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General Terms of Reference
Project: Grid integration of renewable energy and demand side energy efficiency
Project no.: 14.2298.9-004.00
Tender: Smart Home Program Technology Assessment Study and Pilot Design, IGEN-EERB
Contract No. XXXXX

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List of abbreviations

BAI	Building Association of India
BEE	Bureau of Energy Efficiency
CREDAI	Confederation of Real Estate Developers' Associations of India
DISCOMs	Distribution companies
ECBC	Energy Conservation Building Code
ECBC-R	Energy Conservation Building Code- Residential Building
EC Act	Energy Conservation Act
EE	Energy Efficiency
EEB	Energy Efficiency in Building
ESCOs	Energy Services Companies
FSI	Financial Services industry
GHG	Green House Gas
IGEN	Indo German Energy Program
LCC	Life Cycle Cost
MEPS	Minimum Energy Performance Standards
MNRE	Ministry of New and Renewable Energy
MoP	Ministry of Power
MoUD	Ministry of Urban Development
M&V	Measurement and Verification
NAPCC	National Action Plan for Climate Change
NMEEE	National Mission on Enhanced Energy Efficiency
NDC	Nationally Determined Contributions
NREDCO	National Real Estate Development Council
NZEB	Net Zero Energy Building
ULBs	Urban Local Bodies
TCs	Technical Co-operation
ToR	Terms of Reference

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1 Project description

1.1 Brief description of the project

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is an International Cooperation Enterprise for sustainable development which operates worldwide, on a public benefit basis. GIZ is fully owned by the German Federal Government and implements development programs in partner countries on its behalf in order to achieve the German development policy objectives.

The Federal Republic of Germany and the Federal Republic of India have, under the Indo German Technical Cooperation, agreed to jointly promote the "Indo-German Energy Programme" (IGEN) with the aim to promote energy efficiency/conservation in energy consumption so to use energy more efficiently and in turn improve the environment/climate protection. In the forefront of GIZ and the Bureau of Energy Efficiency (BEE) working together for the current policy environment is beginning to promote energy efficiency and the execution of national and state level programs will be the key determinants of its success. India's National Action Plan on Climate Change (2008) points to building efficiency measures as essential to carbon emission reduction.

The Energy Efficiency Building Programme is aligned with the commitments made by the Indian Government to meet its objectives submitted under NDCs.

Smart, Energy Efficient Homes

India is expected to continue to be one of the fastest-growing economies in the world over the next several decades. The combined impact of rapid economic growth, rising per capita income, growing population, and accelerated urbanization in a largely tropical climate, is expected to drive up India's building sector energy consumption faster than anywhere in the world—by an average of 2.7% per year between 2015 and 2040, more than twice the global average increase. Most of this growth (about 70%) in building sector energy demand in India is driven by the residential (domestic) sector. As more people have access to electricity and ownership of electric appliances (particularly air conditioners) grows, it is expected that residential electricity consumption will increase nearly twice as fast as the total residential energy use (electricity and fuels combined) from 2015 to 2040 (IEA, 2017b). Assuming no significant change under a business-as-usual scenario, India's residential electricity demand has been predicted to increase eightfold by 2050.

While this growth in electricity demand is inevitable in light of India's economic progress, and is essential for the well-being and productivity of its people, the significant increase in additional power generation capacity required, the peak load impacts, and resultant increased emissions (as fossil fuels account over 80% of electricity generation) are squarely at odds with India's global climate change commitments and pose severe environmental and societal risks. In recognition of these challenges, India's Nationally Determined Contributions (NDCs) position the building sector as a policy priority and at the centre of national energy and climate policies going forward.

International experience suggests that with the support of forward-looking legal, regulatory and policy frameworks in the electricity sector, smart homes concept offer a major opportunity to reduce power consumption in the building sector, save on energy costs, and avoid costly capital investment towards augmentation of capacity for electricity generation. However, smart homes are largely non-existent for India's residential sector today, representing significant untapped potential for achieving grid-wide energy efficiency gains.

With the transformation of energy systems, the appliances and devices are getting more intelligent. One hand smart grid concept is getting promoted on the other hand new digital technologies involving artificial intelligence, Internet of things, blockchain etc. are getting popular in various domains including energy sector. Although residential building sector contributes significantly to the overall energy demand in the country, the importance of "behind the meter energy optimization" using smart devices and home automation concepts are not yet gained momentum in the country. Overall projection of electrical load from residential sector is very high actually because of mainly air conditioning devices. Therefore, the need of increase in energy efficiency, dynamic optimization of energy consumption, and integration with the overall smartness of the electrical distribution network becomes the need of the hour. There had been sporadic instances of trial of Demand Response, mostly manually operated and for industrial consumers, by very few DISCOMs in the country so far.

1.2 Description of Technical Cooperation (TC)

1.2.1 Objectives

GIZ has supported Government of India, through its statutory agency Bureau of Energy Efficiency, in developing and implementing policies for increasing energy efficiency in the building sector. In a parallel movement, the Government of India has launched measures to augment capacity of grids to anticipate and control energy demand through digital, remotely controlled technologies.

At some point in future, this generation of building energy efficiency policies and, smart supply and transmission infrastructure beginning to be built will have to be seamlessly integrated for attaining maximum energy use optimization in building sector. Essentially building energy efficiency polices will have to mandate buildings and building technologies to be designed for participation in a dynamic energy supply and management framework.

GIZ intends to understand the technologies, application potential in India and the optimal approach for informing demand response or automation centric building energy efficiency policies in future. The agency will recruit a consultant for reviewing global practices, evaluating technologies for home automation and developing a pilot program that highlights benefits and challenges.

1.2.2 Target group and other stakeholders

The target group of the consulting work consists of the relevant staff members of MoP, MoUD, BEE, State Designated Agencies, CPWD & State PWDs, State Urban Development

Ministry, ULBs, City Planners, manufacturers/processors/suppliers/retailers Municipalities, and Green Building certification bodies in India.

1.2.3 Lead executing agency and implementing organization

Lead executing agency and implementation organization will be BEE on behalf of the Ministry of Power, Government of India. The Government of India set up Bureau of Energy Efficiency (BEE) on 1st March 2002 under the provisions of the Energy Conservation Act, 2001. The mission of the Bureau of Energy Efficiency is to assist in developing policies and strategies with a thrust on self-regulation and market principles, within the overall framework of the Energy Conservation Act, 2001 with the primary objective of reducing energy intensity of the Indian economy. This will be achieved with active participation of all stakeholders, resulting in accelerated and sustained adoption of energy efficiency in all sectors.

1.3 Profile of Bidder/Consultant/Consulting Firm

1.3.1 Eligibility Criteria for Bidder/ Consultant/ Consulting Firm [Assessing Eligibility Grid]

- Average annual turnover for the last three financial years (last- but- four financial can be included in case of invitation to tender held within six months of end of last financial year): At least 100,000 Euro (Copy of related document must be submitted) (Ref Sr No. 9)
- Number of employees as at 31.12 of the previous year: Minimum 20 employees (Copy of related document) (Ref Sr No. 10)
- The technical assessment is only based on reference projects with a minimum commission value of 20,000 Euro (Copy of related document) (Ref Sr No. 13)
- Experience in designing and implementing advanced energy monitoring or control programs for building energy efficiency in 5 projects (Ref Sr No. 15)
- Experience in integrating or designing advanced controls for building systems and appliances in 3 projects in the last 3 years (Ref Sr No. 16)

1.3.2 Technical Experience

Experience in the following will required to undertake this assignment

- Conducting techno-economic analysis for technology solutions for building energy efficiency
- Designing programmes for large scale household energy monitoring and management
- Application of digital technologies or IoT based solutions for energy efficiency in buildings
- Formulating and implementing policies for building energy efficiency
- Experience in building energy efficiency pilot design and implementation

2 Terms of Reference

2.1 Contractor's profile

The agency shall be consisting of team of experts in the field of efficient building design, energy efficiency policy development, building labelling, energy efficiency financing, energy simulation, and green building certification. The contractor must have worked in energy efficiency policy advisory and planning for buildings and appliances. The experience of the agency shall also be counted through International and national level policy formulation.

The agency should have worked on development of the Energy Efficiency projects in building and should have supported in International and national programs on Energy Efficiency in building, training and awareness, impact assessment, and implementation. The experience of data collection & analysis, benchmarking, energy savings analysis, GHG impact assessment, and developing large scale implementation programs shall be an added advantage.

2.2 General Terms of Reference for the Contractor

The Terms of Reference (ToR) covers the scope and deliverables by the Contractor to include the energy efficient building materials for buildings in India. The Contractor will be required to carry out market survey so as to assess technology which is presently available in the market.. The tender involves coordination with BEE, GIZ, home automation system manufacturers within stipulated timelines.

The main activities outlined in this tender document provide a guideline for the activities envisaged by the Contractor is expected to adjust flexibly to changing demands for support. This tender solicits to develop the list following the strict timelines; the mobilization of activities will be based on demand and needs of the project tasks, and coordinated by the GIZ project coordinator in India in close coordination with the Indian partners and experts of the contractors.

The Contractor is required to execute the work by involving pool of experts who will be undertaking the desired survey and research activities. The pool has to consist of a mix of senior and mid level experts. A consortium or joint venture can be formed to submit one single bid. A consortium/joint venture needs to appoint one consortium/joint venture leader who will take over all communication and represents the contracted parties in front of GIZ and third parties. No cross-communication to GIZ (via other consortium/joint venture members) will be accepted by GIZ.

The staff members seconded by the Contractor must co-operate closely with the GIZ project co-ordinator. The Contractor will have to submit quarterly (and on request) project status report to GIZ in the prescribed format (in the format provided in annexure A). The activities include seminars, workshops and round table talks with stakeholders at state-level and national level.

The Contractor shall provide documented proofs of internationally acquired experience. The objective of the contract is to make available state of the art information about energy

efficient building materials presently available in the Indian market. The final report must highlight impact of present as well as future material over policy roadmap in Indian residential building sectors for developing the energy efficiency for residential building.. The Contractor mandatorily needs to demonstrate adequate technical knowledge and experience in the Building comfort systems domain. The Contractor is also expected to be familiar or to familiarize him/herself with:

- The objectives of the national energy policy, National Building Code, ECBC 2017, ECBC-R development stages, and the energy policy on state levels of India as well as other relevant documents and regulations .
- The interests of all stakeholders.

2.3 Short description of the work packages

The purpose of this assignment is to study and prioritize technologies in India most feasible for automating control of household envelope, systems and appliances to increase efficient use of energy. Findings of this study will feed the design of a first demonstration or test bed for Smart Homes. In the context of this assignment, a Smart Home is defined as one that uses home automation technologies for enhanced operational energy efficiency and management, and, to be demand response ready. The pilot program should also scrutinize integration of Smart Homes in the demand response framework of utilities. It must also conclude:

1. Appropriate concepts for integrating smart, demand response ready building technologies in residential building energy efficiency polices, cost effectively
2. Strategies for incentivizing consumers and utilities to respectively participate in and start demand response programs

Consultant shall examine devices and software solutions for automating controls and monitoring of comfort conditions, natural and artificial lighting, space cooling and heating appliances or systems, dynamic shading and openings and any other appropriate solutions.

The entire activity is divided into following work packages:

a. WP1: Review Global Policies and Market Trends
b. WP2: Technology Prioritization
c. WP3: Design Smart Homes Community Scheme

2.4 Detailed Specifications (Work Packages)

The assignment is divided into three work packages, leading to development of a pilot program that should test benefits and limitations of using home automation technologies to make building energy efficiency policies more receptive to smart, demand response energy supply systems.
An objective assessment of international policies dictating the design and deployment of home automation technologies will be conducted to understand framework and infrastructure

required in India for encouraging home automation. The consultant will evaluate and prioritize home automation technologies appropriate and ready for large scale deployment through a comprehensive techno-economic analysis.

2.4.1 Technology Mapping and Baseline Assessment

a. Technology Mapping

- Mapping of major Home Automation technologies (including both software and hardware) currently available in National and International market
- Technology review to understand hardware and software solutions, challenges with respect to cyber security and the required realignment of individual privacy concepts in India
- Capture sufficient product performance data (both manufacturer claimed and independent test reports) to demonstrate the efficiency of materials and products currently available on the market
- Review application of Artificial Intelligence (data analytics and machine learning), IoT, Blockchain technology in Home Automation systems

b. Baseline Assessment

- Conduct an assessment of consumer technology markets in India to understand the IoT and advanced residential energy use management products that appeal to Indian consumers.
- Assess the size of the national market for Home Automation Systems (including installed stock, market share of major manufacturers, and distribution channels)
- Assess impact of the building energy codes and green building certifications on materials / products currently available on the market
- Market Dynamics (Drivers, Constraints and Opportunities)
- Market Segmentation and Analysis (Market Size, Growth, and Forecast)
- Develop a forecast for market growth of Home Automation Systems in India. The forecast should be accompanied by an analysis of key drivers of market penetration and growth including, but not limited to, product features and options, service options that affect consumer choice
- Develop and execute a comprehensive data collection process, including the development and dissemination of a detailed questionnaire, outreach to manufacturers and other key stakeholders, and final data collection, management, and analysis
- Identify the barriers that exist to increased market penetration of Home Automation Systems. This should include barriers related to manufacturing, technology, consumer issues (service, price, quality, etc.), and policy implementation

- Conduct a literature review to provide examples of global best practices for market transformation and recommendations for ways to overcome the barriers identified

Deliverables:

1. Detailed report on Technology Mapping that covers the following:
    - Identifying hardware and software solutions at building and community level
    - Case studies on demand response ready, energy efficient homes
2. Comprehensive report on Baseline Assessment that encompasses all sub-tasks identified above; and presents all final analyses, recommendations, and conclusions
3. One stakeholder workshop to present outcomes of Technology Mapping and Baseline Assessment

2.4.2 Review Global Policies and Develop National Policy Roadmap

a. Review international standards guiding design and application of technologies (both hardware devices and software) for smart homes

b. Review international policies, programs or roadmaps for promoting smart, demand response ready homes to achieve energy demand optimization from home to community level

c. Study international examples of intelligent application of energy efficient home automation systems

d. Develop National Policy Roadmap for home automation technologies for residential energy efficiency that can be scaled up in India at home, building, and community level.
    - Assess energy savings, implementation cost and capabilities
    - Conduct a techno-economic analysis to prioritize scalable, high impact home automation solutions
    - Guidelines for integration of Home Automation System requirements in Building Energy Codes

Deliverables:

1. Report on global policies for using home automation devices for demand side energy management
2. Report on techno-commercial analysis and compendium of high impact technologies for energy efficient, demand response ready homes
3. Guidelines for integration of Home Automation System requirements in Building Energy Codes
4. National Policy Roadmap for home automation technologies

5. One stakeholder workshop to present National Policy Roadmap for home automation technologies

2.4.3 Design Smart Homes Community Scheme

Develop a scheme to understand the cost implications and energy conservation potential of home automation devices for energy efficiency will be designed by the Consultant. This pilot must eventually enable understanding of optimal strategies encouraging smart home automation through building energy efficiency polices like Residential Energy Labelling Program, Eco-Niwas Samhita etc. The pilot will test the feasibility of promoting smart homes, technological solutions and implications of integrating demand response ready, smart homes in future residential building energy efficiency policies.

a. Design a smart home pilot program that includes
    1. Pilot objectives and anticipated outcomes
    2. Technology specifications
    3. Cost implications for hardware, software and human resources
    4. Implementation plan
    5. Pilot design and eligibility requirements
    6. Key tasks and their timelines

Deliverables:

1. Smart Home Pilot Program Design Report

2.5 Specification of Inputs

2.5.1 Assignment of personnel

In total, the contract is projected to have a volume of up to 240 man-days; however, bidders are expected to draw a detail expert-days distribution as per the table of Expert-day schedule & activities, to optimize the project timeline with a streamlined and efficient approach.

S.No.	Expert Category	Tentative expert-days
1	Team Lead	40 expert days
2	International Expert-1 (Residential Energy Monitoring)	10 expert days
3	International Expert-2 (Home Automation Solutions)	10 expert days
4	Pool of consultants on Residential Energy Monitoring	90 expert days
5	Pool of consultants on Home Automation Solutions	90 expert days

2.5.2 Brief Profile of Experts

1. Team Lead: [2.1]

- The team lead should be an Engineering Graduate or Architect. (2.1.1)
- S/he should be a senior consultant having minimum 10 years of experience (2.1.3)
- Experience in integrating and applying IT solutions in buildings for enhancing energy efficiency. (2.1.4)

- Knowledge of developing software or hardware solutions for energy efficiency and demand side energy management is necessary. (2.1.4)
- S/he should have experience of designing and implementing large scale residential energy management and control programs (2.1.4)
- Demonstrated the leadership and management of building IT and Control system implementation and team (2.1.5)
- Must have regional experience of building energy efficiency or building Control System in India (2.1.6)
-

2. **International Expert-1 (Residential Energy Monitoring)**: **[2.2]**

- The International Expert should possess degree in Engineering or Architecture. (2.2.1)
- International Consultant with minimum 15 years of overall experience (2.2.3)
- Knowledge of applying advanced monitoring solutions in residential buildings and implementing large scale building energy management and control programs and advising building energy efficiency policies. The expert should be associated with an International research institute.(2.2.4)
- Demonstrated the leadership skill and management of building IT and Control system implementation and team (2.2.5)
- Must have regional experience of building energy efficiency or building Control System in India (2.2.6)
-

3. **International Expert-2 (Home Automation Solutions)**: **[2.3]**

- The International Expert should possess degree in Engineering or Architecture. (2.3.1)
- International Consultant with minimum 15 years of overall experience (2.3.3)
- Knowledge of developing and applying home automation solutions in households and advising building energy efficiency policies. The expert should be associated with an International research institute. (2.3.4)
- Demonstrated the leadership skill and management of building automation and building energy efficiency automation and team (2.3.5)
- Must have regional experience of building energy efficiency or building automation in India (2.3.6)

4. **Pool of Consultants on Residential Energy Monitoring: [2.6]**

The contractor should propose a pool of experts having experience in in applying advanced monitoring and control solutions in residential buildings. At least 15 man-days should be proposed in the category of senior consultant in this pool.

- Should be an Engineering graduate or Architect. (2.6.1)
- At least 5 years of experience in the area of expertise the professional is supposed to cover in the project context. (2.6.3)

- Understanding of building demand management, energy efficiency strategies is necessary. Experience in design of energy efficient buildings and techno-economic analysis for efficient building technologies will be preferred. (2.6.4)
- Must have regional experience of building energy monitoring System in India (2.6.5)
- Experience in working with Development Organisation (2.6.6)

5. **Pool of Consultants on Home Automation Solutions: [2.7]**

   The contractor should propose a pool of experts having experience in in applying advanced monitoring and control solutions in residential buildings. At least 15 man-days should be proposed in the category of senior consultant in this pool.

- Should be an Engineering graduate or Architect. (2.7.1)
- At least 5 years of experience in the area of expertise the professional is supposed to cover in the project context. (2.7.3)
- Understanding of developing and applying home automation solutions in households for enhancing energy use control and management. (2.7.4)
- Must have regional experience of building energy automation and control System in India (2.7.5)
- Experience in working with Development Organisation (2.7.6)

Definition of senior consultant level: At least 15 years of experience in the area of expertise the professional is supposed to cover in the project context and should be an Engineering graduate or Architect.

Definition of consultant level: At least 5 years of experience in the area of expertise the professional is supposed to cover in the project context and should be an Engineering graduate or Architect.

Efforts from Interns cannot be taken into consideration here.
All the Senior Consultants / Consultants should have good command over English language (reading, writing and speaking)

The contractor has to assign no. of personnel, national and International Experts of different level for different activities during the course of project completion. It is expected from contractor to provide the list of assigned personnel for the activities along with expected man days as per format provided. In the case of a tender being submitted by a consortium or joint venture, for each of the consortium/joint venture partner a separate listing shall be provided.

Expert-day schedule & activities						
Sr. No.	Expert Category	Expert International /National	Activities Involved	Job Description	Tentative experts-days	Brief Profile Attached (Yes/No)
1	Team Lead					
2	Expert 1					
3	Expert 2…					
4	Expert ….					

5	etc……					

2.5.3 Timeframe of the contract

Timeframe: The duration of contract shall be for 8 months. The assignment is expected to commence on 1st December 2019 and all the tasks expected to be completed by 31st May 2020.

The location of the assignment will be at Delhi NCR. Consultant's team will travel to state cells and project sites as and when required. For regular updates, reports and meetings, the consultant needs to join weekly meetings/ or as required, with the BEE/ GIZ team in the Project office at BEE, West Block 2, Sector 1, R.K. Puram, New Delhi.

2.5.4 Workshops, Meetings and Launch event

Cost of venue, food etc. for organizing round-tables, workshops shall be borne by GIZ separately. All travel, accommodation, food etc. for the staff of the Contractor has to be borne by them and have to be budgeted in their proposal. Expenses incurred can only be reimbursed after cost proposals have been submitted to and approved by GIZ prior to the acceptance and 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.

2.5.5 Project Management

Team Lead proposed by the consultant for this assignment shall be single point of contact for entire project and will be accountable for ensuring timely completion of projects and deliverables stated in this RfP. It will be the duty of the Team Lead to execute all the tasks along with the team of the selected consultant and to report to GIZ regularly.
A consortium or joint venture can be formed to submit one single bid. A consortium/joint venture needs to appoint one consortium/joint venture leader who will take over all communication and represent the contracted parties in front of GIZ and third parties. No cross-communication to GIZ (via other consortium/joint venture members) will be accepted by GIZ.

2.5.6 Flexible remuneration item

Not applicable.

2.6 Further Requirements

a) The entire proposal including approach and methodology, including tool and software's proposed, CVs etc., needs to be in English. The CVs need to be in uniform format with a maximum of three pages.

b) 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)

c) In case the bidder is a consortium or joint venture, the lead bidder should as well take up tasks in the assignment and shall be involved as the responsible coordinator among the group. The share of tasks shall be evaluated on the basis of the proposal submitted as above.

d) All communication with media (TV, radio, print and other media) related to the assignment has to be approved by the responsible person of GIZ.

e) All reports, slides, presentations and other media and information material need to be submitted to GIZ in English language in soft copy and in hard copy (at least 3 copies) as required.

f) The Contractor 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.

g) Any data to be purchased from external sources if necessary for the purpose of execution of the contract shall be purchased by the Contractor on its own expense.

h) Cost of venue, food etc. for organizing round-tables, workshops shall be borne by GIZ separately. All travel, accommodation, food etc. for the staff of the Contractor has to be borne by them and have to be budgeted in their proposal. Expenses incurred can only be reimbursed after cost proposals have been submitted to and approved by GIZ prior to the acceptance and 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.

i) The bidder should consider all the relevant and related activities, including but not limited to the activities proposed above in the work packages, to ensure the successful completion of all Work Packages.

j) All deliverables under Work Packages shall be considered final after incorporating all the comments and Feedbacks from the stakeholders and final approval from GIZ.

k) Tendering shall be executed in two stages, where the agencies have to be assessed through the Assessment grid for eligibility for qualification in next stage for opening of Technical bid. The technical assessment of the proposals will be undertaken for the bidders, who qualify in eligibility.

l) Please calculate your price bid based exactly on the aforementioned costing requirements. In the contract the contractor has no claim to fully exhaust the days/travel/workshops/ budgets. The number of days/travel/workshops and the

budget amount shall be agreed in the contract as 'up to' amounts. The specifications for pricing are defined in the price schedule

Annexure A: Sample Template for Progress Report

Activity	Responsible Consultant	Timeline as per work plan	Actual % Work Progress	Status	Remarks
WP 1					
Sub task 1.1					
…					
…					
WP 2					
…					
Brief summery in bullets to justify the status					
	Completed (100%)				
	in progress (26%-99%)				
	Progress less than 25%				

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2.7 Project Milestones

S.no	Deliverables/Activities	Reporting	Milestone	Payment	Remarks
0.1	Project kick-off meeting to discuss approach for the study and expected outcomes.	within 10 days from award			
0.2	Inception Report: The consultant shall provide an overview for all sub activities mentioned under each Task.	within 15 days from award			
0.3	Monthly Progress Reports: summary of progress on activities and tasks	monthly until project completion			
WP1	**Technology Mapping and Baseline Assessment**				
1.1	Detailed report on Technology Mapping	Jan - 20			
1.2	Comprehensive report on Baseline Assessment	Jan - 20			
1.3	Two stakeholder workshops to present outcomes of Technology Mapping and Baseline Assessment	Feb - 20	1		
WP2	**Review Global Policies and Develop National Policy Roadmap**				
2.1	Report on global policies for using home automation devices for demand side energy management	Feb - 20			
2.2	Report on techno-commercial analysis and compendium of high impact technologies for energy efficient, demand response ready homes	Feb - 20			
2.3	Guidelines for integration of Home Automation System requirements in Building Energy Codes	Mar - 20			
2.4	National Policy Roadmap for home automation technologies	Mar - 20			
2.5	Two stakeholder workshops to present National Policy Roadmap for home automation technologies	Apr - 20	2		
WP3	**Design Smart Homes Community Scheme**				
3.1	Smart Home Pilot Program Design Report	May - 20	3		