# LOCAL PILOT PROJECTS
towards the reduction of energy poverty and firewood use

## GUIDEBOOK

WWF | BIO BALANCE | Habitat for Humanity | THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME | Life

***Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them.***

| | |
|---|---|
| **Action** | C8 Supporting municipalities of firewood-dependent, low-income communities |
| **Deliverable** | C8.4 Guideline on best practices for low-income communities |
| **Date** | May 2024 |
| **Summary** | Action C8 of the LIFE BioBalance project focused on demonstrating and evidencing solutions to increase the capacity and knowledge of low-income rural communities to reduce firewood-dependency.<br><br>This guideline describes the local pilot projects, the best practices which resulted from their implementation, the lessons learnt during the process as well as recommendations for replicability. |
| **Author** | Anna Turnai, Habitat for Humanity Hungary |
| **Contributors** | Assya Dobrudjalieva, Habitat for Humanity Bulgaria<br>Nora Feldmar, Habitat for Humanity Hungary<br>Robert Stan, Habitat for Humanity Romania |

THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME

# Table of contents




THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME

# INTRODUCTION

Action C8 of the LIFE BioBalance project focused on demonstrating and evidencing solutions to increase the capacity and knowledge of low-income rural communities to **reduce firewood-dependency**.

The Action consisted of three main elements:

- **Research** on energy poverty and household biomass use – Fuel of the Poor study.
- **Pilot projects** to identify good practices that best fit the needs of low-income, firewood-dependent communities.
- **Evaluation** of the outcomes and assessment of their potential for upscaling – developing guidelines in light of the lessons learnt.

The pilot projects were implemented across three countries – Bulgaria, Hungary, and Romania – in four municipalities with a high ratio of low-income households, as they are the most dependent on firewood: using biomass in the highest share and with the lowest efficiency.

Municipalities are in direct contact with fuel-wood-dependent households and therefore, have a large potential to instigate behavioral change, build awareness, and provide support. However, they often lack crucial resources (funding, knowledge, capacity, and stakeholder cooperation) for implementing household or community-level best practices related to biomass sustainability.

The pilot projects aimed to test various small-scale interventions – such as window-replacement, local savings group, attic insulation or firewood drying and storage facilities – and identify best practices to reduce firewood-dependency and increase energy efficiency.

Implementation in each location was coordinated by the national **Habitat for Humanity** office (Habitat for Humanity Bulgaria, Hungary, and Romania) in cooperation with local municipalities, community organizers, and coordinators.

This guideline describes the local pilot projects, the best practices which resulted from their implementation, the lessons learnt during the process as well as recommendations for replicability.

WWF BIO BALANCE Habitat for Humanity THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME Life

The steps to implement the pilot projects, the stakeholders involved, and how to reach and engage the target group are described in the C9.1 Guideline for local capacity buildings and multi-stakeholder planning.

---

# CASE STUDIES

The following chapter describes the process of selecting the implementing partners, the pilot project locations in each country and the implemented interventions grouped by their main objective (see table below for an overview):

1. Increasing access to dry firewood
2. Energy efficiency to decrease solid fuel dependency
3. Awareness-raising

| | Ág | Botevgrad | Comanesti | Varga |
|---|---|---|---|---|
| country | Hungary | Bulgaria | Romania | Hungary |
| region/county | Baranya | Sofia | Bacau, Moldavia | Baranya |
| urban-rural typology | small rural village | urban segregated community | suburban area | small rural village |
| population | 189 | 27 983 | 19 996 | 81 |
| firewood use | 100% | 100% in the segregated area | 100% | 100% |
| partner | local association | the mayor and municipality + a local NGO | local municipality | the mayor and its association |
| no. of beneficiary households | 18 | 15 | 30 | 31 |
| type of interventions | rotating fund for purchasing firewood (1); wood stove upgrade and replacement of old windows and doors (2); savings group-comm. treasury (3) | firewood storage and drying units for individual households (1); residential workshops (3) | attic insulation (2); residential workshops (3) | rotating fund for purchasing firewood (1); wood stove upgrade (2); community storage and drying facility for firewood (2); residental workshops (3) |

# Selection procedure

To be selected as one of the pilot sites of Action C8, municipalities first had to meet the following eligibility criteria:

- **low-income community**; the municipality has a high share of low-income households, whose average income is lower than the national average or is below the respective country's poverty threshold;
    - this can be further evidenced by other socio-economic and housing-related indicators such as unemployment rate, debts, arrears on utility bills, low access to public services (education, health care, transport, etc.), segregation
- **firewood-dependant community**; a high share of the households use solid fuel and are therefore heavily dependent on firewood for heating;
    - this can be further evidenced by the lack of access to infrastructure (gas or district heating network) and the use of outdated heating equipment as well as low efficiency and poor condition of the building stock
- **prior partnership** with the national Habitat for Humanity organization; existing relationships and previous working experience with actors of the local government or other CSO/community key figures in the municipality ensured that initial trust was built between the stakeholders and optimized the chance of a successful working relationship during the pilot projects.

The following steps took place before finalizing the partnerships for the pilot implementation:

- Each project country published a **national call** – describing the project and the eligibility criteria to reach out to the potential local municipalities in their network.
- After all HfH partners had identified and contacted the potential municipalities and received a **positive response for participation** in the project
- the HfH coordinators filled out an **application form** for each municipality, which was the formal step to be considered as an implementation location of a pilot project.

WWF BIO BALANCE Habitat for Humanity THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME Life

- The successful application forms were **reviewed** by the project team (all national Habitat and WWF organizations) and the final list of implementing partners was agreed and **approved**.

- The last step was to sign the **partnership agreement**, including the letter of intent.

After signing the agreement, the selected local partners received the funding for implementation in two installments. Firstly 50% of the total grant was transferred when they submitted the detailed budget and project plan which was a result of the collaborative planning process with Habitat and WWF colleagues (a template was provided in advance to simplify the process). The remaining 50% was transferred following an interim report completed by the local partners.

# Pilot project locations

The pilot projects took place at 4 locations with a variety of characteristics:

- Bulgaria, 1 location – urban segregated community
- Hungary, 2 locations – small rural villages
- Romania, 1 location – suburban area

## Bulgaria

*Source: Money.bg*

The municipality of **Botevgrad** is located in the northern part of the Sofia region, which is in the central part of Western Bulgaria and includes 22 municipalities. Among these, Botevgrad is 4th largest by area. The municipality has a population of 30,665 people in 13 settlements and in the city of Botevgrad, there are 19,012 people.

About 5,200 people or 17% of the population of the Botevgrad municipality are of Roma ethnicity and live in segregated neighborhoods. In the city of Botevgrad, the largest segregated community is in the Saransk district (around 3000 people). Many households live in their own property, but a significant part - about 80 families - are tenants of municipally owned dwellings. These are in concrete block ("panel") multi-apartment buildings built more than 50 years ago. The residents are mostly families with low socioeconomic status, who receive social benefits or work in public employment program, earning only the minimum wage (approximately 363 Euro per month - the lowest rate in the EU).

The city of Botevgrad's gas network is used for heating by 70% of its population, while the segregated Roma quarters do not have access to basic infrastructure, including the gas network, and therefore rely on using firewood for heating.

## Hungary

In Hungary, the pilot projects took place in two small villages in the Southern Transdanubia Region, which includes the counties of Somogy, Tolna, and Baranya. The settlement structure of the region is characterized by the underdevelopment of the urban network and a large proportion of small villages and settlements. The small village settlement structure usually implies unfavorable socioeconomic characteristics. Both pilot locations are in Baranya County, where almost 70% of the villages have less than 500 inhabitants.

**Ág** is one of the 300 poorest of Hungary's 3200 municipalities according to national statistics; it is a typical internal periphery with a population of 189. Due to its unfavorable socio-economic characteristics and geographical isolation, social exclusion as well as energy poverty are common. Most of the dwellings in the village are built from adobe (mud bricks) and are in poor condition: insulation is scarce and the condition of the doors and windows is also critical. Two streets can be considered as segregated part of the settlement. There is no gas network in the village, so the community uses firewood for heating - with an average need of 10 cubic meters/household/year. Several households also lack access to the water network and there is no sewage system in the village. All households uniformly receive a housing social benefit (13 Euro/month) and government-funded social firewood subsidy from the municipality during winter months (approx. 1 cubic meter of firewood).

WWF BIO BALANCE Habitat for Humanity THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME Life

**Varga** is also a small village in Baranya County with a total of 87 inhabitants and 31 households. The village has an ageing population with the average age being between 50-55. The village lacks public services and infrastructure: no school or kindergarten, medical facility, or even a small supermarket. The accessibility to the settlement is also difficult because there is no train station near the village - only a local bus line with 2 services in the morning and 3 in the afternoon to neighboring bigger settlements. Because of the poor quality of public transportation and the lower level of education among inhabitants, there is a lack of access to better-paid jobs and stable employment. As in Ág, there is no gas network, and the households use firewood for heating. The social firewood subsidy provided by the municipality is around 1-1,5 cubic meters/per household, and the residents struggle with securing affordable, proper solid fuel for the winters.

## Romania


*Source: facebook, Comanestigroup*

**Comăneşti** stretches for about 10 km along the middle segment of the Trotuş river valley. The former mining and forestry center has a population of about 20.000 inhabitants, and approximately a fifth of its territory is urban, while a significant part is suburban. Solid fuel use is the predominant form of heating.

HfH Romania has a long-standing collaboration with the town and its local government: in recent years, local Habitat has built houses on lands provided by the municipality, helped more than 200 families with renovations, and established a local branch office thanks to the close partnership and cooperation with Comăneşti town hall.

This situation was a great advantage in implementing the pilot project there because through the activities already carried out by HFH Comanesti employees, they knew the local community very well: not only the representatives of public authorities and the local government but also the general living and housing conditions, the problems of marginalized social groups (low incomes that only cover the daily needs and not enough to save for home and energy efficiency improvements) and the habits regarding the ways of ensuring heating means and keeping warm during the cold season.

WWF BIO BALANCE Habitat for Humanity THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME Life

# Interventions

The pilot projects aimed to test various small-scale interventions and identify best practices to reduce firewood-dependency and increase energy efficiency. In this chapter, we have grouped the interventions and good practices tested in each location around the topics of 1) improving access to dry firewood, 2) increasing energy efficiency, and 3) awareness-raising activities around more sustainable biomass use. More details on the design process of the tested practices and the selection of beneficiary households can be found in the C9.1 Guideline's chapter Steps of Implementation.

In addition to the interventions, the project provided complementary elements:

- air pollution sensors for each pilot site in order to determine the level of air pollution before and after the heating period and to compare air quality before and after the interventions;
- in the relevant locations equipment was provided to measure the moisture content of the wood and regular measurements were taken to note the difference between the wood in the storage facilities - that had been drying already for some time - and freshly cut wood;
- firelighter cubes were distributed to participants of the residential workshops and forums. The results of the municipality survey - carried out as part of the project - showed that the burning of inappropriate materials (people often use them when starting a fire because it is difficult to ignite wet wood) was on the rise. The firelighters are a great help in starting the fire - and therefore to prevent some air pollution -, and can be incorporated into everyday use.


*Moisture meter (left), firelighters (right)*

THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME

## Increasing access to dry firewood

### Setting up a rotating fund for purchasing firewood

The project provided the funds to buy as much wood as the yearly government-funded social firewood subsidy offers. As a result, the “project firewood” allows the “subsidy firewood” to be stored and dried for an extra season before distribution and thus becomes the rotating fund for years to follow.

In Hungary, the government provides a subsidy for municipalities of max. 5000 inhabitants for purchasing “social heating solid fuel” (can be wood or coal) to distribute among people in need. However, the firewood is usually freshly cut and therefore causes avoidable air pollution compared to dry wood - fortunately the purchase of coal is not very common. The household surveys conducted during the project at the pilot sites confirmed that, compared to current practice, more people would like to heat their homes with dry wood (i.e. stored and dried for a longer time before the heating season starts) but cannot do so for financial reasons. For this reason, and to promote a more conscious attitude towards firewood use, a part of the grant was used to purchase firewood in Ág and Varga to create a rotating fund.

THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME

51 cubic meters of wood were bought in Ág and 40 cubic meters in Varga. Firewood was distributed on a universal basis in both municipalities meaning that all households were entitled to firewood. In both cases, the processing and distribution of firewood was organized and managed on a community basis, with the cooperation of the local government, residents, and coordinators.

By setting up the fund and buying additional firewood, the social firewood subsidy received in a given year will be only used in the subsequent year, by that time the previously freshly cut and wet wood has been drying for a year, so its moisture content has also decreased. Under this scheme, the use of social firewood in a given year can be postponed for another year. This practice ensures that people in need and low-income communities can have access to dry wood in the years following the project.

WWF BIO BALANCE Habitat for Humanity THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME Life

## Storage and drying facility for firewood

In Botevgrad, Bulgaria storage units were built for storing wood for individual vulnerable households who live in municipally owned housing. They live in multi-apartment buildings and heat only with wood.

In Varga, Hungary a community-level storage facility was built next to the municipality hall where the social firewood can be stored and dried.

The moisture content of the firewood when cut is approx. 50%, with proper storage for at least 1 year, it can be reduced to approx. 20%. Only wood that is sufficiently dry and has a moisture content of 15-20% should be called firewood. This requires time, preferably two years. Wood can dry well if it's dried in a well-ventilated place - both from the sides and the bottom - and if it’s protected from rain. The drier the wood is, the better its calorific value will be, which means that less wood is needed for heating and fewer pollutants will be released into the air. To achieve the above-mentioned effect, firewood dryer-storage units were built under the pilot projects at 2 locations.

In Botevgrad single storage units were built for tenants of municipal social housing (next to multi-apartment buildings). In this case, one unit belongs to one household (or in some cases shared between two households), and the use of the storage is regulated by a contract between the tenant and the municipality, which checks that the dryer cell is used for storing firewood.

15 households benefited directly from the project - 13 units were built, but 2 of them are double, so altogether 15 cells - the total number of people in the beneficiary households is about 75-90 people. The residential building blocks are located in the Saransk district, Botevgrad, where people are mainly of Roma origin. Once the cells were manufactured, the families had to apply for the use of the storage units, as the families were all of similar size and situation - low income, energy-poor, and disadvantaged - there were no other criteria for approval and decision but a first-come-first-served basis; the first 15 families who applied were accepted.

WWF BIO BALANCE Habitat for Humanity THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME Life

Compared to Botevgrad, Varga is a much smaller settlement, with neither multi-apartment buildings nor municipal housing. Therefore the dryer storage was built for the entire community - in a municipal area next to the village hall - to which all residents (31 families) have access and benefit. It is owned and managed by the municipality and its local government. The community can store the usually freshly cut social wood under the roof and only use it in the upcoming year, and instead distribute the drier firewood previously purchased for the rotating fund at the start of the current heating season. The storage facility, which can hold around 40 cubic meters of wood, was built entirely through community collaboration and construction.

The moisture content of the wood was being monitored by the measurement devices purchased during the project (see chapter introduction), which clearly showed the difference between the moisture content of the rotating fund's "project wood" - that had been drying already for some time - and the freshly cut social wood.

THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME

## Energy efficiency to decrease solid fuel dependency

Another approach to decrease solid fuel dependency is to increase the energy efficiency of the buildings through smaller interventions. These can include e.g. the replacement of windows and doors, draft proofing of windows, insulating the roof or upgrading the heating device/system for a more efficient one. With these solutions, the heat loss can be reduced, which means that less energy and firewood are needed to heat the house, so the energy consumption and firewood use will decrease and therefore the energy costs as well.

WWF BIO BALANCE Habitat for Humanity THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME Life

## Wood stove exchange

Habitat for Humanity Hungary developed a low-cost efficient stove type, the so-called 'Heat Column', to replace the old, outdated, and highly inefficient metal heaters and decrease the firewood used.

In Varga, Hungary 4 Heat Columns were built for low-income families, who regularly participated in community activities.

In Ág, Hungary old iron stoves in critical condition were replaced with new, better ones for 6 families.

In the framework of the pilot projects, we exchanged wood stoves altogether in 10 households in two locations: in Varga and Ág. HfH HU developed a low-cost efficient stove in collaboration with experts based on products/samples available in Northern European countries. The so-called 'Heat Column' could replace the old, outdated, and highly inefficient metal heaters that were in use previously. In Varga, there were 4 heat columns built. The selection of the 4 beneficiary families was based on socio-economic criteria and their participation in community activities and events: from these 4 families, everyone came regularly to community activities such as roof replacement at other houses and the village hall or mowing, tree planting, and events such as folk dancing and communal cooking. Also, all 4 families are low-income and live in houses in bad condition, with low efficiency.

THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME

In Ág, window and door replacement was carried out as an intervention in most of the beneficiary households (see next section), however, in those households where this was not possible or necessary, old iron stoves in critical condition were replaced with new, better ones for 6 families in total.

**Replacement of doors and windows**

In Ág, Hungary there were 19 old windows and doors replaced in 12 households. To make the best possible use of the subsidy and to minimize costs and environmental impact mainly reclaimed, good-quality windows and doors were purchased and the families themselves did the installation or helped each other through community effort and cooperation.

In Ág under the pilot projects, there were 19 old windows and doors replaced in 12 households. As in Varga, active community participation was the basis for the selection of beneficiary households and families in Ág. Beneficiaries of the window and the

above-mentioned wood stove replacement project component were - following the collective decision - only those households that have participated in the operation of the community treasury and savings group (more on this in a future chapter), in the related thematic meetings, and contributed with their own savings to the implementation of the interventions. The members of the group have collectively decided to share equally the grant provided by the project and to complete it according to their own capacity and the amount of savings they can make in the community treasury.

Among the financial solutions and cost-cutting strategies, it was important to make the best possible use of the subsidy and to minimize costs and environmental impact, so they mainly looked for and bought reclaimed, good-quality windows and doors. Of the 19 replacements, the ratio of new to used materials was 6:13. They didn't find suitable second-hand items in all cases, and consideration had to be given to avoiding a lot of construction or demolition next to the window or door to be installed. In some cases, it was more worthwhile to have it newly made to size, as these are quite old and unique dwellings. In many cases, again with the aim of minimizing costs, the families themselves did the installation or helped each other through community effort and cooperation.

**Attic insulation**

In Comanesti, Romania attic insulation was carried out in 30 households to prevent heat loss through the roof or attic, where the largest amount of heat can leave the dwelling without adequate insulation.

When we talk about heat loss in a house, the ceiling is where the largest amount of heat is lost, so one of the preventive solutions can be to insulate the roof or attic of dwellings. In Comanesti they chose this practice as an intervention for 30 families and households. The process of installing mineral wool in the attic of the house is relatively easy and doesn't require much time, but the effect is immediate and is reflected in the reduction of the amount of fuel used and the energy costs to heat the house.

THIS PROJECT IS FUNDED BY THE EU'S LIFE PROGRAMME

The beneficiaries of the interventions were families with low incomes who could not afford to make such an investment and cover the renovation costs on their own. After the agreement and calculations were made on the intervention, the pilot project's local coordinators visited families in the Comanesti Town Hall's database of families in need. Since some families intended to make additional changes to the structure of the house or the existing structure did not support this type of intervention, they visited more families so that in the end they could choose 30 households as beneficiaries of the project where the attic is accessible and implementation is possible. In the 30 households in which interventions were carried out under the pilot project, a total of 138 people live, 73 adults and 65 children. Of the 73 adult beneficiaries of the program, 21 are seniors over 65.


## Awareness-raising

### Residential workshops

There were residential forums and workshops to raise awareness and motivate behavioral change in each pilot site. These discussions and educational events targeted not only the beneficiaries of the interventions but the whole community or neighborhood, and focused on the sustainable use of biomass and energy efficiency in general.

In each pilot project the above-mentioned ‘hard measures’ (i.e. physical, technical/ infrastructural interventions) were accompanied by ‘soft measures’ (i.e. community/social work). This involved residential forums and workshops to raise awareness and motivate behavioral change. These sessions focused on energy efficiency in general and the sustainable use of biomass: ways to reduce the amount of firewood used during the heating season; how to dry and store the wood properly, how to use the dryer storage, and how to light the firewood correctly.

The discussions and educational events targeted the whole community or neighborhood: many residents who were not direct beneficiaries of the hard interventions also participated in the workshops and training. These forums were organized and held jointly by the national Habitat and WWF offices, and the local municipalities and associations. The implementation of the practices was preceded in each location by a face-to-face household survey[1], which helped build trust between actors and stakeholders and contributed to residents' subsequent open and willing participation in these workshops.

Feedback from the municipalities indicated that the workshops were very useful and effective, not only because the participants had the opportunity to learn about how the project interventions affect their lives, how they can achieve energy saving and reduce their energy costs, but also because it helped them to be more aware of their spending, analyze their household expenditure, and understand household management in general.

**Community treasury/savings group in Ág**

In Ág, Hungary there was an additional community-building element during the project: a savings group and community treasury was set up to provide the financial means for additional materials and supplies needed for the planned renovations. In addition, the indirect aim was to empower members for medium and long-term planning through savings practices and to strengthen the community through regular meetings.

In one of the pilot sites, in Ág, the members of the local association and local coordinators of the interventions used an additional community-building element during the project: they reorganized the savings group and community treasury that had already been in operation previously.

The general aim of the group and treasury was to bring medium and long-term (financial) planning closer to the daily lives of the members. The specific aim was to enable the members to create the financial basis for the additional materials and supplies needed for the planned renovations (replacement of windows, doors, and stoves) with their regular savings and to cover the additional costs. The indirect aim was to create a platform for regular communication, meetings and discussions, and community strengthening.

[1] More on this in the C9.1 Guideline's chapter *Steps of Implementation: Carrying out a Household survey.*

During the pilot project, the importance and relevance of the savings group and community treasury were further enhanced by linking participation in the project (being a beneficiary of the interventions) to membership: regular attendance at group meetings and participation in savings was an eligibility criterion for taking part in the project.

How do they operate? The members put in predefined savings each month, and the group collectively decides on the rules of borrowing from the savings. During the project, the members met at least once a month to reflect on the main events in the village, to put in or take out savings, and on several occasions to have thematic discussions on energy poverty. For each meeting, a different member brings the booklet, the treasury box, and the key to the venue. Members deposit the amount in the treasury: the deposits are recorded and signed by the depositor and another witness in the booklet. After the interventions had been completed, the group decided to continue and maintain the treasury: the members are planning to run it mainly to fund the purchase of firewood and to cover the cost of Christmas gifts. For now, the members will collect only for themselves, there will be no borrowing from the treasury.

---

# LESSONS LEARNT

In this section, we summarize the challenges during implementation, achievements and conclusions of the pilot implementations.

## Challenges

- The impact of inflation and price increase (both material and labor costs) between the time of granting the funds to the local partners (each received a fixed sum of 16.000 eur) and the implementation. These made the procurement of materials more difficult and slow.
- The firewood shortage caused by the energy crisis also caused difficulties in Ág, and it was only through a local personal contact that the needed amount of firewood could be purchased at a fair price and quality. The price increase was compensated by the fact that the installation of windows and doors was largely done by the families themselves or by the community, so they saved on labour costs.

- In Varga it was a difficulty too that the price of both the firewood and the delivery time had risen significantly, leaving no money left from the grant for a tarpaulin to cover the wood (until the drying storage was not built), which they had to replace with cheaper nylon.
- Another difficulty in Varga was the administrative and bureaucratic obstacles, which made it difficult, for example, to transfer the grant to the local municipality. We were able to overcome this by granting the funds to the local association founded by the mayor instead of the municipality itself.
- In Comanesti, the process was complicated by the fact that several potential beneficiary families – who were initially enrolled in the program and to whom monitoring and survey visits were made, later changed their minds and no longer agreed to participate. This caused delays in the implementation. The reason for this was that once commitment to start the intervention was getting closer some family members got unsure, and didn't approve the changes, usually because they used the attic for storage and with the insulation they would have lost that space (there is no solid surface on top of the insulation material). Age was another factor in the decision to participate, with several seniors finally deciding that they no longer wanted to make changes to the house. In addition, several beneficiaries would have liked the grant to be used not only for the insulation but also for other improvements to the house: certain works of repair, modernization, and general improvement of housing conditions, but unfortunately, these did not fit into the budget.
- In Botevgrad, the main difficulty was that the beneficiaries first started to load not only wood but also other items into the drying storage units, so it had to be repeatedly explained that the cells should only be used for storing firewood. First, the local coordinator had discussions and meetings with the families, but it became easier over time when the workshops – mentioned above – started because the families could understand it on another level. It was also a great difficulty that all the grant was spent on building and installation of the storage units – as a result, there was no money left to fill the cells with firewood, which the families had to do themselves.

# Achievements

The pilot projects and their interventions have had an impact not only on reducing firewood use and dependency, and increasing energy efficiency among beneficiaries but also at the community level.

- Feedback from Ág is that the pilot project has been a great help to households, especially at a very difficult time when COVID has resulted in reduced incomes and increased isolation, which already exists in a small village. The members of the savings group felt that there was an organic continuation of previous interventions to improve the energy efficiency of their homes. For the local coordination and implementation team – in addition to the professional strengthening of the local association – the biggest success is that the savings group and community treasury will continue independently of the project. Meetings are regularly taking place, and there is a clear improvement in the financial awareness and long-term planning capacity of some families. The re-establishment of the group was particularly important at a time when the pandemic was very disruptive to community processes, and the gradual decline of incomes had started, followed by the energy crisis and sharp increase in firewood prices. All this pushed those affected towards individual survival strategies as opposed to cooperation and solidarity.
- In Varga, the mayor highlighted the strengthening and cohesion of the community as a result of the project and interventions, in addition, families using the heat columns reported back that they are happy with the stoves since they have had to use less wood because it keeps the heat in longer.
- In Comanesti the beneficiary participants said that there is a clear difference in their firewood consumption: it decreased in average by around a quarter compared to the last heating season. The reported savings varied significantly, with the lowest decrease in biomass use being 20%, while the highest reported was 50%. In addition, all beneficiaries reported an improvement in thermal comfort.
- In Botevgrad the interest in the firewood drying units is still current: the feedback is that, apart from those who have been granted the use of the existing cells, the practice has become so popular that other households have submitted applications to the municipality for future units for drying wood. The municipality is trying to find a way to finance the installation of more cells - and

they already have the design and knowledge needed to replicate them because of this project. This type of intervention not only helped the wood to dry, thus reducing the amount used and the harmful emissions caused by the burning of freshly cut wood but also improved the tidiness of the area: before the cells were installed, households stored the wood in all sorts of places and various shacks made of improvised materials. The biggest success, beyond the fact that the municipality would like to continue the tested practice, is that several beneficiary families will be part of another project with the national Habitat office. In addition, Habitat for Humanity Bulgaria and the other local NGO involved in the pilot project (Local Active Group) will continue to cooperate in the longer term: providing microloans for housing and energy efficiency improvements for vulnerable families.

## Conclusions and Recommendations

One of the main goals of the local pilot projects was to identify practices which have the potential for replicability and upscaling for other low-income communities and municipalities. How well each intervention achieved the project objectives and which proved to be a best practice in reducing firewood use and air pollution?

- The rotating fund and the storage and drying facility resulted in better quality firewood with higher heating value, which decreases consumption and air pollution. And having a reserve of additional firewood provides additional energy security for times of shortages and financial emergencies of the local families in need.
- According to the implementers the wood stove exchange proved to be the least successful intervention: although it helped the family in question, the Heat Column project is on hold for now, because in its current form, this practice can't be upscaled: it is too pricey, the costs are too high, both the design and implementation should be developed, and it is very difficult to show and teach the household how to use it correctly to achieve the desired effect.
- The replacement of windows and doors became a recommended practice after the pilot project: not only the energy efficiency of the dwellings but in general the condition of properties improved as well. In addition, in this case, buying good quality, reclaimed materials and self- or community installing is also an option. The majority reported that without this support they would not have

been able to carry out such major interventions in their homes in the foreseeable future.

- The latter complemented by attic insulation only adds to the energy efficiency of the building and therefore reduces firewood-dependency and increases thermal comfort. To achieve even better energy efficiency it would be necessary to expand the pilot programs and increase the grant for testing practices to be able to carry out more types and different combinations of hard measures and interventions at one location, such as, for example, replacing the carpentry or insulating the exterior walls of the house.

- Based on the feedback from implementers and municipalities, we strongly recommend the continuation and extension of similar types of projects and professional and methodological mentoring during both planning and implementation in the most disadvantaged municipalities. Also, it is important in these pilot projects to complement and accompany the 'hard' measures with 'soft' interventions as well, these could be the above-mentioned workshops for inhabitants and for the affected residents, and also the sensitivity training of municipal leaders, local government decision-makers, and mayors.

- In addition to the latter, next time we would consider extending and expanding the residential awareness-raising workshops to reach as high percentage of the inhabitants of the community as possible, and instead of single-time workshops make it a recurring course with interlocking themes on energy efficiency and sustainability.

- In general, it could be a key element during implementation to strengthen and incorporate the use of community instruments (e.g. community building, community construction, installation, treasury, firewood processing, and distribution) accompanying the hard measures in the pilot projects, and the use of additional soft elements like social work: *"vulnerable, low-income families need complex help as their problems are complex as well, those can't be solved with one-size-fitts-all interventions."* (Assya Dobrudjalieva, Habitat for Humanity Bulgaria)