Corporate Unit Evaluation Central Project Evaluation

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Central project evaluation

Green Energy Corridors – Grid Integration of Renewable Energy and Demand-side Energy Efficiency, India

Project number 2014.2298.9

Evaluation Report

On behalf of GIZ by Tatjana Mauthofer (Mainlevel Consulting AG) and Dr Sameer Maithel

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The Evaluation Unit commissioned external independent evaluators to conduct the evaluation. This evaluation report was written by these external evaluators. All opinions and assessments expressed in the report are those of the authors.

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Abbreviations

ANGAN	Augmenting Nature by Green Affordable New-habitat
BEE	Bureau of Energy Efficiency
BMZ	German Federal Ministry for Economic Cooperation and Development
CERC	Central Electricity Regulatory Commission
CPE	Central project evaluation
DAC	Development Assistance Committee
DFID	Department for International Development
DISCOM	Power distribution company
DPR	Detailed Project Report
EE	Energy efficiency
EERB	Energy Efficiency in Residential Buildings (IGEN-EERB)
EESL	Energy Efficiency Services Limited
ENS	Eco-Niwas Samhita
EU	European Union
FY	Financial year
GDP	Gross domestic product
GEC	Green Energy Corridors
GHG	Greenhouse gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
GW	Gigawatt
IEA	International Energy Agency
IGEN	Indo-German Energy Programme
KfW	Kreditanstalt für Wiederaufbau
MOI	Module objective indicator
Mtoe	Million tonnes of oil equivalent
NISE	National Institute of Solar Energy
NMSH	National Mission on Sustainable Habitat
OECD	Organisation for Economic Co-operation and Development
PAT	Perform, Achieve and Trade
PCA	Peace and Conflict Assessment
PFB	Projektfortschrittsbericht (ENG: project progress report)
POSOCO	Power System Operation Corporation Ltd
PTB	Physikalisch-Technische Bundesanstalt
PV	Photovoltaic
PVRT	Photovoltaic rooftop thermal
PVT	Photovoltaic thermal
RE	Renewable energy
REMC	Renewable Energy Management Centre
SCGJ	Skill Council for Green Jobs
SDA	State Designated Agencies
SDG	Sustainable Development Goals
UN	United Nations
USAID	United States Agency for International Development

The project at a glance

India: Green Energy Corridors – Grid Integration of Renewable Energy and Demand-side Energy Efficiency (IGEN-GEC/EE)

Project number	2014.2298.9
Creditor reporting system code(s)	23630 - Transmission and distribution of electricity (interconnected grids)
Project objective	Objective of joint development cooperation programme: The programme objective of German development cooperation in the Indian energy sector is to make a contribution to an inclusive, technically and economically efficient, and socially and environmentally sustainable energy supply Project objective: The conditions for the grid integration of renewable energy and for demand-side energy efficiency have been improved. The project objective is pursued through four components in two activity fields: • Activity field 1: Renewable energy (RE) - Component 002 (IGEN-GEC): Green Energy Corridors - Component 003 (IGEN-PVRT): Photovoltaic rooftop thermal • Activity field 2: Energy efficiency (EE) - Component 001 (IGEN-EE): Energy efficiency - Component 004 (IGEN-EERB): Energy efficiency in residential buildings
Project term	April 2015 - December 2020
Project value	EUR 18,000,000
Commissioning party	German Federal Ministry for Economic Cooperation and Development (BMZ)
Lead executing agency	Ministry for New and Renewable Energy (MNRE), Government of India
Implementing organisations (in the partner country)	Ministry of Power, Bureau of Energy Efficiency (BEE), Energy Efficiency Services Limited (EESL) Ministry of New and Renewable Energy (MNRE), Central Electricity Authority, Central Electricity Regulatory Commission (CERC), Power Grid Corporation of India Limited, Power System Operation Corporation Limited (POSOCO), State Transmission Utilities
Other development organisations involved	Activities aligned with Kreditanstalt für Wiederaufbau (KfW), Physikalisch-Technische Bundesanstalt (PTB) and with the joint development cooperation programme
Development cooperation (DC) pro-gramme	*Förderung erneuerbarer Energien und Energieeffizienz in Indien*
Implementing organisations of the DC programme	KfW Development Bank, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, PTB
Target group(s)	Ministry of Power, Ministry of New and Renewable Energy, Bureau of Energy Efficiency (BEE), State Designated Agencies (SDAs), industries, builders, power distribution companies (DISCOMs), Power System Operation Corporation Limited (POSOCO), National Institute of Solar Energy (NISE), National Institute of Wind Energy

1 Evaluation objectives and questions

This chapter aims to describe the purpose of the evaluation, the standard evaluation criteria, and additional stakeholders' knowledge interests and evaluation questions.

1.1 Evaluation objectives

Central project evaluations of projects commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) fulfil three basic functions: they support evidence-based decisions, promote transparency and accountability, and foster organisational learning within the scope of contributing to effective knowledge management. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH structures the planning, implementation and use of evaluations so that the contribution the evaluation process and the evaluation findings make to these basic functions is optimised (GIZ, 2018a). This evaluation is a final evaluation; the project that is subject to this evaluation ended on 31 December 2020. The project has been selected randomly following the guidelines of GIZ's central project evaluations (CPEs) whereby a 40% random regionally stratified sample is selected annually by GIZ's Evaluation Unit. Given the continued restrictions caused by the global COVID-19 pandemic, a remote evaluation design was followed. Exchanges, interviews and discussions were conducted remotely by an international and national evaluator between 15 and 26 March 2021.

1.2 Evaluation questions

The project is assessed on the basis of standardised evaluation criteria and questions to ensure comparability by GIZ. This is based on the Organisation for Economic Co-operation and Development (OECD)/Development Assistance Committee (DAC) evaluation criteria (updated 2020) for international cooperation and the evaluation criteria for German bilateral cooperation (in German): **relevance, coherence, efficiency**, **effectiveness**, **impact** and **sustainability**. Specific assessment dimensions and analytical questions have been derived from this framework. These form the basis for all central project evaluations in GIZ and can be found in the **evaluation matrix** (see Annex 1). In addition, contributions to the 2030 Agenda for Sustainable Development and its principles are taken into account as well as cross-cutting issues such as gender, the environment, conflict sensitivity and human rights. Also, aspects regarding the quality of implementation are included in all OECD/DAC criteria.

Table 1: Knowledge interests by main evaluation stakeholder groups

Evaluation stakeholder group	Knowledge interests in evaluation/additional evaluation questions	Relevant section in this report
GIZ	• Accountability towards the public (success rate of GIZ's projects) • Learning to understand strengths and weaknesses of individual projects, potential for replication in other countries and lessons learned in terms of GIZ's reputation in the participating countries • Informing key stakeholders who inquire about GIZ's activities in the area of renewable energy and energy efficiency in South Asia	No additional questions identified; included in all criteria

Evaluation stakeholder group	Knowledge interests in evaluation/additional evaluation questions	Relevant section in this report
BMZ	• Accountability towards the public (success rate of German development cooperation projects) • Learnings from projects in the Indian energy sector • Understanding synergies between technical cooperation and financial cooperation	Included in **relevance**, **coherence, effectiveness** and **impact** criteria
Project team	• Learning and improving to integrate lessons learned in their upcoming activities in the follow-on project • Better understanding of key stakeholder perceptions	Included in **effectiveness, impact, coherence** and **sustainability** criteria
Key project partners and the international community	• Learning when it comes to future cooperation initiatives on energy-related aspects • Informing the target group on progress made by German technical cooperation	included in **coherence**, **effectiveness, impact** and **sustainability** criteria

2 Object of the evaluation

This chapter aims to define the evaluation object, including the theory of change, and results hypotheses.

2.1 Definition of the evaluation object

The **evaluation object** is the selected technical cooperation measure – Indo-German Energy Programme: Grid Integration of Renewable Energy and Demand-side Energy Efficiency (IGEN-GEC/EE) – categorised by the project number PN: 2014.2298.9 and henceforth called 'the project'. It forms part of the **German development cooperation programme** *Förderung erneuerbarer Energien und Energieeffizienz in Indien* (promotion of renewable energy and energy efficiency in India), led by Kreditanstalt für Wiederaufbau (KfW), which incorporates both financial cooperation projects implemented by KfW and technical cooperation measures implemented by GIZ and Physikalisch-Technische Bundesanstalt (PTB). There was neither a predecessor nor a direct follow-on project.

Temporal delineation: The project ran from April 2015 to December 2020. Two components (photovoltaic (PV) rooftop (003) and energy efficiency in residential buildings (004)) were added in September 2016. A cost-neutral extension was submitted and approved, extending the duration from March 2019 to the end of December 2020.

Financial delimitation: The project was financed by BMZ. The original budget for the project was EUR 10,000,000. A change offer was submitted in 2016 to add two additional components to the project and increase the budget by EUR 7,000,000. A further EUR 1,000,000 was received in 2018. The total budget for the project was EUR 18,000,000.

Geographical delimitation: The project focused on the Republic of India and operated at both federal and state level. Most of the technical assistance was provided at federal level to institutions in Delhi. Further support was given to energy institutions in selected states. Different project components involved activities in different states. Energy Efficiency in Residential Buildings (IGEN-EE-EERB) provided technical assistance to

five states: Karnataka, Maharashtra, Uttar Pradesh, Delhi and Punjab. A total of 11 Renewable Energy Management Centres (REMCs) related to Green Energy Corridors (IGEN-GEC) were set up: one at national level, three at regional level and in the states of Tamil Nadu, Andhra Pradesh, Karnataka, Gujarat, Maharashtra, Madhya Pradesh and Rajasthan.

Political and sectoral context and framework conditions: India has a low per capita CO_2 emission, but overall, India is the third largest emitter of CO_2 (Carbon Brief, 2019). India is also one of the most vulnerable countries to the effects of climate change. Ensuring that Indian citizens have access to electricity and clean cooking has also been a key priority on the country's political agenda. According to the International Energy Agency (IEA), around 700 million people in India gained access to electricity between 2000 and 2018 (IEA, 2020). The electricity market in India started to evolve with the enactment of the Electricity Act 2003. In order to enable the electricity sector to function in a competitive market, the sector was brought under the umbrella of an Independent Regulatory Body and divided into generation, transmission and distribution segments. Markets for providing different services at competitive prices were introduced and various trading arrangements were put in place (Electrical India, 2016). The Federal Government of Germany, and on its behalf GIZ, has a long history of collaborating with India in the development of energy efficiency and renewable energy (RE) policies, programmes and capacities. For example, GIZ has played an important role in the development of several programmes run by the Bureau of Energy Efficiency (BEE) – the statutory body responsible for the implementation of energy efficiency and energy conservation activities in India.

2.2 Results model including hypotheses

Contribution analyses (following Mayne, 2011) form a cornerstone in this evaluation. A project's theory of change is central to a contribution analysis in making credible causal statements on interventions and their observable results. At GIZ, a theory of change is visualised in results models and is complemented by a narrative, including corresponding hypotheses.

The **project objective** is to improve the conditions for the grid integration of renewable energy and demand-side energy efficiency. Two activity fields with separate results models and seven outputs were pursued to achieve this objective.

Activity field 1: IGEN-GEC (002) + Photovoltaic Rooftop Thermal (PVRT) (003): Under this activity field, the national authorities and the authorities of the Union territories should be advised on how to improve market mechanisms and regulations for the feed-in of RE *and* how to design a programme and develop capacities for rooftop PV systems.

Outputs A, B and C (component 002): The specific technical assistance to be provided covered the drafting of recommendations for the design of the electricity market and the provision of inputs to the Technical Committee of the Government of India on the grid integration of RE. This should lead to a revision of regulatory grid connection rules and technical guidelines and to a revision of market mechanisms for improved grid integration of RE. Improved market mechanisms and regulations for the feed-in of RE were submitted for approval (output A). At the same time, technical assistance should lead to a strengthened ecosystem, and as a result to the creation of technical and institutional foundations for the grid integration of RE in selected federal states and regions and at national level (output B). Intensified capacity building and training on RE forecasting, scheduling and balancing, provided to specialists and executive personnel in REMCs, should lead to improved competencies of personnel in load distribution centres for the grid integration of RE (output C). Within the framework of the project, Detailed Project Reports (DPRs) were prepared for the 11 REMCs. The REMCs were established by India's Ministry of Power, utilising government funds. They are essential for predicting and regulating RE electricity supply, power plant deployment planning and load balancing between the Union territories and regional load distribution centres. If capacities are strengthened and the foundations are laid, REMCs will be fully functioning and capable of operating with a trained workforce. If the recommendations to improve market design are implemented and REMCs are functioning successfully, the conditions for the grid

integration of RE will improve. In turn, this will lead to the effective integration of RE in the Indian grid (Impact 1 in the theory of change).

Output D (component 003): The rooftop PV component aimed at capacity building on a national scale. First, existing course material should be improved, and train-the-trainer courses implemented for trainers in identified institutions. The training was intended to focus on different components for the implementation of rooftop solar PV systems and was to be provided to PV installers, inspectors of PV installations, engineers in electricity distribution companies and engineers in the state nodal agencies responsible for the development of renewable energy. Subsequently, the sector would have a larger number of trained personnel and training institutions with the required capacity. Furthermore, recommendations for the implementation of India's rooftop PV programme were to be conceptualised. To showcase the effectiveness of the proposed recommendations, it was intended to support six photovoltaic thermal (PVT) demonstration projects, and to document their achievements. Both pathways of change should then lead to improved conditions for implementing India's solar rooftop programme (output D). If this proves to be the case, the sustainability of India's rooftop solar PV programme would be strengthened and the conditions for the grid integration of solar energy would improve.

Activity field 2: IGEN-EE (001) + EERB (004): The project envisaged supporting BEE in further developing the Perform, Achieve and Trade (PAT) scheme, improving energy efficiency in residential buildings and expanding the range of available business models for demand-side energy efficiency measures.

Output E (component 001): The specific technical assistance to be provided included the further development and strengthening of the PAT scheme. Specifically, it entailed expanding the scheme to new sectors and increasing the number of designated consumers. The PAT trading mechanism was also to be further operationalised. This was intended to lead to an increase in the number of sectors and designated consumers covered by the PAT scheme and later to the laying of the foundations for expanding the PAT scheme in its second cycle (output E). The PAT mechanism for large energy users would then be expanded and strengthened.

Output F (component 001): The specific technical assistance to be provided covered the development of business models for new services and products such as smart meters and e-vehicles. In theory, this should lead to the testing of new business models in the market. Eventually, this would ensure that the state-led agency Energy Efficiency Services Limited (EESL), promoted by the Ministry of Power, would have a broader range of business models at its disposal for demand-side energy efficiency measures (output F). If this proves to be true, the energy efficiency market transformation approach would be strengthened.

Output G (component 004): The specific technical assistance to be provided to BEE was the development of the national energy efficiency standard, the development of a residential building labelling scheme, the provision of technical support for demonstration projects, the development of replicable building designs, the development of a building materials directory and the development of an adaptive thermal comfort model. This should result in the initiation of mandatory residential building energy efficiency regulations in selected states and the integration of national energy efficiency standards with existing green building rating systems. In turn, this would lead to instruments being available to improve energy efficiency in large residential buildings (output G). This is supposedly a prerequisite for the successful integration of standards and labels within the building regulations and the green building rating system, which once implemented and followed, should lead to improved conditions for demand-side energy efficiency.

Impact level: While the pathways of change develop differently for the field of RE and energy efficiency, they feed into the same overarching development results at impact level. In theory, improved conditions for the grid integration of RE and for demand-side energy efficiency contribute to an increase in the number of RE installations, improved energy efficiency and, thus, to reduced greenhouse gas (GHG) emissions (Sustainable Development Goal (SDG) 13; BMZ policy markers 'Minderung von Treibhausgasen' (reduction in greenhouse gases) and 'Umweltrelevante Vorhaben' (environmentally relevant projects); and a contribution to overall sustainable industrial growth (SDG 9) and good governance). Improvements in energy efficiency contribute directly to SDG 7, i.e. to an increase in the amount of energy saved. The four components, together with

positive outcomes induced by other technical cooperation (PTB) and financial cooperation (KfW) projects and synergies between the different projects, should therefore contribute to the development cooperation goal of making a contribution to an inclusive, technically and economically efficient, and socially and environmentally sustainable energy supply.

Additional information on the results model

System boundary: The system boundary is defined based on the scope of the project, i.e. results outside the system boundary are beyond the exclusive responsibility of the project and are affected by other factors, stakeholders and interventions. In the given project, the high degree of complementarity with the initiatives conducted by KfW, which provided the necessary financing for the Green Energy Corridor initiative, must be examined to understand the detailed scope of influence of the project at outcome and impact level (see the coherence criterion).

Unintended results: The updated results models show several unintended results, marked for differentiation in Figures 1 and 2.

Potential interactions between social, economic and environmental results: The project contributes to social, economic and environmental results with close interaction between the different dimensions. This is reflected in the project's contribution to various SDGs.

Concept updates: As mentioned before, a change offer was submitted and approved, leading to the addition of two components. The conceptual areas of work for the existing components were not changed, however.

Figure 1: Current results model (activity field 1) (October 2020), adapted during evaluation

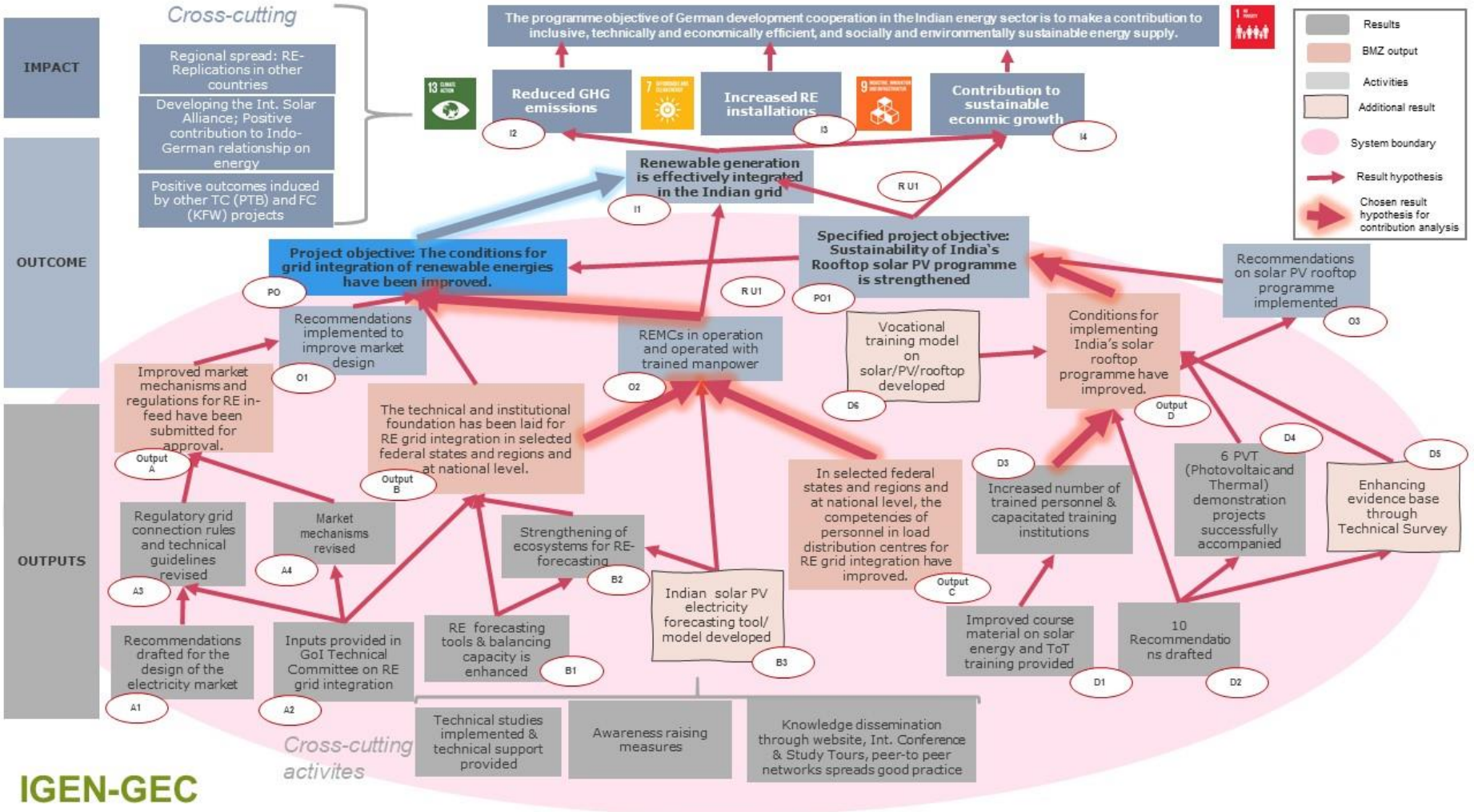
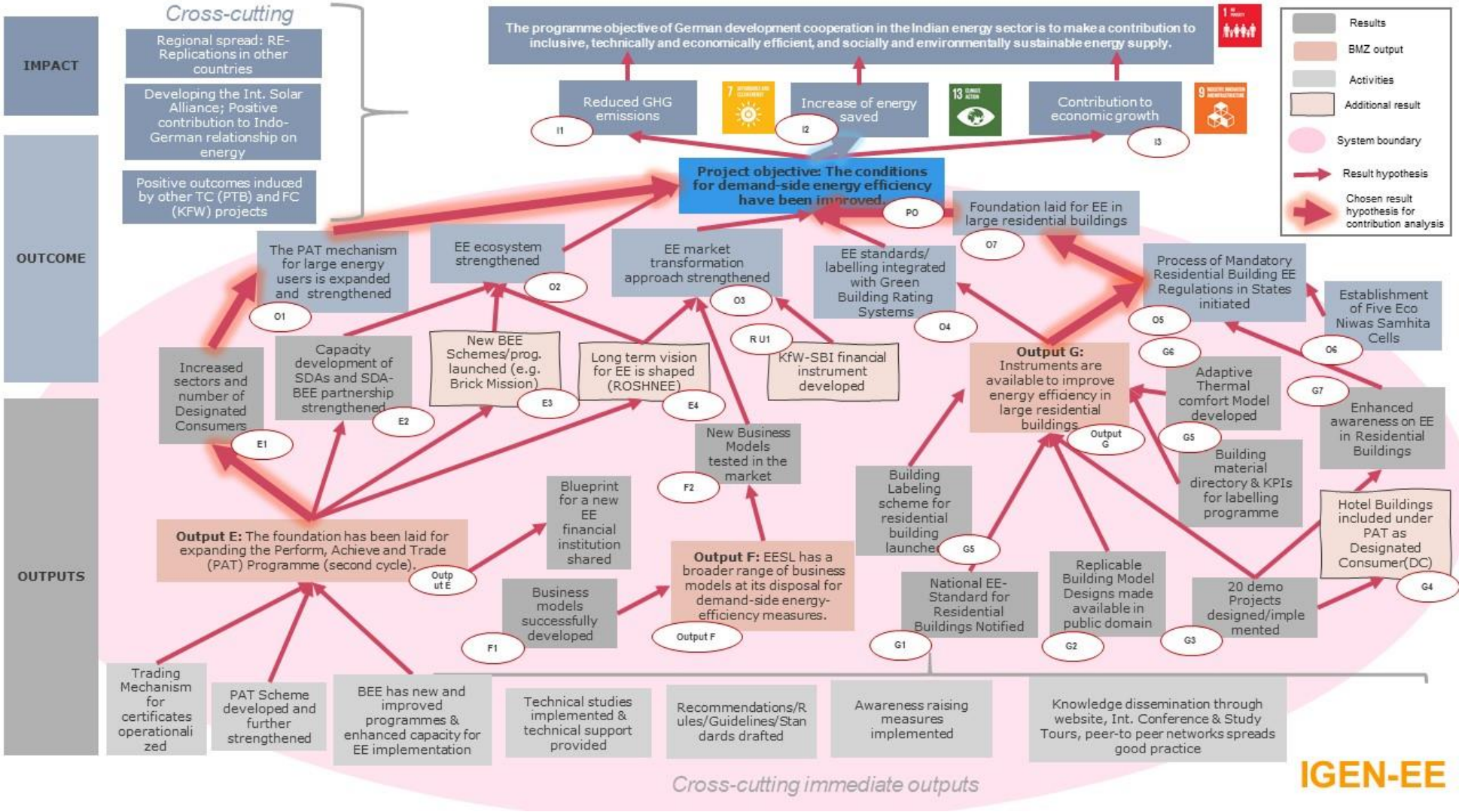


Figure 2: Current results model (activity field 2) (October 2020), adapted during evaluation



3 Evaluability and evaluation process

This chapter aims to clarify the availability and quality of data and the process of the evaluation.

3.1 Evaluability: data availability and quality

This section covers the following aspects:

- availability of essential documents,
- monitoring and baseline data including partner data, and
- secondary data.

Availability of essential documents

The project provided the evaluation team with a series of documents that formed an important data source for this evaluation. These comprise the project offer and change offer, including the project's results matrix; a map of actors; project progress reports; context, political and gender analyses; and the project's capacity development strategy. The project's results model was prepared by the evaluation team during the inception mission. All relevant project documents were made available and could be used during the evaluation mission. A complete list of documents and sources can be found in the List of References at the end of this report.

Monitoring and baseline data including partner data

To understand the monitoring system, it is important to consider the project design. The project was divided into four different components, each deploying a different team and pursuing independent activities. As a result, each component conceptualised their own monitoring system. There was no overarching monitoring and evaluation officer for the project, nor any overarching results-based monitoring, but very regular and institutionalised coordination and communication between components. During weekly core group meetings, which involved staff members from each component, information was exchanged and activities were coordinated. Each head of component monitored progress for their field of work on a regular basis and explicitly reported progress to the project director for overall BMZ reporting (Int_3 with GIZ). According to the evaluation team, this lean approach proved to be adequate and most efficient for overall project coordination. All progress reports at project and development cooperation programme level were available for the evaluation team. While they were set up differently, one element that was consistent throughout the components was that the key guiding document to monitor activities consisted of annual operating plans agreed upon with respective partners. The evaluation team had access to soft copies of these operating plans and made use of them as a data source for the evaluation. Further component-specific monitoring and evaluation documents comprise reports from third-party consultants, indicator documents that describe the indicator progress or the GIZ-internal *Wirkungsmonitor* (Results Monitor) (for one of the components). Based on the feedback received by the project, no external baseline study had been conducted prior to the start of the project (given that many baseline values were 0), but target values were discussed and set following experiences of previous GIZ initiatives in the same sector. The evaluation team used recall questions with the various partner institutions to establish before/after comparisons and understand the baseline situation. While neither the project team nor

the evaluation team had access to an established partner monitoring system[1] per se, relevant partner documents were received during the evaluation mission.

The project deliberately did not apply the KOMPASS procedure, i.e. acquire a collection of additional (qualitative) data to identify unintended results and support course corrections.

> The existing monitoring data described above were an important source of information but, in comparison to other evaluations, monitoring data could only be used to a lesser extent. The fact that there were very few project-wide monitoring processes across the four components impeded the evaluation team from using structured documents and data.

Secondary data

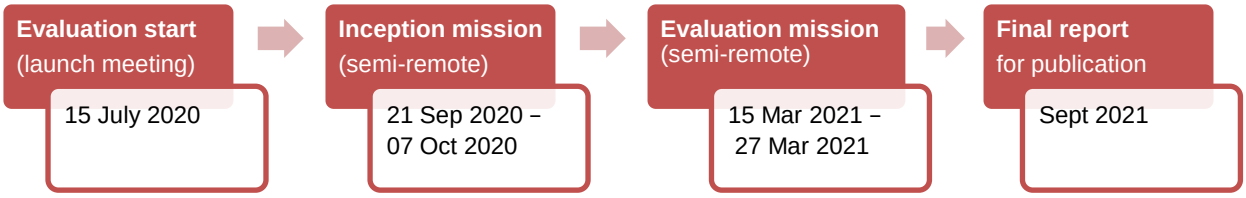
To complement primary data and the project monitoring data, secondary data sources were reviewed for consideration. The evaluation team made use of national data, e.g. the energy savings and renewable energy reports issued by the government. These reports, which deal with RE installations and energy saved through energy efficiency measures, are available publicly. There were no joint monitoring activities or sharing of data with other international implementing agencies or German development cooperation projects; joint programme reporting with KfW and PTB did take place, however.

3.2 Evaluation process

This section covers the following aspects:

- milestones of the evaluation process,
- involvement of stakeholders,
- selection of interviewees,
- data analysis process,
- roles of international and local evaluators,
- remote evaluation, and
- context and conflict sensitivity within the evaluation process.

Figure 3: Milestones of the evaluation process



Involvement of stakeholders

The involvement of various stakeholders in the evaluation is central to the CPE. It strongly determines the success of the evaluation and acceptance of the evaluation findings and recommendations. During the inception mission, the evaluation team initiated an activity with key project team members to map crucial stakeholders in the project and discuss their involvement in the evaluation. Based on this mapping exercise, relevant stakeholders (listed below) were identified. The data collection instrument applied was **key informant**

[1] Considering the broad number of partners, it was not feasible in this evaluation to assess their (potential) systems and the respective data quality in depth.

interviews conducted with project stakeholders due to the political and high-level nature of the project. Questionnaires were semi-structured.

Selection of interviewees

During interviews with team members in the inception phase, key institutional actors to be interviewed were analysed and key criteria for selecting interviewees within the project framework were identified:

- the importance of the stakeholder (key or primary),
- the value of (additional) information provided, and
- the feasibility of including them within the time frame/evaluation mission schedule.

Overall, 40 people were interviewed, including 7 members of the project team and 31 project partners.

Table 2: List of evaluation stakeholders and selected participants

Organisation/company/ target group	Overall number of persons involved in evaluation (including gender disaggregation)	No. of interview participants	No. of focus group participants	No. of workshop participants	No. of survey participants
Donors	2 (2 f)	2			
United States Agency for International Development (USAID)					
BMZ					
GIZ	8 (8 m)	7		7	
GIZ project team					
GIZ head of components and teams					
GIZ Sectoral Department					
Partner organisations (direct target group)	9 (1 f, 8 m)	9			
Bureau of Energy Efficiency (BEE)					
Ministry of New and Renewable Energy					
State Designated Agencies (SDAs) – Gujarat, Chhattisgarh, Karnataka and Uttar Pradesh					
Other stakeholders (e.g. public actors, other development projects)	10 (1 f, 9 m)	10			
National Institute of Solar Energy (NISE)					
Skill Council for Green Jobs (SCGJ)					
Central Public Works Department					
Power System Operation Corporation Ltd (POSOCO)					
Power Grid Corporation of India Limited					
National Power Training Institute					

Organisation/company/ target group	Overall number of persons involved in evaluation (including gender disaggregation)	No. of interview participants	No. of focus group participants	No. of workshop participants	No. of survey participants
Civil society and private sector actors	3 (3 m)	3			
National Real Estate Development Council					
Ashok B Lal Architects					
Confederation of Indian Industry					
Universities and think tanks	4 (1 f, 3 m)	3			
The Energy and Resources Institute, New Delhi					
Centre for Environmental Planning and Technology (CEPT) University					
Final beneficiaries/indirect target groups (sum)	4 (1 f, 3 m)	4			
PAT industry					
Builder of demo residential building project					
Note: f = female; m = male					

Data analysis process

The evaluation team consistently followed a data triangulation methodology, i.e. using two or more methods to verify findings and results and thus to increase the credibility and validity of the findings. To ensure efficient data management and analysis, the evaluation team compiled all qualitative findings from the documents and interviews by employing a qualitative data analysis software (MaxQDA®). To analyse different data sources, as per the evaluation matrix, a category system was developed for the evaluation questions. By doing so, information obtained from several data sources regarding a certain evaluation dimension could be retrieved and compared and findings could be summarised. Preliminary findings were then discussed with the project management staff during validation interviews.

Roles of international and local evaluators

The Mainlevel evaluation team consisted of one international evaluator, **Tatjana Mauthofer**, and one local evaluator, **Dr Sameer Maithel**. The division of tasks between the consultants was as follows. The international evaluator was in charge of the evaluation design, including data collection tools. She acted as the focal point for GIZ and the project team, and was responsible for implementing the inception and evaluation mission. In addition, Tatjana Mauthofer oversaw the data analysis as well as the final evaluation products. The local evaluator contributed with technical, sectoral and local expertise. Dr Sameer Maithel was in charge of coordinating the interview schedule, while virtual interviews were conducted together. In addition, Dr Sameer Maithel conducted a document review of national legislation documents, policies, frameworks and international conventions or standards related to the energy sector. A quality infrastructure designed for the evaluation mission strengthened cooperation and quality assurance. On the one hand, this was based on a close exchange between the appointed experts. Both the international and the local consultant constantly reflected

on findings and shared learning experiences. Researcher triangulation was fostered with a view to ensuring a common interpretation and analysis of the available data material. On the other hand, data quality control was performed by the lead international consultant.

Remote evaluation

The COVID-19 pandemic is affecting the way we have routinely performed our work procedures. Given that international travel restrictions and quarantine obligations continued to exist and cases in India rose significantly during the evaluation, the evaluation team conducted a remote evaluation. Discussions with the project team prior to the mission confirmed that virtual interviews could be arranged for the majority of stakeholders, even for the ministries. The evaluation team made use of a variety of collaboration and communication software, such as Microsoft Teams, to conduct these interviews.

Context and conflict sensitivity within the evaluation process

India has been ranked by BMZ as a country characterised by a certain amount of conflict and fragility. In recent years, there has been a resurgence of the Hindu-Muslim conflict, with demonstrations against the newly passed Citizenship Amendment Act and violence in the Union territory of Jammu and Kashmir as well as in regions of India’s north-eastern states (especially Assam). However, given that the project operates at the macro and meso level with a focus on the country’s capital, conflicts within the population and in specific regions do not affect the project’s operation and evaluation.

4 Assessment according to OECD/DAC criteria

4.1 Impact and sustainability of predecessor projects

The evaluation did not include a predecessor project because the evaluation object did not have a direct predecessor that followed the same set-up (four components under one umbrella). However, the IGEN-GEC/EE project emerged out of two individual projects working in the same area: a component on energy efficiency that worked at the consumer level and a component that focused on technical assistance for grid operation. According to interviewees, the experience that was gained previously during PAT cycle I in particular contributed to the effectiveness of the following cycles that took place in the course of this evaluated project by demonstrating the potential benefits of PAT cycle II and creating a higher acceptance of the current project among stakeholders (Int_1 with GIZ, Int_1 with private, Int_2 with GIZ).

4.2 Relevance

This section analyses and assesses the relevance of the project Green Energy Corridors – Grid Integration of Renewable Energy and Demand-side Energy Efficiency (IGEN-GEC/EE).

Summarising assessment and rating of relevance

Table 3: Rating of OECD/DAC criterion: relevance

Criterion	Assessment dimension	Score and rating
Relevance	Alignment with policies and priorities	30 out of 30 points
	Alignment with the needs and capacities of the beneficiaries and stakeholders	27 out of 30 points
	Appropriateness of the design	18 out of 20 points
	Adaptability – response to change	20 out of 20 points
Relevance total score and rating		Score: **95 out of 100 points** Rating: **Level 1: highly successful**

An analysis of the relevance criterion showed that the project objective corresponded to the focus area set out in the respective BMZ strategy and position papers and was very closely aligned with India's national strategies on RE and energy efficiency as well as with climate change policies, such as those that formed part of the Paris Declaration. The project is highly relevant to Agenda 2030 and makes direct contributions to SDGs 7, 9 and 13 and a cross-cutting contribution to SDG 1. The evaluation team further concluded that activities and interventions were well aligned overall with the needs of heterogeneous target groups and partners. The different components were well designed, which facilitated a straightforward execution. A common strength among the four components was the adoption of technically relevant and actionable approaches, making this one of the core strengths of the project overall. However, combining the four components in one project did not yield any specific advantages except for reporting and in fact led to additional complexity. Instead, setting up four different projects, as is currently being done in the follow-on projects, has been found to be a more suitable project set-up. Lastly, the project staff managed to adapt to changes in a suitable manner and, above all, managed to adapt their support measures according to changing external demand.

In total, the relevance of the project is rated as Level 1: highly successful, with 95 out of 100 points.

Analysis and assessment of relevance

This section analyses and assesses the relevance of the IGEN-GEC/EE project. The relevance criterion covers the following dimensions: (i) the alignment of the project design with relevant policies, priorities and strategic frameworks, (ii) the extent to which the project design matches the needs of the target groups, (iii) the relevance of the project design and results logic, and (iv) the adaptability of the project design and project activities to changes in the environment. The relevance criterion was mainly assessed through the analysis of project data. Additional strategic documents and data from stakeholders were also considered. The analysis followed the analytical questions in the evaluation matrix (see Annex 1).

Relevance dimension 1: Alignment with policies and priorities

The first dimension of the relevance criterion analyses whether the intended results of the project at outcome and impact level (according to the defined results model) are in line with political priorities, relevant strategic reference frameworks – both at national and international level – and with relevant strategies of German development cooperation published by BMZ.
With regard to relevant strategic reference frameworks, the German documents include *The BMZ's New Asia Policy – Using Asia's Dynamism* (BMZ, 2015) and in particular BMZ's goals in relation to reducing the continent's GHG emissions. BMZ also issued a worldwide strategy entitled *Sustainable Energy for Development – German Development Cooperation in the Energy Sector* (BMZ, 2014). The two action areas of this strategy – renewables and energy efficiency – are very much aligned with the project's outputs and objectives. The evaluation team thus assesses the relevance for German development cooperation as high.

The evaluation team found that the project was very well aligned with India's climate change policy, which is articulated primarily through two key documents. The first one is the National Action Plan on Climate Change adopted on 30 June 2008 (Government of India, 2008). This action plan comprises eight national missions, three of which are relevant to the project: the National Solar Mission, the National Mission on Enhanced Energy Efficiency and the National Mission on Sustainable Habitat. While the National Solar Mission is anchored within the Ministry of New and Renewable Energy, the National Mission on Enhanced Energy Efficiency is anchored within the Ministry of Power and the National Mission on Sustainable Habitat is housed within the Ministry of Housing and Urban Affairs. India also submitted its Intended Nationally Determined Commitments to the United Nations Framework Convention on Climate Change (UNFCCC) on 2 October 2015, in preparation for the Paris climate change summit (Government of India, 2015). In line with these commitments, India has pledged to improve the emission intensity of its gross domestic product (GDP) by 33–35% by 2030, i.e. below 2005 levels. The document outlining the Intended Nationally Determined Commitments lists major strategic mitigation actions, among which three actions are directly aligned with the project. These are:

- scaling up of the National Solar Mission from 20 Gigawatt (GW) to 100 GW by 2022; this aligns with components 002 and 003,
- rolling out of Green Energy Corridor projects to ensure evacuation from RE plants; this aligns with component 002 and
- launching of the Nationwide Campaign for Energy Conservation with the aim of saving 10% of current energy consumption by 2018/2019; this aligns with components 001 and 004.

This alignment was also reiterated by the Indian Government partners and the GIZ team as these ambitious goals require significant investment (Int_9 with partner orgs, Int_2 with partner orgs, Int_5 with other stakeholders, Int_3 with GIZ, Int_4 with GIZ, Int_6 with GIZ, Int_1 with GIZ).

The evaluation team found that the project was also aligned with the goals of Agenda 2030. The project intended to make direct contributions to affordable and clean energy (SDG 7) through efforts to increase the production of RE, foster innovation and build infrastructure (SDG 9) as part of the Green Energy Corridors project and generally contribute to the availability of RE to power industrial production in India. SDG 13, which relates to climate action, was intended to be addressed by efforts to reduce GHG emissions through the efficient use of energy and green technologies in industry. Indirectly, the project aimed to help alleviate poverty (SDG 1) through improved employment opportunities in the renewables sector.

Figure 4: Project contribution to the Sustainable Development Goals

Relevance dimension 1 – Alignment with policies and priorities – scores **30 out of 30 points.**

Relevance dimension 2: Alignment with the needs and capacities of the beneficiaries and stakeholders

In order to analyse the needs of the project's target groups and the benefits that they could derive, the project's main target groups were first ascertained to ensure an objective and overall assessment. These target groups and the respective activity field include the following.

- **Public partners**: This target group consisted of direct beneficiaries of the project. At national level, under activity field 1, these partners were the Ministry of New and Renewable Energy, Power System Operation Corporation Limited (POSOCO), National Institute of Solar Energy (NISE) and Skill Council for Green Jobs (SCGJ). At state level, these partners included power distribution companies (DISCOMs) and established REMCs whose needs are centred around supporting changes in national regulations and building internal capacities to forecast and integrate RE into the Indian grid. Under activity field 2, government partners at national level were BEE and the Ministry of Power. At state level, partners consisted of State Designated Agencies (SDAs) and established ENS cells (ENS = Eco-Niwas Samhita, an energy conservation building code for residential buildings), which needed further support to expand the PAT scheme and extend energy efficiency commercial building activities to the residential sector, respectively.
- **Private sector companies**: Under activity field 1, designated consumers, auditors for the PAT scheme and players in the construction sector (such as architects and developers for IGEN-EERB, energy efficiency in residential buildings) were target groups in the private sector. These actors were interested in increasing their own capacities, growing their profits from business operations through the PAT scheme or increasing sales of residential buildings. They were in need of technical assistance in monitoring outcomes and in applying energy efficiency housing standards.
- **Civil society**: Civil society was a final but indirect beneficiary of the project; it benefits from the availability of clean energy and reduced emissions.

Public partners: Under activity field 1, all members of this target group confirmed the alignment with their institutional needs. Stakeholders cited the regulatory changes and the capacity building measures provided under the Indo-German Energy Programme in the area of renewable energy (IGEN-RE) as a significant support in helping public partners at state level to further understand the changes that were necessary in grid operation to integrate renewables (Int_2 with partner orgs, Int_6 with other stakeholders, Int_8 with other stakeholders). This was also confirmed by state-level actors themselves who found the training to be relevant to their work (Int_5 with partner orgs). Nevertheless, the project also had to promote awareness of the need for its planned forecasting activity among public stakeholders until it was incorporated into the respective institutional priorities (Int_3 with GIZ). Stakeholders involved in the photovoltaic rooftop thermal component (IGEN-PVRT) largely echoed these positive assessments. The number of skilled trainers emerging from the training at SCGJ and NISE will have to be increased in the medium term if the Indian Government is able to

reach its rooftop solar objectives (Int_2 with partner orgs). As the GIZ project was not able to work on national 'quality packages', which are set curricula for specific vocational education programmes with a validity period of about three years (Int_3 with GIZ, Int_5 with other stakeholders), the project concentrated on methodological support for trainers in the rooftop solar area. Its aim was to increase the retained knowledge of participants and overall quality in the delivery of existing courses for the 'Suryamitra' programme, a skills development programme delivered by the National Institute of Solar Energy (Int_3 with GIZ, Int_5 with other stakeholders). As such, the project made use of large-scale existing vocational education programmes (Int_3 with GIZ). Stakeholders confirmed the need for upskilling, as the quality of vocational training in India is considered rather low, and for the added value of the methodological support brought to the Suryamitra programme (Int_5 with other stakeholders).

Under activity field 2, IGEN-EE (component 1, energy efficiency) public stakeholders were extremely positive about how the project responded to institutional needs and capacities. Given that the GIZ team was embedded directly in BEE offices, the ministerial staff perceived the GIZ team as colleagues who added additional capacities within the organisation to implement PAT. Further appreciation was expressed for the inclusion of ministerial staff in all steps of the implementation of the PAT scheme, while GIZ was seen as a driving force in its progress (Int_9 with partner orgs, Int_6 with partner orgs). At state level, the evaluation team received similar comments on the generally very customised approach of capacity building measures for states (see also the effectiveness criterion) (Int_3 with partner orgs). Public stakeholders involved in IGEN-EERB agreed that adding the residential housing sector to BEE's initiatives in commercial housing was a relevant addition and somewhat of a kick-start to efforts in this area for the whole sector. Locating IGEN-EERB in BEE created the potential to use synergies between commercial and residential initiatives. However, concerns were also raised about the choice of BEE to provide the necessary capacities (Int_8 with partner orgs). Nevertheless, as the project started to work with BEE, further needs were identified that required the development of additional activities (Int_6 with GIZ). At state level, stakeholders involved in the same component provided positive feedback on the close consultations with the GIZ project team regarding the planned activities. Moreover, outputs such as the draft ENS guidelines enabled the ENS cells to take further action, for example, to include energy-efficient building materials in the schedule of rates in collaboration with the Central Public Works Department (Int_4 with partner orgs, Int_1 with partner orgs).

Private sector actors: IGEN-EE consulted extensively with private sector actors as the success of the PAT scheme relies on investment in green technology and the detailed reporting of energy savings by industrial players in the PAT sectors. These designated consumers reported high levels of satisfaction with their interaction with the project team. Specifically, the industrial players were very satisfied with the normalisation process and capacity building in the pro forma reporting system. Furthermore, participation in the PAT scheme resulted in an improved economic performance at production sites, which enhanced acceptance and compliance of the scheme as it was meeting the need for production rationalisation (Int_3 with beneficiary, Int_1 with beneficiary). A supporting factor in this compliance was that the previous project that had implemented PAT cycle I had already set expectations for new industries joining in the following cycles under IGEN-EE (Int_1 with private). On the collaboration between private sector players and IGEN-EERB, interviewees reported that the project had made very important contributions that addressed their needs. Architects expressed excitement over the possibility of working with the project's thermal comfort model, and developers expressed interest in using the building labelling scheme to market their residential buildings (Int_4 with private, Int_2 with beneficiary, Int_1 with academia). At the same time, the evaluation team also found that there was still some criticism of the appropriateness of the labelling scheme in increasing marketing potential in a housing market focusing on short-term gains and price. Attempts to express this to service providers of the project were not successful and suggestions to review the labelling system were raised (Int_2 with beneficiary).

Looking at efforts to ensure gender inclusiveness, the evaluation team found that the project did attempt to increase the participation of women in capacity building measures by asking service providers and partners to nominate women as well as men (Int_2 with GIZ, Int_3 with academia). However, since the sector is largely male dominated, this proved to be quite difficult for the project, and participants were mainly men (Int_2 with

GIZ). With respect to the project's inclusiveness and consideration of marginalised/vulnerable groups' needs, especially with regard to the central promise of Agenda 2030 to 'leave no one behind', the project's tools – with their clear link to the end consumer, e.g. the building materials directory or labelling scheme – were designed in a way to also be relevant for lower-income groups (Int_6 with GIZ, Int_1 with academia). However, there was no further emphasis on the inclusion of certain marginalised groups. Nevertheless, the project team stressed that interventions in energy have the potential to have a broad-based impact on the whole Indian population (see also impact dimension 1).

Based on the findings, the evaluation team confirms the relevance of project activities and interventions and concludes that they were well aligned overall with the needs of the target groups.

Relevance dimension 2 – Alignment with the needs and capacities of the beneficiaries and stakeholders – scores **27 out of 30 points.**

Relevance dimension 3: Appropriateness of the design

The basis for the assessment of the appropriateness of the design is the revised results model (see above) as well as interviews that were conducted with the GIZ project teams and project partners (Int_2 with partner orgs, Int_6 with other stakeholders). The analysis follows the analytical questions in the evaluation matrix (see Annex 1).

The overall design of the project changed over the course of the project period. Initially, components 001 and 002 (based on previous GIZ projects) made up the structure at the design stage in 2014, while components 003 and 004 (one in each activity field of energy efficiency and RE, respectively) were added in 2016 via a change offer. This structure was perceived as an artificial conglomerate of separate projects working in different sectors within their activity fields. As a result of being in different sectors, the components also established separate implementation agreements with government partners and operated largely independently of one another (Int_2 with GIZ, Int_3 with GIZ, Int_4 with GIZ). In practice, efforts were made to gain advantages through joint reporting to BMZ, financial management, operational plans per activity field and stakeholder meetings, which resulted in some efficiency gains (see efficiency criterion) (Int_2 with GIZ, Int_3 with GIZ). Financially, all components perceived their initial budget as sufficient for their activities (Int_1 with GIZ, Int_3 with GIZ, Int_4 with GIZ, Int_6 with GIZ). Budget pressures experienced in relation to component 002 (Int_3 with GIZ) resulted from an expanded scope based on partner demands (see relevance dimension 4). Stakeholders across each component's sector appreciated the focus on technical expertise that GIZ maintained throughout the project, implementing solutions at meso level rather than concentrating only on energy policy at macro level (Int_2 with academia, Int_2 with partner orgs, Int_6 with other stakeholders, Int_2 with beneficiary). The evaluation team therefore considers the provision of technically relevant and actionable approaches as one of the core strengths of the project overall.

Looking specifically at the project's outputs under each activity field and respective component, the following conclusions can be drawn.

Activity field 1

IGEN-RE worked on activities under outputs A, B and C, focusing on the revision of grid codes in India, the establishment of REMCs to balance the Indian grid and the training of future operators of these institutions. The activities appeared to be very relevant to achieving the objective of improving the grid integration of renewables. REMCs were adequately designed and equipped with the relevant forecasting tools, while trained operators increased their capacities, especially in states where RE productivity is low. As such, the project delivered a holistic set of services to key stakeholders in grid integration and underlying hypotheses are thus considered plausible. IGEN-PVRT worked on activities under output D, focusing on enhancing the methodological approach of existing and new training programmes for rooftop solar installations and the skills of DISCOM staff in this regard. Recommendations for a faster implementation of the national rooftop solar programme were also delivered to the Ministry of New and Renewable Energy. All activities appeared to be very relevant to achieving the objective, although an analysis of the progress of the National Solar Mission to

align the supply of and demand for skilled and qualified rooftop solar workers in the Indian labour market could have been helpful. As a result, most underlying results hypotheses under this output area appear plausible.

Activity field 2

IGEN-EE worked on activities under outputs E and F, concentrating on the preparations to further expand the PAT scheme, including the normalisation process, the monitoring and verification system and the trading of energy saving certificates. New models for demand-side energy efficiency optimisation were also developed and EESL was established as an organisation for their integration into the public sector. The activities appeared to be very relevant to achieving the objective of improved energy efficiency in India. The project identified key industrial players and used a systematic approach to provide benefits while supporting climate outcomes nationally. As a result, the underlying hypotheses are considered plausible. IGEN-EERB worked on activities under output G, concentrating on the provision of support to BEE in the development of national energy efficiency standards for large residential buildings (ENS), the implementation of these standards by communal and state authorities and the development of incentive structures to encourage the use of these standards by stakeholders in the sector. Although the activities are anchored in national objectives and initiatives to improve energy efficiency in residential buildings and BEE is the main target of the component, it is not the main government partner involved in the construction of residential housing in India: residential projects are mainly conducted by the Ministry of Housing and Urban Affairs (Int_8 with partner orgs). As a result, the underlying hypotheses are considered mostly plausible.

From the evaluation team's point of view, the system boundary was well chosen and plausible. Due to the project's direct collaboration with relevant project partners and target groups (BEE, Ministry of New and Renewable Energy, state governments, industry) the project could set up activities in such a way that the intended objectives could be achieved. At the same time, because the project was embedded in the partner structures, there were dependencies on the progress made by partners towards national objectives implied in the design. This led to some unavoidable complexity and challenges during implementation (see also the effectiveness criterion for the results of such challenges).

Relevance dimension 3 – Appropriateness of the design – scores **18 out of 20 points.**

Relevance dimension 4: Adaptability – response to change

Overall, the project's ability to adapt to changes in the way cooperation took place is assessed as good, as the project was able to resolve challenges in an appropriate and timely manner and focused on maintaining the relevance to implementation partners. Changes in the following two areas exemplify this assessment across activity fields.

External demand for services: Under IGEN-EE in activity field 1, the normalisation process ensured the development cooperation-centred implementation of the PAT scheme. As Indian and international market dynamics changed over the course of the project's implementation, targets for energy saving had to be adjusted. For this purpose, technical committees were set up by BEE with support from the project to identify and prioritise factors in the process of normalisation (Int_1 with private). Under activity field 2, IGEN-RE was able to address increased demand for services leading to the establishment of REMCs; further details of this will be provided in the section dealing with the efficiency criterion. The project renegotiated consultant contracts to make this possible and allocated more resources to this area (Int_3 with GIZ, Int_2 with partner orgs). Rather than an increase in demand, the same component experienced a drop in interest when the National Institute for Wind Energy terminated the collaboration with the project after initial investments were made. In this case also, the project provided the new partnership structure with additional resources and delivered a relevant forecasting tool (Int_6 with other stakeholders, Int_3 with GIZ). Under IGEN-PVRT, the project implemented demonstration projects of solar technology based on a new request from government partners (Int_2 with partner orgs, Int_4 with GIZ). Under IGEN-EERB, in order to support the work on labelling and regulations, gaps in the existing framework were identified in consultation with BEE and the project was adapted to undertake new initiatives, for example, the creation of a building materials directory and the

development of an adaptive thermal comfort model for residential buildings (Int_1 with academia, Int_6 with GIZ).

COVID-19: Fortunately for the project, the number of COVID-19 cases in India only started to increase in the last year of implementation, which meant that the majority of crucial activities required to produce the intended results (see the section on effectiveness) had already been completed. In the case of capacity building activities, such as training for components 002, 003 and 004, the project moved to an online training environment to deliver the contents and interact with stakeholders. Component 003 also adjusted its assumptions on outreach data based on the difficult circumstances facing the in-person training that had been planned (Int_4 with GIZ). Within component 004, concerns were raised that the outreach activities conducted via online workshops and meetings for relevant stakeholders in the construction industry to raise awareness of innovative interventions – such as the building materials directory and the labelling scheme for residential buildings – would result in a decrease in overall effectiveness (Int_7 with other stakeholder, Int_8 with partner orgs).

Overall, the evaluation team concludes that the project managed to adapt to all changes in a suitable manner.

Relevance dimension 4 – Adaptability – response to change – scores **20 out of 20 points.**

Methodology for assessing relevance

Table 4: Methodology for assessing OECD/DAC criterion: relevance

Relevance: assessment dimensions	Basis for assessment	Evaluation design and empirical methods	Data quality and limitations
Alignment with policies and priorities	Relevant strategic national and international frameworks: • India's National Action Plan on Climate Change • India's Intended Nationally Determined Commitments • BMZ position paper *The BMZ's New Asia Policy – Using Asia's Dynamism* • India 2020: Energy Policy Review"	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix. **Empirical methods:** Semi-structured interviews with the political partner and other key partners; qualitative and quantitative content analysis of key documents.	No limitations identified.
Alignment with the needs and capacities of the beneficiaries and stakeholders	Direct target group: • Public partners at ministry level and corresponding sub-organisations • Private actors involved	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix. **Empirical methods:** Semi-structured interviews with target group; content analysis of project documents and interviews.	Less openness on the part of interview partners due to the remote set-up.
Appropriateness of the design*	Updated results model	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix. **Empirical methods:** Semi structured interviews with project partners and stakeholders.	No limitations identified.

Adaptability – response to change	Change offers in 2018 and 2020 Project progress reports	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix. **Empirical methods:** Key informant interviews with project team and partners. Deductive approach: Verification of identified changes and adaptations. Inductive approach: Open questions to detect additional changes and necessary adaptations.	Fewer insights into potential negative results due to the remote set-up.

* The project design encompasses the project objective and theory of change (GIZ results model, graphic illustration and narrative results hypotheses) with outputs, activities, instruments and results hypotheses as well as the implementation strategy (e.g. methodological approach, capacity development strategy, results hypotheses).

4.3 Coherence

This section analyses and assesses the coherence of the project. It is structured according to the assessment dimensions in the GIZ project **evaluation matrix** (see Annex 1).

Summarising assessment and rating of coherence

Table 5: Rating of OECD/DAC criterion: coherence

Criterion	Assessment dimension	Score and rating
Coherence	Internal Coherence	42 out of 50 points
	External Coherence	48 out of 50 points
Overall score and rating		Score: **90 out of 100 points** Rating: **Level 2: successful**

Internal coherence was fostered by the joint development cooperation programme on energy. Indeed, GIZ and KfW collaborated closely in both activity fields to provide the financing options needed for the sector through financial cooperation while providing technically sound support measures through technical cooperation. The coordinated provision of EUR 1 billion to extend the grid in India was also perceived as a significant success and investment, resulting in high visibility for German development cooperation. However, the collaboration was not without challenges, as timeliness, processes and instruments differed between the agencies. External coherence with two donor organisations was institutionalised through memorandums of understanding and joint activities were conducted to foster knowledge exchange. This collaboration was further facilitated through a joint pool of financial resources. To further promote coherence between different donor initiatives, the project's political partner and corresponding sub-institutions took a very proactive approach to divide support according to different states. No duplication in efforts could be identified.

In total, the coherence of the project is rated as Level 2: successful, with 90 out of 100 points.

Analysis and assessment of coherence

This section analyses and assesses the coherence of the Indo-German Energy Programme project in the areas of energy efficiency and renewable energy. The coherence criterion comprises two dimensions, namely (i) internal coherence, which primarily analyses the extent to which the design and implementation of the project fit with the instruments and other initiatives of German development cooperation and relevant (inter)national norms and standards, and (ii) external coherence, which looks specifically at the complementarity and coordination of the project with other donors and the joint use of structures and common systems. The coherence criterion was assessed mainly through interviews with relevant stakeholders and the project team as well as reviews of relevant documents.

Coherence dimension 1: Internal Coherence

Examining the degree to which the project design and implementation fit into the overall framework of German development cooperation, it is worth reiterating that the project is part of the German development cooperation programme *Förderung erneuerbarer Energien und Energieeffizienz in Indien*, led by KfW, which incorporates both financial cooperation projects and technical cooperation measures. As a result, the project considered the coherence of activities within German development cooperation from the design stage (Change offer, 2014). Based on evidence gained from qualitative interviews and online resources, the project experienced the following with regard to partnerships within German development cooperation.

Activity field 1 (IGEN-RE): At the design stage, KfW concessional loans with a total investment amount of up to EUR 1 billion, available within the Green Energy Corridors framework, were earmarked to expand power grids at inter-state level (Change offer, 2016). In practice, these loans were granted and are expected to improve the transmission of RE surpluses to states with lower RE production capacities. REMCs established by the project will thus be supporting the balancing of these inputs. The sheer size of the loan further strengthened the visibility of German development cooperation vis-à-vis the Indian Government and ensured the buy-in of government institutions. The financing proposed by KfW to establish the REMCs within the same component was not accepted by government partners, as they preferred to make the investment themselves (see also the section on efficiency) (Int_2 with GIZ, Int_3 with GIZ).

Activity field 2 (IGEN-EERB): GIZ and KfW jointly approached BEE to implement a financing scheme totalling EUR 250 million to incentivise the construction of energy-efficient residential buildings. GIZ, KfW and BEE held several joint meetings, but the scheme did not materialise due to disagreements on the allocation of funding. Instead, another financing scheme operated by KfW together with the State Bank of India is currently being pursued; it is expected to also help to improve the enabling environment for energy efficiency in residential buildings in India. Although the initial initiative aimed at establishing a financing scheme with BEE was unsuccessful, project staff considered that this helped to strengthen the perception of Indian stakeholders that KfW and GIZ were working in ‘tandem’, i.e. working closely together (Int_4 with GIZ, Int_6 with GIZ).

These examples show the potential and the challenges experienced by the project staff during implementation. On the one hand, there is a great need for financing in the energy efficiency and RE sectors to incentivise investment in new technologies, such as solar technology, and successful collaboration was perceived as bringing about significant changes in the enabling environment for green energy in India (Int_2 with GIZ). On the other hand, challenges remain with the development of such initiatives, as KfW area experts were not based in-country and there were differences overall in the way that instruments were designed (Int_4 with GIZ). Collaboration on technical and financial cooperation thus remained on an ad hoc basis and could be further strengthened in the future.

The intervention was designed and implemented in the wake of the Conference of the Parties 21 (CoP 21) and the Paris Agreement, which set out new targets to reduce global GHG emissions. This resulted, for instance, in greater demand from the Indian Government for further initiatives to decrease CO_2 emissions and was perceived by the project staff as a contributing factor in the increased scope of the project and the addition of components 003 and 004 (Int_6 with GIZ).

Coherence dimension 1 – Internal Coherence – scores **42 out of 50 points**.

Coherence dimension 2: External Coherence

With regard to external coherence, the project coordinated successfully overall with other donor agencies while different components established different arrangements.

Under activity field 1, IGEN-RE established a very successful collaboration with the United States Agency for International Development (USAID) and the Department for International Development (DFID)[2] and signed a memorandum of understanding to not duplicate efforts. Different partners focused on different technical areas: REMCs (GIZ), increasing the operational flexibility of coal power plants in India (Int_1) and market economics (DFID) (Int_3 with GIZ, Int_1). The collaboration extended to jointly organising two international conferences. GIZ approached USAID to collaborate on the first conference in 2017 and assisted by bringing in expert speakers from the USA (Int_1). For the second conference in 2019, GIZ and USAID started working together fully almost six to eight months prior to organising the conference, while DFID joined the team later (Int_1). Donor agencies that were interviewed expressed a high level of satisfaction with this collaboration (Int_1, Int_3 with GIZ). The international partner also suggested exploring the possibility of creating a joint budget to organise such conferences or to support studies, instead of the current arrangement of different partners supporting different parts of the work independently (Int_1).

In other components, it was the government partner that took the lead in dividing and coordinating work between the various donor agencies. In component 003, several international agencies (e.g. GIZ, World Bank, Asian Development Bank and European Union (EU)) were involved in developing capacities in the different states, which were assigned to the various agencies by the Ministry of New and Renewable Energy. GIZ was assigned five states and coordinated activities with other donors in periodic review meetings driven by the ministry (Int_4 with GIZ, Int_2 with partner orgs). In activities related to IGEN-EERB, the Swiss Agency for Development and Cooperation was involved in developing part I of the energy conservation building code for residential buildings (ENS part I) while ENS part II was developed with GIZ support, coordinated by BEE. In IGEN-EE, GIZ was the only international agency involved in supporting BEE with the PAT scheme (Int_9 with partner orgs).

Coherence dimension 2 – External Coherence – scores **48 out of 50 points.**

Methodology for assessing coherence

Table 6: Methodology for assessing OECD/DAC criterion: coherence

Coherence: assessment dimensions	Basis for assessment	Evaluation design and empirical methods	Data quality and limitations
Internal coherence	Project results matrix and results model, project progress reports, theory of change	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix. **Empirical methods:** Analysis of project monitoring data and review of relevant guidelines; semi-structured interviews with GIZ country director and project leader.	Moderate strength of evidence. Limitations: Evidence is based largely on anecdotal evidence. No interviews could be conducted with KfW and BMZ representatives in the German Embassy in New Delhi.

[2] DFID was disbanded in mid-2020 and merged with the Foreign, Commonwealth & Development Office.

Coherence: assessment dimensions	Basis for assessment	Evaluation design and empirical methods	Data quality and limitations
External coherence	Project offer, project progress reports	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix. **Empirical methods:** Qualitative content analysis of project monitoring data; semi-structured interviews with GIZ country manager, project leader and USAID.	Moderate strength of evidence. Limitations: Evidence is based largely on anecdotal evidence. No interviews could be conducted with other donors, such as the World Bank.

4.4 Effectiveness

This section analyses and assesses the effectiveness of the project. It is structured according to the assessment dimensions in the GIZ project evaluation matrix (see Annex 1).

Summarising assessment and rating of effectiveness

Table 7: Rating of OECD/DAC criterion: effectiveness

Criterion	Assessment dimension	Score and rating
Effectiveness	Achievement of the (intended) objectives	28 out of 30 points
	Contribution to achievement of objectives	27 out of 30 points
	Quality of implementation	18 out of 20 points
	Unintended results	19 out of 20 points
Overall score and rating		Score: **92 out of 100 points** Rating: **Level 1: highly successful**

The evaluation team found that the project indicators were fully achieved or over-achieved by the end of the project. Implementation of the project was very well planned and target oriented. Contribution analyses allowed for more detailed examination of the effectiveness of selected activities and corresponding pathways of change. In the area of RE, technical support in key processes, such as the compilation of detailed project reports, the development of the forecasting tool and capacity building, contributed directly to the set-up and successful operationalisation of REMCs and therefore confirmed the underlying hypothesis of IGEN-GEC (Green Energy Corridors, component 002; contribution analysis 1). Targeted support for capacity building in the solar sector contributed to both the scaling up of skills training for solar technicians and stakeholders and to the improvement in the quality of training provided (contribution analysis 2). In the area of energy efficiency (contribution analyses 3 and 4), capacity development activities were implemented effectively and mechanisms to encourage energy efficiency were successfully integrated into the PAT scheme, thus contributing directly to improved conditions overall for demand-side energy efficiency. IGEN-EERB made important and holistic contributions to laying a sound foundation for energy efficiency in large residential buildings, but the success of the labelling scheme depends largely on the respective government institution. The quality of implementation was also assessed as very positive. Key factors of success included the fact that the project team was embedded in relevant government organisations and that the project was closely aligned with partner

strategies and ongoing processes. A range of positive results, which were not planned per se beforehand, could be identified during the evaluation; no negative unintended results were identified. Additional positive results emerged due to ad hoc support measures that facilitated the implementation by Indian partners.

In total, the effectiveness of the project is rated Level 1: highly successful, with 92 out of 100 points.

Analysis and assessment of effectiveness

Effectiveness dimension 1: Achievement of the (intended) objectives

The information presented below provides an overview of the achievement of the project objective (the conditions for the grid integration of renewable energy and for demand-side energy efficiency have been improved) as measured by the indicators in the results matrix. This required a comparison of the current status and the targets of the outcome indicators. To set the basis for this assessment, indicators were examined with regard to how SMART (specific, measurable, achievable, relevant, timely) they were. Five out of six project objective indicators were assessed as SMART while one indicator was improved in terms of specificity. Another SMART indicator was slightly updated to reflect the correct name of the programme. The evaluation basis for assessing this dimension was the project's internal monitoring data and final report to BMZ, which was complemented by qualitative data that was collected through interviews and discussions with key target group and project team members.

Module objective indicators for activity field 1

Module objective indicator 1 (MOI1): One recommendation on regulatory aspects and one recommendation on new or adapted market mechanisms for the grid integration of renewable energy were adopted.

The first MOI refers to the results of activities conducted within the framework of IGEN-GEC (component 002). It measures the number of recommendations adopted on the grid integration of renewable energy through regulation of the grid and market mechanisms. According to the project monitoring data, project documents and discussions with the project team, CERC instructed POSOCO to implement the framework on forecasting for renewable energy generating stations based on wind and solar at inter-state level, which had been developed by the project (CERC, 2017; Int_3 with GIZ; GIZ PFB, 2020[3]). Prior to this, the Indian Electricity Grid Code of 2010 was amended to allow for the new framework to be implemented (CERC, 2016). The interview with the relevant implementer, POSOCO, confirmed the organisation's mandate and the implementation based on these regulatory changes. MOI1 is therefore assessed as fully achieved.

Module objective indicator 2 (MOI2): In one of the five regional power grids in India, procedures have been agreed between the federal state and regional load distribution centres on RE power supply forecasts, power station resource planning and load compensation to enable the secure operation of the grid with a high ratio of RE.

Like MOI1, MOI2 refers to the results of activities implemented within the framework of IGEN-GEC (component 002). The five regional grids that existed in India prior to 2013 are now interconnected in one national grid. However, to examine MOI2, we referred to the five 'original' regions to understand the current status. According to the project monitoring data and interviews with the project team, IGEN-GEC developed 11 detailed project reports which were used to develop one national-level, three regional-level and seven state-level REMCs. Throughout the establishment of REMCs, government partners at regional and national level worked on integrating the REMCs with different systems, in particular load distribution centres. The involvement of the Ministry of New and Renewable Energy and the Ministry of Power throughout this process and the inputs from the consultant consortium commissioned by IGEN-GEC were perceived as highly relevant and of good quality (Int_6 with other stakeholders). MOI2 is thus assessed as over-achieved.

[3] PFB = Projektfortschrittsbericht (project progress report).

Module objective indicator 3 (MOI3): Some 10,000 individuals (including planners, project managers, installers, bank staff and grid operators) received training through measures accredited by the National Council for Vocational Training or SCGJ in their respective areas of expertise related to installing rooftop solar systems.

The third MOI assesses activities implemented under IGEN-PVRT (component 003). MOI3 measures the number of targeted and relevant individuals within the area of rooftop solar energy. The project followed a train-the-trainer approach and calculated the final number of trained individuals based on assumptions about the reach of these trainers through separate training courses. The project conducted 49 direct training courses for trainers, involving 1,093 participants. For instance, DISCOMs and Suryamitra trainers were assumed to provide 4 training courses. Impact data for the project showed that further training courses reached 126 inspectors, 80 DISCOM trainers, 237 DISCOM engineers, 386 DISCOM managers, 87 Suryamitra trainers and 177 state nodal agency officers (state nodal agencies are government-designated agencies whose remit is to develop, coordinate, finance and promote research projects in the new and renewable energy field). Given the plausible assumption derived from participant surveys that DISCOM and Suryamitra trainers conducted four training courses with an average of 16 participants each, the project calculated that a total of 11,738 individuals received training from the National Council for Vocational Training or SCGJ. This is based on a reduced number of training courses for 2020 due to the COVID-19 pandemic. Given the target of 10,000 trained individuals, MOI3 is therefore assessed as over-achieved.

Module objective indicators for activity field 2

Module objective indicator 4 (MOI4): Some 70% of the large-scale designated consumers involved in the second cycle of the PAT scheme, which originated in the Energy Conservation Act of 2001, provide evidence of sufficient measures for meeting the prescribed efficiency targets.

The fourth MOI measures the share of designated consumers that are reporting their success in meeting their consumer-level targets to SDAs and BEE under IGEN-EE (component 001). This data was only available in a BEE publication and did not form part of a project progress report. According to this data, 535 out of 621 designated consumers reported energy savings that met the overall target, representing 86% of all designated consumers in PAT cycle II. MOI4 is therefore assessed as over-achieved.

Module objective indicator 5 (MOI5): EESL tested another business model for climate-friendly energy savings on the market (pilot test). The project contributed significantly to the development of this business model.

Like MOI4, MOI5 refers to the results of activities implemented under IGEN-EE (component 001). The indicator measures the number of tested business models that were implemented by EESL and that were developed with significant support from IGEN-EE. In this component, an integrated expert was placed at EESL to support the gradual development of new business models. With the project's support, business models in the areas of e-mobility, water pumps, air conditioning and fans were developed. EESL has started procurement processes for the relevant technology needed to scale up and implement activities in these areas and has generated initial interest at policy level (Int_1 with GIZ; GIZ PFB, 2020). Having therefore tested five new business models throughout IGEN-EE, MOI5 is assessed as over-achieved.

Module objective indicator 6 (MOI6): Two of the green building rating programmes operating in India have incorporated the energy efficiency standards for large residential buildings published by BEE into the criteria for awarding their green building seal of approval.

The sixth and final MOI relates to IGEN-EERB (component 004) and measures whether existing green building programmes in India have included the energy efficiency standards for large residential buildings (ENS), which were developed in close cooperation with IGEN-EERB. These standards would then become fully integrated in the decision to award the green building seal of approval. At the time of the evaluation, part II of these standards had not been published by BEE; publication was planned for April 2021. Nevertheless, ENS is approved by BEE; there are ENS cells in all Indian states to support implementation once the standards are

published and significant experience with energy efficiency standards for commercial buildings exists at regional level (Int_6 with GIZ, Int_8 with partner orgs). Given this strong basis for the implementation of ENS, it is plausible to assume that this indicator will be achieved on completion of IGEN-EERB; however, a conclusive assessment of MOI6 is not possible at this time.

Table 8: Assessed and adapted objective indicators for specific modules (outcome level)

Project's objective indicator according to the (last change) offer	**Assessment according to SMART* criteria**	**Specified objective indicator** (only if necessary for measurement or understanding)
1 recommendation on regulatory aspects and 1 recommendation on new or adapted market mechanisms for grid integration of RE have been adopted. Base value: 0 Target value: 2 Current value: 2 Achievement in %: 100%	The indicator fulfils all SMART criteria.	No adaptation necessary.
In one of the five regional power grids in India, procedures have been agreed between the federal state and regional load distribution centres on RE power supply forecasts, power station resource planning and load compensation to enable the secure operation of the grid with a high ratio of RE. Base value: 0 Target value: 1 Current value: 5 Achievement in %: 500%	Language needs to be adapted, as there are no longer regional grids, but one single grid. However, to examine the indicator, we can still refer back to the five 'original' regions to understand the current status. REMCs co-exist now with load distribution centres.	We suggest no adaptation, but instead suggest keeping in mind the changes in the sector when examining this indicator.
Some 10,000 individuals (including planners, project managers, installers, bank staff and grid operators) receive training through measures accredited by the National Council for Vocational Training or SCGJ in their respective areas of expertise related to installing rooftop solar systems. Base value: 700 Target value: 10,000 Current value: 11,738 Achievement in %: 117%	The indicator fulfils all SMART criteria.	No adaptation necessary.
Some 70% of the large-scale designated consumers involved in the second cycle of the PAT scheme, which originated in the Energy Conservation Act of 2001, provide evidence of sufficient measures for meeting the prescribed efficiency targets. Base value: 0 Target value: 70% Current value: 86% Achievement in %: 123% Source: Monitoring data for component 002 and public data	The indicator fulfils all SMART criteria.	No adaptation necessary.
EESL tested another business model for climate-friendly energy savings on the market (pilot test). Base value: 0 Target value: 1 Current value: 3	It is important to measure business models, as EESL developed many different business models in the project phase; the project made a	EESL tested another business model for climate-friendly energy savings on the market (pilot test); the project made a significant contribution to this project too.

Project's objective indicator according to the (last change) offer	**Assessment according to SMART* criteria**	**Specified objective indicator** (only if necessary for measurement or understanding)
Achievement in %: 300% Source: Monitoring data for component 004 and public data	significant contribution to the development of this model.	
Two of the building certification programmes operating in India have incorporated the energy efficiency standards for large residential buildings, published by BEE, into the criteria for awarding their green buildings seal of approval. Base value: 0 Target value: 2 Current value: Could not be assessed yet Achievement in %: Could not be assessed yet Source: Documentation for component 004 and public data	Slight adaptation of wording as name of programme has changed.	Two of the green building rating programmes operating in India have incorporated the energy efficiency standards for large residential buildings, published by BEE, into the criteria for awarding their green buildings seal of approval.
* SMART: specific, measurable, achievable, relevant and timely		

The evaluation team came to the conclusion that all five out of six project objective indicators were fully achieved by the end of the project and it is plausible to assume that one indicator will be achieved.

Effectiveness dimension 1 – Achievement of the (intended) objectives – scores **28 out of 30 points.**

Effectiveness dimension 2: Contribution to achievement of objectives

In this section, the selected results hypotheses for the contribution analysis are scrutinised to illustrate how outputs contributed to project outcomes. The hypotheses were selected together with the project team during the inception phase based on (i) their perceived significance within the overall implementation of the project, (ii) the interest of the project team and the evaluation team and (iii) the feasibility of assessing and evaluating the links, given the time frame and resources allocated to the evaluation. Following Mayne (2011), the validated results model, including risks and assumptions, guided the analysis. In collaboration with the project team, the evaluation team identified four causal links from output to objective during the inception mission. Evidence for the underlying hypotheses was then collected through interviews with project stakeholders (government staff, private sector representatives, civil society actors and research institutions). In the following, findings are compiled in a contribution story to find plausible explanations for either confirming or rejecting the chosen hypotheses. In addition, case studies to showcase and promote the potential impact of developed solutions were taken as an additional valuable source of information to assess the potential to achieve this impact. The contribution analysis begins with outputs under activity field 1 and then moves on to examine activity field 2.

Activity field 1

Table 9: Selected results hypotheses for effectiveness

Hypothesis 1 (activity – output – outcome)	Detailed technical assistance, provided in particular by the Detailed Project Reports (DPRs) and the forecasting tool, and improvements in the competencies of personnel, lead to the successful set-up and operation of functioning REMCs, operating with a trained workforce.
Main assumptions	DPRs are technically adequate, and the forecasting tool is used for load balancing.
Risks/unintended results	State authorities do not have sufficient capacity to operate REMCs.
Alternative explanation	N/A, GIZ is the only donor supporting the establishment of REMCs.
Confirmed/partly confirmed/not confirmed	Confirmed

The first hypothesis examined refers to the pathway of change beginning with activities under output B (activity field 1, IGEN-GEC). Key underlying project activities to achieve the formulated results aimed at (i) providing DPRs through a consultant consortium, which laid the foundation for the establishment of REMCs, (ii) developing a forecasting tool for the integration of energy from renewable sources, and (iii) training the operational staff of REMCs. At output level, IGEN-GEC over-achieved the two dedicated indicators by establishing seven (B.1 target value: three) operational REMCs at state level; three (B.2 target value: two) operational REMCs at regional level; and one operational REMC at national level. This over-achievement was possible due to an expansion of the services provided by the project, which was based on a specific demand by the Ministry of New and Renewable Energy and the Ministry of Power (Int_3 with GIZ, Int_2 with partner orgs).

Detailed Project Reports: The partners that were interviewed confirmed that the DPRs used to procure services for the establishment of REMCs at state, regional and national level and the methodology used by the international consultant consortium to prepare the DPRs greatly facilitated the establishment of REMCs (Int_6 with other stakeholders, Int_2 with partner orgs). While the DPRs were more than one year in development, the international consultant consortium regularly visited states and met with state and national government stakeholders directly affected by the later establishment of REMCs. Frequent communication with local stakeholders facilitated the preparation of DPRs, which were prepared in the context of each respective state's energy portfolio and requirements. Stakeholders thus assessed the technical quality as very good and relevant to their needs. In addition, respondents confirmed that the responsible ministry, the Ministry of New and Renewable Energy, was involved on a bimonthly basis with both the consultant consortium and the implementing state agencies to discuss the action plan for the establishment of REMCs. This is indicative of the strong local ownership of the process, although a prolonged tendering process for service providers to establish the REMCs delayed their launch until 2020 (Int_6 with other stakeholders, Int_3 with GIZ). Nevertheless, the DPRs contributed directly to the successful implementation of the REMCs.

Forecasting tool: Assessing the contribution of the forecasting tool for the integration of RE in the Indian grid, respondents confirmed the necessity and usefulness of the tool for the REMCs' operations as designed by the project. Stakeholders noted that forecasting and scheduling is a fundamental activity to control the grid and is essential for meeting the renewable energy targets of the Indian Government (Int_2 with partner orgs, Int_6 with other stakeholders). Currently, the forecasting tool is assisting REMCs in monitoring 72 GW in renewable energy. The design of the forecasting tool currently used by REMCs has remained unchanged from the draft submitted by the GIZ project, indicating the applicability of the tool for REMC operations. Although some inaccuracies remain in the forecasting of the renewable energy fed into the grid, stakeholders are confident that the accuracy will improve significantly as more data becomes available over the course of implementation and better weather forecasting is made available and is integrated into calculations (Int_6 with other stakeholders, Int_3 with GIZ). In summary, the forecasting tool contributed further to the successful operation of the REMCs.

Capacity development: The evaluation team also assessed the contribution that training made to the successful operation of REMCs. The interviews showed that efforts to build capacity for the staff of REMCs as well as stakeholders affected by new initiatives in the grid integration of renewable energy were assessed as effective by activity participants and organisers. Organised training included a 90-day distance learning programme with weekly sessions and in-person training courses, which were held mainly in 2018/2019. Both learners and organisers described the topics covered by the training as well as the training materials retained by the learners as highly relevant to the sector and their work. Contributions made by international renewable energy experts and research institutions were assessed as positive additions to the training. A respondent further cited concrete examples of the application of knowledge gained in the integration of solar energy and the passing on of said knowledge and materials to colleagues. The sole limitation of the training mentioned by participants and organisers was a further demand for case studies and a link to policies in India (Int_5 with partner orgs, Int_8 with other stakeholders, Int_3 with GIZ). The evaluation team thus considers the training provided by the project as effective in contributing to the successful operation of the established REMCs.

Considering this evidence, the evaluation team finds that all three activities laid a strong foundation for the set-up of REMCs, which are currently functional and in operation. The contribution hypothesis is therefore assessed as confirmed.

Table 10: Selected results hypotheses for effectiveness

Hypothesis 2 (activity – output – outcome)	Increased capacity building of training institutions, professionals and experts leads to a larger trained workforce, and thus to improved conditions. This in turn contributes to the sustainable implementation of India's rooftop solar PV programme.
Main assumptions	The training of more trainers will also lead to more training that will enable workers in the solar sector to gain the necessary skills.
Risks/unintended results	Skilled workers cannot be trained due to COVID-19.
Alternative explanation	Training providers outside of India are entering the market to provide workers with the skills needed for the solar sector.
Confirmed/partly confirmed/not confirmed	Confirmed

The second hypothesis examined refers to the pathway of change beginning with activities under output D (activity field 1, IGEN-GEC). Key underlying project activities to achieve the formulated results aimed at improving course materials on solar energy and training trainers. At output level, IGEN-PVRT over-achieved the relevant indicator by accrediting 478 trainings institutions (D.1 target value: 250).

Training the trainers: One of the key initial activities undertaken in the project was to organise a study tour for the 30 heads of state nodal agencies and 30 heads of DISCOMs (Int_4 with GIZ). DISCOMs then identified engineers who were trained to become trainers. To train the trainers, one single international tender resulted in the selection of the experienced German organisation, the Renewables Academy, which worked closely with Indian partners like SCGJ and NISE (Int_4 with GIZ).

Training trainers for the Ministry of New and Renewable Energy's Suryamitra programme was a key activity of the project. It aimed to train 50,000 employees within a period of five years (2015/2016 to 2019/2020). Interviewees commented that the project came at an appropriate time as the Suryamitra programme was in its initial stages and good quality trainers were a prerequisite for the scaling up of the initiative (Int_5 with other stakeholders). The Renewables Academy also brought with it international best practices in train-the-trainer programmes (Int_5 with other stakeholders). The biggest contribution was to train the trainers on the methodology to deliver training (Int_5 with other stakeholders). The train-the-trainers programme also introduced evaluation methods, added practical exercises and made training programmes interactive; these changes were highly valued by the trainers (Int_3 with other stakeholders).

Given this evidence, the evaluation team finds that train-the-trainer programmes contributed to both the scaling up of skills training for solar technicians and other important stakeholders (such as state nodal agencies and DISCOMs) and the improvement of the quality of training programmes. Indian partners are aware of the challenges involved in providing appropriate employment and entrepreneurship opportunities to the technicians undergoing the Suryamitra skills development programme and are taking steps to address the issue. The contribution hypothesis is therefore assessed as confirmed.

Activity field 2

Table 11: Selected results hypotheses for effectiveness

Hypothesis 3 (activity – output – outcome)	If studies (i.e. baseline studies and benchmarks for each new industrial sector) for expanding the PAT scheme are conducted, the number of sectors and designated consumers in the PAT scheme will increase and mechanisms will be strengthened, leading to improved conditions for demand-side energy efficiency.
Main assumptions	BEE will incorporate new mechanisms into processes established under PAT cycle I and the normalisation process for designated consumers is technically sound.
Risks/unintended results	Resistance of potential new designated consumers to enter the PAT scheme.
Alternative explanation	Designated consumers are investing in technology to save energy outside of the PAT scheme.
Confirmed/partly confirmed/not confirmed	Confirmed

The third hypothesis examined refers to the pathway of change beginning with activities under output E (activity field 2, IGEN-EE). Key underlying project activities to achieve the formulated results aimed at (i) increasing the number of PAT designated consumers and sectors based on technically sound consultation and capacity building, and (ii) establishing an operationalised PAT trading mechanism. At output level, IGEN-EE over-achieved indicator E.1 by expanding the PAT mechanism to 956 designated consumers in 13 sectors (E.1 target values: 800 designated consumers in 11 sectors) and achieved indicator E.2 by operationalising the PAT trading mechanism (E.2 target value: PAT trading mechanism established). This over-achievement was possible due to strong technical advice, processes established during PAT cycle I and effective implementation arrangements (discussed in the next dimension) (GIZ PFB, 2020).

The interviews confirmed that the project set up several effective channels and processes to strengthen stakeholders in terms of beneficiary participation in the PAT scheme:

Capacity building and normalisation at state and designated consumer level: Interviewees complimented the project's efforts in raising awareness of the PAT scheme and its objectives among new designated consumers. They also praised the close consultation with the designated consumers throughout the normalisation process, i.e. the setting of energy saving targets for each designated consumer and the capacity building measures that were developed for designated consumers and SDAs alike (Int_1 with beneficiary, Int_1 with private, Int_3 with partner orgs, Int_3 with beneficiary, Int_9 with partner orgs, Int_6 with partner orgs). Interviewed designated consumers attended several forums organised by GIZ and BEE to discuss their participation in the PAT scheme. They discussed potential issues and provided personal contacts to the project team for queries outside of formal meetings attended by the designated consumers (Int_3 with beneficiary, Int_1 with beneficiary, Int_1 with private). This approach of close follow-ups in between sessions was maintained for the normalisation process, resulting in adjustments to the normalisation guidelines in line with the needs of designated consumers and increased knowledge on how to use pro forma documents for reporting (Int_6 with partner orgs). This further increased acceptance of the PAT scheme among new designated consumers and added to compliance with energy saving targets and regulations later on (Int_3 with partner orgs, Int_1 with private). The improved capacities of designated consumers to attend to the technical challenges of reporting

energy efficiency further translated into an improvement in the reporting process at SDAs, and stakeholders expressed confidence in their ability to conduct the state-level reporting and interact with designated consumers (Int_3 with partner orgs, Int_1 with private). A limiting factor, however, remains the number of staff available to SDAs to conduct the PAT scheme in their state, resulting in varying performance between states (Int_3 with beneficiary, Int_1 with private, Int_6 with partner orgs, Int_1 with GIZ).

Auditing: Interviewees also highlighted the significance and positive impact that the implementation of the auditing process at designated consumer level had on PAT cycle II (Int_1 with beneficiary, Int_3 with partner orgs, Int_1 with private). Interviewees reported that the quality of energy audits, which are conducted every three years at designated consumer level, improved over time between PAT cycle I and cycle II because of close handholding by the project and BEE (Int_1 with private, Int_1 with beneficiary). In addition, verification studies were conducted in sample industries, adding to the stringent implementation of the PAT scheme (Int_1 with private). Moreover, designated consumers appreciated the audits as a source for creating action plans for additional investments in energy efficiency to build on past successes (Int_1 with beneficiary, Int_3 with beneficiary). The capacity building measures for SDAs mentioned above also contributed to developing at least a few technical professionals in each state and led to a deeper understanding of the auditing reports among states (Int_3 with partner orgs). However, one interviewee noted that the quality of audits could be improved even further by ensuring that all consultants participating in the audit from one company have similarly good qualifications (Int_1 with beneficiary).

Trading mechanism: The interview partners confirmed that the trading system, which was established under cycle I of the PAT scheme remained operational under PAT cycle II (Int_1 with GIZ). At the time of the evaluation, e-certificates for cycle II had not yet been issued and trading had not started, so the contribution analysis refers to past experiences of stakeholders to determine the plausibility of current findings. Under cycle I, the trading volume was Rs 100 crore (almost EUR 11.5 million), which indicates that the mechanism is functioning (Int_1 with GIZ). SDAs also worked with new designated consumers to train them up on the trading process; this took place in four training sessions per year. This training included registering the designated consumers on the Indian Energy Exchange (India's premier energy marketplace/power exchange) and resulted in a general awareness of the process among the designated consumers (Int_3 with partner orgs, Int_3 with beneficiary, Int_1 with beneficiary). This indicates a generally strong foundation for trading under cycle II. Nevertheless, stakeholders also noted that there was potential to improve the mechanism in terms of timeliness and the pricing of e-certificates: delays in the reporting of targets resulted in delays in the start of trading (Int_1 with private, Int_1 with beneficiary). Moreover, prices in cycle I were considered lower than expected by designated consumers, which resulted in some hesitation on the part of the designated consumers that were interviewed to trade certificates in cycle II (Int_1 with private, Int_3 with beneficiary). At the same time, BEE is working to broaden the trading market, and reporting of targets is now done through an online survey, which interviewees felt can increase the mechanism's potential (Int_1 with private, Int_1 with GIZ).

Given this evidence, the evaluation team finds that all capacity development activities have been effectively implemented and mechanisms to encourage energy efficiency have been successfully integrated into the PAT scheme. Consequently, output E has been over-achieved and there has been an overall improvement in demand-side energy efficiency. Although there is room for improvement in the trading mechanism (which is an evolving mechanism), there is an initiative to tackle these issues and trading is still expected to be significant due to more designated consumers and additional sectors. The contribution hypothesis is therefore assessed as confirmed.

Table 12: Selected results hypotheses for effectiveness

Hypothesis 4 (activity – output – outcome)	If instruments such as the building labelling scheme are available, the process of introducing mandatory energy efficiency regulations for residential buildings in states can be initiated. This will lead to the establishment of a solid foundation for energy efficiency in large residential buildings and thus to the project objective of improving conditions for demand-side energy efficiency.
Main assumptions	States are going to make energy efficiency regulations for large residential buildings mandatory.
Risks/unintended results	The building labelling scheme does not align with the interests of private sector players in the construction industry and remains voluntary.
Alternative explanation	Private sector actors in the construction industry are investing in energy efficiency without further incentives and regulation.
Confirmed/partly confirmed/not confirmed	Confirmed

The fourth hypothesis examined refers to the pathway of change beginning with activities under output G (activity field 2, IGEN-EE). Key underlying project activities to achieve the formulated results aimed at (i) creating a labelling scheme for residential buildings, (ii) publishing a national standard for residential buildings, (iii) initiating the process of mandatory energy efficiency regulations for residential buildings in states, (iv) supporting labelling and regulations, e.g. a building materials directory and replicable building designs. At output level, IGEN-EE has partly achieved indicator G.1 with BEE's publication of the ENS. Part I of the ENS was published in 2018; Part II has been completed and accepted by BEE but is awaiting formal publication by BEE. Indicator G.2 was also partially achieved, as three or four states initiated a process for the mandatory introduction (launch) of the national energy efficiency standard for large residential buildings but did not complete this process. The interviews confirmed that the GIZ project made important contributions in laying the foundation for energy efficiency in large residential buildings in India.

Building labelling: The interviewees were of the view that the voluntary energy label for residential buildings is a very good concept and could be useful for creating a market for energy-efficient housing and for the real estate industry (Int_1 with academia, Int_7 with other stakeholders, Int_2 with beneficiary, Int_4 with partner orgs). The labelling scheme has been launched, but would require top level political support for its operationalisation (Int_6 with GIZ). Interviewees provided several suggestions for the further development of the labelling scheme as some risks remain in relation to its sustainability. The suggestions included (i) implementing the scheme through specialised agencies outside of BEE (Int_1 with academia, Int_2 with academia), (ii) providing incentives to builders and developers to adopt the labelling system (Int_7 with other stakeholders), (iii) introducing robust processes to implement the scheme (Int_2 with beneficiary), and (iv) making the ENS requirement mandatory for labelling (Int_1 with academia, Int_2 with beneficiary).

National standard for residential buildings: The national residential energy efficiency code, ENS, consists of two parts. Part I was developed by BEE in collaboration with the Swiss Agency for Development and Cooperation and was launched in 2018. GIZ technical support focused mainly on the development of part II of the national standard. This work was completed and the standard was submitted to BEE; it is likely to be launched in March/April 2021 (Int_6 with GIZ).

Mandatory energy efficiency regulations for residential buildings in states: The interviewees confirmed that the process of introducing mandatory energy efficiency regulations for residential buildings has been initiated in states. The state of Karnataka has drafted the ENS code for the state along with draft rules (Int_1 with partner orgs). The state of Uttar Pradesh is also working on launching the ENS in the state (Int_4 with partner orgs). However, it was pointed out that the process of launching in the various states could be accelerated if

residential buildings came under the Essential Commodities Act (Int_1 with partner orgs, Int_4 with partner orgs).

Activities to support labelling and regulations: The project supported other activities to fill the gap in the existing framework for the implementation of labelling and building regulations. This includes a building materials directory, replicable building designs and an adaptive thermal comfort study. Interviewees were reasonably impressed by the ability of the GIZ project to identify these gaps and initiate studies (Int_1 with academia). A large amount of very useful technical work was undertaken and the reports and outputs of these studies were submitted to BEE but are yet to be made public.

Given this evidence, the evaluation team finds that the project has made important contributions in laying a solid foundation for energy efficiency in large residential buildings and the contribution hypothesis is confirmed, although some uncertainties remain in relation to future implementation.

Effectiveness dimension 2 – Contribution to achievement of objectives – scores **27 out of 30 points.**

Effectiveness dimension 3: Quality of implementation

This dimension assesses the quality of implementation in the sense of team set-up/leadership/collaboration in the team and collaboration with partners. In contrast to the other dimensions, the analysis is not separated into activity fields, as implementation arrangements were similar across activity fields.

GIZ team set-up: All interviewed government partners worked closely with GIZ team members embedded in the relevant ministries (as was the case for the components in activity field 2) or with GIZ team members situated in separate offices who complemented the expertise and relevant skill profiles of the government partners (as was the case in activity field 1) (Int_9 with partner orgs, Int_8 with partner orgs, Int_6 with partner orgs, Int_2 with partner orgs). Due to the high level of involvement of the project teams directly with final beneficiaries, similar views were echoed by the relevant sector stakeholders (Int_3 with partner orgs, Int_2 with beneficiary). The GIZ team also considered that the available resources, including staff on the individual component teams, were capable of achieving the project objectives despite a wider scope of implementation based on government partner demand in IGEN-RE (Int_2 with GIZ, Int_6 with GIZ, Int_3 with GIZ). IGEN-RE also faced a brief period of uncertain leadership in the start-up phase, which was addressed by sharing leadership staff from IGEN-EE (Int_2 with GIZ, Int_3 with GIZ). Further complementarities were sought in the outreach to project stakeholders, and regular exchanges were conducted between project teams to coordinate operational plans within their respective activity fields (Int_2 with GIZ). Isolated challenges in the implementation of objectives were experienced mainly in the collaboration with contracted service providers. These were addressed in a timely manner and with additional efforts by the GIZ teams (Int_2 with GIZ, Int_3 with GIZ).

Collaboration of partners: Based on the alignment with national strategic objectives and effective consultations with partners described in the criteria and dimensions above, government partners overall showed political will and a high level of involvement and ownership in all components (Int_2 with GIZ, Int_1 with GIZ, Int_3 with GIZ, Int_4 with GIZ, Int_6 with GIZ). Selected examples include:

- IGEN- EE: BEE and GIZ collaborated closely on the capacity development of SDAs and designated consumers while BEE allocated resources to its own activities (Int_2 with GIZ, Int_1 with GIZ).
- IGEN-RE: The Ministry of New and Renewable Energy was in close contact with states and the consultant consortium to ensure quality in the establishment of REMCs and insisted on financing this activity (Int_6 with other stakeholders, Int_3 with partner orgs, Int_3 with GIZ, Int_2 with GIZ).
- IGEN-PVT: The Ministry of New and Renewable Energy provided and coordinated the inputs for demonstration sites with the project (Int_4 with GIZ, Int_2 with partner orgs).

- IGEN-EERB: BEE communicated with the GIZ team and other stakeholders on ways to adapt the labelling scheme in technical committee sessions (Int_6 with GIZ, Int_1 with private, Int_2 with partner orgs).

Due to this high level of involvement and the high number of activities conducted through government partners, the project was also subject to the internal processes of the partners, which caused some delays, in particular due to prolonged procurement processes (Int_3 with GIZ, Int_1 with private, Int_6 with GIZ). However, given the project's performance regarding the achievement of targets, the evaluation team assumes that such delays were not detrimental to reaching the project objective overall.

Effectiveness dimension 3 – Quality of implementation – scores **18 out of 20 points.**

Effectiveness dimension 4: Unintended results

The evaluation team found that throughout the implementation, the project yielded some positive unintended results. These results highlighted the role that the project played in (i) incentivising Indian stakeholders to invest in energy-efficient technology and (ii) initiating and strengthening a national conversation on green energy subjects among stakeholders (Int_1 with beneficiary, Int_3 with beneficiary, Int_8 with other stakeholders, Int_5 with other stakeholders, Int_3 with other stakeholders).

- IGEN-RE (activity field 1): The online training on grid integration for system operators resonated well with participants and the implementing agency. As a result, the responsible implementing agency is looking to further scale up training on grid integration and develop a structured training programme with certification for a wider national, and potentially international, audience. Although no concrete action plan exists yet, this was an unintended intention produced directly by the project's intervention (Int_8 with other stakeholders).
- IGEN-PVRT (activity field 1): The project's intervention in providing methodological support for the train-the-trainer approaches taken by local training institutions SCGJ and NISE was scaled up to include train-the-trainer programmes run by SCGJ and NISE in partnership with other institutions and a review of additional curricula on the methodologies that had been introduced. This effort includes additional external partners of these institutions such as the International Solar Alliance (Int_8 with other stakeholders, Int_5 with other stakeholders).
- IGEN-EE (activity field 2): The auditing system used for reporting progress on energy-saving targets was appreciated by designated consumers as a source of knowledge for investing in more green technology. Stakeholders described how, prior to the PAT scheme, there was less information available about best practices in energy efficiency and investments made by potential competitors in the same sector. Now, based on the recommendations and action plans provided by auditors referring to best practices implemented by other designated consumers, an indirect exchange has been achieved between designated consumers. BEE's publication of best practices in the same area was also regarded as a valuable addition to the PAT scheme (Int_3 with beneficiary, Int_1 with beneficiary).

No negative unintended results could be identified by the evaluation team. Unintended results were not structurally monitored or documented, but weekly exchange sessions between heads of components facilitated close exchange and discussion of potential risks or new opportunities.

Effectiveness dimension 4 – Unintended results – scores **19 out of 20 points.**

Photo 1: Wind energy production in India

Methodology for assessing effectiveness

Table 13: Methodology for assessing OECD/DAC criterion: effectiveness

Effectiveness: assessment dimensions	Basis for assessment	Evaluation design and empirical methods	Data quality and limitations
Achievement of the (intended) objectives	Project monitoring data Perception of key partners, perception of project team members Progress reports	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix (see Annex 1). **Empirical methods:** Interviews, review of monitoring data, document analysis	Good evidence strength. Limitations: No overarching project monitoring system.
Contribution to achievement of objectives	Examination of hypotheses 1-4 from output to outcome level identified during inception mission	**Evaluation design:** Contribution analysis **Empirical methods:** Interviews, analysis of monitoring data, document analysis	Good evidence strength. Limitations: No overarching project monitoring system.
Quality of implementation	Team set-up, leadership, collaboration in the team, work culture, collaboration with partners	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix (see Annex 1) **Empirical methods:** Semi-structured interviews with key stakeholders (project team management, team members, key partners)	No limitations identified.

Effectiveness: assessment dimensions	Basis for assessment	Evaluation design and empirical methods	Data quality and limitations
Unintended results	Additional results that were identified during the inception mission were further verified; a deductive and inductive approach was followed when collecting data	**Evaluation design:** Most Significant Change technique **Empirical methods:** Interviews with project team and stakeholders Validation interviews with project team	Moderate evidence strength. Limitations: Due to remote set-up, some contextual factors might be missed and negative results are harder to identify.

4.5 Impact

This section analyses and assesses the impact of the project. It is structured according to the assessment dimensions in the GIZ project evaluation matrix (see Annex 1).

Summarising assessment and rating of impact

Table 14: Rating of OECD/DAC criterion: impact

Criterion	Assessment dimension	Score and rating
Impact	Higher-level (intended) development changes/results	30 out of 30 points
	Contribution to higher-level (intended) development results/changes	38 out of 40 points
	Contribution to higher-level (unintended) development results/changes	30 out of 30 points
Impact score and rating		Score: **98 out of 100 points** Rating: **Level 1: highly successful**

Promising overarching results on SDGs 7 and 13, energy saving and GHG emissions, could already be achieved by the Indian state. Energy-saving targets were achieved through the completion of the PAT scheme cycles, to which IGEN-EE directly contributed. The implementation of the building label, provided that there is continued political willingness, has great potential to yield further savings, but no actual impact could be assessed at the time of writing. The support of REMCs facilitated a technically sound increase in the share of renewables in the country's energy mix and recommendations on rooftop PV have the potential to integrate solar energy more effectively. Given the cross-cutting nature of the project and its broad-based impact on end-users, a contribution to the alleviation of poverty (SDG 1) can be expected. Contribution analyses examined these developments more closely and concluded that (i) the project made a direct and very significant contribution to the successful implementation of PAT cycle II, (ii) IGEN-RE provided specific support measures to improve legal and technical conditions for better grid integration. Limitations could only be seen in terms of the current capacities, as there are variations between states. Lastly, the evaluation revealed significant unintended positive results at impact level, in particular with regard to the competitiveness of designated consumers and in terms of knowledge sharing at an international level.

In total, the impact of the project is rated Level 1: highly successful, with 98 out of 100 points.

Analysis and assessment of impact

The evaluation team also conducted a contribution analysis to assess the impact criterion. Potential contributions of the project were identified during the evaluation despite several limitations. For instance, as several activities, such as the establishment of REMCs and the publication of the building labelling scheme, had either been completed in the final months of the project or concrete impact data was still pending, the impact analysis had to make plausible assumptions based on expected impacts. In this regard, the evaluation team followed a similar methodological basis as for the assessment of the effectiveness criterion and conducted a contribution analysis. As a basis, the situation prior to the involvement of GIZ was discussed and the evaluators asked all key project partners what would have happened without the project. Impact dimensions 1 and 2 will be considered jointly, as the contribution analyses in the second dimensions specifically illustrate the project's pathways of change from outcome to impact level.

Impact dimension 1: Higher-level (intended) development changes/results

During the reconstruction of the results model, overarching development results to which the project intended to contribute were identified (in accordance with the project proposal). These are shown in the results model. At a higher outcome/impact level, the results identified comprise contributions to an increase in the energy saved and the integration of renewable energy (SDG 7); to reduced GHG emissions (SDG 13); to overall sustainable economic growth (SDG 9); and to the reduction of poverty (SDG 1). The effects that could be observed empirically during the evaluation (evidence-based contributions) and the potential that is seen for future contributions at impact level based on the given findings (plausible contributions) will be scrutinised in the following paragraphs.

SDG 7 – Increase in energy saved/integration of renewables into grid: Under activity field 1, the Indian Government plans to integrate 175 GW of renewable energy into the Indian grid by 2022. This will require the regulation of generators to deal with varying input and demand for renewable energy through forecasting and solid institutions (Int_2 with partner orgs, Int_6 with other stakeholders; IEA, 2020). Regarding the integration of solar energy specifically, the production of solar power increased by 44% year-on-year in the period between 2012 and 2016. In efforts to accelerate this growth, the Indian Government set a target of 100 GW of solar power by 2022. This includes a target of 40 GW of rooftop solar PV (IEA, 2020). Although this goal is not likely to be met, given that India had 32.5 GW of installed solar capacity in 2019 (Int_2 with partner orgs; GIZ PFB, 2020; IEA, 2020), the official announcement by the Ministry of New and Renewable Energy to tender 25-30 GW annually indicates an increasing demand for skilled workers to install photovoltaic thermal systems (Int_2 with partner orgs, Int_4 with GIZ). IGEN-PVRT is thus laying the ground to facilitate the expansion of solar production capacity (Int_2 with partner orgs, Int_3 with GIZ, Int_5 with other stakeholders).

Under activity field 2, the BEE report on the impact of energy efficiency measures for the year 2018/2019 provides conclusive evidence of energy savings made under the PAT scheme implemented by IGEN-EE. These savings are illustrated in the table below:

Table 15: Energy savings across PAT cycles II to IV *(Source:* Government of India, 2020).

PAT cycle	Number of PAT designated consumers analysed	Estimated energy savings for complete PAT cycle	Energy savings achieved by FY 2018/2019 (Mtoe)
II	535	12.85	12.85
III	116	1.06 (estimated)	0.64 (estimated)
IV	109	0.7 (estimated)	0.21 (estimated)
Total	760	14.61	13.7

The table indicates that the total energy savings achieved through the PAT scheme cycles II to IV by the Indian financial year (FY) 2018/2019 was 13.7 million tonnes of oil equivalent (Mtoe), while the three completed PAT cycles combined are expected to achieve energy savings of 14.61 Mtoe. It is worth noting that while the numbers for PAT cycle II are based on numbers reported by designated consumers, the numbers for cycles III and IV are estimated. Focusing on PAT cycle II, which was completed in the period under review, the 535 designated consumers analysed that submitted reporting data had a combined target of 11.05 Mtoe in energy savings. The energy saving target for cycle II was thus surpassed by 16% (Government of India, 2020). According to the same report, the labelling scheme developed for residential buildings is estimated to save 388 billion units (1 billion units is equal to 1 terawatt hour) in energy by 2030 with an expected steady increase from 0.9 billion units in the Indian FY 2019/2020 to 90.5 billion units in FY 2029/2030. Given that the labelling scheme is yet to be operationalised, if the government is willing do so, and there is still work to be done to ensure that the intervention is sustainable (see the sustainability criterion) (Int_1 with academia, Int_6 with GIZ), these numbers may need to be readjusted. Nevertheless, the evaluation team considers these estimates to be a plausible indication of the building labelling scheme's potential for saving energy.

SDG 13 – Reduced greenhouse gas emissions: Under activity field 1, the carbon intensity of the power sector in India has declined by over 10% since 2010; one of the reasons for this is an increase in the share of renewables in the country's energy mix. Current projections estimate an increase in this share 'from the current 18% to 45% in 2040' (IEA, 2020, p. 64) given the current policies in place. IGEN-PVRT developed 10 recommendations to ensure that this expansion process would be speeded up in the solar sector and that quality rooftop installations would be provided by stakeholders in the sector; this resulted in the Ministry of New and Renewable Energy revising the way in which it promoted rooftop solar energy (GIZ PFB, 2020; Int_4 with GIZ). IGEN-RE's interventions in facilitating the integration of renewables also aimed at helping to reduce potential GHGs based on the increased use of RE.

Under activity field 2, the energy savings made in each PAT scheme cycle translated into direct reductions in CO_2 emissions of a total of 61.92 million tons of carbon dioxide ($MtCO_2$) over three cycles (Government of India, 2020) as visualised in the table below:

Table 16: Reductions in CO_2 emissions across PAT cycles II to IV

PAT cycle	Reductions in CO_2 emissions by FY 2018/2019 ($MtCO_2$)
II	58.3
III	2.86 (estimated)
IV	0.76 (estimated)
Total	61.92

SDG 9 – Sustainable industrial growth: The potential impact on sustainable industrial growth during and beyond the project implementation period needs to be considered against the background of rising energy demand of about 7% per year since 2010 in a growing and increasingly wealthy Indian economy with a gross domestic product (GDP) growth rate of 6.8% year-on-year in the same period (IEA, 2020). Under activity field 1, the forecasting tool is a particularly important instrument in ensuring that Indian industries are making the necessary investments to ensure sustainable production in relation to energy sources. Based on forecasting, industrial players can be sanctioned for not adhering to pre-set targets, potentially ensuring a higher consumption of renewables once inaccuracies in the forecasting decrease over time (Int_2 with partner orgs, Int_6 with other stakeholders). In addition, accurate forecasting is expected to also reduce balancing costs for the Indian grid (IEA, 2020). Activities conducted in activity fields 1 and 2 to bring industries into the PAT scheme and sensitise state governments to the need to integrate renewables more effectively into the national grid have created awareness among industrial players around the issue of sustainable production using

renewable technologies and incentives to streamline energy efficiency across internal departments (Int_2 with partner orgs, Int_6 with other stakeholders, Int_1 with GIZ, Int_3 with beneficiary, Int_1 with beneficiary).

SDG 1 – Reduction in poverty: Under activity field 1, given the cross-cutting nature and broad-based impact of energy on end-users and the electrification of 99.9% of villages in India (Central Statistics Office, 2019), it is plausible to assume that an increase in energy supply from renewable sources based on the grid integration of RE will result in the provision of a more sustainable and climate-friendly supply for Indian end-users (Int_2 with GIZ, Int_3 with GIZ). The training and qualification of participants on the Suryamitra programme also has the potential to help improve opportunities for skilled Indian workers, enabling them to find employment in the field of solar energy. The first steps have been taken by including a requirement for 'graduates' of the Suryamitra programme to be employed at a minimum wage in tenders issued by Indian developers (Int_4 with GIZ, Int_2 with partner orgs). Activities conducted under activity field 2 also show consideration of the broad-based impacts on the Indian population: IGEN-EERB's building materials directory, aimed at promoting more sustainable residential housing, can be applied to housing solutions at most income levels in India and the labelling system has the potential to create broad-based consumer awareness of energy-efficient housing, based on positive experiences with the appliance star rating system in India (Int_6 with GIZ, Int_1 with academia, Int_3 with academia, Int_2 with beneficiary).

Based on the significant immediate and expected contributions to GHG reductions, the expected broad-based impacts on the Indian population due to investment in national infrastructure and the initial signs of greater awareness of energy-efficient technologies, the evaluation team assesses higher-level results of the project as highly successful within the given time frame and scope defined by the project design and context.

Impact dimension 1 – Higher-level (intended) development changes/results – scores **30 out of 30 points.**

Impact dimension 2: Contribution to higher-level (intended) development results/changes

As in the case of the effectiveness criterion, a contribution analysis was conducted to understand perceptions of (potential) contributions to overarching results. Key data sources were the GIZ management and team, as well as the political partners and private sector partners. Two hypotheses from the results model were examined in more detail to explain causal relationships between project outcomes and impacts.

Table 17: Selected results hypotheses for impact

Results Hypothesis 1 (outcome – impact)	If conditions for demand-side energy efficiency are improved, an increase in energy saved can be evidenced.
Main assumption	An improvement in conditions will immediately translate into energy savings.
Risks	Stakeholders do not have the capacity to act on improved conditions.
Alternative explanation	N/A
Confirmed/partly confirmed/not confirmed	Confirmed

Hypothesis 1, examined at impact level, describes the contribution made by IGEN-EE from outcome to impact. To examine this hypothesis, two areas of contributions were considered: firstly, the regulatory environment for energy efficiency in India prior to and after the project and, secondly, the capacity to implement energy efficiency measures and their potential beyond the project's duration as perceived by interviewees.

Regulatory environment: The regulatory environment and the scope of the PAT scheme were strengthened and widened between 2015 and 2020. PAT cycle I, which ended in 2015, covered 478 designated consumers in 8 sectors. By 31 March 2020, BEE had rolled out 6 PAT cycles; the number of designated consumers had increased to 1,073 and the number of sectors had increased to 13 (Int_9 with partner orgs). The trading of energy saving certificates is now operational. An online PATNet portal through which designated consumers

can be issued with/are entitled to purchase the certificates electronically is up and running, while the Central Electricity Regulatory Commission (CERC) is the market regulator for trading energy saving certificates and POSOCO is the registry for the certificates (Int_9 with partner orgs). As far as the regulatory environment for energy-efficient residential buildings (EERB) is concerned, no regulations existed in 2015. Part II of ENS, developed with GIZ's support and covering standards for electro-mechanical systems, has gone through technical appraisals and has been submitted to BEE (Int_9 with partner orgs). BEE is also proposing an amendment to the Energy Conservation Act, to bring residential buildings under its purview (Int_8 with partner orgs). If ENS and building labelling is implemented, large savings of 125 billion units and 388 billion units, respectively, are projected by 2030. However, several interviewees pointed out that greater political support, proper institutional arrangements (preferably outside BEE) and improvements in the technical content and process would be needed for the implementation of building labelling (Int_6 with GIZ, Int_4 with private, Int_2 with beneficiary, Int_2 with academia, Int_1 with academia).

Technical capacities: The human and institutional capacities to implement energy efficiency programmes have increased substantially since 2015. Increasing the capacity of state nodal agencies, enabling them to support the PAT scheme, and GIZ's interventions in other aspects helped to increase capacities at state level, facilitating the implementation of PAT (Int_1 with GIZ, Int_1 with beneficiary, Int_3 with partner orgs). The capacities of industries to implement energy efficiency activities has increased as they now employ accredited energy auditors and managers; regular training programmes and peer-to-peer learning have also supported designated consumers (Int_3 with beneficiary, Int_1 with beneficiary). The quality of the energy auditors has improved as a result of project measures (Int_1 with beneficiary). One of the biggest contributions made by the IGEN-EERB project has been to create an awareness among businesses and building professionals on the supply side (e.g. architects, engineers, government officials). The GIZ project established ENS cells in five states, thus providing the states with the necessary capacity to implement energy efficiency in residential buildings; BEE now supports such cells in all the states.

Given the above evidence, the evaluation team considers impact hypothesis 2 as confirmed.

Table 18: Selected results hypotheses for impact

Results Hypothesis 2 (outcome – impact)	If (technical and legal) conditions for the grid integration of renewable energy have improved, renewable energy is effectively integrated in the Indian grid.
Main assumption	The improved technical and legal conditions are resulting in direct gains for the grid integration of renewable energy.
Risks	Key stakeholders at state and national level do not have the capacity to act on improved conditions.
Alternative explanation	N/A
Confirmed/partly confirmed/not confirmed	Confirmed

Hypothesis 2, examined at impact level, describes the contribution made by IGEN-GEC from outcome to impact. To examine this hypothesis, two areas of contributions were considered: firstly, the regulatory environment for grid integration in India prior to and after the project and, secondly, the technical improvements made by the REMCs and forecasting intervention and their potential beyond the project's duration as perceived by interviewees.

Regulatory environment: Prior to IGEN-GEC, CERC attempted to establish the Renewable Regulatory Fund mechanism. This required wind generators to forecast their own electricity production, which ultimately did not lead to a more balanced system (IEA, 2020). However, national strategies such as the National Solar Mission meant an increasing demand for the integration of RE in the Indian grid. Following on from the previous phase of GIZ's Green Energy Corridor programme, which entailed a significant investment in intra-state and inter-state transmission, the Ministry of Power drove the process to establish REMCs as mechanisms for load

balancing with the support of its German partners (KfW and GIZ) but ended up insisting on financing the REMCs itself (Int_3 with GIZ). IGEN-GEC then supported the required change in the Indian Electricity Code of 2010 (amended in 2016) with technical inputs (CERC, 2016). CERC also instructed POSOCO to implement the framework on forecasting for renewable energy generating stations based on wind and solar at inter-state level, which had been developed by the project (CERC, 2017; Int_3 with GIZ; GIZ PFB, 2020). Unlike the previous approach, which focused on the generators, REMCs are now following a 'hybrid approach', distributing responsibilities between dispatch centres and generators (IEA, 2020). The evaluation team thus considers the regulatory environment as improved for the grid integration of RE.

Technical capacities: IGEN-GEC provided training for operators, which was assessed as adequate by participants (Int_3 with GIZ, Int_5 with partner orgs, Int_8 with other stakeholders). The forecasting tool was also deemed technically appropriate, with inaccuracies in forecasts expected to reduce in the next year (Int_6 with other stakeholders, Int_3 with GIZ). Nevertheless, there were some delays in the establishment of REMCs with regard to procurement processes. This resulted in late disbursements of funds for their implementation and inauguration (Int_6 with other stakeholders, Int_3 with GIZ). Further limitations persist in the varying capacities available in state-level REMCs. States with a high share of RE in their energy mix are therefore expected to perform better than states with low shares of RE (IEA, 2020; Int_3 with GIZ). Nevertheless, despite these limitations, initial experiences from their operations are encouraging. System operators are monitoring 75 megawatts of renewable energy through the set-up of REMCs (Int_6 with other stakeholders) which, according to the IEA, showed immediate results in the states where they were implemented:

> The state of Tamil Nadu – one of the pioneers of wind power deployment in India – implemented the REMC in 2016, which helped them to achieve a substantial reduction in wind power curtailment (IEA, 2020, p. 206).

Given the above evidence, the evaluation team considers impact hypothesis 2 as confirmed.

Impact dimension 2 – Contribution to higher-level (intended) development results/changes – scores **38 out of 40 points**.

Impact dimension 3: Contribution to higher-level (unintended) development results/changes

The evaluation team identified various unintended positive effects at the impact level that were not accounted for in the original project design.

Overarching: Based on the successful implementation, in terms of both effectiveness and impact of energy efficiency and RE mechanisms, the project passed on best practices in training to other GIZ projects in Nepal and Bangladesh. The project also trained a delegation from Nigeria in its approaches (Int_ 2 with GIZ).

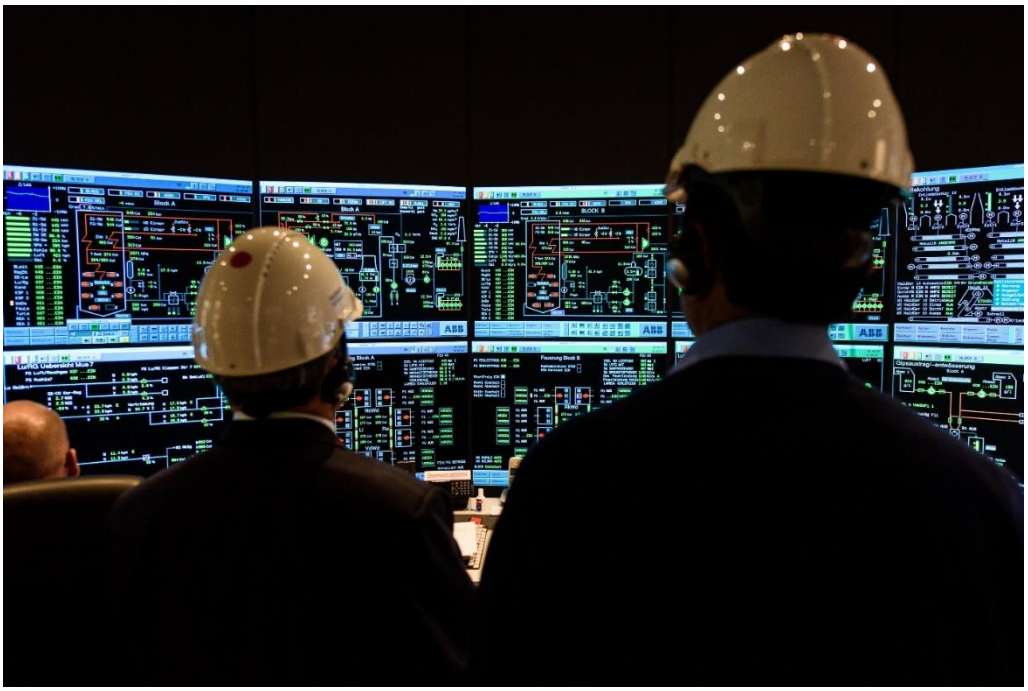
IGEN-PVRT: The training in methods for 'master trainers' deployed by SCGJ also contributed to the improvement in online international training programmes supported by the International Solar Alliance. The same master trainers who trained Indian stakeholders have thus also passed on their knowledge to international stakeholders (Int_5 with other stakeholders).

IGEN-EE: Designated consumers participating in the PAT scheme and the linked auditing process reported that the PAT scheme contributed to rationalising their production processes. Efforts to increase the energy efficiency of their production also resulted in a decrease in production costs due to energy savings, making their production more competitive nationally and internationally (Int_3 with beneficiary, Int_1 with beneficiary). The evaluation team also considers this to be a potential indirect contribution to the sustainable growth objective in SDG 9.

Given these significant unintended positive results at impact level, in particular with regard to the competitiveness of designated consumers, the evaluation team assess the dimension as highly successful.

Impact dimension 3 – Contribution to higher-level (unintended) development results/changes – scores **30 out of 30 points**.

Photo 2: Control centre for plant surveillance



Methodology for assessing impact

Table 19: Methodology for assessing OECD/DAC criterion: impact

Impact: assessment dimensions	Basis for assessment	Evaluation design and empirical methods	Data quality and limitations
Higher-level (intended) development changes/results	Overarching development results described in the project proposal and programme description	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix **Empirical methods:** Document analysis, Interviews	Medium strength of evidence. Very indirect contribution to upper-level impact results (e.g. SDGs).
Contribution to higher-level (intended) development results/changes	Hypothesis identified during inception mission 5-6	**Evaluation design:** Contribution analysis **Empirical methods:** Interviews **Secondary data:** Official reports by the EU Commission	Medium strength of evidence.
Contribution to higher-level (unintended) development results/changes	Evidence of widespread impact at final beneficiary level	**Evaluation design:** Most Significant Change questions **Empirical methods:** Interviews	Medium strength of evidence. Limitations: Some anecdotal evidence.

4.6 Efficiency

This section analyses and assesses the efficiency of the project. It is structured according to the assessment dimensions in the GIZ project evaluation matrix (see Annex 1).

Summarising assessment and rating of efficiency

Table 20: Rating of OECD/DAC criterion: efficiency

Criterion	Assessment dimension	Score and rating
Efficiency	Production efficiency (Resources/Outputs)	65 out of 70 points
	Allocation efficiency (Resources/Outcome)	25 out of 30 points
Efficiency score and rating		Score: **90 out of 100 points** Rating: **Level 2: successful**

According to the evaluators' analysis, the project's production efficiency was very good. In retrospect, the cost allocation across components appeared plausible with most resources invested in components 001 and 002. While component 003 only received 13% of the project budget, the outreach of the capacity building measures is outstanding. The high achievement of indicator targets at output level across all components (except for component 004) and the qualitative factors of success, such as project management and excellent partner contributions, confirm the project's production efficiency. The outsourcing of activities to third-party consultancies was sometimes challenging and required great involvement of project management staff. Furthermore, the project used its resources appropriately regarding the achievement of the objectives. However, the question of whether the outcomes could have been maximised with the same amount of resources cannot be thoroughly answered in this evaluation given the limitations of this CPE. Nevertheless, anecdotal evidence allowed the evaluators to identify supporting factors that indicate that the outcomes were maximised within the given resources. Scaling-up processes in particular led to widespread impact and outreach. A monitoring system at project level that systematically tracks the potential for positive results could have supported the high allocation efficiency of the project even more.

In total, the efficiency of the project is rated Level 2: successful, with 90 out of 100 points.

Analysis and assessment of efficiency

The key issue addressed by the efficiency criterion is whether the project's use of resources is appropriate with regard to achieving both the outputs and the outcome (project objective). The assessment examined whether the level of resourcing (e.g. funding, expertise) led to satisfactory results. Combining information on both project costs and results provides more insights than looking at these two components separately. Focusing on results alone would limit the use of data in strategic decision-making. Focusing on costs alone may distract from the recommendations that aim to ensure quality in the results. A distinction is made between two types of efficiency: production efficiency and allocation efficiency. While the former evaluates the transformation of inputs into outputs, the latter evaluates the transformation of inputs into results at outcome level. This includes an analysis of the extent to which even more results could have been achieved at output level with the same overall use of funds. It is therefore not only a question of investigating how costs could have been saved but rather of how existing resources could have been better used to achieve the desired results. Following GIZ's guidelines on assessing efficiency, this CPE applied the 'follow-the-money' approach as a standard method for analysing the project's production efficiency. The evaluation team used an Excel tool developed by GIZ's Corporate Unit Evaluation to standardise the efficiency analysis of the project.

Efficiency dimension 1: Production efficiency

The following assessments are based on information extracted from the *Kosten-Obligo* (cost commitment) report, a human resources output distribution tool and further discussions with the project team and stakeholders, using GIZ's approach to the 'follow-the-money' concept (Palenberg, 2011, p. 46). Considering the large project volume and the work and budget division by component, the evaluation team agreed with the Evaluation Unit to divide costs per component rather than per output. To do this, the actual cost commitment report was used for each project component, and the costs were integrated into the Excel tool.

The overview of all individual costs (as of February 2021) is shown in the following table. While a few final commitments and repayments had not yet been reflected in the cost commitment report, it was found that project costs were in line with the planned budget.

Table 21: Overview of costs

Project objective	The conditions for the grid integration of renewable energy and for demand-side energy efficiency have been improved.
BMZ costs (sum of individual costs)	EUR 16,050,926
Co-financing	EUR 0.00
Partner inputs	EUR 0.00
Total individual costs	EUR 16,050,926
Residual funds (BMZ costs and co-financing)	-EUR 267,790.71

As the project was commissioned before the Joint Procedural Reform (*Gemeinsame Verfahrensreform*, GVR), the progress reports did not contain any planned/actual comparison. Consequently, deviations between actual and planned budgets could not be analysed by the evaluation team.

Maximum principle:

All components (with the exception of component 004) achieved or over-achieved their output targets (GIZ PFB, 2020; Validation Workshop). At the same time, as mentioned in the section on effectiveness, the evaluation team would like to reiterate the importance and relevance of the foundations laid by activities under component 004 (which are not reflected in the output indicators) for further action on energy efficiency in residential buildings in the country. The evaluation team concludes that outputs were maximised to a great extent with the volume of available resources, especially when the limiting external factors that influenced certain achievements (e.g. COVID-19, introduction of completely innovative mechanisms in India, changes in implementation partners) were taken into consideration.

Table 22: Overview of outputs achievement for activity field 1

Component 002						Component 003	
A1	A2	B1	B2	C1	C2	D1	D2
100%	100%	233%	150%	206%	100%	191%	100%

Table 23: Overview of outputs achievement for activity field 2

Component 001			Component 004	
E1	E2	F	G1	G2
120%	100%	300%	50%	25%

The evaluation team then assessed the costs allocated under each component. Table 24 shows that 22% of project costs were used to achieve component 001. Component 002 used 40% of costs, component 003 used

13% and component 004 used 23%. In the retrospective assessment, the project management staff allocated only marginal costs (2%) to the overarching costs. The evaluation team understands that these overhead costs were kept to a minimum and were shared between the components.

Table 24: Overview of costs allocated to outputs

	Component 001	Component 002	Component 003	Component 004
Component objectives	The conditions for demand-side energy efficiency have been improved.	The conditions for the grid integration of renewable energy have been improved.	The sustainability of India's rooftop solar PV programme is strengthened.	The conditions for demand-side energy efficiency have been improved.
Total costs	**EUR 2,777,159.77**	**EUR 2,560,174.89**	**EUR 612,815.72**	**EUR 1,408,776.45**
Total costs in %	**22%**	**40%**	**13%**	**23%**

The approach followed to analyse production efficiency entailed contrasting the cost allocation to the achievement of results at output level. The results of this analysis were also discussed during project team interviews to complement the data with anecdotal findings. In retrospect, the cost allocation appears at first glance to be largely plausible. Components 001 and 002 were the most expensive components of the project as their implementation began in 2015 while components 003 and 004 were added only after a change offer in 2016 and thus received a lower share of financial resources. Furthermore, the additional budget amount received in 2018 was split between components 001 and 002 (Int_3 with GIZ, Int_2 with GIZ).

The costs incurred by components 001 and 002 are justified based on several reasons: Firstly, both components together have the highest share of AMAs (*Auslandsmitarbeiter,* field staff) (see Table 25). For instance, both components included the salary of the overall project coordinator, who provided support during the above-mentioned transition phase of component 002 until the leadership was replaced, while the project design envisaged allocating the salary to component 001. Secondly, component 002's scope was extended over time due to higher demand for services than the demand expected by the Ministry of New and Renewable Energy and the larger role played by the component in forecasting due to the loss of a partnership. This meant a re-allocation towards this component due to the increased costs of the international consultant consortium and project team. Some EUR 1 million were spent on construction contracts for component 002. Thirdly, component 001 essentially extended the BEE workforce by providing national experts that were directly embedded in the ministry to work on the PAT scheme. This was in addition to costs for the international consultant consortium for the implementation of the PAT scheme. Although component 004 missed some of its output targets, the component still managed to lay the foundation in various areas to make an impact in the future on EERB through activities that were not necessarily reflected in outputs and objectives, e.g. the thermal comfort study or the ANGAN (Augmenting Nature by Green Affordable New-habitat) conference. Component 003 particularly stands out with low investment costs, high productivity and an effective use of local consultants. This indicates the well-designed train-the-trainer approach used in the training of targeted personnel in the solar sector and to maximise the number of training participants.

Table 25: Allocation of human resources and instruments costs

	Component 001	Component 002	Component 003	Component 004	Overarching costs
International staff (AMA/PMA[4])	24%	46%	14%	14%	3%
National staff	56%	23%	7%	14%	0%
Head office staff (IMA/PMI)	0%	5%	0%	56%	39%
Integrated experts	25%	39%	16%	20%	0%
Returning experts	2%	67%	23%	8%	0%

In addition to the retrospective analysis of cost allocations, questions on the efficiency of the project were posed to the project team and partners to understand qualitative factors supporting or impeding the production efficiency of the IGEN-RE/EE project. The following conclusions could be made.

General project management: In terms of project management, many good aspects were underlined within and outside the GIZ team, e.g. dialogue, openness, reactivity and good planning. In the evaluation mission, all partners who were interviewed confirmed a smooth relationship and good bilateral collaboration with GIZ (Int_9 with partner orgs, Int_2 with partner orgs).

Outsourcing implementation components to a third-party consultancy: The project had mixed experiences in the outsourcing of technical cooperation to third-party consultancies. Due to GIZ's internal regulation to commission third-party consultancies to perform work that accounts for 25% of the costs, the project outsourced several activities, such as the labelling scheme under component 003 or the preparation of REMCs and forecasting frameworks, to international consultant consortia. The practice of prioritising financial concerns in the selection of consultants, which can lead to lower performance overall, was criticised. The project team suggested being able to change consultants earlier once poor performance was detected in order to mitigate the impact on the overall project performance. Nevertheless, both stakeholders and the project team also cited very successful collaborations, in particular under components 001 and 002 (Int_2 with GIZ, Int_3 with GIZ, Int_6 with other stakeholders, Int_9 with partner orgs).

Outsourcing activities to local consultancies**:** Local consultancies run by trusted consultants in India were used as a means of quality assurance and a way to mitigate any potential negative effects of poor performances by consultants. This proved to be an efficient mitigation measure and also resulted in an increased workload for the GIZ team itself (Int_2 with GIZ).

Partner contributions: In particular, components working with BEE (components 001 and 002) used the office spaces of their government partners without incurring further costs, contributing to the low overheads of the project. Further in-kind contributions were made for workshops and other meetings on an ad hoc basis. Even more significant, however, were the partner contributions that were made towards the impact of interventions. Outstanding examples are BEE's investment in the establishment of REMCs at a cost of several million US dollars (USD) *a*nd in government activities, both under component 001 (Int_2 with GIZ, Int_6 with GIZ). While it was originally planned that German financial cooperation would support the set-up of the centres, the Indian Government proactively insisted on providing the financing itself.

The evaluation team concludes that the project's production efficiency was very good. Considering the large project budget and the variety of module objective areas, the project found appropriate ways to allocate costs, which led to efficient and professional project management. Challenges in the collaboration with service providers were dealt with in appropriate manner although there was a need for more resources.

Efficiency dimension 1 – Production efficiency – scores **65 out of 70 points**.

[4] PMA = Projektmitarbeiter Ausland (project staff, field); IMA = Inlandsmitarbeiter (Germany-based staff); PMI = Projektmitarbeiter Inland (project staff, national)

Efficiency dimension 2: Allocation efficiency

In terms of allocation efficiency, the evaluation team assessed the extent to which the project's use of resources was appropriate with regard to achieving its objective based on the Excel tool analysis. Further findings are considered plausible assumptions and anecdotal evidence. Nevertheless, the evidence identified provides indications on how the outcomes could have been maximised. In contrast to production efficiency, allocation efficiency describes the transformation of inputs to outcomes.

In general, indicator achievements at module objective level in both activity fields are high and satisfactory (see the section on effectiveness); the exception is MOI6.

Table 26: Overview of output achievement for activity field 1

Component 002		Component 003	Component 001		Component 004
MOI1	MOI2	MOI3	MOI4	MOI5	MOI6
100%	500%	117%	123%	300%	Could not be assessed.

The following additional conclusions could be drawn on allocation efficiency.

Participatory planning: Interviewees stated that the project adopted a generally participatory approach, which was perceived as an important driver for allocation efficiency. In particular, conversations with BMZ were sought to ensure the most cost-efficient use of funds although a pre-set allocation to specific outputs/outcome was not required (Int_2 with GIZ). On the one hand, this made the allocation of funds between components somewhat untransparent and had to be justified vis-à-vis government partners (Int_2 with GIZ, Int_3 with GIZ). On the other hand, financial management between the components was facilitated and remained flexible as there was no separation of funds according to project number. A further advantage was observed in the reduced time spent on reporting requirements as all components reported jointly (Int_2 with GIZ).

Synergies with other donor organisations and international agencies: Synergies with other donor organisations were systematically included in the planning processes to improve results at outcome level. The collaboration with USAID and DFID in the organisation of the ANGAN conferences under activity field 1 represents one example (Int_2 with GIZ, Int_6 with GIZ).

Scaling up of results: As evidenced by the high success rates in achieving targets, the project systematically scaled up promising or successful interventions. In particular, the expansion of REMCs and the PAT scheme were overly successful in incorporating more stakeholders and geographic areas in their scope.

Good choice of partnership: Component 003 illustrated the importance of partnerships to scale up results. By partnering with the Suryamitra programme, the project benefited from a leveraging effect that enhanced training quality in the solar sector.

Mobilisation of further funding: With a strong focus on impact, the project team used change offers to proactively mobilise more funding for specific components to intensify and scale up measures that had proved to be impactful. This is considered an important factor in maximising results at outcome and impact level.

Lack of a monitoring system at project level: While each component had either a results-based management system in place or used a detailed operational plan, there was no monitoring system at project level that could have supported the identification of further additional results or potential to scale up between the different components.

With the given data, the evaluation team concludes that the project's allocation efficiency has been very successful.

Efficiency dimension 2 – Allocation efficiency – **scores 25 out of 30 points**.

Methodology for assessing efficiency

Table 27: Methodology for assessing OECD/DAC criterion: efficiency

Efficiency: assessment dimensions	Basis for assessment	Evaluation design and empirical methods	Data quality and limitations
Production efficiency (Resources/Outputs)	Transformation of inputs to outputs based on: • GIZ efficiency tool • Project's *Kostenträger-Obligo* (cost commitment) report • Results matrix • Progress reports • Results-based management system	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix 'Follow-the-money' approach **Empirical methods:** Interview with project management and project team, document analysis	Good evidence strength as costs were not allocated retrospectively, but the components' cost commitment reports were used.
Allocation efficiency (Resources/Outcome)	Transformation of inputs to outcomes Total cost allocation according to GIZ Excel tool Indicator achievement rates at project objective level	**Evaluation design:** Analysis follows the analytical questions in the evaluation matrix (see Annex 1) 'Follow-the-money' approach **Empirical methods:** Interviews with project partner and project team, document analysis	Low evidence strength due to anecdotal evidence on maximising outcomes.

4.7 Sustainability

This section analyses and assesses the sustainability of the project. It is structured according to the assessment dimensions in the GIZ project evaluation matrix (see Annex 1).

Summarising assessment and rating of sustainability

Table 28: Rating of OECD/DAC criterion: sustainability

Criterion	Assessment dimension	Score and rating
Sustainability	Capacities of the beneficiaries and stakeholders	18 out of 20 points
	Contribution to supporting sustainable capacities	27 out of 30 points
	Durability of results over time	42 out of 50 points
Sustainability score and rating		Score: **87 out of 100 points** Rating: **Level 2: successful**

The analysis of the project's sustainability examined the capacities of the target group and the project's contribution to sustaining those as well as the durability of results. Project collaboration, due to its strategic importance, was characterised by a high level of ownership by government stakeholders from the very beginning, which is an important requisite for sustainability. In activity field 1, continued financial investment by the Indian Government will be crucial in ensuring that programmes and mechanisms will continue. In activity field 2, the long-term support of German development cooperation on energy efficiency programmes has led to great achievements. At the same time, considering that BEE, as an implementation partner, has been used to

intensive support measures, some doubts were expressed by interviewees whether skills and capacities have been sufficiently built to ensure a smooth continuation of the programmes without GIZ's support. The evaluation also concludes that the project – across the components – made an important contribution to supporting sustainable capacities, either by providing direct support through team members working closely with project partner staff (e.g. components 001 and 004) or through the set-up of training and train-the-trainer programmes (component 003). Thanks to efforts to institutionalise results from the very beginning, achievements under components 001, 002 and 003, in particular, will be durable. However, there are a range of external risks that might hamper durability. Employment opportunities for participants of the Suryamitra programme are still scarce as demand for solar installations is limited. The success of the PAT scheme will be highly dependent on the continued long-term commitment and willingness of designated consumers and adequate incentivising mechanisms. The component on energy efficiency in residential buildings (004) could not build on any predecessor project and, while important progress was made in this project, additional efforts are required to ensure that results are anchored and sustained in the long term.

In total, the sustainability of the project is rated Level 2: successful, with 87 out of 100 points.

Analysis and assessment of sustainability

Sustainability dimension 1: Capacities of the beneficiaries and stakeholder

The first dimension assesses the extent to which the beneficiaries and stakeholders of the project have the institutional, human and financial resources as well as the willingness to sustain the results of the project over time. The analysis will be split between activity fields.

Activity field 1

Within IGEN-RE, the public partners had a high level of ownership from the very beginning. This was evidenced by the high level of investment volunteered by the Ministry of New and Renewable Energy and the Ministry of Power in the Green Energy Corridors and REMCs (see also the sections on coherence, effectiveness and efficiency). Given this large-scale investment and the expected rise in the share of renewables based on policy objectives in the Indian energy mix (see the section on impact), the Ministry of New and Renewable Energy and POSOCO also alluded to the strategic importance of the operationality of RE infrastructure in the future (Int_6 with other stakeholders, Int_2 with partner orgs). However, it was noted that Ministry of New and Renewable Energy was in discussions with the Ministry of Power about the provision of continued financial support for REMCs, with a decision pending at the time of the evaluation (Int_2 with partner orgs). IGEN-PVRT also did not encounter issues regarding ownership by some key stakeholders, especially SCGJ. For instance, the Suryamitra programme was established with partner networks already in place prior to the addition of this project component and thus was supported at a very 'opportune' moment (Int_5 with other stakeholders). The Ministry of New and Renewable Energy also alluded to plans to ensure vocational education for 20,000 Suryamitra programme participants annually as the speed of the National Solar Mission implementation picks up (Int_2 with partner orgs). Nevertheless, it was also mentioned that SCGJ and NISE are both dependent on the financial support of the Indian Government, which could pose a risk to the overall sustainability of these institutions (Int_5 with other stakeholders).

Activity field 2

Regarding activity field 2, the PAT scheme has been implemented under the auspices of BEE since 2008 and has become one of BEE's flagship programmes, attracting the attention of high-level decision-makers in India (Int_2 with GIZ, Int_9 with partner orgs). Based on this long-standing partnership with GIZ over time, BEE's ownership of PAT beyond the duration of IGEN-EE is ensured and capacities have been built within BEE through training and the establishment of processes (see sustainability dimension 2) over time. In addition, PAT cycles III and IV are still ongoing while further cycles are already planned for which further support was requested by the beneficiary (Int_9 with partner orgs). Nevertheless, all other interviewees stated that the PAT scheme, under component 001, is sufficiently institutionalised and BEE has the capacity to take on full

implementation responsibilities (Int_1 with private, Int_2 with GIZ, Int_1 with GIZ). In contrast, interviewees stated that, under component 004, BEE does not have sufficient skilled staff, nor the political will, to further institutionalise contributions made by IGEN-EERB (Int_6 with GIZ, Int_4 with private, Int_3 with academia). Similarly, BEE stated it did not have a mandate to develop legally binding regulations in the residential sector (Int_9 with partner orgs) although ENS cells are seen as a potential vehicle to integrate the energy efficiency labelling of residential buildings (Int_6 with GIZ). Given these perspectives on future collaboration, an indirect follow-on project will work with the Ministry of Housing and Urban Affairs.

Based on the evidence presented, the evaluation team assesses this dimension as moderately successful, as there are significant differences between the components in terms of the capacities of partners and some risks remain in relation to the sustainability of activities. For instance, under activity field 1, government stakeholders committed to the further operationalisation of the RE infrastructure and the training of skilled workers. Under activity field 2, government stakeholders will also continue the PAT scheme while the capacities to make progress on residential building energy efficiency are not sufficient and another political partner has been approached.

Sustainability dimension 1 – Capacities of the beneficiaries and stakeholders – scores **18 out of 20 points.**

Sustainability dimension 2: Contribution to supporting sustainable capacities

The second sustainability dimension assesses the extent to which the project has contributed to the above-named capacities of stakeholders to sustain positive results over time.

Activity field 1

IGEN-RE contributed significantly to the sustainability of the results in the grid integration of renewables by addressing capacity building for operational staff in REMCs and DISCOMs and connecting REMC staff in different states to form a network of qualified staff to provide peer support in this area. Its main contribution, however, was the establishment of subsidiary processes between different levels of grid integration and clear processes for the interactions between these levels in the future (Int_2 with partner orgs, Int_3 with GIZ, Int_6 with other stakeholders). IGEN-PVRT's contribution to training programmes run by NISE and SCGJ was to improve the overall methodological quality of the training (see the section on effectiveness). This has already been passed on by these institutions to 'master trainers', who in turn will train other trainers in these methods, further institutionalising the results of the component (Int_3 with other stakeholders).

Activity field 2

In addition to the extensive work in capacity building and personal exchanges with designated consumers and SDAs (see the section on effectiveness), IGEN-EE concentrated in the last two years on providing further human capacity development at national level. This was achieved by creating sector experts within BEE and engaging two engineers per SDA to ensure that the technical expertise was available to continue the PAT scheme at the relevant levels (Int_1 with GIZ). Furthermore, especially under cycle II, mechanisms such as the auditing of designated consumers were strengthened by addressing capacity building for auditors, and a digital monitoring and verification system was established. Both mechanisms are expected to facilitate implementation of the scheme in the future (Int_1 with private). IGEN-EERB focused on piloting the formation of ENS cells in five states to add to the capacities of the state nodal agencies to implement energy efficiency in residential buildings while BEE is planning to support integrated ENS cells in all the states in the future (Int_8 with partner orgs). IGEN-EERB further attempted to incentivise more widespread use to pilot the residential building labelling scheme by offering free technical support and registration for the first 100 projects; however, this proposal was only approved at the end of the project period (Int_6 with GIZ). All interviewees in the construction sector argued that additional work and resources need to be invested in order to encourage various stakeholder groups, especially developers, to contribute to the sustainability of the activities (see also durability of results) (Int_4 with private, Int_3 with academia, Int_4 with private, Int_2 with private).

Based on the evidence presented, the evaluation team assesses this dimension as successful as the majority of risks relating to the capacities of beneficiaries were addressed while some risks relating to the capacities of stakeholders remain.

Sustainability dimension 2 – Contribution to supporting sustainable capacities – scores **27 out of 30 points**.

Sustainability dimension 3: Durability of results over time

The third dimension assesses the extent to which the results of the project will be sustained over time and are influenced by context factors. The analysis will be split between activity fields.

Activity field 1

Given the first indications that the REMC model is producing the intended impact (see the sections on effectiveness and impact) and given the favourable political circumstances (see sustainability dimension 1), results produced by IGEN-RE, such as investment in infrastructure and organisational development, can be considered to be durable. Furthermore, trained REMC and DISCOM operators mentioned that continued training opportunities are necessary in a fast-evolving sector (Int_5 with partner orgs), while implementation partners for the capacity building activities already intend to continue the training modules that have been designed (Int_3 with GIZ, Int_8 with other stakeholders). Indian start-ups in the area of forecasting have also emerged as the topic gained traction in the country, potentially benefiting further developments in this area in the future and improving on an already positive eco-system in grid integration (Int_3 with GIZ). Under IGEN-PVRT, one concern expressed by all stakeholders interviewed remains the insufficient number of employment opportunities and competition from unskilled workers who accept lower salaries, putting pressure on the wages of skilled workers who have completed the Suryamitra training. Although initial steps to oblige developers to hire more expensive skilled labour, i.e. workers who have completed the Suryamitra training (see the section on impact), have been taken since 2018, delays caused by the National Solar Mission continue to limit their employability. This further increases the sustainability of training providers dependent on government funds, as currently there are more training providers than there is demand for skilled workers in solar energy (Int_5 with other stakeholders). The indirect follow-on project (I-RISE) is making an effort to increase the demand for skilled workers; the adequacy of this response cannot be evaluated at this time (Int_4 with GIZ).

Activity field 2

As the PAT scheme will continue on the basis of plans outlined by BEE and the overall strong commitment of SDAs and designated consumers, the durability of results under IGEN-EE will depend on the continued long-term commitment of existing and new designated consumers to make the necessary investment in a voluntary scheme. Although PAT has established an incentive structure that was generally appreciated by the designated consumers interviewed (Int_3 with beneficiary, Int_1 with private, Int_1 with GIZ), there are differences in the willingness to invest in different sectors. This willingness is dependent on the marginal costs of investments and on the scale of industrial players (Int_1 with private, Int_9 with partner orgs, Int_1 with GIZ). In the latest PAT cycles in particular, medium-sized players became designated consumers and their potential for energy savings may be lower. As a result, the incentive structure and the trading of energy saving certificates may need to be reviewed by BEE to encourage long-term investment (Int_1 with private, Int_1 with GIZ). Regarding IGEN-EERB, stakeholders in the construction industry generally perceived the labelling scheme and building materials directory to be an important first step towards reducing energy demand in residential housing, increasing consumer awareness and marketing of buildings. The majority of stakeholders interviewed under this component identified several additional activities that could contribute to sustainability and the realisation of potential savings (see the section on impact), including: (i) linking the ENS code to the labelling system and making it obligatory, (ii) reducing the dependency of the rating on consumer lifestyle, (iii) ensuring sufficient testing of materials, (iv) setting up a system to update the material registry, (v) creating cost incentives to use energy-efficient materials in states (Int_2 with beneficiary, Int_3 with academia, Int_2 with private, Int_4 with private). Given this need for improvement and uncertainties in the political will, the durability of results of IGEN-EERB may thus be dependent on the political will of BEE moving forward.

The durability of results over time is assessed as moderately successful. Under activity field 1, most results, such as infrastructural improvements, will be continuously used by national stakeholders, while some risks remain with the absorption of trained skilled workers into the Indian labour market. Under activity field 2, the PAT scheme is also going to continue with only minor adjustments to the incentive structure for designated consumers necessary over time. The largest risk lies with the results of component 004 whose outputs need further revision and a new political partner will be needed over time.

Sustainability dimension 3 – Durability of results over time – scores **42 out of 50 points**.

Methodology for assessing sustainability

Table 29: Methodology for assessing OECD/DAC criterion: sustainability

Sustainability: assessment dimensions	Basis for assessment	Evaluation design and empirical methods	Data quality and limitations
Capacities of the beneficiaries and stakeholders	The durability, stability, and long-term resistance of the existing/strengthened capacities are analysed: • capacities of key project partners to apply and replicate obtained knowledge • capacities of key project partners to sustain results • capacities of training participants to apply the obtained knowledge	**Evaluation design:** Data triangulation to assess evaluation questions in the evaluation matrix **Empirical methods:** Semi-structured interviews with BEE and the Ministry of New and Renewable Energy Validation workshop with project team Document analyses	Moderate strength of evidence. Limitations: Partially anecdotal evidence from individual players.
Contribution to supporting sustainable capacities	The contributions of the project to ensure that the capabilities of the target groups are sustainably strengthened	See above	See above.
Durability of results over time	Stakeholder perceptions Findings from the impact and effectiveness assessments examined in regard to sustainability	See above	See above.

4.8 Key results and overall rating

According to the evaluation team's assessment, the IGEN-RE/EE project was highly successful. Despite attempting to tackle a wide range of challenges in energy efficiency and renewable energy in India at the same time, the project was able to produce concrete results at both outcome and impact level by the end of the implementation period. In particular, quantifiable results in the reduction of GHG emissions stand out in this regard. These results were also firmly rooted in the national policy frameworks and priorities proposed by the Indian Government in relation to energy efficiency and renewable energy. Ownership by the public and private stakeholders was thus observed in key activities, such as the expansion of the PAT scheme, the Suryamitra vocational training, the grid integration of renewable energy and the launch of ENS, and resulted in even further demand for the project's services. Processes that contributed to the successful implementation were institutionalised within the relevant stakeholders in each sector or in close coordination with them. In cases where the sustainability of results and initiatives still remains to be seen, further steps largely depend on the political will of stakeholders to keep pursuing the pathways set out by the project. These results were based on overall effective and efficient project management by the teams in each component. Difficulties, in particular due to differences in performances of third-party contractors, were addressed and managed though additional efforts. The project also sought partnerships with other donor agencies to maximise outputs, and a number of significant synergies were realised within the framework of German financial cooperation. Table 30 summarises the final ratings provided to each of the OECD-DAC criteria.

Photo 3: Indian cable route

Table 30: Overall rating of OECD/DAC criteria and assessment dimensions

Evaluation criteria	Dimension	Max	Score	Total (max.100)	Rating
Relevance	Alignment with policies and priorities	30	30	**95**	Level 1: highly successful
	Alignment with the needs and capacities of the beneficiaries and stakeholders	30	27		
	Appropriateness of the design	20	18		
	Adaptability – response to change	20	20		
Coherence	Internal Coherence	50	42	**90**	Level 2: successful
	External Coherence	50	48		
Effectiveness	Achievement of the (intended) objectives	30	28	**92**	Level 1: highly successful
	Contribution to achievement of objectives	30	27		
	Quality of implementation	20	18		
	Unintended results	20	19		
Impact	Higher-level (intended) development results/changes	30	30	**98**	Level 1: highly successful
	Contribution to higher-level (intended) development results/changes	40	38		
	Contribution to higher-level (unintended) development results/changes	30	30		
Efficiency	Production efficiency	70	65	**90**	Level 2: successful
	Allocation efficiency	30	25		
Sustainability	Capacities of the beneficiaries and stakeholders	20	18	**87**	Level 2: successful
	Contribution to supporting sustainable capacities	30	27		
	Durability of results over time	50	42		
Mean score and overall rating		100	**92**		**Level 1: highly successful**

Table 31: Rating and score scales

100-point scale (score)	6-level scale (rating)
92–100	Level 1: highly successful
81–91	Level 2: successful
67–80	Level 3: moderately successful
50–66	Level 4: moderately unsuccessful
30–49	Level 5: unsuccessful
0–29	Level 6: highly unsuccessful
Overall rating: The criteria of effectiveness, impact and sustainability are knock-out criteria: If one of the criteria is rated at level 4 or lower, the overall rating cannot go beyond level 4 although the mean score may be higher.	

5 Conclusions and recommendations

5.1 Key findings and factors of success/failure

To facilitate learning from the outcomes of this evaluation, this section presents key factors of success and central weaknesses of the project. Efforts and positive achievements in the key factors of success have the potential to leverage current achievements, mitigate current or future risks, or be applied to other similar projects.

Factors of success

- **Anchoring of activities in** existing initiatives and policies: Overall, the project design was aligned with concrete numerical targets derived from national strategies and policies, which ensured relevance and contributed to ownership by public partners. The collaboration with SCGJ also highlights the importance of linking interventions to promising or successful local initiatives that can catalyse effectiveness and impact.
- **Technical expertise of project team**: All stakeholders at all levels appreciated the expertise of the GIZ teams in their respective sectors. As a result, GIZ experts were able to mobilise a large network in their respective sectors to facilitate implementation.
- **Institutionalisation of collaboration with other donor agencies**: The institutionalisation of the collaboration between the project, DFID and USAID stands out as a proactive way of coordinating donors in sectors with a potential overlap in activities. The memorandum of understanding formalised initial expressions of intent, brought in additional partner contributions for the conferences and overall contributed to the satisfaction of donor partners, resulting in further demand for collaboration.
- **Holistic approach in stakeholder engagement**: The project identified and engaged all relevant stakeholders at different levels to ensure effective implementation. For instance, capacity building measures for the PAT scheme targeted state-level and consumer-level stakeholders. The project also communicated directly with these stakeholders between training programmes, which allowed challenges to be tackled in a timely manner. The institutionalisation of stakeholder-centred processes, such as the auditing process, also ensured compliance with the scheme overall.

- **Responsiveness to demand of public partners**: In cases where public partners showed a high level of ownership of proposed activities, the project was able to ensure sufficient flexibility to extend its engagement in specific areas, e.g. REMCs under component 002. In this case, the design of four sub-projects in one helped by providing budgetary flexibility to meet increased demand.

Factors of failure

- **Complex design:** Although there were some advantages in reporting and flexible financing, assembling four components which generally acted as separate projects contributed to some complexity vis-à-vis public partners. The different components therefore signed separate implementation agreements to provide some clarity in the implementation. Should this design be pursued further in the future, a more structured results-based approach to collaboration between components may be considered as well (see recommendations below).
- **Differences in performance of third-party service providers:** The quality of work provided by third-party service providers varied significantly and posed challenges for the project team. In cases of poor performance, the project had to invest further resources. This entailed more work for the project team or national consultancies to ensure quality in project delivery. In a highly technical project like this, a selection mechanism that gives a substantially larger weighting to technical capacities than to price could have been helpful in avoiding under-performance of third-party service providers.
- **Preconditions for institutionalising the labelling scheme:** The sustainability of results achieved by the labelling scheme could have been considered earlier in the implementation to ensure that preconditions are set for the continuation of the scheme.

Findings regarding 2030 Agenda

Universality, shared responsibility and accountability

The project has made efforts to share responsibility with different donors. Significant coordination was achieved between the technical and financial donor organisations in German development cooperation, allowing for large-scale investment in the Indian energy grid. Other donors were involved in joint activities for mutual benefit, e.g. the ANGAN conference with USAID and DFID. The project also implemented many activities embedded in the ministerial structures of public partners, which resulted in continuous discussions about synergies and anchoring initiatives such as the PAT scheme firmly in local institutions. The project developed a shared monitoring system specifically for monitoring and verification in the PAT scheme; this has now been handed over to the Indian partners. Other than this activity on a specific monitoring system, further efforts could have been made in an overarching monitoring system for all components. Based on this implementation progress, the project first and foremost made significant direct contributions to (i) affordable and clean energy (SDG 7), (ii) reduced GHG emissions (SDG 13) and (iii) sustainable infrastructure and industrial growth (SDG 9). Indirectly, the project also contributed to poverty alleviation (SDG 1) through interventions influencing the employability of workers in the solar sector.

Interplay of economic, environmental and social development

The project's interventions are firmly embedded in Indian national policies, which in turn adhere to global goals, in particular the Paris Agreement for climate action. Within its implementation period, the project supported the reduction in Indian GHG emissions and contributed to energy savings in very energy-intensive plants operated by industrial players. There is great potential to achieve energy savings in the residential housing sector in the future, given the political commitment to the labelling scheme. The rising share of renewable energy in the Indian grid will be managed more efficiently through REMCs, allowing the Indian population to consume more green energy. The unintended result of improving the competitiveness of the Indian industrial sector may also result in broad-based development based on environmentally friendly changes made by companies in the area of energy savings.

Inclusiveness/leave no one behind (LNOB)

With regard to the central promise of Agenda 2030 to leave no one behind, the evaluation team found that the inclusion of the most vulnerable population groups was not the focus of project activities. However, gender aspects were considered for participation in training programmes. Furthermore, the cross-cutting nature of energy production and the nationwide scope of the project means that a higher input of renewable energy eventually means that the whole Indian population may consume more renewable energy.

Findings regarding follow-on project

There is no direct follow-on project to the IGEN-GEC/EE project following the same logic. However, there are indirect follow-on projects in different areas of work.

5.2 Recommendations

Recommendations based on findings of the previous sections in this report are divided into two sections. They address specific actors and stakeholders within GIZ, as well as partners.

Recommendations for the follow-on project and the design of new projects (directed to the project team and the GIZ Sectoral Department)

Make the project procurement process more flexible: One of the challenges affecting the efficiency and effectiveness of the project's implementation was the variable performances delivered by service providers. Furthermore, if poor performance was detected, contract changes to the scope of the assignment and the awarding of new contracts were perceived as too rigid for project implementation. GIZ could thus consider establishing a performance tracking mechanism for project consultants to intervene earlier in the event of challenges. GIZ may wish to examine how this process could provide more flexibility for projects.

Recommendation for general project implementation (directed to the project team)

Strengthen overall project monitoring: While each component had its own system to report to indicators, there was no overall project monitoring system that included the data of all four components. One recommendation is to set up a holistic system to gather robust data across the components and enable better cross-learning. Potential synergies between components could then be detected in a more structured way, allowing projects to exploit unintended positive changes more intensively.

Recommendation on the general rollout of renewable energy and energy efficiency projects (directed to the project's key partners):

Institutionalise the residential building labelling scheme: BEE may explore an alternative institutional arrangement for the implementation of the Energy Star labelling scheme for residential buildings based on the perspectives of stakeholders and BEE's view of its own mandate. More concretely, BEE may wish to explore the option of expanding partnerships with specialised organisations (e.g. certification agencies) to implement the labelling scheme and provide further support in addressing technical improvements suggested by stakeholders in this evaluation (see the section on sustainability).

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Annex: Evaluation matrix

Assessment dimensions	**Filter - Project Type**	**Evaluation questions**	**Evaluation indicators**	**Data collection methods** (e.g. interviews, focus group discussions, documents, project/partner monitoring system, workshop, survey, etc.)	**Data sources** (list of relevant documents, interviews with specific stakeholder categories, specific monitoring data, specific workshop(s), etc.)	**Evidence strength** (moderate, good, strong)
The project concept (1) is in line with the relevant strategic reference frameworks. Max. 30 points	Standard	Which strategic reference frameworks exist for the project? (e.g. national strategies incl. national implementation strategy for 2030 agenda, regional and international strategies, sectoral, cross-sectoral change strategies, if bilateral project especially partner strategies, internal analysis frameworks e.g. safeguards and gender (2))	List of strategic reference frameworks	Document review and criteria-led analysis	India's National Action Plan on Climate Change (NAPCC) and India's Intended Nationally Determined Commitments; BMZ Position Paper "BMZ's New Asia Policy - Using Asia's Dynamism", "India 2020: Energy Policy Review; National Solar Mission (NSM), National Mission on Enhanced Energy Efficiency (NMEEE), National Mission on Sustainable Habitat (NMSH).	strong
	Standard	To what extent is the project concept in line with the relevant strategic reference frameworks?	Comparison of objetives and goals between project and frameworks	Document review and criteria-led analysis	Project proposal; operating plans strategic reference documents (see above)	strong
	and Fragility	To what extent was the (conflict) context of the project adequately analysed and considered for the project concept (key documents: (Integrated) Peace and Conflict Assessment, Safeguard Conflict and Conflict Sensitivity documents)?	Context documents exists and their recommendation s are considered	Document review and criteria-led analysis	PCA, Gender analysis	strong
	Standard	To what extent are the interactions (synergies/trade-offs) of the intervention with other sectors reflected in the project concept – also regarding the sustainability dimensions (ecological, economic and social)?	Assessment of cross-sectoral interactions	Document review and criteria-led analysis	Project proposal, Implementing Agreement, Operating Manual	strong
	Standard	To what extent is the project concept in line with the Development Cooperation (DC) programme (If applicable), the BMZ country strategy and BMZ sectoral concepts?	Comparison of objetives and goals between project and BMZ documents	Document analysis of the project concept and BMZ strategy	"BMZ's New Asia Policy - Using Asia's Dynamism"	strong
	Standard	To what extend is the project concept in line with the (national) objectives of the 2030 agenda? To which Sustainable Development Goals (SDG) is the project supposed to contribute?	Comparison with relevant SDGs	Document analysis of the project concept and Agenda 2030	Project proposal, Agenda 2030	strong
	Standard	To what extend is the project concept subsidiary to partner efforts or efforts of other relevant organisatons (subsidiarity and complementarity)?	Perception of key partners	Donor document identification according to snowball principle; Interviews	Project proposal, progress reports, Interviews	moderate
	and SV/GV	To what extent does the project complement bilateral or regional projects? To what extent does it complement other global projects?	Perspectives of women and men are considered in project document			

	and SV/GV	To what extent is the measure geared towards solving a global challenge that cannot only be effectively addressed bilaterally/ regionally?	Disadvantaged groups are considered in key project documents			
	and IZR					strong
	and IZR					strong
	and IZR					strong
The project concept (1) matches the needs of the target group(s). Max. 30 points	Standard	To what extent is the chosen project concept geared to the core problems and needs of the target group(s)?	Comparison needs identified and perspectives of atarget group	Document analysis; Interviews	Document analysis of project planning document; Interviews with target group representatives from the academia sector	strong
	Standard	How are the different perspectives, needs and concerns of women and men represented in the project concept?	Gender sensitivity of the project	Document analysis of project planning documents; Interviews	Document analysis of project planning document; Interviews with target group representatives from the academia sector	moderate
	and Fragility	How were deescalating factors/ connectors (4) as well as escalating factors/ dividers (5) identified (e.g. see column I and II of the Peace and Conflict Assessment) and considered for the project concept (please list the factors)? (6)	Identification context factors exists and was considered during project implementation	Document analysis; Interviews	Document analysis of PAC; interviews with project team	good
	Standard	To what extent was the project concept designed to reach particularly disadvantaged groups (LNOB principle, as foreseen in the Agenda 2030)? How were identified risks and potentials for human rights and gender aspects included into the project concept?	Disadvantaged groups are considered in key project documents	Document analysis	Document analysis of project planning document; Interviews with target group representatives from the public, private and CSO sector	moderate
	and Fragility	To what extent were potential (security) risks for (GIZ) staff, partners, target groups/final beneficiaries identified and considered?	Risks and mitigations trategies identified and implemented	Document analysis	Document review of risk analysis in project proposal and progress reports	
	and IKT	To what extent has the utilization of digital solutions contributed to expanding the cooperation with partners or beeficiaries, i.e. through additional participation possibilities?				
	Standard	To what extent are the intended impacts regarding the target group(s) realistic from todays perspective and the given resources (time, financial, partner capacities)?	The needs assessed regarding the target group are realistic	PCA concept, activity reports	Document analysis of project planning document; Interviews with target group representatives from the public, private and CSO sector	good

The project concept (1) is adequately designed to achieve the chosen project objective. Max. 20 points	Standard	Assessment of current results model and results hypotheses (theory of change, ToC) of actual project logic: - To what extent is the project objective realistic from todays perspective and the given resources (time, financial, partner capacities)? - To what extent are the activities, instruments and outputs adequately designed to achieve the project objective? - To what extent are the underlying results hypotheses of the project plausible? - To what extent is the chosen system boundary (sphere of responsibility) of the project (including partner) clearly defined and plausible? - Are potential influences of other donors/organisations outside of the project's sphere of responsibility adequately considered? - To what extent are the assumptions and risks for the project complete and plausibe?	The results model represents the projet logic in an adequate way	Analysis of updated results model	Project's original and updated results model; Interview with FMB, Interview with project management	good
	Standard	To what extent does the strategic orientation of the project address potential changes in its framework conditions?	Changes in legislation Changes in project set-up mentioned in change offer	Document review; Interviews	Interviews with project management and head of components	
	and IKT	Which digital solutions are used in the project and what significance do these digital solutions have in the framework of the results model?	Risks / bottlenecks outside the sphere of responsibility mentioned by project staff			
	Standard	How is/was the complexity of the framework conditions and guidelines handled? How is/was any possible overloading dealt with and strategically focused?	Risks / bottlenecks outside the sphere of responsibility mentioned by project staff	Document review; Interviews	Interviews with project management and head of components	moderate
The project concept (1) was adapted to changes in line with requirements and re-adapted where applicable. Max. 20 points	Standard	What changes have occurred during project implementation? (e.g. local, national, international, sectoral, including state of the art of sectoral know-how)?	Changes in legislation Changes in project set-up mentioned in change offer	Document review; Interviews	Interviews with project management and head of components	strong
	Standard	How were the changes dealt with regarding the project concept?	Activities conducted to address changes	Interviews	Interviews with project management and head of components	strong

(1) The 'project concept' encompasses project objective and theory of change (ToC, see 3) with activities, outputs, instruments and results hypotheses as well as the implementation strategy (e.g. methodological approach, CD-strategy, results hypotheses)

(2) In the GIZ Safeguards and Gender system risks are assessed before project start regarding following aspects: gender, conflict, human rights, environment and climate. For the topics gender and human rights not only risks but also potentials are assessed. Before introducing the new safeguard system in 2016 GIZ used to examine these aspects in seperate checks.

	(3) Theory of Change = GIZ results model = graphic illustration and narrative results hypotheses	
	(4) Deescalating factors/ connectors: e.g. peace-promoting actors and institutions, structural changes, peace-promoting norms and behavior. For more details on 'connectors' see: GIZ (2007): 'Peace and Conflict Assessment (PCA). Ein methodischer Rahmen zur konflikt- und friedensbezogenen Ausrichtung von EZ-Maßnahmen', p. 55/135.	
	(5) Escalating factors/ dividers: e.g. destructive institutions, structures, norms and behavior. For more details on 'dividers' see: GIZ (2007): 'Peace and Conflict Assessment (PCA). Ein methodischer Rahmen zur konflikt- und friedensbezogenen Ausrichtung von EZ-Maßnahmen', p. 135.	
	(6) All projects in fragile contexts, projects with FS1 or FS2 markers and all transitional aid projects have to weaken escalating factors/dividers and have to mitigate risks in the context of conflict, fragility and violence. Projects with FS1 or FS2 markers should also consider how to strengthen deescalating factors/ connectors and how to address peace needs in its project objective/sub-objective?	

OECD-DAC Criterion EFFECTIVENESS (max. 100 points)

Assessment dimensions	**Filter - Project Type**	**Evaluation questions**	**Evaluation indicators**	**Data collection methods** (e.g. interviews, focus group discussions, documents, project/partner monitoring system, workshop, survey, etc.)	**Data sources** (list of relevant documents, interviews with specific stakeholder categories, specific monitoring data, specific workshop(s), etc.)	**Evidence strength** (moderate, good, strong)
The project achieved the objective (outcome) on time in accordance with the project objective indicators.(1) Max. 40 points	Standard	To what extent has the agreed project obective (outcome) been achieved (or will be achieved until end of project), measured against the objective indicators? Are additional indicators needed to reflect the project objective adequately?	Achievement of seven project objective indicators	Review of project documentation and activity plans; triangulated with interviews	Project documents (Activity plans, consultant reports, progress reports); interviews with key implementing partners	strong
	and Fragility	For projects with FS1 or FS2 markers: To what extent was the project able to strengthen deescalating factors/ connectors (2,4)?	Perception of key partners, perception of project team members	Interviews	Project management and staff; key implementing partner interviews	
	Standard	To what extent is it foreseeable that unachieved aspects of the project objective will be achieved during the current project term?	Partners and project team confirm that unachievable aspects are likely to be achieved	Interviews	Project management and staff; key implementing partner interviews	good
The activities and outputs of the project contributed substantially to the project objective achievement (outcome).(1) Max. 30 points	Standard	To what extent have the agreed project outputs been achieved (or will be achieved until the end of the project), measured against the output indicators? Are additional indicators needed to reflect the outputs adequately?	Achievement of output indicators	Review of activity reports; analysis of endline assessment data; Triangulated with interviews	Project documents (Activity plans, consultant reports, progress reports); interviews with key implementing partners	strong

	Standard	How does the project contribute via activities, instruments and outputs to the achievement of the project objective (outcome)? (contribution-analysis approach)	Evidence for hypotheses established/rejected	Review of monitoring data at reaction and learning level; endline assessment data; Participatory observations	Interviews with key implementing partners; site visits of two selected pilot projects	strong
	Standard	Implementation strategy: Which factors in the implementation contribute successfully to or hinder the achievement of the project objective? (e.g. external factors, managerial setup of project and company, cooperation management)	Open question on hindering and supporting factors that supported the achievement of the project objective	Interviews, validation workshop	Interviews with all key stakeholders, validation workshop with project team	strong
	Standard	What other/alternative factors contributed to the fact that the project objective was achieved or not achieved?	Alternative factors are identified	Interviews	Interviews with all key stakeholders, validation workshop with project team	good
	and IKT	To what extent has the utilization of digital solutions contributed to the achievement of objectives?				
	Standard	What would have happened without the project?	Perception of project staff and partners on what would have happened without the project	Interviews	Interviews with all key stakeholders, validation workshop with project team	good
No project-related (unintended) negative results have occurred – and if any negative results occured the project responded adequately.	Standard	Which (unintended) negative or (formally not agreed) positive results does the project produce at output and outcome level and why?	Examination of additional results identified (see results model)	Interviews	Interviews with all key stakeholders, validation workshop with project team	good

The occurrence of additional (not formally agreed) positive results has been monitored and additional opportunities for further positive results have been seized. Max. 30 points	and Fragility	To what extent was the project able to ensure that escalating factors/ dividers (3) have not been strengthened (indirectly) by the project (4)? Has the project unintentionally (indirectly) supported violent or 'dividing' actors?	Assessment of Do-no-harm factors	Interviews	Interviews with all key stakeholders, validation workshop with project team	moderate
	Standard	How were risks and assumptions (see also GIZ Safeguards and Gender system) as well as (unintended) negative results at the output and outcome level assessed in the monitoring system (e.g. 'Kompass')? Were risks already known during the concept phase?	Assessment of monitoring system on risks	Analysis of monitoring system on risks, progress reports; Document analysis	Activity reports, progress reports	moderate
	and Fragility	To what extent have risks in the context of conflict, fragility and violence (5) been monitored (context/conflict-sensitive monitoring) in a systematic way?	Assessment of monitoring system on conflict, fragility and violence	Analysis of monitoring system on conflict, fragility and violence; Document analysis	Activity reports, progress reports	moderate
	Standard	What measures have been taken by the project to counteract the risks and (if applicable) occurred negative results? To what extent were these measures adequate?	Risk mitigation measures identified	Analysis of monitoring system on risks, progress reports; Document analysis	Activity reports, progress reports	moderate
	Standard	To what extend were potential (not formally agreed) positive results at outcome level monitored and exploited?	Risk management and monitoring	Analysis of monitoring system on risks, progress reports; Document analysis	Activity reports, progress reports	moderate

(1) The first and the second evaluation dimensions are interrelated: if the contribution of the project to the objective achievement is low (2nd evaluation dimension) this must be considered for the assessment of the first evaluation dimension also.

(2) Deescalating factors/ connectors: e.g. peace-promoting actors and institutions, structural changes, peace-promoting norms and behavior. For more details on 'connectors' see: GIZ (2007): 'Peace and Conflict Assessment (PCA). Ein methodischer Rahmen zur konflikt- und friedensbezogenen Ausrichtung von EZ-Maßnahmen', p. 55/135.		
(3) Escalating factors/ dividers: e.g. destructive institutions, structures, norms and behavior. For more details on 'dividers' see: GIZ (2007): 'Peace and Conflict Assessment (PCA). Ein methodischer Rahmen zur konflikt- und friedensbezogenen Ausrichtung von EZ-Maßnahmen', p. 135.	(5) Escalating factors/ dividers: e.g. destructive institutions, structures, norms and behavior. For more details on 'dividers' see: GIZ (2007): 'Peace and Conflict Assessment (PCA). Ein methodischer Rahmen zur konflikt- und friedensbezogenen Ausrichtung von EZ-Maßnahmen', p. 135.	(5) Escalating factors/ dividers: e.g. destructive institutions, structures, norms and behavior. For more details on 'dividers' see: GIZ (2007): 'Peace and Conflict Assessment (PCA). Ein methodischer Rahmen zur konflikt- und friedensbezogenen Ausrichtung von EZ-Maßnahmen', p. 135.
(4) All projects in fragile contexts, projects with FS1 or FS2 markers and all transitional aid projects have to weaken escalating factors/dividers and have to mitigate risks in the context of conflict, fragility and violence. Projects with FS1 or FS2 markers should also consider how to strengthen deescalating factors/ connectors and how to address peace needs in its project objective/sub-objective?		
(5) Risks in the context of conflict, fragility and violence: e.g. contextual (e.g. political instability, violence, economic crises, migration/refugee flows, drought, etc.), institutional (e.g. weak partner capacity, fiduciary risks, corruption, staff turnover, investment risks) and personnel (murder, robbery, kidnapping, medical care, etc.). For more details see: GIZ (2014): 'Context- and conflict-sensitive results-based monitoring system (RBM). Supplement to: The 'Guidelines on designing and using a results-based monitoring system (RBM) system.', p.27 and 28.		

OECD-DAC Criterion IMPACT (max. 100 points)

Assessment dimensions	**Filter - Project Type**	**Evaluation questions**	**Evaluation indicators**	**Data collection methods** (e.g. interviews, focus group discussions, documents, project/partner monitoring system, workshop, survey, etc.)	**Data sources** (list of relevant documents, interviews with specific stakeholder categories, specific monitoring data, specific workshop(s), etc.)	**Evidence strength** (moderate, good, strong)
The intended overarching development results have occurred or are foreseen (plausible reasons). (1) Max. 40 points	Standard	To which overarching development results is the project supposed to contribute (cf. module and programme proposal with indicators/ identifiers if applicable, national strategy for implementing 2030 Agenda, SDGs)? Which of these intended results at the impact level can be observed or are plausible to be achieved in the future?	Contribution to reduced GHG emmissions, increased RE installations, sustainable growth	Analysis of document; interviews	Review of the updated results model and continuous adaptation; interview with project management and BMZ representative; public data on energy saved, RE installations made	good
	and IZR	To what extent have the IZR criteria contributed to strengthening overarching development results?				
	Standard	Indirect target group and 'Leave No One Behind' (LNOB): Is there evidence of results achieved at indirect target group level/specific groups of population? To what extent have targeted marginalised groups (such as women, children, young people, elderly, people with disabilities, indigenous peoples, refugees, IDPs and migrants, people living with HIV/AIDS and the poorest of the poor) been reached?	Degree of contribution to Indian energy consumers ; Perception of partners on impact for final beneficiaries	Interviews	Interviews and validation with project team, interview with project management (former and current director), implementing partner	moderate
The project objective (outcome) of the project contributed to the occurred or foreseen overarching development results (impact).(1) Max. 30 points	Standard	To what extent is it plausible that the results of the project on outcome level (project objective) contributed or will contribute to the overarching results? (contribution-analysis approach)	Evidence for hypotheses established/rejected (Behaviour and results)	Interviews, Document analysis, participatory observations	Interviews and project case study ; side visits of pilot projects	good
	Standard	What are the alternative explanations/factors for the overarching development results observed? (e.g. the activities of other stakeholders, other policies)	Alternative factors explained	Interviews, Document analysis	Interviews and validation with project team, interview with project management (former and current director), implementing partner	good

		Standard	To what extent is the impact of the project positively or negatively influenced by framework conditions, other policy areas, strategies or interests (German ministries, bilateral and multilateral development partners)? How did the project react to this?	Influence of framework conditions (Indo-German Energy Forum)	Interviews, Document analysis	Interviews and validation with project team, interview with project management , implementing partner	good
		Standard	What would have happened without the project?	Counterfactual situation	Interviews	Interviews and validation with project team, interview with project management , implementing partner	moderate
		Standard	To what extent has the project made an active and systematic contribution to widespread impact and were scaling-up mechanisms applied (2)? If not, could there have been potential? Why was the potential not exploited? To what extent has the project made an innovative contribution (or a contribution to innovation)? Which innovations have been tested in different regional contexts? How are the innovations evaluated by which partners?	Additional impacts identified; Synergies leveraged between FC and TC cooperation	Interviews, Document analysis	Interviews and validation with project team, interview with project management, implementing partner, KFW, PTB; other donors	strong
		and IZR	To what extent has the project made an innovative contribution (or a contribution to innovation)? Which innovations have been tested in different regional contexts? How are the innovations evaluated by which partners?				
	No project-related (unintended) negative results at impact level have occurred – and if any negative results occured the project responded adequately. The occurrence of additional (not formally agreed) positive results at impact level has been monitored and additional opportunities for further positive results have been seized. Max. 30 points	Standard	Which (unintended) negative or (formally not agreed) positive results at impact level can be observed? Are there negative trade-offs between the ecological, economic and social dimensions (according to the three dimensions of sustainability in the Agenda 2030)? Were positive synergies between the three dimensions exploited?	Examination of additional impacts (see results model)	Interviews	Interviews and validation with project team (head of components), interview with project management , implementing partner	good
		and Fragility	To what extent did the project have (unintended) negative or escalating effects on the conflict or the context of fragility (e.g. conflict dynamics, violence, legitimacy of state and non-state actors/institutions)? To what extent did the project have positive or deescalating effects on the conflict or the context of fragility (e.g. conflict dynamics, violence, legitimacy of state and non-state actors/institutions)?	Do-no-harm analysis	Interviews	Interviews and validation with project team, interview with project management (former and current director), implementing partner	moderate
		Standard	To what extent were risks of (unintended) results at the impact level assessed in the monitoring system (e.g. 'Kompass')? Were risks already known during the planning phase?	Degree of assessment ing monitoring tools	Document analysis of monitoring documents	Analysis of monitoring system	moderate
		Standard	What measures have been taken by the project to avoid and counteract the risks/negative results/trade-offs (3)?	Mitigation measures mentioned	Document analysis, interviews	Analysis of monitoring system, Interview with project team	moderate
		Standard	To what extent have the framework conditions played a role in regard to the negative results ? How did the project react to this?	Role of framework conditions in negative results	Document analysis, interviews	Analysis of monitoring system, Interview with project team	moderate

	Standard	To what extent were potential (not formally agreed) positive results and potential synergies between the ecological, economic and social dimensions monitored and exploited?	Synergies of sustainability dimensions	Document analysis, interviews	validation discussion with head of components, interview with project management, implementing partner	moderate

(1) The first and the second evaluation dimensions are interrelated: if the contribution of the project outcome to the impact is low or not plausible (2nd evaluation dimension) this must be considered for the assessment of the first evaluation dimension also.

(2) Broad impact (in German 'Breitenwirksamkeit') is defined by 4 dimensions: relevance, quality, quantity, sustainability. Scaling-up approaches can be categorized as vertical, horizontal, functional or combined. See GIZ (2014) 'Corporate strategy evaluation on scaling up and broad impact: The path: scaling up, the goal: broad impact' (https://www.giz.de/de/downloads/giz2015-en-scaling-up.pdf)

(3) Risks, negative results and trade-offs are separate aspects and are all to be considered.

OECD-DAC Criterion EFFICIENCY (max. 100 points)

Assessment dimensions	**Filter - Project Type**	**Evaluation questions**	**Evaluation indicators (pilot phase for indicators - only available in German so far)**	**Data collection methods** (e.g. interviews, focus group discussions, documents, project/partner monitoring system, workshop, survey, etc.)	**Data sources** (list of relevant documents, interviews with specific stakeholder categories, specific monitoring data, specific workshop(s), etc.)	**Evidence strength** (moderate, good, strong)
The project's use of resources is appropriate with regard to the outputs achieved. [Production efficiency: Resources/Outputs] Max. 70 points	Standard	To what extent are there deviations between the identified costs and the projected costs? What are the reasons for the identified deviation(s)?	Das Vorhaben steuert seine Ressourcen gemäß des geplanten Kostenplans (Kostenzeilen). Nur bei nachvollziehbarer Begründung erfolgen Abweichungen vom Kostenplan.	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard	Focus: To what extent could the outputs have been maximised with the same amount of resources and under the same framework conditions and with the same or better quality (maximum principle)? (methodological minimum standard: Follow-the-money approach)	Das Vorhaben reflektiert, ob die vereinbarten Wirkungen mit den vorhandenen Mitteln erreicht werden können.	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard		Das Vorhaben steuert seine Ressourcen gemäß der geplanten Kosten für die vereinbarten Leistungen (Outputs). Nur bei nachvollziehbarer Begründung erfolgen Abweichungen von den Kosten. Die übergreifenden Kosten des Vorhabens stehen in einem angemessen Verhältnis zu den Kosten für die Outputs. Die durch ZAS Aufschriebe erbrachten Leistungen haben einen nachvollziehbaren Mehrwert für die Erreichung der Outputs des Vorhabens.	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard		Die übergreifenden Kosten des Vorhabens stehen in einem angemessen Verhältnis zu den Kosten für die Outputs.	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard		Die durch ZAS Aufschriebe erbrachten Leistungen haben einen	Efficiency Tool; interviews	Efficiency-tool, project management	good

			nachvollziehbaren Mehrwert für die Erreichung der Outputs des Vorhabens.			
	Standard	Focus: To what extent could outputs have been maximised by reallocating resources between the outputs? (methodological minimum standard: Follow-the-money approach)	Das Vorhaben steuert seine Ressourcen, um andere Outputs schneller/ besser zu erreichen, wenn Outputs erreicht wurden bzw. diese nicht erreicht werden können (Schlussevaluierung). Oder: Das Vorhaben steuert und plant seine Ressourcen, um andere Outputs schneller/ besser zu erreichen, wenn Outputs erreicht wurden bzw. diese nicht erreicht werden können (Zwischenevaluierung).	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard	Were the output/resource ratio and alternatives carefully considered during the design and implementation process – and if so, how? (methodological minimum standard: Follow-the-money approach)	Das im Modulvorschlag vorgeschlagene Instrumentenkonzept konnte hinsichtlich der veranschlagten Kosten in Bezug auf die angestrebten Outputs des Vorhabens gut realisiert werden.	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard		Die im Modulvorschlag vorgeschlagene Partnerkonstellation und die damit verbundenen Interventionsebenen konnte hinsichtlich der veranschlagten Kosten in Bezug auf die angestrebten Outputs des Vorhaben gut realisiert werden.	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard		Der im Modulvorschlag vorgeschlagene thematische Zuschnitte für das Vorhaben konnte hinsichtlich der veranschlagten Kosten in Bezug auf die angestrebten Outputs des Vorhabens gut realisiert werden.	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard		Die im Modulvorschlag beschriebenen Risiken sind hinsichtlich der veranschlagten Kosten in Bezug auf die angestrebten Outputs des Vorhabens gut nachvollziehbar.	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard		Die im Modulvorschlag beschriebene Reichweite des Vorhabens (z.B. Regionen) konnte hinsichtlich der veranschlagten Kosten in Bezug auf die angestrebten Outputs des Vorhabens voll realisiert werden.	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard		Der im Modulvorschlag beschriebene Ansatz des Vorhabens hinsichtlich der zu erbringenden Outputs entspricht unter den gegebenen Rahmenbedingungen dem state-of-the-art.	Efficiency Tool; interviews	Efficiency-tool, project management	good
	Standard	For interim evaluations based on the analysis to date: To what extent are further planned expenditures meaningfully distributed among the targeted outputs?	siehe oben	Efficiency Tool; interviews	Efficiency-tool, project management	good
The project's use of resources is appropriate with regard to achieving	Standard	To what extent could the outcome (project objective) have been maximised with the same amount of resources and the same or better quality (maximum principle)?	Das Vorhaben orientiert sich an internen oder externen Vergleichsgrößen, um seine Wirkungen kosteneffizient zu erreichen.	Interviews	Project team and management	good

the projects objective (outcome). [Allocation efficiency: Resources/Outcome] Max. 30 points	Standard	Were the outcome-resources ratio and alternatives carefully considered during the conception and implementation process – and if so, how? Were any scaling-up options considered?	Das Vorhaben steuert seine Ressourcen zwischen den Outputs, so dass die maximalen Wirkungen im Sinne des Modulziels erreicht werden. (Schlussevaluierung) Oder: Das Vorhaben steuert und plant seine Ressourcen zwischen den Outputs, so dass die maximalen Wirkungen im Sinne des Modulziels erreicht werden. (Zwischenevaluierung)	Interviews	Project team (head of components) and management	good
	Standard		Das im Modulvorschlag vorgeschlagene Instrumentenkonzept konnte hinsichtlich der veranschlagten Kosten in Bezug auf das angestrebte Modulziel des Vorhabens gut realisiert werden.	Interviews	Project team (head of components) and management	good
	Standard		Die im Modulvorschlag vorgeschlagene Partnerkonstellation und die damit verbundenen Interventionsebenen konnte hinsichtlich der veranschlagten Kosten in Bezug auf das angestrebte Modulziel des Vorhaben gut realisiert werden.	Interviews	Project team (head of components) and management	good
	Standard		Der im Modulvorschlag vorgeschlagene thematische Zuschnitte für das Vorhaben konnte hinsichtlich der veranschlagten Kosten in Bezug auf das angestrebte Modulziel des Vorhabens gut realisiert werden.	Interviews	Project team (head of components) and management	good
	Standard		Die im Modulvorschlag beschriebenen Risiken sind hinsichtlich der veranschlagten Kosten in Bezug auf das angestrebte Modulziel des Vorhabens gut nachvollziehbar.	Interviews	Project team (head of components) and management	good
	Standard		Die im Modulvorschlag beschriebene Reichweite des Vorhabens (z.B. Regionen) konnte hinsichtlich der veranschlagten Kosten in Bezug auf das angestrebte Modulziel des Vorhabens voll realisiert werden.	Interviews	Project team (head of components) and management	good
	Standard		Der im Modulvorschlag beschriebene Ansatz des Vorhabens hinsichtlich des zu erbringenden Modulziels entspricht unter den gegebenen Rahmenbedingungen dem state-of-the-art.	Interviews	Project team and management, FMB, BMZ	good
	Standard	To what extent were more results achieved through cooperation / synergies and/or leverage of more resources, with the help of other ministries, bilateral and multilateral donors and organisations (e.g. co-financing) and/or other GIZ projects? If so, was the relationship between costs and results appropriate or did it even improve efficiency?	Das Vorhaben unternimmt die notwendigen Schritte, um Synergien mit Interventionen anderer Geber auf der Wirkungsebene vollständig zu realisieren.	Interviews	Project team and management, KFW, PTB, USAID	good
	Standard		Wirtschaftlichkeitsverluste durch unzureichende Koordinierung und Komplementarität zu Interventionen anderer Geber werden ausreichend vermieden.	Interviews	Project team and management, KFW, PTB, USAID	good
	Standard		Das Vorhaben unternimmt die notwendigen Schritte, um Synergien	Interviews	Project team and management, other GIZ projects	good

			innerhalb der deutschen EZ vollständig zu realisieren.			
	Standard		Wirtschaftlichkeitsverluste durch unzureichende Koordinierung und Komplementarität innerhalb der deutschen EZ werden ausreichend vermieden.	Interviews	Project team and management, KFW, PTB, USAID	good
	Standard		Die Kombifinanzierung hat zu einer signifikanten Ausweitung der Wirkungen geführt bzw. diese ist zu erwarten.	n.a.	n.a.	
	Standard		Durch die Kombifinanzierung sind die übergreifenden Kosten im Verhältnis zu den Gesamtkosten nicht überproportional gestiegen.	n.a.	n.a.	
	Standard		Die Partnerbeiträge stehen in einem angemessenen Verhältnis zu den Kosten für die Outputs des Vorhabens.	n.a.	n.a.	

OECD-DAC Criterion SUSTAINABILITY (max. 100 points)

Assessment dimensions	**Filter - Project Type**	**Evaluation questions**	**Evaluation indicators**	**Data collection methods** (e.g. interviews, focus group discussions, documents, project/partner monitoring system, workshop, survey, etc.)	**Data sources** (list of relevant documents, interviews with specific stakeholder categories, specific monitoring data, specific workshop(s), etc.)	**Evidence strength** (moderate, good, strong)
Prerequisite for ensuring the long-term success of the project: Results are anchored in (partner) structures. Max. 50 points	Standard	What has the project done to ensure that the results can be sustained in the medium to long term by the partners themselves?	Measures identified for sustainability	Interviews	Implementing partners of four components	good
	Standard	In what way are advisory contents, approaches, methods or concepts of the project anchored/institutionalised in the (partner) system?	Degree of instituionalization of results	Interviews, participatory observations, document analysis	Implementing partners of four components, site visits of pilot projects, energy reports and reports from think tans	moderate
	Standard	To what extent are the results continuously used and/or further developed by the target group and/or implementing partners?	Examples from partners	Interviews	Implementing partners of four components, energy reports and reports from think tanks	moderate
	Standard	To what extent are resources and capacities at the individual, organisational or societal/political level in the partner country available (long-term) to ensure the continuation of the results achieved?	Degree of capacities used	Interviews	Implementing partners of four components	good
	Standard	If no follow-on measure exists: What is the project's exit strategy? How are lessons learnt for partners and GIZ prepared and documented?	Perception on project's exit strategy		Implementing partners of four components	moderate

	and Fragility	To what extent was the project able to ensure that escalating factors/dividers (1) in the context of conflict, fragility and violence have not been strengthened (indirectly) by the project in the long-term? To what extent was the project able to strengthen deescalating factors/connectors (2) in a sustainable way (3)?	Perception of sustainability of conflict factors	Interviews	Interviews with key partners, PTB, KFW	moderate
Forecast of durability: Results of the project are permanent, stable and long-term resilient. Max. 50 points	Standard	To what extent are the results of the project durable, stable and resilient in the long-term under the given conditions?	Perception of partners and GIZ team	Interviews	Interviews with key partners, validation with project team	moderate
	Standard	What risks and potentials are emerging for the durability of the results and how likely are these factors to occur? What has the project done to reduce these risks?	Perception of partners and GIZ team	Interviews	Interviews with key partners, validation with project team	moderate

(1) Escalating factors/ dividers: e.g. destructive institutions, structures, norms and behavior. For more details on 'dividers' see: GIZ (2007): 'Peace and Conflict Assessment (PCA). Ein methodischer Rahmen zur konflikt- und friedensbezogenen Ausrichtung von EZ-Maßnahmen', p. 135.

(2) Deescalating factors/ connectors: e.g. peace-promoting actors and institutions, structural changes, peace-promoting norms and behavior. For more details on 'connectors' see: GIZ (2007): 'Peace and Conflict Assessment (PCA). Ein methodischer Rahmen zur konflikt- und friedensbezogenen Ausrichtung von EZ-Maßnahmen', p. 55/135.

(3) All projects in fragile contexts, projects with FS1 or FS2 markers and all transitional aid projects have to weaken escalating factors/dividers and have to mitigate risks in the context of conflict, fragility and violence. Projects with FS1 or FS2 markers should also consider how to strengthen deescalating factors/ connectors and how to address peace needs in its project objective/sub-objective?

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