

Ex post evaluation – India



Sector: Energy Policy and Administrative Management (23110)
Project: Energy Efficient New Residential Housing*
 BMZ-No. 2008 66 129 / 2008 66 137 / 2008 70 154
Implementing agency: National Housing Bank (NHB)



Ex post evaluation report: 2021

in EUR million	Credit Line (Planned)	Credit Line (Actual)	Complementary Measure (Planned)	Complementary Measure (Actual)
Investment costs (total)	50,00	50,00	1,50	1,14
Counterpart contribution	0,00	0,00	0,00	0,00
Funding	50,00	50,00	1,50	1,14
of which BMZ budget funds	12,00	12,00	1,50	1,14

*) Random sample 2019

Summary: The project “Energy Efficient New Residential Housing” consisted of a credit line of EUR 50 million to NHB. NHB used these funds to refinance sub-loans for energy-efficient housing projects through financial intermediaries (banks and housing finance corporations, known as “Primary Lending Institutions” (PLIs)). Almost 2,000 sub-loans were refinanced and channelled from NHB through 6 PLIs to individual home buyers of apartments in 12 larger residential building projects, mainly in the metropolitan area of Delhi. It is assumed that the overall energy savings correlated with these buildings are 43,700 MWh p.a., which are equivalent to 37,000t of CO₂. A Complementary Measure supported NHB during the implementation of the project. As an additional component another technical assistance measure supported the development of a tool named “EnEff:ResBuild Tool” for the assessment of energy efficiency standards of residential buildings.

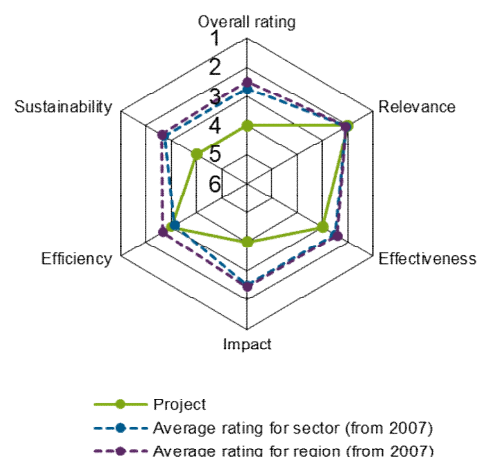
Objectives: The project objective (outcome level) was to implement a pilot promotional scheme for energy efficient residential buildings. The overarching developmental objectives (impact) were (i) to contribute to the emission reduction of greenhouse gases and thus, towards climate change mitigation, and (ii) to contribute to a sustainable economic development through broad-based, technically and economically efficient, socially and ecologically sustainable energy use which supports economic growth.

Target group: The target group of the project had been defined as the buyers of energy-efficient apartments. Additional beneficiaries of the project were the global population that benefit from reduced carbon emissions from India’s fast growing housing sector.

Overall rating: 4

Rationale: The project was designed and implemented as a “pilot scheme” with a pioneering character during a time when no established market for energy-efficient housing finance existed in India. It anticipated and addressed the high growth rates in India’s residential housing sector and their impact on energy use and carbon emissions. The project was implemented as planned. However, from today’s point of view, the project’s outcome did not contribute sufficiently to the development of an energy-efficient housing finance sector. Sustainability and Impact of the project’s results is therefore rated as insufficient, which means that the project cannot be rated as successful overall.

Highlights: KfW Development Bank plays a crucial role in setting up finance schemes for energy efficient residential housing finance in its domestic promotional operations in Germany. The project had intended to use this mandate of KfW Development Bank as a role model and modify and adapt it to the Indian context. From today’s point of view, one can conclude that this initiative may have been launched a few years too early - at that time, India lacked the necessary regulating framework.



Rating according to DAC criteria

Overall rating: 4

Sub-rating:

Relevance	2
Effectiveness	3
Efficiency	3
Impact	4
Sustainability	4

General conditions and classification of the project

The project was designed and appraised as a “pilot scheme” with a pioneering character during a time (2008-2010) when no established market for energy-efficient housing finance existed. At that time neither NHB nor any of the larger banks or financial institutions had been promoting energy-efficient (or otherwise “green”) home financing. On the regulatory side, no enabling framework existed as well as no tools for measuring, verification and certification of energy efficiency standards and also no widely-accepted labeling system in the housing sector. The project was India’s first large-scale project in the housing sector concerning energy efficiency. It intended to demonstrate to a variety of stakeholders that investments in energy-efficient residential buildings can be implemented in a technically and financially viable manner.

Relevance

India’s dynamic economic growth combined with a growing trend towards urbanization drives a massive demand for construction of new residential buildings especially in urban areas. It is estimated that approx. 50 % of the buildings that will exist in 2030 are yet to be constructed, mainly in urban areas. The number of cities with a population exceeding one million inhabitants grew from 35 in 2001 to 50 in 2011; in 2030 this figure is expected to grow to almost 90.

At the time of project preparation and appraisal (2008-2010), the housing policies of India’s Government as well as promotional schemes had mainly focused on affordable housing / low cost housing. Several support schemes regarding investments in housing were targeting mainly India’s economically weaker sections and low-income groups. Some of those schemes made use of the fairly well-developed housing finance sector in India. This finance sector proved to be a suitable basis for the project approach through the financial sector from an institutional point of view. However, at the time of project preparation no promotional schemes to support energy efficiency measures in residential buildings were in place and the policies of India’s Government were not anticipating the potential to generate energy savings through the implementation of energy efficiency measures in the housing sector. At that time the relevant legislation (Energy Conservation Act 2001) focused on promotion of energy efficiency measures in particular in SME and commercial buildings, but explicitly not in residential buildings. Consequently, no promotional schemes on a significant scale and also no enabling regulatory framework existed. The project addressed this gap by introducing a first pilot scheme to promote energy efficiency measures in the residential housing sector. It was implemented as one component of Indo-German Financial Cooperation (FC) with its focus on, among others, renewable energy and energy efficiency (including climate protection) and was well in line with the sectoral strategy agreed upon between the governments of India and Germany.

The theory of change implied that the establishment of a credit line to NHB as apex bank for housing finance should facilitate access to finance for buyers of energy-efficient apartments. This was considered to be a new and innovative niche in India’s housing finance market. Complementary Measures to support the establishment of an enabling regulatory environment (energy efficiency standards, labelling) should then create transparency in this new market niche so that other market participants (financial institutions as lenders and buyers as borrowers) gain confidence in it. An evolving market in energy-efficient housing finance should - over the years - increase the energy efficiency standard in India’s building stock, and

hence reduce its energy demand, energy consumption and resulting carbon emissions. From today's point of view, this theory of change and the underlying assumed potential for energy savings in the building sector is still of high relevance. The residential building sector is expected to become the largest consumer of electricity by around 2032. In 2018 the sector accounted for 24 % of India's gross electricity consumption, ranked second behind the industrial sector (40 %). Hence, there remains an urgent need but also the potential to reduce a significant share of the electricity consumption as well as the corresponding greenhouse gas emissions from this sector.

Considering this potential, the Indian Government (incl. public sector institutions) has launched a limited number of donor-financed activities to promote energy efficient (or "green") housing since the implementation of this FC project. Worth mentioning are the Indo-German Energy Programme implemented by GIZ, the Indo-Swiss Building Energy Efficiency Project (BEEP) and USAID who helped to develop a minimum energy efficiency standard for commercial buildings. All three work on the development of an enabling regulatory framework. On the financial side, AFD (France) provided a credit line to NHB for promoting "green affordable housing" in 2017.

Considering the high energy saving potential in India's growing housing sector and given the pioneering character of the project, we can conclude that the projects' relevance was high and remains high.

Relevance rating: 2

Effectiveness

The project objective (outcome level) had been defined as follows: "A Pilot Promotional Programme for new energy-efficient residential buildings has been implemented". The following indicators had been defined and agreed upon and the fulfillment of the indicators can be summarized as follows:

Indicator	Status
(1) The energy needs of buildings refinanced under the project at design and completion will be at least 30 % lower than the benchmark building due to energy efficiency measures applied to the building envelope and to energy-efficient cooling technologies. During implementation (April 2013) NHB and FC agreed to lower the target to \geq 18 % for buildings with passive measures only, and keep it for buildings with passive and active measures at \geq 30 %.	Partly fulfilled
(2) The assessment tool to be developed by Fraunhofer Institute and TERI shall be applied to calculate the energy needs of at least 10 larger energy-efficient residential buildings.	Fulfilled
(3) At least 10 larger residential buildings, which include energy efficiency measures, will be certified with an Energy Efficiency Label. This Energy Efficiency Label shall confirm that the energy needs of the energy-efficient building, calculated at the design stage with the EnEff:ResBuild Tool is on average 30 % lower than the energy needs of the Benchmark Building.	Partly fulfilled
(4) After conclusion of the project, at least half of the PLIs, who participated in the implementation, confirm their interest in a continuation of energy-efficient apartment promotion and the supply of respective loans.	Partly fulfilled

Indicator 1: This indicator has partly been fulfilled and the revised indicators have been formally fulfilled:

- (i) The average energy savings for buildings with passive measures only has been 21 % (average of 1,772 sub-loans)

- (ii) The average energy savings for buildings with active and passive measures has been 34 %
(average of 140 sub-loans)

The average energy savings for all buildings have been 22 % (overall average of 1,912 sub-loans). There was no indicator addressing the envisaged number of sub-loans, but the actual number of sub-loans (1.912) exceeds the estimated number (1.400) due to a lower than expected average sub-loan amount.

In India, energy efficiency appliances ("active measures", in particular air conditioning) are usually not provided by project developers but by the end-users / buyers instead. Consequently, appliances are usually not financed as part of housing loans. NHB had therefore proposed to FC to differentiate the energy saving target indicators for buildings applying only "passive" measures to 18 %, and keep it at 30 % for buildings applying "active" and "passive" measures. This differentiation has been (and still is) considered as a reasonable and justified adjustment of the project concept.

Hence, the initial target indicator has not been met (22 % vs. 30 %) whilst the revised, differentiated indicator(s) - which are considered to reflect an appropriate ambition level - have been fulfilled.

Indicator 2: This indicator has been fulfilled: A tool named "EnEff:ResBuild Tool" has been developed, financed by an additional grant contribution provided by FC on behalf of the German Government. The tool has become known also as "Fraunhofer/TERI Tool". During project implementation 19 larger energy-efficient residential buildings have been assessed by the implementation consultant using the "EnEff:ResBuild Tool". However, it should be noted that the above-mentioned calculations have been conducted and reported by the implementation consultant using the "EnEff:ResBuild Tool" ex ante (at design stage) without verification after completion.

By and large, the tool has been (and still is) recognized as a suitable and easy-to-handle instrument which fully served its purpose during project implementation. Yet, the application of the tool could be considered as a method to achieve the project objective rather than as an indicator of its achievement.

Indicator 3: This indicator is partly fulfilled. Although the development and introduction of an Energy Efficiency Label had been planned as part of the Complementary Measure, had been implemented by the TA consultant. Yet, other labels were about to be developed at the same time. Certification of the buildings has therefore been limited to ex-ante assessments of energy savings using the "EnEff:ResBuild Tool" (see Indicator 2 above), but no separate labelling system has been applied continuously.

Indicator 4: This indicator is partly fulfilled but it is difficult to measure and has not been properly documented. Six PLIs participated in the implementation of the credit line. Representatives from these PLIs attended workshops, trainings, conferences and study tours organized as part of the Complementary Measure. It is reasonable to assume that the participation (in particular the allocation of human capacities) in such training measures can be considered as a confirmation of interest in further lending for energy-efficient building projects. However, this interest is not documented in any way and/or visible in the PLI's actual lending operations in the years after project implementation. For a better measurement the indicator should have rather monitored actual activities in the sector and not interest by itself.

The project concept did not define a comparable indicator to measure NHB's continuous interest in promoting energy-efficient (or "green") housing finance. From today's point of view, this would have been adequate as a suitable indicator to address NHB's function as project executing agency and its prominent role as regulator, promotional agency and key apex institution for India's housing finance sector.

Summing up, the indicators of the project objective (outcome level) are partly fulfilled. Hence, the effectiveness is rated as satisfactory.

Effectiveness rating: 3

Efficiency

The housing finance market in India is considered to be fairly advanced. However, the market is not yet considered to have delivered on all aspects of housing finance. At the time of project appraisal none of the larger banks or financial institutions advertised energy-efficient (or otherwise “green”) home financing. However, the project concept, in particular for implementing the credit line, made good use of the existing structures, especially NHB’s position as apex institution with good relationship to many PLIs but also its policy mandate in housing finance. No project-specific implementation structure had to be set up and not many preconditions or stiff eligibility criteria had been defined which had contributed to an efficient implementation of the credit line in accordance with NHB’s regular refinancing operations. The credit line was fully disbursed within 3 years as planned.

In addition, the terms and conditions of individual sub-loans provided by the PLIs to their end-borrowers were not different from the PLIs’ regular, well established lending operations for housing loans. The credit line extended to NHB is denominated in EUR whereas NHB lends to PLIs in INR. The resulting hedging cost for NHB is estimated to be around 6 % p.a. Considering the additional cost for the guarantee fee charged by the Government of India (approx. 1.2 % p.a.), NHB’s resulting cost of funding in INR is not considerably lower (if at all) than the cost of NHB’s regular funding. The chosen project structure (channeling funds through NHB (as apex bank) and PLIs to end-borrowers as “three step loan”) increases the administrative costs at various levels. Even though each NHB and the PLIs were suitably qualified to use the funds efficiently on their level, the overall efficiency has suffered from the multi-step flow of funds. This dilemma, and also high hedging costs, are difficult to avoid but must be considered as a burden for efficient use of foreign concessional loans, as shown in this particular project.

Overall, the concessionality provided by the German government to NHB could not be passed on to (PLIs and) end-borrowers. Hence the availability of refinancing through NHB did not influence the PLIs’ lending operations or business strategy and did therefore not influence the buyers’ decision to purchase an energy efficient apartment or not. It enabled them to access adequate housing loans but did not trigger the purchase of a particular “green” apartment. From today’s point of view this would have been a desirable, if not necessary, element to create incentives to promote energy-efficient housing through the financial sector. A more efficient implementation structure could be a financing scheme addressed directly to project developers / builders (rather than to end-users). In the case of the project this would not have been in line with NHB’s mandate since it would not benefit from the advantages of a strong involvement of NHB as key actor in India’s housing finance sector.

Related to the consulting services, at the time of project design and appraisal (and in parts still today) no enabling regulatory framework existed. No tools for measuring, verification and certification of energy efficiency standards as well as no widely accepted labelling system in the housing sector had been available at that time. Therefore, the project could not avoid developing project-specific tools and procedures to ensure targeted use of funds to promote (only) energy-efficient residential buildings. The “EnEff:ResBuild Tool” had been designed at very reasonable cost based on an existing tool and operated in a lean and efficient manner. It served the purpose to support implementing the credit line.

Summing up, the efficiency is rated as satisfactory.

Efficiency rating: 3

Impact

The overarching developmental objectives (impact) as defined at appraisal were

- (i) to contribute to the emission reduction of greenhouse gases, especially CO₂, and thus, towards climate change mitigation, and
- (ii) to contribute to a sustainable economic development through broad-based, technically and economically efficient, socially and ecologically sustainable energy supply and use which supports economic growth

No indicators for the achievement of the overarching development objectives (impact) had been defined. Nevertheless, we assess the fulfilment of the overarching developmental objectives as follows:

Objective (i):

It should be noted that the credit line provided to NHB has been used to refinance loans for residential building projects which had been at a fairly advanced design and/or construction stage at the time of financing. The design and, thus, the energy efficiency standard of those buildings had not been notably influenced by the refinancing opportunities through NHB (even though some design optimizations / corrections might have been made for individual projects after assessment of the energy efficiency standard by using the “EnEff:ResBuild Tool”). The direct contribution of the project to the emission reduction was therefore negligible and no additional, direct impact was achieved. This could have been avoided by giving more time to develop and finance newly designed buildings fulfilling (more) ambitious energy efficiency standards (at the “cost” of a longer implementation and disbursement period). However, considering the pioneering character and its early contribution to the development of an almost untouched market niche it can be reasonably assumed that the project has some positive indirect impacts. The project touched upon a sector with high and even increasing energy saving (and hence emission reduction) potential in India’s growing housing sector. By doing so, it likely raised awareness among PLIs and potential borrowers for the future and further investments. These indirect positive impacts are hard to quantify but the, in general, positive trend towards energy-efficient housing in India is one indicator in support of this hypothesis.

Objective (ii), with a focus on broad-based, technically and economically efficient, socially and ecologically sustainable energy use:

(i) The project did not significantly contribute to a broad-based and socially sustainable energy use as it did not focus on the lending operation towards a particular target group such as e.g. economically weaker sections or low-income groups. Instead, the project focused generally on buyers of energy-efficient apartments, who to a large part belong to the middle class. The project was explicitly not designed as a “pro poor” approach.

(ii) The project did contribute to a technically and economically efficient energy use in a way that it explicitly targeted the increase of energy efficiency by promoting tested and cost-efficient technologies. The project’s energy saving targets (see above) had been defined (and refined) in a reasonable manner without being “overambitious”, but the project’s direct contribution remains questionable.

(iii) The project did contribute to a sustainable energy use in a way that it was designed as a pilot project with a pioneering character. It did provide valuable experiences and inputs for the development of a better functioning market for energy efficient residential housing but to a small extent only. However, limitations in the sustainability of the project impacts are obvious and further described below.

Considering that no direct impact was achieved and a contribution to a socially sustainable energy use was meagre we consider the development impact as unsatisfactory.

Impact rating: 4

Sustainability

At the time of project appraisal, energy efficient housing (comprising design, construction and finance) was almost a non-existent topic in India. Even today it is still considered an emerging topic. Although the mind-set and the acceptance of increased investment cost for apartments with energy efficiency measures have increased, the market is still small and in an infant stage. From a financing perspective, the project, being the first promotional scheme at a larger size, was pioneering and gave impetus to subsequent initiatives.

The project allowed NHB to gain knowledge and competency towards “green housing” and to experiment relations with banks/housing finance corporations and with the building sector for the promotion of energy-efficient housing finance. This relates in particular to a credit line initiated in 2017 and currently implemented jointly by NHB and AFD (SUNREF Housing India). Lessons learned from the implementation of the FC credit line have been taken into account in the design of SUNREF Housing India, and it is reasonable to assume that NHB would not have entered into SUNREF Housing India without having gained previous experiences from its earlier cooperation with FC. Apart from that, the stimulus of the FC project to

NHB's continuous lending operations from their own financing sources (i.e. without external support) is negligible.

Beyond the impact of the project to NHB as an apex level institution, the FC credit line has been channelled via 6 PLIs. None of them had lending operations to explicitly promote energy-efficient housing before their participation in the FC project. Although the participating PLIs seem to have communicated their interest in continuing energy efficiency promotion during project implementation (as defined as a success indicator for the project, see above "effectiveness"), the project has not resulted in a visible scaling up of PLIs' lending operations for energy efficient residential buildings since then.

The Government of India has initiated policies (and continues to receive external support) to develop promotional schemes that are targeted towards increased investment in energy efficiency measures in residential buildings. The most notable step is the introduction of the Energy Conservation Building Code for Residential Buildings (ECBC-R) by the Bureau of Energy Efficiency (BEE) as a voluntary code in 2018 supported by the Indo-Swiss Development Cooperation. The introduction of a tool to assess and certify energy efficiency in residential buildings is imminent (expected in 1st quarter 2020) and -provided there is awareness and acceptance among market participants- could be a major step forward to the establishment of an enabling regulatory environment for energy-efficient housing (finance). The ECBC-R is currently further developed with support by Indo-German Technical Cooperation (GIZ). Although full implementation (including becoming a mandatory code) on national, state and local levels is expected to still take several years, market participants might rely more on government-sponsored certification and labelling scheme than on private schemes (which already do exist to a certain extent).

However, the contribution of the FC project to those developments has been marginal. One output of the FC project had been the development of the "EnEff:ResBuild Tool" for a quick and easy-to-handle assessment of a building's energy performance. The tool was successfully used during project implementation but thereafter the tool has neither been used by other market participants (banks, project developers, architects) nor has it been further developed nor was it used as input or nucleus for the development of the tool recently developed by BEE. The same applies to the establishment of a labelling scheme, which had been planned to be one component of the Complementary Measure. This has not been implemented either.

From today's point of view, parts of the activities under the Complementary Measure (in particular related to measuring, verification and labelling) should have been more focused on supporting BEE's activities rather than NHB (due to the roles and mandates of the respective institution), in order to increase the usefulness of its results beyond (only) supporting the implementation for the specific FC credit line.

Summing up, even acknowledging the pioneering character of the project at a time when no relevant experience in energy-efficient housing finance had existed and the (although limited) valuable impetus which the project has given to the development of the sector, the sustainability is rated as unsatisfactory.

Sustainability rating: 4

Notes on the methods used to evaluate project success (project rating)

Projects are evaluated on a six-point scale, the criteria being **relevance, effectiveness, efficiency** and **overarching developmental impact**. The ratings are also used to arrive at a **final assessment** of a project's overall developmental efficacy. The scale is as follows:

Level 1	Very good result that clearly exceeds expectations
Level 2	Good result, fully in line with expectations and without any significant shortcomings
Level 3	Satisfactory result – project falls short of expectations but the positive results dominate
Level 4	Unsatisfactory result – significantly below expectations, with negative results dominating despite discernible positive results
Level 5	Clearly inadequate result – despite some positive partial results, the negative results clearly dominate
Level 6	The project has no impact or the situation has actually deteriorated

Rating levels 1-3 denote a positive assessment or successful project while rating levels 4-6 denote a negative assessment.

Sustainability is evaluated according to the following four-point scale:

Sustainability level 1 (very good sustainability): The developmental efficacy of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability): The developmental efficacy of the project (positive to date) is very likely to decline only minimally but remain positive overall. (This is what can normally be expected).

Sustainability level 3 (satisfactory sustainability): The developmental efficacy of the project (positive to date) is very likely to decline significantly but remain positive overall. This rating is also assigned if the sustainability of a project is considered inadequate up to the time of the ex post evaluation but is very likely to evolve positively so that the project will ultimately achieve positive developmental efficacy.

Sustainability level 4 (inadequate sustainability): The developmental efficacy of the project is inadequate up to the time of the ex post evaluation and is very unlikely to improve. This rating is also assigned if the sustainability that has been positively evaluated to date is very likely to deteriorate severely and no longer meet the level 3 criteria.

The **overall rating** on the six-point scale is compiled from a weighting of all five individual criteria as appropriate to the project in question. Rating levels 1-3 of the overall rating denote a "successful" project while rating levels 4-6 denote an "unsuccessful" project. It should be noted that a project can generally be considered developmentally "successful" only if the achievement of the project objective ("effectiveness"), the impact on the overall objective ("overarching developmental impact") and the sustainability are rated at least "satisfactory" (level 3).