SKILLS
INSTRUCT
INSTRUMENTS
CONSTRUCTION

MONITORING OF IMPACTS AND BARRIERS AND MEANS TO OVERCOME THEM

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 894756.

D7.4 REPORT ON MONITORING OF IMPACTS AND BARRIERS AND MEANS TO OVERCOME THEM

Dissemination Level: Public
Lead Partner: RIL
Due date: 28.02.2023
Actual submission date: 28.02.2023

Published in the framework of:

Evidence-based market and policy instruments implementation across EU to increase the demand for energy skills across construction sector value chain.

Authors:

Miimu Airaksinen, RIL
Ville Raasakka, RIL
Agnieszka Kowalska, ASM Market Research and Analysis Centre Ltd.
In addition all demonstration leaders have contributed to the deliverable

Revision and history chart

Version	Date	Editors	Comment
0.1	30.06.2021	Miimu Airaksinen	Structure of the deliverable, first draft
0.2	15.7.2021	Miimu Airaksinen, input from all partners	Information about demonstartions
0.3	10.8.2021	Miimu Airaksinen, input from all partners	Detailed information about demonstartions
1.0	19.8.2021	Miimu Airaksinen, Agniezska Kowalska	Fine tuning
1.1	27.2.2023	Janne Tähtikunnas	Update in the final project phase
1.2	28.2.2023	Sylvain Kubicki	Reviewer LIST

Disclaimer:

Table of contents

List of figures:

List of tables:

Glossary

Acronym	Full name
CA	Consortium Agreement
EC	European Commission
EASME	The Executive Agency for Small and Medium-sized Enterprises
GA	Grant Agreement
PC	Project Coordinator
WP	Work Package
TL	Task Leader
DoA	Description of Action
PSC	Project Steering Committee
SQM	Scientific and Quality Manager
DEC	Dissemination and Exploitation Committee
KOM	Kick-off meeting
ASM	ASM – Market Research and Analysis Centre
VTT	Technical Research Centre of Finland
LIST	Luxembourg Institute of Science and Technology
RIL	Finnish Association of Civil Engineers
CU	Cardiff University
R2M	Research to Market Solution France
DTTN	Distretto Tecnologico Trentino
ENEFFECT	Center for Energy Efficiency EnEffect
GER	General Exploitable Result
AB	Advisory Board
PM	Person month
M	Month

Executive summary

The present document is an output of Task 7.7. Monitoring of impacts and barriers and means to overcome them and provides information and practices for project impacts and barriers regarding the INSTRUCT project. This document is addressed to the INSTRUCT consortium and aims at establishing a functional flow to guarantee the maximum impact of the project. This document also supports the project management plan.

1. Introduction

The present document is an output of Task 7.4. Monitoring of impacts and barriers and means to overcome them and provides information and practices for project impacts and barriers regarding the INSTRUCT project. This document is addressed to the INSTRUCT consortium and aims at establishing a functional flow to guarantee the maximum impact of the project. This document also supports the project management plan.

Some of the topics have been already addressed in GA and CA, therefore this document is partly based on them. However, regarding those matters that were described in CA, it should be noted that CA specifies them in more detail. On the other hand, some parts of the document are not based on the aforementioned documents at all. Hence, the monitoring of the impacts and barriers should be recognized as complementary to them.

The document presents the monitoring process and procedures and the current state-of-the-art of the project impacts and barriers and the means to overcome them.

2. Monitoring of project impacts and barriers and ways to overcome them

2.1. Impacts monitoring methodology

The objective of the monitoring in INSTRUCT is to assess the impact of the INSTRUCT project. The monitoring process ensures that the goals and the long-term strategy are reviewed on a regular basis. In addition, it measures and keeps track of the progress, and it reveals potential shortcomings and deviations related to the targets. The impact assessment of the project's envisioned impacts, against the established baselines, evaluates also the potential of the proposed solutions at wider perspective and in the long run.

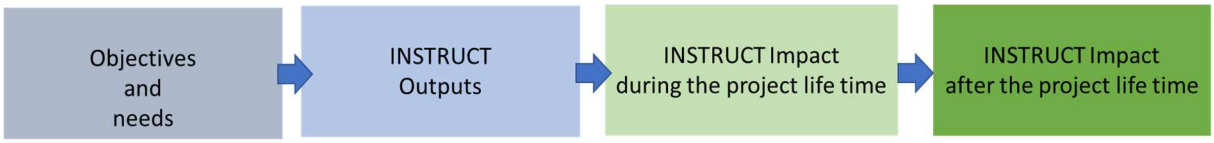

Figure 1 The schematic picture of the methodology for INSTRCUT impacts during the project time and the long terms impacts

2.2. Continuous monitoring frame in the INSTRUCT

To achieve the expected impact a monitoring scheme is followed. The monitoring scheme is using performance indicators to make it easy to follow the progress.

In INSTRUCT the WP2 is focusing on current energy efficiency training, on the taxonomy of the training offers and on the skills and learning outcomes. In addition, the focus is in requirements for new instruments. Since WP2 is the foundation of the project a thorough work has been done. This is also why a minor (one month) delay was in one deliverable. This was because INSTRUCT wanted to engage the wide range of stakeholders to make sure all aspects were covered. The consortium meetings and WP level meetings we used to guarantee that all relevant stakeholders could be reached via consortium partners contacts.

The WP3 is focused on frameworks, toolset specification and database, new legislative frameworks. In addition it focuses on sensitization methodology on producers and retailers as well as expectation of building and home owners. This WP will give frame and foundation to demonstrations in different European countries.

In INSTRUCT, the project lifetime impact is evaluated in the demonstration works (WP4). The demonstrations are different in nature and thus, different indicators are needed. Some of the impacts can be shown in measurable units like energy savings in kWh/m2, year, but some of the expected impact are different in nature. For example, increased collaboration and understanding across different trades and professional groups cannot be measured directly in number but can be measured indirectly e.g. by increased collaborative workshops or increased number of project meetings between different stakeholders.

The INSTRUCT impact assessment is based on monitoring framework and KPIs. Since there are already many good existing frameworks and KPIs, INSTRUCT is using those existing ones as a base line and then check the demonstration specific indicators and data availability to guarantee the indicator validity for the impact assessment monitoring, presented in Figure 2.

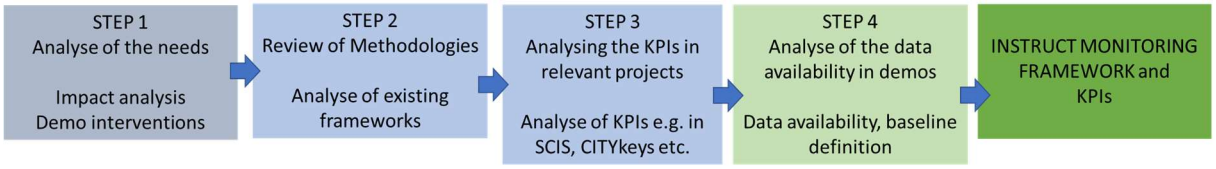

Figure 2 Schematic picture of INSTRUCT monitoring framework, KPIs and baseline definition

2.1. INSTRUCT demonstrations

INSTRUCT has 8 demonstrations in different geographical regions in Europe. Each of the demonstration is focusing on different angle of the energy efficiency:

1) Tools for energy skills recognition
2) Initiatives for building and home owners
3) Support to public authorities
4) Partnership with producers and retailers
5) Initiatives reinforcing the link between skills and energy performance.

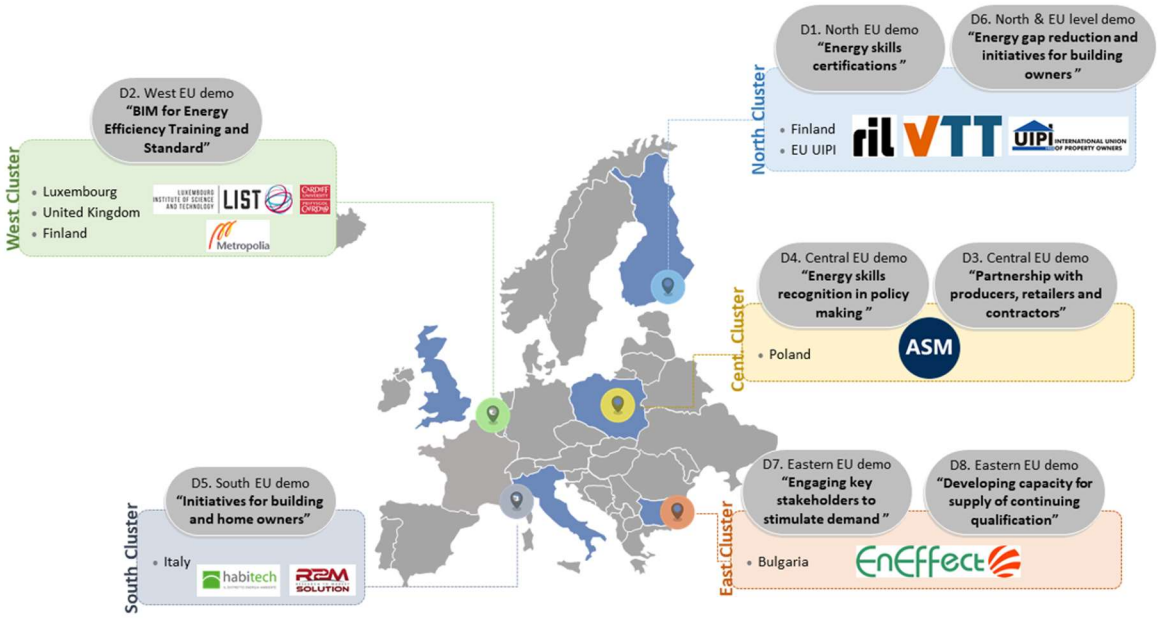

Figure 3 INSTRUCT demonstrations

Table 1 Demonstration focuses and geographical locations.

Demo n:o	Demo focus	Demo location
1	Energy skills certifications	North Europe
2	BIM for Energy Efficiency Training and Standard	West Europe
3	Partnership with producers, retailers and contractors for energy skills recognition	Central Europe
4	Energy skills recognition in policy making	Central Europe
5	Initiatives for building and homeowners	South Europe
6	Energy gap reduction and initiatives for building owners	North and European level
7	Engaging key stakeholders to stimulate demand of energy skills	Eastern Europe
8	Developing capacity for supply of continuing qualification services through blended learning systems	Eastern Europe

The demonstrations have been defined according to best knowledge during the project preparation phase. After the project kick-off the demonstrations were defined more in detail.

2.2. INSTRUCT monitoring the impact during project lifetime

The impact is estimated based on actions and demonstration done in WP4. First the preconditions in the demonstrations are prepared, the data quality and availability are secured, and the demonstration is kicked off. To guarantee the impact the demonstration performance is continuously monitored. In the end of the demonstration the KPIs are calculated and thus the impact is confirmed.

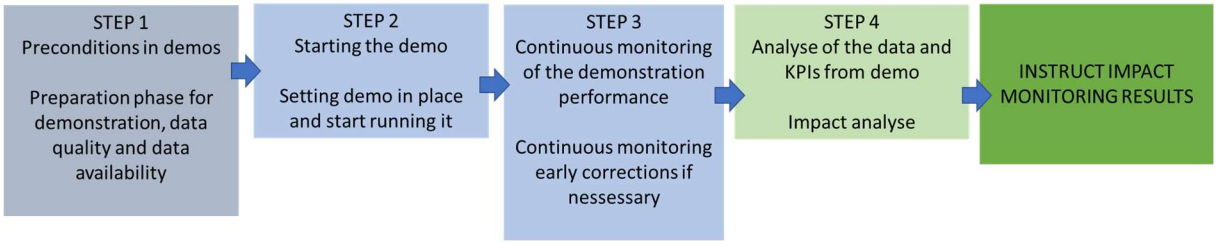

Figure 4 Schematic picture of the monitoring of the impact during the project lifetime

In INSTRUCT there are many demonstrations across Europe which are contributing e.g. to energy saving. The demonstration impact is calculated based on individual actions in the demonstrations and summed up as on impact. The estimated impacts calculated in project preparation phase are given in Annex I with additional information for each of the demonstrations if the estimated impacts are still valid and if not, the impacts are re-defined and the deviation is explained.

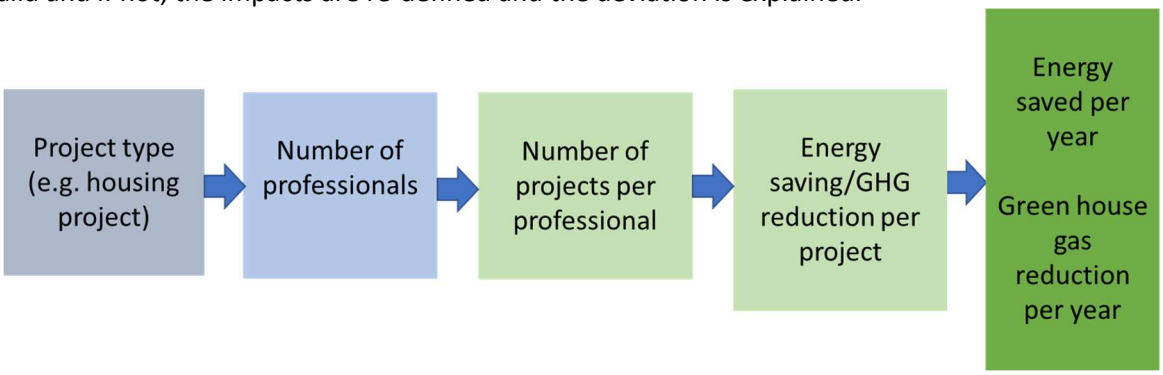

Figure 5 Schematic picture of energy saving calculations per one demonstration task (bottom-up approach)

In some of the demonstrations the impact is based on top-down approach. E.g. the impact is estimated based on impacts from previous projects or literature. There a base line needs to be defined where the impact is compared. Also, in this approach different previous projects/literature might give different impacts (e.g. energy saving between 14-25%). In these estimates the reference is defined as close as possible for the project type and for the country since building practices and climates are different, thus the impact for energy saving is also different.

WP3 is currently running and focusing on crosscutting instruments to accelerate market uptake. Since the work package is still ongoing, some of the demonstrations can not define their actions and impacts very precisely due to waiting the results from WP3. This will create some uncertainties to the impact monitoring at current stage. However, WP3 will be finished before demonstrations are starting and this will not jeopardize the demonstration work package and its impacts.

To support the estimation of the demonstrations the Annex I have been worked out to check the deviations. In addition to help to reach the impact in the demonstrations, the demonstration descriptions are defined according to current situation. The first iteration of the detailed description of demonstration cases will be finalized in M4 (end September) after third project meeting scheduled for 14/09/2020.

Table 2 Changes in impacts in different demonstration actions

Demo n:o	Demo focus	Change	Reason for change
1	Energy skills certifications	no estimated change	

2	BIM for Energy Efficiency Training and Standard	Higher impact than expected	Contacted more professionals than expected
3	Partnership with producers, retailers and contractors for energy skills recognition	Higher impact than expected	Contacted more professionals than expected
4	Energy skills recognition in policy making	no estimated change	
5	Initiatives for building and homeowners	Originally planned to reach 600 attendees including building owners, professionals, condominium managers, contractors. Long time estimate was 360 (30 attendees/event).	Covid-19 and the related restrictions for live events in Italy will reduce the possibility to reach the original expected numbers. A hybrid physical-digital format of events will be implemented, but changes in the attendance of participants are expected. In the end Demo 5 reached more than original 600 attendees.
6	Energy gap reduction and initiatives for building owners	no estimated change	
7	Engaging key stakeholders to stimulate demand of energy skills	Lower impact than expected. Current attendees result is 300.	Did not attract enough professionals to attend seminars. Situation in Eastern Europe is very fragile at the moment and all the attention is very focused on situation in Ukraine and if it affects to other nations as well.
8	Developing capacity for supply of continuing qualification services through blended learning systems	no estimated change	

The demo 7 changes are affecting on overall changes of INSTRUCT impacts only slightly, as from the table below can be seen. For the other impacts there are no changes or positive changes. However, it is evident, that since e.g. primary energy savings are calculated based on estimated savings in average projects there can be changes in real values in the end of the project. But further the main aim is to reach as many potential stakeholders as possible and by that influence on primary energy savings, increased use of renewable energy sources and CO_2 reductions.

Table 3 Overall changes for the impacts

	Primary energy (GWh/year)	RES (GWh/year)	Investment (M€)
1	114.1	1 164	36.6
2	294	3 150	84
3	140 => 191	1 350 => 2 049	7.56 => 11.47
4			
5	10.3	956 => 1 834	22.95 => 86.95
6	143	1500	43.5
7	57.7 => 34,7	563 => 338	20.25 => 12.25
8			
TOTAL	779 GWh => 787 GWh Impact increased 1%	8 945 GWh => 10035 GWh Impact increased 12%	221 M€ => 275 M€ Impact increased.

*Detailed calculations are shown in Annex 1

2.3. INSTRUCT impact in the long term

The long-term impacts (after 5 years of the project end) are expressed in a range. The minimum impact of the range is estimated based on direct attribute of the project impact. This can be e.g. energy certification scheme/program which is used in stakeholders involved in INSTRUCT. The maximum impact calculated by assuming that the activities done is INSTRUCT is replicated in other regions/countries/stakeholders. The long-term impacts are estimated against baseline (how would the situation be without INSTRUCT project).

2.4. INSTRUCT impact final quality check

In addition to the continuous monitoring of the impacts and quality, the impact quality check is done also in the end of the project. The long-term impacts are compared to the short-term impacts by focusing if it is realistic to assume the long-term impacts. E.g., what is the replication potential etc. In addition, the relative impact ratios are checked. E.g. is the energy saving impacts realistic compared to GHG emissions. In addition, the long-term impacts especially the maximum impacts are checked that they are realistic compared to European wide impact. E.g. energy savings must be realistic compared to the energy use in relevant sectors.

Annex I

1 Primary Energy savings triggered by the project

Demo 1: Number of attendees 935 (designers and constructors) will result to energy saving of 114 GWh/year

	n.o profess	n:o project.	Energy saved(kWh/year/build)	Energy saving (GWh/year)
Designers (homes)	110	5	7	3,85
Designers (commercial)	400	2	70	42
Construction (homes)	50	5	7	1,75
Construction (commercial)	375	2	70	52,50
Totals	**935**			**114,10**

Demo 2: Number of attendees 840 (all construction process) will result in 294 GWh/year

	n.o profess	n:o project.	Energy saved(kWh/year/build)	Energy saving (GWh/year)
Designers (commercial)	410	5	70	147
Construction (commercial)	410	5	70	147
Totals	840			**294**

Demo 3 Number of attended 894 resulting in 140 GWh/year

	n.o profess	n:o project.	Energy saved(kWh/year/build)	Energy saving (GWh/year)
Designers (commercial)	150	2	70	21
Construction (commercial)	644	3	70	135
Build,owners(comm/publ)	100	5	70	35
Totals	**894**			**191**

Note in Demo 3 the expected savings are calculated based on estimated number of projects per professionals

Demo 5: The demo consists in awareness courses for four different categories: home owners, condominium managers, designers and contractors. The estimated energy saving is 10.3 GWh/year

Attendees by category		n:o of homes	Energy saving (MWh/yr/home)	effectiveness ratio (*)	Energy saving (MWh/yr)
category	number				
Home owners	198	1,3	7	10%	180
Condominium manag.	28	3,7	7	10%	103

Professionals and contractors	536	5	7	30%	10 017
Totals	**762**				**10 300**

(*)Effectiveness ratio: percentage of attendees who perform the actions required to obtain the energy saving following the participation to the course.

Demo 6: The estimated energy savings are 143 GWh/year

	n.o profess	n:o project.	Energy saved(kWh/year/build)	Energy saving (GWh/year)
Building owners (homes)	90	5	7	3.15
Build,owners(comm/publ)	200	10	70	140
Totals	**290**			**143.15**

Demo 7 The estimated energy savings are 34.7 GWh/year

	n.o profess	n:o project.	Energy saving (kWh/year/build)	Energy sav(GWh/year)
Designers (homes and comm)	150	3	38.5	17.3
Construction professionals	150	3	38.5	17.3
Totals	**300**			**34.7**

Note: in Demo 7 the estimated energy saving is average in commercial and homes since many professionals are doing both types of projects.

2 Measurable energy savings and/or renewables production resulting from improved skills

Demo 1: Number of attendees 935 (designers and constructors) will result to RES production of 1164 GWh/year

	n.o profess	n:o project.	Increase in RES	RES (GWh/year)
Designers (homes)	110	5	1.25	0,69
Designers (commercial)	400	2	750	600
Construction (homes)	50	5	1.25	0,31
Construction (commercial)	375	2	750	563
Totals	**935**			**1 164**

Demo 2: Number of attendees 840 (all construction process) will result in 3150 GWh/year

	n.o profess	n:o project.	Increase in RES	RES (GWh/year)

Designers (commercial)	420	5	750	1575
Construction (commercial)	420	5	750	1575
Totals	840			**3 150**

Demo 3 Number of attended 894 resulting in 2049 GWh/year

	n.o profess	n:o project.	Increase in RES	RES (GWh/year)
Designers (commercial)	150	2	750	225
Construction (commercial)	644	2	750	1449
Building owners (commercial/public)	100	5	750	375
Totals	894			**2 049**

Demo 5. The table below summarizes the estimated energy produced from RES, being 1 834 GWh

Attendees by category		n:o of homes	from RES (MWh/yr)	effectiveness ratio (*)	total energy from RES (MWh/yr)
Category	number				
Home owners	198	1,3	1,25	10%	32,17
Condominium managers	28	3,7	1,25	10%	12,95
Professionals and contractors	536	17,8	1,25	30%	1 789
Totals	762				**1 834,12**

(*)Effectiveness ratio: percentage of attendees who perform the actions required to obtain the energy saving following the participation to the course.

Demo 6. Number of attended 290 resulting in 1500 GWh/year

	n.o profess	n:o project.	Increase in RES	RES (GWh/year)
Building owners (homes)	90	5	1.25	0,563
Building owners (commercial/public)	200	10	750	1500
Totals	**290**			**1500.6**

Demo 7 The estimated RES increase is 338 GWh/year

	n.o profess	n:o project.	Increase in RES	RES (GWh/year)
Designers (homes and commercial)	150	3	375.6	169
Construction professionals	150	3	375.6	169
Totals	**300**			**338**

Note: in Demo 7 the estimated RES is average in commercial and homes since many professionals are doing both types of projects.

3 Investments in sustainable energy triggered by the project (in million Euro)

Demo 1: Number of attendees 935 (designers and constructors) will result to 36. 600 M€

	n.o profess	n:o project.	investment €/project	Investment (M€)
Designers (homes)	110	5	7000	3. 850
Designers (commercial)	400	2	20000	16.000
Construction (homes)	50	5	7000	1.750
Construction (commercial)	375	2	20000	15.000
Totals	**935**			**36.600**

Demo 2: Number of attendees 840 (all construction process) will result in 84 M€

	n.o profess	n:o project.	investment €/project	Investment (M€)
Designers (commercial)	840	5	20000	84
Totals	840			**84**

Demo 3 Number of attended 894 resulting in 11.474 M€

	n.o profess	n:o project.	investment €/project	Investment (M€)
Designers (commercial)	150	2	4200	1.260
Construction (commercial)	644	3	4200	8.114
Building owners (comm./public)	100	5	4200	2.100
Totals	894			11.474

Note: Demo 3 is calculated based on assumption that the reached people have in average 40% less investment costs than in average Europe.

Demo 5 Number of attended 762 resulting in 86.95 M€

Attendees by category		n:o of homes	estimated investment per home (€)	effectiveness ratio (*)	total investment (k€)
category	number				
home owners	198	1,3	30000	10%	772,7
condominium managers	28	3,7	30000	10%	310.8
professionals and contractors	536	17,8	30000	30%	85 867.2
Totals	**762**				**86 949.4**

(*)Effectiveness ratio: percentage of attendees who perform the actions required to obtain the energy saving following the participation to the course.

Demo 6. Estimated investments 43 150 M€

	n.o profess	n:o project.	investment €/project	Investment (M€)
Building owners (homes)	90	5	7000	3.150
Building owners (commercial/public)	200	10	20 000	40.000
Totals	**290**			**43.150**

Demo 7 Estimated investments 12 150 M€

	n.o profess	n:o project.	investment €/project	Investment (M€)
Designers (homes and commercial)	150	3	13 500	6.075
Construction professionals	150	3	13 500	6.075
Totals	**300**			**12.150**

Note: in Demo 7 the estimated investment is average in commercial and homes since many professionals are doing both types of projects.

4 Increased number of certification schemes for energy efficiency skills

Our project will initiative altogether 14 certification schemes or preparation of certification schemes which will include the energy efficiency aspects in our 6 demonstrations in 7 countries. The number of professionals in the schemes or planned schemes is (300+500+280+300+500) = 1880.

Demonstrations enabling the impact:

Demo 1. Yearly 5 certifications schemes including energy aspects. This 5 schemes will include round 300 professionals yearly applying the certification.

Demo 2. Standardisation is very linked to the certification schemes. The working group will reach 500 professionals and will give the spark for the preparation of the energy efficiency schemes estimated to be 4 in number.

Demo 4. Energy skills recognition in and requirements for skilled workers will discuss a part of the quality check also certification. The reached professionals is estimated to be 280 in number. The plan is for 3 schemes or preparation of schemes

Demo 5. National certification body is involved in campaigns and will reach estimated 300 professionals in number. (1 scheme)

Demo 7 and 8: National agencies are involved in campaigns and will reach 500 professionals (1 scheme in preliminary preparation)

5 Improved mutual recognition of sustainable energy skills between Member States and neighbouring countries

INSTRUCT has 5 different geographical clusters, which are working and sharing experiences to increase the mutual recognition of skills. The list below shows the arenas where the mutual recognition work is done:

North cluster (lead Finland): working with Nordic BuiltUp skills via MOTIVA and with Nordic Ministries of Environment via Ministry of Environment.

Central West Cluster (Lead Luxemburg): working with Benelux and French-speaking (France, Canada, Switzerland) countries via standardisation association (BuildingSmart) and BIM alliance (a collaboration amongst 4 projects funded under H2020, incl. BIMEET).

Central East Cluster (Lead Poland): working with Germany, Czech Republic and Slovakia to align the recognition via local Chambers of Commerce

South Cluster (Lead Italy): working with Italian and French countries directly via companies like R2M which have units in both countries

South East Cluster (Lead Bulgaria): working with Romania, Croatia and Greece via Building Knowledge Hubs network, product manufacturers and regional energy agencies. In addition close co-operation is dome with PRO-NZEB and URBAN-INCERC

6 Improved collaboration and understanding across different trades and professional groups

Project will reach **directly** in courses, meetings and workshops **4 021 professionals** from different trades and disciplines (manufacturers, designers, architects, construction workers, building owners, municipalities) leading to better understanding and improved collaboration. (935+840+894+762+290+300) = 4 021

Additionally, the project will reach **12 000 professionals** (6000+2000+2000+1000+1000) **with its wider networks and information campaigns**.

Demonstrations enabling the impact:

Demo 1. Yearly 960 participants days for the courses targeting on multidiscipline understanding of aspects of factors affecting on energy efficiency (32 courses with 30 participants in average). The participants for courses are at least from four different professional groups (architects, construction engineers, HVAC engineers, building owners) TOTAL 960 professionals. In addition the information campaigns will reach 6000 professionals (RIL members)

Demo 2. Training in 3 countries (LUX, UK, FRA), 8 trainings each having in average 30 participants from stakeholders in design, construction and building owners. Total reach 240 professionals. Additional information campaigns will reach 2000 professionals (LIST professional collaboration network)

Demo 3. Arranged meetings and collaboration workshops between different stakeholders, 8 work shops/meetings/consultations from stakeholders varying from producers and manufacturers, contractors as well as retailers, special focus is given to SMEs with a TOTAL 200 targeted professionals, and 1000 people with its wider networks

Demo 5. Arranged of 12 meetings with 50 people, together 600 150 professionals. In addition, multimedia campaign about the benefits of the improvements of energy efficiency are produced reaching up to 2000 professionals. TOTAL 2600 professionals.

Demo 6. Arranged of 10 meetings and workshops with building owners and municipalities (in average 25 people), together the reach is 250 professionals

Demo 7. Training engagement arranged in 10 times with in average 50 people resulting 500 people

Demo 8. Capacity building engagement meetings and and information 12 times in average 40 people resulting 480 professionals. In addition the wider network contains roughly 1000 people.

7 Increased market acceptance of sustainable energy skills

The increased market acceptance is created in three main ways; firstly the professionals (designers, architects and construction professionals) are giving education and certification leading better understanding and spreading the understanding and concrete benefits from energy efficiency. The estimated increase of market acceptance is estimated to increase by 20%

Secondly the buildings owners are included in training courses and workshops. The estimated reach of the potential stakeholders is 60-70% and 40-60% of the projects are estimated to increase sustainability in the energy choses.

Thirdly the producers and manufacturer are already increasing the supply of energy efficient choses, resulting that 40% of the supply is more sustainable than previously.

This will result in average increase of market acceptance (20% +(65% x 50% x 0.9) + 40% x 0.8)/3 = 27%

The factor 0.9 corresponds to parallel projects where both factors from building owners and designers are onboard. The factor 0.8 corresponds to parallel projects with all above mentioned actions.

8 Legislative changes stimulating the demand for energy skilled construction workers/professionals

From INSTRUCT demonstrations 7 of the total 8 demonstrations are connected to the national and regional municipalities. This gives a direct link to the changes in legislation. Since the process to change the legislation is very slow, the impact is seen after the project life time.

The legislative changes include: 1)requirement for certified skills both in design and construction, 2)Requirement for public procurement, 3) Requirement for energy renovation 4) Requirement for sustainable energy skills

Demonstrations enabling the impact:

Demo 1. Building designer and worker energy skills requirement (Ministry of Environment in Finland)

Demo 3. Requirement for energy certification of products (Polish Construction Chamber)

Demo 4. Energy certification of skills (Polish Construction Chamber)

Demo 5. Energy efficient renovation requirements (Distretto Famiglia Vallagarina, Italy)

Demo 6. Sustainable energy skills (Ministry of Environment, Finland)

Demo 7. Public procurement requirement (Ministry of Energy, Bulgary)

Demo 8. Energy skills certification requirement (Municipal Energy Efficiency Network EcoEnergy, Bulgary)

9 Demonstrated reduction in the gap between designed and actual energy performance through improved quality of construction

INSTRUCT will reach directly 4 021 professionals and with its wider network 12 000 being total 16 000 professionals of which 60% are working directly in the construction process (design and construction). The yearly number of the projects (in average 3 projects per person) carried out by these professionals is 0.6 x 12 000 x 3 = 21 600 projects

Energy consumption per project in average (20 + 200)/2 MWh (see impact 1) resulting 110 MWh per project.

The potential to reduce the gap via increased skills 21 600 x 110 MWh x 0.04 = 95 040 MWh

Demonstrations enabling the impact:

Demo 5. South Europe cases

Demo 6. North European cases

Demo 8. South East European cases

(1) de Wilde, P. 2014. The gap between predicted and measured energy performance of buildings: A framework for investigation. Automation in Construction 41 (2014) 40–49.

(2) Dall'O', G., Sarto, L., Galante, A. & Pasetti, G. 2012. Comparison between predicted and actual energy performance for winter heating in high-performance residential buildings in the Lombardy region (Italy). Energy and Buildings 47 (2012) 247–253

Additional impacts Reduction of the greenhouse gases emissions (in tCO2-eq/year) and/or air pollutants (in kg/year) triggered by the project

The average CO2 ekv emissions in EU is 385 g CO2/kWh (Eurostat).

- The saved energy (impact1) is estimated to be 787,25 GWh/year, thus the average CO2 ekv reduction is 787,25 GWh x 385 g CO2/kWh = 303 091 tn CO2ekv
- The RES increase (impact 2) will additionally reduce the CO2ekv emissions 10 035 GWh x 385 g CO2/kWh = 3 863 475 tn CO2ekv
- The increased quality in construction (impact 9) will reduce CO2ekv emissions 95 040 MWh x 385 g CO2/kWh = 36 590 tn CO2ekv

Total reduction of greenhouse gas emissions is: **4.2 million tn CO2ekv**

SKILLS
INSTRUCT
INSTRUMENTS
CONSTRUCTION

Evidence-based market and policy instruments implementation across the EU to increase the demand for energy skills across construction sector value

www.instructproject.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 894756.