Final report

Please attach relevant pictures from the project as a separate file (.png or .jpeg/.jpg).

1. Project details

Project title	IEA Bioenergy Task 37 Energy from Biogas
File no.	64019-0062
Name of the funding scheme	EUDP
Project managing company / institution	BIOSANTECH
CVR number (central business register)	33685041
Project partners	
Submission date	23 April 2024

2. Summary

English: IEA Bioenergy Task 37 is an international partnership under the International Energy Agency - IEA (www.iea.org), whose purpose is international cooperation, dissemination of knowledge and research results in the production and use of biogas from AD, via circular economy processes, to displace fossil fuels, decarbonisation of society and environmental improvement. The project period 2019-2021 has focused on three major topics: 1) The role of biogas in energy systems; 2) The sustainability of biogas systems and methods to ensure good practice; 3) Integration of biogas in technological processes. The project has resulted in the publication of nine scientific biogas reports, data collection on biogas upgrading in the member countries, updates regarding biogas production and use in member countries via annual country reports as well as publication of fourteen biogas case stories from the member countries, of which five of the published case stories were from Denmark. Several research-based international biogas workshops were organized in connection with the periodic task meetings. The above project results have been disseminated mainly as online

publications and are available for free download from the Task 37 website http://task37.ieabioenergy.com . Further dissemination of results took place through the periodic task meetings and the support activities linked to these meetings. In Denmark, the project results were disseminated via the project's website www.dffb.dk .

Project partners/Task Member Countries: Australia, Austria, Brazil, Canada, China, Denmark, Estonia, Finland, France, Germany, India, Ireland, Italy, Korea, Norway, Sweden, Switzerland, The Netherlands, United Kingdom.

Danish: IEA Bioenergy Task 37 er et internationalt partnerskab under Det Internationale Energiagentur - IEA (www.iea.org), hvis formål er internationalt samarbejde, formidling af viden og -forskningsresultater indenfor produktion og anvendelse af biogas fra AD, via cirkulære økonomiprocesser, til erstatning af fossile brændstoffer, de-karbonisering og miljøforbedring. Projektperioden 2019-2021 har fokuseret på tre store emner: 1) Biogassens rolle i energisystemer; 2) Bæredygtigheden af biogassystemer og metoder for at sikre god praksis; 3) Integration af biogas i teknologiske processer. Projektet har resulteret i publicering af ni videnskabelige biogas rapporter, dataindsamling om biogasopgradering i medlemslandene, opdateringer vedr. biogas produktion og anvendelse i medlemslande via *country reports* samt fjorten biogas *case stories* fra medlemslandene, herunder fem *case stories* fra Denmark. Der blev organiseret en række forskningsbaserede internationale biogas workshops, i forbindelse med de periodiske task-møder. Disse projektresultater er blevet formidlet som online publikationer, og kan downloades gratis fra Task 37 hjemmeside http://task37.ieabioenergy.com. Yderligere formidling af resultater foregik også via de periodiske task-møder samt de støttende aktiviteter sammenkoblet til møderne. I Danmark blev projektresultaterne formidlet via projektets hjemmeside www.dffb.dk .

Projektpartnere/ Medlemslande: Australien, Østrig, Brasilien, Canada, Kina, Danmark, Estland, Finland, Frankrig, Tyskland, Indien, Irland, Italien, Korea, Norge, Sverige, Schweiz, Holland, Storbritannien.

3. Project objectives

The project period 2019-2021 had four main objectives, as briefly outlined below:

Objective 1. To promote the market deployment of technologies and systems, for sustainable energy production from biomass.

The project aimed to help provide a realistic overview of the readiness level of different conversion technologies as well as the potential benefits and impacts on the market. Furthermore, the objective was to provide an integrated technology approach and to identify the potential synergies regarding the use of biomass for energy purposes as well as the use of co-products (chemicals, fodder, fibers, mechanical wood / biomass products. For this, it was necessary to identify and characterize the R&D priorities for bioenergy, including the scientific and technical innovations needed for new and growing market, to encourage joint actions on technological innovation around bioenergy including energy driven biorefineries and job creation.

In addition, the work aimed to identify the most promising bioenergy technologies and most efficient public policies and investigate technical and non-technical barriers and incentives to the market deployment of these technologies in the context of the scenarios of the 2020-2050 low carbon society and investigate the emerging technologies for this. This also included encouraging promotion of sustainable deployment of technologies with important local, regional, and global socio-economic and environmental benefits, able to secure the energy supply and to create jobs.

The objective implies also emphasizing bioenergy as a crucial player for a sustainable environmental footprint through control of GHG emissions, better soil quality and nutrient balance, sustainable water footprint, recycling, and resource sufficiency etc.

Objective 2. To raise public awareness through communication with key stakeholders for the use of biomass as an energy source and to provide clear and verified information on bioenergy.

The project aimed to provide scientifically sound and politically and commercially independent data and information for policy makers, industry, and IEA bodies, in a format appropriate to the specific audience. It was important for the Task 37 to have a leading role in the discussion of current topics in the field of biogas and biomass for energy and to ensure communication on different levels and with different means, using various means of dissemination (website, newsletters, events, site visits etc.), as well as to exchange feedback with the relevant target groups, to gauge visibility and impact.

It is expected that this should encourage other sectors of the bio-based economy, to apply the

same stringent rules of sustainability in using biomass, like the biogas and biofuels sector.

Objective 3: To strengthen the outreach efforts of the Implementing Agreement to involve interested new member countries, their biogas industry, and multilateral organizations

The task worked to actively involve relevant industry players by organizing topical workshops with panel discussions at both the ExCo and the Task level. The industry and the associations should be encouraged to contribute to Task work, where appropriate. Inclusion of new member countries should be actively sought, herewith by inviting them as observants, to become aware of the benefits of the membership.

The work program of the task was flexible and should make possible later adjustments, to enhance cooperation with the biogas industry by addressing the topics of their interest. The task would adapt its work to enable the involvement of countries with less developed bioenergy infrastructure and expertise, while maintaining a collaboration which is attractive to internationally leading countries and experts on biogas area.

The information exchange and joint research projects at ExCo and at Task level, with other IEA Implementing Agreements, topically close to IEA Bioenergy, were part of this objective as well.

Objective 4. To enhance the dissemination of information

The main dissemination of information and of results was always the web page of the task https://task37.ieabioenergy.com , where all the scientifical reports, news and other deliverables are permanently uploaded and updated, and the content of the webpage is available for free download. The web page should therefore be kept up-to-date and increasingly integrated with the main web page of the IEA Bioenergy https://www.ieabioenergy.com .

The Member Countries were encouraged to create a national dissemination platform, or distribution list for newsletters and to periodically provide information on relevant developments, through the national bioenergy publications, newsletters, events etc.

The task members giving oral contributions to national and international workshops and conferences were encouraged to briefly mention their work for the Task 37, where appropriate.

The focus of the project period 2019-2021 was on three main areas:

1) The role of biogas in energy systems
2) The sustainability of biogas systems and methods to ensure good practice
3) Integration of biogas in technological processes

4. Project implementation

The overall scientific part of the project work was mainly implemented as initially planned, without any significant changes or disruptions.

The networking and the dissemination activities were affected by the pandemic restrictions already from the early 2020. This meant that all the meetings and the related international biogas research workshops took place online, until the end of the project

Furthermore, all the site visits, which should normally take place in the member country, hosting the respective task meeting, were cancelled due the same pandemic travel and meeting restrictions. Some task members were appointed by the Task to make conference contributions, and these were also made online, throughout the rest of the project period.

A significant change occurred also in the project partnership, as one of the Danish partners involved, DFFB, cessed its activity in 2021. DFFBs main role in the project was to disseminate the project results in Denmark, throughout a web page dedicated to IEA Bioenergy Task 37, and hosted by DFFBs main webpage.This meant that the Danish task member run the last six months of the project activity without a webpage. EUDP and ENS were aware of this situation, and a decision was made not to involve another partner to overtake DFFBs responsibilities.

The pandemic travel restrictions and the change in partnership required budget adjustments for the Danish partner. The new budgets were elaborated and approved in close collaboration with the EUDP.

5. Project results

In spite the unexpected developments brought about by the pandemic situation, the project rapidly adjusted its physical activity to the new situation. This meant that the online meetings and webinars replaced the physical ones. The online experience did not decrease the quality of the contributions, nor the impact of the workshops. On the contrary, it offered possibilities for larger audience, as no travel and accommodation expenses were involved for the attendees. As shown before, the main limitation due the restrictions concerned the cancellation of all site visits, that were normally associated with the regular meetings, and organised by the member countries hosting these meetings.

Apart from these changes, related to the pandemic restrictions, the original objectives of the project were obtained. The project achieved its milestones and some supplementary case studies were published as well. Apart from that, four new countries become members of the Task 37 during the project period. China, Italy, and Norway become task members in 2020, and India joined the membership in 2021.

As usually, the produced technical reports, case stories and webinar presentations, uploaded on the website of Task 37 https://task37.ieabioenergy.com , were received with great interest by the target groups. Measurements of the traffic on the website of the task were taken periodically, and confirmed this interest, as shown in the Table 1.

	2020 Sept.	2020 October	2020 Nov.	2020 December	2021 January	2021 Feb	2021 March	2021 April	2021 May	2021 June	2021 July	2021 August
Australia	**23 (3.7%)**	**39 (4.5%)**	**26 (3.7%)**	**13 (1.9%)**	**19 (2.4%)**	**23 (3.6%)**	**21 (3.0%)**	**21 (3.3%)**	**46 (5.4%)**	**26 (3.8%)**	**31(4.9%)**	**39 (5.6%)**
Austria	20 (3.2%)	31 (3.6%)	34 (4.8%)	29 (4.3%)	20 (2.5%)	9 (1.4%)	18 (2.6%)	13 (2.0%)	46 (5.4%)	22 (3.2%)	11 (1.7%)	20 (2.9%)
Brazil	**72(11.5%)**	**48 (5.6%)**	**44 (6.2%)**	**37 (5.4%)**	**31 (3.9%)**	**30 (4.7 %)**	**28 (4.0%)**	**26 (4.1%)**	**25 (2.9%)**	**16 (2.4%)**	**26 (4.1%)**	**22 (3.2%)**
Canada	17 (2.7%)	29 (3.4%)	23 (3.3%)	15 (2.2%)	24 (3.0)%	18 (2.8%)	28 (4.0%)	9 (1.4%)	33 (3.9%)	19 (2.8%)	14 (2.4%)	9 (1.3%)
China	**36 (5.7%)**	**55 (6.4%)**	**59 (8.3%)**	**50 (7.4%)**	**91 (11.5%)**	**95 (14.8%)**	**69 (9.9%)**	**93 (14.6%)**	**65(7.6%)**	**55 (8.1%)**	**55 (8.6%)**	**83 (12.0%)**
Denmark	8 (1.3%)	10 (1.2%)	8 (1.1%)	22 (3.2%)	12 (1.5%)	16 (2.5%)	16 (2.3%)	13 (2.0%)	21 (2.5%)	14 (2.1 %)	8 (1.3%)	9 (1.3%)
Estonia	—	**1 (0.1%)**	**1 (0.1%)**	—	**1 (0.1%)**	—	**1 (0.1%)**	—	**3 (0.4%)**	**1 (0.2%)**	**1 (0.2%)**	**2 (0.3%)**
France	25 (4.0%)	30 (3.5%)	31 (4.4%)	30 (4.4%)	26 (3.3%)	29 (4.5%)	27 (3.9%)	13 (2.0%)	32 (3.7%)	63 (9.2%)	20 (3.1%_	28 (4.1%)
Finland	**26 (4.2%)**	**32 (3.7%)**	**40 (5.7%)**	**30 (4.4%)**	**39 (4.9%)**	**26 (4.0%)**	**22 (3.2%)**	**10 (1.6%)**	**28 (3.3%)**	**18 (2.6%)**	**15 (2.4%)**	**32 (4.6%)**
Germany	29 (4.6%)	38 (4.4%)	21 (3.0%)	30 (4.4%)	43 (5.4%)	35 (5.4%)	30 (4.3%)	33 (5.2%)	42 (4.9%)	30 (4.4%)	33 (5.2%)	41 (5.9%)
India	**18 (2.9%)**	**25 (2.9%)**	**25 (3.5%)**	**21 (3.1%)**	**20 (2.5%)**	**15 (2.3%)**	**26 (3.8%)**	**28 (4.4%)**	**40(4.7%)**	**19 (2.8%)**	**27 (4.2%)**	**29 (4.2%)**
Ireland	26 (4.1%)	42 (4.9%)	48 (6.8%)	21 (3.1%)	29 (3.7%)	25 (3.9%)	32 (4.6%)	29 (4.5%)	27 (3.2%)	17 (2.5%)	28 (4.4%)	14 (2.0%)
Italy	**22 (3.5%)**	**20 (2.3%)**	**22 (3.1%)**	**23 (3.4%)**	**21 (2.7%)**	**14 (2.2 %)**	**16 (2.3%)**	**24 (3.8%)**	**26 (3.0%)**	**14 (2.1%)**	**22 (3.5%)**	**18 (2.6%)**
Korea	5 (0.8%)	10 (1.2%)	7 (1.0%)	2 (0.3%)	9 (1.1%)	5 (0.8%)	14 (2.0%)	7 (1.1%)	15 (1.8%)	7 (1.0%)	7 (1.1%)	7 (1.0%)
Norway	**18 (2.9%)**	**12 (1.4%)**	**8 (1.1%)**	**11 (1.6%)**	**11 (1.4%)**	**13 (2.0%)**	**11 (1.6%)**	**8 (1.3%)**	**10 (1.2%)**	**10 (1.5%)**	**7 (1.1%)**	**7 (1.0%)**
Sweden	14 (2.2%)	16 (1.9%)	29 (4.1%)	18 (2.7%)	17 (2.2%)	17 (2.6%)	12 (1.7%)	13 (2.0%)	20 (2.3%)	11 (1.6%)	6 (0.9%)	7 (1.0%)
Switzerland	**14 (2.2%)**	**16 (1.9%)**	**15 (2.1%)**	**9 (1.3%)**	**9 (1.1%)**	**12 (1.9%)**	**5 (0.7%)**	**8 (1.3%)**	**22 (2.6%)**	**13 (1.9%)**	**8 (1.3%)**	**10 (1.5%)**
Nether-lands	34 (5.4%)	53 (6.1%)	28 (4.0%)	32 (4.7%)	50 (6.3%)	42 (6.5%)	29 (4.2%)	21 (3.3%)	44 (5.2%)	37 (5.4%)	19 (3.0%)	28 (4.1%)
United Kingdom	**33 (5.3%)**	**82 (9.5%)**	**54 (7.6%)**	**46 (6.8%)**	**52 (6.6%)**	**39 (6.1%)**	**56 (8.1%)**	**37 (5.8%)**	**49 (5.7%)**	**49 (7.2%)**	**29 (4.6%)**	**49 (7.1%)**
Total users	626	864	708	679	789	643	693	638	851	679	634	690
United States	66(10.5%)	122 (14.1%)	54 (7.6%)	79 (11.6%)	85 (10.7%)	55 (8.5%)	67 (9.7%)	79(12.4%)	110 (12.9%)	95(13.9%)	149 (23.4%)	118 (17.1%)

Table 1: Traffic by country for the 12-month period, from 1st September 2020 to 31st August 2021

Concerning the Danish participation, four milestones were set and fulfilled as highlighted below:

M1: Contributions to the periodical Task Meetings. Denmark attended all task meetings and prepared and submitted the necessary documents. The first meeting, held in Seoul / Korea in November 2019 was attended physically, and the subsequent meetings were all held online. At these meetings, a short oral country update was given.

M2: Country Report updates were produced as ppt and as Word versions, to illustrate the developments of the Danish biogas sector and the Danish energy, environment, and climate policies. The information in the country report is always one year behind, as it is based on the previous year's statistics and data available from the published governmental biogas and energy policies, official statistics, communication with Danish stakeholders, herewith the Danish Energy Agency, and the Danish Biogas Organization, with biogas experts and scientists from public bodies and research institutions, etc. Due to the pandemic situation, data collection was more difficult for member countries in 2021, so the latest compiled Word version of country reports, uploaded on the web page is from 2020 and based on data from 2019 (see 8. Appendices).

	Ten most downloaded documents 1st September 2020 to 31st August 2021	**Downloads**
1	IEA Task 37 Country Report Summaries 2019	631 (16%)
2	Integration of Anaerobic Digestion into Farming Systems In Australia, Canada, Italy and the UK, August 2020	211 (5.4%)
3	Integration of biogas systems into the energy system: Technical aspects of flexible plant operation, August 2020	196 (5%)
4	Green methanol from biogas in Denmark- a versatile transport fuel, Nov. 2020	155 (4%)
5	Drivers for Successful and Sustainable Biogas Projects: International Perspectives: Report of a symposium held on March 26, 2020	124 (3.2%)
6	Production of food grade sustainable CO2 from a large biogas facility GO'CO2 at The Korskro Biogas Plant, Denmark, November 2020	114 (2.9%)
7	Food waste digestion: Anaerobic Digestion of Food Waste for a Circular Economy, December 2018	85 (2.2%)
8	Compact and automated on-farm biogas production in Southwestern Ontario, Canada, April 2020 Case Story Canada	83 (2.1%)
9	The role of anaerobic digestion and biogas in the circular economy, August 2018	77 (2%)
10	Two page summary – Integration of biogas systems into the energy system: Technical aspects of flexible plant operation, August 2020	72 (1.8%)
	Downloads total	3936

Table 2: Ten most downloaded documents for a 12-month period (1st Sept. 2020 to 31st Aug. 2021)

M3: Publication of 1-2 Case stories from Denmark, on the web page of Task 37. This was done in close collaboration with the task members, who approved the proposed cases from each country. Although only two cases stories were scheduled to be published from Denmark, five cases from Denmark were selected by the task members and were published during the project period. This confirms, once again, the great international interest for the actual biogas developments in Denmark. This interest is also illustrated by Table 2, showing that two Case stories from Denmark are in position four and respectively six, in the top ten of the most downloaded documents.

4) Periodical activity reports to EUDP, including present final reporting and external audit report, were all elaborated and submitted in due time.

The target groups for dissemination of activities and results of the activities of the task were set to be decision makers, politicians, biogas plant operators, biogas experts, researchers, financial companies and other investors, farmers, agro-industries, biogas industry, municipalities and local authorities, waste companies, local businesses, the public at large. To all of them, the activities of the Task 37 facilitated access to the most recent research results and scientifical knowledge about anaerobic digestion systems and their application via circular economy processes to decarbonization and environmental improvement.

The Task works with broad international collaboration, addressing issues and disseminating research results of importance for the Danish biogas development and energy strategy of the future. The content of the work programme was tailored by the Task 37 members to suit the interest areas of all member countries, including Denmark. The topics and objectives of the work were in line with the objectives of Green Growth (Grøn Vækst) plan and with the long-term Danish Energy Strategy, aiming to replace completely the fossil fuels from the energy supply by 2050 and to enhance the production of biogas. The broad international collaboration, made possible through the activities of the task, has supported this move, through joint international efforts of research sharing, networking, information, and knowledge dissemination, at all levels.

Participation to the task collaboration offered member countries the possibility of interacting with a broad spectrum of biogas experts from different countries, thus increased opportunities for further collaboration as well as a consolidated interaction platform, with influence on the future path of biogas development around the world, and from where the Danish biogas concepts, knowledge, know-how and expertise are and will be made even more internationally visible, for the benefit of the Danish biogas industry and for its technology and knowhow export potential.

Published technical reports

(Available for free download from http://task37.ieabioenergy.com/technical-brochures.html

- Drivers for Successful and Sustainable Biogas Projects: International Perspectives Report of a symposium held on March 26, 2020

- Two-page summary – Integration of biogas systems into the energy system: Technical aspects of flexible plant operation; August 2020

- Integration of biogas systems into the energy system: Technical aspects of flexible plant operation; August 2020

- Two-page summary - Integration of Anaerobic Digestion into Farming Systems In Australia, Canada, Italy and the UK; August 2020

- Integration of Anaerobic Digestion into Farming Systems in Australia, Canada, Italy and the UK; August 2020

- Two-page summary - Potential and utilization of manure to generate biogas in seven countries: June 2021

- Potential and utilization of manure to generate biogas in seven countries: June 2021

- Two-page summary – Renewable Gas – discussion on the state of the industry and its future in a decarbonized world; November 2021

- Renewable Gas – discussion on the state of the industry and its future in a decarbonized world; November 2021

Collaboration with other IAE Bioenergy tasks:

1. Task 41 special project on Hydrogen in the grid: European Commission DG Energy, IEA Hydrogen, IEA Task 40 (Deployment of biobased value chains) and 45 (Climate and Sustainability effects of bioenergy within the broader bioeconomy)
2. Renewable Gas co-operation with Task 40.
3. *D8* "Integration of Biogas Systems into the Energy System: Technical aspects of flexible plant operation," associated with Task 44 (Flexible bioenergy and system integration)

Dissemination of results

By internet web page

Main dissemination of results took place through the uploaded technical reports, case stories, country updates and other information on the web page of Task 37 http://task37.ieabioenergy.com .

By events:

1) *Workshops and webinars organised by the Task 37 during the project period (Details available from: http://task37.ieabioenergy.com/workshops.html):*

- 8th International Renewable Energy Conference 2019, COEX, Seoul, Korea, October 10th, 2019
- Online: International Perspectives Symposium 2020: Drivers for Successful and Sustainable Biogas Projects, In association with Canadian Biogas Association; March 26th, 2020.
- Online: Biomass to energy in Switzerland: Achievements and Perspectives, Centre General Guisan, Pully and Switzerland, September 10th, 2020.
- Online: Workshop Biomethane: Timely solutions for successful implementation and use; Organised by the University of Natural Resources and Life Sciences IFA Tulln, Austria, April 15th, 2021

2) *Events organised by task members:*

- On-line: Flexible biogas systems" Richard O'Shea, Jan Liebetrau and Jerry D Murphy presented at Central European Biogas Conference Graz Austria at a workshop held by IEA Bioenergy Task 44, 24 jan 2020

- Online webinar: Bioenergy Australia "Decarbonizing the gas network - potential, projects and policies" - 6 May 2020. Presenters: Jerry D Murphy, Claus Mortensen, Ole Hvelplund and Joshua Moran.

- Online webinar: *Integration of Biogas Systems into the Energy System: Technical aspects of flexible plant operation*, Presenter & Moderator: Prof Jerry Murphy, Presenter: Dr.-Ing. Jan Liebetrau

By Social Media

Twitter:

Dissemination of results and information about the task activities was done through the Twitter Account @JerryDMurphy66 Professor and Chair of Civil Engineering, UCC. Director of SFI MaREI Centre. Task Leader of International Energy Agency Bioenergy Energy from Biogas, with 2009 followers and 875 following.

6. Utilisation of project results

In most countries of the world, the energy policies are promoting production and use of renewable energy and fuels, aiming the substitution of the fossil ones. Some of the main drivers of this substitution process are the need of mitigating climate changes, prevent pollution, secure the energy supply, and provide economic sustainability. Along with other renewables, there is significant interest around the world in production of biogas from anaerobic digestion of manure, wastes and other biomasses, making its deployment one of the highest energy priorities in many countries. The activities of the Task 37 are in line with this development in the member countries and around the world. In Denmark, the project is in line with the objectives of Green Growth (Grøn Vækst) plan and with the long-term Danish Energy Strategy, aiming to build a fossil free society by 2050. Such ambitious objective requires considerable development of all renewable energy sectors, biogas included. It is estimated that up to 50% of the produced animal manure in Denmark should be treated in biogas plants in the future. For this, the necessary digester capacity must be established, the operational performance improved, new markets and technologies for gas and digestate utilization developed.

The new role of the biogas sector, as an important player in the circular economy, will be to provide balance, in a wind dominated energy sector, to contribute to security of energy supply, as well as to provide food safety and environmental protection. The international collaboration, taking place within the frames of Task 37, supports this move, through joint international efforts of research sharing, networking, information and -knowledge dissemination at all levels. The EU energy policies are also accommodated by the project, more specific the renewable energy objectives (Renewable Energy and implementation of the 2009 EU Renewable Energy Directive), agriculture (rural development) and the environment (climate change and the implementation of the 2008 EU Waste Framework Directive).

7. Project conclusion and perspective

The adoption of anaerobic digestion (AD) has grown in all Task 37 member countries over the last decades, albeit at different rates. In all cases, renewable energy targets and climate change policies have been the dominant drivers that have enabled growth.

The participation to the task 37 offered the task members and the involved stakeholders a consolidated and open interaction platform, with influence on the future path of biogas development, in the member countries, and around the world. From this platform, the Danish biogas concepts, knowledge, know-how and expertise has been and will be made even more internationally visible, for the benefit of the Danish biogas industry technology and for its knowhow development and export potential.

A new Task 37 project triennium (2022-2024) is ongoing. The work will build further on the knowledge and experience accumulated during the previous activity trienniums, ensuring continuity, and enhancing the power of impact on the future development of biogas around the world.

There are around 20000 small- and large-scale installations, operating in China, and around 42 million of micro-scale digesters, operating at households. It is estimated that around 150 million households in China are suitable for the establishment of micro installations. In India there are close to 5 million small and micro scale installations. These countries, as well as Australia and Brazil, with enormous biogas potential, have joined the membership of the Task 37 during the last years, proving once again that the work done by the task members is of highest relevance for the deployment of biogas around the world.

8. Appendices

8.1.1

Country Reports: **IEA Bioenergy Task 37 Country Report Summaries 2019**
Available from: IEA Task 37 Country Report Summaries 2019 (1).pdf

Case Story Denmark: **Green methanol from biogas in Denmark a versatile transport fuel, November 2020;** Available from: Case Story DK_Green Methanol_web.pdf

Case Story Denmark: **Deep bedding: a co-digestion substrate with significant potential Danish experience with handling and feeding deep bedding, November 2020.**
Available from: Case Story Deep Bedding_Nov 2020.pdf

Case Story Denmark: **Production of food grade sustainable CO2 from a large biogas facility GO'CO2 at The Korskro Biogas Plant, Denmark, November 2020;**
Available from: Case Story CO2 recovery Denmark November 2020.pdf

Case Story Denmark: **Organic biogas improves nutrient supply, Kroghsminde Bioenergy I/S, Denmark February 2019;**
Available from: IEA_Organic Biogas Denmark_Case Story_end.pdf

Case Story Denmark: **Greening the gas grid in Denmark, February 2019;**
Available from: IEA_Greening the Gas Grid_end.pdf

There are furthermore nine technical publications, as listed in *Part 5 Project results*. All of them are available for free download from http://task37.ieabioenergy.com/technical-brochures.html

OBS: Group picture from the virtual task meeting of November 2021 is sent as a separate file