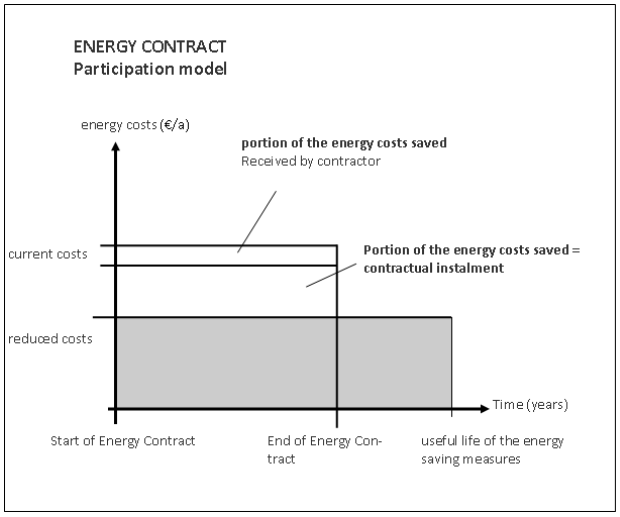
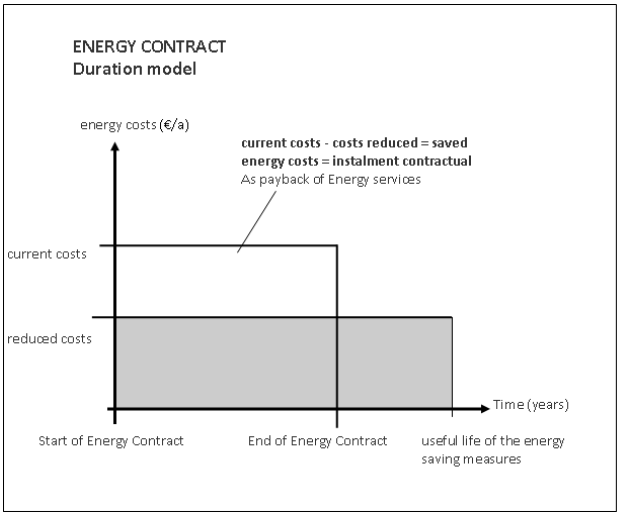
Second Level: **5 step towards the implementation and Historic Buildings PILOT**

PUBLIC AND HISTORIC BUILDINGS

Steps for Implementation of the Action Plan:
1. Identify all funding channels,
2. Prepare the specifications, takeoffs, public notices, tenders,
3. Select Esco in relation to scores on the most advantageous offer,
4. Commit to the energy performance contracting (EPC) with guaranteed results,
5. Start of redevelopment efficiency of public buildings.

The provider (ESCO) guarantees coverage of the costs and the realization of own profit through the "cash flow", which corresponds to the energy savings in the time duration of the contract.
As regards the remuneration in the form of sharing energy savings (shared-savings), the contract may be made so as to immediately benefit of savings both the Administration and the provider, in the sense that these savings are divided between the parties in quotas contractually defined, so that the Administration sees reduce own spending since the beginning, also paying the remuneration to the provider. Another possibility is that the Administration pays the amounts corresponding to level of "historical" (source) of its energy costs and all the savings are collected by the provider up to what his fee is accrued, while after this moment the administration itself keeps the entire share of savings resulting by the implementation of the interventions by the provider. It defines "participation model" the first case and "duration model" the second.
The two models are visually represented in the following two graphs that show energy costs depending on the duration of the contract, equal to total saving.





Note that for historical buildings could pose the need for a specific intervention "tailor made".
You may select the historic buildings along these 3 categories:
a) those that require urgent structural or conservative redevelopment,
b) those that can obtain more financing channels (PBT do not always fall in the times of the EPC contract: 10-15 years),
c) those with constraints imposed by the current system of protection and conservation that prevent any type of intervention.

According to the table below may be situations where there are only a few or all 3 conditions.

Historic buildings	a) the need / urgency intervention	b) economic / financial opportunities	c) constraints that prevent intervention
1 (Bologna)	x	x	x
2 (Quedlinburg)		x	x
3	x		x
4			x

In this case we can proceed on pilot projects (see examples Bologna, Quidlinburg) waiting for the legislation at various levels (EU, national) transposes the suggestions of greater flexibility in the classification of historic buildings (see Toolkit- STEP 8 – Policy Reccommendations for EE and RES in Public and Historic Buildings).

Implementation of LAP may start or may include actions on specific targets which may be seen as pilot actions. Pilot actions may help in finding innovative solutions as well as consolidate experience in a new approach towards EE in public buildings. Pilot actions acquire highest meaning while facing historical public buildings.
For example, the City of Bologna, as a result of the work of preparation of the LAP, illustrated in WP 3.3.4 "Bologna Local Action Plan", has performed an in-depth study about its historical buildings, doing some surveys and some energy audits of detail, to verify the feasibility of additional saving measures and adoption of renewable energy sources not provided for in the processing of energy audits performed by Bologna asset Management and also to check the degree of applicability of the proposed interventions on its assets in WP 4.3.1 "Transnational feasibility study on the possibilities of Energy Efficiency and the efficient exploitation of renewable energy sources (RES) in heating historic buildings."

Bologna Pilot: Palazzo Accursio

Building's function	Museum, offices
Construction period	From 1336 till1886
Structure typology	Walls in solid brick blocks
Windows typology	Both single and double glazed windows
Heating system installation year	-
Heating source	Diesel
Building's heated area	6754 m^2
Building's heated volume	36144 m^3
Heated floors	7

Main issues and suggested improvements:

Since this is a different kind of energy diagnosis and its main objective was to overcome the restrictions dictated by the fact that we are dealing with a historic building, actual potential estimations are not given. The improvements are described in a general level.In any case, according to the audit the needed interventions are the following:

- Roof insulation and windows replacement in the "Sala degli Stemmi" located inside the Arts Municipal Collection;
- Windows replacement in the office rooms;
- Improvements in the lighting system in the Municipal Art Collection's rooms and in the offices;
- Methane conversion of the heating system (increasing the efficiency of the system's components);
- Improvement in the efficiency of the heating's distribution system;
- Improving the energy management through advanced monitoring, integrating more regulations related to external and internal factors.

Moreover, the PHPP (Passive House Planning Package) revealed that the "Municipal Collections" and "Office area" of Palazzo D'Accursio are far away from achieving the passive house standard.
The main losses of the "Office Area" stem from the high glazed surface and high number of windows disposed to North due to the shape of the wing of the palace and for the type of windows present.
For the shape of the building and the presence of infiltration it was obligating to run the test on one surface. Even the roof and the walls, though very thick contribute in dissipating the heat.
The situation concerning the "Municipal Collection" is not much different, greater losses can be attributed to the windows. In some affected areas the glass surface exposed to the East and West can help reduce the losses in relation to solar gains and as a consequence the relationship between losses and gains will drop. The blower door test revealed a high incidence of losses in this area due to doors and windows, but is also related to the distribution systems located under the floor and along the perimeter walls of several rooms. The air change rate is high in each area and its value is estimated around 8 – 12.

Quedlinburg Pilot – PV on administrative building in the "Halberstädter Straße 45"

„Halberstädter Straße 45" before installation of the PV- System

The Departments of Preservation for Historic Monuments are in general not very open to make compromises to permit officially PV systems on the stock of listed buildings. It is hampering, that Quedlinburg enjoys the status of a World Heritage, resulting in stronger argumentation by the Department of Preservation for Historic Monuments not to permit the installation of PV systems on listed buildings. In that discussion, there was no differentiation between the different buildings or type (position or size of the PV system) of installation. Rather, it was more a general attitude of the authorities. After the selection of the estate a lot of discussions with Dept. of Preservation for Historic Monuments took place, finally lasting in an agreement about the selection of the material for the photovoltaic system and the way of installation on the roof as well.

We have selected 8 historic buildings, amongst it kindergartens, schools, administrative buildings and a church, currently used for cultural events. Parts of the buildings were not suitable for the installation of photovoltaic panels and for the others there was no approval of the monument protection authority. Finally, the administrative building in the "Halberstädter Str. 45" had been chosen.

After long consultations and several conversations with companies a visit in the Fraunhofer Institute for Solar Energy Systems (ISE) in Freyburg took place at the beginning of July 2012.

There the newest researches and development stages have been presented and contacts with the company SLG Kunsstoff Ltd have been set up.

At this time, this company was working on a new patented system, which allows the production of every form of plastic bricks customized to different colours and attached with nearly invisible solar modules.

The adjustment to an estate located in Quedlinburg and the shaping of a roof with this system was, however, so cost-intensive, that it would have extended the limit of the provided funds. In this case only a small-sized display surface could has been set up. At this moment the not yet examined and defined constructional regulations regarding legal aspects, the certificates regarding the fire protection as well as the weather protection were sufficiently proofed with respect to the innovative roof tiles. Hence, the contact couldn't pursued.

As a result, the contacts, which have been established at the exhibition Intersolar in Munich, with different companies, were expanded and the tendering procedure was implemented.

The company *Enerpoint* won the tender. The selection of the estate was carried out together with this company; the intensive coordination with the Department of preservation for historic monuments has been implemented and the project was successfully realized.

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ANFORDERUNGSKRITERIEN

- Die Photovoltaik-Installation soll sich harmonisch in das Gesamtbild des Gebäudes einfügen
- Der dunkle Charakter der vorhandenen Ziegel muss beibehalten werden
- Alle „Unwägbarkeiten" eines Daches müssen bewältigen werden (z.B. Umbauung eines Fensters oder Schneefangs, Anpassung an alle Dachformen).
- Der gesamte Teilbereich muss lückenhaft belegt werden

REQUIREMENTS

- The photovoltaic installation had to fit in well with the overall appearance of the building
- The dark character of the existing roofing tiles had to be retained
- The PV system had to be installed as inconspicuously as possible
- It had to accommodate all "eventualities" that could accompany a roof (e.g. modification of a window or snow guard, adaptation to suit all roof shapes)
- The complete partial area had to be covered completely

REALISIERUNG

- Die gewählte Lösung eines Glas/Glas-PV-Moduls erfüllt dabei alle Kriterien der Projektanforderungen
- Durch das durchgängig schwarze Erscheinungsbild fügt sich die PV-Anlage harmonisch in das Gesamtbild ein
- Die PV-Module sind aufgrund ihrer flexiblen Größe und Geometrie universell auf allen Dächern einsetzbar. Zudem können durch die Flexibilität alle Störflächen eines Daches gut umbaut werden.
- Das Glas/Glas-PV-Modul ist aufgrund des eingesetzten Laminats für Überkopfverglasungen zugelassen und kann so flexibler als herkömmliche PV-Module eingesetzt werden
- Bei dem Konzept der PV-Installation wurde berücksichtigt, dass es zu keinem oder nur sehr geringem Eingriff in die Bausubstanz kommt

REALIZATION

- The photovoltaic installation had to fit in harmoniously with the building's overall black appearance
- The PV modules needed to be universally usable on all roofs thanks to their flexible size and geometry. In addition, the roof had to be easily modifiable due to how unpredictable disturbing areas can be.
- The design of the PV installation was selected in such a way that it can be dismantled later on
- Due to the laminate used, the glass/glass-PV module had to be approved for use in overhead glazing, therefore it can now be used more flexibly than conventional PV modules
- With respect to the concept of the PV installation, the fact that no or at least very few changes were to be made to the substance of the building was taken into consideration
- The aspect of fire protection was also fully considered with the concept of the PV system

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