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1. PUBLISHABLE EXECUTIVE SUMMARY

In 2012 the European Commission approved the Energy Efficiency Directive (2012/27/EU) setting up the target of 20% energy efficiency by 2020. A year before, in 2011, the BUILDUP Skills Initiative was already in place to increase Europe's independency of energy imports, that were causing the outflow of approx. 270 Billion Euro,¹ of which 40% came from the building sector.

The BUILDUP Skills Initiative expected the Member States to develop national roadmaps explaining how they would overcome barriers and identify skills gaps in the various professions in such a way that the building sector could contribute to the 2020 energy targets.

Regarding heritage buildings, in 2018 the Council of the EU together with a group of experts, published the report "Fostering Cooperation in the European Union on Skills, Training and Knowledge Transfer in Cultural Heritage Professions". The objective was to ensure the long-term sustainability of Europe's cultural heritage. One of the conclusions was the need for a more integrated approach to conservation and management, across different policy areas, in order to maximise the benefits to economy, culture, environment and society as a whole.

The present document analyses the status of the BUILDUP Skills national initiatives in the PRO-Heritage partner countries as well as relevant training for craftspeople, architects, designers and engineers in energy efficiency and renewable energy for historic buildings. The statistics are not unified and differ from country to country. Furthermore, it is difficult to rely on the official statistics to identify the impact on energy efficiency for traditional buildings, as the Energy Efficiency Directive from 2012 defined an exemption for traditional buildings: "*buildings officially protected as part of a designated environment, or because of their special architectural or historical merit, in so far as compliance with certain minimum energy performance requirements would unacceptably alter their character or appearance*".

Concerning the **Cultural Heritage sector** of the 5 countries analysed (Austria, UK, Slovakia, Portugal and Spain), there are no standard statistics on the number of historic buildings. But if we take constructions built before 1919 with traditional construction systems, we know that in Austria there are 327,350 historic buildings, in England there are approximately 4.41 million historic dwellings and 550,000 historic commercial buildings, including listed buildings, and in Portugal there are 206,343 buildings.

Slovakia has not that many historic buildings built before 1945, approximately 10,000 apartments are older than 100 years. Spain has 17,621 CIG properties (Cultural Interest Goods) and 22,114 private historic properties. In addition, Spain has a registry of a total of 5,600 buildings scattered throughout the Spanish geography of different times that can be consulted in a database found at www.archxx-sudoe.es.

Furthermore, in the UK there are a total of 586,300 listed buildings and 11,160 conservation areas. And in Portugal there are 4,107 listed assets, comprising 810 National Monuments, 2,701 listed as Public Interest and 569 listed Regional Interest.

¹ Source: BUILD UP Skills Austria – Final report, April 2013



The **BUILDUP** initiative across the 5 countries aims to improve know-how and vocational education for occupations in the building sector in order to react proactively to the challenges of “green economy” by 2020, in particular as regards energy efficiency and use of renewable energy sources.

All 5 countries have initiated national strategies bringing together the relevant players around the table and facilitating a new dialogue between the institutions involved, where a previous lack of communication existed.

To meet the objectives, a number of workers have been identified who would require specific education: approx. 25,000 people in Austria, 47,000 in Slovakia, between 31,200 and 46,400 in Portugal.

A conclusion of the roadmaps was that even a structured range of courses alone would not guarantee the participation of the target groups to the extent necessary. Additional measures have to be put in place such as: adequate financing of the lifelong learning scheme, information and motivation for employers to use a skilled and certified workforce, structural improvement in education, or quality standards in the construction sector.

The roadmaps include traditional buildings, although there are no explicit offers for heritage skills in traditional buildings, which highlights the need of specific projects such as PRO-Heritage.

There are still large gaps to be filled in the **training sector for Cultural Heritage**. In Austria the education for craftspeople is based on theory and practice, but there is no specialisation in historic buildings. The only specific courses are offered by the Federal Office of Monument Protection at the Education Centre Charterhouse Mauerbach.

In England currently none of the colleges teach traditional construction. There are currently no minimum training requirements for craftsmen to work in the heritage sector, although where larger projects are grant-aided by the National Lottery Heritage Fund there can be an insistence that operatives have gained their Construction Skills Certification Scheme (CSCS) Gold Card. For similar projects there can be an insistence that the project has to be led by an architect/professional who is fully heritage accredited/certified. Neither however relate to energy efficiency.

In Slovakia since 2002, the Monuments Board of the Slovak Republic deals with the special professional competence for cultural heritage research. At the moment there are no legal minimum training requirements for craftspeople to work in the heritage sector. There is only one secondary school in Banská Štiavnica offering a study programme in Restoration and Conservation, with the focus on facades and stucco. Besides that, there is no secondary or university programme with the main focus on energy efficiency in historic buildings or on traditional crafts. There is also no non-formal education with the main focus on energy efficiency in historic buildings.

In Portugal any operation of conservation or modification to classified heritage must be supervised and signed by a person holding a legally recognized qualification, usually a university degree, and submitted to the Heritage Institute. However at construction sites most of the blue collar workers are craftspeople with skills training or skilled by self-learning. But this stops at decorative finishing such as stucco, decorative painting, tiles, wood work, gilded surfaces, stone masonry, etc. In the recent past most of the blue collar workers were in charge of those, since 2000 these interventions are mostly done exclusively by conservator-restorers. In all other

Kommentiert [GB1]: UK?

Kommentiert [GB2]: Needs clarification: only England?
Obviously some colleges must teach traditional construction.

traditional buildings craftspeople do the best they know on each of their specific skills. That rarely or never includes any knowledge about energy efficiency.

To work on heritage sites in Spain, adequate training is necessary for the position to be held. Depending on the level of competence, functions range from management, organization, communication, planning, monitoring, to the evaluation of cultural heritage programs and projects. University degrees cover: Art and Humanities directly related to Cultural Heritage, Social and Legal Sciences, Cultural Management with complementary training in Cultural Heritage through postgraduate or specialization courses. Also, knowledge of financing, accounting and marketing and especially for matters related to energy efficient historic buildings, and renewable energy used for historic buildings. But there are no courses on energy efficiency related to historic buildings.



2. EU DEFINITIONS OF FORMAL, NON-FORMAL AND INFORMAL EDUCATION²

2.1 Formal education

Formal learning is the learning that occurs in an organised and structured environment (e.g. in an education or training institution or on the job) and is explicitly designated as learning (in terms of objectives, time or resources). Formal learning is intentional from the learner's point of view. It typically leads to validation and certification.

2.2 Non-formal education

Non-formal learning is learning which is embedded in planned activities not always explicitly designated as learning (in terms of learning objectives, learning time or learning support), but which contains an important learning element. Non-formal learning is intentional from the learner's point of view.

2.3 Informal education

Informal learning means learning resulting from daily activities related to work, family or leisure. It is not organised or structured in terms of objectives, time or learning support. Informal learning is mostly unintentional from the learner's perspective.

² Source: Cedefop, (2009), European Guidelines for Validating Non-formal and Informal Learning, Luxembourg: Office for Official Publications of the European Communities, ISBN 978-92-896-0602-8



3. OVERVIEW OF PRE-CONDITIONS TO WORK IN HERITAGE SITES

The main focus of all training mentioned here is related to traditional crafts for historic/traditional buildings.

3.1 European Union

At the European level, primary energy consumption is one of the main challenges. For this reason, the EU Commission released in 2012, the Energy Efficiency Directive (2012/27/EU), which establishes a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. This also led to a closer look at the total energy efficiency of buildings.

However, the general need to increase energy efficiency of buildings was the basis to also start the BUILDUP Skills Initiative in 2011. The overall objective of this initiative is to increase Europe's independency of energy imports and at the same time to reduce the risk of this dependency. In 2011, energy imports caused the outflow of approx. 270 Billion Euro³, 40% of this was for the building sector.

3.1.1 BUILDUP Skills Initiative

The EU Commission expected from the BUILD Skills Initiative a significant contribution for the implementation of the EU energy efficiency plan 2011⁴. The central result of the initiative should be widely recognised national strategies, put together in national "Roadmaps", which have to meet the following criteria⁵:

The national roadmap developed under BUILD UP Skills should explain how to overcome barriers and identified skills gaps in the various professions in such a way that the building sector can contribute to the 2020 energy targets.

Therefore, the recipients of the roadmap are all players with the potential to contribute to overcome these barriers and skill gaps. Besides the organisations already involved in the national qualification platform, the roadmap is of interest to all the stakeholders who are in a position to support and undertake those initiatives consistent with the priorities and measures identified in the roadmap.

The developed roadmap must be endorsed by relevant national public authorities and key stakeholders like social partners, craftsmen, building and industry associations, vocational training institutions, etc. (the list will vary from country to country) in order to become part of the national strategy in the sector.

The European Commission expects from the National Roadmaps:

1. Identification of the skills required
2. Identification of the need for training in the sectors concerned
3. Identification of the barriers that hinder the implementation of the 2020 goals

³ Source: BUILD UP Skills Austria – Final report, April 2013

⁴ Source: EU energy efficiency plan 2011, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Aen0029>

⁵ Source: Quotes from the EU catalogue of requirements for the National Roadmaps, November 2012



4. Measures to meet this need
5. Strategies to increase the attractiveness of educational measures
6. Monitoring concept for monitoring the achievement of goals

3.1.2 European Agenda for Culture

In 2018, the European Year of Cultural Heritage, the Council of the European Union started an OMC (Open Method of Coordination) Working Group of Member States' Experts regarding heritage skills. This group created a report regarding "Fostering Cooperation in the European Union on Skills, Training and Knowledge Transfer in Cultural Heritage Professions".

In this group, the Council invited national experts to investigate skills, training and knowledge in the heritage professions in [Europe](#)⁶. This report was intended to be a resource for the European Union (EU) to ensure the long-term sustainability of Europe's cultural heritage. It should also contribute to the [European Framework for Action on Cultural Heritage](#)⁷, launched by the European Commission with the aim of leaving a policy imprint beyond 2018.

The report defined as one of its results:

[A new European landscape for heritage professions](#)⁸

In the space of just a few years, the European policy framework on cultural heritage has been completely overhauled, moving towards a people-centred and holistic approach, and eliminating the divisions between the tangible, intangible and digital dimensions. It sees cultural heritage as a shared resource, highlighting that all stakeholders share responsibility for its transmission to future generations. It stresses the need for a more integrated approach to conservation and management, across different policy areas, in order to maximise the benefits to economy, culture, environment and society as a whole. It acknowledges the opportunities that new technologies offer to preserve cultural heritage, and to enhance the visitor experience and public engagement at heritage sites and museums. This new framework changes the way in which cultural institutions manage, protect and provide access to their heritage. It changes the way in which citizens and communities engage with their cultural heritage and also naturally influences the way that professionals deal with it.

One of the major tools that was used by the group is the SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis. From the major results only the important ones for PRO-Heritage are selected.

⁶ Source: Conclusions of the Council and of the Representatives of the governments of the Member States, meeting within the Council, on a Work Plan for Culture (2015-2018) (2014/EC/436/02).

⁷ Source: European Commission, Commission Staff Working Document, European Framework for Action on Cultural Heritage, SWD (2018) 491 final. Brussels, 5.12.2018.

⁸ Source: Report "Fostering Cooperation in the European Union on Skills, Training and Knowledge Transfer in Cultural Heritage Professions", p.6



3.1.2.1 STRENGTHS

1. INCREASING ACCESSIBILITY

- Databases, web portals, manuals, applications, 3D, new techniques
- Projects to make information digitally accessible (maps, cadastral plans, books, heritage sites)
- E-learning

2. NATIONAL COOPERATION/NETWORK

- Excellent networking in movable and immovable heritage
- Knowledge exchange
- Shared principles

3. FORMAL EDUCATION

- Work-based placements and internships
- Strong formal education and research in traditional fields (restorers, art historians)
- Sectoral practical training centres
- Interdisciplinary learning in training centres

4. CONTINUED PROFESSIONAL DEVELOPMENT/LIFELONG LEARNING/ NON-FORMAL EDUCATION

- Non-formal training programmes for building management professions, museums and traditional crafts
- Interdisciplinary training programmes
- Courses and seminars outside of schools, networking days
- Innovative research projects

5. ACCREDITATION AND CERTIFICATION

- Grant schemes and legislation stimulate conservation accreditation
- Formal descriptions of heritage professions
- National systems of recognition, validation, certification and qualification for arts, crafts and museums

6. ENGAGING SOCIETY

- Projects to stimulate interaction between heritage professionals and the general public
- National events like European Heritage Days, museum weekends, monument and mills days, and special years dedicated to heritage
- Involving unemployed people in the conservation and restoration of cultural heritage

7. ENGAGING YOUNG PEOPLE

- Early contact with heritage increases opportunities for young people to engage and decide to follow a career
- Projects to help young professionals to get a job in the heritage field

9. INTERNATIONAL COOPERATION

- Peer friendships and job-shadowing
- Involvement in the activities of UNESCO, ICCROM, ICOMOS, ICOM, the European Heritage Heads Forum, Blue Shield, NIPOS, HEREIN and Cedefop, ENCoRE



10. INCREASE THE IMPORTANCE OF INTANGIBLE HERITAGE

- Increasing attention is being given to intangible cultural heritage
- Pilot initiatives have been developed to promote the transmission and renewal of crafts
- Ancient traditions and worldviews are encouraged and supported through heritage communities

11. FLOURISHING CRAFTS AND SKILLS

- Traditional skills and crafts (for buildings and structures, intangible heritage, archaeology, arts and crafts, etc.)
- General communication and digital skills

12. HERITAGE BOOSTS THE ECONOMY

- Significant effects of the heritage sector on the economy
- Interaction between craftworking and design

3.1.2.2 WEAKNESSES**1. SKILLS AT RISK**

- Tangible heritage: skills related to craftsmanship are in danger
- Archaic traditions and traditional skills in intangible cultural heritage are disappearing
- New digital heritage skills are underdeveloped and there is a skills gap in digital skill among heritage professionals

2. EDUCATIONAL GAPS

- Minimal formal education programmes for heritage
- Training for heritage professionals is insufficient, too theoretical, not interdisciplinary enough and often low quality (education and teachers)
- Gap between content and the realities of the labour market

3. PROBLEMS WITH QUALITY ASSURANCE IN PROFESSION

- Lacking occupational profiles/no formal organisation of sector
- No standards and guidelines in the field are not known about or not used
- No structural financial investment in knowledge transfer
- Low inflow of professionals
- Gap in the connection between academics and communities/tradition bearers

4. NO POLICY TO PROMOTE CRAFTS AND HERITAGE PROFESSIONS

- Plans to promote crafts and heritage professions have not been developed or are underdeveloped
- Lack of markets for craft products

3.1.2.3 OPPORTUNITIES FROM OUTSIDE THE HERITAGE SECTOR**1. EUROPEAN QUALIFICATIONS FRAMEWORK (EQF) AND VALIDATION OF PRIOR AND INFORMAL LEARNING**

- Validation and appreciation of tacit knowledge and prior learnings
- The International Standard Classification of Occupations (ISCO)
- European Qualification Assurance in Vocational Education and Training (EQAVET)

3. NEW LEARNING APPROACHES AND TRAINING FORMATS

- New learning theories: informal learning, lifelong learning, experiential learning
- New training formats: dual education, apprenticeships, crossover training
- E-learning and blended learning
- New networks for knowledge sharing – face-to-face and digital



5. INCREASING INTEREST AND PARTICIPATION IN HERITAGE

- Growing interest in crafts, intangible heritage and born-digital heritage
- Growing public awareness of cultural heritage values

6. CROSS-SECTORAL PARTNERSHIPS

- Partnerships between heritage institutions and the public and private sectors
- New connections with cultural and creative industries

7. HERITAGE AS A KEY FACTOR IN SUSTAINABLE DEVELOPMENT

- Traditional crafts and materials are a source of inspiration for environmental sustainability
- Heritage as an economic asset for a country (economic sustainability)

8. COOPERATION BETWEEN HERITAGE SECTOR AND FORMAL EDUCATION

- Join forces with higher education
- Better heritage education in primary and secondary schools
- Better links with adult education

9. LEGISLATION TO SUPPORT TRANSMISSION OF KNOWLEDGE AND SKILLS

- Legislation supports knowledge sharing in the field of intangible heritage and crafts, like the Convention for the Safeguarding of the Intangible Cultural Heritage

3.1.2.4 THREATS FROM OUTSIDE THE HERITAGE SECTOR**1. ACADEMISATION OF SOCIETY**

- Vocational careers do not attract young people: decreasing status for executive roles
- The education system favours academic training over vocational training
- Academic programmes have reduced the time allocated to practice
- Lack of formal recognition of professions in the field

2. DEMOGRAPHIC IMPACT ON WORKFORCE: RECRUITMENT PROBLEMS

- Ageing of cultural heritage professionals and lack of generational replacement
- Emigration: brain drain and loss of skills
- Poor representation of social diversity in heritage organisations

4. REDUCTION OF PUBLIC FUNDING AND INSTITUTIONAL INSTABILITY

- An uncertain and underpaid sector
- No continuity of skill transfer

5. MARKET CONDITIONS AND COMMERCIAL PRESSURE

- The principles of a free market are universally and automatically applied in cultural heritage
- Strong focus on projects and events
- Pressure to create cheap products that sell
- Strong focus on the economic impact of heritage organisations

6. NEGATIVE VIEWS ON HERITAGE

- General image of heritage as dull, boring and dying
- Questioning of the social and economic added value of heritage and skills
- Heritage as an obstacle to development, growth and prosperity

7. CONFLICTING INTERESTS PUT PRESSURE ON HERITAGE ASSETS

- Conflicting interests with other public sectors

8. IMPACT OF DIGITALISATION, ROBOTICS, AUTOMATION AND NEW TECHNOLOGIES

- Replacement of manual skills with digital crafts and greater standardisation
- Uncritical digitalisation and open-access policy
- Gap between digital and analogue professionals



The report distinguished between:

- Raising awareness
- Education and training
- Lifelong learning
- Knowledge transfer

PRO-Heritage is focussing on Lifelong learning and Knowledge transfer, but as a basis also for having a closer look at education and training.

3.1.3 Energy Efficiency for Traditional Buildings

In the Energy Efficiency Directive from 2012, the EU Commission defined an exemption for traditional buildings:

- 2) *Member States may decide not to set or apply the requirements referred to in paragraph 1 to the following categories of buildings:*
 - a) *buildings officially protected as part of a designated environment, or because of their special architectural or historical merit, in so far as compliance with certain minimum energy performance requirements would unacceptably alter their character or appearance;*
 - b) *buildings owned by the armed forces or central government and serving national defence purposes, apart from single living quarters or office buildings for the armed forces and other staff employed by national defence authorities;*
 - c) *buildings used as places of worship and for religious activities.*

This rule is implemented differently throughout Europe. Therefore, PRO-Heritage cannot rely on the official statistics to identify the impact on energy efficiency for traditional buildings consistently across Europe.

3.2 Austria

3.2.1 Description of the Cultural Heritage Sector

In Austria, 2.0 million (90%) of the approximately 2.2 million residential buildings in 2011 are of one- and two-family houses (SFH). These are 61% (228.99 million m²) of total floor space; the remaining 39% (146.4 million m²) consist of multi-family dwellings (3-10 households) as well as multi-storey residential buildings (more than 11 apartments).

The major construction activity - overall - was recorded in Austria in the period 1961 to 1980, whereby the largest living space has been created in all periods by one- and two-family houses. From 1961 to 1980 the sector of multi-family homes (MFH) was dominated by multi-storey buildings (MSB).



To identify the number of historic buildings it is necessary to look at the year of construction. This is visualised in the following chart.

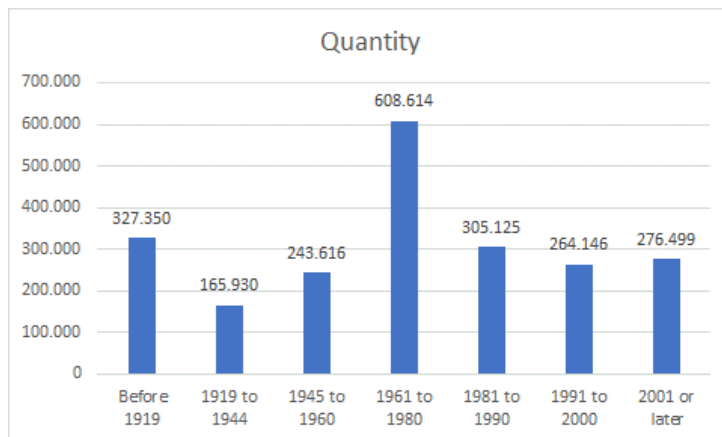


Figure 1: Quantities of buildings per age group (Source: Austrian Energy Agency, Reference buildings – the [Austrian building typology](#))

Knowing that the change of construction methods of buildings had happened between 1930 and 1940 there are no exact figures for the number of historic buildings in Austria available.

3.2.2 Reference to the BUILDUP Roadmap for Austria

In Austria, the "BUILDUP Skills" initiative had intended to create the relevant conditions to ensure the know-how of tradesmen in the construction and ancillary trades through suitable measures for the new requirements of the EPBD:

- Contribution to the achievement of the EU energy goals (20/20/20; EPBD)
- Reduction of construction defects and damage, in particular also deficiencies in the sense of missing specified energy values
- Ensuring the necessary number of appropriately qualified specialists, with particular attention to the next generation
- Improving the structure of education so that lifelong learning in the target area becomes more attractive and strengthened.

This initiative was meant to ensure the skills and competencies of the operators ("blue collar workers") are taken into account if they are important for the activity profiles of the target group.



The project had to initiate a national strategy process that would bring together the relevant players in the area of qualification, training and education in the sense of a common platform in order to develop a national roadmap to improve the qualification of tradesmen in the building sector. This roadmap had been intended as part of a broad recognition process, guaranteeing that the strategies developed form the basis for the targeted development of training and further education in Austria (www.buildupskills.at).

Main statements:

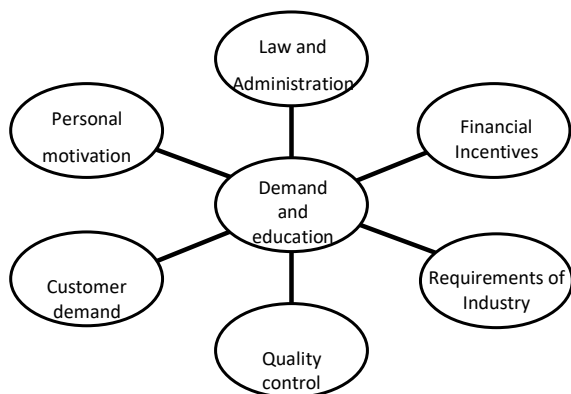
Continuing education for the identified approx. 25,000 people requires a structured approach:

- Clear definition of learning objectives according to the basic requirements of the NQF
- Attractive courses that are tailored to the "BUILD UP Skills" strategy
- Coordination with funding instruments
- Quality assurance and monitoring

A conclusion of the Roadmap was that even a well-planned range of courses alone does not guarantee the participation of the target groups to the extent necessary. The voluntary use of further training can be reinforced with a bundle of measures to increase the attractiveness of the training measures.

Following measures were identified:

- Increase in demand for educational opportunities



- Implementation of existing strategic plans (Austrian strategy for lifelong learning "LLL: 2020", Masterplan Greenjobs, AMS Standing Committee on New Skills, Master plan to ensure human resources in the field of renewable energy)
- Law and administration (Practice of authorization in business licenses, inspection of heating and air conditioning systems, labour market policy and funding for further training measures)
- Structural improvement in education (stronger competence orientation, educational standards for energy efficiency and renewable energy technologies, personal certifications, public presentation of competencies, modular systems in vocational education and training, increasing qualification of teaching staff, target group-oriented further training, increasing attractiveness of the professions)
- Quality in the construction sector (quality audits in building inspections, quality coaching on site, detection of defects and damage as the basis for training and reflection this in insurances, quality requirements in public tenders)

Most of these measures are also valid for traditional buildings, but the main problem of the Roadmap is the exclusion of all offers dedicated to heritage skills for traditional buildings. This is also one reason for the need articulated in PRO-Heritage.

3.2.3 Training sector for Cultural Heritage

The education for craftspeople in Austria is based on a duality between theoretical and practical education of young people aged between 15 and 18 years (called "Dual education"). There is no specialisation in historic buildings: the only specialised courses are offered by the Federal Office of Monument Protection – Information and (further) Education Centre in the Charterhouse Mauerbach. In those workshops craftspeople can learn in their profession what is needed to know to work about historic buildings. The training offered will be described in chapter 4.

3.3 United Kingdom

3.3.1 Description of the Cultural Heritage Sector

There are just over 500,000 listed buildings in England, 47,400 in Scotland, 30,000 in Wales and 8,900 in Northern Ireland, making a total of 586,300 for the UK. In addition, there are 10,000 conservation areas in England, 600 in Scotland, 500 in Wales and 60 in Northern Ireland, making a total of 11,160 for the UK; conservation areas contain buildings of historic interest which are not individually listed but which contribute to the historic character of the area and therefore are relevant to the issues and aims of PRO-Heritage.

Not all buildings are listed, so using the definition of a historic building as being one that dates from before 1919, this research has calculated that there are approximately 4.41 million historic dwellings and 550,000 historic commercial buildings, including listed buildings in England.



According to research by the Construction Industry Training Board, in conjunction with the National Heritage Training Group, in the UK as a whole the construction industry generates £149 billion of turnover (at basic prices) - at an output of over £77 billion (at 2000 prices) this represents about 8% of the national economy in terms of gross domestic product (GDP). Repair, maintenance and improvement is by far the single largest type of work undertaken, contributing 49% of total sector output. Analysis undertaken as part of this research suggests that approximately £3.5 billion is spent on conservation and restoration of historic buildings, with £1.7 billion of this spent on listed buildings.

In the UK as a whole, the construction industry employs over 2.1 million people. Excluding electrical wiring and fitting and plumbing, just over 1.8 million people work in the construction contracting sector. A further 225,000 are employed in professional consultancies.

The built heritage sector is a sub-set of the main construction industry and this research determined that the estimated workforce in 2004 was 86,430.

3.3.2 Training Sector for Cultural Heritage

These figures have to be considered in light of the fact that almost 25% of buildings within the UK (34% in Wales) are traditionally constructed (i.e. pre-1919), and therefore built with lime mortar - yet currently none of the colleges, at least within England, teach traditional construction. The situation is even worse when considering that it is estimated that half of the entire construction work at any one time are repairs or maintenance to these older buildings.

There are currently no minimum training requirements for craftsmen to work in the heritage sector, although where larger projects are grant-aided by the National Lottery Heritage Fund there can be an insistence that operatives have gained their Construction Skills Certification Scheme (CSCS) Gold Card. For similar projects there can be an insistence that the project has to be led by an architect/professional who is fully heritage accredited/certified. Neither however relates to energy efficiency; on the contrary, a pure conservation approach to satisfy heritage funding and comply with statutory regulations for historic buildings will prioritise 'conserve as found' and presume against any changes to improve energy efficiency which could be considered to compromise historic integrity.

3.4 Slovakia

3.4.1. Reference to the BUILD UP Skills in Slovakia

Better construction and use of buildings in the EU will affect 42% of the final energy consumption, approximately 35% of greenhouse gas emissions and more than 50% of all extracted raw materials, and may also help save as much as 30% of water. Therefore, the current policies to support energy efficiency and use of renewable energy sources in buildings play a key role in meeting the EU 2020 energy objectives. Costs on buildings during their life cycle should be taken into consideration to a larger degree, rather than only initial costs, including the construction and demolition waste. Better infrastructure planning is a necessary precondition to achieve efficient use of sources in the building sector and mobility. A



significant improvement in the energy use during the life cycle will contribute to competitiveness of the construction sector and to development of buildings which make efficient use of energies. It requires active participation of the whole value chain in the construction industry. Specific policies are necessary to support small and medium-size companies which represent the majority of construction firms with the aim to invest into the methods of construction and procedures for efficient use of energies, and into the necessary vocational education.

In respect of the EU 2020 objectives, renovation, construction of buildings and infrastructure within the EU shall be carried out with a high extent of an efficient use of sources. To a large degree, the approach based on life cycle will be used; all new buildings in the EU will be nearly zero-energy buildings⁴, with a high rate of efficient use of materials. An obligation to renovate the existing buildings has also been introduced, where great attention is paid to long-term planning of renewal of all types of buildings with an emphasis on in-depth renovation as well as renovation of public buildings, which should serve as examples of energy performance of buildings. As much as 70% of safe construction and demolition waste will be recycled.

The objective of the Build Up Skills Slovakia (BUSSK) is to prepare a national Roadmap to improve vocational education for occupations in the building sector, for workers at construction sites in order to react proactively to the challenges of a “green economy” by 2020, in particular as regards energy efficiency (EE) and use of renewable energy sources (RES). The aim of the Roadmap is to propose measures and manner of their implementation so that Slovakia would be ready to fulfil the objectives in the area of energy performance of buildings by 2020. The project focuses on the area of vocational education for workers at construction sites. For that reason, the project target groups are employees of construction firms and workers installing technologies and technical equipment in buildings.

Slovakia, compared to other European countries, belongs to the countries with the low portion of historic buildings built up to 1945 and so their contribution to the climate change and gas emissions is quite low. Even according to the Energy Efficiency Directive from 2012 where these buildings don't need to fulfil the requirements of this Directive, the energy efficiency of historic buildings is still a very interesting issue from the economic point of view of their owners.

According to the Build up Skills Slovakia project, the construction sector in Slovakia was developing gradually, especially after 1945. There are more than 920,000 apartments in Slovakia that form the, so-called, “fund of residential buildings”. These are of different ages. Approximately 10,000 apartments are older than 100 years. 785,608 apartments were built from 1947 to 1992, within the so-called mass forms of construction used for the last 20-65 years; these now need renovation. Apartments in residential buildings constitute 48.73% of the total number of apartments, in the SR. Most of these were built within the so-called mass forms of construction, using prefabricated technology. The largest number of apartments was built from 1960 to 1983 (525,221 apartments). Mass construction used standardized solutions and ended in 1992, in Slovakia.

Here are some important results and lessons learnt from the Build up Skills project Slovakia which are also relevant to historic buildings:

- The project was welcomed by all relevant state institutions and its outputs led to the creation of a strategic document endorsed by three ministries and approved by the Slovak Government.



- The project highlighted a previous lack of communication between a wide range of stakeholders active in the construction sector and managed to encourage new dialogue.
- Projects revealed that there are 47,000 workers requiring training and 14,000 workers are currently being trained (estimate based on data from 2006 and 2009). Professions with the highest needs of training are: bricklayers; insulators; plasterers and dry mounting installers; installers of sanitary equipment; plumbers; roofers; carpenters; HVAC installers.
- One of the recommendations of the project was to develop a national scheme for vocational education and training aimed at skills and knowledge for energy efficiency and renewables in buildings. Another recommendation was to launch a scheme of certification and skills testing, including quality control. Others included ensuring appropriate sources of funding to support delivery of objectives, and additional incentives, adequate financing of the lifelong learning scheme and motivating employers to use a skilled and certified workforce.
- Closer cooperation with representatives of competent ministries, institutions and organizations involved in the process of "greening" in the Slovak Republic. Dialogue was facilitated between those stakeholders who can bridge the gaps between theory and practice, which the Slovak Republic needs to fulfill the 2020 energy targets.

Also like in the case of other PRO-Heritage project partners' countries most of these measures are also valid for traditional buildings, but the main problem of the Roadmap and Build up project Slovakia is the same, which is the exclusion of all offers dedicated to heritage skills for traditional buildings. This is why there is a need for projects like PRO-Heritage.

3.4.2. Cultural Heritage Sector and pre-conditions to work in heritage buildings

The protection and restoration of monuments in Slovakia today is governed by the Act of the National Council of the SR No 49/2002 on the Protection of Monuments Stock (as amended by the Act of the NC SR No 479/2005 Coll), approved on 19 December 2001, and put into effect from 1 April 2002.

The full text of Act No. 49/2002 Z. z. on the protection of monuments and historic sites reflecting all the amendments can be found [here](#).

This Monuments Act has completely changed the philosophy of monuments protection in Slovakia. In the past the monuments preservation bodies were only advisory institutions for other state administration authorities. Although they often had broad-scoped competencies – in reality the existing legislation did not entrust them with decision-making power over the fate of monuments. That changed only with the Monuments Act of 2002. The new monuments organisation – the [Monuments Board of the Slovak Republic](#) – has directly become part of the specialised state administration and has assumed decision-making power in legal terms.

The Monuments Board of the Slovak Republic was established on 1 April 2002. It is based in Bratislava, the capital of Slovakia. The protection of the monuments stock of Slovakia, consistent with scientific knowledge and international conventions on the protection of cultural heritage, has become its main mission, provided for both in the



Monuments Act and in the Statute. It has been entrusted with a society-wide role to carry out all activities related to the protection of the monuments stock of Slovakia.

Organisationally, the Monuments Board is divided into the Central Office in Bratislava, concentrating on management, conceptual, methodological, scientific and research-related documentation and restoration works, and eight regional monuments preservation authorities, undertaking protection of monuments in the first instance of state administration in individual regions of Slovakia.

The Monuments Board maintains the Central List of Monuments Stock of the Slovak Republic, containing registers of real and movable cultural monuments, monuments preserves and zones. It is the main groundwork for the performance of the state heritage administration. It is so because the powers of the Monuments Board and its regional branches come directly from these registers. Decisions can only be taken on the structures, objects and territories that are recorded as cultural monuments or historic districts or that are to be found in the protected territory. The protected territory may include monuments reserves, monuments zones or archaeological sites. Cultural monuments also include archaeological findings discovered through archaeological research. A thorough knowledge of the monuments stock is the main prerequisite for its good protection and rehabilitation.

Therefore the principal task of recent years has been the revision of the Central List of Monuments Stock by means of basic field research and documentary research. The synthesis of data obtained, supplemented with the data of the preceding generations of preservationists, as well as the latest scientific studies, is the basis for the new edition of the publication National Cultural Monuments of the Slovak Republic, in which the entire monuments stock of Slovakia will gradually be introduced to the general public. In addition to providing synthetic knowledge of registered cultural monuments, the above revision will also result in proposals for the declaration of new cultural monuments or historic territories (the designation of structures as historic sites is in the competence of the [Ministry of Culture of the Slovak Republic](#)). Indeed, the historic treasures of Slovakia have not entirely been discovered yet and many structures, items or territories are still waiting to be revealed and evaluated.

Where theoretical and methodological issues are concerned, the Monuments Board is guided and inspired by recent state-of-the-art trends in the protection and presentation of cultural heritage. The best have been selected from amongst all methods governing monuments preservation in the past centuries, and conservation, reconstruction and restoration are now being aptly combined. The aesthetic principle of rehabilitation has won over the historical one. Particular architectural periods and styles and their techniques are respected, none of them are negated at the expense of the other. At the same time, the preservation of the authenticity of the monument and its heritage values are highlighted (historic, social, landscape, urbanist, architectural, scientific, technical or artisanal). If restoration as a specific kind of recovering the state of a historic place is not necessary, artisan works and the use of traditional technologies and materials are advocated. Equally, in the presentation of a cultural monument, such a method would be applied that best preserves its heritage values, highlighting them, or optimally using them. What is important is the overall, self-contained reflection of the restored monument, although an analytical presentation of its exceptional elements is not ruled out. The improvement of the construction and technical conditions of the monument and the elimination of causes of decay and malfunctions are taken for granted in restoration efforts. Revitalisation



of the surrounding environment also contributes to the resulting overall effect of the historic site restoration.

Protection of monuments is not only a technically and financially challenging activity but also a very delicate matter as the preservationist directly interferes with the ownership rights of people and societies, who are the monuments' proprietors or users. The interests of state protection of cultural heritage do not always consistently coincide with private interests. The monument preservationist-versus-owner relationship is not always ideal. During Slovakia's recent economic boom, monument protection faced many tough struggles with the authorities. On the one hand the inflow of financial investments offer the hope of improved conditions for the monuments stock of Slovakia, while on the other they pose a risk that the commercial interests of influential companies, supported by public efforts to raise the standard living for the population, will steamroll the voice of monument preservationists. It is therefore important in this situation for the voice of heritage protection to be steadily raised and for new educational and promotional initiatives to be developed.

3.4.3. Preconditions for the interventions in historic buildings and monuments

According the Monuments Act before commencing renovation (or restoration), the owner of a cultural heritage monument must submit an application to the Regional Monuments Board for a decision on the renovation (restoration) plan. The owner shall enclose the renovation plan with the application for a decision on the renovation (restoration) plan; it shall include the identification data of the cultural heritage monument, information on the ownership of the cultural heritage monument, the planned future use of the cultural heritage monument and a specification of the changes foreseen in the cultural heritage monument. Regional Monuments Board shall specify whether the proposed plan is acceptable in relation to the interests protected by this Act and specify conditions in which the anticipated renovation (restoration) plan can be prepared and implemented so as not to endanger, damage or destroy the cultural heritage monument, stating in particular whether the renovation (restoration) plan requires research and other preparatory documentation and project documentation. The Regional Monuments Board shall determine whether the proposed plan is acceptable with regard to the interests protected by this Act, and set conditions for the implementation of modifications to the immovable property in a historic site, in particular principles of spatial organisation, height and architectural solutions for the exterior of the immovable property. The Regional Monuments Board shall also determine whether the modifications require research and other preparatory documentation and project documentation and require the owner to notify the board in advance of the commencement of modification of the immovable property and the forecast end of work. Project documentation for renovation and project documentation for modification of immovable property in a historic site can be drawn up only by a person so authorised pursuant to the relevant legislation. The same applies also for the restoration process. Restoration can be carried out only by a natural person who has professional competence for it pursuant to relevant legislation.

The § 35a of Monuments Act is also dealing with the special professional competence for cultural heritage research.

(1) Cultural heritage research pursuant to this Act other than archaeological research can be carried out by a natural person who has a certificate of special professional



competence for the performance of cultural heritage research (hereinafter referred to as a "certificate of professional competence") and by the Monuments Board through natural persons with a certificate of professional competence. The Ministry shall issue a certificate of professional competence with a validity period of five years; an extension of the validity period of a certificate of professional competence can be granted for an additional five-year period, also repeatedly, based on an application.

(2) A certificate of professional competence can be obtained in the following areas of cultural heritage research: a) art historical research, b) architectural-historical research, c) urban historical research, d) archaeological research.

(3) A certificate of professional competence can be obtained by a natural person who: a) has completed the second level of higher education in a relevant field of study, b) has passed an examination of his/her theoretical knowledge and professional skills in the area of cultural heritage monuments and historic sites, c) has at least three years of professional experience in cultural heritage research, d) has irreproachable character; a person is deemed to have irreproachable character if they have not been convicted with final effect of a deliberate crime.

(4) When submitting an application for issuing of a certificate of professional competence, the applicant shall enclose a copy of documentation of completed education, documentation of professional experience, a professional assessment by the Monuments Board or the Archaeological Institute of completion of professional experience and an extract from the criminal register no more than three months old. An application for extension of a certificate of professional competence shall be accompanied by an extract from the criminal register no more than three months old. The Ministry shall retain the submitted documents.

(5) The Ministry shall cancel the certificate of professional competence of a natural person if they do not comply with this Act in the performance of cultural heritage research or if they cause serious damage to cultural heritage value. The Ministry shall also cancel the certificate of professional competence of a person convicted of a deliberate crime with final effect.

(6) The Ministry shall publish a list of natural persons who have valid certificates of professional competence in a specific area of cultural heritage research on its website. The list shall include their names, surnames, academic titles and contact data.

(7) The particulars of acquiring and extending a certificate of professional competence shall be laid down in an act of general application issued by the Ministry.

However for the actual work on monuments and for the people – we can call them craftsmen at the moment – there are no legal minimum training requirements for craftsmen to work in the heritage sector. There are also very limited possibilities for training for the craftsmen working in the heritage sector. There is only one secondary school in Slovakia dealing a little with the education in the field of monuments. It is a school of Samuel Mikoviny in Banská Štiavnica which is offering the study programme Restoration and Conservation, with the focus on facades and stucco.

In Slovakia there is no secondary or university programme with the main focus on energy efficiency in historic buildings or on traditional crafts. There is also no non-formal education with the main focus on energy efficiency in historic buildings. There are only few non-formal courses on traditional crafts run by the Obnova company and



NGO's like Academia Istropolitana Nova and The National Trust of Slovakia or ArTUR civil association.

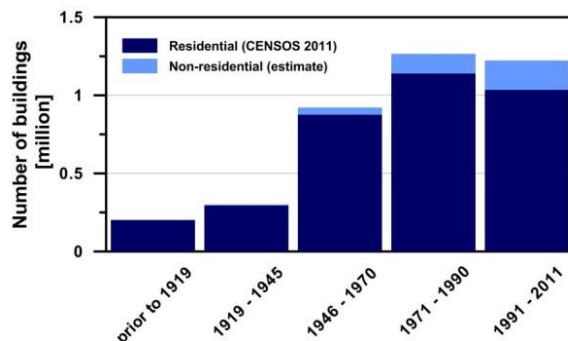
The Ministry of Culture has on its webpage the list of the craftsmen – however these people are mainly self-educated but skilled people who didn't receive any special recognition by the state and authorities.

There is no pre-condition to be a director or a manager of a historical building or historical site in Slovakia. Nevertheless, all these sites or buildings are usually directed or managed by people with university degrees, Masters or even PhDs. However nowadays many heritage sited are managed also by private owners and volunteers.

3.5 Portugal

3.5.1 Description of the Cultural Heritage Sector

There are 3,544,384 buildings in Portugal, 206,343 of which were built before 1919 in traditional construction systems (source: National Institute of Statistics, 2018). Mainly in this group of buildings, are 4,107 listed assets, comprising 810 National Monuments, 2,701 listed has Public Interest and 569 listed Regional Interest. Among National Monuments are 17 World Heritage Sites listed by UNESCO.



Source: CENSOS 2011 and estimate based on Statistics on Completed Works, INE (2011).

Buildings by period of construction

In the above chart it is possible to identify that the number of buildings built before 1919 is around 5% of all the buildings. Since the construction methods from traditional structure to concrete structures changed in the 1920s (the last building with traditional wood and lime-based heavy walls dates from 1926 in Lisbon), it is possible to estimate around 10% of buildings are "historic".

Nevertheless, these figures are different in city contexts. As an example, in Lisbon, the same group of buildings built before 1919 are 18%, comprising 34% of the total buildings if the 1919-1945 group is added.

In an overall perspective, the chart shows the three major construction activity periods driven mainly to address housing problems for the population between 1946



and 1990, and a more diverse construction (services, office buildings, hotels) from 1991 to 2011, but where housing buildings keep a first position in numbers. The residential sector is certainly the largest segment, in terms of both number of buildings and built-up area, although no nationwide statistics are available for the non-residential building sector. Therefore, the total number of buildings constructed between 1999 and 2010 that were not targeted for housing purposes, represent an accumulated total of 73,887 and 15.4% of all buildings constructed in that decade (479,431).

3.5.2 Reference to the BUILDUP Roadmap for Portugal

In Portugal, the “BUILDUP Skills” project aimed to bring together the building sector and establish a national consultation platform to develop a roadmap to drive the training of on-site building construction workers and installers of renewable energy systems until 2020 and beyond. The project team – LNEG (National Laboratory of Energy and Geology), DGEG (Directorate General for Energy and Geology of the Ministry of Economy), ADENE (Portuguese Energy Agency) and ANQ (National Agency for Qualification) – provided support to the relevant national authorities in energy, education and training areas, and involved the national stakeholders from industry and social partners, as well as training institutions and crafts associations.

Giving support to the national authorities, the project team has the potential of gathering in this action the relevant national stakeholders from industry to social partners, as well as training institutions to crafts associations. The project work is developed at three different levels. The starting point analysis and the roadmap definition are performed at core team level. But contacts with stakeholders will be promoted from the beginning, in order to engage them in the National Qualification Platform (NQP), thus, constituting the second level.

NQP, together with 6 other national organisations, is updating the qualifications developed in the National Qualifications System and reviewing some of the professional profiles and the training standards related to the renewable energies. NQP is presently conceiving a technological platform to give support to the Sector Councils to share, reveal and dematerialize the information produced in the scope of the Sector Councils for Qualification.

National Report on training needs and gaps (status quo report):

- Number of workers involved in the sector (construction/building/craftsmen and other on-site workers): 55,000-65,000
- Number of workers requiring training: 31,200-46,400
- Number of workers currently trained: n.a.

The structural measures of the roadmap mainly regard the Vocational and Educational Training (VET) system and consist of a set of recommendations to improve the current qualification standards or to regulate activities/qualifications. The operational measures consist of training programs targeted to the identified skills needs. The supporting actions act as drivers for training the workforce as well as for creating EE and RES requirements in companies, building owners and general public.

Looking back to the chart, is understandable why the traditional building skills are not formally included in the Roadmap and this project is focused on recent construction



methods. But the problem is that three or four hundred thousand buildings, mainly in big cities, some of them huge, do make a difference. And that those buildings have very specific needs and need craftspeople who know what they are doing in order to fulfil the energy targets without damaging the historic fabric.

3.5.3. Cultural Heritage Sector and pre-conditions to work in heritage buildings

There is no pre-condition to be a director or a manager of a historical building or historical site in Portugal. Nevertheless, all these sites or buildings are in fact directed or managed by people with university degrees, Masters or even PhDs. Nowadays, the number of PhDs in these places is increasing and becoming a requirement for the most important heritage sites in the country.

But making interventions in classified heritage is a different thing.

According to the Articles 45^o and 51^o of the Decreto-Lei n.º 107/2001 from 8th September, any operation of conservation or modification in classified heritage must be signed by someone responsible with a qualification legally recognized, and submitted to the Heritage Institute "Direção Geral do Património Cultural" (DGPC).

The authorization will always require a university degree conservator-restorer exclusively for maintenance by plasters or painters, or restoration of an altar or a ceiling (minimum of 5 years studies in conservation, according to the Decreto-Lei n.º 140/2009); it will require an archaeologist if there are excavations, land movements in heritage classified areas or backyards, or even demolitions in buildings where historical remains are suspected to appear (so-called above-ground archaeology); it will require an architect if there is any kind of renovation of tiles on a roof, if there are additions of ramps or any single transformation, or as a group of interventions where the architect can work as a coordinator.

But these are coordination and supervising positions.

Just like in general construction sites, in listed buildings contexts (around 4,000 assets) most of the blue collar workers are craftspeople with skills training or skilled by self-learning. But this stops at decorative finishing such as stucco, decorative painting, tiles, wood work, gilded surfaces, stone masonry, etc. In a recent past most of the blue collar workers were in charge of those, since 2000 these interventions are mostly done exclusively by conservator-restorers.

Anyway, in all the other traditional buildings (around 400,000 buildings) craftspeople do the best they know according to their specific skill, and that will rarely or never include any knowledge about energy efficiency or measures to improve buildings' thermal passive performance.

3.6 Spain

3.6.1 Description of the Cultural Heritage Sector

The only national and official document on CIGs (Cultural Interest Goods) in Spain is the Statistical Yearbook published by the Ministry of Culture. In this report, a distinction is made between movable and real estate CIGs. According to the last report published in 2018, Spain has 17,621 CIG properties and 22,114 personal properties (although these are figures corresponding to 2017). Most probably there are a few more. Monuments, archaeological zones, historical complexes, historical



sites and gardens are the most representative cultural assets. The Balearic Islands and Andalusia are the regions with the higher number of catalogued CIGs.

When CIGs are registered in this inventory, they come under the State Administration. This is something that should guarantee their protection. The municipalities become responsible for ensuring that these CIGs and their surroundings do not suffer any deterioration. But sometimes this is not the case.

Spain adopted on May 5, 1982 the Convention for the Protection of the Cultural and Natural Heritage of Humanity of UNESCO of 1972.

Spain is currently the country with the third highest number of World Heritage Sites in the world, behind Italy and China. As of 2019, 48 assets have been declared in Spain:

- 42 are cultural properties
- 4 are natural assets
- 2 are mixed assets

In addition, Spain has a registry of a total of 5,600 buildings scattered throughout the Spanish geography of different times that can be consulted in a database found at www.archxx-sudoe.es with basic data such as location, year of construction and architectural data. The information has been divided into five geographical areas. The site is providing an important public service, since citizens can participate and organize actions through the web to prevent, for example, lack of common sense in cases when buildings that should be preserved are demolished or put their signature on anonymous buildings. The data will be expanded in another phase of the project that the authors hope to start soon.

3.6.2 Reference to the BUILD UP Roadmap for Spain

In 2013, a Royal Decree 235/2013 was approved in order to transpose into national law the demands of the European Union for energy efficiency certification for existing buildings. With this Royal Decree of 2013 the previous Royal Decree 47/2007 was repealed. This also included heritage buildings, for which there is no specific regulation in this field.

The existing gap in terms of regulations has led to the elaboration of particular instruments for rehabilitation or restoration of historical buildings. These have been created by professionals thanks to an extensive experience gained along the years in architectural restoration.

Evaluations and solution development are intended to anticipate and assess the feasibility of adapting a building to the requirements established in the CTE (Technical Code for Building Construction) without damaging the conservation of the protected values.

Protected buildings present great difficulty when it comes to complying with the CTE. For this reason, a new code was created in 2006: Building Technician and Architectural Restoration.

The evaluation criteria must be applied when starting any action on a building and during the whole process of both the project and the works.

In Spain, training in Near Zero Energy Buildings (EECN) is a key pillar in a strategy that seeks to increase in the construction sector.



Taking into account the 18 million homes in the residential stock in Spain, it is proposed to focus work on the renovation of the existing buildings as the only way to meet the objectives set by the Europe Union. Building renovation needs to be done with almost zero energy consumption criteria to achieve these goals.

The PROF / TRAC project "PROFessional multi-disciplinary TRaining and Continuing development in skills for NZEB principles" offers a solution to achieve a multidisciplinary approach in the training of the EECN sector. This approach will be developed through the creation and maintenance of an education platform for the continuous training of professionals in the sector. The proposed approach will lead to a substantial reduction in the inadequacy of professional qualifications, an increase in management capacity to support innovation through new leadership, design, construction and management skills for mid-level professionals and superior and fostering better cooperation between disciplines. However, this approach is still not very common and is usually working in a fragmented process.

The barriers that were found when planning the project, and that were considered necessary to solve, are the following:

- Imbalance between existing and necessary competences, as well as the management capacity of professionals.
- Collaboration between different disciplines and professionals in the building sector is not very common.
- Professionals lack information about the qualifications and training materials available.
- There are no mapping and qualification qualifications available for certain specific groups. Most of the training material available focuses on a specific group or technique or concept.
- Training and education materials are created ad-hoc, without consensus or without a basic qualification framework.

In addition, training materials should be updated so that training can be sustainable and appropriate to long-life learning processes.

The proposals made for the future in this regard include the following topics:

- Motivation, Information, Experiences and Benefits for Users
- Architectural and Construction Solutions
- Embeddable Systems and Technologies
- Integration of Renewable Energies
- Actual Benefits of the EECN
- Rehabilitation and Urban Regeneration
- Positive Energy Buildings and Districts
- Use, management, operation and maintenance
- Circular Economy
- EECN PROJECTS (Nearly Null Energy Consumption Buildings Projects) of new construction or renovation in progress.



3.6.3. Training Cultural Heritage Sector and conditions to work in cultural heritage

To work in heritage sites in Spain, adequate training is necessary for the position to be held. From the State Federation of Associations of Cultural Managers (FEAGC), a job description has been made for cultural managers in general and, in particular, for professionals working in historic buildings / heritage sites. They are professionals who use cultural management tools and instruments to carry out programs, projects and actions on cultural heritage. This document explains the different professional profiles, referring to the Public Administration structure, but it should be understood that the profiles, levels and tasks, as well as the degree levels could also serve as a basis for the private sector.

Depending on the level of competence, their functions range from management, organization, communication, planning, monitoring, to the evaluation of cultural heritage programs and projects.

A booming diversification in cultural heritage fosters cooperation, to design, program, plan, and implement cooperation projects in cultural heritage of international scope.

Regarding university degrees, we can find:

- Degrees from the branch of Art and Humanities directly related to Cultural Heritage (Archaeology, History, Art History, ...) and the branch of Social and Legal Sciences (Social and Cultural Anthropology, ...). This training must be complemented with additional training in cultural management through postgraduate or specialization courses.
- A degree in Cultural Management with complementary training in Cultural Heritage through postgraduate or specialization courses.
- Degrees of the branch of Social and Legal Sciences related to economics and law, with complementary training in heritage and cultural management.
- Bachelor's degrees in History, Art History, Humanities, Social and Cultural Anthropology (in extinction). This training must be complemented with additional training in cultural management through postgraduate or specialization courses.
- Knowledge of financing, accounting and marketing and especially for matters related to energy efficient historic buildings, and renewable energy used for historic buildings.

In recent years, various universities have launched postgraduate studies in Cultural Heritage Management, having their first promotions of graduates. The modern techniques learned in postgraduate studies sums up to the knowledge these graduates obtained in their home career. This complementary training is necessary to properly administer the elements of Cultural Heritage whose management will be entrusted to them.

Currently, historic sites are managed by qualified people holding university degrees, masters and postgraduate degrees.

In order to intervene, conserve and restore cultural heritage, the participation of suitably qualified professionals is required. There are professionals who are responsible for the preservation of cultural assets regardless of their nature (painting, sculpture, ...) and support (paper, fabric, wood, metal, ...), always guaranteeing



respect for their cultural significance – historical, aesthetic and/or artistic. They are professionals who have a degree in conservation and restoration or a Bachelor of Fine Arts, specialty conservation/restoration or a Diploma in Conservation and Restoration of Cultural Property.

Interventions for the conservation and restoration of cultural property must conform to a methodology that guarantees respect for the values that society recognizes in them. Both the appreciation of these values and the way to safeguard them must be approached from a specialized and interdisciplinary professional perspective.

Since the need for intervention can affect any kind of cultural asset – both monumental buildings, such as paintings, sculptures or goldsmith's objects, archaeological heritage or goods with ethnological or industrial interest – and that each of them may have a particular problem to attend to, the intervention methodology must consider all possible cases and integrate any particular process or requirement. Among these requirements are those that emanate from the regulations for the protection of cultural property.

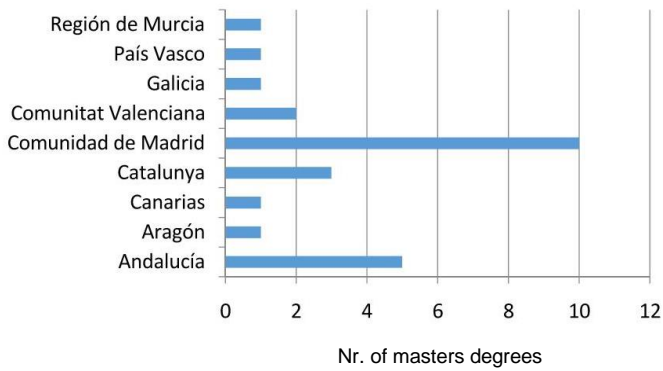
The building management regulations must be followed, mainly Law 38/1999, of November 5, on Building Planning (BOE No. 266, of November 6) and Royal Decree 314/2006, of March 17, which approves the Technical Building Code, with particular emphasis on the methodology of intervention in real estate, without forgetting the relevance of other rules of application, such as those that affect the prevention of occupational hazards or the management of waste.

On the other hand, the recognition of this profession as "Restorer of Works of Art", is included in the Official Bulletin of the European Union of 30-09-2005 (p. 44), in the Directive 2005 / 36EC (Directive 2005/36 / EC on the recognition of professional qualifications). As a professional activity it is reflected in the CNAE 2009 (National Classification of Economic Activities), in section 90.03 referring to the Artistic and literary creation, which includes the epigraph of [Restoration of Works of Art](#). In the interests of clarifying this profession, it has been manifesting itself progressively in the countries of the European Union, as shown in the recent decree law No. 138/2009, approved in Portugal in June 2009 (Diário da República, 1st series - No. 113 - 15 of Junho de 2009), which regulates who and how interventions should be addressed in the "Classified goods" (denomination used in Portugal).

The figure below shows a total record of graduate programs in each autonomous community. The autonomous communities that do not appear on the graph do not present any postgraduate program related to energy efficiency and heritage buildings.

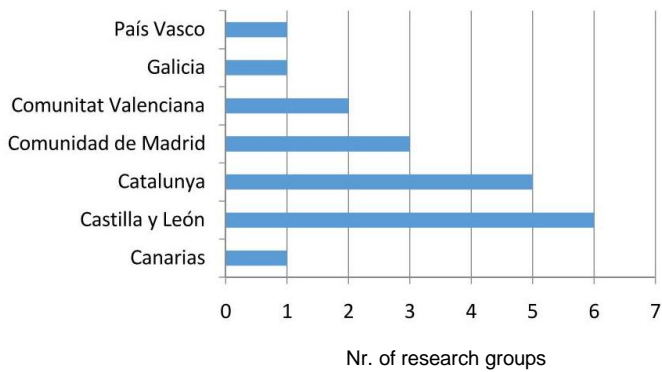
Graduate programs





The figure below shows a total record of research groups from each autonomous community. The autonomous communities that do not appear on the graph do not present any research group.

Research groups



4. CERTIFIED EDUCATION FOR CRAFTSMEN IN ENERGY ISSUES

4.1 Austria

4.1.1 Name of training course (for each course please complete the following template)

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	
Country of sustaining organisation	
Duration of educational activity	
Legislative basis	
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	
Location (city and country)	
Working language	
Acquired (academic) title, qualification, professional level	
To what entitles this education? a. Access to further education b. Access to occupations	
Curriculum / Content of education (Modules, Elements etc)	
Background of teachers and trainers	



4.2 United Kingdom

4.2.1 Name of training course (for each course please complete the following template)

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	<p style="text-align: center; color: red; font-weight: bold;">PLEASE SEE THE ATTACHED SPREADSHEET FOR A LIST OF CERTIFIED ENERGY COURSES AVAILABLE IN THE UK</p>
Country of sustaining organisation	
Duration of educational activity	
Legislative basis	
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	
Location (city and country)	
Working language	
Acquired (academic) title, qualification, professional level	
To what entitles this education?	
<ul style="list-style-type: none"> a. Access to further education b. Access to occupations 	
Curriculum / Content of education (Modules, Elements etc)	
Background of teachers and trainers	



4.3 Slovakia

4.3.1 Architectural Construction and Design – accredited master’s degree programme

Field of education	<input checked="" type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Slovak University of Technology in Bratislava, Faculty of Civil Engineering,
Country of sustaining organisation	Slovakia
Duration of educational activity	Bachelor’s degree – 3 years M.Sc. degree – 2 years
Legislative basis	<p>The Faculty of Civil Engineering (FCE) was founded in 1938 as the first faculty of the Slovak University of Technology (STU). It was originally located in both Košice and Martin. The launching of its first departments laid the foundations not only for the present Faculty, but also for technical education as a whole in Slovakia. Slovak University of Technology (STU) was founded in Košice and authorised by the Act No. 170/1937 Coll. of the Czechoslovak National Council, on June 25, 1937 as the Technical University of M. R. Štefánik.</p> <p>You can find more infor here: https://www.svf.stuba.sk/en/faculty/history.html?page_id=2122</p>
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	Bachelor’s degree – 3 years
Location (city and country)	Bratislava, Slovakia
Working language	Slovak, English, Russia, French and German
Acquired (academic) title, qualification, professional level	<p>Diploma in Civil Engineering - Dipl. Ing. , an M.Sc. equivalent degree</p> <p>A new system of study introduced after 1989 at the Faculty has recently been further updated to a credit-based modular-unit system. The first part of the study, a three-year course (180 credits), leads to a <u>bachelor's degree</u>. It gives the student the theoretical background necessary for further specialisation together with the basics of civil engineering. To broaden the students' educational perspectives, courses in the arts and social sciences, including philosophy, sociology, law, psychology and aesthetics, have been added to the</p>



	<p>curricula.</p> <p>The second part of the system, which is aimed at developing special skills in the chosen specialisation, is completed by a thesis. Its successful completion results in the award of the <u>Diploma in Civil Engineering - Dipl. Ing.</u>, an M.Sc. equivalent degree. This part lasts two years (120 credits) and permits students to implement their individual goals for their vocational education and specialisation. Thereafter, a four-year <u>Ph.D. study programme</u> in all the major theoretical civil engineering subjects is offered to students with an M.Sc. degree.</p> <p>The new study plan provides three means by which foreign students can attend courses offered by the Faculty. Presently they can enter the B.Sc. and M.Sc. <u>courses</u> held in Slovak after taking a Slovak language course. An English-language B.Sc. and M.Sc. programmes are currently being prepared for foreign students and will initially be open to approximately 20 participants. An individual study programme is arranged for each Ph.D. candidate. The candidate is monitored by a supervisor and a commission. The study programme also includes teaching activities and a seminar in a foreign language. Ph.D. students can pursue their doctoral thesis in Slovak or a foreign language.</p> <p>The civil engineering training is supported by education in foreign languages (English, Russian, German and French) at all levels of instruction provided by the <u>Department of Languages</u>. Instruction in the Slovak language is also offered for foreign students.</p> <p style="text-align: center;">STUDY DEGREES</p> <div style="text-align: center;"> <pre> graph TD A["1. Bachelor study - Bc. 3 years** Title Bc. 180 credits*"] --> B["2. Master study - Ing. 2 years Title Ing. 120 credits"] B --> C["3. Doctoral study - Ph.D. 4 years"] </pre> </div> <p style="text-align: center;"><small>* Building Structures and Architecture 240 credits ** Building Structures and Architecture 4 years</small></p>
<p>To what entitles this education?</p> <ol style="list-style-type: none"> a. Access to further education b. Access to occupations 	<ol style="list-style-type: none"> a. Access to Master and Ph.D. in any related subject b. Graduates can be employed in developing solutions to complex issues of the technological aspects of architecture during research and development and the design and realization of buildings. They can effectively work independently as members of work teams and also as heads or coordinators of interdisciplinary tasks; they can also be employed in development activities in the area of the management of architectural development projects as well as building contractor organizations, in the area of environmental protection, within educational systems and the like.



Curriculum / Content of education (Modules, Elements etc)	<p>Department of Building Construction delivers lectures in building construction, studio design typology, thermodynamics, acoustics, daylighting, and the energy efficiency of buildings. Students are trained in the design of construction units, elements, and details through theoretical and experimental methods of reasoning.</p> <p>The Department's scientific and research activities rely on an established experimental basis and are aimed at problems of thermal comfort, heat and humidity transfer through the walls and roofs of buildings and their joints, sound transmission in buildings, room and urban acoustics, the theory of daylighting and the solar energy of buildings, air infiltration and the effect of driving rain on walls and roofs of buildings and their joints, the total energy effectiveness of buildings, the durability of building materials, and building reconstruction.</p> <p>Between the bearing subjects belong also:</p> <p>The building and energy</p> <p>The building pathology</p> <p>The building renovation and monuments conservation</p> <p>The construction thermal technics etc.</p> <p>Graduates of this program of study acquire a comprehensive second-degree university education with a specialization in building structures with an emphasis on the technological aspects of architectural design and projects and the implementation of buildings. They are able to creatively and scientifically tackle technological issues of architecture and find and implement their own solutions to problems in the design and implementation of new architectural works as well as in the reconstruction and modernization of original buildings. They are prepared to apply theories, methods, tools, principles, and concepts of technology in architecture in areas such as the structural development and protection of buildings, their physical and static analyses, the technological and environmental development of the architectural environment of buildings and modern construction technologies of buildings and economics of buildings within a process related to the comprehensive design and implementation of architectural works.</p> <p>Graduates master the development of ecological, energy-efficient architecture with a high degree of sensitivity to design elements and details of architectural structures with an emphasis on the primary requirements for construction materials, design elements and structures established by EC Directive 89/106/EEC.</p>
Background of teachers and trainers	



4.3.2 Building Structures and Architecture - accredited master's degree programme

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Slovak University of Technology in Bratislava, Faculty of Civil Engineering
Country of sustaining organisation	Slovakia
Duration of educational activity	Bachelor's degree – 3 years M.Sc. degree – 2 years
Legislative basis	The same as above 4.3.1
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	Bachelor's degree – 3 years
Location (city and country)	Bratislava, Slovakia
Working language	Slovak, English
Acquired (academic) title, qualification, professional level	Diploma in Civil Engineering - Dipl. Ing. , an M.Sc. equivalent degree
To what entitles this education? a. Access to further education b. Access to occupations	<p>a. Access to Master and Ph.D. in any related subject</p> <p>b. The study program on building structures and architecture is focused on the education of civil engineers, university-educated experts for creative design, jobs related to building structures (residences, their amenities, industrial and agricultural facilities). The study program follows an 8-semester Bachelor's study program. The study program creates prerequisites for the acquisition of certification from the Chamber of Architects and the Chamber of Civil Engineers. Graduates can be employed under Act No.138/1992, Coll. on Certified Architects, under § 4 and Certified Civil Engineers under § 5, Section 1, subsection a.</p>
Curriculum / Content of education (Modules, Elements etc)	<p>Graduates are able to perform comprehensive design activities and develop architectural designs, plans, and projects as well as work in reconstruction and modernization of buildings and the renovation of building monuments. They are able to process supporting data for documentation of master plans. They can perform project management supervisory tasks and develop supporting data for environment impact assessments for buildings.</p> <p>Graduates can develop scientific approaches to architectural and</p>



	technological issues within architecture. They master the development of intelligent buildings and ecological energy-saving architecture with a high degree of sensitivity for the elements of architectural design, operations, and static aspects of the design of architectural structures and their elements. They can concentrate on details with an emphasis on their aesthetic and functional value and the requirements of building materials, elements and structures.
Background of teachers and trainers	

4.3.3. Building Services - accredited master's degree programme

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Slovak University of Technology in Bratislava, Faculty of Civil Engineering
Country of sustaining organisation	Slovakia
Duration of educational activity	Bachelor's degree – 3 years M.Sc. degree – 2 years
Legislative basis	The same as above 4.3.1
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	Bachelor's degree – 3 years
Location (city and country)	Bratislava, Slovakia
Working language	Slovak, English, French, Russian
Acquired (academic) title, qualification, professional level	Diploma in Civil Engineering - Dipl. Ing. , an M.Sc. equivalent degree
To what entitles this education? a. Access to further education b. Access to occupations	<p>a. Access to Master and Ph.D. in any related subject</p> <p>b. Graduates can be employed as members of creative teams, team leaders or independent experts for the development of optimum solutions of problems relating to installations, energy and management systems in buildings, the development of new technologies and technological equipment for buildings, the realization of building structures within technical and technological units for ensuring the application of facilities and coordination of components of the technological facilities of buildings, as well as in the area of environmental protection during the construction and operation of buildings, state administrations and regional development, educational systems and the like.</p>



Curriculum / Content of education (Modules, Elements etc)	Graduates acquire a comprehensive second-degree university education with a specialization in Building Structures and Architecture with a focus on the theory and development of technological components in an architectural structure. They have knowledge of the composition and inter-relation of separate components of technological facilities, heating systems, ventilation and air conditioning systems, metering and regulation and sanitary technology systems. They also know how to assess the quality of internal environments, the energy intensiveness of various kinds of buildings and how to conduct experimental analyses of temperatures, aerodynamics, humidity and the microbiology of indoor building environments. They are able to assess the impact of facilities on external ecological aspects.
Background of teachers and trainers	

4.3.4. Theory and Environmental Technology of Buildings – accredited doctoral study programme

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Slovak University of Technology in Bratislava, Faculty of Civil Engineering
Country of sustaining organisation	Slovakia
Duration of educational activity	Ph.D. programme – 4 years
Legislative basis	The same as above 4.3.1.
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	Bachelor's degree – 3 years M.Sc. degree – 2 years
Location (city and country)	Bratislava, Slovakia
Working language	
Acquired (academic) title, qualification, professional level	Ph.D. title
To what entitles this education? a. Access to further education b. Access to occupations	a. Access to Master and Ph.D. in any related subject b. Graduates of this doctoral program are able to independently resolve tasks of basic and applied research and lead research and auditing teams.



Curriculum / Content of education (Modules, Elements etc)	Graduates acquire a comprehensive third-degree university education in the specialization of Building Structures with a focus on issues of the theory and development of technological environments in architectural work and construction. They understand the comprehensive context of separate professional fields of the technological facilities of buildings and the special physical phenomena characterizing water, gas, heating and cooling. They understand all technical and technological systems in the context of the most up-to-date control and regulatory systems in order to develop and experimentally analyze and assess the quality of the internal environment of intelligent buildings, to assess the energy intensiveness of buildings and produce technical and energy audits from an environmental point of view.
Background of teachers and trainers	

4.3.5. Architecture and Urban Planning (Bc.), Architecture (Ing.arch.) and (PhD).

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Slovak University of Technology, Faculty of Architecture
Country of sustaining organisation	Slovakia
Duration of educational activity	<p>Bachelor study, Bc., 4-year, 3-year, Bachelor, Bachelor in Architecture and Urban Design, Bachelor in Product Design; Bachelor in Landscape Architecture and Landscape Planning (3-year)</p> <p>Master study, Ing.arch., Mgr.art., 2-year, Master, Master in Architecture Ing.arch.; Master in Urban Design Ing.arch.; Master of Arts in Product Design Mgr.art.</p> <p>Doctoral study, PhD., ArtD., 3-year (part-time 5-years), Doctoral, Architecture PhD.; Urban Design PhD.; Restoration of Architectural Heritage PhD.; Industrial and Product Design ArtD.; Theory of Architecture PhD.</p>
Legislative basis	The Faculty of Architecture, located in the town centre, is one of the seven Faculties of the Slovak University of Technology in Bratislava (SUT) - one of the biggest Universities in Slovakia with which a number of outstanding personalities is associated. The ambition of the SUT is to contribute to extending knowledge through its acquisition from science and to foster its dissemination via education as well as its application in direct co-operation with industry. In this way the university adheres to the significant heritage created by its predecessors – academicians of the Mining Academy in



	<p>Banská Stiavnica, which was the first technical university established in the heart of Europe in 1762. The current University was founded in 1937, establishment of the Department of Architecture and Building Construction in 1946 was the birth of the architectural education in Slovakia. An independent Faculty of Architecture was established in 1976. Within the short history of our school, students and staff have achieved significant results in international competitions, research projects and design for practice.</p> <p>Nowadays Faculty has nine institutes – Institute of Architecture of Residential Buildings; Institute of Architecture of Public Buildings, Institute of Sustainable and Experimental Architecture; Institute of History and Theory of Architecture and Heritage Restoration; Institute of Architectural and Engineering Structures; Institute of Interior and Exhibition Design; Institute of Urban Design and Urban Planning; Institute of Garden and Landscape Architecture; Institute of Industrial and Product Design: They are supplemented by three Departments: Computer and Multimedia Disciplines, Visual Arts and Languages.</p>
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	https://www.fa.stuba.sk/buxus/docs/studium/podmienky_pre_prijatie_Bc_20_2021_AJ.pdf
Location (city and country)	Bratislava, Slovakia
Working language	Slovak, English
Acquired (academic) title, qualification, professional level	<p>For Bachelor programmes: Higher secondary school diploma (grammar school or equivalent).</p> <p>For Master programmes: Bachelor's degree (in architecture, civil engineering or similar).</p> <p>Admission exams are required for both.</p>
To what entitles this education? a. Access to further education b. Access to occupations	a. Access to Master and Ph.D. in any related subject
Curriculum / Content of education (Modules, Elements etc)	<p>Complying with the European accreditation standards, the Faculty offers academic education and carries out research at an internationally compatible level in the following study fields: Architecture and Urban Design, Landscape and Garden Architecture, Industrial and Product Design. Since 2002, in coherence with the Bologna Declaration, the study model consists of Bachelor's degree programmes in the study fields Architecture and Urban Design, Industrial and Product Design (4 years), and in Landscape and Garden Architecture (3 years). The Master's degree programmes are in Architecture, in Urban Design, and Industrial and Product Design (2 years). These as well as the Doctoral degree programmes (3 years) can be taken also in English. In Architecture and Urban Design the curriculum corresponds to the requirements of the Directive 2005/36/EC on professional qualification.</p> <p>The studies are organized in the ECTS credit system allowing thus vivid participation in exchange programmes.</p>



Bachelor study programmes provide fundamental architectural education and prepare students for the master programmes. The Study Programme in Architecture and Urban Design (based on the EU guidelines) focuses on theoretical knowledge as well as development of creative skills through design studios. They form more than 40% of the overall curriculum structure, complemented by construction engineering and sciences (20%), theoretical courses (16%), visual arts (more than 13%) and humanities and history (7%).

In the fourth year students can choose from nine thematic modules. The final bachelor degree project consists of a theoretical seminar and an architectural or urban design, it is defended in the form of a state exam.

The Study Programme Product Design offers a complex information basis in design theory, history of arts, ergonomics, technology and product engineering, material machining, ecology. Design studios are an important part of the study.

The Study Programme Landscape Architecture and Landscape Planning focuses on the design and protection of cultural landscapes in coherence with socio-cultural, natural, ecological and economic aspects of quality. Graduates can continue Master's degree studies at the Civil Engineering Faculty within the study programme Landscape Engineering.

The Master Programme in Architecture and the Master Programme in Urban Design are offered in a two year full-time form, open to graduates of the Bachelor programmes in Architecture and Urban Design and related recognized study programmes. They combine traditional and new forms of study, including new technology and up-to-date themes and prepare students for the architectural profession – the title Ing.arch. granted by STU is accepted as a professional qualification for the architectural profession in all EU countries.

The curriculum core in Architecture and Urban Design is represented by design studios (58% of total hours with related courses and seminars), obligatory theoretical courses form about 30% of the total curriculum structure. Additionally students make their choice from a variety of optional elective courses depending on each student's personal orientation and own desired profile. Final work in each specialization consists of two parallel parts: the diploma seminar focused on a survey of the given theme and the diploma project. The student should demonstrate the capacity of working out architectural or town-planning designs in a complex, creative and original manner, to coordinate the aesthetic, technical, structural, economic, ecological, social and other requirements for the building or the urban environment.

The Master study programme in Industrial and Product Design is open to graduates of the Bachelor study programme in Product Design or related fields of study. The study focuses on developing creativity skills in product and interior design, providing complex information in humanities and technical sciences, artistic and manual capacities as well as computer skills.

Full-time (3 years) and part-time (5 years) programmes leading to a doctoral degree are offered in three study branches: in Architecture and Urban Design: Architecture, Urban Design, Restoration of Architectural Heritage and Structural Systems in Architecture (Title: PhD.); in Industrial and Product Design (Title: ArtD.); and within History and Theory of Fine Arts and Architecture: Theory of Architecture (Title: PhD.). Eligible are candidates who have a Master's degree and admission is subject to a selection procedure.

The doctoral programme includes a number of courses and seminars and participants are invited to participate in research projects of the Faculty. Research topics are offered by promoters. The doctoral degree is granted following a public defence of the work.

The individual programmes reflect the current research and artistic orientation of the Institutes of the Faculty and they allow for shaping of an



	<p>individual profile of the candidates aimed at theoretical-philosophical exploring, preparing them for an independent creative, scientific and research career or artistic activity in the fields of architecture, town-planning, industrial design and theory of arts and architecture, including protection of architectural heritage.</p> <p>This top-level theoretical study offers preparation for a well-founded research and science – oriented professional career in theory, philosophy and history of the field. The candidate obtains competence for self-contained and creative work, for participation in theoretical, research and scientific projects, analysis- demanding tasks within the field, identification of their principles and rules, and acquires knowledge that represents the state-of-the-art in the given theoretical or artistic field.</p> <p>Within the Faculty of Architecture is working The Institute of Ecological and Experimental Architecture</p> <p>This Institute comprises a variety of sciences dealing with the environment quality. They deal with the environment defined by the geographical conditions, culture, history, etc. The complexity of environment and its manifold understanding have been a part of research and educational application. They develop into a creative activity that is based on the environment protection and cultural heritage perspective. The programs of the Institute are, at the Faculty of Architecture, accredited in all degree levels – Bachelor, Masters and PhD.</p> <p>Core Subjects and Their Characteristics</p> <p>Bc. Low-energy Housing Fundamentals of environment-friendly architecture Building physics Studio work</p> <p>MSc. Architecture and Environment – offers a theoretical introduction to the environmentally motivated architectural design. It makes use of the surrounding investigations and their influence on design process and results. Settlement Ecology and Sustainable Development – a core subject provides students with the basics of sustainable life comprehension in the context of civilization development. Studio work, within the MSc study, focuses at creative applications of the principles arising from the theoretical instruction both in model and real situations.</p> <p>PhD. Individual programmes</p> <p>More info about this institute you can find here: https://www.fa.stuba.sk/english/institutes/institute-of-ecological-and-experimental-architecture.html?page_id=1059</p>
Background of teachers and trainers	



4.4 Portugal

4.4.1 Energy rehabilitation and buildings conservation

Field of education	<input checked="" type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Madeira University
Country of sustaining organisation	Portugal
Duration of educational activity	4 semesters, 2 years
Legislative basis	Registo DGES 1321/T065
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	Certificate of secondary education
Location (city and country)	Funchal, Madeira Island
Working language	Portuguese
Acquired (academic) title, qualification, professional level	Graduate Diploma in Conservation and Restoration
To what entitles this education? c. Access to further education d. Access to occupations	a. Access to Master in any related subject b. Career opportunities working in restoration and historic building and heritage sites
Curriculum / Content of education (Modules, Elements etc)	(1st semester) Maths, Physics, Chemistry, Informatics, buildings construction drawing, entrepreneurship (2nd semester) Maths II, Buildings stability, security in construction sites, rehabilitation materials, topography (3rd semester) Renewable energies and micro production, energy efficiency, pathologies and foundations rehabilitation, maintenance (4th semester) Internship https://www.uma.pt/ensino/ctesp/ctesp-em-reabilitacao-energetica-e-conservacao-de-edificios/
Background of teachers and trainers	



4.4.2 Energy rehabilitation and buildings conservation

Field of education	<input checked="" type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	IPG, Polytechnic of Guarda
Country of sustaining organisation	Portugal
Duration of educational activity	4 semesters, 2 years
Legislative basis	Despacho n.º 14358/2015 from Ministry of Education and Science
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	Certificate of secondary education
Location (city and country)	Guarda, Portugal
Working language	Portuguese
Acquired (academic) title, qualification, professional level	Graduate Diploma in Conservation and Restoration
To what entitles this education? a. Access to further education b. Access to occupations	a. Access to Master in any related subject b. Career opportunities working in restoration and historic building and heritage sites
Curriculum / Content of education (Modules, Elements etc)	(1st semester) Portuguese, Technical English I, Maths, Physics, construction drawing, Technical office, buildings (2nd semester) Technical English II, Mechanics, Infrastructures survey techniques, Procurement laws and regulations, sewage nets (3rd semester) Pathologies and foundations rehabilitation, renewable energies, topography, security in construction sites, foundations (4th semester) Internship http://www.ipg.pt/website/ensino_tesp.aspx?id=12&curso=Reabilita
Background of teachers and trainers	

4.4.3 Adaptive reuse and energy efficiency



Field of education	<input type="checkbox"/> post graduate <input checked="" type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Institution ADENE (National Energy Agency)
Country of sustaining organisation	Portugal
Duration of educational activity	12 days, 50 hours
Legislative basis	
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	Certificate of secondary education
Location (city and country)	Guarda, Portugal
Working language	Portuguese
Acquired (academic) title, qualification, professional level	Certificate Diploma
To what entitles this education? a. Access to further education b. Access to occupations	a. Access to occupations working in restoration and historic building and heritage sites
Curriculum / Content of education (Modules, Elements etc)	<p>General concepts of conservation, rehabilitation, adaptive reuse</p> <p>General characterization of the Portuguese built reality</p> <p>Legal context of rehabilitation, adaptive reuse and energy in buildings</p> <p>Historic buildings characterization</p> <p>Acoustics, Thermic behaviour, construction main problems</p> <p>Buildings maintenance</p> <p>Thermic rehabilitation - general concepts</p> <p>Thermic rehabilitation – improvement's measures</p> <p>Thermic rehabilitation – incentives</p> <p>Energy efficiency and NZEB (Nearly zero-energy buildings)</p> <p>Energy production, self-sufficiency and energy management systems</p> <p>Reference case study visit https://academia.adene.pt/curso-reabilitacao-edificios-eficiencia-energetica/</p>



Background of teachers and trainers	
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4.5 Spain

4.5.1 Master's degree in diagnosis of the state of conservation of historical heritage

Field of education	<input checked="" type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Universidad Pablo de Olavide (Pablo de Olavide University)
Country of sustaining organisation	Spain
Duration of educational activity	1 year (60 ECTS credits)
Legislative basis	Publication date in BOE (official state gazette): 2013-11-15
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	<p>This Masters Degree is designed for historic heritage preservation or protection professionals who want to learn more about ways of diagnosing current states of preservation and monitoring interventions.</p> <p>It is aimed at university and college graduates and diploma holders, whether they be Spanish or foreign applicants, in different fields of arts or science, although most of those admitted have a background in arts/humanities. A considerable number of applications also come from architects. Notwithstanding, priority consideration will be given to graduates and university diploma holders in Fine Arts, Archaeology, Humanities, History, Chemistry, Physics, Environmental Sciences, Geology, Architecture, Engineering, Biology, Biotechnology and Restoration. Matriculation records show that nearly all places for new participants are filled by students who choose this Masters Degree as their first choice.</p> <p>The unique characteristics of this Masters Degree make it desirable for enrolling students to have a suitable background in History of Art and Archaeology, or in the sciences, because they will be able to complement their knowledge in other fields from a historic heritage diagnosis perspective during the programme itself, in preparation for work in multidisciplinary diagnosis teams.</p> <p>Those students who need to reconcile work and family commitments with their dedication to the Masters Degree are strongly urged to choose to cover the syllabus part time over two academic years.</p>
Location (city and country)	Seville, Spain
Working language	Spanish



Acquired (academic) title, qualification, professional level	Masters Degree in Diagnosis of the State of Preservation of the Historical Heritage																																								
<p>To what entitles this education?</p> <ul style="list-style-type: none"> e. Access to further education f. Access to occupations 	<p>This Masters Degree specialises students to be able to make a diagnosis and a characterization of the historical heritage state of preservation in order to obtain information from an artwork by studying its technique, its restoration and alterations. Everything in order to propose possible interventions. Research about nature and the historical heritage state of preservation are the basis of the most recent studies about heritage, which will train students of the Masters Degree to take decisions in different fields of the historical heritage (characterisation, dating, cataloguing, diagnosis...).</p> <p>Having a Masters Degree is an obligatory requirement in order to continue onto Doctoral studies. The admission to a PhD Programme may be determined with the compliance of additional specific requirements or, as in this case, to training complements.</p>																																								
Curriculum / Content of education (Modules, Elements etc)	<p>The Masters Degree in Diagnosis of the Historical Heritage State of Preservation establishes a complete and coherent offer whose principal aim is the high quality training of researchers and specialists in the historical heritage state of preservation field. The offer consists of five academic units named modules, integrated at the same time by subjects closely related among them.</p> <p>There has to be a minimum number of students in order to activate an educational pathway or an optional subject.</p> <table border="1" data-bbox="411 1048 1082 1787"> <thead> <tr> <th>CODE</th> <th>NAME</th> <th>TYPE</th> <th>NUMBER OF CREDITS</th> </tr> </thead> <tbody> <tr> <td>2106651</td> <td>SCIENCE AND TECHNOLOGY IN HISTORICAL HERITAGE</td> <td>Compulsory subject</td> <td>4</td> </tr> <tr> <td>2106652</td> <td>NON-DESTRUCTIVE/INVASIVE TECHNIQUES APPLIED TO THE STUDY OF HISTORICAL HERITAGE I. NDT-I</td> <td>Compulsory subject</td> <td>6</td> </tr> <tr> <td>2106654</td> <td>SPECTROSCOPY TECHNIQUES APPLIED TO THE DIAGNOSIS OF HISTORICAL HERITAGE</td> <td>Compulsory subject</td> <td>3</td> </tr> <tr> <td>2106664</td> <td>MATERIALS: DIAGNOSIS AND INTERVENTION</td> <td>Compulsory subject</td> <td>3</td> </tr> <tr> <td>2106666</td> <td>RESTORATION AND REHABILITATION</td> <td>Compulsory subject</td> <td>3</td> </tr> <tr> <td>2106667</td> <td>PREVENTIVE CONSERVATION AND ENVIRONMENT</td> <td>Compulsory subject</td> <td>2</td> </tr> <tr> <td>2106670</td> <td>THEORY OF HISTORICAL HERITAGE AND RESTORATION</td> <td>Compulsory subject</td> <td>3</td> </tr> <tr> <td>2106653</td> <td>NON-DESTRUCTIVE/INVASIVE TECHNIQUES APPLIED TO THE STUDY OF HISTORICAL HERITAGE I. NDT-II</td> <td>Optional subject</td> <td>6</td> </tr> <tr> <td>2106655</td> <td>NEW IMAGE TECHNOLOGIES APPLIED TO HISTORICAL HERITAGE (GIS AND IMAGE)</td> <td>Optional subject</td> <td>2</td> </tr> </tbody> </table>	CODE	NAME	TYPE	NUMBER OF CREDITS	2106651	SCIENCE AND TECHNOLOGY IN HISTORICAL HERITAGE	Compulsory subject	4	2106652	NON-DESTRUCTIVE/INVASIVE TECHNIQUES APPLIED TO THE STUDY OF HISTORICAL HERITAGE I. NDT-I	Compulsory subject	6	2106654	SPECTROSCOPY TECHNIQUES APPLIED TO THE DIAGNOSIS OF HISTORICAL HERITAGE	Compulsory subject	3	2106664	MATERIALS: DIAGNOSIS AND INTERVENTION	Compulsory subject	3	2106666	RESTORATION AND REHABILITATION	Compulsory subject	3	2106667	PREVENTIVE CONSERVATION AND ENVIRONMENT	Compulsory subject	2	2106670	THEORY OF HISTORICAL HERITAGE AND RESTORATION	Compulsory subject	3	2106653	NON-DESTRUCTIVE/INVASIVE TECHNIQUES APPLIED TO THE STUDY OF HISTORICAL HERITAGE I. NDT-II	Optional subject	6	2106655	NEW IMAGE TECHNOLOGIES APPLIED TO HISTORICAL HERITAGE (GIS AND IMAGE)	Optional subject	2
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	2106656	METAL	Optional subject	2
	2106657	PAPER	Optional subject	2
	2106658	TEXTILES	Optional subject	2
	2106659	STONE AND MORTARS	Optional subject	2
	2106660	GLASS AND CERAMICS	Optional subject	2
	2106661	MURAL PAINTING	Optional subject	2
	2106662	ORGANIC MATERIALS	Optional subject	2
	2106663	BIOLOGY OF RESTORATION	Optional subject	2
	2106665	NEW MATERIALS (PLASTICS	Optional subject	2
	2106668	DIAGNOSIS AND PROCESSING OF HISTORICAL HERITAGEMATERIALS WITH LASER AND NEW TECHNOLOGIES	Optional subject	3
	2106671	THE FUNCTION OF THE HISTORY OF ART IN THE CONSERVATION OF CULTURAL GOODS	Optional subject	3
	2106672	ARCHAEOLOGICAL ANALYSIS OF CONSTRUCTION TECHNIQUES IN HISTORICAL BUILDINGS	Optional subject	3
	2106673	MANAGEMENT AND MUSEALISATION OF THE ARCHAEOLOGICAL HERITAGE	Optional subject	3
	2106669	INTERNSHIPS	Internships	6
	2106674	MASTER'S THESIS	Master's thesis	12
Background of teachers and trainers	Professors and researchers from: <ul style="list-style-type: none"> • Department of Physical, Chemical and Natural Systems • Department of Geography, History and Philosophy • Physics • Chemistry • Archaeology • Geologic Sciences • Environmental Management / Integral Water Management • Lasers applied to chemical research • Biological Sciences (Department of Microbiology) • Integral Environment Management 			

4.5.2 Master's degree in renewable energies and energy efficiency



Field of education	<input checked="" type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Universidad de Zaragoza (University of Zaragoza)
Country of sustaining organisation	Spain
Duration of educational activity	The courses are organized so that a total of 75 ECTS credits must be completed, 60 of them are for knowledge acquisition through regulated teaching and 15 through a master's final project. Therefore the master's degree must be taken in one academic year and part of the next.
Legislative basis	Royal Decree 1393/2007
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	<p>This master's degree is aimed at graduates in the current official degrees of industrial engineering and chemical engineering. It can also be suitable for graduates in physical sciences and chemical sciences and industrial technical engineers of the specialties mechanical, electrical and industrial electronics and to a lesser extent, industrial chemistry.</p> <p>In any case, prior knowledge of electrical engineering, electrical machines, technical thermodynamics and heat transfer will be necessary.</p> <p>Due to the research orientation, it is more suitable for students from higher degrees (engineering and undergraduate degrees) than for students from technical engineering, who tend to seek a more applied approach.</p>
Location (city and country)	College of Higher Engineering and Architecture, Zaragoza, Spain
Working language	Spanish
Acquired (academic) title, qualification, professional level	Master's degree in renewable energies and energy efficiency
To what entitles this education? g. Access to further education h. Access to occupations	<p>The program's approach is technological, but without losing sight of the fundamental problem of energy sustainability, which will give us a global perspective in the medium term. The inclusion in the program of courses such as "Energy Sustainability" centres the issue so that students do not lose sight of the fact that the technologies, and the calculation and design skills learned in each of the courses, must be put into context of the future.</p> <p>Although the proposed degree is oriented towards research, the training obtained may be of professional interest in the case of graduates who want to develop their activity in R + D + i departments or engineering cabinets. The industrial sectors to which the graduates of the master's degree could be incorporated are described below, taking full advantage of the training obtained. Likewise, the most immediate challenges of R&D in the sector are briefly detailed.</p> <p>Regarding the field of specialization, we can distinguish three type profiles:</p> <ol style="list-style-type: none"> 1. General renewable energy (wind, solar thermal, photovoltaic solar,



	<p>biomass) in the first four-month period and a specialization in renewable energy and thermal systems or electrical systems in the second.</p> <ol style="list-style-type: none"> 2. Specialization in renewable energy (biomass, solar thermal) and energy efficiency in thermal systems from the beginning, taking subjects related to combustion, hydrogen, thermal engines, power cycles, polygeneration, storage and capture of CO₂, etc. 3. Specialization in renewable energy (wind, solar photovoltaic) and energy efficiency in electrical systems from the beginning, taking subjects related to the transport and distribution of electrical energy in systems that contain an important part of non-manageable renewable generation, design of electrical machines, integration of renewable energy and distributed generation. <p>When choosing the specialization, the student must take into account that it is necessary to have a prior basis. If you have had a previous specialized training (especially technical engineering) you must continue with the itinerary of your specialization.</p>
Curriculum / Content of education (Modules, Elements etc)	<p>Mandatory subjects:</p> <ul style="list-style-type: none"> • Fundamentals of Electrical and Energy Engineering (6.0 ECTS) • Wind and hydraulic energy (6.0 ECTS) • Solar and biomass energy (10.0 ECTS) • Energy Efficiency (8.0 ECTS) <p>The optional subjects (all of them of 5.0 ECTS) are grouped into three modules:</p> <p>Thermal systems</p> <ul style="list-style-type: none"> • Hydrogen and fuel cells • Solar power expansion • Biomass energy expansion • Energy efficiency in the building • Tools for industrial energy analysis. Energy intensive industries • Advanced thermoelectric generation. Zero emission plants. Emissions trading • Electric systems <p>Power quality and network connection</p> <ul style="list-style-type: none"> • Distributed generation, smart grids and electric mobility • Advanced simulation of electrical systems with renewable sources • Protection and control of electrical systems with renewable sources • Electric generators for renewable energy applications • Control and design of electric converters <p>Energy sustainability</p> <ul style="list-style-type: none"> • Energy markets • Renewable energy installations projects • External practices <p>To obtain a specialty (thermal systems, electrical systems) it will be necessary to take at least 25 ECTS of the corresponding itinerary.</p>
Background of teachers and trainers	<p>The teaching staff belongs mainly to the Department of Electrical Engineering and Mechanical Engineering (area of machines and thermal engines), also collaborating with the Department of Computer Science and Systems Engineering (Area of Systems and Automation Engineering). Being a master's in introduction to research, all professors are doctors and have experience in both teaching and research.</p>



4.5.3 Master's degree in management of conservation-restoration projects

Field of education	<input checked="" type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Universitat de Barcelona (University of Barcelona)
Country of sustaining organisation	Spain
Duration of educational activity	1 year (60 ECTS credits)
Legislative basis	Royal Decree 1393/2007
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	It is expected that graduates who already have specific training in the field of heritage conservation-restoration will access this master's degree, since this master's degree is a path of specialization.
Location (city and country)	Barcelona, Spain
Working language	Catalan (30%), Spanish (63%) and English (7%)
Acquired (academic) title, qualification, professional level	Master's degree in management of conservation-restoration projects
To what entitles this education? i. Access to further education j. Access to occupations	<p>The master trains professionals to lead multidisciplinary projects and teams that work in the field of heritage conservation and restoration.</p> <p>It also trains the student for free exercise as a professional in these fields.</p> <p>Given the research-enhancing structure, the master facilitates the continuation of training in the field of research through the doctorate.</p> <p>In relation to the conservation-restoration of collections and heritage collections, the student, once finished the master, will have reached the following specific skills:</p> <ul style="list-style-type: none"> • Ability to work and lead a multidisciplinary team. • Ability to establish protocols and interpret the results of analytical studies of cultural property, as heritage elements within a set and context. • Ability to establish the conditions of preventive conservation of cultural property in context and to manage its maintenance. • Ability to select and carry out specific treatments and treatment methods in order to guarantee the integral conservation of both objects and the whole. • Ability to document in an orderly and systematic way all phases of interventions.



	<ul style="list-style-type: none"> • Ability to estimate, plan and direct human, technical and material resources. • Ability to apply quality criteria and safety, health and environmental standards that affect jobs and the conservation-restoration process. • Ability to apply the form of management and operation of administrations related to heritage. • Ability to disseminate the knowledge acquired in the exercise of the profession and in the research projects carried out.
Curriculum / Content of education (Modules, Elements etc)	<p>Specialty: Conservation-Restoration Project Management</p> <ul style="list-style-type: none"> • Picture Collections: Study, Conservation-Restoration • Collections of Graphic Documents: Conservation-Restoration • Collections from the Everyday to the Museum Scope • Communication, Advertising and Public Relations • Law Applied to Cultural Management • Management and Coordination of Heritage Intervention Projects • The Materials of the Urban Landscape and its Preservation • Materials for the Reintegration of Archaeological Objects • Scientific Methods Applied to the Study of Heritage • Urban Landscape • Mural Painting: between the Architectural and the Museum Context • Internship • Digitalization and Content Security Projects • Master's Thesis
Background of teachers and trainers	<p>The Master starts from the initiative and the management of the group of professors of the Conservation-Restoration Section of the Faculty of Fine Arts of the UB who, with this offer, wants to give continuity and specialization to the Degree studies as well as offer a way to initiate research in the field of heritage conservation and restoration.</p> <p>The participation of other groups, such as the group of professors of the Master's Degree in Urban Design, the subject of Law in the field of heritage and the team of scientific staff of the Scientific and Technological Centers of the UB as well as the participation of external professionals form a team which responds to the needs of students who consider deepening in the field of conservation-restoration.</p>

4.5.4 Master's degree in conservation of architectural heritage

Field of education	<input checked="" type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Universitat Politècnica de València (Polytechnic University of Valencia)
Country of sustaining	Spain



organisation	
Duration of educational activity	72 ECTS credits, therefore the master's degree must be taken in one academic year and part of the next.
Legislative basis	Royal Decree 1393/2007 This University Master's degree is designed to achieve three general objectives related to academic training, professional specialization and the initiation to research of its students in the disciplinary fields of conservation and architectural heritage management, as a direct response to the professional competences that society trusts in the current Building Law. This University Master's Degree is based on the capabilities of the Master's Degree in Heritage Conservation that, as a UPV degree, exists since 1989.
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	It is aimed at graduates in Architecture, Technical Architecture or engineering with sufficient knowledge in construction. It also targets graduates in other disciplines such as Geography and History, Art History and Tourism.
Location (city and country)	Valencia, Spain
Working language	Spanish
Acquired (academic) title, qualification, professional level	Master's degree in conservation of architectural heritage
To what entitles this education? k. Access to further education l. Access to occupations	The skills that students acquire when taking this master are: <ul style="list-style-type: none"> • Appropriate knowledge of legislation regarding conservation and intervention in heritage. • Ability to identify and characterize architectural typologies. • Advanced knowledge of the main stages of the History of Architecture. • Knowledge of heritage conservation theories, and their evolution in history. • Ability to identify and characterize materials. • Advanced knowledge of the main construction techniques applied throughout the history of Architecture. • Ability to analyse and assess interventions made in the architectural heritage. • Ability to formulate proposals for action in equity • Ability to analyse the structural behaviour of historical buildings. • Ability to analyse, recognize, assess and appropriately represent the state of buildings from previous studies. • Ability to apply advanced methods and techniques for surveying and representing built Architecture. • Ability to identify and analyse the interpretive values of architectural heritage. • Ability to develop research and conservation projects, intervention and management of Architectural Heritage; applying the knowledge and skills acquired in the subjects of the Master.
Curriculum / Content of education (Modules, Elements etc)	MODULE 1: Fundamentals Theory and History: Culture and history of architecture, Theory and history of conservation Techniques and Methods: Intervention Criteria: From theory to practice, Recognition and evaluation methodologies and techniques, Construction techniques and materials for conservation



	<p>Management and City: Urban and territorial analysis, Heritage management</p> <p>MODULE 2: Specialization</p> <p>Intervention Techniques: Study and analysis of interventions, Legislation, economics and execution of conservation works, Conservation and intervention workshop, Intervention techniques</p> <p>Management: Sustainable development and heritage, Public heritage management, Interpretation and enhancement, World heritage, Management workshop, Tourism and architectural heritage</p> <p>Anthropic Territory: Study and analysis of interventions in the anthropic territory, Landscape and anthropic territory, Workshop of intervention in the landscape and territory, Workshop of intervention in the anthropic territory</p> <p>The historic city: Study and analysis of interventions in the historic city, The historic city, Intervention workshop in the urban landscape, Intervention workshop in the historic city</p> <p>MODULE 3: Complements</p> <p>Technology, Theory and Heritage: Structural analysis in vaulted systems, Archaeology of architecture, Valencian contemporary architecture, Architecture in industrial heritage, Valencian Gothic architecture, Valencian historic residential architecture: characters and conservation, Underground architecture excavated in Levante, Conservation and restoration of Pre-Columbian architecture, Conservation and restoration in the Valencian Community, Diagnosis and intervention of concrete structures of the first half of S. XX, Energy efficiency in the rehabilitation of buildings, Tests and non-destructive techniques applied in the diagnosis of historical constructions, Spaces Historical for music, History of structures: theory, methods and systems, Coatings: techniques and materials in classicist Valencia, Modern heritage, Virtual reconstruction of architectural heritage, Advanced techniques to support the survey o: topography, photogrammetry and laser scanner, Advanced technology applied to the conservation of architectural heritage, Valencia historic city</p> <p>MODULE 4: Master's thesis</p>
Background of teachers and trainers	<p>Professors and researchers from the following departments:</p> <ul style="list-style-type: none"> • Department of Continuous Media Mechanics and Structural Theory • Department of Architectural Constructions • Department of Architectural Projects • Planning Department • Department of Architectural Graphic Expression • Department of Architectural Composition • Department of Cartographic Engineering Geodesy and Photogrammetry • Department of Applied Physics



5. NON-CERTIFIED EDUCATION FOR CRAFTSMEN IN ENERGY ISSUES

5.1 Austria

5.1.1 Name of training course (for each course please complete the following template)

Field of education	<input type="checkbox"/> post graduate <input checked="" type="checkbox"/> vocational training courses <input type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Bundesdenkmalamt / Federal Monument Protection Authority
Country of sustaining organisation	Austria
Duration of educational activity	
Legislative basis	No base
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	
Location (city and country)	
Working language	
Acquired (academic) title, qualification, professional level	
To what entitles this education? a. Access to further education b. Access to occupations	
Curriculum / Content of education (Modules, Elements etc)	
Background of teachers and trainers	



5.2 United Kindom

No information available in United Kingdom

5.3 Slovakia

5.3.1 Renovation of traditional houses

Field of education	<input type="checkbox"/> post graduate <input checked="" type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	ArTUR
Country of sustaining organisation	Slovakia
Duration of educational activity	3 days
Legislative basis	NGO established in
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	Only the interest to participate in the course and ability to use the results of the course
Location (city and country)	Hrubý Šúr, Slovakia
Working language	Slovak
Acquired (academic) title, qualification, professional level	no
To what entitles this education? c. Access to further education d. Access to occupations	This non formal education helps the owners and other interested people to renovate the old traditional houses
Curriculum / Content of education (Modules, Elements etc)	<p>1. st Day – Traditional Houses, Research</p> <ul style="list-style-type: none"> - traditional houses, folk architecture, regional features, values, why not to demolish the traditional houses - legislative and duties of the owners, monuments, monuments´zones, building permission, energy standards, sustainability. - Examples: <ul style="list-style-type: none"> • state of the house, analyse, diagnostics, examples how to deal with the building´s defects, building materials <p>2. nd Day – Preservation and conservation principles, concept of</p>



	<p>restoracion</p> <ul style="list-style-type: none"> - adverse effects of water, dehumidification methods and examples - construction physics, condensation, heat cladding, air proofness, ventilation, inner environment, steam proofness, - features and behaviour of traditional materials <p>3rd Day – Sustainability, Summaries and Excursion</p> <ul style="list-style-type: none"> - new materials and technologies - evaluation and purpose of sustainability - good practise examples - excursion
Background of teachers and trainers	Architects

5.4 Portugal

No information available in Portugal

5.5 Spain

5.5.1 Ramón Recuero traditional forge recovery centre

Field of education	<input type="checkbox"/> post graduate <input checked="" type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input checked="" type="checkbox"/> private
Name of sustaining organisation	Ramón Recuero Blacksmith Traditional School (https://ramonrecuero.jimdofree.com/)
Country of sustaining organisation	Spain
Duration of educational activity	Duration of the courses ranges from one weekend to 6 weeks
Legislative basis	Private academy
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	Only the interest to participate in the course and ability to use the results of the course
Location (city and country)	San Antonio (Toledo), Spain



Working language	Spanish
Acquired (academic) title, qualification, professional level	No
To what entitles this education? e. Access to further education f. Access to occupations	This non-regulated teaching allows both amateurs and professionals to acquire or perfect the technique of traditional forging
Curriculum / Content of education (Modules, Elements etc.)	<p>1. Weekend courses</p> <ul style="list-style-type: none"> - Initiation to traditional forge - Tool forging and heat treatment of steel - Electric welding - Brazing - Engraving on metal - Chiselled <p>2. Week courses (Monday to Friday)</p> <ul style="list-style-type: none"> - Traditional forge - Tool forging and heat treatment of steel - Techniques applied to iron sculpture - Brazing - Engraving on metal - Bronze casting - Chiselled <p>3. Six weeks courses</p> <ul style="list-style-type: none"> - Course for future masters
Background of teachers and trainers	Blacksmiths

5.5.2 El Barco training centre

Field of education	<input type="checkbox"/> post graduate <input checked="" type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input checked="" type="checkbox"/> private
Name of sustaining organisation	El Barco centre for the training of artistic crafts and heritage conservation (http://www.elbarco.es/en/training-centre.html)
Country of sustaining organisation	Spain
Duration of educational activity	The courses usually last 3 months
Legislative basis	Private academy
Preconditions (Recognition of educational credentials and	The courses are specially addressed to people with a certain degree of craftsmanship willing to apply their knowledge to the conservation and



prior learning, Admission rules and restrictions, Admission procedure)	restoration of the architectonic heritage
Location (city and country)	Madrid, Spain
Working language	Spanish
Acquired (academic) title, qualification, professional level	No
To what entitles this education? g. Access to further education h. Access to occupations	This non-regulated teaching aims at helping both amateurs and professionals to access the labour market
Curriculum / Content of education (Modules, Elements etc.)	Monographic courses on specific techniques for artistic crafts and restoration: <ul style="list-style-type: none"> • Course on artistic stone • Course on stucco marble • Course on wood restoration
Background of teachers and trainers	Professional craftsmen

5.5.3 Homo Faber training courses

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input checked="" type="checkbox"/> private
Name of sustaining organisation	Homo Faber training centre (http://homofabercursos.com/)
Country of sustaining organisation	Spain
Duration of educational activity	The courses usually last 5 days
Legislative basis	Private academy
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	The courses are specially addressed to people with a certain degree of craftsmanship willing to apply their knowledge to the conservation and restoration of the architectonic heritage
Location (city and country)	Mansilla de las Mulas (León), Spain
Working language	Spanish
Acquired (academic) title,	No



qualification, professional level	
To what entitles this education? i. Access to further education j. Access to occupations	This non-regulated teaching aims at helping both amateurs and professionals to access the labour market
Curriculum / Content of education (Modules, Elements etc.)	<p>Monographic courses on:</p> <ul style="list-style-type: none"> • Advanced lime stucco techniques: The lime cycle. Stucco materials: lime, aggregates and pigments. Plastered and carved stuccos. Sgraffito stuccos. Gold leaf applications. Ironed stuccos. Imitation stone. Lime paints • Hot-ironed stucco course: practice and restoration • Marbled-stucco course: applied to sculpture • Lime sgraffito course • Mural painting course: fresh and dry • Earthen construction: tapia, adobe, wall of hand (COB) • Artistic earthenware coatings • Lightweight wood and earthenware framework • Stairs and partitioned vaults
Background of teachers and trainers	Professional craftsmen, architects, art historians, museologists, graduates in Fine Arts, Conservation and Restoration

5.5.4 Lime museum of Morón

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input checked="" type="checkbox"/> private
Name of sustaining organisation	Lime museum of Morón de la Frontera (http://museocaldemoron.com/formacion.html)
Country of sustaining organisation	Spain
Duration of educational activity	The courses usually last 2 to 3 days
Legislative basis	Private academy
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	The courses are specially addressed to people with a certain degree of craftsmanship willing to apply their knowledge to the conservation and restoration of the architectonic heritage
Location (city and country)	Morón de la Frontera (Seville), Spain
Working language	Spanish



Acquired (academic) title, qualification, professional level	No
To what entitles this education? k. Access to further education l. Access to occupations	This non-regulated teaching aims at helping both amateurs and professionals to improve their working techniques and achieve greater professional specialisation
Curriculum / Content of education (Modules, Elements etc.)	Monographic courses on: <ul style="list-style-type: none"> • Practical workshop on techniques for working with plaster: the combination of plaster and lime • Plant cover and traditional techniques in the historical heritage • Tapial architecture: traditional building technique and its restoration • Traditional lime stucco and its place in the historical heritage
Background of teachers and trainers	Professional craftsmen and architects

5.5.5 Santa María de Albarracín Foundation

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input type="checkbox"/> public <input checked="" type="checkbox"/> private
Name of sustaining organisation	Santa María de Albarracín Foundation (https://fundacionsantamariadealbarracin.com/ciclo-formativo-conservacion/#restauracion)
Country of sustaining organisation	Albarracín (Aragón), Spain
Duration of educational activity	The courses usually last 80 to 120 hours
Legislative basis	Private academy
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	These courses are open to people, whether working or unemployed, who have completed their studies in restoration at the Faculties of Fine Arts and Higher Schools of Conservation and Restoration of Cultural Assets. Graduates of related professions may also enrol on the Preventive Conservation course
Location (city and country)	Spain
Working language	Spanish
Acquired (academic) title, qualification, professional level	No
To what entitles this education?	These courses are part of the Training and Professional Insertion Plan developed by the Ministry of Culture. Its main objectives are:



m. Access to further education n. Access to occupations	- To raise the value of cultural heritage assets - To promote specialisation in different areas of conservation and restoration of cultural assets - To promote the training of postgraduates (graduates, diploma holders, undergraduates). - To facilitate the realization of applied practices on real cultural assets
Curriculum / Content of education (Modules, Elements etc.)	Advanced courses in conservation and restoration: <ul style="list-style-type: none"> • Conservation and restoration of metallic materials • Preventive conservation
Background of teachers and trainers	Technical staff from the Spanish Cultural Heritage Institute

5.5.6 IAPH School of Cultural Heritage

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Andalusian Institute of Historical Heritage (IAPH)
Country of sustaining organisation	Spain
Duration of educational activity	The courses usually last 5 days
Legislative basis	Agency attached to the Regional Department of Culture and Historical Heritage (Regional Government of Andalusia)
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	The courses are specially addressed to people with a certain degree of craftsmanship willing to apply their knowledge to the conservation and restoration of the architectonic heritage
Location (city and country)	Seville, Spain
Working language	Spanish
Acquired (academic) title, qualification, professional level	No
To what entitles this education? o. Access to further education p. Access to occupations	This non-regulated teaching aims at helping professionals to improve their working techniques and achieve greater professional specialisation
Curriculum / Content of education (Modules, Elements etc.)	Advanced courses in: <ul style="list-style-type: none"> • Practical carpentry workshop • Other courses organised together with the Lime museum of Morón de la Frontera (mentioned above)



Background of teachers and trainers	Professional craftsmen
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5.5.7 Introduction to risk and emergency management in cultural heritage

Field of education	<input type="checkbox"/> post graduate <input type="checkbox"/> vocational training courses <input checked="" type="checkbox"/> adult training courses
Sustaining organisation	
Type of sustaining organisation	<input checked="" type="checkbox"/> public <input type="checkbox"/> private
Name of sustaining organisation	Spanish Cultural Heritage Institute (IPCE)
Country of sustaining organisation	Spain
Duration of educational activity	60 hours
Legislative basis	Agency attached to the Ministry of Culture
Preconditions (Recognition of educational credentials and prior learning, Admission rules and restrictions, Admission procedure)	The course is addressed to professionals involved in the conservation of archives, museums, other cultural collections, curators, restorers, archaeologists, related professionals with risk identification and emergency management of State security bodies and professionals of the civil protection system. And also to researchers or students of interested higher university students who wish to complete their training.
Location (city and country)	Online
Working language	Spanish
Acquired (academic) title, qualification, professional level	No, just a certificate
To what entitles this education? q. Access to further education r. Access to occupations	This course aims at helping professionals to improve their working techniques and achieve greater professional specialisation
Curriculum / Content of education (Modules, Elements etc.)	Fields of action <ul style="list-style-type: none"> - Typologies of cultural heritage - The national legislative framework for the protection of cultural heritage and the regulations on self-protection plans - The field of civil protection Preventive actions. Mitigation mechanisms <ul style="list-style-type: none"> - Disaster Preparedness - Emergency management planning - Risk Management Cycle: Detection, Evaluation and Mitigation Types and impact of catastrophic risks on cultural heritage <ul style="list-style-type: none"> - Classification and emergency levels



	<ul style="list-style-type: none"> - Natural disasters - Disasters of anthropic origin <p>Plans for safeguarding property in cultural institutions</p> <ul style="list-style-type: none"> - Objectives, methodology and development - Before the emergency - During the emergency <p>Post-emergency intervention methodology</p> <ul style="list-style-type: none"> - Assessment of damage, post-disaster needs and recovery preparedness - After the disaster - Analysis and presentation of real cases <p>Catastrophic risk management in rural areas. Material and human resources</p> <ul style="list-style-type: none"> - Mechanisms for mitigation and action on the ground - Intelligence tools and exploitation of heritage databases - Practices, rules, lines of work and case studies
Background of teachers and trainers	Conservators, restorers, emergency experts (firemen, experts from the Ministry of Defence)



6. CONCLUSIONS

6.1 Summary of achievements

The BUILDUP Skills initiative has helped different Member States of the European Union (among which are the five PRO-Heritage countries: Austria, United Kingdom, Slovakia, Portugal and Spain) to organize working groups to implement national action plans. This has allowed breaking silos between ministries, departments and institutions, and starting a dialogue at various levels where it did not exist before. It has also highlighted gaps in energy efficiency training in historic buildings for craftspeople, architects, designers and engineers.

In tackling this task of promoting energy efficiency and renewable energy education in traditional buildings, the national working groups realize that simultaneous actions need to be launched to ensure a true implementation of the program, such as: motivating employers and employees in construction sites, ensuring a valid certification for this type of training, adequate financing, quality standards, etc.

Although it is not always a legal requirement in the five countries analysed, in most of the cases, interventions and repairs in historic buildings are supervised by professionals with a legally-recognized qualification, usually a university degree and a minimum experience on the job. Often at construction sites, most of the "blue collar" workers are craftspeople skilled by self-learning.

Formal and structured training courses on energy efficiency and renewable energy applied to historic buildings are still scarce. There are mostly projects (many are European-funded projects) that result in guidelines to good practices for the restoration of architectural heritage properties.

In the five countries analysed there are a few notable examples of specific training courses that cover energy efficiency in historic buildings, such as the Education Centre Charterhouse Mauerbach in Austria, several one-day or various-days courses in United Kingdom for professionals, or a secondary school in Banská Štiavnica (Slovakia) offering a study programme in Restoration and Conservation.

Besides that, in all countries there are university courses and masters' degrees that cover building renovation, restoration and conservation, or energy efficiency and renewable energies, but have no specific focus on energy performance in traditional crafts for historic buildings.

A central theme concerning the approach to potential retrofit measures between all Pro-Heritage partner countries is the incompatible disconnection between the Heritage sector and the Energy industry, which has generated tension and mistrust. Undoubtedly there is a lack of understanding - on both sides - about the appropriate approach and potential consequences that inappropriate measures will have on traditional buildings.

Unfortunately, craft training for all relevant trades is nearly non-existent, with adhoc training courses only available for the so-called 'Professional Sector' - and few of these are recognised as qualifications. This not only reflects the general lack of awareness of the subject, but also the lack of demand for such an important topic.



The same can be also said about the low level of sector take-up between traditional conservation and digital skills; they are not as some perceive 'good and evil', but should work harmoniously together.

There is also a trend across Europe that publicly funded and owned property projects can only be supervised by University-accredited professionals, not 'time-served' (Blue Collar) craftworkers who have learned their skills on the tools over many years but have no 'piece of paper' to prove it. This prejudice against craftworkers needs to be addressed, not least to enable potential entrants into the Heritage Sector feel valued and to ensure that they can aspire to a proper career.

In November 2019 the European Commission announced and outlined the broad scope and objectives of the European Green Deal. On 16 September 2020, in the State of the European Union address by Ursula von der Leyen provided more detail how the targets for carbon reduction would be achieved to make Europe the world's first climate neutral continent by 2050. This was followed by the launch of substantial funding programmes to implement the European Green Deal, a key component of which is the 'Renovation Wave', intended to reduce the 40% of energy consumed by buildings. Within this ambition is the substantial number of older historic buildings, many of which significantly underperform in terms of energy/carbon consumption, but which are the subject of PRO-Heritage. Therefore, PRO-Heritage will take into account the increased priority which the European Green Deal places upon improving the energy performance of older historic buildings, as the experience, techniques and skills deployed by the cultural heritage sector can lead by example.

6.2 Relation to continued developments

In order to ensure that building and renovation projects meet the required energy efficiency standards, this document evidences a widespread and significant need to:

- Raise awareness on energy efficiency issues in historic structures, particularly in "soft" conservation, maintenance and continuous care.
- Promote the creation of higher training courses for craftsmen, architects, designers and engineers specifically focused on energy efficiency and renewable energy in the restoration and conservation of historic buildings.
- Establish a structured education system that allows lifelong learning for professionals and craftsmen providing traditional competences and skills for built heritage.
- Certify educated professionals and craftsmen to guarantee recognition of their competences and skills.
- Identify best practices to encourage skills and knowledge exchange among European countries.
- Encourage journeyman's travels to support the exchange of competences and skills across Europe.



6.3 Other conclusions and lessons learned

An improvement in the education of energy efficiency issues for professionals working in the maintenance and renovation of heritage structures, in subjects such as thermal insulation, draught proofing, carpentry, glazing, maintenance or energy efficiency technology, has the potential to have a significant positive influence on the Heritage Sector in relation to sustainability. This would increase Europe's independency of energy imports in line with the Energy Efficiency Directive (2012/27/EU) and the BUILDUP Skills initiative.

6.4 Contact to the Coordinator's Data Protect Officer

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7. ACRONYMS AND TERMS

Acronym Explanation.

Term Explanation.



8. REFERENCES

- [1] Author's Last Name, First Name. *Title*. <<collection>> (if existent),. Editor (if relevant). Volume (if relevant). Place of Publication: Publisher, Publication Date.

References: Any content that is not a genuine contribution of the OrbEEt project must be referenced.



9. APPENDICES

Further information is described in related background documents:

Appendix 1: Dx.x_A1_PRO-Heritage_

Appendix 2: Dx.x_Ax_PRO-Heritage_

Avoid excessive length:

- Deliverables should not exceed ~40 pages.
- Deliverables can be supported by attached documents as appendices (e.g. workshop reports, test results, state of the art descriptions).
- The core deliverable document should be sufficient for assessing (by internal QA & EC review) the achievements without reading the appendices.

