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DELIVERABLE 5.2.

DEPLOYMENT PLAN AND ROADMAP FOR REPLICATION (FINAL REPORT)

DELIVERABLE TYPE
Report

MONTH AND DATE OF DELVERY
Month 36 I March 2022

WORK PACKAGE
WP 5

LEAD
TUD

DISSEMINATION LEVEL
Report I Public

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PROGRAMME
H2020

CONTRACT NUMBER
837626

DURATION
36 Months

START
April 2019

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Revision History

Version	Date	Reviewer	Modifications
v.1	03.03.2022	Alex Gabriel (ULOR)	Number of short-term programmes participants

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INDEX OF CONTENTS

INDEX OF TABLES

INDEX OF FIGURES

1.   Summary

SMAGRINET operational objective is to update, develop and implement a capacity building programme (CBP) for boosting the research, innovation and education for energy transition.

This report is part of the Work Package 5 "Deployment, replication and exploitation" of the SMAGRINET project. It describes the work carried out under the T5.1 Deployment plan and roadmap for replication. The first version - initial report of the deployment plan and roadmap for replication was delivered in M12 (D5.1). The current document is the final report, which presents the existing model of deployment - expanding the programmes to more countries.

The **SMAGRINET Deployment plan and roadmap for replication report (initial)**, described in the first version (D5.1) developed during the first phase of the project (M12), is the document which included concrete actions to achieve the multiplier effect and enlarge the network of organisations interested in implementing the capacity building programmes.

The **SMAGRINET Deployment plan and roadmap for replication report (final)** is the improved and finalised initial report based on the results of the second phase of the project.

The plan and roadmap include concrete actions to achieve the multiplier effect. The activities were started in the middle of the project and included train-the-trainers' workshop, network building and experience exchange activities, on-line live sessions, as well as annual conferences during the period 04.2020 – 03.2022.

The initial deployment plan was updated regularly during the first and second project implementation phases based on the lessons learnt in establishing the competence hub for collaboration and knowledge sharing, developing and piloting the capacity building programmes. The existing model is described in the final report (D5.2 – current document).

2.   Introduction

Through taskforce meetings, Telcos, desk analysis, the **first version of the SMAGRINET Deployment plan and roadmap for replication report** was completed in M12 (D5.1). During the second and third year of the project, the plan and roadmap were regularly reviewed and updated according to the activities and needs of other related tasks, resulting in the second version of the report in M35 (final report).

The main objective of the first document (D5.1 – initial report) was to outline the deployment plan and replication roadmap of the whole project in order to achieve the multiplier effect, enlarge the network of organisations interested in implementing the capacity building programmes. The final version of the Deployment Plan and roadmap of replication (current document D5.2) – contains updated activities, actions and timing to describe the existing model of replicating and deploying the assets of SMAGRINET.

The aim of the deployment plan and roadmap of replicability is to **assure the replicability** of the project results, concretize the value of the project and suggest actions **to find 4 organisations beyond the consortium to take up the short-term programmes** during the lifetime of the SMAGRINET project and attend the 2-days train-the-trainers workshop. The trainers of these target organisations from 4 countries received online manual and support (deployment package) and were prepared under the train-the-trainers pilot before the start of the second piloting round of the SMAGRINET programmes.

Replication of the capacity building programmes. The stakeholder network has been asked to disseminate information regarding the capacity building programmes in their networks and to target further organisations interested in the uptake of the programmes. This process had two main benefits for the project - the recommendations of the Competence Hub allowed to identify new organisations interested in the uptake of the programmes that also leads to the enlarged number of contacts in the Competence Hub.

Note: This document is the final version of SMAGRINET Deployment Plan and roadmap of replication, developed at the end of the project´s third year activities (M35) based on the initial report, delivered in M12. The initial report included suggestions regarding the outreached regions to take up the short-term programmes, as well as concrete actions to achieve the multiplier effect and answered the following questions:

➢ How to reach, involve and engage different target groups to the project activities during the project term
➢ Which channels for replication to use and how
➢ How to measure the expected impacts (KPIs) of deployment and replication
➢ What are the concrete activities
➢ Who is responsible for which activity

3. SMAGRINET competence hub and capacity building programmes

Table 1 depicts the main relationships of this deliverable to other activities and deliverables developed within the SMAGRINET project.

Table 1: Relation to other activities in the project

Deliverable No	Contributions
D2.1	List of stakeholders
D2.4	Report on the network building and experience exchange activities
D3.2	Modules' pilot report (1)
D3.3	Modules´ pilot report (2)
D3.6	Modules´ pilot evaluation and updated modules (1)
D4.1	Short-term programmes
D4.2	Short-term programmes´ pilot report (1)
D4.4	Short-term programmes´ evaluation and updated programmes (1)
D5.1	Initial deployment plan and roadmap for replication
D5.3	Deployment package
D5.4	Train-the-trainers´ pilot report
D6.3	web portal
D6.7	First annual conference

3.1. SMAGRINET Competence Hub

Main characteristics of the competence hub and its actors:
Establishing the competence hub for collaboration and knowledge sharing and engagement of the stakeholders (ecosystem integration). The competence hub operates via SMAGRINET web portal (D6.3), where the resource base (T2.2) and matrix of challenges (T2.3) is integrated, addressed in T2.4.
Network building and experience exchange activities and all WP3-WP6 capacity building and dissemination actions. The competence hub is integral to the whole project, so it is a living framework for all WP3-WP6 capacity building and dissemination actions, gradually enlarging the stakeholder engagement and building on the results of the project.

The concrete types of stakeholders in the mapped list are:
1. Distribution system operators
2. Ministries

3. Municipality bodies of larger cities
4. Production of Electricity
5. Trade for Electricity and Energy
6. Transmission System Operators
7. Universities

During the first period of the SMAGRINET project, the consortium organized 9 national workshops "Electrical Engineers for Smart Grid – needs mapping and experience exchange", incl. events organised within major conferences, as well as 5 thematic roundtables, where members of the competence hub actively participated. The main conclusions of the workshops and roundtables:

➢ the main barrier for implementing Smart Grid Solutions or Technologies is the availability of sufficiently qualified specialists;
➢ Smart Grid specific education should start at the electrical and power engineering masters' level.

The competence hub is providing services, activities, events and opportunities for European universities, municipalities and energy industries to enhance their capacity in energy research and innovation to tackle the smart grid energy transition. The competence hub, entitled POWER ON, is operated via the SMAGRINET web portal (https://www.smagrinet.eu/).

3.2. SMAGRINET Capacity Building Programmes

Brief description in which countries the programmes have been implemented and the students' participation:

<u>3 case-based master level modules:</u> **First academic year/phase:** Six consortium universities designed three case-based modules as listed in Table 2. All partners finished the first round of implementation accordingly: TUB (Germany) with **17 students**, KTU (Lithuania) according to their evaluation forms with **8 students.** ULOR with **17 students,** TalTech (Estonia) with **19**, ULJUB (Slovenia) with **10**. TUD (Germany) implemented the first phase of the module in the second academic year, due to the coronavirus situation, and registered **10** participants.

Second academic year/phase (second and third piloting phases). In the second academic year TalTech, TUB and KTU implemented two pilots, TUD, ULOR and ULJUB one pilot. In the second (09.2020 – 12.2021) and third (09.2021 – 02.2022) piloting phases, lectures and exercise sessions were mainly led by the local teaching staff at each university, with the aid of the Train the Trainers materials and the results from the first pilot. **98 students** participated in modules pilots during the second project phase and **61** in the third phase.

In total, **240 students** participated in piloting the modules during the first and second project phases (first, second and the third piloting phases).

Table 2: Allocation of the modules

Module title	Responsible universities
Module 1 "Artificial Intelligence in a Smart Grid with Prosumers"	Kaunas University of Technology (KTU)
	Technische Universität Dresden (TUD)
Module 2 "Economic Operation and Societal Challenges"	Université de Lorraine (ULOR)
	Tallinn University of Technology (TalTech)
Module 3 "Connection Planning in Smart Grids"	Technische Universität Berlin (TUB)
	University of Ljubljana (ULJUB)

<u>3 short-term blended learning programmes</u> **(duration 3 months)** for different target groups (engineering workforce, early stage researchers and engineering researchers beyond the universities, broader public):
First academic year/ phase - the 3 short-term programmes were provided by the **consortium universities targeting** the respective **target groups in their 5 countries**. Each pilot for each target group in each pilot country included 2 online

live sessions. All together **583 participants** were enrolled to the courses, and **216 participants** were fully certified.

Starting from the **second academic year/project phase (09.2021 – 03.2022)** uptake of the short-term programmes was done by additional **4 organisations from 2 different MS/AMS countries beyond the consortium** (Poland, Ukraine). NOVA School of Science and Technology, Portugal and Norwegian University of Science and Technology have disseminated the programmes to their students, partners and relevant organisations, such as IEEE. As a next step the pilot in the Netherlands and in Czech Republic is planned (course instances in LMS Canvas have been created).

On-line live sessions were organised in these countries with participation of local universities in the implementation, supervised by TUD together with ULOR and TUB. In total, **11 on-line live sessions** were organised, incl. **3 common** on-line live sessions (Germany - France – Ukraine) and **Workshop for broader public** during the International Conference "Information and communication technologies in modern education: experience, problems, prospects", Live broadcast from Lviv (05.11.2021). **In total 457 participants** joined the online live sessions from the organisations beyond the consortium and from Germany and France (3 common online live sessions Germany-France-Ukraine). In addition, the 3 short-term programmes pilots were implemented by the **6 consortium universities in their 5 countries.** Each pilot for each target group in each pilot country included 2 online live sessions, TUD, TUB and ULOR organised **3 common online live sessions**. During the second academic year, **901 persons** have registered *(this number does not include the number of TalTech's pilot participants joined the course outside LMS Canvas in Estonian language)* and **576 participants** really followed the courses implemented by **10 organisations** within and beyond the consortium, where **291 participants** were fully certified.

The trainers from organisations from countries beyond the consortium received on-line manuals and support (deployment package) and were prepared under the train-the-trainer's workshop (11.2020). There were **20 participants from 7 organisations** beyond the consortium from 5 different countries **(Poland, Portugal, Ukraine, the Netherlands and Estonia)** and **50 participants** from Consortium Universities and project partners. Total number of participants of the **train-the-trainer's workshop was 70.**

4. Evaluation results of the programmes

Lessons learnt from the implementation of the capacity building programmes:

The biggest challenge was to involve participants in each programme. Based on the programmes' evaluation and participants' feedback, following activities were undertaken to increase the number of participants of the short-term programmes:

1) language of the course/module should be translated in their mother tongue:

For example, UROL included the subtitles in French language and French voice-over to the videos in YouTube. Subtitles in Estonian language have been included by TalTech, and also the SMAGRINET's smart grid training course in Estonian is now part of Estonian national re-educational programme.
Partners are trying to achieve the sustainability of the project materials and looking for the opportunities to translate course materials into the local languages.

2) In addition to the Train-the-Trainers Workshop, support for organisations beyond the consortium such as conducting an on-line meeting with consortium experts to kick-start the launch of the short-term programme recommended.

For example, TalTech, TUB, TUD and ULOR organised a meeting with organisations beyond the consortium from Portugal, Poland and Ukraine in November 2020, as well as a series of meetings conducted in June – August 2021.

List of organisations:
- Universidade Nova de Lisboa (FCT NOVA)
- The Silesian University of Technology
- O.M.Beketov National University of Urban Economy in Kharkiv

3) Improvement of the communication strategy

This includes holding the SMAGRINET workshops for different target groups within the relevant conferences / events / exhibitions (i.e. City Day, STEM events for pupils, cooperation with support groups in engineering education etc.). A workshop for broader public was organised in November 2021 (Live broadcast from Lviv). To disseminate the course announcements among the experts such networks as LinkedIn and relevant groups in Telegram were used, as dissemination in social networks works well for broader public. One more way to promote the courses was dissemination in IEEE Power and Energy chapter and VDE Association for Electrical, Electronic & Information Technologies.

4) Involvement of industrial partners to present an industrial point of view concerning smart grid during the on-line live sessions (i.e. VDE Association for Electrical, Electronic & Information Technologies (Germany)) is recommended to increase an awareness of Smart Grid implementation of the industrial sector.

5) The topic "Energy Community" could be added to the programmes and has been discussed during the question and answering sessions within the on-line live sessions. Especially, the topic is interesting for broader public to understand how residents can contribute to the energy transition.

6) Continuous support and communication with participants of the short-term programmes via LMS Canvas "Announcements" and "Discussions" is needed to keep them motivated to learn. Consortium has provided participants with project updates, additional explanations of the requested topics (i.e. Quiz 3.3.3) and answered on all corresponding questions. The agenda of the on-line live sessions was announced in advance via LMS Canvas module "Announcements".

5. Outreach regions of the programmes

3 case-based master's level modules: During the first and second academic years the modules were taught by the leading experts of the **consortium** who were rotating between the **6 consortium universities from 5 project countries.**

In the first phase (01.2020 – 12.2020) of the project, the modules were implemented by all consortium universities.
In the second phase TalTech, TUB and KTU implemented two pilots (09.2020 – 02.2022), TUD, ULOR and ULJUB one pilot (02.2021 – 12.2021).

3 short-term blended learning programmes for different target groups (engineering workforce, early stage researchers and engineering researchers beyond the universities, broader public):
First academic year/ phase - the 3 short-term programmes were provided by the **consortium universities targeting** the respective **target groups in their 5 countries**. Each pilot for each target group in each pilot country included 2 online live sessions. All together **583 participants** were enrolled to the courses, out of whom **216 participants** successfully completed the courses.

Starting from the **second academic year/phase (09.2021 – 02.2022)** programmes were expanded to 4 more organisations from **Poland and Ukraine:**

- Silesian University of Technology, Poland / Faculty of Electrical Engineering / Department of Power Electronics, Electrical Drives and Robotics / Department of Power System & Control
- O.M.Beketov National University of Urban Economy in Kharkiv, Ukraine / Department of Urban Electricity Supply and Power Consumption Systems
- Lviv State University of Life Safety, Ukraine
- National Power Company UKRENERGO, Ukraine

All together **1484* participants** were **enrolled** to the courses, where **264 from organisations beyond the consortium**. All together **507* participants** were fully certified, where **141 from organisations beyond** the consortium. *(*this number does not include the number of TalTech's pilot participants joined the course outside LMS Canvas in Estonian language)*

During February 2022, KTU runs contact 2-weeks courses with **electricity network operators**, which are based on SMAGRINET material. The work takes place in laboratories and the lectures leads contact lectures. **96 participants** take part in these courses.

Other mapped organisations, involved into the dissemination process (course instances in LMS Canvas have been created) were:

- NOVA School of Science and Technology, **Portugal** / Centre of Technology and Systems (besides students and researchers, information has been disseminated in the IEEE Power and Energy chapter)
- NTNU: **Norwegian** University of Science and Technology / Faculty of Information Technology and Electrical Engineering / Department of Electric Power Engineering (information disseminated to students and researchers)

As a next step the dissemination in **the Netherlands and in Czech Republic** is planned (course instances in LMS Canvas has been created). See Figure 1 and Table 3.

Four international students' mobility internship programmes and roadshows between the academia and industry held in **Belgium and will be held online in organisations from Norway and from the United Kingdom of Great Britain and Northern Ireland**:

1. SMAGRINET International Mobility Programme facilitated internships in companies during the summer of 2021.
Participants: **6** Module 1 and 3 students from ULJUB, KTU, TUD, TUB
https://www.smagrinet.eu/newsflash/blog/smagrinet-mobility-program-going-to-the-road-/

2. SMAGRINET International Mobility Programme Roadshow in Brussels/Paris
Participants: **22** Module 2 students from ULOR and TALTECH, Oct 26th, 2021
https://www.smagrinet.eu/newsflash/blog/smagrinet-mobility-program-continued-this-month-with-the-first-smagrinet-roadshow-/

3. SMAGRINET International Mobility Programme Roadshow in Estonia on November 14-18, 2021
Participants: **15** Module 1 and 3 students from ULJUB, KTU, TUD, TUB
https://www.smagrinet.eu/newsflash/blog/smagrinet-roadshow-took-students-to-estonia/

4. SMAGRINET Mobility Online Session - UK & Norway, March 23, 2022 | 15-17 CET | Online
(Registration in progress. The link for the session will be provided after signing up):

"SMAGRINET is inviting you to a virtual visit to the UK and Norway. We are getting to know the UK National Grid, one of the largest investor-owned energy companies in the world - their innovation activities and challenges. On top of that, we will look into the Norwegian electrical system and its future with the Norwegian Smartgid Center".
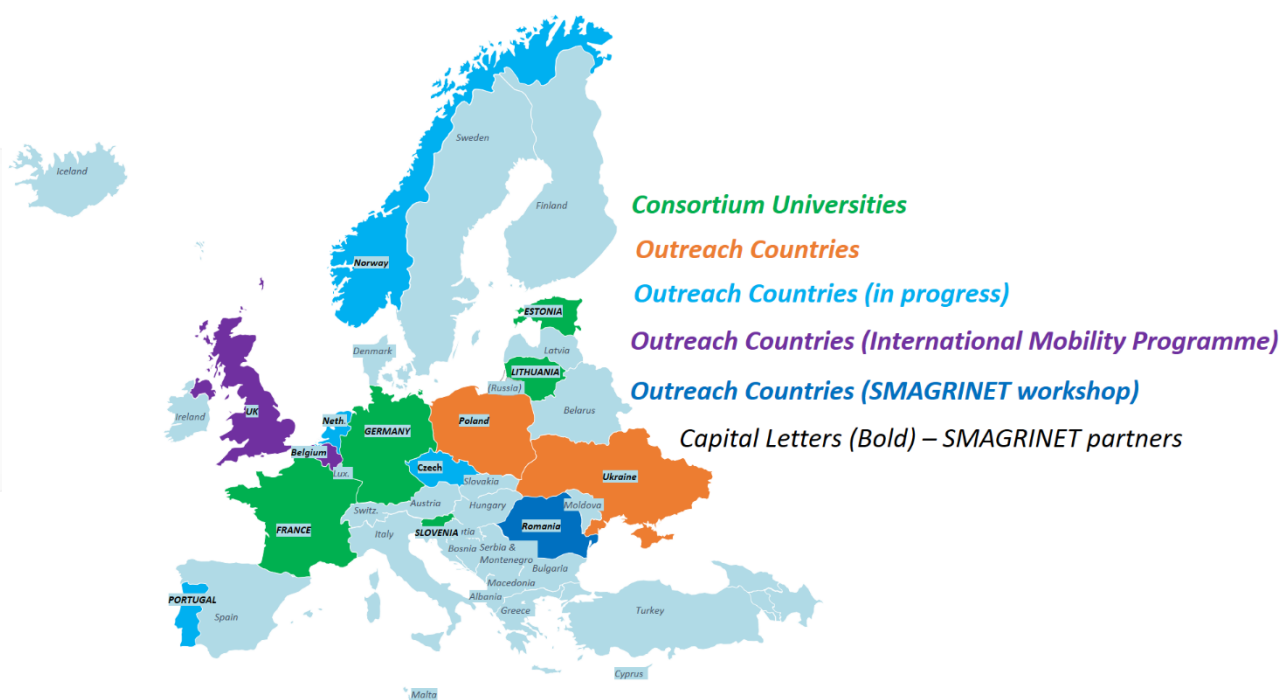
Figure 1: Map of the project outreach countries

Table 3: Outreach regions – concrete organisations cooperated / contacted (local Universities and/or organisations)

Region/country	Hub actors involved / contacted
Northern Europe	
Norway *enrolment in progress*	Norwegian University of Science and Technology / Faculty of Information Technology and Electrical Engineering / Department of Electric Power Engineering *course instances in LMS Canvas have been created*
Eastern Europe	
Poland *Ongoing pilot for researchers (until the end of February-March 2022)* *Ongoing pilot for broader public (until the end of February-March 2022)*	The Silesian University of Technology Faculty of Electrical Engineering Department of Power Electronics, Electrical Drives and Robotics
Romania	University POLITEHNICA of Bucharest, Faculty of Power Engineering, Department of Power Systems *SMAGRINET Workshop within the 2019 IEEE PES Innovative Smart Grid Technologies Europe (ISGT-Europe), Bucharest*
Czech Republic	In progress *course instances in LMS Canvas have been created*
Southern Europe	

Portugal *enrolment in progress*	Universidade Nova de Lisboa (FCT NOVA), Faculty of Science and Technology, Department of Electrical and Electrical Engineering (DEE) *course instances in LMS Canvas have been created*
Central Europe	
The Netherlands	➢ TU Delft, Faculty of Electrical Engineering, Mathematics & Computer Science, Department of Electrical Sustainable Energy ➢ EIT InnoEnergy https://www.innoenergy.com/ Participant of the Train-the-Trainers workshop *course instances in LMS Canvas have been created*
Rest of EU and associated countries	
Ukraine *Completed pilot for researchers (1st pilot: 09.2021 – 11.2021; 2nd pilot: 11.2021 – 12.2021)*	O.M.Beketov National University of Urban Economy in Kharkiv / Department of Urban Electricity Supply and Power Consumption Systems
Completed pilot for broader public (1st pilot: 09.2021 – 11.2021; 2nd pilot: 11.2021 – 12.2021)	Lviv State University of Life Safety
Completed pilot for workforce (09.2021 – 12.2021)	National Power Company UkrEnergo

Feedback from the pilots' implementation in Ukraine is presented in the Annex 1 and Annex 2 (Acknowledgment from the National Power Company UkrEnergo and from Lviv State University of Life Safety).

Photos from the SMAGRINET on-line training implementation (Course "Smart Grid from A to Z") in Lviv State University of Life Safety (Fig.2 – Fig. 5):

Представники Університету взяли участь у проєкті SMARGRINET та успішно завершили навчання на онлайн курсі Smart Grid from A to Z

Figure 2: Staff members of the department of supervision-preventive activity and fire automatic and Department of Information Technologies and Telecommunications (with SMAGRINET Certificates). Photo Credits by Lviv State University of Life Safety
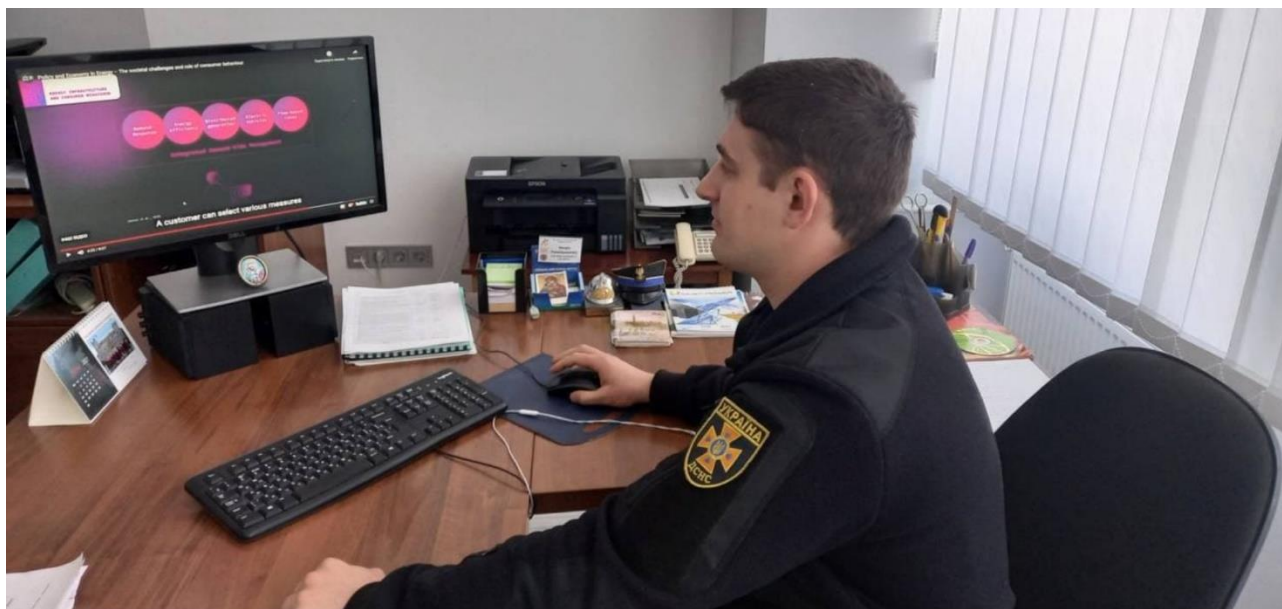
Представники Університету взяли участь у проєкті SMARGRINET та успішно завершили навчання на онлайн курсі Smart Grid from A to Z

Figure 3: SMAGRINET on-line training. Photo Credits by Lviv State University of Life Safety

Представники Університету взяли участь у проєкті SMARGRINET та успішно завершили навчання на онлайн курсі Smart Grid from A to Z

Figure 4: SMAGRINET on-line training. Photo Credits by Lviv State University of Life Safety

Figure 5: Common on-line live session of the pilots in Germany, France and in Ukraine. 01.December 2021. Zoom (screenshot).

6. Deployment Plan
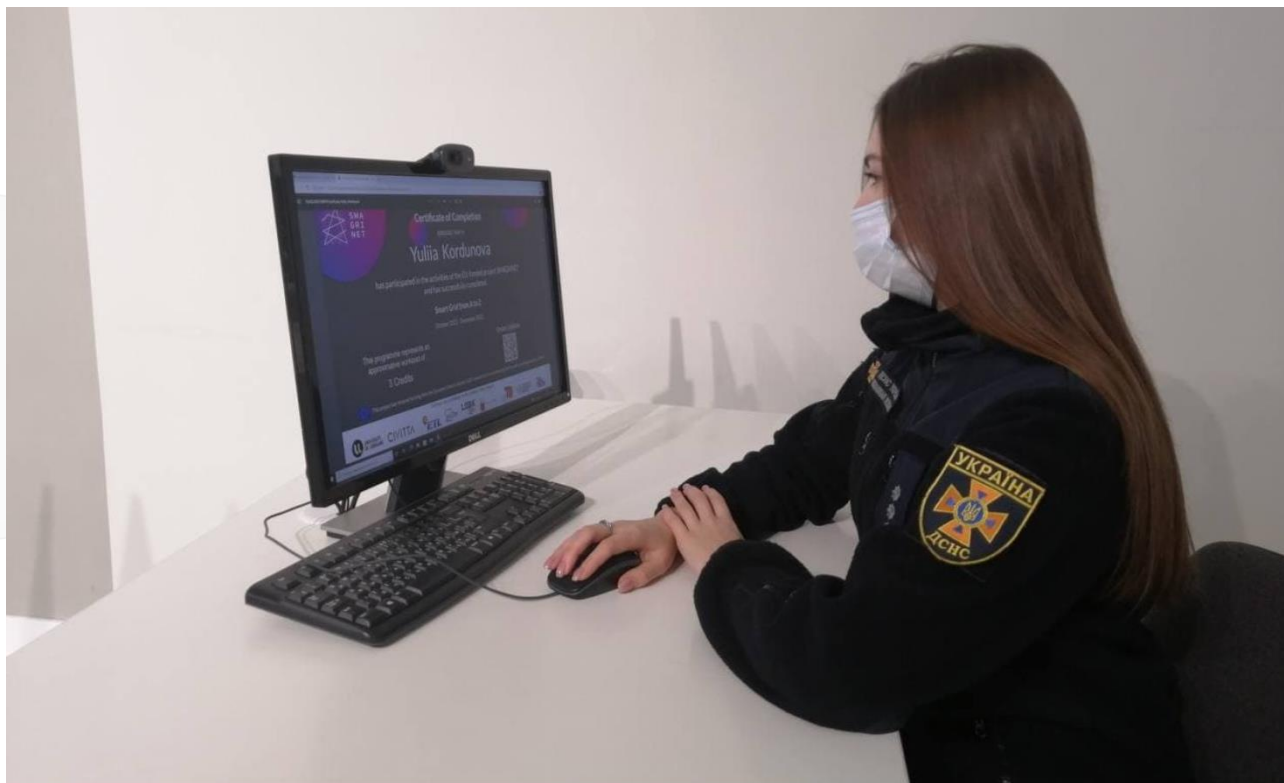
The Final Deployment Plan (Table 4) demonstrates how the network of organisations interested in implementing the capacity building programmes has been enlarged during the project lifetime, how to widen the network and ensure the sustainability after the project lifetime.

The target groups were split in 2 groups: the ones with engineering background and others:

Target groups with engineering background:
- Master's engineering students;
- Current workforce from the industry, incl. service providers, professional end users, public administration (decision makers, managers, representatives of cities and regions), engineering universities, industry representatives at large;
- Early stage researchers, engineering trainees beyond universities

Target groups with background other than engineering:
- University students with background other than engineering;
- Vocational education and applied higher education students;
- SSH (Social Sciences and Humanities) and ICT (Information and communications technology) representatives, specialists from other industry sectors, public administration (decision makers, managers, cities and regions);
- Decision makers and managers;
- Wider audience

Table 4: Deployment Plan

N	How to reach stakeholders during the project term	Type of informing	Target groups[1]	Channels	M35 KPI Status
1	To inform about the modules	on-line brochure with modules description	1,2,4-8	Project Web-site (Power On)	240 students attended the master's programmes
		Deployment package		Competence hub mailing list	735 brochures downloaded from the SMAGRINET web portal (brochure is the information presented on the web page, i.e. 735 page visits)
		Manuals for the trainers		Social networks (incl. business and employment-oriented such as LinkedIn and XING)	
		Train-the-trainers' workshop		Messaging services (Telegram relevant channels)	increased website and social media contact rates: returning visitors (11,7%); Social media: 1071 followers (Number of visits: Youtube channel: 13,096; Followers in Facebook, Twitter, LinkedIn: 1071) + 13.096 views on Youtube channel; Number of countries = 115
		Experience exchange and knowledge sharing activities (SMAGRINET Webinars)		Smagrinet Youtube Channel	
		Newsletters (2 times per year)		Direct information (face-to-face) from university teachers	new mapped stakeholders: registered participants on SMAGRINET events and number of organisations, who are interested in replication (9 workshops and 5 roundtables "Needs mapping and experience exchange" (1,515 participants), Workshop Train-the-trainers (70 participants), 1st Annual Conference "Energy Game Changers – Understanding the Value of Energy Transition"*; 2nd Annual Conference "ENERGY GAME CHANGERS 2022" (at least 100 participants are expected); 3 webinars for knowledge sharing (189 participants, 922 views on YouTube).
		Published video lectures in project Youtube channel		Direct calling via phone and direct emailing (competence hub members)	
		Project teaser (promotional video)		Sending out e-mail newsletters	* Annual Conference: Actual number of participants: 95 participants at the Worksup platform; 508 views during Facebook live; 1311 people reached in Facebook
		Published Press Releases of events		LMS Canvas (modules "Announcements" and "Discussions")	
		Public deliverables			
		Blog in the website		Communication materials (flyers, posters, rollup, toys)	
		Posts in social media, messages in Telegram channels		Participation in events for two-way communication and interaction with relevant target groups (European and national events, incl. events organised by IEEE, VDE)	40 contacts for follow up actions
		Supporting activities and initiatives: SMAGRINET Annual conference (2020, 2022)			Number of subscribers to SMAGRINET Newsletter = 1366

[1] Target groups with engineering background: 1=Master's students; 2=Current workforce from the industry, incl. service providers, professional end users, public administration (decision makers, managers, representatives of cities and regions), engineering universities, industry representatives at large; 3=Early stage researchers, engineering trainees beyond universities; Target groups with background other than engineering: 4=University students; 5=Vocational education and applied higher education students; 6=SSH and ICT representatives, specialists from other industry sectors, public administration (decision makers, managers, cities and regions); 7=Decision makers and managers; 8=Wider audience

Cooperation with existing initiatives/conferences:
Organisations - VDE, IEEE,
Conferences - IEEE PES Innovative Smart Grid Technologies Europe (ISGT Europe) etc.

2	To inform about the modules and blended learning programmes	On-line brochure with modules and short programmes' description	2, 4-8	See 1)

1484* participants attended the short-term programmes and around 240 students attended the master's modules

this number does not include the number of TalTech's pilot participants joined the course outside LMS Canvas in Estonian language

Programmes' syllabus

certificate of participation

on-line manual and support (deployment package)

Number of brochures downloaded from the SMAGRINET web portal (modules web-page visits = 735; short-term programmes web-page visits= 2,643, additional visits (syllabuses, deployment package - see comments): manuals and deployment plan=245; Syllabus: broader public programme=293, researchers programme=98, workforce programme=209

project promo-video

on-line lectures in project's YouTube channel

on-line live sessions as a part of short-term programmes

increased website and social media contact rates: returning visitors (11.7%); Social media: 1071 followers (Number of visits: Youtube channel: 13,096; Followers in Facebook, Twitter, LinkedIn: 1071) + 13.096 views on Youtube channel; Number of countries = 115

MOOC in LMS Canvas

Train-the-trainers' workshop

Experience exchange and knowledge sharing activities (SMAGRINET Webinars)

new mapped stakeholders:
registered participants on SMAGRINET events and number of organisations, who are interested in replication (9 workshops and 5 roundtables "Needs mapping and experience exchange" (1,515 participants), Workshop Train-the-trainers (70 participants), 1st Annual Conference "Energy Game Changers – Understanding the Value of Energy Transition"*; 2nd Annual Conference "ENERGY GAME CHANGERS 2022" (at least 100 participants are expected); 3 webinars for knowledge sharing (189 participants, 922 views on YouTube).

Newsletters (2 times per year)

Published Press Releases of events

Public deliverables

Blog in the website

		Posts in social media, messages in Telegram channels			* Annual Conference: Actual number of participants: 95 participants at the Worksup platform; 508 views during Facebook live; 1311 people reached in Facebook
		Supporting activities and initiatives: SMAGRINET Annual conference (2020, 2022)			
		Cooperation with existing initiatives/conferences: Organisations - VDE, IEEE, Conferences - IEEE PES Innovative Smart Grid Technologies Europe (ISGT Europe) etc.			Networks of the consortium in the target countries (online meetings, workshops, personal contacts)
3	To inform about the capacity building programmes	on-line brochure with modules and short programmes' description Programmes' Syllabus Project promo-video on-line lectures in project's YouTube channel	3	See 1)	See 1) and 2)
4	To inform about the methodological manuals	on-line manual and support (deployment package) Train-the trainers' workshop	2, 3	Project Web-site (Power On) Social networks (incl. business and employment-oriented such as LinkedIn and XING) LMS Canvas (modules "Announcements" and "Discussions") Participation in events for two-way communication and interaction with relevant target groups (European and national events, incl. events organised by IEEE, VDE) Conducting a live session / conference / meeting with external / out-reached partners to kick-start the launch of the short-term programme	70 participants attended the Train-the-Trainers Workshop, incl. 7 organisations beyond the consortium Network with outreach / targeted countries (online meetings, workshops)

5	To inform and involve in the train-the-trainers pilot	on-line brochure with modules and short programmes' description Train-the trainers' workshop Agenda A certificate of participation	3	Project Web-site (Power On) Competence hub mailing list Social networks (incl. business and employment-oriented such as LinkedIn and XING) LMS Canvas (modules "Announcements" and "Discussions") Participation in events for two-way communication and interaction with relevant target groups (European and national events, incl. events organised by IEEE, VDE) Direct information (face-to-face) from university teachers Direct calling via phone and direct emailing (competence hub members) Sending out e-mail newsletters	4 organisations beyond the consortium participated in short-programmes pilot during the second year/phase 2 organisations are actively involved into dissemination and participants' enrolment
6	To inform about SMAGRINET To collect feedback/perception towards SMAGRINET	Experience exchange and knowledge sharing activities (SMAGRINET Webinars) Advisory Board meetings Survey, incl. open-questions in LMS Canvas at the end of each module and at the end of course (i.e. for Poland https://forms.gle/ps2SvprYwcUWDQBB9) Interview with employers of participants in the workforce programme	All target groups	See 1) Discussions via LMS Canvas Survey with open-question in LMS Canvas Questionnaire for the employers of participants in the workforce programme Participation in events for two-way communication and interaction with relevant target groups (European and national events, incl. events organised by IEEE, VDE) Conducting a live session / conference / meeting with external / out-reached partners to kick-start the launch of the short-term programme and/or modules	1st annual conference organised under the frame of SMAGRINET respectively with actual number of participants: 95 participants at the Worksup platform; 508 views during Facebook live; 1311 people reached in Facebook the 2nd conference will be on the 17th of March 2022 (ca. 100 participants are expected) One advisory board meeting has been organised 3 webinars for knowledge sharing and experience exchange: 189 participants, 922 views on YouTube 10 on-line live sessions were organised during the 1st pilot of short-term programmes and 11 on-line live sessions were organised, incl. 3 common on-line live sessions (Germany - France – Ukraine) during the 2nd pilot.

Smagrinet Annual Conferences (2020, 2022)

Discussions via module "Discussions" in LMS Canvas

Cooperation with existing initiatives/conferences:
Organisations - VDE, IEEE, Conferences - IEEE PES Innovative Smart Grid Technologies Europe (ISGT Europe) etc.

International students' mobility internship programmes and roadshows between the academia and industry

35 participants joined the workshop for broader public during the International Conference "Information and communication technologies in modern education: experience, problems, prospects", Live broadcast from Lviv (05.11.2021).

In total 457 participants joined the online live sessions during the 2nd phase of the project from the organisations beyond the consortium.

7	To engage to actively participate in the project activities and events, and to be part of SMAGRINET community	Actively involving competence hub members (end-users) in identification and validation of emerging knowledge, skills, competences' needs for the energy transition Direct calling and mailing via stakeholders mapped list Interviews with employers of participants in the workforce programme	All target groups	See 1) and 6) Co-creation and co-participation workshops and meetings online survey / questionnaires	At least 20 registered participants from external organisations at each project event Number of events organised in WP2: 18 events. Estimated number of persons reached, in the context of WP2 activities: • Scientific Community (Higher Education, Research) = 344 • Industry = 135 • General Public = 1000 • Policy Makers = 29 • Customers = 7
8	To inform about the project objectives, events and achievements	Updated information on the SMAGRINET website, social networks, and on the partners websites and social networks Via Competence hub Via Advisory Board Via LMS Canvas SMAGRINET Newsletter	All target groups	See 1) and 6) Continuous communication and support of programmes participants via LMS Canvas	1366 SMAGRINET Newsletters dispatched Ca. 10,000 SMAGRINET website visits from 115 countries

| 9 | To widen the network after the project lifetime | Networking, communication via social media, feedback, discussion and experience exchange regarding the programmes and modules implementation | Teachers trained during the project | follow-up activities:

proposal design meetings to initiate a new joint projects

feedback / news on the universities' websites and social media

Using Contextual advertising on the website (google "key words")

dissemination via professional associations and their (national) sections, such as IEEE, VDE etc. | increased website and social media contact rates

Requests for modules replication from at least 2 organisations from each outreach region and from at least 3 EU AMS |
| 10 | To ensure the modules' sustainability after the project lifetime | Universities and organisations active in vocational training | Teachers trained during the project | Conducting courses with the participation fee | |

Table 4: Deployment Plan

The following Table 5 shows the metrics method to measure the KPIs.

Table 5: KPIs

Activity	Expected results (KPIs)	Metrics method and M35 KPI Status	Comments
To inform about the modules	240 master students educated with the SMAGRINET academic module program (240 (6 universities * 2 pilots * 20 participants))	number of students registered to the modules = 240	KPI met
	At least 100 contacts showing interest in receiving detailed info in master's courses	Number of web portal visits = 735 and brochure downloads (brochure is the information on web page)	unique page view=741
	increased website and social media contact rates (500 visits per month. More than 40% of visitors spending 1 minute or more in)	Number of visits, time spent on the web portal and returning visitors (11.7%); Social media: 1071 follower + 13.096 views on YouTube channel; Number of countries =115	Number of visits: YouTube channel: 13,096; Followers in Facebook, Twitter, LinkedIn: 1071
	new mapped stakeholders: at least 100 new members in the list	registered participants on SMAGRINET events and number of organisations who are interested in replication (9 workshops and 5 roundtables "Needs mapping and experience exchange" (1,515 participants), Workshop Train-the-trainers, 1st Annual Conference "Energy Game Changers –Understanding the Value of Energy Transition"; 2nd Annual Conference "ENERGY GAME CHANGERS 2022" (at least 100 participants are expected); 3 webinars for knowledge sharing (189 participants, 922 views on YouTube)	WS Train the trainers: 70 participants; Annual Conference: Actual number of participants: 95 participants at the Worksup platform; 508 views during Facebook live;

			1311 people reached in Facebook
	Around 500 brochures downloaded	Number of the downloaded brochures from the SMAGRINET web portal = 735 (number link visits** (see comments)	**https://www.smagrinet.eu/power-on/powerful-services/challenge-and-case-based-modules/
	Requests for modules replication: at least from 1 University in each 27 EU MS and 3 AMS -> at least 30 contacts for follow up actions	registered participants on the SMAGRINET events; Number of the downloaded brochures from the SMAGRINET web portal; direct contacts regarding the modules replication = ca. 40	KPI achieved, see other numbers above
	At least 100 contacts showing interest in receiving detailed info	registered participants on SMAGRINET events; umber of brochures downloaded from the SMAGRINET web portal; number of the downloaded manuals and deployment plan from the SMARGINET web portal = 245 (page visits)	KPI achieved, see other numbers above
To inform about the modules and blended learning programmes	Around 2000 brochures downloaded	Number of brochures downloaded from the SMAGRINET web portal (modules' web-page visits = 735; short-term programmes' web-page visits= 2,643, additional visits (syllabuses, deployment package - see comments)	Page visits: manuals and deployment plan=245; Syllabus: broader public programme=293, researchers programme=98, workforce programme=209
To inform about the capacity building programmes	increased website and social media contact rates (500 visits per month. More than 40% of visitors spending 1 minutes or more in)	Number of visits, time spent on the web portal and returning visitors (11.7%); Social media: 1071 follower + 13.096 views on YouTube channel; Number of countries = 115	Number of visits: Youtube channel: 13,096; Followers in Facebook, Twitter, LinkedIn: 1071
	new mapped stakeholders: at least 100 new members in the list	registered participants on SMAGRINET events and number of organisations, who are interested in pilots and/or in replication	see above + meeting with organisations beyond the consortium from Portugal, Poland and Ukraine (5 participants) + Workshop for broader public in Lviv (35 participants)

	Requests for courses replication: at least from 10 from each targeted group in each 27 EU MS and 3 AMS -> at least 30 contacts for follow up actions	registered participants on SMAGRINET events; Number of brochures' download on the SMAGRINET web portal; direct contacts regarding the CBPs replication; number of the downloaded manuals and deployment plan from the SMARGINET web portal	KPI achieved. see numbers above
	At least 500 contacts showing interest in receiving detailed info	registered participants on SMAGRINET events; Number of the downloaded brochures and number of the downloaded manuals and deployment plan from the SMARGINET web portal	KPI achieved. see numbers above
	Networks of the consortium in the target countries	number of pilots, and participants in train-the trainers workshop=70; number of the downloaded manuals and deployment plan from the SMARGINET web portal (see above)	KPI achieved. see numbers above
	720 participants will attend the short-term programmes and 240 students will attend the master programmes	number of students registered to participate in CBPs; number or the downloaded manuals from the SMARGINET web portal	KPI achieved
To inform about the methodological manuals (deployment package)	720 participants will attend the short-term programmes and 240 students will attend the master programmes	number of students registered to participate in CBPs = ca. 1000; number of the downloaded manuals and deployment plan from the SMARGINET web portal= 245 (page visits)	see details above
	Around 1000 brochures will downloaded from SMAGRINET web portal	number of the downloaded brochures = 2,643 (page visits)	KPI achieved
	Around 100 manuals will downloaded from SMAGRINET web portal	number of the downloaded manuals = 245 (page visits)	KPI achieved
	At least 500 contacts showing interest in receiving detailed info	number of the downloaded manuals, brochures, number of the registered participants on the SMAGRINET events; number of the downloaded manuals and deployment plan from the SMARGINET web portal	KPI achieved. see details and numbers above

	Networks of the consortium in the target countries	number of pilots and participants in train-the trainers workshop; number of the downloaded manuals and deployment plan from the SMARGINET web portal	KPI achieved. see details and numbers above. Number of pilots: Modules: 15 pilots; short-term programmes: 12 pilots
To inform and involve in the train-the-trainers pilot	Additional 4 organisations beyond the consortium will participate in short-programmes pilot during the second year/phase	number of countries=2 and for 3 more countries the course instances in LMS Canvas have been created and organisations, where pilots done (additional 4 organizations beyond the consortium participated in short-programmes pilot during the second year/phase)	KPI achieved.
	Requests for courses replication: at least from 5 from each targeted group in each 27 EU MS and 3 AMS -> at least 20 contacts for follow up actions	number of pilots and participants in train-the trainers workshop = 70; number of the downloaded manuals and deployment plan from the SMARGINET web portal	see details and numbers above
To inform /sensitize about SMAGRINET. To collect feedback /perception towards SMAGRINET	2 annual conferences will be organised under the frame of SMAGRINET respectively with 50 and 100 participants	number of conferences and number of the registered participants	1st Conference: Actual number of participants: 95 participants at the Worksup platform; 508 views during Facebook live; 1311 people reached in Facebook 2nd Conference (100 registered participants expected)
	3 AB meetings will be organised	AB meeting reports	3 AB meeting organised
	Around 100 web site visitors will join the Forum and view the discussions	Number of visits, time spent on the web portal and returning visitors; Number of discussions in Forum	number of visits ca. 10,000; returning visits ca.12%; for discussions the LMS Canvas has been used
To engage to actively participate in the project activities and events, and to be part of SMAGRINET community	25 registered external participants at each project event	number of the registered participants	KPI achieved. see details and numbers above
	Around 2000 brochures and manuals will downloaded from SMAGRINET web portal	number of the downloaded brochures and manuals from the SMAGRINET web portal	KPI achieved. see details and numbers above

	Around 100 website visitors will join the Forum and view the discussions	Number of visits, time spent on the web portal and returning visitors; Number of discussion in Forum. Number of subscribers of SMAGRINET Newsletter: 1366	KPI achieved. see details and numbers above. for discussions the LMS Canvas has been used
	At least 5 events participated per partner	number of the events per partner	number should be updated***
To inform about the project objectives, events and achievements	increased website and social media contact rates (500 visits per month. More than 40% of visitors spending 1 minutes or more in)	Number of visits, time spent on the web portal and returning visitors; Number of countries = 115	see details and numbers above
	new mapped stakeholders: at least 100 new members in the list	Number of registered participants on SMAGRINET events and number of organisations, who are interested in replication	7 organisations participated in the Train-the-Trainers workshop
	Around 100 web site visitors will join the Forum and view the discussions	Number of visits, time spent on the web portal and returning visitors; Number of discussion in Forum	for discussions the LMS Canvas has been used. Number of subscribers to SMAGRINET Newsletter=1366
	At least 5 events participated per partner	number of events per partner	numbers should be updated***

7.   The Channels for replication

The main channel for replication is the **SMAGRINET website**, where Network and Competence Hub – called "POWER ON", brings together different stakeholders from engineering, academia and industry, public administration, policy makers and key societal stakeholders, also the Advisory Board members, who are leading experts in the field of new generation of electrical grid technology (smart grids).

Other channels: **social media** (incl. business and employment-oriented such as LinkedIn and XING), publications and email marketing of project newsletters (twice a year), with news and information on project activities, events and outputs available. **The telephone** and messengers (WhatsApp, Viber, Skype, Telegram) for **calling** the stakeholders and sharing the information through the relevant Telegram Channels.

The basement for replication of the capacity building programmes is the deployment package, which includes presentations of the short-term programmes and three-case based modules and methodological manuals for the trainers, developed by the teaching experts of consortium universities. All materials are available for download on the SMAGRINET website.

SMAGRINET YouTube channel consists of 47 videos, including 3 webinars for experience exchange and network building and 6 videos from the SMAGRINET conferences "Energy Game Changers 2020 - Understanding the Value of Energy Transition" and "Energy Game Changers 2022 - Importance of an Informed Society".

Webinars:

- ✓ Artificial Intelligence in the Smart Grid | Smagrinet Webinars - Session 1
- ✓ Economic Operation and Societal Challenges In the Energy Sector | Smagrinet Webinars - Session 2
- ✓ Connection Planning in Smart Grids | Smagrinet Webinars - Session 3

Transnational collaboration of the SMAGRINET project allows to bring together top-level and interdisciplinary expertise from European universities. Guest external presentations from R&I, industry, SSH, public administration and policy institutions industry representatives during SMAGRINET Annual conferences, events and on-line live sessions within the course "SMART GRID from A to Z" supported the replication process of the programmes.

List of Lectures provided by the SMAGRINET Consortium and external experts during the online live sessions within the course "SMART GRID from A to Z" for different target groups:

1) Electrolyzer and Fuel Cell: The Key Technologies for the Development of Smart Grid.
   Speaker: Dr.Damien Guilbert, Associate Professor, Université de Lorraine

2) Explorative Implementation of Open-Source Peer-to-Peer Energy Trading Approaches
   Speaker: Alex Gabriel, researcher, Université de Lorraine

3) Smart Energy Grid trends - from digital twin to AI.
   Speaker: Sebastian Kosslers, Head of VDE Competence Center Smart Grid, Germany

4) Automatic Anomaly Detection in Power Quality Data using AI method.
   Speaker: Dipl-Ing. Olga Zyabkina, research assistant, Chair of Electrical Power Supply, Institute of Electrical Power Systems and High Voltage Engineering, Technical University Dresden, Germany

5) Energy Network Berlin Adlershof

   Speaker: Stefan Bschorer M. Sc., researcher, Department of Energy and Automation Technology, Technical University Berlin

6) Innovative Teaching Approaches

   Speakers: Anna Czerwinska M. Sc., Flavio Gromann M. Sc., researchers, Department of Energy and Automation Technology, Technical University Berlin

7) Evaluation of potential benefits of load flexibility as a part of distribution network planning
   Speaker: Gregor Lekan, mag. ing. el., Researcher at Laboratory of Electricity Networks and Devices, Faculty of Electrical Engineering, University of Ljubljana, Slovenia

8) Optimal sizing of battery storage for electrical power systems
   Speaker: Aivaras Slivikas, project engineer, Kaunas University of Technology, Lithuania

8.   Roadmap for replication

Task 5.1 was dedicated to manage the replication activities for the SMAGRINET project. The following **Fehler! V erweisquelle konnte nicht gefunden werden.** summarises the main findings. The roadmap for replication is described on the Table 6.

The stakeholders mapped under the T2.1. were engaged to the SMAGRINET project activities throughout the project. After giving input to the T2.2 and T2.3, they were engaged in the network building and experience exchange activities, as well as in the activities to enlarge the network constantly. The list of activities – roadmap of replication is presented in Table 5.

Table 6: SMAGRINET roadmap for replication

Activities	Indicative Timeline								Responsible Partner
	M13-15	M16-18	M19-21	M22-24	M25-27	M28-30	M31-33	M34-36	
1. Lectures development, publishing and dissemination	x	x	x	x	x	x	x	x	All partners
video lectures (links) published on the web (project/partners websites, social media)	x	x							LOBA, All partners
Lecture materials and videos published and access provided via LMS Canvas (1st and 2nd project phases)	x	x			x	x	x	x	LOBA, ULOR
Translation of video lectures to French language, publishing in YouTube and dissemination (French edition)	x	x	x	x	x	x			LOBA, ULOR

Activity	1	2	3	4	5	6	7	8	Responsible
Translation of the course materials in Estonian language and dissemination	x	x	x	x	x	x			TalTech
Course "SMART GRID from A to Z" dissemination: sending the letter via stakeholders emailing list, calling and direct emailing to some of them, Newsletter dispatching	x	x	x	x	x	x			LOBA, TUD, all partners
2. Project promo video development based on the video lectures			X	X					LOBA, ULOR
project promo video published on the web (project/partner websites, social media)				X					LOBA
sending the letter via stakeholders emailing list and calling and direct emailing to some of them				x	x	x	x		LOBA, TUD, all partners
3. Project presentation and promo video demonstration during network activities	During the project lifetime								All partners
4. Project presentation and promo video demonstration during 3 network building and experience exchange workshops (Webinars)		**x**							CIVITTA, KTU, TUB, TalTech
5. Development of on-line brochure (information) with modules' and short-term programmes' description (on-line)	**x**	**x**							LOBA, TUB, ULOR
on-line brochures publishing on the web (project website, social media)	x	x							LOBA
preparing letters and articles for Newsletter with information about modules and short term programmes with links to the online brochures on the website		x	x						LOBA, TUB, ULOR

Sending letters via stakeholders emailing list calling and direct emailing some of them, Newsletter dispatching		x	x	x	x	x			LOBA, TUD, all partners
6. Project printed materials (i.e. brochure, poster, roll-up, goodies) dissemination during the project lifetime and other relevant events	x	x	x	x	x	x	x	x	all partners
7. On-line manual and support development (deployment package)	x	x	x	x	x				TalTech
preparing a letter and article with information regarding the deployment package					x				TalTech, ULJUB
sending the letter via stakeholders mailing list and calling and direct emailing to some of them					x	x	x		LOBA, TUD, all partners
8. Engagement of early stage researchers to participate in the train-the-trainers' workshop (meeting with outreach universities), market the event			x						ULJUB, TalTech, TUD, TUB
9. Train-the-trainers' workshop organisation		x	x						ULJUB, TalTech, all partners
10. Using Contextual advertising on the website (google "key words")	during the project								All partners
11. Presentation the project results on external events, conferences, workshops	during the project (see dissemination and project events reports)								All partners
12. Newsletter development (N.2 N.6)	x		x	x			x	x	LOBA, all partners
13. Newsletter dispatched	x		x	x			x	x	LOBA
14. Press Release	Adhoc (when relevant announcements/achievements)								LOBA, all partners
15. Publications	Ad hoc (during the project lifetime): 1. Gabriel, Alex, Dupont, Laurent, Berger, Kévin etc. / Applying a Living Lab Approach to Smart Grid Training Course Design / Conference: 26th ICE / IEEE ITMC International								All partners

| | Conference on Engineering, Technology & InnovationAt: Cardiff, United Kingdom / June 2020 / DO - 10.1109/ICE/ITMC49519.2020.9198604 https://www.researchgate.net/publication/342889455_Applying_a_Living_Lab_Approach_to_Smart_Grid_Training_Course_Design 2.Alex Gabriel, Rima Oulhaj, Laurent Dupont / Explorative Implementation of Open-Source Peer-to-Peer Energy Trading Approaches https://hal.univ-lorraine.fr/ERPI-UL/hal-03419773v1 | |

9. Summary

The deployment plan and roadmap presented concrete actions to achieve the multiplier effect and **answered the following questions:**

- ➢ How the different target groups were reached, involved and engaged to the project activities during the project lifetime
- ➢ What replication channels were used and how
- ➢ How to measure the impacts (KPIs) of deployment and replication
- ➢ What concrete activities have been done
- ➢ Who was responsible for which activity
- ➢ How to widen the network and ensure the sustainability after the project lifetime

This document is updated version of the initial deployment plan and roadmap of replication (D5.1, M12).

Annex 1. Acknowledgement from the NPC UKRENERGO

UKRENERGO
National power company

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phone:+38 044 238-38-38, fax:+38 044 238-32-64,
e-mail: nec-kanc@ua.energy, web: ua.energy

_____ № _____

SMAGRINET team

Dear SMAGRINET team!

On behalf of NPC Ukrenergo, we would like to express our gratitude to your team of specialists for the opportunity to take the Smart Grid from A to Z training course, gain valuable knowledge in the field of energy and learn more about current trends.

30 employees of our company from different departments had the opportunity to improve their skills and obtain certificates of international standard.

We would also like to express our gratitude for 5 online lectures from leading European experts. They were held at the highest level, and the experience shared by the speakers was unique.

We also thank you for the round-the-clock technical support of our colleagues during the course on the training platform.

Our cooperation is very valuable for us, we will be happy to continue it in the future. We hope to implement new joint projects and useful initiatives.

Yours sincerely,

Oksana Chikalo
Head of Department
of corporate social responsibility of NPC Ukrenergo

ДОКУМЕНТ ПІДПИСАНО КЕП
Сертифікат 2B6C7DF9A3891DA104000000B76F1D000F9D2F02
Підписувач ЧІКАЛО ОКСАНА МИКОЛАЇВНА
Дійсний з 4/5/2021 1:44:48 PM по 4/5/2022 11:59:59 PM

НЕК "Укренерго"

Вих.№ 01/2233
від 18.01.2022

Annex 2. Acknowledgement from Lviv State University of Life Safety

ЛЬВІВСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ БЕЗПЕКИ ЖИТТЄДІЯЛЬНОСТІ

НАВЧАЛЬНО НАУКОВИЙ ІНСТИТУТ ЦИВІЛЬНОГО ЗАХИСТУ

Україна, 79007, м.Львів, вул. Клепарівська, 35

Тел./факс (032) 233-03-44, сайт www.ldubgd.edu.ua

23.02.22 № 04555/2

На № _____

Dear SMAGRINET Consortium!

on behalf of students and researchers of Lviv State University of Life Safety, I would like to thank you for the opportunity to participate in piloting the SMAGRINET training programs for broader public and engineering researchers.
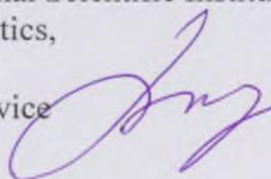
More than 20 students and staff members of our University have successfully completed the on-line course "Smart Grid from A to Z" during the period from October 2021 – December 2021.

The modules and methodological manuals presented at the SMAGRINET web portal will be definitely using in the research work and in the education process on the Department of supervision-preventive activity and fire automatics, on the Department of Information Technologies and Telecommunications

We wish you further successful implementations and are glad to be a part of SMAGRINET network.

Sincerely

Deputy Head of the Educational Scientific Institute of Civil Defence
PhD in Physics and Mathematics,
Associate Professor
Colonel of Civil Defence Service   Olha MENSHYKOVA

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www.ttu.ee

SLOVENIA
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www.welcome.univ-lorraine.fr