General Terms of Reference

Indo – German Energy Program - Green Energy Corridors (IGEN – GEC)

Dimensioning of Control Reserves in Southern Region Grid States

PN 14.2298.9-002.00

A. Project Description

A.1 Description of the assignment

I. Objectives and indicators
II. Target group(s) and other stakeholders
III. Lead executing agency and implementing organisations

B. Terms of Reference

I. General Terms of Reference for the Consultant
II. Detailed specifications of the tasks
III. Specification of inputs
IV. Further requirements

a. Project Description

The extensive targets for the capacity increase of wind and solar power plants in India for the next few years mandates that significant efforts have to be made to be able to efficiently integrate these intermittent Renewable Energy (RE) generators into the Indian electricity grid. The Government of the Republic of India and the Government of the Federal Republic of Germany share a long standing, trustful and successful development cooperation. Sustainable access to clean energy is a major focus of this bilateral cooperation. Both countries share a policy with a view to extending the role of RE in their national energy strategy. With this objective the Green Energy Corridor – Technical Cooperation project was initiated under Indo – German Energy Programme (IGEN) of Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH to assist the Indian government (and government agencies) in the area of large scale integration of renewable energy.

A.1 Description of the assignment

Balancing of demand and supply is an important task of planners and operators of power systems. Short term control reserves are required to balance the electricity grid. Automatic Generation Control (AGC) is still in pilot phase. This assignment aims at quantifying the requirement of primary and secondary control reserves for balancing in the southern region taking into consideration the RE capacity addition plans of southern region States by 2022.

I. Objective and Indicator

The broad objective of the IGEN – GEC project is to ensure that the conditions for grid integration of renewable energies have been improved. In this particular assignment, the objective is to provide specific sets of recommendations to SRPC for control reserve requirement identification by 2022 in south Indian States backed with a scientific methodology. The objective is measured by the following indicators

1. Methodology for dimensioning of control reserves is submitted to SRPC
2. Dimensioning of State wise, regional control reserve requirement by 2022 in southern region
3. Quantitative showcasing of benefits, if any, of reserve sharing within the existing policy dimensions in India

II. Target group(s) and other stakeholders

The major target group of the consulting work is the Southern Regional Power Committee (SRPC). Relevant power planning and grid operation agencies in the States of Andhra Pradesh, Karnataka, Kerala, Telangana and Tamil Nadu and Southern Regional Load Despatch Centre (SRLDC) are also the relevant stakeholders.

III. Lead executing agency and implementing organisations

Lead executing agency and implementation organization will be SRPC on behalf of the Government of India. SRPC is responsible for facilitating the stable and smooth operation of the integrated grid with economy & efficiency in the operation of power system in the southern region comprising the states of Andhra Pradesh, Karnataka, Kerala, Telangana, Tamil Nadu and Union Territory of Puducherry. In view of 175 GW RE capacity addition plan by 2022, SRPC is undertaking numerous steps to ensure safe and secure operation of electricity grid in southern region.

b. Terms of Reference

I. General Terms of Reference for the Consultant

The Terms of Reference (TOR) covers the scope and deliverables by the Consultant to develop the methodology for reserve dimensioning and actual dimensioning of different types of reserves for each of the State in southern India (barring the Union Territory of Puducherry) by 2022. The following are the main tasks of this assignment:

a) Identification of types of reserves required at southern State and/or regional level

b) Detail out a methodology for reserve dimensioning

c) Reserve dimensioning using appropriate simulation method for 5 southern Indian States

d) Investigate the reserve sharing potential by southern region States

The Consultant shall provide consultancy to come up with an analysis of the requirements suitable for Indian power system and propose an according work schedule and time plan for

GIZ to work with the Indian side. This is important to note that SRPC will strive to provide the data required under this assignment, to the extent available.

The main activities outlined in the TOR document provide a guideline for the activities envisaged but the Consultant is expected to adjust flexibly to changing demands for support. The individual mobilization of the experts will be coordinated by the GIZ project coordinator in India in close coordination with the Indian partners.

The consultancy includes field visit and organisation of seminar and/or round table talks with relevant stakeholders on need basis.

Monitoring and evaluation

The Consultant will have to submit monthly (or on request) status report to GIZ in a format pre-agreed during the kick-off meeting.

II. Detailed Specifications of the tasks

This assignment consist of four major tasks. Details of these tasks are provided in the following section:

Task 1: Identification of types of reserves required at southern State(s) and/or at regional level

Consultant will identify the type of reserves (primary and secondary control reserve) required at State level in consultation with the SRPC constituent States (namely Andhra Pradesh, Karnataka, Kerala, Telangana and Tamil Nadu). A justification of the level (State or region or both) at which the control reserves are required is to be provided keeping the concept of reserve optimisation and power system structure in India in consideration.

Deliverables of Task 1:

A report containing the details of consultations with States and proposed recommendations.

Task 2: Detail out a methodology for reserve dimensioning

Consultant will propose a methodology for dimensioning of primary and secondary control reserves at State/ regional level highlighting the data requirements. This methodology will be discussed with SRPC and State(s) in order to consider their views and suggestions on the proposed methodology.

Deliverables of Task 2:

A report containing the reserve dimensioning methodology along with data requirements.

Task 3: Reserve dimensioning using appropriate simulation method for 5 States

Based on the outputs of task 1 and task 2, consultant will quantify / dimension the primary and secondary control reserves required at State / regional level in 2022 power scenario. The consultant is expected to propose a simulation method for carrying out this dimensioning exercise in their offer. The consultant must consider conventional and RE capacity addition plans up to the year 2022 while dimensioning the reserves. Relevant available data for this exercise will be provided by the respective States. SRPC will facilitate the data collection process.

Deliverables of Task 3:

One report for each State / region on the outcome of simulations for quantification of control reserves in 2022 power scenario.

Task 4: Investigate the reserve sharing potential by southern region States

The consultant will quantify, with at least two examples, the economic benefits of reserve sharing by States in south India. Barrier in reaping these economic benefits will also be highlighted.

Deliverables of Task 4:

A report containing the detailed analysis and at least two examples showcasing the economic benefits of reserve sharing at regional level.

The Consultant may have to visit SRPC, energy departments, regulators and utilities of 5 south Indian States namely Andhra Pradesh, Karnataka, Kerala. Telangana and Tamil Nadu.

The Consultants may be required to provide some small additional services/travel on ad-hoc basis if some urgent request comes from Indian partners.

Eligibility Criteria

Consulting organisation must have:

- Minimum average annual turnover of Euro 400,000 (equivalent INR) for the last three financial years.
- Minimum 12 number of full time employees as on December 31, 2017.
- At least 2 projects completed in the field of RE grid integration in general and on control reserve concept in particular. At least 3 projects completed in southern Indian States (i.e., Andhra Pradesh, Karnataka, Kerala, Telangana and Tamil Nadu). Minimum commissioning value of these reference projects must be Euro 30,000 or above.
- At least 3 years project experience on policy, regulatory & market aspects of large scale RE Grid integration in India
- At least 3 years project experience on power market simulations
- Prior experience of working with south Indian States i.e., Andhra Pradesh, Karnataka, Kerala, Telangana and Tamil Nadu on power sector related issues.

The parameters/criteria's for evaluation are also listed in the evaluation sheet named *Assessing eligibility of consulting firms*.

III. Specification of Inputs

Assignment of personnel

In total the contract has a volume of up to 180 working person days to be covered by national or international short term experts.

Sr. No.	Expert	Person - days
1	Team Lead	15 person days[1]
1	Pool of experts in control reserve markets and control reserve dimensioning (3 experts)	90 person days
2	Pool of experts in Power Policy, Regulations and Market in India (3 experts)	75 person days

Person-days for field visits have already been included in the above mentioned tasks. The Consultant will visit all the five mentioned States for meeting the key stakeholders and collection of data. Tentatively the experts may have to spend 40 person days in the target States. The consultant should include the overhead costs in the person day cost only.

Definition of senior Consultant level: At least 10 years of experience in the area of expertise the expert is supposed to cover in the above mentioned set of areas.

Definition of Consultant level: At least 5 years of experience in the area of expertise the expert is supposed to cover in the above mentioned set of areas.

Interns cannot be taken into consideration.

Language requirements: Fluency in English in writing and speaking is must for all experts.

International and domestic (India) travel: The consultants will be required to travel to different States in southern part of India for data collection, meetings and stakeholder consultation seminar. The consultant must include all the travel, lodging and boarding related costs in their offer. Tentatively up to 18 domestic return flights and 4 international return flights *(applicable only if international experts are part of the proposal)* could be included in the budget offer.

Brief Profile of Experts

a) **Team Lead**: S/he must be an expert in senior consultant level preferably from either of the pools mentioned below {b) and c)}. S/he should also have experience of managing and implementing complex international projects wherein co-ordination with multiple stakeholders was required.

b) **Pool of experts in control reserve market and control reserve dimensioning**: This pool must have 3 senior consultant level experts having proven experience in control

[1] Exclusively for meetings, project management and coordination activities

reserve requirements, control reserves market design and control reserve dimensioning. At least 2 experts must be having proven experience of simulating power systems and/or using software simulation methods to quantify control reserve requirements.

c) **Pool of experts in power policy, regulations and markets in India:** This pool must have 3 experts having proven experience of power policy, regulations and markets in southern Indian States. The pool, with at least one senior consultant, collectively must have experience of working with all the five select States on the areas related to integration of large scale renewable energy in the grid.

Timeframe of the contract

The contract would be awarded for a duration of 6 months.

Items of equipment

Not applicable.

Expendable goods

Not applicable.

Workshops, training and upgrading

Roundtable discussions with key stakeholders are expected under this assignment. GIZ will bear the cost of venue and other arrangements separately, if need be.

Design, printing, communication and workshop material cost

The consultant will design and print the task reports, broachers and workshop material. The consultant may propose a suitable budget for this. However, during implementation, use of this budget item has to be approved by the responsible person on GIZ side.

IV. Further Requirements

a) The proposal should contain the following information:

- Interpretation of objectives, strategy (technical concept), implementation method, work and time schedule, monitoring and evaluation concept, knowledge and information management, backstopping concept, and detailed CVs
- possible alternative concepts, including time and personnel involved
- a personnel assignment plan (giving alternatives, if necessary) with details of the personnel to be engaged in the individual fields of work and their periods of assignment and on the position to be held by the individual experts in this assignment
- Curricula vitae (CVs) of the experts designated for the assignment. The CVs are to be in tabular form and should cover the following points in the given order: Name, date of birth, nationality, professional training / higher education, language skills with an indication of the level (categories: native speaker, competent, basic, rudimentary), professional experience specifying the employer, duration of

employment, scope of duties and periods of employment, management experience and scope (partner and foreign experts), relevant work experience, as well as publications by the candidates if applicable.

b) The entire proposal including approach and methodology, including modelling tool and software proposed, CVs etc., needs to be in English. GIZ may ask the shortlisted consultants to make a presentation of their technical bid.

c) Backstopping-services need to be specified. Back stoppers have to be listed and need to be available during the contract duration.

d) All activities including travels, meetings and tasks in different focus areas need to be aligned with the GIZ project co-ordinator (to be nominated by GIZ in the beginning of this assignment).

e) Experts should be proposed within the specified categories. It is strongly desired that the experts proposed within these categories should only work on the tasks where their expertise is required.

f) Each expert proposed for the study and whose CV has been used for technical evaluation has to declare bindingly that s/he shall be available for executing their respective tasks within the assignment until the assignment term.

g) The proposed consultants need to be available from the first day of the official start of the assignment till the end of the assignment.

h) The proposed consultants should be included in all communication, coordination meetings with the GIZ team and should as well be available for making presentations /participate in meetings with the relevant stakeholders.

i) The experts assigned to the assignment will be agreed contractually. It has to be confirmed that only these experts will work on the tasks under the assignment. Any deputation can only be agreed for relevant cause such as sick leave or expert leaving the company but has to be communicated and aligned with the GIZ coordinating team well in advance.

j) The proposal should clearly line out how the consultants complement each other according to their fields of expertise to give evidence that all relevant tasks are covered appropriately.

k) In case different consultants form a consortium,

    1) Lead consortium partner must be an organisation registered in India.

    2) A clear proposal (based on deliverables) is to be submitted along with clear definition of the roles and responsibilities of each member of the consortium.

l) The evaluation of the proposal will follow the attached evaluation matrix.

m) At the beginning of each step, a work-plan has to be submitted to GIZ for alignment.

n) The different steps/ activities shall be documented in a professional manner to be shared with the relevant stakeholders for information dissemination.

o) The consultant should at all times of the assignment possess the copyrights (licenses in the case of software packages) of the documents, pictures, technical papers, standards used in the study.

p) Cost of venue, food etc. for organizing round-tables, workshops shall be borne by GIZ separately. All travel, accommodation, food etc. for the Consultant has to be borne by them and have to be budgeted in their proposal. Expenses incurred can only be reimbursed if sufficient bills / proofs are submitted to GIZ as desired. All costs related to participants shall be borne either by the participants themselves or by GIZ separately.

q) The consultant should propose the software to be used in their technical bids and highlight the benefits and limitations related to the assignment. **It is to be noted that there is no budget provision for licensing of software under this assignment.**