

IMPACT SHEET: RurEnergy

Promoting sustainable residential energy consumption in rural China



Promotes rural households' adoption of cost-effective systematic energy retrofitting solutions as well as energy efficient behaviour change in Henan and Gansu Provinces.



PROJECT BACKGROUND

The Chinese government has set an ambitious goal to achieve carbon neutrality before 2060. Rural houses account for nearly one-third of China's total building stock and more than 20% of its final energy consumption, with heating and cooking representing the largest share of energy use. Despite this, energy consumption in rural areas has received limited attention.

Most rural houses are self-built by local construction workers and lack energy-efficient design. Dispersed coal and unprocessed biomass remain the primary energy sources for heating and cooking, making rural energy use highly carbon-intensive and contributing to adverse impacts on health and well-being. Promoting sustainable energy consumption in rural China is therefore essential for achieving national decarbonisation and sustainable development goals

CHALLENGE

Energy-efficient retrofitting of building envelopes, together with sustainable heating and cooking technologies, are already available on the market and have been successfully piloted in rural regions of China. However, scaling up these solutions has faced numerous challenges. Many rural households remain unaware of the benefits of energy retrofitting and efficient energy use. Uncertainty regarding product quality persists due to an underdeveloped supply chain and uneven product standards. High upfront costs and limited access to financing continue to be major barriers. Although subsidies have supported pilot projects, they remain insufficient to drive large-scale deployment, and green financing mechanisms tailored to rural contexts are largely absent.

In addition, the lack of viable business models for delivering integrated retrofit solutions, combined with the relatively higher fuel costs of clean energy sources, reduces the economic attractiveness of sustainable options.



PROJECT OBJECTIVES

The Action aimed to promote sustainable energy consumption in rural China and thus to foster low-carbon, resource-efficient, and resilient rural development

The specific objectives include:

- Accelerate rural households' adoption of cost-effective systematic energy retrofitting and sustainable heating solutions
- Promote energy-efficient behavioural change among rural communities

TARGET GROUPS

- Rural households and village committees
- local consumer associations
- local retailers/producers MSMEs of related products
- construction workers
- local financial institutions
- National and local housing authorities

PROJECT ACTIVITIES

The Action consisted of the following interlinked activities:

- Created a scalable toolbox comprising technical solutions for systematic energy retrofitting, evaluation criteria for sustainable technologies and products, and tailored business models and green financing mechanisms.
- Implemented pilot projects that integrated these technology solutions, business models, and financing mechanisms, and fostered their wider adoption across rural communities.
- Developed an easy-to-use mobile application for various stakeholders to promote and support the adoption of systematic energy retrofitting solutions during the pilot, replication, and upscaling phases.
- Co-developed effective enabling policy frameworks at both national and local levels to facilitate the scaling up of systematic energy retrofitting technologies.
- Effectively disseminated and communicated the action to key stakeholders, achieving a high level of visibility for the project at local, national, and international levels.

LESSONS LEARNED

In China, the uptake of sustainable heating technologies by rural households largely depended on subsidies. The Action developed tailored financing mechanisms for sustainable heating projects, enabling banks to provide alternative financing options to MSMEs responsible for project implementation. Although the banks were initially hesitant, their attitudes improved through continuous engagement over the course of the Action.

Moreover, few viable business cases were available for MSMEs to implement such projects, and when combined with limited access to financing, incentives for participation remained low. To address this challenge, the Action also designed tailored business models to better support MSMEs.

Training of construction workers and the organisation of workshops with key stakeholders—including village committees, consumer associations, retailers, and financial institutions—were delayed during the early phase of the project due to the Covid-19 pandemic. As a mitigation measure, virtual exchanges were organised with pilot implementers, and more intensive training sessions with stakeholders were conducted during the second year.

Scaling up sustainable heating solutions in rural China required an integrated approach that combined technical support, tailored sustainable financing, viable business models, and enabling policy framework.

Awareness-raising and co-creation with stakeholders were essential to ensure that the solutions developed under the Action were effectively integrated into the pilot and replication projects, and that their adoption would continue beyond the project's duration.



PROJECT ACHIEVEMENT

Technology Solutions:

Robust systematic energy retrofitting and sustainable heating solutions were identified and implemented in pilot and replication projects across 140 villages.

Business Models:

A set of viable business models was identified and applied within the projects to support the deployment of sustainable heating solutions.

Green Financing:

Three green financing mechanisms were co-developed in collaboration with 30 financial institutions. Tailored green loans were provided to MSMEs implementing the projects, mobilising a total of EUR 12.5 million in green financing.

Policy Development:

Two local guidelines were co-developed with financial institutions on green financing for sustainable heating in rural China. In addition, two local technical guidelines were developed jointly with local authorities on the application of systematic energy retrofitting. Furthermore, two policy proposals were submitted to national governmental authorities to support the large-scale adoption of systematic energy retrofitting solutions in rural households.





Dr. Chun Xia-Bauer
Project team leader

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The RurEnergy project accelerated the adoption of cost-effective systematic energy retrofitting and sustainable heating solutions in rural houses across 140 villages in Henan and Gansu Provinces, China. Through an integrated approach—combining technical support, tailored sustainable financing, viable business models, and enabling policy frameworks—the project empowered rural households in the two target provinces to embrace clean energy solutions. These can be replicated in other regions and will continue to deliver lasting impacts beyond the Action.

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Long-term project sustainability

- The technology solutions implemented under the Action will continue to be adopted by rural households beyond the project's duration.
- The business models developed and further disseminated will support MSMEs across China in implementing sustainable heating projects.
- The green financing mechanisms developed can be applied more broadly, extending their benefits beyond the scope of the target regions in the Action.
- The policies at both national and local level formulated during the Action are expected to generate lasting impacts well beyond the project itself.

Project contributions to Climate Change Mitigation and SDGs

SDG1

(End poverty in all its forms everywhere)

7245 jobs created

SDG5

(Achieve gender equality and empower all women and girls)

Priority was given to female, and 60% of the action participants are female.

SDG 7

(Ensure access to affordable, reliable, sustainable and modern energy for all)

PV and heat pumps used for 428 TJ heating

SDG 12

(Ensure sustainable consumption and production patterns)

27,792 households adopt systematic energy retrofitting solutions with the support of the intervention

SDG 13

(take urgent action to combat climate change and its impacts)

39.452 tonnes in annual Greenhouse Gas emissions (GHG) reduction

Impacts at a Glance

Economic Impact	• 54.3 million EUR mobilised, with the support of the intervention, for green financing leveraged with the support of the intervention • 305 MSMEs supported by the intervention in improving business models and selling quality products; • Over 80% of MSMEs that effectively change, with the support of the intervention, business models or improve products • 8 viable and bankable business cases applied with the support of the intervention
Environmental Impact	• The action supported the phase-out of coal and unprocessed biomass, and promoted the use of renewable energy in heating, resulting in improved air quality. • The action also integrated the circular economy principle through promoting the sustainable use of agriculture waste and durable products and construction materials including recycled content.
Social Impact	• 27792 households that adopt systematic energy retrofitting solutions with the support of the intervention • 7245 jobs created associated with pilots and demonstration • 523 construction workers, that obtain certified qualification on energy retrofitting technologies with the support of the intervention • Health of rural households is expected to improve due to improved indoor temperature as well as indoor and outdoor air quality. • The Action supported gender equity by mobilising women's groups in villages to promote awareness of sustainable energy consumption, and by ensuring that women from various stakeholder organisations received training opportunities.
Climate Benefits	• 428 terajoules (TJ) of direct annual energy saving • 361 TJ Renewable energy used for heating • 39452 tonnes in annual Greenhouse Gas emissions (GHG) reduction
Green Finance	• 31 financial institutions that produce green financial products with support of the intervention • 12.5 Millions of EUR for green loans mobilized with the support of the intervention
Target Group Engagement	• 305 MSMEs supported by the intervention in improving business models and selling quality products • Annual conferences for disseminating project outcomes and exchanging with stakeholders • 7 trainings for village committees and 22 consumer associations, financial institutions, retailers/producers, and construction workers during pilot and replication; • 29 awareness-raising campaigns supported by village committees
Policy Development	• 8 policy dialogues with national housing authorities • 10 policy dialogues with local housing authorities in the two target regions • 2 local guidelines co-developed on rural households' access to green financing. • 2 local technical guidelines co-developed on applying systematic energy retrofitting • 2 policy proposals submitted to national governmental authorities for scaling up systematic energy retrofitting solutions in rural households.
Europe-Asia Cooperation	• 1 EU-China high level policy dialogue to exchange policy that accelerate sustainable heating in the EU and China • Annual conference supported by various partner organizations from the EU and China



FUNDING

EUR 2,300,000
(EU Contribution: 80%)



DURATION

2022 - Jun 2025



PARTNERS



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Environment and Energy (WI)



Beijing University of Civil Engineering
and Architecture (BUCEA)



Central University of Finance and
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China Association of Building
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Gansu Construction Technology and
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