ENERGY EFFICIENCY AND SUSTAINABLE DEVELOPMENT
IN THE CHINESE CONSTRUCTION SECTOR
10 years of French-Chinese cooperation

Combating the greenhouse effect and climate change
870,000 m\(^2\) of new housing and 29,000 m\(^2\) of rehabilitated housing achieving energy savings of 50% or more thanks to the French-Chinese cooperative programme

"Energy efficiency and sustainable development in the Chinese construction sector"
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The impact of Building on global warming and the emission of greenhouse gases

Sustainable development and the reduction of greenhouse gas emissions in China

The reduction of greenhouse gas emissions and the fight against climate change have emerged as crucial questions facing the entire world. As the world’s 3rd largest economic power and also its greatest producer of greenhouse gases, accounting for 11% of global emissions, China has a very important role to play. Coal was the source of 69% of primary energy production in 2005 and 75% of electricity production in 2006. This massive level of coal-based energy consumption poses real problems for the local and global population.

China has to build approximately 10 million housing units per year. This level of growth makes it necessary to implement sustainable urbanisation and building concepts coupled with new, high-performance technologies for the use of coal and substitute fuels such as natural gas. The government is now prioritising energy efficiency and basing its energy policy on the use of “clean coal” and the development of renewable energies.

Beyond simply making progress in the field of energy efficiency, China is also concerned with living standards which are one of the keys to its economic and social development.

Programmes designed to improve energy efficiency, such as those conducted with the French Global Environment Facility (FFEM), represent an important opportunity to reconcile growth, social development and respect for the environment. Thanks to them, China is progressing along the path toward sustainable development and the protection of the global environment.
The impact of building on global warming and the emission of greenhouse gases

China: the world's largest builder of housing

China is the world's largest builder of housing with a construction rate of 200 to 300 million m² every year (i.e. 2.5 to 3.7 million dwelling units) in urban areas and 700 million m² in rural areas. The housing stock, which currently stands at more than 30 billion m², is therefore destined to grow, particularly in view of the fact that this rate of construction is expected to continue for the next 10 years.

According to United Nations statistics, the rate of urbanisation rose from 18% in 1978 to 40% in 2005. The urban population has tripled in 25 years to account for 520 million out of a total population of 1.3 billion in 2005. In 2030, the number of urban dwellers is expected to be 870 million. The living space per person living in urban areas rose from 10 m² in 1990 to nearly 14 m² in the early 2000s. However, this figure is well below the average for the developed countries which runs at 35 m² per person. This comparison illustrates the extremely high level of pressure that will affect building construction in the years to come.

The weatherisation of existing buildings in Northern China is also a government priority. The aim, which is set out in the 11th plan (2006-2010), is to reduce energy consumption per unit of gross domestic product by 4% per annum.

Currently, heating an uninsulated dwelling in Beijing results in the emission of approximately 7 tonnes of CO₂ per year. It is possible to reduce this quantity by 50% by installing insulation and improving heat regulation. The cooperative programme "Energy efficiency and sustainable development in the Chinese construction sector" has focused both on new construction and the rehabilitation of existing housing by seeking to achieve reductions in energy consumption while accompanying China in its energy management policy within the building sector.
The programme for energy efficiency and sustainable development in the Chinese construction sector

The building sector accounts for 28% of the country’s energy consumption, a level which is increasing as the country’s economic development is joined by a growing demand for comfort: more heating and lighting, air conditioning equipment, increased household use of domestic appliances.

Energy demands in the Chinese residential sector are determined by the climate: heating requirements are high in the northern and central regions (in Harbin in Heilongjiang, the country’s northernmost province, the mean daytime temperature in January is -25°C), while air conditioning needs increase from the central down to the southern regions of China. Despite a regulation on heating first issued in 1985 and regularly revised, only a small proportion of the existing housing stock is insulated.

The management of the energy consumption of buildings is, at the economic, social and environmental levels, a major local and global challenge for both China and the entire planet. One possible solution is to improve building design and the technical performance achieved by the construction sector. The Chinese authorities, the operators and the population all share the same desire to bring about these improvements and are aware of their importance for the country.
A programme based on cooperation and consultation

France and China have undertaken a major cooperative project focusing on the issues of energy efficiency and sustainable development in the construction and rehabilitation of housing (principally for social purposes). Between 1999 and 2002, an action programme has been conducted in collaboration with the Chinese Ministry of Housing and Urban-Rural Development (MOHURD), the provincial Construction Committees and the Chinese municipal authorities, under the auspices of the French Ministry of Ecology, Energy, Sustainable Development and Planning (MEEDDAT), and financed by the French Global Environment Facility (FFEM).

The programme has received 6 million euros of funding, a sum which represents less than 4% of the construction cost. Its principal aim was to achieve energy savings in the housing sector. The conduct of the program was entrusted to the French Agency for the Environment and Energy Management (ADEME) which coordinated a French group of experts and architects in their dealings with Chinese property developers and decision-makers.

On the basis of projects which had already been decided on and financed at the local level, the programme facilitated the introduction of improvements to the energy efficiency of new housing (modification of plans to reduce heat losses and increase the use of solar energy, heat insulation, improved heating) and existing dwellings (external heat insulation, improved heating) while limiting the additional costs to a level acceptable to the local market.

The aid was primarily used to provide support in the form of consulting and engineering services and simplified access to new technologies. The programme also comprised training for operators (workers, prime contractors, etc.), local decision-makers, as well as architectural experts and students in order to ensure that the achieved project results could be replicated.

The French Global Environment Facility (FFEM)

The French Global Environment Facility (FFEM) was created in 1994 by the French government following the 1992 Earth Summit in Rio de Janeiro to promote environmental protection in developing countries. Initially set up for four years, it has been renewed three times, first in 1998 and then again in 2002 and 2006.

The FFEM comes under the supervision of the ministries in charge of the Economy, Foreign Affairs, the Environment and Research, as well as the French Development Agency which is responsible for the FFEM’s management.

The FFEM’s contribution includes funding subsidies for sustainable development projects having a significant impact on one of the main global environmental areas: biodiversity, climate change, international waters, the ozone layer, land degradation, including desertification and deforestation, and persistent organic pollutants.

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The programme for energy efficiency and sustainable development in the Chinese construction sector

The aims of the programme

To develop energy-efficient buildings (a reduction of at least 50% in energy consumption for heating in the North, 65% for heating and air conditioning in Shanghai) in order to cut greenhouse gas emissions and reduce the impact of pollution at both the local and regional level. It is important for these improvements to be sensitive to economic realities in China and represent an additional cost that is acceptable to the market.

To encourage the application and further development of local standards and regulations.

To facilitate know-how transfer which will make it possible to secure energy efficiency in the construction sector in the long term.
A 3-pronged approach

**To achieve the widespread application** of innovative technologies relating to energy efficiency in buildings to property development operations. Consequently, the technological proposals made to Chinese property developers in the new building sector included changing the orientation and position in order to maximise the use of solar energy, modifying building designs to reduce the surface area of the outside walls while retaining the same living space, reducing heat bridges, insulating walls and roofs, draught proofing and insulating windows, heat distribution and temperature/ventilation regulation inside buildings or the installation of outside solar protection to reduce air conditioning requirements. With regard to rehabilitated buildings, the technical proposals primarily related to the installation of external heat insulation and improvements to heating regulation.

**To accompany** the different local institutions (city or provincial authorities) in the adaptation of their regulatory frameworks and the mechanisms available to encourage energy management in the construction sector.

It was possible to launch a number of key initiatives: development of local technical standards to promote energy management in the construction sector; improvement of the system for the certification of energy efficient building products; changes to local regulations for heating charges; test of a new label for ecological buildings (“green buildings”).

**To make the results known** on a widespread scale. Technical guides presenting the operations performed, the employed technologies and the results achieved were drawn up by the local authorities and distributed in large numbers at seminars attended by the various operators concerned by energy management in housing. The Chinese Ministry of Construction has evaluated the results achieved by the programme and drawn up a guide to the rehabilitation of existing housing. A film about the programme intended for a wide audience has been produced in French, English and Chinese by the French participants. Training seminars for engineers and architecture students, including site visits, have been organised in China. Visits by French and Chinese decision-makers focusing on the issue of sustainable development in the construction sector have been organised in France and China.
Cooperation at institutional level

The FFEM programme was conducted over a period of 10 years subdivided into two phases of 5 years each. While the first phase related solely to the construction of housing, the second extended to weatherisation and made it possible to develop a strong partnership at institutional level with the Chinese ministry responsible for construction.

**MoHURD**

An agreement was concluded at national level between the Chinese Ministry of Housing and Urban-Rural Development (MoHURD) and the FFEM. Within the programme’s general management, MoHURD is represented by the Department Of Science and Technology (DOST) which itself delegates operation activities (to ministerial agencies, universities etc.) and which liaises with the Heilongjiang, Beijing and Shanghai Science and Technology services. A number of organisations are responsible for cooperation at central level: RISN, IC, CEEB and CHI.

The CEEB - Centre of Energy Efficiency in Buildings - was responsible for evaluating the project on the basis of measurement campaigns conducted on-site with the aim of assessing the energy savings achieved in the provision of heating and air conditioning. Alongside the technical aspects (employed materials, type of heating), the evaluation also considered the choices made and the technologies adopted for demonstration operations. The replication of this type of energy-efficient housing and the adoption of the practices employed in the pilot projects by other Chinese sites have also made it possible to assess the impact of the FFEM programme.

A guide to the reform of heating provision to housing in the cold and very cold regions of China has been produced by the CHI (Centre for Housing Industrialization). This work proposes technical measures for housing rehabilitation (insulation of the envelope, heating system). It also presents stimulus initiatives in terms of the pricing of electricity and the funding of rehabilitation work designed to promote construction projects offering high energy performance.

The RISN (Research Institute of Standards & Norms) develops and drafts standards and regulations. It has drafted a standard on energy efficiency in residential buildings based on the results and experience gained from demonstration operations conducted during the FFEM programme.

Cooperation with the Information Centre (IC) focused on the media coverage of the project through the publication of brochures to communicate the programme’s results to the public as well as on the organisation of a concluding seminar in China.
The World Bank

The programmes conducted by the FFEM and the World Bank were coordinated in those areas where they related to energy efficiency in residential buildings, heating systems and the price of heating in Northern China. The World Bank is managing a project financed by the GEF (Global Environment Facility) in Northern China: the HRBEE (Heat Reform and Building Energy Efficiency) which also bears on energy efficiency in residential buildings and on the reform of heating provision (production, transport, pricing, billing).

Since there are clear synergies between the FFEM and GEF programmes, a cooperative agreement for the implementation of joint actions was concluded between the FFEM and the World Bank.

The HRBEE programme and the World Bank

The 6-year HRBEE programme for heating reform and energy efficiency in the Chinese building industry was launched in 2005. The World Bank is coordinating this programme which has a total budget of 1,097 million dollars, 18 million of which comes from GEF subsidies. A number of studies are underway or have already been completed in the cities of Dalian, Tangshan, Tianjin and Ürümqi in The North of the country. These have the aim of reducing energy consumption by 65% compared to the residential buildings constructed in the past.
A programme, its projects and the results

Varying results for the different projects

On the launch of this cooperative programme, the National Development and Reform Commission (NDRC) invited FFEM to work together with three provinces situated in the North of the country (Heilongjiang, Liaoning, Beijing) all of which had a high level of heating requirements. Half-way through the undertaking, the city of Shanghai asked to take part in the programme. These regions all exhibit different climatic, economic and social conditions and are therefore all faced with different sets of difficulties. Consequently, the recommended technical solutions and the results obtained differed between the various provinces as a function of their particular context and the support provided by the local authorities.

The construction of urban housing in China

The challenge

According to the United Nations, China’s urban population has tripled in 25 years and, in 2005, accounted for 520 million of the 1.3 billion people who inhabit the country. In 2030, the number of urban dwellers is expected to be 870 million. This level of growth is accompanied by a construction rate of 200 to 300 millions m$^2$, or 2.5 to 3.7 million, dwellings per year in urban areas.

This situation is resulting in an increase in the amount of energy consumed for construction which is accentuated by the Chinese population’s desire for greater comfort: heating and lighting systems, air conditioning, household appliances etc.

Moreover, 75% of electricity production in 2006 was coal-based. The very large-scale consumption of this fuel source for power generation poses real problems for local urban populations. At the economic, social and environmental levels, the management of the energy consumption of buildings has therefore become a crucial challenge for China.
The Taï Haï district in Harbin

It was in the capital of Heilongjiang province, Harbin, that the programme’s first success stories emerged. Very well received by the local authorities from the outset, the programme made it possible to develop an energy-efficient housing district known as Taï Haï. The measures implemented during the first tranche of 123,000 m², which was handed over in 2001, demonstrated that it was possible to reduce the quantity of energy required for heating by nearly 50% at an additional construction cost of no more than 5.7%. Since then, two further tranches representing 170,000 m², have also been handed over and again achieve the aim of a 50% saving in energy consumption.

The local authorities have also consulted French experts with regard to modifying provincial regulations in order to encourage energy savings by reducing the price of heating in energy-efficient dwellings.

Two large-scale, socially-oriented programmes in Beijing

As part of the capital, Beijing’s, largest social housing project, the Tian Tong Yuan district (8 million m²), a complex of buildings constructed in the French architectural style and representing 280,000 m² was handed over in 2003. By modifying the outline plan (elimination of a row of buildings in order to increase exposure to sunlight at the lower levels) and reducing the surface area of the outside walls while retaining the same amount of floor space it was possible to achieve a measured energy saving of 42% at an additional construction cost of only 0.8%.

The "Sun Star City" project, which represents 2 million m², is located in the green belt to the North of the capital. French experts and heating engineers contributed their expertise to the architectural design (reduction of the length of the facades, improvements to the quality of the glazing and insulation) and the heating (improved distribution and regulation) of 120,000 m² of housing. The achieved savings in terms of heating energy amounted to 54% at an additional construction cost of just 10% compared to uninsulated buildings.
A programme, its projects and the results

The construction of urban housing in China

Two pilot operations in Shenyang

Two pilot operations have been conducted in Shenyang, the capital of Liaoning province. These involve two building complexes (representing a total of 46,000 m$^2$) and prove that it is possible to achieve the aim of cutting energy consumption by 50% at a reasonable additional cost of less than 3%.

A pilot ecological certification operation in Shanghai

In Shanghai, two sets of residential buildings with a total surface area of 133,000 m$^2$ have been constructed in the Biliwan district with the support of French experts. The aim was to test measures making it possible to save heating energy during the winter and reduce air conditioning consumption in the summer: orientation of the accommodation, reduction of the length of the facades while keeping the floor area unchanged, installation of high-performance windows and external heat insulation, simplified natural ventilation, installation of external blinds (rarely practiced in China), installation of high-performance air conditioning during construction. The additional construction cost due to these measures was 3.3%. A range of measurements taken by the CEEB at one of the two sets of buildings showed that it was indeed possible to achieve energy savings of 50% for heating and air conditioning. A 5 °C increase in indoor winter temperatures was observed. However, the real energy savings are difficult to calculate because occupants only turn on their heating and air conditioning very intermittently in view of the high cost of electricity. Nevertheless, the enhanced comfort achieved testifies to the success of the project.

In the final tranche of housing, which is due to be handed over in 2010, the energy savings for heating and air conditioning may even exceed 65%.

Other environmental mechanisms have been adopted in Biliwan such as measures which make it possible to save on drinking water, infiltrate rainwater and significantly replant around buildings. This operation was selected by the Ministry of Construction as a pilot scheme for the testing of the new Chinese certification for ecological buildings (“Green Buildings”).
The environmental certification of buildings

There are two main reasons for labelling buildings and materials: to gradually strengthen the regulations and, by certifying their buildings, to reward developers who act ahead of the introduction of standards. It also makes it possible to communicate the message of energy efficiency in the construction sector in a clear and transparent way.

Energy management is a key element of Green Buildings certification which focuses on environmental mechanisms relating to water and air management as well as the planning of outdoor spaces and the choice of materials. This certification represents a first step towards a more global approach to the environmental quality of buildings. A future step could take the form of the construction of passive or positive energy buildings.

Wang Yu Lan, resident of Biliwan

In my old apartment, I had to turn on extra heating whenever it was cold. Now I don’t need to. I never turn on the heating in winter. It doesn’t get cold. And for such a large apartment, the electricity costs are very low - just a few tens of yuan.

Xu Yu Lin, developer of the Biliwan complex

Biliwan is an example pilot construction. It shows that we can incorporate energy efficiency in buildings. This was not yet done at the time we launched the project. Many of Shanghai’s property developers came to visit the complex and so did developers from the surrounding provinces of Zhejiang, Shandong and Jianxi. We received many visits and this affected the way people see things. It made it possible to promote energy-efficient constructions in our society.
A programme, its projects and the results

The weatherisation of housing

The rehabilitation of existing housing in Harbin and Heihe

In the Habiao district of Harbin, 5 blocks of flats representing a total of 18,900 m² have been rehabilitated using an external heat insulation process. The work was financed by adding extra storeys and selling the newly created units. In Heihe, the northernmost city of Heilongjiang province where the January temperature falls as low as –45°C, two blocks of flats of 3,000 m² each were externally insulated. The work was financed by the city. The measurement campaigns undertaken by the CEEB showed that the aim of achieving a 50% energy saving for heating was indeed attained in these two operations. The success of the programme has persuaded other building owners to do likewise and 100,000 m² of housing has been rehabilitated in Harbin using the same construction principles.

The rehabilitation of the CFFCME

A Beijing training building of 4,000 m² in size was selected for rehabilitation as part of the programme. The building accommodates the premises of the French-Chinese Training Centre for Energy-related Professions (CFFCME). The installation of external heat insulation, the replacement of the windows and the provision of mechanically controlled ventilation and an automatically regulated substation will make it possible to achieve heating energy savings of 68%.

Wang Li,
Assistant Director of the Science and Technology Centre, Heilongjiang Construction Commission

First of all we had to thicken the walls. Then we insulated the surface area and replaced the flat roofs with sloping roofs. That completed the measures necessary for the walls and the structure. For heating, we installed a heat distribution mechanism for each apartment, thus allowing each household to adjust its temperature independently. Each apartment is equipped with a valve. The occupants don’t have to pay any extra. We used the revenue from the sale of the 6th floor units to pay for the rehabilitation investments.
The challenges and prospects for rehabilitation

Even though it is easier and cheaper to incorporate thermal modifications during building design, the rehabilitation market represents a growing potential for energy savings and represents a major challenge in the task of reducing CO₂ emissions in the building sector.

En 2008, 800,000 m² of housing was rehabilitated using the model adopted in Harbin’s Habiao district. This year, the Heilongjiang Construction Committee has an obligatory objective fixed by the 11th Five-Year Plan to complete 15,000,000 m² of residential rehabilitation work for which it wants to draw on the experience of the rehabilitation operations undertaken with the FFEM as well as the work performed by the AFD in Wuhan.

In addition, the CHI has implemented a guide for the reform of heating provision in housing in the cold and very cold regions in the North of China. This is intended to ensure the reform of heating provision and suggest orientations and technical measures for existing housing. The purpose of this work is also to propose a suitable policy and measures relating to the billing of heating provision, the financing of rehabilitation operations, supervisory measures etc.

Despite the social and financial questions it raises, it is now very clear that the rehabilitation of the existing building stock (whether residential or not) is the next approach to take, not simply because it reflects the needs expressed by our Chinese partners but also because of the greenhouse gas releases that it will help to avoid.

Study of the Finance Mechanisms

In recent years, the ownership of housing has been transferred from enterprises to the employees whom they had accommodated in the past. The regulatory mechanisms of the property market have therefore started to operate. Despite this, speculative property phenomena can mean that confused signals are sent. In particular, heating costs have not yet been transferred and owners therefore have little incentive to concern themselves with improvements.

The purpose of the study of the finance mechanisms was to identify the constraints involved in improving the energy performance of buildings and propose suitable measures and possible avenues for the policy guiding the energy efficiency market in the existing housing sector in Heilongjiang.

This study has provided an in-depth understanding of the economic and social significance of improving energy efficiency in existing housing with regard to the issue of sustainable urban development.

Liu Yongqiang, Deputy Director of the Heihe Construction Committee

To encourage rehabilitation and reinforce the implementation and development of energy saving measures in new buildings, Heihe has developed a number of beneficial heating-related policies. Anyone who performs rehabilitation work which incorporates energy-saving methods benefits from a 15% reduction in their heating costs. We have also strengthened our management. Since 2005, we have obligatorily required all new constructions to meet the standard of 50% energy savings.
The construction of rural houses in Heilongjiang

The challenge

With the majority of its population still living in rural areas, China builds 700 million m² of rural housing, or nearly 9 million dwelling units, every year. Heilongjiang is a primarily rural region which is characterised by particularly severe winter climatic conditions. The construction of energy-efficient pilot houses which are easy to replicate on a large scale is therefore a major challenge if the province is to reduce energy consumption and offer its inhabitants a higher level of comfort.

Energy-efficient pilot houses

The programme also included the construction of 20 energy-efficient rural pilot houses in a number of villages in Heilongjiang (in Shengli and the Heihe region). The measurement campaign indicates that the aim of achieving a 50% energy saving for heating was indeed attained. The savings even amount to 80% in the case of certain very heavily insulated houses (results provided by the measurement campaign undertaken by the Heilongjiang Construction Committee). Since the houses in question are low-cost units, the additional cost of achieving the energy savings was greater in relative terms than for apartment blocks and amounted to 18%. The occupants now enjoy a significantly higher level of comfort, with no condensation on their walls and improved indoor air quality thanks to better ventilation.
The construction of rural houses in Heilongjiang

My old house was made of earth and I had to light the boiler twice as often outside of mealtimes. Now, it is no longer necessary. When we cook, it creates enough heat for the entire day. If I compare the two houses, my old earth house had very poor heat insulation, there wasn’t enough light and the air quality was very poor. Here, it is light and more comfortable. And the air is cleaner.

Replicable projects

It is in Heilongjiang that the FFEM programme has had the greatest impact. 1,300 rural houses have since been constructed using the model piloted during the programme and without any aid from FFEM. A technical guide explaining this energy-efficient approach has been drawn up by French and Chinese experts and distributed throughout the province in order to encourage its adoption.

Song Zhanping, occupant of a rural house in Heilongjiang

My old house was made of earth and I had to light the boiler twice as often outside of mealtimes. Now, it is no longer necessary. When we cook, it creates enough heat for the entire day. If I compare the two houses, my old earth house had very poor heat insulation, there wasn’t enough light and the air quality was very poor. Here, it is light and more comfortable. And the air is cleaner.
A summary of 10 years of the FFEM programme in China

In ten years, the French-Chinese energy management programme has made it possible to reduce CO₂ emissions by 50,000 tonnes per year while simultaneously securing more comfortable living conditions for the occupants of the renovated or newly constructed housing. 870,000 m², or nearly 11,000 dwelling units, have been built and 29,000 m², or 310 units, have been rehabilitated, with the achieved energy savings amounting to at least 50%.

A success based on partnership

The programme’s success is due both to the dynamism of the local partners and the trust and confidence established between the Chinese and French actors at all levels: national, provincial and local authorities, developers, technology partners (design institutes, universities, enterprises) and industrial partners.

The adopted process made it easy to form partnerships: in every property-related project, a French team consisting of an architect and a heating engineer worked on the basis of a project developed and financed by their Chinese colleagues. The Chinese property developers, who acted as the real project managers, chose the proposals which they wished to implement in the buildings they were constructing. The architect and heating engineer continued to provide them with technical support during construction and through to the commercial release of the property. They suggested modifications and assessed their impact on construction costs and on reductions in energy consumption. Once the housing was occupied, a performance monitoring campaign was conducted to check that the desired savings were really being achieved.
A sustainable transfer of know-how and innovative technologies

One of the programme’s main aims was to encourage Chinese construction companies and property developers to adopt and use the new methods and technologies which make it possible to achieve energy savings. The sustainable transfer of these technologies is illustrated, in particular, by the creation of new construction markets, the emergence of factories for the production of new materials, modifications to the regulations governing building work, and the desire of municipal authorities to incorporate energy efficiency in their housing rehabilitation projects.

To ensure that these new methods and technologies continue to be employed in the future, several Chinese universities, such as Tsinghua in Beijing, Harbin Institute of Technology in Harbin, and Tongji in Shanghai, have worked together with French experts to develop training seminars for their architecture students. Similarly, Chinese property developers and experts have been trained at seminars and visits intended to help them re-use the techniques employed during the programme.

Jiang Hao, architecture student

The Biliwan complex is a good example of the energy-saving measures employed in Shanghai, the complex has taken some interesting measures. This gives us a detailed idea of how to combine energy efficiency and architecture.
Future prospects for development

Thanks to the programme’s success, the partnerships developed and the experience acquired on-site by the Chinese participants, this cooperative programme has led to further example operations conducted without the FFEM’s support. In Heilongjiang, for example, the local authorities believe that the programme has made it possible to implement local energy efficiency standards two years ahead of schedule, with the result that millions of m² of buildings now benefit from external insulation. Since the handover of the first operation conducted as part of the Harbin cooperative programme, the volume of energy efficiency housing constructed each year in Heilongjiang province has increased by 150%.

Now that the Chinese government has made energy performance a key objective in the construction sector, it must accelerate the introduction of new heating and insulation regulations together with financial incentives in order to encourage the development of these practices at the national, provincial and local levels.

Another priority must be the weatherisation of the building stock. The French Development Agency and ADEME are currently financing a programme of cooperation with the Wuhan municipal authorities and Hubei province for the rehabilitation of office buildings in Wuhan.

The French-Chinese cooperation conducted within the framework of the FFEM programme represents a first step along the path towards High Environmental Quality, or even towards positive energy buildings.
“We must commit ourselves to a vision of sustainable development in order to respond to the needs of the present without compromising the ability of future generations to respond to theirs.”