/2022 **Inactive from**

Partner name:

Organisation in original language Tartu Ülikool

13 / 250 characters

Organisation in English University of Tartu

19 / 250 characters

Department in original language Keemia Instituut

16 / 250 characters

Department in English Institute of Chemistry

22 / 250 characters

Partner location and website:

Address Ravila 14a

11 / 250 characters

Postal Code 50411

5 / 250 characters

Town Tartu

5 / 250 characters

Website https://chem.ut.ee/et

21 / 100 characters

Country Estonia

NUTS1 code Eesti

NUTS2 code Eesti

NUTS3 code Kesk-Eesti

Partner ID:

Organisation ID type	Registration code (Registrikood)
Organisation ID	74001073
VAT Number Format	EE + 9 digits
VAT Number	N/A ☐ EE100030417 (11 / 50 characters)
PIC	999895013 (9 / 9 characters)

Partner type:

Legal status	a) Public
Type of partner	Higher education and research instituti — University faculty, college, research institution, RTD facility, research cluster, etc.
Sector (NACE)	72.19 - Other research and experimental development on natural sciences and engineering

Partner financial data:

Is your organisation entitled to recover VAT related to the EU funded project activities?	No

Role of the partner organisation in this project:

To increase the sustainability of biomethane production, a system where hydrogen is produced by the use of renewable electricity (wind, solar) will be analyzed by a team led by Enn Lust from the University of Tartu, Institute of Chemistry. University of Tartu (TU), Faculty of Science and Technology, Institute of Chemistry is focused on environmental engineering and chemical processes. TU is one of the leaders in the field of hydrogen production and storage in the Baltic States. Institute of Chemistry of TU actively participated in projects and more than 30 projects were successfully realized. TU team have more than 10 year of experience in the field of development of nanoporous materials with high specific surface area, single cells for solid oxide fuel cells, and catalysts for polymer electrolyte fuel cells. TU has more than 100 publications that approve the high competence of the team. The Institute's scientific and technical capacity is sufficient for launching new projects.

993 / 1,000 characters

Has this organisation ever been a partner in the project(s) implemented in the Interreg Baltic Sea Region Programme?

○ Yes ○ No

State aid relevance

For the partner type selected, the Programme sees a medium to high risk for implementing State aid relevant activities. If the partner is of the opinion that its activities are not State aid relevant, it can ask the MA/JS for a plausibility check on the State aid relevance. Does the partner want to do this?

○ Yes ○ No

2.2 Project Partner Details - Partner 4

LP/PP	Project Partner		
Partner Status	Active		
Active from	22/09/2022	**Inactive from**	

Partner name:

Organisation in original language	ZAAO - Ziemeļvidzemes atkritumu apsaimniekošanas sistēma (57 / 250 characters)
Organisation in English	ZAAO - Northern Vidzeme waste management system (48 / 250 characters)

Department in original language	ZAAO (4 / 250 characters)
Department in English	ZAAO (4 / 250 characters)

Partner location and website:

Address	Rigas st 32 (11 / 250 characters)	**Country**	Latvia
Postal Code	LV 4201 (7 / 250 characters)	**NUTS1 code**	Latvija
Town	Valmiera (8 / 250 characters)	**NUTS2 code**	Latvija
Website	https://www.zaao.lv/en (22 / 100 characters)	**NUTS3 code**	Vidzeme

Partner ID:

Organisation ID type	Unified registration number (Vienotais reģistrācijas numurs)
Organisation ID	44103015509
VAT Number Format	LV + 11 digits
VAT Number	**N/A** ☑ (0 / 50 characters)
PIC	n/a (3 / 9 characters)

Partner type:

Legal status	a) Public	
Type of partner	Large enterprise	≥ 250 employees
Sector (NACE)	39.00 - Remediation activities and other waste management services	

Partner financial data:

Is your organisation entitled to recover VAT related to the EU funded project activities? No

Role of the partner organisation in this project:

SIA “ZAAO” will:
- Give their opinion on the choice of technological solutions for bioenergy storage – production and storing of hydrogen and biomethane from renewable sources.
- Justify the use of bioenergy in the light of different strategies and alternatives.
- Gain new knowledge about the use of bioenergy on a municipal scale.
- Inform stakeholders with new knowledge about bioenergy in regions and municipalities.
- Participate in stakeholder activities during the time of the project

491 / 1,000 characters

Has this organisation ever been a partner in the project(s) implemented in the Interreg Baltic Sea Region Programme?

○ Yes ○ No

2.2 Project Partner Details - Partner 5

LP/PP	Project Partner
Partner Status	Active
Active from	22/09/2022
Inactive from	

Partner name:

Organisation in original language	Tartumaa Omavalitsuste Liit (27 / 250 characters)
Organisation in English	The Association of Municipalities of Tartu County (49 / 250 characters)
Department in original language	Tartumaa Omavalitsuste Liit (27 / 250 characters)
Department in English	The Association of Municipalities of Tartu County (49 / 250 characters)

Partner location and website:

Address	Pepleri 6 (9 / 250 characters)	**Country**	Estonia
Postal Code	51003 (5 / 250 characters)	**NUTS1 code**	Eesti
Town	Tartu (5 / 250 characters)	**NUTS2 code**	Eesti
Website	https://www.tartumaa.ee/en (26 / 100 characters)	**NUTS3 code**	Lõuna-Eesti

Partner ID:

Organisation ID type	Registration code (Registrikood)
Organisation ID	80190322
VAT Number Format	EE + 9 digits
VAT Number	N/A ☑ (0 / 50 characters)
PIC	n/a (3 / 9 characters)

Partner type:

Legal status	a) Public	
Type of partner	Regional public authority	Regional council, etc.
Sector (NACE)	70.21 - Public relations and communication activities	

Partner financial data:

Is your organisation entitled to recover VAT related to the EU funded project activities?	No

Role of the partner organisation in this project:

The objective of The Association of Municipalities of Tartu County is to advocate for balanced and sustainable development of the County of Tartu through joint actions of the local municipalities of Tartumaa, preservation and promotion of local cultural traditions, representing the county and their members, pursuing common interests of their members, promoting cooperation between local authorities and bodies and creating better opportunities to carry out statutory tasks for our members.
The Association of Municipalities of Tartu County will:
- Contribute as a contact point within all municipalities,
- Help to distribute the tool developed within the project to local governments;
- Give our opinion on the choice of technological solutions for bioenergy storage with a focus on accumulation in the form of biofuel energy – production and storing of hydrogen and biomethane from renewable sources.
- Justify the use of bioenergy in the light of different strategies and alternatives.
- Gain new knowledge about the use of bioenergy on a municipal scale.
- Inform stakeholders with new knowledge about bioenergy in regions and municipalities.
- assist local governments in adopting the best solutions in the context of transport and energy system planning using local biomass;
- Participate in stakeholder activities during the time of the project.
- Assist with knowledge exchange in project's pilots.

1,410 / 1,000 characters

Has this organisation ever been a partner in the project(s) implemented in the Interreg Baltic Sea Region Programme?

○ Yes ○ No

2.2 Project Partner Details - Partner 6

LP/PP Project Partner

Partner Status Active

Active from 22/09/2022 **Inactive from**

Partner name:

Organisation in original language Latvijas biogāzes asociācija

28 / 250 characters

Organisation in English Latvian Biogas Association

26 / 250 characters

Department in original language Latvijas biogāzes asociācija

28 / 250 characters

Department in English Latvian Biogas Association

26 / 250 characters

Partner location and website:

Address Mukusalas iela 46

17 / 250 characters

Postal Code LV-1004

7 / 250 characters

Town Riga

4 / 250 characters

Website www.latvijasbiogaze.lv

22 / 100 characters

Country Latvia

NUTS1 code Latvija

NUTS2 code Latvija

NUTS3 code Rīga

Partner ID:

Organisation ID type	Unified registration number (Vienotais reģistrācijas numurs)
Organisation ID	40008009027
VAT Number Format	LV + 11 digits
VAT Number	**N/A** ☐ LV40008009027 (13 / 50 characters)
PIC	n/a (3 / 9 characters)

Partner type:

Legal status	a) Public	
Type of partner	NGO	Non-governmental organisations, such as Greenpeace, WWF, etc.
Sector (NACE)	20.11 - Manufacture of industrial gases	

Partner financial data:

Is your organisation entitled to recover VAT related to the EU funded project activities?	No

Role of the partner organisation in this project:

The main objective of the LBA is to raise public awareness of the importance of biogas and renewable energy in protecting the environment and to represent the interests of members in the development and implementation of biogas and biomethane policy. The LBA is a founding member of the European Biogas Association. Participation in policy development and implementation to implement and ensure the uptake of biogas and biomethane as renewable energy in Latvia, contributing to the protection of the environment and the prevention of climate change.
Latvian Biogas Association will:
- Give their opinion on the choice of technological solutions for biogas production with a focus on biogas upgrading - biomethanation.
- Justify the use of upgraded biogas in the light of different strategies and alternatives.
- Gain new knowledge about the production of biomethane on a municipal scale.
- Assist with knowledge exchange in project's pilots.

942 / 1,000 characters

Has this organisation ever been a partner in the project(s) implemented in the Interreg Baltic Sea Region Programme?

◉ Yes ○ No

2.3 Associated Organisation Details - AO 1

Associated organisation name and type:

Organisation in original language: Latvijas Bioenerģijas asociācija
33 / 250 characters

Organisation in English: Latvian Bioenergy Association
29 / 250 characters

Department in original language: Latvijas Bioenerģijas asociācija
33 / 250 characters

Department in English: Latvian Bioenergy Association
29 / 250 characters

Legal status: a) Public

Type of associated organisation: NGO — Non-governmental organisations, such as Greenpeace, WWF, etc.

Associated organisation location and website:

Address: Meža iela 4B
13 / 250 characters

Country: Latvia

Postal Code: LV-5134
7 / 250 characters

Town: Jaunjelgava
11 / 250 characters

Website: -
1 / 100 characters

Role of the associated organisation in this project:

Latvian Bioenergy Association will:
- Give their opinion on the choice of technological solutions for bioenergy storage with a focus on the accumulation in the form of biofuel energy – production and storing of hydrogen and biomethane from renewable sources.
- Justify the use of bioenergy in the light of different strategies and alternatives.
- Gain new knowledge about the use of bioenergy on a municipal scale.

415 / 1,000 characters

2.3 Associated Organisation Details - AO 2

Associated organisation name and type:

Organisation in original language: Preiļu novada pašvaldība (24 / 250 characters)

Organisation in English: Preili Municipality (19 / 250 characters)

Department in original language: Preiļu novada dome (18 / 250 characters)

Department in English: Preili Municipality Council (27 / 250 characters)

Legal status: a) Public

Type of associated organisation: Local public authority — Municipality, city, etc.

Associated organisation location and website:

Address: Raiņa bulvāris 19 (17 / 250 characters)

Country: Latvia

Postal Code: LV-5301 (7 / 250 characters)

Town: Preiļi (6 / 250 characters)

Website: https://preili.lv/ (18 / 100 characters)

Role of the associated organisation in this project:

Preili Municipality Council will:
- contribute as a contact point within all municipalities,
- help to distribute the tool developed within the project to local governments;
- assist local governments in adopting the best solutions in the context of transport and energy system planning using local biomass;
- participate in stakeholder activities during the time of the project.

381 / 1,000 characters

2.3 Associated Organisation Details - AO 3

Associated organisation name and type:

Organisation in original language: Rīgas pašvaldība (16 / 250 characters)

Organisation in English: Riga municipality agency (24 / 250 characters)

Department in original language: Rīgas Enerģētikas Aģentūra (26 / 250 characters)

Department in English: Riga Energy Agency (18 / 250 characters)

Legal status: a) Public

Type of associated organisation: Local public authority — Municipality, city, etc.

Associated organisation location and website:

Address: Mazā Jauniela 5 (15 / 250 characters)

Country: Latvia

Postal Code: LV1050 (6 / 250 characters)

Town: Riga (4 / 250 characters)

Website: https://rea.riga.lv (19 / 100 characters)

Role of the associated organisation in this project:

Riga Energy Agency will:
- contribute as a contact point within all municipalities,
- help to distribute the tool developed within the project to local governments;
- assist local governments in adopting the best solutions in the context of transport and energy system planning using local biomass;
- participate in stakeholder activities during the time of the project.

372 / 1,000 characters

2.3 Associated Organisation Details - AO 4

Associated organisation name and type:

Organisation in original language: Latvijas Vēja enerģijas asociācija (34 / 250 characters)

Organisation in English: Latvian Wind Energy Association (31 / 250 characters)

Department in original language: Latvijas Vēja enerģijas asociācija (34 / 250 characters)

Department in English: Latvian Wind Energy Association (31 / 250 characters)

Legal status: a) Public

Type of associated organisation: NGO — Non-governmental organisations, such as Greenpeace, WWF, etc.

Associated organisation location and website:

Address: Kaļķu iela 7 (12 / 250 characters)

Country: Latvia

Postal Code: LV1010 (6 / 250 characters)

Town: Riga (4 / 250 characters)

Website: https://wea.lv/ (15 / 100 characters)

Role of the associated organisation in this project:

Wind Energy Association will:
- Give their opinion on the choice of technological solutions for wind energy usage for hydrogen production.
- Inform stakeholders with new knowledge about wind energy in regions and municipalities.
- Participate in stakeholder activities during the time of the project.
- Assist with knowledge exchange in project's pilots.
- Help to disseminate the project results to our members and target groups.

431 / 1,000 characters

2.3 Associated Organisation Details - AO 5

Associated organisation name and type:

Organisation in original language: Gulbenes novada pašvaldība
26 / 250 characters

Organisation in English: Gulbene Municipality
20 / 250 characters

Department in original language: Gulbenes novada pašvaldība
26 / 250 characters

Department in English: Gulbene Municipality
20 / 250 characters

Legal status: a) Public

Type of associated organisation: Local public authority — Municipality, city, etc.

Associated organisation location and website:

Address: Ābeļu iela 2
12 / 250 characters

Country: Latvia

Postal Code: LV4401
6 / 250 characters

Town: Gulbene
7 / 250 characters

Website: www.gulbene.lv
14 / 100 characters

Role of the associated organisation in this project:

Gulbene Municipality will:
- contribute as a contact point within all municipalities,
- help to distribute the tool developed within the project to local governments;
- assist local governments in adopting the best solutions in the context of transport and energy system planning using local biomass;
- participate in stakeholder activities during the time of the project.

374 / 1,000 characters

2.3 Associated Organisation Details - AO 6

Associated organisation name and type:

Organisation in original language
Vides Aizsardzības un reģionālās attīstības ministrija
54 / 250 characters

Organisation in English
The Ministry of Environmental Protection and Regional Development of the Republic of Latvia
91 / 250 characters

Department in original language
Vides Aizsardzības un reģionālās attīstības ministrija
54 / 250 characters

Department in English
The Ministry of Environmental Protection and Regional Development of the Republic of Latvia
91 / 250 characters

Legal status
a) Public

Type of associated organisation
National public authority
Ministry, etc.

Associated organisation location and website:

Address
Peldu street 25
15 / 250 characters

Country
Latvia

Postal Code
LV-1494
7 / 250 characters

Town
Riga
4 / 250 characters

Website
www.varam.gov.lv
16 / 100 characters

Role of the associated organisation in this project:

In case the project proposal is approved, the Ministry would further collaborate where possible, for example, in disseminating the project's results and upon availability participating in events of interest to the Ministry.
The Ministry demonstrates its willingness to cooperate with project partners of the project.
317 / 1,000 characters

2.3 Associated Organisation Details - AO 7

Associated organisation name and type:

Organisation in original language: Lietuvos bioduju asociacija (27 / 250 characters)

Organisation in English: Lithuanian Biogas Association (29 / 250 characters)

Department in original language: Lietuvos bioduju asociacija (27 / 250 characters)

Department in English: Lithuanian Biogas Association (29 / 250 characters)

Legal status: b) Private

Type of associated organisation: NGO — Non-governmental organisations, such as Greenpeace, WWF, etc.

Associated organisation location and website:

Address: Senasis Ukmerges road 4, Užubaliu k. (36 / 250 characters)

Country: Lithuania

Postal Code: 14013 (5 / 250 characters)

Town: Vilnius (7 / 250 characters)

Website: www.lbda.lt/ (12 / 100 characters)

Role of the associated organisation in this project:

- Give opinion on the choice of technological solutions for bioenergy storage – production and storing of hydrogen and biomethane from renewable sources.
- Justify the use of bioenergy in the light of different strategies and alternatives.
- Gain new knowledge about the use of bioenergy on a municipal and national scale.
- Inform stakeholders with new knowledge about bioenergy in regions and municipalities.
- Participate in stakeholder activities during the time of the project.
- Assist with knowledge exchange in project's pilots.

536 / 1,000 characters

2.3 Associated Organisation Details - AO 8

Associated organisation name and type:

Organisation in original language: Biojėgainių vystymo klasteris
29 / 250 characters

Organisation in English: Biopower Plant Development Cluster
34 / 250 characters

Department in original language: Biojėgainių vystymo klasteris
29 / 250 characters

Department in English: Biopower Plant Development Cluster
34 / 250 characters

Legal status: b) Private

Type of associated organisation: Business support organisation

Chamber of commerce, chamber of trade and crafts, business incubator or innovation centre, business clusters, etc.

Associated organisation location and website:

Address: Radvilu g. 11
13 / 250 characters

Country: Lithuania

Postal Code: LT-57254
8 / 250 characters

Town: Kedainiai
9 / 250 characters

Website: www.klaster.lt/klateris/biojegainiu-vystymo-klasteris/
54 / 100 characters

Role of the associated organisation in this project:

- Give opinion on the choice of technological solutions for bioenergy storage with a focus on accumulation in the form of biofuel energy – production and storing of hydrogen and biomethane from renewable sources.
- Justify the use of bioenergy in the light of different strategies and alternatives.
- Gain new knowledge about the use of bioenergy on a municipal scale.
- Inform stakeholders with new knowledge about bioenergy in regions and municipalities.
- Participate in stakeholder activities during the time of the project.
- Assist with knowledge exchange in project's pilots.

582 / 1,000 characters

2.3 Associated Organisation Details - AO 9

Associated organisation name and type:

Organisation in original language
UAB Addeco
10 / 250 characters

Organisation in English
Ltd. Addeco
11 / 250 characters

Department in original language
UAB Addeco
10 / 250 characters

Department in English
Ltd. Addeco
11 / 250 characters

Legal status
b) Private

Type of associated organisation
Small and medium enterprise

Micro, small, medium enterprises < 250 employees, ≤ EUR 50 million turnover or ≤ EUR 43 million balance sheet total

Associated organisation location and website:

Address
Kranto str. 36, Pašiliai k., Kėdainiai r.
41 / 250 characters

Country
Lithuania

Postal Code
LT-58157
8 / 250 characters

Town
Kėdainiai
9 / 250 characters

Website
www.addeco.lt/
14 / 100 characters

Role of the associated organisation in this project:

- Give opinion on the choice of technological solutions for bioenergy storage – production and storing of hydrogen and biomethane from renewable sources.
- Justify the use of bioenergy in the light of different strategies and alternatives.
- Gain new knowledge about the use of bioenergy on a municipal scale.
- Inform stakeholders with new knowledge about bioenergy in regions and municipalities.
- Participate in stakeholder activities during the time of the project.
- Assist with knowledge exchange in project's pilots.

523 / 1,000 characters

2.3 Associated Organisation Details - AO 10

Associated organisation name and type:

Organisation in original language
UAB Ekotikslai
14 / 250 characters

Organisation in English
JSC Ekotikslai
14 / 250 characters

Department in original language
UAB Ekotikslai
14 / 250 characters

Department in English
JSC Ekotikslai
14 / 250 characters

Legal status
b) Private

Type of associated organisation
Small and medium enterprise

Micro, small, medium enterprises < 250 employees, ≤ EUR 50 million turnover or ≤ EUR 43 million balance sheet total

Associated organisation location and website:

Address
Pramones ave. 21
16 / 250 characters

Country
Lithuania

Postal Code
LT-51328
8 / 250 characters

Town
Kaunas
6 / 250 characters

Website
www.rekvizitai.vz.lt/imone/ekotikslai/
38 / 100 characters

Role of the associated organisation in this project:

- Give opinion on the choice of technological solutions for bioenergy storage – production and storing of hydrogen and biomethane from renewable sources.
- Justify the use of bioenergy in the light of different strategies and alternatives.
- Gain new knowledge about the use of bioenergy on a municipal scale.
- Inform stakeholders with new knowledge about bioenergy in regions and municipalities.
- Participate in stakeholder activities during the time of the project.
- Assist with knowledge exchange in project's pilots.

523 / 1,000 characters

3. Relevance

3.1 Context and challenge

The main challenge is the transition from fossil to renewable resources for the transport sector of the Baltic Sea Region (BSR). This includes challenges that are related to more efficient hydrogen production from renewable sources, storage of hydrogen, the production of biogas from residues, and strengthening and stabilization of the transport sectors and other sectors requiring biomethane. It is necessary to make a transition from fossil resources such as natural gas to renewable resources, given Europe`s difficult situation in the energy sector. An important step towards independence from fossil resources is to improve local bioenergy pathways in BSR. Biogas is a renewable fuel that can be produced from a wide range of organic wastes. Raw biogas contains about 50-70% methane and 30-50% carbon dioxide. Due to its high CO2 content, biogas can usually only be used in cogeneration. Enhanced biogas with up to 95% methane content can be directly connected to the natural gas grid or transported efficiently after compression, used in large-scale storage, and used as a transport fuel in the transport sector. The most significant environmental advantage of biogas upgrading - biomethanation and its use as a transport fuel - is that the transport sector produces fewer greenhouse gas (GHG) emissions, so using biomethane as a vehicle fuel saves around 500 kg CO2eq. per MWh equivalent compared to petrol or diesel. The project plan is based on the conversion of existing biogas plants to produce biomethane, the transport of the biomethane produced to gas networks or refueling facilities, as well as the provision of some form of guaranteed consumption in the BSR. Renewable sourced hydrogen and biogas technologies also open up new opportunities for strengthening regions' energy and therefore transport sector independence. It is important to promote the transition toward an efficient circular economy creating green jobs and local secure affordable and sustainable energy for BSR.

1,996 / 2,000 characters

3.2 Transnational value of the project

While the European power sector is in good progress towards a fossil-free future, large challenges still remain in other sectors like transportation. In Latvia, transport is one of the largest sources of non-ETS greenhouse gas (GHG) emissions. In EU, the target set in Directive 2009/28/EC for the share of RES in the transport sector is 10% in 2020 and 14% in 2030. The transport sector accounts for around 30% of the total EU energy sector emissions. the revised Renewable Energy Directive 2018/2001/EC of the EP and the Council entered into force. The directive emphasizes that biofuels are the most important alternative fuel with the potential to significantly reduce CO2 emissions and that locally produced biomethane must be used to complement the existing natural gas distribution network.
The partners will collaborate in research with the goal to expand technology use regarding biomethane production and its use for end-user. The aim of the partnership is to transfer knowledge between scientists in a field related to the improvement of technological processes and the end-user. This project will significantly contribute to improving the capacity and skills of the project partners due to the involvement of scientific staff at various levels of education for the implementation of the project and planned international exchange.
Project results will leave a positive impact on the knowledge base in the fields of energy and transport sector. It will also strengthen relations between partners and target groups and promote the development of the transport sector in the BSR. The project will contribute to the capacity of each of the involved partners in the topics related to European Green Deal capability in valorization of technologies on national levels to reach the goals set within related national plans. The topics of utilizing variable renewable energy, future with hydrogen and independent local energy systems will all be further developed by involved project partners.

1,996 / 2,000 characters

3.3 Target groups

Target group	Sector and geographical coverage	Its role and needs
National public authority	Baltic Sea region. Latvia, Estonia, Lithuania The Ministry of Environmental Protection and Regional Development of the Republic of Latvia 139 / 500 characters	The countries have been chosen because most are highly dependent on natural gas imports and, given the current geopolitical situation, the introduction of new solutions, where transport and energy needs are met using local biomass, is urgent. - contribute as a contact point within municipalities, - help to distribute the results of technology developed within the project to local governments; - assist local governments in adopting new solutions in the context of transport and energy system planning using local biomass; - participate in stakeholder activities during the time of the project. 598 / 1,000 characters

Target group	Sector and geographical coverage	Its role and needs
Local public authority	Latvia: Riga, Salaspils, Preiļi, Gulbene 40 / 500 characters	Local public authorities need independence from fossil fuels on the municipal level. Different municipalities can: - contribute as a contact point within all municipalities, - help to distribute the tool developed within the project to local governments; - assist local governments in adopting the best solutions in the context of transport and energy system planning using local biomass; - participate in stakeholder activities during the time of the project. 462 / 1,000 characters
NGO	Latvia, Estonia, Lithuania. Agriculture sector, Biogas Energy Association, Solar Energy Association, Wind Energy Association, Latvian Bioenergy Association, 157 / 500 characters	Non-governmental organizations are important intermediary organizations between public authorities and business organizations. they can organize meetings between interested organizations and provide information of new technologies in their field. they can: Give an opinion on the choice of technological solutions for bioenergy storage with a focus on the accumulation in the form of biofuel energy – production and storing of hydrogen and biomethane from renewable sources -Justify the use of bioenergy in the light of different strategies and alternatives -Gain new knowledge about the use of bioenergy on a municipal scale. -Inform stakeholders with new knowledge about bioenergy in regions and municipalities -Participate in stakeholder activities during the time of the project. -Assist with knowledge exchange in project pilots -Inform stakeholders with new knowledge about renewable energy in regions and municipalities -Help to disseminate the project results to our members and target groups 1,000 / 1,000 characters
Business support organisation	Baltic States LIAA Biopower Plant Development Cluster 53 / 500 characters	Business support organizations need investors and new ideas for local companies to improve the energy and transport sectors. New ideas can be offered in stakeholder meetings by business support organizations. They can: - Participate in stakeholder activities during the time of the project. - Assist with knowledge exchange in project pilots. - Help to disseminate the project results to our members and target groups. 418 / 1,000 characters

Target group	Sector and geographical coverage	Its role and needs
Small and medium enterprise	Biogas plants, Renewable energy (wind, solar, hydrogen) systems companies, transport companies, biofuel storage and transportation companies 141 / 500 characters	Small and medium enterprises, such as biogas plants in the agriculture sector, companies in the renewable energy sector and the transports sector need new technologies for their development. They can: - Participate in stakeholder activities during the time of the project. - Assist with knowledge exchange in project pilots. - Help to disseminate the project results to our members and target groups. - Give our opinion on the choice of technological solutions for biogas production with a focus on biogas upgrading - biomethanation. - Justify the use of upgraded biogas in the light of different strategies and alternatives. - Gain new knowledge about the production of biomethane on a municipal scale. 704 / 1,000 characters

3.4 Project objective

Your project objective should contribute to:

Smart green mobility

Research and project implementation will not only contribute to the improvement of the technological system but will also result in the development of future policy documents that will guide the development of the sectors and the goals of the Green Deal. Tasks to reach the goal of the project: to develop a higher efficiency H2 cell; to increase the methane content in biogas; to improve biomethane production; to assess the potential of biomethane in the BSR and assess the impact of improvements made by other tasks.
• Participation in scientific conferences which result in high-level publications in Open Access publications in the fields of biogas, transport, hydrogen, and energy systems
• Reporting of projects activities with the use of projects and partners' web pages and related social media during all stages of the project and provide a portfolio that will be available after the end of the project to provide sustainability of the results
• Organize round table discussions with important associations, external experts, and other stakeholders (ministries, industry) to obtain recommendations during the progress of the project
• Organize informative seminars, lectures, and roleplay to provide sustainability of projects results to the public outside academic
The project will have a great impact on the involved institution (academic, governmental, and non-governmental) capacity and experience in the topic of hydrogen implementation in national energy networks, by combining existing systems which face upcoming exclusion or out-competing (natural gas systems and infrastructure, biogas plants, internal combustion vehicles) with incoming new renewables (solar, wind) which need utilization during over-availability periods as an alternative to expensive battery storage systems.

1,800 / 2,000 characters

3.5 Project's contribution to the EU Strategy for the Baltic Sea Region

Please indicate whether your project contributes to the implementation of the Action Plan of the EU Strategy for the Baltic Sea Region (EUSBSR).

(•) Yes ( ) No

Please select which Policy Area of the EUSBSR your project contributes to most.

PA Transport

Please list the action of this Policy Area that your project contributes to and explain how.

The project contributes to Action 2 "Development of measures towards climate-neutral and zero pollution transport", as it will ensure the development of sustainable supply chain strategies as a multi-fuel approach in the BSR by providing solutions for more efficient hydrogen production from renewable sources, hydrogen storage, the production of biogas from residues and strengthening and stabilization of the transport sectors and other sectors requiring the biomethane. The suggested project helps to introduce higher usage of renewable energy in BSR by providing a transition from fossil fuels to renewable energy and addresses existing issues related to the use and storage of hydrogen and the shortcomings of the methanation process at the same time.
The project will also contribute to the objective set out in Action 3 "Facilitate innovative technologies & solutions in the Baltic Sea region" to invest in research and to create a novel biogas-hydrogen-biomethanation (BHB) system capable of covering all modes of transport. This will be achieved through a combination of innovations in hydrogen generation, biogas and biomethanation system improvement to develop a BHB pilot system, that would demonstrate the technologies viability and enabling stakeholders to disseminate and evaluate introduction of such systems at existing and new biogas plants. Generated biomethane would enable a secure and sustainable alternative to natural gas and facilitate BSR independence from fossil resources.

1,500 / 1,500 characters

If applicable, please describe which other Policy Areas of the EUSBSR your project contributes to and how.

The proposed project also contributes to policy area Energy, "Action 2: Further regional gas and electricity market integration including climate-proof infrastructure development" as this project could be identified as necessary for renewable energy development in the BSR because the technology is based on the efficient use of local resources, such as off-peak renewable energy for hydrogen generation and biogas production from local biomass. The technology combines off-peak energy and local biogas into one product, biomethane, which promotes regional energy and gas infrastructure integration, BSR energy independence and resilience to climate change.
Another Policy Area which contributes to project "IndiGas" is Innovation, "Action 1: Challenge-driven innovation". As described previously, the main aim of the proposed project is to find solutions for such environmental and economic grand challenges in the Baltic Sea region as the transition from fossil fuels to renewables in the transport sector as well as the promotion of improvement of energy security in the region.
Action 4 of Policy Area "Energy" determines that sharing best practices on renewable energy communities is needed. IndiGas project will significantly contribute to improving the capacity and skills of the project partners due to the involvement of scientifists, local authorities, NGOs and enterprises for the implementation of the project and planned international exchange.

1,458 / 1,500 characters

3.6 Other political and strategic background of the project

Strategic documents

The European Green Deal set out a strategy to transform the EU into a fair and prosperous society with a modern, resource-efficient and competitive economy. As part of the European Green Deal, the package "Fit for 55" envisages reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. "IndiGas" project's aim is to speed up the transition from fossil to renewable resources in the transport sector by so cutting emissions in the designated sector.

480 / 500 characters

By promoting greener hydrogen production by developing and improving existing biomethane production technologies and promoting their use in the transport sector the "IndiGas" project contributes to a target of 14 % share of renewables and a target of 3.5% for the consumption of advanced biofuels and biogas in the final consumption of energy in the transport sector by 2030 which were set by the revised Renewable Energy Directive 2018/2001/EC.

445 / 500 characters

The EU Strategy for Energy System Integration COM(2020) 299 states that there is a need to ensure the usage of renewable and low-carbon fuels, including hydrogen to store the energy produced from variable renewable sources, exploiting synergies between the electricity sector, gas sector and end-use. These goals will be promoted by the "IndiGas" project by developing the use of biomethane and green hydrogen for renewable energy storage and the transport sector.

464 / 500 characters

3.7 Seed money support

Please indicate whether your project is based on a seed money project implemented in the Interreg Baltic Sea Region Programme 2014-2020.

( ) Yes (•) No

3.8 Other projects: use of results and planned cooperation

Full name of the project	Funding Source	Use of the project outcomes and/or planned cooperation
Efficient production of fuels from biomass 42 / 200 characters	Estonian Science Foundation 27 / 200 characters	In this project, a technological solution for the production of hydrogen from biomass was developed. The development of this project is directly compatible with the goals set by the IndiGas project, as the generated hydrogen is intended to be used for biogas improvement using an innovative biomethane system. 309 / 1,000 characters
Development of materials and single cells for solid oxide and polymer electrolyte fuel cells, high-temperature electrolyzers and supercapacitors 144 / 200 characters	Archimedes Foundation 21 / 200 characters	This R&D project improved the efficiency of the hydrogen fuel cell and provided innovation in the development of advanced fuel cell materials. The contribution of this project is directly linked to the objectives of the IndiGas project, as the planned pilot system will also use state-of-the-art fuel cell systems for more efficient use of hydrogen. 349 / 1,000 characters
Rainbow colors of biobutanol (Brainbow) 39 / 200 characters	Fundamental and Applied Research Project of the Latvian Council of Science 74 / 200 characters	Using MCA, LCA, SCA, etc. analyses and modeling tools, the best set of technological solutions is found to enable efficient production of competitive biofuel from locally available biomass. The developed base of this Brainbow project. can also be used directly in the IndiGas project, as it is necessary to use dynamic modeling and to integrate biomethane into the existing transport infrastructure 398 / 1,000 characters
SYNGAS, Innovative biomass gasification technologies 52 / 200 characters	EEA and Norway Grants 21 / 200 characters	SYNGAS project provided an opportunity to improve the technological solutions for biomass processing, in this case obtaining syngas from local biomass, which is a hydrogen-rich gas mixture that is also directly applicable to the biogas upgrading and the biomethanization process. 279 / 1,000 characters
Microbiological anaerobic fallowing of seaweeds and study of released gases 75 / 200 characters	Lithuanian national funding for Applied Research (TMT) 55 / 200 characters	The aim of the project is to carry out anaerobic digestion of seagrass in the bioreactor to produce biogas from waste materials. The knowledge gained in this project can be directly applied to the search for the most efficient solutions in the IndiGas project to ensure the optimal operation of the pilot system and the suitability of the generated biogas for the biomethanation process. 387 / 1,000 characters

3.10 Horizontal principles

Horizontal principles	Projects's direct impact
Sustainable development	positive
Non-discrimination including accessibility	positive
Equality between men and women	neutral

4. Management

Allocated budget 10%

4.1 Project management

☑ **Please confirm that the lead partner and all project partners will comply with the rules for the project management as described in the Programme Manual.**

If relevant, please indicate any other important aspects of the project management, e.g. external entity supporting the lead partner in the management of the project, advisory board, steering committee, any other relevant working groups, etc.

0 / 500 characters

4.2 Project financial management

☑ **Please confirm that the lead partner and all project partners will comply with the rules for the financial management and control as described in the Programme Manual.**

If relevant, please indicate any other important aspects of the financial management, e.g. external entity supporting the lead partner, positions planned for financial management, involvement of special financial experts (e.g. for public procurement), etc.

0 / 500 characters

4.3 Input to Programme communication

☑ **Please confirm that you are aware of the obligatory inputs to Programme communication that must be submitted along the pre-defined progress reports, as described in the Programme Manual.**

If relevant, please describe other important aspects of project communication that you plan to introduce, e.g. a communication plan, opening and closing events, social media channel(s) etc.

0 / 500 characters

4.4 Cooperation criteria

Please select the cooperation criteria that apply to your project. In your project you need to apply at least three cooperation criteria. Joint development and joint implementation are the obligatory ones you need to fulfill in your project.

Cooperation criteria	
Joint Development	☑
Joint Implementation	☑
Joint Staffing	☐
Joint Financing	☑

5. Work Plan

Number	Work Package Name
1	WP1 Preparing solutions

Number	Group of Activity Name
1.1	Hydrogen production and storage
1.2	Biogas production
1.3	Biomethanation system development

Number	Work Package Name
2	WP2 Piloting and evaluating solutions

Number	Group of Activity Name
2.1	Developing biotrickling filter reactor pilot system for biogas upgrading
2.2	Validation of biomethanation systems pilot

Number	Work Package Name
3	WP3 Transferring solutions

Number	Group of Activity Name
3.1	Biomethane potential in Baltic Sea Region evaluation
3.2	Dissemination, communication and exploitation
3.3	Project results analyses

Work plan overview

Period:	1	2	3	4	5	6	Leader
WP.1: WP1 Preparing solutions							**PP1**
A.1.1: Hydrogen production and storage							PP3
D.1.1: Develop a higher efficiency H2 cell			D				
A.1.2: Biogas production							PP2
D.1.2: Increased methane concentration in biogas production process			D				
A.1.3: Biomethanation system development							PP1
D.1.3: Upgraded biogas with methane concentration above 90%			D				
WP.2: WP2 Piloting and evaluating solutions							**PP1**
A.2.1: Developing biotrickling filter reactor pilot system for biogas upgrading							PP1
D.2.1: Pilot of biomethane production system				D	D		
A.2.2: Validation of biomethanation systems pilot							PP1
O.2.2: State-of-the-art biomethane production system					O		
WP.3: WP3 Transferring solutions							**PP6**
A.3.1: Biomethane potential in Baltic Sea Region evaluation							PP1
O.3.1: Model of biomethane potential in Baltic Sea Region					O	O	
A.3.2: Dissemination, communication and exploitation							PP5
A.3.3: Project results analyses							PP1
O.3.3: Recommendations for policy makers and stakeholders						O	

Outputs and deliverables overview

Code	Title	Description	Contribution to the output	Output/ deliverable contains an investment

D 1.1	Develop a higher efficiency H2 cell	During biomethanation microorganisms use the CO2 present in the biogas and externally supplied hydrogen to generate methane, thus significantly increasing the total methane concentration in the biogas. Hydrogen can be produced via electrolysis using electricity from off-peak electricity surplus from such intermittent renewable energies as solar and wind power. In this way, the biomethane can be fed into the natural gas network, efficiently transported after compression, used in large-scale storage, and used as a fuel in transport. The use of a trickling biofilter in the biomethanation process is state-of-the-art technology, as evidenced by the fact that the oldest publications on this topic were published in 2016, with the majority of papers being published in 2020. For hydrogen storage, the novel micro-meso-macro-porous carbons and thin-film NaAlH4 deposited onto different hierarchical micro-meso-macro-porous carbon supports will be synthesized under various conditions (deposition temperature, deposition rate, thickness, and porosity of thin-film, the gas composition of the deposition environment, pore former concentration and particle size distribution, etc.). cutting-edge operando analysis methods combined with electrochemical testing methods will be applied. Novel hierarchically porous carbons and thin-film complex metal hydrides will be synthesized, characterized, and tested under operando conditions, etc. The influence of sulfur, silanes, CO, and other contaminants in biogas on the stability of complex hydrides as well as carbon adsorption activity will be analyzed.	State-of-the-art biomethane production technology	
D 1.2	Increased methane concentration in biogas production process	The development of innovative technology for increasing the methane concentration in biogas would allow controlling the process parameters and composition of the raw materials supplied to the bioreactors by biotechnological methods. The aim of this work will be to extract a higher concentration of methane in biogas, which would increase by 2-5% compared to conventional technologies (55%) while maintaining a stable operation of the bioreactor. The problem could be solved by controlling and optimally supplying feedstocks with optimal composition to the biogas reactor while controlling the carbon/nitrogen C/N ratio, controlling the acidity of the substrate, using other biotechnological methods (such as additional hydrogen injection into the biogas reactor substrate and selective feedstock treatment). Research activities are planned to develop original technology, which will be able to: - control the composition of raw materials according to a pre-modeled algorithm; - to produce biogas with higher methane concentration; - additional hydrogen injection into biosubstrates; - selectively treated raw materials.	State-of-the-art biomethane production technology	
D 1.3	Upgraded biogas with methane concentration above 90%	Deliverable is the development of an efficient trickling biofilter biomethanation process using innovative ash filters, which would enable the production of upgraded biogas with methane concentration above 90%. Originality and novelty are based on a new approach to increasing the efficiency of the biomethanation process is the cultivation of methanogenic microorganisms using a trickling biofilter, which serves as an attachment surface for microorganism colonies, thus significantly increasing the speed of the process and the purity of the obtained biomethane. Various types of polymer filters from fossil resources such as clear polyvinyl chloride (PVC), polyurethane foam (PUF), etc. are currently used as trickling biofilters. The leading partner and project promoter offer vulcanized ash filters, which use end-of-the-line waste ash, as the main raw material for the production of filters as a completely innovative and previously unexplored alternative to fossil sourced trickling biofilters. The ash filter is a porous material similar to expanded clay and the project applicant has patented the technology for making these filters with three patents. The use of these filters provides an opportunity to replace fossil sourced polymer filters and to find applications for thus far underutilized waste product - wood ash. In general, biomethanation is a promising method for upgrading biogas that finds application in off-peak surplus electricity from solar and wind power generation. The use of a trickling biofilter in the biomethanation process is state-of-the-art technology, with the majority of papers being published in 2020. Finally, the already innovative biometanation process by using trickling biofilters is complemented by previously unexplored environmentally friendly filter material from wood ash, which reduces the need for fossil polymers and finds application for underutilized end-of-the-line waste products.	State-of-the-art biomethane production technology	

D 2.1	Pilot of biomethane production system	In general, biomethanation is a promising method for upgrading biogas that finds application in off-peak surplus electricity from solar and wind power generation. The use of a trickling biofilter in the biomethanation process is state-of-the-art technology, with a majority of papers being published in 2020. Finally, the already innovative biomethanation process by using trickling biofilters is complemented by previously unexplored environmentally friendly filter material from wood ash, which reduces the need for fossil polymers and finds application for underutilized end-of-the-line waste products. Expanding the use of technology involves new knowledge and innovation at different levels of the system. Expanding the application includes issues related to the transition from fossil to renewable resources, producing more efficiently hydrogen from renewable sources, the use of materials from waste, biogas production from residues, as well as strengthening and stabilizing the industry in general, which requires the system's end product - methane. Two streams – biogas and hydrogen produced by the use of renewable electricity will be pumped into a biotrickling reactor packed with a newly developed wood ash filter. Partners from Latvia, Estonia, and Lithuania will actively contribute to the preparation of the piloting biomethanation system and will take part in testing the new biomethanation system. The pilot project is an initial small-scale implementation that is used to prove the viability of a project idea. This will involve the exploration of a novel new approach to biomethane production. Biogas producers will be able to see the pilot as a possible technology in their own imagination. Renewable energy producers will be offered the opportunity to familiarize themselves with the parameters of the installed technology in order to assess how they could adapt it to their own production processes.	State-of-the-art biomethane production system	
O 2.2	State-of-the-art biomethane production system	Assessments of the cost-effectiveness of bio-methane production valorization. Biomethanation is a promising method for upgrading biogas that finds application in off-peak surplus electricity from solar and wind power generation. The use of a trickling biofilter in the biomethanation process is state-of-the-art technology, with the majority of papers being published in 2020. Finally, the already innovative biomethanation process by using trickling biofilters is complemented by previously unexplored environmentally friendly filter material from wood ash, which reduces the need for fossil polymers and finds application for underutilized end-of-the-line waste products. Expanding the use of technology involves new knowledge and innovation at different levels of the system. Expanding the application includes issues related to the transition from fossil to renewable resources, producing more efficiently hydrogen from renewable sources, the use of materials from waste, biogas production from residues, as well as strengthening and stabilizing the industry in general, which requires the system's end product - methane. Through the experiences gained in the pilot action, target groups will learn how the biomethane production system can be implemented in biogas production plants, that is how it is used in real-life settings with different configurations as well as different levels of technological capacity and innovation potential. Project partners will monitor the process of pilot implementation (and make it easier to be followed by other partners later on in the dissemination stage) aiming to improve the usability of the tool, especially in terms of it achieving the project's specific objectives, its user-friendliness, and technological capabilities.		

Work package 1

5.1 WP1 Preparing solutions

5.2 Aim of the work package

The aim of this work package is to prepare solutions to help address the identified challenge. You can either develop entirely new solutions or adapt existing solutions to the needs of your target groups. Prepare your solutions in a way that you can pilot them in Work Package 2. Consider how you involve your target groups in preparation of the solutions.
Organise your activities in up to five groups of activities to present the actions you plan to implement. Describe the deliverables and outputs as well as present the timeline.

5.3 Work package leader

Work package leader 1 PP 1 - Riga Technical University

Work package leader 2 PP 3 - University of Tartu

5.4 Work package budget

Work package budget 30%

5.5 Target groups

	Target group	How do you plan to reach out to and engage the target group?
1	National public authority Baltic Sea region. Latvia, Estonia, Lithuania The Ministry of Environmental Protection and Regional Development of the Republic of Latvia 139 / 500 characters	National public authorities in the Baltic States will be asked to participate in stakeholder activities during the time of the project. The information about bioenergy in regions and municipalities and its potential will be discussed together with public authorities, NGOs, enterprises, and business support organizations. 323 / 1,000 characters
2	Local public authority Latvia: Riga, Salaspils, Preiļi, Gulbene 40 / 500 characters	Local public authorities will be asked to participate in stakeholder activities during the time of the project. They will gain new knowledge about the production of biomethane on a municipal scale. The information about bioenergy in regions and municipalities and its potential will be discussed together with public authorities, NGOs, enterprises, and business support organizations. 385 / 1,000 characters
3	NGO Latvia, Estonia, Lithuania. Agriculture sector, Biogas Energy Association, Solar Energy Association, Wind Energy Association, Latvian Bioenergy Association, 157 / 500 characters	Biogas Energy Association, Bioenergy Association, Solar Energy Association, and Wind Energy Association will be asked for an opinion on the choice of technological solutions for wind energy usage for hydrogen, biogas, and biomethane production. Will be asked to participate in stakeholder activities during the time of the project. They could inform stakeholders with new knowledge about renewable energy in regions and municipalities. The information about bioenergy in regions and municipalities and its potential will be discussed together with public authorities, NGOs, enterprises, and business support organizations. 623 / 1,000 characters
4	Business support organisation Baltic States LIAA Biopower Plant Development Cluster 53 / 500 characters	Business support organizations will be asked to participate in stakeholder activities during the time of the project, assist with knowledge exchange in project pilots, and help to disseminate the project results to our members and target groups. The information about bioenergy in regions and municipalities and its potential will be discussed together with public authorities, NGOs, enterprises, and business support organizations. 433 / 1,000 characters
5	Small and medium enterprise Biogas plants, Renewable energy (wind, solar, hydrogen) systems companies, transport companies, biofuel storage and transportation companies 141 / 500 characters	Biogas plants, and renewable energy systems companies will be asked to give our opinion on the choice of technological solutions for biogas production with a focus on biogas upgrading - biomethanation. They will gain new knowledge about the production of biomethane on a municipal scale. The information about bioenergy in regions and municipalities and its potential will be discussed together with public authorities, NGOs, enterprises, and business support organizations. 475 / 1,000 characters

5.6 Activities, deliverables, outputs and timeline

No.	Name
1.1	**Hydrogen production and storage**
1.2	**Biogas production**
1.3	**Biomethanation system development**

WP 1 Group of activities 1.1

5.6.1 Group of activities leader

Group of activities leader PP 3 - University of Tartu

A 1.1

5.6.2 Title of the group of activities

Hydrogen production and storage

31 / 100 characters

5.6.3 Description of the group of activities

The objective of the A 1.1 is to develop a higher efficiency hydrogen production system for use in biomethanation system. New sulphur-tolerant complex oxides for high-temperature electrolysis cells and high-temperature fuel cells will be developed. Cutting-edge operando analysis methods combined with electrochemical testing methods will be applied.
Hydrogen as a very high-quality energy carrier/fuel with a very high gravimetric energy density (32.9 kWh/kg) can be produced by water electrolysis, co-electrolysis of H2O and CO2 and by methane and biomethane decomposition by catalytic process and other methods. The main aim of this project is the development of metals nanoclusters free high-temperature solid oxide electrolysis systems for H2O and H2O and CO2 co-electrolysers. The sulphur tolerant electrodes, applicable in high-temperature electrolysis and high-temperature fuel cell regimes, will be designed and fully characterized by operando electrochemical, synchrotron radiation beam, and neutron scattering methods
Task 1.1: Desk review of hydrogen production from renewable energy sources, storage, and use. Summarized research gaps for hydrogen production from renewable energy sources, storage and use, their strong and weak points, best practices, and demonstration projects (including technology readiness level and integration readiness level) identified and assessed.
Task 1.2: Verification of technological modules and system concept development. Defined preliminary technological scheme of components for improved hydrogen production and storage system, considering results from Task 1.1. Design of experimental investigation plan. The experiment plan will be based on factors affecting system's performance. Developed laboratory stand for experimental investigation including advanced process control and data monitoring systems.
Task 1.3: Carrying out developed system testing. Carried out the experimental investigation and successive tests will be performed to evaluate proposed hydrogen production technology advantages over conventional technologies. Impact of each technological module on hydrogen yield in pilot-scale system also will be evaluated, in fact demonstrating the contribution of each novel improvement separately. System's ability to adapt to changing variable parameters, including the effect of system scaling.
Task 1.4: Hydrogen storage. Report on innovative solution performance for hydrogen storage based on the micro- meso- macro-porous carbons and thin-film complex hydrides (NaAlH4, LaNi5H6, MgH2) modified carbon scaffold structures. Influence of hierarchical porous structure of carbon particles, carbon particles size distribution, pores size distribution, etc. on the hydrogen adsorption/absorption in complex hydrides as well as desorption rates, and reversibility of complex metal hydride composition under repetitive cycle.

2,884 / 3,000 characters

5.6.4 This group of activities leads to the development of a deliverable ✔

D 1.1

Title of the deliverable

Develop a higher efficiency H2 cell

35 / 100 characters

Description of the deliverable

During biomethanation microorganisms use the CO2 present in the biogas and externally supplied hydrogen to generate methane, thus significantly increasing the total methane concentration in the biogas. Hydrogen can be produced via electrolysis using electricity from off-peak electricity surplus from such intermittent renewable energies as solar and wind power. In this way, the biomethane can be fed into the natural gas network, efficiently transported after compression, used in large-scale storage, and used as a fuel in transport.
The use of a trickling biofilter in the biomethanation process is state-of-the-art technology, as evidenced by the fact that the oldest publications on this topic were published in 2016, with the majority of papers being published in 2020.
For hydrogen storage, the novel micro-meso-macro-porous carbons and thin-film NaAlH4 deposited onto different hierarchical micro-meso-macro-porous carbon supports will be synthesized under various conditions (deposition temperature, deposition rate, thickness, and porosity of thin-film, the gas composition of the deposition environment, pore former concentration and particle size distribution, etc.). cutting-edge operando analysis methods combined with electrochemical testing methods will be applied. Novel hierarchically porous carbons and thin-film complex metal hydrides will be synthesized, characterized, and tested under operando conditions, etc. The influence of sulfur, silanes, CO, and other contaminants in biogas on the stability of complex hydrides as well as carbon adsorption activity will be analyzed.

1,599 / 2,000 characters

Which output does this deliverable contribute to?

State-of-the-art biomethane production technology

49 / 100 characters

5.6.6 Timeline

Period:	1	2	3	4	5	6
WP.1: WP1 Preparing solutions						
A.1.1: Hydrogen production and storage						
D.1.1: Develop a higher efficiency H2 cell						

5.6.7 This deliverable/output contains productive or infrastructure investment ☐

WP 1 Group of activities 1.2

5.6.1 Group of activities leader

Group of activities leader PP 2 - Vytautas Magnus University Agriculture Academy

A 1.2

5.6.2 Title of the group of activities

Biogas production

17 / 100 characters

5.6.3 Description of the group of activities

The objective is to develop innovative technology for increasing the methane concentration in biogas maintaining a stable operation of the bioreactor. It will be done by 1) identification of optimally supplying feedstocks, 2) selectively treatment of the raw materials, 3) anaerobic process control organization and 4) additional hydrogen injection into biosubstrates.
Biomethane production is currently considered to be the most advanced and efficient area of biogas energetics. The most commonly used purification methods (cryogenic refrigeration, absorption into liquids or solids, membrane cleaning, etc.) are expensive due to high energy or material costs. Both at the scientific level and in industry, biogas production technologies have been developed and improved, focusing on increasing biogas yield or ensuring process stability, but not on increasing methane concentration.
Task 2.1: Desk review of technologies for the increasing concentration of methane in biogas. A comparative assessment report and deep knowledge of the best available biogas production practice, including new innovations in feedstock selection and preparing, feeding, and decomposition. Analysis of possibilities for additional hydrogen injection into biosubstrates. Review of other applied teaching systems for automation control systems. Developed pre-modeled algorithm for raw materials composition.
Task 2.2: Definition of the boundaries of the system and development of a technological scheme. The principal concept of the proposed biogas production system. Definition of most critical parameters for biogas production. Identified factors will be investigated in experimental research. A detailed experimental plan on testing procedure, parameters, and methods. Required materials and instruments are obtained. Experimental methods for assessing the potential biogas yield and energy value will be used. Defined method of creating laboratory stand – required modeling software and hardware. Algorithm for producing biogas with higher methane concentration.
Task 2.3: Laboratory experimental testing of the biogas production. Consolidated report about methane concentration increase in biogas by: 1) application of selectively treated raw materials; 2) additionally injecting hydrogen into biosubstrates; 3) developed system for automation control systems. Additionally, a scientific paper on methane concentration increasing in biogas.
Task 2.4: Life cycle assessment of biogas production. It is planned to carry out a life cycle assessment in order to determine the sustainability indicators of the researched technology. Life cycle performance will be assessed by SimaPro software. Mathematical modeling methods for assessing biomass production, collection, transportation, processing into biogas, energy conversion, and life cycle assessment of the whole analyzed system. Additionally, a scientific paper on Life cycle assessment of biogas production.

2,948 / 3,000 characters

5.6.4 This group of activities leads to the development of a deliverable ✔

D 1.2

Title of the deliverable

Increased methane concentration in biogas production process

60 / 100 characters

Description of the deliverable

The development of innovative technology for increasing the methane concentration in biogas would allow controlling the process parameters and composition of the raw materials supplied to the bioreactors by biotechnological methods. The aim of this work will be to extract a higher concentration of methane in biogas, which would increase by 2-5% compared to conventional technologies (55%) while maintaining a stable operation of the bioreactor. The problem could be solved by controlling and optimally supplying feedstocks with optimal composition to the biogas reactor while controlling the carbon/nitrogen C/N ratio, controlling the acidity of the substrate, using other biotechnological methods (such as additional hydrogen injection into the biogas reactor substrate and selective feedstock treatment).
Research activities are planned to develop original technology, which will be able to:
- control the composition of raw materials according to a pre-modeled algorithm;
- to produce biogas with higher methane concentration;
- additional hydrogen injection into biosubstrates;
- selectively treated raw materials.

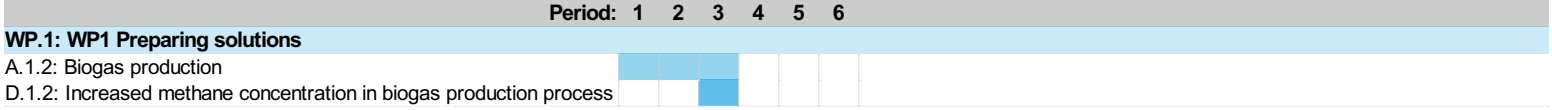
1,126 / 2,000 characters

Which output does this deliverable contribute to?

State-of-the-art biomethane production technology

49 / 100 characters

5.6.6 Timeline



5.6.7 This deliverable/output contains productive or infrastructure investment ☐

WP 1 Group of activities 1.3

5.6.1 Group of activities leader

Group of activities leader PP 1 - Riga Technical University

A 1.3

5.6.2 Title of the group of activities

Biomethanation system development

34 / 100 characters

5.6.3 Description of the group of activities

The objective of A 1.3 is the development of an efficient trickling biofilter biomethanation process using innovative ash filters, which would enable the production of upgraded biogas with methane concentration above 90%.
Task 3.1: Desk review of Biomethanation. Developed a detailed testing plan and biomethanation system development plant.
Task 3.2: Development of the trickling biofilter biomethanation system. Purchased necessary materials, inventory and tools, built trickling biofilter biomethanation prototype system.
Task 3.3.1: Validation of each separate system's element. Functionality of the following system's elements validated: gas flow and gas mixing control; reactor flushing with N2; H2, CO2, N2 and biogas injection under the trickling biofilter; residual H2, CO2 recirculation; constant H2, CO2 and CH4 concentration monitoring in reactor; automatic H2 injection when residual H2 concentration drops below the threshold during operation; digestate injection into reactor using sprinkling system; digestate recirculation; digestate pH monitoring and pH level automatic control; automatic temperature control during operation using heating/cooling jacket; upgraded biogas flow meter; monitoring system for CO2, H2, H2O and CH4 concentration in the upgraded gas; ensuring that reactors design enables simple and quick removal of used ash biofilters and replacing with new ones; ensuring that system is coupled with widely used biomethane compression and storage equipment, which can be easily integrated into existing natural gas, transportation or gas storage infrastructure.
Task 3.3.2: Validation of complete biomethanation system functionality. Biomethanation system is fully functional with all elements working in a complete system.
Task 3.4: Experiments and optimization of the process using ash filters. The porosity of the wood ash filters was tested in a developed biomethanation system, optimal pore size was identified; Various forms of the wood ash filters (balls, cylinders, sheets, disks, etc.) and their stacking methods were tested, the optimal form and stacking method identified; Gas flow upwards through various size and form ash filters tested, optimal properties identified; Sprinkler parameters effect on the efficiency of the system tested, the optimal type of sprinkler and number of sprinklers identified; Tested inoculation time of hydrogentrophic methanogens after replacing filters and how long it takes until the system can operate again at the optimal CH4 production rate.
Experiments will result in the identification of the optimal biomethanation system parameters when using novel wood ash filters as trickling biofilters. The developed technological solution will offer similar or better production rates and quality defining properties of the upgraded gas than existing fossil sourced filters and the overall scientific contribution will advance trickling biofilter biomethanation technology closer to its introduction into industrial environment

3,000 / 3,000 characters

5.6.4 This group of activities leads to the development of a deliverable ☑

D 1.3

Title of the deliverable

Upgraded biogas with methane concentration above 90%

52 / 100 characters

Description of the deliverable

Deliverable is the development of an efficient trickling biofilter biomethanation process using innovative ash filters, which would enable the production of upgraded biogas with methane concentration above 90%. Originality and novelty are based on a new approach to increasing the efficiency of the biomethanation process is the cultivation of methanogenic microorganisms using a trickling biofilter, which serves as an attachment surface for microorganism colonies, thus significantly increasing the speed of the process and the purity of the obtained biomethane. Various types of polymer filters from fossil resources such as clear polyvinyl chloride (PVC), polyurethane foam (PUF), etc. are currently used as trickling biofilters. The leading partner and project promoter offer vulcanized ash filters, which use end-of-the-line waste ash, as the main raw material for the production of filters as a completely innovative and previously unexplored alternative to fossil sourced trickling biofilters. The ash filter is a porous material similar to expanded clay and the project applicant has patented the technology for making these filters with three patents. The use of these filters provides an opportunity to replace fossil sourced polymer filters and to find applications for thus far underutilized waste product - wood ash.
In general, biomethanation is a promising method for upgrading biogas that finds application in off-peak surplus electricity from solar and wind power generation. The use of a trickling biofilter in the biomethanation process is state-of-the-art technology, with the majority of papers being published in 2020. Finally, the already innovative biometanation process by using trickling biofilters is complemented by previously unexplored environmentally friendly filter material from wood ash, which reduces the need for fossil polymers and finds application for underutilized end-of-the-line waste products.

1,937 / 2,000 characters

Which output does this deliverable contribute to?

State-of-the-art biomethane production technology

49 / 100 characters

5.6.6 Timeline

Period:	1	2	3	4	5	6
WP.1: WP1 Preparing solutions						
A.1.3: Biomethanation system development						
D.1.3: Upgraded biogas with methane concentration above 90%						

5.6.7 This deliverable/output contains productive or infrastructure investment

☐

Work package 2

5.1 WP2 Piloting and evaluating solutions

5.2 Aim of the work package

The aim of this work package is to pilot, evaluate and adjust solutions. Plan one or several pilots to validate the usefulness of the solutions prepared in Work Package 1. Start Work Package 2 early enough to have time to pilot, evaluate and adjust solutions, together with your target groups. By the end of this work package implementation the solutions should be ready to be transferred to your target groups in Work Package 3.
The piloted and adjusted solution should be presented in one project output.
Organise your activities in up to five groups of activities. Describe the deliverables and outputs as well as present the timeline.

5.3 Work package leader

Work package leader 1 PP 1 - Riga Technical University

Work package leader 2 PP 2 - Vytautas Magnus University Agriculture Academy

5.4 Work package budget

Work package budget 30%

5.4.1 Number of pilots

Number of pilots 1

5.5 Target groups

	Target group	How do you plan to reach out to and engage the target group?
1	National public authority Baltic Sea region. Latvia, Estonia, Lithuania The Ministry of Environmental Protection and Regional Development of the Republic of Latvia 139 / 500 characters	National public authorities in the Baltic States will be asked to participate in stakeholder activities during the time of the project. The information about bioenergy in regions and municipalities and its potential will be discussed together with public authorities, NGOs, enterprises, and business support organizations. Public authorities will help to distribute the results of technology developed within the project to local governments. A topic-related event or a workshop in order to increase the number of participants. It is very important to have face-to-face experience. Questionnaires or interviews to increase the number of pilot testers to guarantee meaningful feedback and results by involving a maximum number of test persons from target groups that will help to improve the comprehensive version of the technology. All observations will be recorded and reported to other partners. 897 / 1,000 characters
2	Local public authority Latvia: Riga, Salaspils, Preiļi, Gulbene 40 / 500 characters	Local public authorities will be asked to participate in stakeholder activities during the time of the project. They will gain new knowledge about the production of biomethane on a municipal scale. The information about bioenergy in regions and municipalities and its potential will be discussed together with public authorities, NGOs, enterprises, and business support organizations. Public authorities will help to distribute the results of technology developed within the project to local governments. A topic-related event or a workshop in order to increase the number of participants. It is very important to have face-to-face experience. Questionnaires or interviews to increase the number of pilot testers to guarantee meaningful feedback and results by involving a maximum number of test persons from target groups that will help to improve the comprehensive version of the technology. All observations will be recorded and reported to other partners. 959 / 1,000 characters

	Target group	How do you plan to reach out to and engage the target group?
3	NGO Latvia, Estonia, Lithuania. Agriculture sector, Biogas Energy Association, Solar Energy Association, Wind Energy Association, Latvian Bioenergy Association, 157 / 500 characters	Biogas Energy Association, Bioenergy Association, Solar Energy Association, and Wind Energy Association will be asked for an opinion on the choice of technological solutions for pilots for wind energy, solar energy, hydrogen, biogas usage, for biomethane production. Will be asked to participate in stakeholder activities during the time of the project. They could inform stakeholders with new knowledge about renewable energy in regions and municipalities. A topic-related event or a workshop in order to increase the number of participants. It is very important to have face-to-face experience. Questionnaires or interviews to increase the number of pilot testers to guarantee meaningful feedback and results by involving a maximum number of test persons from target groups that will help to improve the comprehensive version of the technology. All observations will be recorded and reported to other partners. 912 / 1,000 characters
4	Business support organisation Baltic States LIAA Biopower Plant Development Cluster 53 / 500 characters	Business support organizations will be asked to participate in stakeholder activities during the time of the project, assist with knowledge exchange in the project pilot, and help to disseminate the project results to our members and target groups. The information about bioenergy in regions and municipalities and its potential will be discussed together with public authorities, NGOs, enterprises, and business support organizations. A topic-related event or a workshop in order to increase the number of participants. It is very important to have face-to-face experience. Questionnaires or interviews to increase the number of pilot testers to guarantee meaningful feedback and results by involving a maximum number of test persons from target groups that will help to improve the comprehensive version of the technology. All observations will be recorded and reported to other partners. 890 / 1,000 characters
5	Small and medium enterprise Biogas plants, Renewable energy (wind, solar, hydrogen) systems companies, transport companies, biofuel storage and transportation companies 141 / 500 characters	Biogas plants, and renewable energy systems companies will be asked to give our opinion on the choice of technological solutions for biogas production with a focus on biogas upgrading - biomethanation. They will gain new knowledge about the production of biomethane using the pilot system. The information about bioenergy in regions and municipalities and its potential will be discussed together with public authorities, NGOs, enterprises, and business support organizations. A topic-related event or a workshop in order to increase the number of participants. It is very important to have face-to-face experience. Questionnaires or interviews to increase the number of pilot testers to guarantee meaningful feedback and results by involving a maximum number of test persons from target groups that will help to improve the comprehensive version of the technology. All observations will be recorded and reported to other partners. 932 / 1,000 characters

5.6 Activities, deliverables, outputs and timeline

No.	Name
2.1	**Developing biotrickling filter reactor pilot system for biogas upgrading**
2.2	**Validation of biomethanation systems pilot**

WP 2 Group of activities 2.1

5.6.1 Group of activities leader

Group of activities leader PP 1 - Riga Technical University

A 2.1

5.6.2 Title of the group of activities

Developing biotrickling filter reactor pilot system for biogas upgrading

72 / 100 characters

5.6.3 Description of the group of activities

To prepare the quality of gas suitable for transport sector, hydrogen produced by the use of renewable electricity (wind, solar) will be used in special biomethanation reactors in combination with biogas.
Objective of the WP2 is to develop biotrickling filter reactor pilot system for biogas upgrading. Developed solutions on 1) hydrogen production from renewable source, 2) biomethanation with wood ash filters and 3) improved biogas production will be analyzed and tested in joint bioreactor system. Two streams – biogas and hydrogen produced by the use of renewable electricity will be pumped into biotrickling reactor packed with newly developed wood ash filter. Partners from Latvia, Estonia and Lithuania will actively contribute to the preparation of pilot biomethanation system and will take part in testing of the new biomethanation system. Experiments and optimization of the biomethanation process in the pilot reactor will be part of WP2, in which obtained results will be evaluated for further tasks to implement the technological solutions into industrial environment. The developed technological solution will offer similar or better production rates and quality defining properties of the upgraded gas than existing fossil sourced filters and the overall scientific contribution will advance trickling biofilter biomethanation technology closer towards its introduction into industrial environment.

1,415 / 3,000 characters

5.6.4 This group of activities leads to the development of a deliverable ✔

D 2.1

Title of the deliverable

Pilot of biomethane production system

37 / 100 characters

Description of the deliverable

In general, biomethanation is a promising method for upgrading biogas that finds application in off-peak surplus electricity from solar and wind power generation. The use of a trickling biofilter in the biomethanation process is state-of-the-art technology, with a majority of papers being published in 2020. Finally, the already innovative biomethanation process by using trickling biofilters is complemented by previously unexplored environmentally friendly filter material from wood ash, which reduces the need for fossil polymers and finds application for underutilized end-of-the-line waste products. Expanding the use of technology involves new knowledge and innovation at different levels of the system. Expanding the application includes issues related to the transition from fossil to renewable resources, producing more efficiently hydrogen from renewable sources, the use of materials from waste, biogas production from residues, as well as strengthening and stabilizing the industry in general, which requires the system's end product - methane. Two streams – biogas and hydrogen produced by the use of renewable electricity will be pumped into a biotrickling reactor packed with a newly developed wood ash filter. Partners from Latvia, Estonia, and Lithuania will actively contribute to the preparation of the piloting biomethanation system and will take part in testing the new biomethanation system. The pilot project is an initial small-scale implementation that is used to prove the viability of a project idea. This will involve the exploration of a novel new approach to biomethane production. Biogas producers will be able to see the pilot as a possible technology in their own imagination. Renewable energy producers will be offered the opportunity to familiarize themselves with the parameters of the installed technology in order to assess how they could adapt it to their own production processes.

1,925 / 2,000 characters

Which output does this deliverable contribute to?

State-of-the-art biomethane production system

45 / 100 characters

5.6.6 Timeline

Period:	1	2	3	4	5	6
WP.2: WP2 Piloting and evaluating solutions						
A.2.1: Developing biotrickling filter reactor pilot system for biogas upgrading						
D.2.1: Pilot of biomethane production system						

5.6.7 This deliverable/output contains productive or infrastructure investment ☐

WP 2 Group of activities 2.2

5.6.1 Group of activities leader

Group of activities leader PP 1 - Riga Technical University

A 2.2

5.6.2 Title of the group of activities

Validation of biomethanation systems pilot

42 / 100 characters

5.6.3 Description of the group of activities

Experiments and optimization of the biomethanation process in the pilot reactor will be part of WP2, in which obtained results will be evaluated for further tasks to implement the technological solutions into an industrial environment. The developed technological solution will offer similar or better production rates and quality defining properties of the upgraded gas than existing fossil sourced filters and the overall scientific contribution will advance trickling biofilter biomethanation technology closer towards its introduction into an industrial environment.
The pilot will be validated by operating simultaneously under constant conditions. The performance and variability of the pilot will be discussed with partners.
Through the experiences gained in the pilot action partners and target groups will learn how they use technology at the industrial level, that is how it is used in real-life settings with different levels of enterprises capacity and innovation potential. Validated results of the pilot of the project will be used for the integration of biogas systems into the energy-transport system through different dissemination activities.

1,164 / 3,000 characters

5.6.4 This group of activities leads to the development of a deliverable ☐

O 2.2

Title of the output

State-of-the-art biomethane production system

45 / 100 characters

Description of the output

Assessments of the cost-effectiveness of bio-methane production valorization. Biomethanation is a promising method for upgrading biogas that finds application in off-peak surplus electricity from solar and wind power generation. The use of a trickling biofilter in the biomethanation process is state-of-the-art technology, with the majority of papers being published in 2020. Finally, the already innovative biomethanation process by using trickling biofilters is complemented by previously unexplored environmentally friendly filter material from wood ash, which reduces the need for fossil polymers and finds application for underutilized end-of-the-line waste products. Expanding the use of technology involves new knowledge and innovation at different levels of the system. Expanding the application includes issues related to the transition from fossil to renewable resources, producing more efficiently hydrogen from renewable sources, the use of materials from waste, biogas production from residues, as well as strengthening and stabilizing the industry in general, which requires the system's end product - methane. Through the experiences gained in the pilot action, target groups will learn how the biomethane production system can be implemented in biogas production plants, that is how it is used in real-life settings with different configurations as well as different levels of technological capacity and innovation potential. Project partners will monitor the process of pilot implementation (and make it easier to be followed by other partners later on in the dissemination stage) aiming to improve the usability of the tool, especially in terms of it achieving the project's specific objectives, its user-friendliness, and technological capabilities.

1,771 / 3,000 characters

Target groups and uptake of the solution presented in this output

Target groups	How will this target group apply the output in its daily work?
Target group 1 Small and medium enterprise Biogas plants, Renewable energy (wind, solar, hydrogen) systems companies, transport companies, biofuel storage and transportation companies	Biogas producers will be able to see the pilot as a possible technology in their own imagination. Renewable energy producers will be offered the opportunity to familiarize themselves with the parameters of the installed technology in order to assess how they could adapt it to their own production processes. The target group of the project is agricultural enterprises processing agricultural products and by-products into biogas. As well as enterprises' technological solutions in the biogas production sector. The biomethane production pilot results would have an impact on rural workers, contributing to the sustainable development of rural areas, ensuring the further use of existing biotechnologies, and contributing to their future profitability. 753 / 1,000 characters
Target group 2 Local public authority Latvia: Riga, Salaspils, Preiļi, Gulbene	The biomethane production systems results would have an impact on rural workers, contributing to the sustainable development of rural areas, ensuring the further use of existing biotechnologies, and contributing to their future profitability. Project partners will assist local governments in adopting the best solutions in the context of transport and energy system planning using local biomass. 396 / 1,000 characters
Target group 3 NGO Latvia, Estonia, Lithuania. Agriculture sector, Biogas Energy Association, Solar Energy Association, Wind Energy Association, Latvian Bioenergy Association,	State-of-the-art biomethane production system The biomethane production systems results would have an impact on rural workers, contributing to the sustainable development of rural areas, ensuring the further use of existing biotechnologies, and contributing to their future profitability. Project partners will assist local governments and NGOs in adopting the best solutions in the context of transport and energy system planning using local biomass. 451 / 1,000 characters
Target group 4 Business support organisation Baltic States LIAA Biopower Plant Development Cluster	Business support organisations will use the State-of-the-art biomethane production system to develop new start-ups, and existing businesses in the bioenergy, biofuel and transport sectors. Project partners will assist local governments and NGOs in adopting the best solutions in the context of transport and energy system planning using local biomass. 351 / 1,000 characters

Durability of the output

The pilot project is an initial small-scale implementation that is used to prove the viability of a project idea. This will involve the exploration of a novel new approach of biomethane production.
Biogas systems can operate as a biological battery in coupling the electricity and gas grids using surplus electricity to produce hydrogen to react with biogenic CO2 in biogas producing biomethane and increasing the output of biomethane. The system itself will be possible to implement in different renewable energy and transport sectors according to their technological capability and infrastructure.
Biogas producers will be able to see the biomethane production system as a possible technology in their own imagination. Renewable energy producers will be offered the opportunity to familiarize themselves with the parameters of the installed technology in order to assess how they could adapt it to their own production processes.

933 / 1,000 characters

5.6.6 Timeline

Period:	1	2	3	4	5	6
WP.2: WP2 Piloting and evaluating solutions						
A.2.2: Validation of biomethanation systems pilot						
O.2.2: State-of-the-art biomethane production system						

5.6.7 This deliverable/output contains productive or infrastructure investment ☐

Work package 3

5.1 WP3 Transferring solutions

5.2 Aim of the work package

In Work Package 3, communicate and transfer the ready solutions to your target groups. Plan at least one year for this work package to transfer your solutions to the target groups, considering their respective needs. Select suitable activities to encourage your target groups to use the solutions in their daily work.
Organise your activities in up to five groups of activities. Describe the deliverables and outputs as well as present the timeline.

5.3 Work package leader

Work package leader 1 PP 6 - Latvian Biogas Association

Work package leader 2 PP 5 - The Association of Municipalities of Tartu County

5.4 Work package budget

Work package budget 30%

5.5 Target groups

	Target group	How do you plan to reach out to and engage the target group?
1	National public authority Baltic Sea region. Latvia, Estonia, Lithuania The Ministry of Environmental Protection and Regional Development of the Republic of Latvia 139 / 500 characters	During WP3, national public authorities will be asked to participate in seminars, meetings, or panel discussions with project partners. The main objective for this target group is to contribute as a contact point within all municipalities, help to distribute the tool developed within the project to local governments; assist local governments in adopting the best solutions in the context of transport and energy system planning using local biomass; participate in stakeholder activities during the time of the project. Results and recommendations will be discussed with public authorities during seminars and meetings and round table discussions of the project dissemination part. 682 / 1,000 characters
2	Local public authority Latvia: Riga, Salaspils, Preiļi, Gulbene 40 / 500 characters	During WP3, local public authorities will be asked to participate in seminars, meetings, or panel discussions with project partners. The main objective for this target group is to contribute as a contact point within all municipalities, help to distribute the tool developed within the project to local governments; assist local governments in adopting the best solutions in the context of transport and energy system planning using local biomass; participate in stakeholder activities during the time of the project. Results and recommendations will be discussed with public authorities during seminars and meetings and round table discussions of the project dissemination part. 679 / 1,000 characters
3	NGO Latvia, Estonia, Lithuania. Agriculture sector, Biogas Energy Association, Solar Energy Association, Wind Energy Association, Latvian Bioenergy Association, 157 / 500 characters	To ensure the knowledge of leading institutions in the biogas and transport sector, a regular dialogue cooperation platform will be ensured in part by organizing round table discussions with such organisations as European Biogas Association, Latvian Biogas Association, Estonian Biogas Association, Lithuanian Biogas Association, Hydrogen Europe, Latvian Hydrogen Association, Lithuanian Hydrogen Energy Association, Estonian Hydrogen Association, Latvian Fuel Traders Association, Automotive Association, Latvian Biofuel and Bioenergy Association, Latvian Association of Local Governments ect. 594 / 1,000 characters
4	Business support organisation Baltic States LIAA Biopower Plant Development Cluster 53 / 500 characters	During WP3 Business support organizations in Baltic Sea Region will be invited to seminars with project partners where projects outcomes will be presented and discussed. WP3 activities will give presentation materials for business support organizations for the development of rural areas and local business companies. 317 / 1,000 characters
5	Small and medium enterprise Biogas plants, Renewable energy (wind, solar, hydrogen) systems companies, transport companies, biofuel storage and transportation companies 141 / 500 characters	During WP3 different small and medium enterprises in Baltic Sea Region will be invited to seminars with project partners where projects outcomes will be presented and discussed. WP3 activities will give presentation materials for transport companies, renewable energy organizations for the development of rural areas and local business companies. 346 / 1,000 characters

5.6 Activities, deliverables, outputs and timeline

No.	Name
3.1	**Biomethane potential in Baltic Sea Region evaluation**
3.2	**Dissemination, communication and exploitation**
3.3	**Project results analyses**

WP 3 Group of activities 3.1

5.6.1 Group of activities leader

Group of activities leader PP 1 - Riga Technical University

A 3.1

5.6.2 Title of the group of activities

Biomethane potential in Baltic Sea Region evaluation

52 / 100 characters

5.6.3 Description of the group of activities

The objective of A 3.1 is to model the production potential of bio-methane in BSR and its impact on the region. WP5 will provide an overview of the synergic effect between the electricity and biomethane production in the North European countries providing an evaluated potential location for hydrogen production. WP5 will combine results from the other work package and estimate the economical overall effects of the main findings.
Task 1: Holistic energy system modeling. An open-source and freely available Balmoral tool will be used. An Biomethane addon will be developed as an update to energy system model for the Baltic countries and neighboring regions covering electricity, heat and transportation. Raw data required for calculation is being collected.
Task 2: Life Cycle Assessment (LCA) modeling. LCA provides a decision-making platform to understand the mid-term and long-term environmental effects of biomethane valorization scenarios acc. to ISO Standard requirements. To exclude high input data uncertainties (if any) as well as to identify model behavior factors, sensitivity analysis is performed. The LCA will include health and safety, cultural heritage, governance impact categories covering the interests of such stakeholder groups as workers, local community, society, consumers.
Task 3: Definition of regional development scenarios and model forecast boundaries, strengths, weaknesses, opportunities, and threats (SWOT). Data set on future regional development of the energy system in general and on techno-economic data for bio-methanation towards 2050.
Task 4: Cost analysis and sustainable regional development analysis. Assessments of the cost-effectiveness of bio-methane production valorization. The economic effects of implementation of bio-methane production scenarios in the regions is assessed and benchmarked via regional development sustainability indicators. The results will be used to find optimal production levels and cost for hydrogen production
Task 5: Definition of multi-sectoral regulatory requirements for biomethane. Considering multi-sectorial (transport, heating, industry, environmental protection, national safety, economy) impact of replacing natural gas with biomethane, analysis of regulatory requirements is performed. This includes requirements of biomethane quality and production capability. To ensure the knowledge of leading institutions in the biogas and transport sector, a regular dialogue cooperation platform will be ensured in part by organizing round table discussions with such organizations as the European Biogas Association, Latvian Biogas Association, Estonian Biogas Association, Lithuanian Biogas Association, Hydrogen Europe, Lithuanian Hydrogen Energy Association, Estonian Hydrogen Association, Latvian Fuel Traders Association, Automotive Association, Latvian Bioenergy Association, Latvian Association of Local Governments, Road Traffic Safety Directorate, municipalities, and private companies.

2,974 / 3,000 characters

5.6.4 This group of activities leads to the development of a deliverable ☐

O 3.1

Title of the output

Model of biomethane potential in Baltic Sea Region

50 / 100 characters

Description of the output

The main environmental advantage of biogas upgrading and its use as a transport fuel is that less greenhouse gas (GHG) emissions are made in the transport sector (typically between 60% and 80% compared to gasoline), thus, the utilization of biomethane as fuel for vehicles saves around 500 kg of CO_2 eq per MWh equivalent compared to petrol or diesel, with the savings slightly higher for diesel fuel. Results will be used from the other work package to develop a dataset for different technical and economic characteristics of hydrogen and biomethane production at the current state and likely developments in the future. This dataset will be used in an updated energy sector model, covering power, heat as well as transportation sectors in the BSR to analyze scenarios for a 100% renewable BSR in 2050. The model will be used to provide insight into the future role of both hydrogen and upgraded biomethane in the future Baltic system. The results will focus on synergic effects with variable energy production and focus on how the transition to a 100% renewable BSR energy system may take advantage of the domestic production of hydrogen and biomethane. The main output will be quantifications of the likely production costs for hydrogen/biomethane and the costs/value for electricity producers and the entire energy system. The output will give policy advice on how hydrogen production best can be included in the energy system.
Produced biomethane can be filled into the car using specific filling stations. At this moment the infrastructure required for biomethane use in the transport sector is not developed in BSR, just several filling stations exist. In 2020 three CNG filling stations are open in Latvia as well as there are 6 CNG stations which are operating in Lithuania and 18 CNG stations in Estonia. Estonia was one of three countries to connect its first biomethane plants to national gas networks in 2018. The optimal number and distribution in BSR must be identified. Additionally, the infrastructure of classic filling stations can be supplemented with personal mobile filling systems. This technology would facilitate the transition of city bus fleets to biomethane by speeding up and facilitating their filling.
A combination of filling stations, personal mobile filling systems, and biomethane injected into the existing gas grid will be analyzed at to identify economic, environmental, and social aspects. Achieved results from the project can be used for policymakers to develop regulation documents and strategies for unique biomethane infrastructure development in BSR.
Assessments of the cost-effectiveness of bio-methane production valorization. The economic effects of implementation of bio-methane production scenarios in the regions is assessed and benchmarked via regional development sustainability indicators.

2,846 / 3,000 characters

Target groups and uptake of the solution presented in this output

Target groups	How will this target group apply the output in its daily work?
Target group 1 National public authority Baltic Sea region. Latvia, Estonia, Lithuania The Ministry of Environmental Protection and Regional Development of the Republic of Latvia	The output will give advice to national and public authorities on how hydrogen and biomethane production best can be included in the energy and transport system. 163 / 1,000 characters
Target group 2 Local public authority Latvia: Riga, Salaspils, Preiļi, Gulbene	The output will give advice to national and public authorities (local and national public authorities, NGOs etc.) on how hydrogen and biomethane production best can be included in the energy and transport system. 213 / 1,000 characters
Target group 3 NGO Latvia, Estonia, Lithuania. Agriculture sector, Biogas Energy Association, Solar Energy Association, Wind Energy Association, Latvian Bioenergy Association,	The model of biomethane potential in the Baltic Sea Region will be a good tool for NGOs for advising and promoting this technology in different regions in Latvia, Estonia, and Lithuania. It would help to explain the possibilities and potential of biomethane production from their site of view according to the association. The main information of this output can be useful for NGOs because it quantifies the likely production costs for hydrogen/biomethane and the costs/value for electricity producers and the entire energy system. 532 / 1,000 characters
Target group 4 Business support organisation Baltic States LIAA Biopower Plant Development Cluster	The model of biomethane potential in the Baltic Sea Region will be a good tool for business support organizations for advising and promoting this technology in different regions. It would help to explain the possibilities and potential of biomethane production. The main information of this output can be useful for business support organizations because it quantifies the likely production costs for hydrogen/biomethane and the costs/value for electricity producers and the entire energy system. 497 / 1,000 characters

Durability of the output

Model of biomethane potential in the Baltic Sea Region will be a great tool in the future for NGOs, public authorities, and different companies in the renewable energy sector. The model itself can be modified up to date if necessary for Baltic Sea Region countries. It would help to explain the possibilities and potential of biomethane production in the future when technologies will be implemented in the transport infrastructure.

432 / 1,000 characters

5.6.6 Timeline

Period:	1	2	3	4	5	6
WP.3: WP3 Transferring solutions						
A.3.1: Biomethane potential in Baltic Sea Region evaluation						
O.3.1: Model of biomethane potential in Baltic Sea Region						

5.6.7 This deliverable/output contains productive or infrastructure investment ☐

WP 3 Group of activities 3.2

5.6.1 Group of activities leader

Group of activities leader PP 5 - The Association of Municipalities of Tartu County

A 3.2

5.6.2 Title of the group of activities

Dissemination, communication and exploitation

45 / 100 characters

5.6.3 Description of the group of activities

A detailed dissemination plan including dissemination concept of the project, identification of involved parties, methods for dissemination and timing of distribution the results, responsibilities and activities will be elaborated and maintained. Regular reporting and impact monitoring of the project assessing the dissemination impact will be elaborated and discussed during the Project Team meetings.
In this way, it will be possible to inform the public about the environmental, social, economic, and long-term health benefits of the technology. In any case, the results of the technical analysis will also provide an opportunity to liaise with the local government and local authorities to ensure that new legislation is drafted that could facilitate the utilization of the novel technology, entry into the market and founding of existing biogas plants.
Scientific results of the project will be distributed through original scientific publications, presentations at conferences and joint international seminars/webinars.
Dissemination and Communication with Public and Stakeholders (associations, ministries, public authorities, biogas and renewable energy industries, etc.) Public and stakeholders are informed on biomethanation valorization routes and their assessment methodologies. Three Popular science articles will be prepared for this task. Six press releases of project's progress will be developed and distributed (webpage, Facebook, Twitter, e-mails, etc.) to the general public and stakeholders. Joint international seminars/webinars and public meetings will be organized with target groups and partners of this project to discuss the implementation of solutions for the transport sector in the Baltic Sea Region.
"IndiGas" project portfolio (objective, tasks, results, ongoing process information, public events, funding institutions, photos, etc.) will be developed and regularly updated on the developed project website and social profiles of partners.
The experience gained from scientific research in the development of this interdisciplinary technology will enhance the scientific excellence of the staff, thus providing opportunities for successful knowledge sharing and collaboration with high-level foreign researchers and scientific institutions. Information transfer and knowledge dissemination are essential parts of this project. The dissemination of results through publications will also be ensured after the project has been implemented.
Thanks to a variety of approaches to disseminating results (i.e. scientific publications, seminars, round table discussions, popular science publications, press releases, news releases on the RTU IESE website and social networks, open lectures, tours to the laboratory stand and pilot etc.), it will be possible to inform all target groups (scientists, new researchers, societies, NGOs, Business support organizations, entrepreneurs, municipalities and government) of the results of this project.

2,971 / 3,000 characters

5.6.4 This group of activities leads to the development of a deliverable ☐

5.6.6 Timeline

Period:	1	2	3	4	5	6
WP.3: WP3 Transferring solutions						
A.3.2: Dissemination, communication and exploitation						

WP 3 Group of activities 3.3

5.6.1 Group of activities leader

Group of activities leader PP 1 - Riga Technical University

A 3.3

5.6.2 Title of the group of activities

Project results analyses

24 / 100 characters

5.6.3 Description of the group of activities

Projects pilot validation results and model of biomethanation potential in the Baltic Sea Region will be analyzed and discussed in panel discussions and meetings with target groups and experts.
Project partners and target groups and stakeholders are informed on biomethanation valorization routes and their assessment methodologies. Results from the model Results from the project analyses can be used for policymakers to develop regulation documents and strategies for unique biomethane infrastructure development in the Baltic States. WP3 will give policy advice on how biomethane production technology best can be included in the transport and energy system.

662 / 3,000 characters

5.6.4 This group of activities leads to the development of a deliverable

O 3.3

Title of the output

Recommendations for policy makers and stakeholders

50 / 100 characters

Description of the output

Based on results from the project's pilot and model of biomethanation potential in BSR, recommendations will be prepared on the feasibility of implementing the developed and validated optimal solution set in Latvia for the production biomethane using new biotrickling wood ash filters. Recommendations would outline the possibility and direction of future research and new project proposals.
Thanks to a variety of approaches to disseminating results (i.e. scientific publications, round table discussions, popular science publications, press releases, news releases on RTU IESE website and social networks, open lecture, study module, tours to the laboratory stand, etc.), it will be possible to inform all target groups (scientists, new researchers, societies, NGOs, students, entrepreneurs, municipalities, and government) of the innovative technology developed by this project. The outline and main focal points of the recommendations for policymakers will be discussed during seminars and meetings of project dissemination part.

1,034 / 3,000 characters

Target groups and uptake of the solution presented in this output

Target groups	How will this target group apply the output in its daily work?
Target group 1 National public authority Baltic Sea region. Latvia, Estonia, Lithuania The Ministry of Environmental Protection and Regional Development of the Republic of Latvia	During WP3, national public authorities will participate in seminars, meetings, or panel discussions with project partners. The main objective for this target group is to contribute as a contact point within all municipalities, help to distribute the tool developed within the project to local governments; assist local governments in adopting the best solutions in the context of transport and energy system planning using local biomass; participate in stakeholder activities during the time of the project. Results and recommendations will be discussed with public authorities during seminars and meetings and round table discussions of the project dissemination part. The challenge is clear: to develop a process that is both resilient to the realities of the policy making system and appropriate for meeting future challenges. 831 / 1,000 characters
Target group 2 Local public authority Latvia: Riga, Salaspils, Preiļi, Gulbene	During WP3, national public authorities will participate in seminars, meetings, or panel discussions with project partners. The main objective for this target group is to contribute as a contact point within all municipalities, help to distribute the tool developed within the project to local governments; assist local governments in adopting the best solutions in the context of transport and energy system planning using local biomass; participate in stakeholder activities during the time of the project. Results and recommendations will be discussed with public authorities during seminars and meetings and round table discussions of the project dissemination part. 670 / 1,000 characters

Durability of the output

Recommendations for policy makers can be used by local and national public authorities when they are planning for preparing national or regional development documents about bioeconomy, bioenergy, transport sector ect.

217 / 1,000 characters

5.6.6 Timeline

Period:	1	2	3	4	5	6
WP.3: WP3 Transferring solutions						
A.3.3: Project results analyses						
O.3.3: Recommendations for policy makers and stakeholders						

5.6.7 This deliverable/output contains productive or infrastructure investment

6. Indicators

Indicators

Output indicators				Result indicators		
Output indicators	**Total target value in number**	**Project outputs**	**Please explain how the solution presented in this output serves the target group(s).**	**Result indicator**	**Total target value in number**	**Please explain how organisations in the target groups within or outside the partnership will take up or upscale each solution.**
RCO 84 – Pilot actions developed jointly and implemented in projects	1	N/A	N/A			
RCO 116 – Jointly developed solutions	3	O.2.2: State-of-the-art biomethane production system	Through the experiences gained in the action of the solution, target groups will learn how the biomethane production system can be implemented in biogas production plants, that is how it is used in real-life settings with different configurations as well as different levels of technological capacity and innovation potential. Project partners will monitor the process of technology implementation (and make it easier to be followed by other partners later on in the dissemination stage) aiming to improve the usability of the tool, especially in terms of it achieving the project's specific objectives, its user-friendliness, and technological capabilities. Biogas producers, hydrogen producers, and transport system companies will gain new knowledge about the production of biomethane using the state-of-the-art system. 822 / 1,000 characters			
		O.3.1: Model of biomethane potential in Baltic Sea Region	The model will be a good tool for business support organizations and NGOs for advising and promoting this technology in different regions. It would help to explain the possibilities and potential of biomethane production and its role in a sustainable transport system. The main information of this output can be useful for business support organizations because it quantifies the likely production costs for hydrogen/biomethane and the costs/value for electricity producers and the entire energy system. The main information of this output can be useful for NGOs and business support organizations because it quantifies the likely production costs for hydrogen/biomethane and the costs/value for electricity producers and the entire energy system. 748 / 1,000 characters			

Output indicators	Total target value in number	Project outputs	Please explain how the solution presented in this output serves the target group(s).	Result indicator	Total target value in number	Please explain how organisations in the target groups within or outside the partnership will take up or upscale each solution.
		O.3.3: Recommendations for policy makers and stakeholders	It will give advice to policymakers on how hydrogen and biomethane production best can be included in the energy and transport system. Recommendations will be discussed with public authorities during seminars and meetings and round table discussions of the project dissemination part. Recommendations are important for all target groups as they can be an important tool for policy-making in the transport sector and they may impact all target groups in the future. 465 / 1,000 characters	**RCR 104 - Solutions taken up or up-scaled by organisations**	3	Preparing and piloting new solutions will help boost the development of the bioenergy and transport sector in the Baltic Sea Region. The involvement, continuation, and development of biogas plants contribute significantly to the sustainable development of rural areas in the BSR rich in bioresources. Research and project implementation will contribute to the improvement of the technological system. Still, it will also lead to future policy documents that will guide the development of the sectors and the objectives of the European Green Deal. National and local public authorities will use the recommendations and model for future policymaking decisions. The model of biomethane potential in the Baltic Sea Region will be a good tool for NGOs to advise and promote this technology in different regions in Latvia, Estonia, and Lithuania. According to the association, it would help to explain the possibilities and potential of biomethane production from their site of view. Business support organizations, small, medium and large enterprises and NGOs will use project solutions to develop the bioenergy and transport sector. Project results will leave a positive impact on the knowledge base in the fields of energy and transport sector. Project implementation will have a positive effect on achieving 2030 targets in the transport sector in the Baltic States and EU (at least 14% renewable fuel at the transport sector and the minimum share of modern biofuels and biogas in the share of renewable energy 3.5%). Our hypothesis is that the Baltic States can achieve a biomethane share at the transport sector of at least 5% by 2030 and at least 25 % by 2050 in a socio-economically feasible way. 1,702 / 2,000 characters

Result indicator	Total target value in number	Please explain how organisations in the target groups within or outside the partnership will take up or upscale each solution.

Output indicators		Result indicators			
Output indicator	**Total target value in number**	**Result indicator**	**Total target value in number**	**Please describe what types of organisations are planned to actively participate in the project. Explain how this participation will increase their institutional capacity. These types of organisations should be in line with the target groups you have defined for your project.**	
RCO 87 - Organisations cooperating across borders	16	**PSR 1 - Organisations with increased institutional capacity due to their participation in cooperation activities across borders**	25	Project partners and associated organisations	Higher education and research institutions - Vytautas Magnus University Agriculture Academy, University of Tartu, Riga Technical University. The aim of the partnership is to transfer knowledge between scientists in a field related to the improvement of technological processes and the end-user. Other higher education and research organizations will strengthen relations and promote the development of research in the Baltic Sea Region. National and local public authorities Baltic Sea region such as The Ministry of Environmental Protection and Regional Development of the Republic of Latvia, municipalities of Riga, Salaspils, Preiļi, and Gulbene will be able to predict biomethane production potential using projects solutions. It will increase their competence in the bioenergy and transport sector in the context of sustainable transport sector development. Also, NGOs from Latvia, Estonia, and Lithuania, such as the Latvian Biogas Association, Wind Energy Association, Latvian Bioenergy Association, and The Association of Municipalities of Tartu County will be able to use projects results for giving advice to companies in their sector as intermediate between public authorities and enterprises. Small and medium enterprises - Northern Vidzeme waste management system, Ltd. Addeco, Ltd. Līgo, JSC Ekotikslai etc will be able to use results from valorized technology system and implement it in their infrastructure. 1,425 / 1,500 characters
				Other organisations	Project results will leave a positive impact on the knowledge base in the fields of energy and transport sector. Results of this research can be used as a starting point for discussions and engagement of local actors (public transport operators, fuel suppliers, municipalities) in moving towards a low-carbon society. Different organizations will benefit from projects solutions, such as Business support organizations, NGOs, small, medium, and large enterprises, national and local public authorities, organizations such as the European Biogas Association, Latvian Biogas Association, Estonian Biogas Association, Lithuanian Biogas Association, Hydrogen Europe, Latvian Hydrogen Association, Lithuanian Hydrogen Energy Association, Estonian Hydrogen Association, Latvian Fuel Traders Association, Automotive Association, Latvian Association of Local Governments ect. 867 / 1,500 characters

7. Budget

7.0 Preparation costs

Preparation Costs

Would you like to apply for reimbursement of the preparation costs?	No

7.1 Breakdown of planned project expenditure per cost category & per partner

No. & role	Partner name	Partner status	CAT1 - Staff	CAT2 - Office & administration	CAT3 - Travel & accommodation
1 - LP	Riga Technical University	Active 22/09/2022	277,692.30	41,653.85	41,653.85
2 - PP	Vytautas Magnus University Agriculture Academy	Active 22/09/2022	144,615.38	21,692.31	21,692.31
3 - PP	University of Tartu	Active 22/09/2022	146,153.84	21,923.08	21,923.08
4 - PP	ZAAO - Northern Vidzeme waste management system	Active 22/09/2022	14,230.76	2,134.61	2,134.61
5 - PP	The Association of Municipalities of Tartu County	Active 22/09/2022	27,692.30	4,153.85	4,153.85
6 - PP	Latvian Biogas Association	Active 22/09/2022	28,461.54	4,269.23	4,269.23
Total			638,846.12	95,826.93	95,826.93

No. & role	Partner name	CAT4 - External expertise & services	CAT5 - Equipment	Total partner budget
1 - LP	Riga Technical University	109,000.00	0.00	470,000.00
2 - PP	Vytautas Magnus University Agriculture Academy	42,000.00	0.00	230,000.00
3 - PP	University of Tartu	40,000.00	0.00	230,000.00
4 - PP	ZAAO - Northern Vidzeme waste management sy	1,500.02	0.00	20,000.00
5 - PP	The Association of Municipalities of Tartu County	4,000.00	0.00	40,000.00
6 - PP	Latvian Biogas Association	3,000.00	0.00	40,000.00
Total		199,500.02	0.00	1,030,000.00

7.1.1 External expertise and services

Contracting partner	Group of expenditure	Item no.	Specification	Investment item?	Group of activities no.	Planned contract value	
1. Riga Technical U	Events/meetings	CAT4-PP1-A-0	Project partners meetings organization 38 / 100 characters	No	1.1 1.2 1.3 2.1 2.2 3.1 3.2	6,000.00	
1. Riga Technical U	Other	CAT4-PP1-G-0	Engineering services 20 / 100 characters	No	1.3 2.1 2.2	10,000.00	
1. Riga Technical U	Communication	CAT4-PP1-C-0	Seminars organization 21 / 100 characters	No	3.1 3.2	2,000.00	
1. Riga Technical U	Communication	CAT4-PP1-C-0	Publishing fee in scientific journals 37 / 100 characters	No	1.1 1.2 1.3 2.1 2.2 3.1 3.2	4,000.00	
1. Riga Technical U	Communication	CAT4-PP1-C-0	Publicity activities in social media 36 / 100 characters	No	1.1 1.2 1.3 2.1 2.2 3.1 3.2	2,000.00	
1. Riga Technical U	Other	CAT4-PP1-G-0	Materials and tools for laboratory 34 / 100 characters	No	1.1 1.2 1.3 2.1 2.2 3.1 3.2	85,000.00	
2. Vytautas Magnus	Other	CAT4-PP2-G-0	Materials and tools for laboratory 34 / 100 characters	No	1.2 2.1 2.2	40,000.00	
2. Vytautas Magnus	Communication	CAT4-PP2-C-0	Publishing fee in scientific journals 37 / 100 characters	No	1.2	2,000.00	
	Total					199,500.02	

Contracting partner	Group of expenditure	Item no.	Specification	Investment item?	Group of activities no.	Planned contract value	
3. University of Tart	Other	CAT4-PP3-G-0	Materials and tools for laboratory 34 / 100 characters	No	1.1 2.1 2.2	40,000.00	
4. ZAAO - Norther	Events/meetings	CAT4-PP4-A-1	Seminars organization 21 / 100 characters	No	3.1 3.2	1,500.02	
5. The Association	Events/meetings	CAT4-PP5-A-1	Seminars and meetings organization 34 / 100 characters	No	3.1 3.2	4,000.00	
6. Latvian Biogas A	Events/meetings	CAT4-PP6-A-1	Seminar organization for Biogas companies 41 / 100 characters	No	3.1 3.2	3,000.00	
	Total					199,500.02	

7.1.2 Equipment

Contracting partner	Group of expenditure	Item no.	Specification	Investment item?	Group of activities no.	Planned contract value	
Please select	Please select	CAT5-PP--01	0 / 100 characters	Please select		0.00	
	Total					0.00	

7.1.3 Infrastructure and works

Contracting partner	Group of expenditure	Item no.	Specification	Investment item?	Group of activities no.	Planned contract value	
Please select	Please select	CAT6-PP--01	0 / 100 characters	Please select		0.00	
	Total					0.00	

7.2 Planned project budget per funding source & per partner

No. & role	Partner name	Partner status	Country	Funding source	Co-financing rate [in %]	Total [in EUR]	Programme co-financing [in EUR]	Own contribution [in EUR]	State aid instrument
1-LP	Riga Technical University	Active 22/09/2022	LV	ERDF	80.00 %	470,000.00	376,000.00	94,000.00	For each partner, the State aid relevance and applied aid measure are defined in the **State aid section**
2-PP	Vytautas Magnus University Agriculture Academy	Active 22/09/2022	LT	ERDF	80.00 %	230,000.00	184,000.00	46,000.00	
3-PP	University of Tartu	Active 22/09/2022	EE	ERDF	80.00 %	230,000.00	184,000.00	46,000.00	
4-PP	ZAAO - Northern Vidzeme waste management system	Active 22/09/2022	LV	ERDF	80.00 %	20,000.00	16,000.00	4,000.00	
5-PP	The Association of Municipalities of Tartu County	Active 22/09/2022	EE	ERDF	80.00 %	40,000.00	32,000.00	8,000.00	
6-PP	Latvian Biogas Association	Active 22/09/2022	LV	ERDF	80.00 %	40,000.00	32,000.00	8,000.00	
Total ERDF						1,030,000.00	824,000.00	206,000.00	
Total						1,030,000.00	824,000.00	206,000.00	

7.3 Spending plan per reporting period

	EU partners (ERDF)		Total	
	Total	Programme co-financing	Total	Programme co-financing
Period 1	165,000.00	132,000.00	165,000.00	132,000.00
Period 2	165,000.00	132,000.00	165,000.00	132,000.00
Period 3	180,000.00	144,000.00	180,000.00	144,000.00
Period 4	165,000.00	132,000.00	165,000.00	132,000.00
Period 5	165,000.00	132,000.00	165,000.00	132,000.00
Period 6	190,000.00	152,000.00	190,000.00	152,000.00
Total	1,030,000.00	824,000.00	1,030,000.00	824,000.00