REF: UNDP-TUR-RFP-PROJ(EEB)-2015/01

REQUEST FOR PROPOSALS

for

Renewable Energy Technologies Economic Analysis Tool (RET-EAT) Algorithm and Testing Models Development, Preparations for Tender File, Provision of Post-Handover Support Services during RET-EAT Software Development

Promoting Energy Efficiency in Buildings in Turkey Project

Turkey

United Nations Development Programme
January 2015

SECTION 1. LETTER OF INVITATION

Ankara, Turkey
21 January 2015

Renewable Energy Technologies Economic Analysis Tool (RET-EAT) Algorithm and Testing Models Development, Preparations for Tender File, Provision of Post-Handover Support Services during RET-EAT Software Development

Dear Mr./Ms.:

The United Nations Development Programme (UNDP) hereby invites you to submit a Proposal to this Request for Proposal (RfP) for the above-referenced subject.

This RfP includes the following documents:

Section 1 – This Letter of Invitation
Section 2 – Instructions to Proposers (including Data Sheet)
Section 3 – Evaluation Methodology for Proposals
Section 4 – Terms of Reference (incl. Annexes)
Section 5 – Proposal Submission Form
Section 6 – Documents Establishing the Eligibility and Qualifications of the Proposer
Section 7 – Technical Proposal Form
Section 8 – Financial Proposal Form
Section 9 – Instructions for Preparation and Submission of Proposals
Section 10 - Contract for Professional Services, including General Terms and Conditions

Your offer, comprising of a Technical and Financial Proposal, in separate sealed envelopes, should be submitted in accordance with Section 2.

You are kindly requested to submit an acknowledgement letter to UNDP to the following address:

United Nations Development Programme
Birlik Mahallesi, 415. Cadde, No: 11, 06610
Çankaya, Ankara Turkey
Fax number: +90 312 496 14 63
gokhan.resuloglu@undp.org
Attention: *Gökhan Resuloğlu*

The letter should be received by UNDP no later than *January 28, 2015.* The same letter should

advise whether your company intends to submit a Proposal. If that is not the case, UNDP would appreciate your indicating the reason, for our records.

If you have received this RfP through a direct invitation by UNDP, transferring this invitation to another firm requires your written notification to UNDP of such transfer and the name of the company to whom the invitation was forwarded.

Should you require further clarifications, kindly communicate with the contact person identified in the attached Data Sheet as the focal point for queries on this RfP.

UNDP looks forward to receiving your Proposal and thanks you in advance for your interest in UNDP procurement opportunities.

Yours sincerely,

Matilda Dimovska
Deputy Resident Representative
UNDP Turkey

SECTION 2. INSTRUCTION TO PROPOSERS

Definitions

a) *"Contract"* refers to the agreement that will be signed by and between the UNDP and the successful proposer, all the attached documents thereto, including the General Terms and Conditions (GTC) and the Appendices.

b) "*Country"* refers to the country indicated in the Data Sheet.

c) *"Data Sheet"* refers to such part of the Instructions to Proposers used to reflect conditions of the tendering process that are specific for the requirements of the RfP.

d) *"Day"* refers to calendar day.

e) *"Government"* refers to the Government of the country that will be receiving the services provided/rendered specified under the Contract.

f) *"Instructions to Proposers"* (Section 2 of the RfP) refers to the complete set of documents that provides Proposers with all information needed and procedures to be followed in the course of preparing their Proposals

g) *"LOI"* (Section 1 of the RfP) refers to the Letter of Invitation sent by UNDP to Proposers.

h) *"Material Deviation"* refers to any contents or characteristics of the proposal that is significantly different from an essential aspect or requirement of the RfP, and: (i) substantially alters the scope and quality of the requirements; (ii) limits the rights of UNDP and/or the obligations of the Offeror; and (iii) adversely impacts the fairness and principles of the procurement process, such as those that compromise the competitive position of other Offerors.

i) *"Proposal"* refers to the Proposer's response to the Request for Proposal, including the Proposal Submission Form, Technical and Financial Proposal and all other documentation attached thereto as required by the RfP.

j) *"Proposer"* refers to any legal entity that may submit, or has submitted, a Proposal for the provision of services requested by UNDP through this RfP.

k) *"RfP"* refers to the Request for Proposals consisting of instructions and references prepared by UNDP for purposes of selecting the best service provider to perform the services described in the Terms of Reference.

l) *"Services"* refers to the entire scope of tasks and deliverables requested by UNDP under the RfP.

m) "*Supplemental Information to the RfP"* refers to a written communication issued by UNDP to prospective Proposers containing clarifications, responses to queries received from prospective

Proposers, or changes to be made in the RfP, at any time after the release of the RfP but before the deadline for the submission of Proposals.

n) *"Terms of Reference"* (TOR) refers to the document included in this RfP as Section 4 which describes the objectives, scope of services, activities, tasks to be performed, respective responsibilities of the proposer, expected results and deliverables and other data pertinent to the performance of the range of duties and services expected of the successful proposer.

A. GENERAL

1. UNDP hereby solicits Proposals in response to this Request for Proposal (RfP). Proposers must strictly adhere to all the requirements of this RfP. No changes, substitutions or other alterations to the rules and provisions stipulated in this RfP may be made or assumed unless it is instructed or approved in writing by UNDP in the form of Supplemental Information to the RfP.

2. Submission of a Proposal shall be deemed as an acknowledgement by the Proposer that all obligations stipulated by this RfP will be met and, unless specified otherwise, the Proposer has read, understood and agreed to all the instructions in this RfP.

3. Any Proposal submitted will be regarded as an offer by the Proposer and does not constitute or imply the acceptance of any Proposal by UNDP. UNDP is under no obligation to award a contract to any Proposer as a result of this RfP.

4. UNDP implements a policy of zero tolerance on proscribed practices, including fraud, corruption, collusion, unethical practices, and obstruction. UNDP is committed to preventing, identifying and addressing all acts of fraud and corrupt practices against UNDP as well as third parties involved in UNDP activities. (See http://www.undp.org/about/transparencydocs/UNDP_Anti_Fraud_Policy_English_FINAL_june_2011.pdf and http://www.undp.org/content/undp/en/home/operations/procurement/procurement_protest/ for full description of the policies)

5. In responding to this RfP, UNDP requires all Proposers to conduct themselves in a professional, objective and impartial manner, and they must at all times hold UNDP's interests paramount. Proposers must strictly avoid conflicts with other assignments or their own interests, and act without consideration for future work. All Proposers found to have a conflict of interest shall be disqualified. Without limitation on the generality of the above, Proposers, and any of their affiliates, shall be considered to have a conflict of interest with one or more parties in this solicitation process, if they:

   5.1 Are or have been associated in the past, with a firm or any of its affiliates which have been engaged UNDP to provide services for the preparation of the design, specifications, Terms of Reference, cost analysis/estimation, and other documents to be used for the procurement of the goods and services in this selection process;
   5.2 Were involved in the preparation and/or design of the programme/project related to the services requested under this RfP; or

5.3 Are found to be in conflict for any other reason, as may be established by, or at the discretion of, UNDP.

In the event of any uncertainty in the interpretation of what is potentially a conflict of interest, proposers must disclose the condition to UNDP and seek UNDP's confirmation on whether or not such conflict exists.

6. Similarly, the Proposers must disclose in their proposal their knowledge of the following:

6.1 That they are owners, part-owners, officers, directors, controlling shareholders, or they have key personnel who are family of UNDP staff involved in the procurement functions and/or the Government of the country or any Implementing Partner receiving services under this RfP; and
6.2 All other circumstances that could potentially lead to actual or perceived conflict of interest, collusion or unfair competition practices.

Failure of such disclosure may result in the rejection of the proposal or proposals affected by the non-disclosure.

7. The eligibility of Proposers that are wholly or partly owned by the Government shall be subject to UNDP's further evaluation and review of various factors such as being registered as an independent entity, the extent of Government ownership/share, receipt of subsidies, mandate, access to information in relation to this RfP, and others that may lead to undue advantage against other Proposers, and the eventual rejection of the Proposal.

8. All Proposers must adhere to the UNDP Supplier Code of Conduct, which may be found at this link: http://web.ng.undp.org/procurement/undp-supplier-code-of-conduct.pdf

B. CONTENTS OF PROPOSAL

9. Sections of Proposal

Proposers are required to complete, sign and submit the following documents:

9.1 Proposal Submission Cover Letter Form (see RfP Section 5);
9.2 Documents Establishing the Eligibility and Qualifications of the Proposer (see RfP Section 6);
9.3 Technical Proposal (see prescribed form in RfP Section 7);
9.4 Financial Proposal (see prescribed form in RfP Section 8);
9.5 Any attachments and/or appendices to the Proposal.

10. Clarification of Proposal

10.1 Proposers may request clarifications of any of the RfP documents no later than the date indicated in the **Data Sheet** (DS no. 16) prior to the proposal submission date. Any request for clarification must be sent in writing via courier or through electronic means to the UNDP address indicated in the **Data Sheet** (DS no. 17). UNDP will respond in writing,

transmitted by electronic means and will transmit copies of the response (including an explanation of the query but without identifying the source of inquiry) to all Proposers who have provided confirmation of their intention to submit a Proposal.

10.2 UNDP shall endeavor to provide such responses to clarifications in an expeditious manner, but any delay in such response shall not cause an obligation on the part of UNDP to extend the submission date of the Proposals, unless UNDP deems that such an extension is justified and necessary.

11. Amendment of Proposals

11.1 At any time prior to the deadline of Proposal submission, UNDP may for any reason, such as in response to a clarification requested by a Proposer, modify the RfP in the form of a Supplemental Information to the RfP. All prospective Proposers will be notified in writing of all changes/amendments and additional instructions through Supplemental Information to the RfP and through the method specified in the **Data Sheet** (DS No. 18).

11.2 In order to afford prospective Proposers reasonable time to consider the amendments in preparing their Proposals, UNDP may, at its discretion, extend the deadline for submission of Proposals, if the nature of the amendment to the RfP justifies such an extension.

C. PREPARATION OF PROPOSALS

12. Cost

The Proposer shall bear any and all costs related to the preparation and/or submission of the Proposal, regardless of whether its Proposal was selected or not. UNDP shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the procurement process.

13. Language

The Proposal, as well as any and all related correspondence exchanged by the Proposer and UNDP, shall be written in the language (s) specified in the **Data Sheet** (DS No 4). Any printed literature furnished by the Proposer written in a language other than the language indicated in the **Data Sheet**, must be accompanied by a translation in the preferred language indicated in the **Data Sheet**. For purposes of interpretation of the Proposal, and in the event of discrepancy or inconsistency in meaning, the version translated into the preferred language shall govern. Upon conclusion of a contract, the language of the contract shall govern the relationship between the contractor and UNDP.

14. Proposal Submission Form

The Proposer shall submit the Proposal Submission Form using the form provided in Section 5 of this RfP.

15. Technical Proposal Format and Content

Unless otherwise stated in the **Data Sheet** (DS no. 28), the Proposer shall structure the Technical Proposal as follows:

15.1 Expertise of Firm/Organization – this section should provide details regarding management structure of the organization, organizational capability/resources, and experience of organization/firm, the list of projects/contracts (both completed and on-going, both domestic and international) which are related or similar in nature to the requirements of the RfP, and proof of financial stability and adequacy of resources to complete the services required by the RfP (see RfP clause 18 and DS No. 26 for further details). The same shall apply to any other entity participating in the RfP as a Joint Venture or Consortium.

15.2 Proposed Methodology, Approach and Implementation Plan – this section should demonstrate the Proposer's response to the Terms of Reference by identifying the specific components proposed, how the requirements shall be addressed, as specified, point by point; providing a detailed description of the essential performance characteristics proposed; identifying the works/portions of the work that will be subcontracted; and demonstrating how the proposed methodology meets or exceeds the specifications, while ensuring appropriateness of the approach to the local conditions and the rest of the project operating environment. This methodology must be laid out in an implementation timetable that is within the duration of the contract as specified in the **Data Sheet** (DS nos. 29 and 30).

Proposers must be fully aware that the products or services that UNDP requires may be transferred, immediately or eventually, by UNDP to the Government partners, or to an entity nominated by the latter, in accordance with UNDP's policies and procedures. All proposers are therefore required to submit the following in their proposals:

a) A statement of whether any import or export licences are required in respect of the goods to be purchased or services to be rendered, including any restrictions in the country of origin, use or dual use nature of the goods or services, including any disposition to end users; and
b) Confirmation that the Proposer has obtained license of this nature in the past, and have an expectation of obtaining all the necessary licenses, should their Proposal be rendered the most responsive.

15.3 Management Structure and Key Personnel – This section should include the comprehensive curriculum vitae (CVs) of key personnel that will be assigned to support the implementation of the proposed methodology, clearly defining the roles and responsibilities vis-à-vis the proposed methodology. CVs should establish competence and demonstrate qualifications in areas relevant to the TOR.

In complying with this section, the Proposer assures and confirms to UNDP that the personnel being nominated are available for the Contract on the dates proposed. If any of the key personnel later becomes unavailable, except for unavoidable reasons such as death or medical incapacity, among other possibilities, UNDP reserves the right to

consider the proposal non-responsive. Any deliberate substitution arising from unavoidable reasons, including delay in the implementation of the project of programme through no fault of the Proposer shall be made only with UNDP's acceptance of the justification for substitution, and UNDP's approval of the qualification of the replacement who shall be either of equal or superior credentials as the one being replaced.

15.4 Where the **Data Sheet** requires the submission of the Proposal Security, the Proposal Security shall be included along with the Technical Proposal. The Proposal Security may be forfeited by UNDP, and reject the Proposal, in the event of any or any combination of the following conditions:

a) If the Proposer withdraws its offer during the period of the Proposal Validity specified in the **Data Sheet** (DS no. 11), or;
b) If the Proposal Security amount is found to be less than what is required by UNDP as indicated in the **Data Sheet** (DS no. 9), or;
c) In the case the successful Proposer fails:

i. to sign the Contract after UNDP has awarded it;
ii. to comply with UNDP's variation of requirement, as per RfP clause 35; or
iii. to furnish Performance Security, insurances, or other documents that UNDP may require as a condition to rendering the effectivity of the contract that may be awarded to the Proposer.

16. Financial Proposals

The Financial Proposal shall be prepared using the attached standard form (Section 8). It shall list all major cost components associated with the services, and the detailed breakdown of such costs. All outputs and activities described in the Technical Proposal must be priced separately on a one-to-one correspondence. Any output and activities described in the Technical Proposal but not priced in the Financial Proposal, shall be assumed to be included in the prices of other activities or items, as well as in the final total price.

17. Currencies

All prices shall be quoted in the currency indicated in the **Data Sheet** (DS no. 15). However, where Proposals are quoted in different currencies, for the purposes of comparison of all Proposals:

a) UNDP will convert the currency quoted in the Proposal into the UNDP preferred currency, in accordance with the prevailing UN operational rate of exchange on the last day of submission of Proposals;
b) In the event that the proposal found to be the most responsive to the RfP requirement is quoted in another currency different from the preferred currency as per **Data Sheet** (DS no. 15), then UNDP shall reserve the right to award the contract in the currency of UNDP's preference, using the conversion method specified above.

Proposals submitted by two (2) or more Proposers shall all be rejected if they are found to have <u>any</u> of the following:

a) they have at least one controlling partner, director or shareholder in common; or
b) any one of them receive or have received any direct or indirect subsidy from the other/s; or
c) they have the same legal representative for purposes of this RfP; or
d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about, or influence on the Proposal of, another Proposer regarding this RfP process;
e) they are subcontractors to each other's Proposal, or a subcontractor to one Proposal also submits another Proposal under its name as lead Proposer; or
f) an expert proposed to be in the team of one Proposer participates in more than one Proposal received for this RfP process. This condition does not apply to subcontractors being included in more than one Proposal.

18. Documents Establishing the Eligibility and Qualifications of the Proposer

The Proposer shall furnish documentary evidence of its status as an eligible and qualified vendor, using the forms provided under Section 6, Proposer Information Forms. In order to award a contract to a Proposer, its qualifications must be documented to UNDP's satisfaction. These include, but are not limited to, the following:

a) That, in the case of a Proposer offering to supply goods under the Contract which the Proposer did not manufacture or otherwise produce, the Proposer has been duly authorized by the goods' manufacturer or producer to supply the goods in the country of final destination;
b) That the Proposer has the financial, technical, and production capability necessary to perform the Contract; and
c) That, to the best of the Proposer's knowledge, it is not included in the UN 1267/1989 List or the UN Ineligibility List, nor in any and all of UNDP's list of suspended and removed vendors.

19. Joint Venture, Consortium or Association

If the Proposer is a group of legal entities that will form or have formed a joint venture, consortium or association at the time of the submission of the Proposal, they shall confirm in their Proposal that : (i) they have designated one party to act as a lead entity, duly vested with authority to legally bind the members of the joint venture jointly and severally, and this shall be duly evidenced by a duly notarized Agreement among the legal entities, which shall be submitted along with the Proposal; and (ii) if they are awarded the contract, the contract shall be entered into, by and between UNDP and the designated lead entity, who shall be acting for and on behalf of all the member entities comprising the joint venture.

After the Proposal has been submitted to UNDP, the lead entity identified to represent the joint venture shall not be altered without the prior written consent of UNDP. Furthermore, neither the lead entity nor the member entities of the joint venture can:

a) Submit another proposal, either in its own capacity; nor
b) As a lead entity or a member entity for another joint venture submitting another Proposal.

The description of the organization of the joint venture/consortium/association must clearly define the expected role of each of the entity in the joint venture in delivering the requirements of the RfP, both in the Proposal and the Joint Venture Agreement. All entities that comprise the joint venture shall be subject to the eligibility and qualification assessment by UNDP.

Where a joint venture is presenting its track record and experience in a similar undertaking as those required in the RfP, it should present such information in the following manner:

a) Those that were undertaken together by the joint venture; and
b) Those that were undertaken by the individual entities of the joint venture expected to be involved in the performance of the services defined in the RfP.

Previous contracts completed by individual experts working privately but who are permanently or were temporarily associated with any of the member firms cannot be claimed as the experience of the joint venture or those of its members, but should only be claimed by the individual experts themselves in their presentation of their individual credentials.

If a joint venture's Proposal is determined by UNDP as the most responsive Proposal that offers the best value for money, UNDP shall award the contract to the joint venture, in the name of its designated lead entity. The lead entity shall sign the contract for and on behalf of all other member entities.

20. Alternative Proposals

Unless otherwise specified in the **Data Sheet** (DS nos. 5 and 6), alternative proposals shall not be considered. Where the conditions for its acceptance are met, or justifications are clearly established, UNDP reserves the right to award a contract based on an alternative proposal.

21. Validity Period

Proposals shall remain valid for the period specified in the **Data Sheet** (DS no. 8), commencing on the submission deadline date also indicated in the **Data Sheet** (DS no. 21). A Proposal valid for a shorter period shall be immediately rejected by UNDP and rendered non-responsive.

In exceptional circumstances, prior to the expiration of the proposal validity period, UNDP may request Proposers to extend the period of validity of their Proposals. The request and the responses shall be made in writing, and shall be considered integral to the Proposal.

22. Proposer's Conference

When appropriate, a proposer's conference will be conducted at the date, time and location specified in the **Data Sheet** (DS no. 7). All Proposers are encouraged to attend. Non-attendance, however, shall not result in disqualification of an interested Proposer. Minutes of the proposer's conference will be either posted on the UNDP website, or disseminated to the individual firms who have registered or expressed interest with the contract, whether or not they attended the conference. No verbal statement made during the conference shall modify the terms and conditions of the RfP unless such statement is specifically written in the Minutes of the Conference, or issued/posted as an amendment in the form of a Supplemental Information to the RfP.

D. SUBMISSION AND OPENING OF PROPOSALS

23. Submission

23.1 The Financial Proposal and the Technical Proposal Envelopes MUST BE COMPLETELY SEPARATE and each of them must be submitted sealed individually and clearly marked on the outside as either "TECHNICAL PROPOSAL" or "FINANCIAL PROPOSAL", as appropriate. Each envelope MUST clearly indicate the name of the Proposer. The outer envelopes shall bear the address of UNDP as specified in the **Data Sheet** (DS no.20) and shall include the Proposer's name and address, as well as a warning that state "*not to be opened before the time and date for proposal opening*" as specified in the **Data Sheet** (DS no. 24)**.** The Proposer shall assume the responsibility for the misplacement or premature opening of Proposals due to improper sealing and labeling by the Proposer.

23.2 Proposers must submit their Proposals in the manner specified in the **Data Sheet** (DS nos. 22 and 23). When the Proposals are expected to be in transit for more than 24 hours, the Proposer must ensure that sufficient lead time has been provided in order to comply with UNDP's deadline for submission. UNDP shall indicate for its record that the official date and time of receiving the Proposal is the actual date and time when the said Proposal has physically arrived at the UNDP premises indicated in the **Data Sheet** (DS no. 20).

23.3 Proposers submitting Proposals by mail or by hand shall enclose the original and each copy of the Proposal, in separate sealed envelopes, duly marking each of the envelopes as "Original Proposal" and "Copy of Proposal" as appropriate. The 2 envelopes shall then be sealed in an outer envelope. The number of copies required shall be as specified in the **Data Sheet** (DS No. 19)**.** In the event of any discrepancy between the contents of the "Original Proposal" and the "Copy of Proposal", the contents of the original shall govern. The original version of the Proposal shall be signed or initialed by the Proposer or person(s) duly authorized to commit the Proposer on every page. The authorization shall be communicated through a document evidencing such authorization issued by the highest official of the firm, or a Power of Attorney, accompanying the Proposal.

23.4 Proposers must be aware that the mere act of submission of a Proposal, in and of itself, implies that the Proposer accepts the General Contract Terms and Conditions of UNDP as attached hereto as Section 10.

24. Deadline for Submission of Proposals and Late Proposals

Proposals must be received by UNDP at the address and no later than the date and time specified in the **Data Sheet** (DS nos. 20 and 21).

UNDP shall not consider any Proposal that arrives after the deadline for submission of Proposals. Any Proposal received by UNDP after the deadline for submission of Proposals shall be declared late, rejected, and returned unopened to the Proposer.

25. Withdrawal, Substitution, and Modification of Proposals

25.1 Proposers are expected to have sole responsibility for taking steps to carefully examine in detail the full consistency of its Proposals to the requirements of the RfP, keeping in mind that material deficiencies in providing information requested by UNDP, or lack clarity in the description of services to be provided, may result in the rejection of the Proposal. The Proposer shall assume the responsibility regarding erroneous interpretations or conclusions made by the Proposer in the course of understanding the RfP out of the set of information furnished by UNDP.

25.2 A Proposer may withdraw, substitute or modify its Proposal after it has been submitted by sending a written notice in accordance with Clause 23.1, duly signed by an authorized representative, and shall include a copy of the authorization (or a Power of Attorney). The corresponding substitution or modification of the Proposal must accompany the respective written notice. All notices must be received by UNDP prior to the deadline for submission and submitted in accordance with RfP Clause 23.1 (except that withdrawal notices do not require copies). The respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," or MODIFICATION".

25.3 Proposals requested to be withdrawn shall be returned unopened to the Proposers.

25.4 No Proposal may be withdrawn, substituted, or modified in the interval between the deadline for submission of Proposals and the expiration of the period of proposal validity specified by the Proposer on the Proposal Submission Form or any extension thereof.

26. Proposal Opening

UNDP will open the Proposals in the presence of an ad-hoc committee formed by UNDP of at least two (2) members. If electronic submission is permitted, any specific electronic proposal opening procedures shall be as specified in the **Data Sheet** (DS no. 23).

The Proposers' names, modifications, withdrawals, the condition of the envelope labels/seals, the number of folders/files and all other such other details as UNDP may consider appropriate, will be announced at the opening. No Proposal shall be rejected at the opening stage, except for late submission, for which the Proposal shall be returned unopened to the Proposer.

27. Confidentiality

Information relating to the examination, evaluation, and comparison of Proposals, and the recommendation of contract award, shall not be disclosed to Proposers or any other persons not officially concerned with such process, even after publication of the contract award.

Any effort by a Proposer to influence UNDP in the examination, evaluation and comparison of the Proposals or contract award decisions may, at UNDP's decision, result in the rejection of its Proposal.

In the event that a Proposer is unsuccessful, the Proposer may seek a meeting with UNDP for a debriefing. The purpose of the debriefing is discussing the strengths and weaknesses of the Proposer's submission, in order to assist the Proposer in improving the proposals presented to UNDP. The content of other proposals and how they compare to the Proposer's submission shall not be discussed.

E. EVALUATION OF PROPOSALS

28. Preliminary Examination of Proposals

UNDP shall examine the Proposals to determine whether they are complete with respect to minimum documentary requirements, whether the documents have been properly signed, whether or not the Proposer is in the UN Security Council 1267/1989 Committee's list of terrorists and terrorist financiers, and in UNDP's list of suspended and removed vendors, and whether the Proposals are generally in order, among other indicators that may be used at this stage. UNDP may reject any Proposal at this stage.

29. Evaluation of Proposals

29.1 UNDP shall examine the Proposal to confirm that all terms and conditions under the UNDP General Terms and Conditions and Special Conditions have been accepted by the Proposer without any deviation or reservation.

29.2 The evaluation team shall review and evaluate the Technical Proposals on the basis of their responsiveness to the Terms of Reference and other documentation provided, applying the evaluation criteria, sub-criteria, and point system specified in the **Data Sheet** (DS no. 32). Each responsive Proposal will be given a technical score. A Proposal shall be rendered non-responsive at this stage if it does not substantially respond to the RfP particularly the demands of the Terms of Reference, which also means that it fails to achieve the minimum technical score indicated in the **Data Sheet** (DS no. 25)**.** Absolutely no changes may be made by UNDP in the criteria, sub-criteria and point system indicated in the **Data Sheet** (DS no. 32) after all Proposals have been received.

29.3 In the second stage, only the Financial Proposals of those Proposers who achieve the minimum technical score will be opened for evaluation for comparison and review. The Financial Proposal Envelopes corresponding to Proposals that did not meet the minimum passing technical score shall be returned to the Proposer unopened. The overall evaluation score will be based either on a combination of the technical score and the financial offer, or the lowest evaluated financial proposal of the technically qualified Proposers. The evaluation method that applies for this RfP shall be as indicated in the **Data Sheet** (DS No. 25).

When the Data Sheet specifies a combined scoring method, the formula for the rating of the Proposals will be as follows:

Rating the Technical Proposal (TP):

TP Rating = (Total Score Obtained by the Offer / Max. Obtainable Score for TP) x 100

Rating the Financial Proposal (FP):

FP Rating = (Lowest Priced Offer / Price of the Offer Being Reviewed) x 100

Total Combined Score:

(TP Rating) x (Weight of TP, e.g. 70%)

\+ (FP Rating) x (Weight of FP, e.g., 30%)

Total Combined and Final Rating of the Proposal

29.4 UNDP reserves the right to undertake a post-qualification exercise aimed at determining, to its satisfaction the validity of the information provided by the Proposer. Such post-qualification shall be fully documented and, among those that may be listed in the **Data Sheet** (DS No.33), may include, but need not be limited to, all or any combination of the following :

- Verification of accuracy, correctness and authenticity of information provided by the Proposer on the legal, technical and financial documents submitted;
- Validation of extent of compliance to the RfP requirements and evaluation criteria based on what has so far been found by the evaluation team;
- Inquiry and reference checking with Government entities with jurisdiction on the Proposer, or any other entity that may have done business with the Proposer;
- Inquiry and reference checking with other previous clients on the quality of performance on ongoing or previous contracts completed;
- Physical inspection of the Proposer's offices, branches or other places where business transpires, with or without notice to the Proposer;
- Quality assessment of ongoing and completed outputs, works and activities similar to the requirements of UNDP, where available; and
- Other means that UNDP may deem appropriate, at any stage within the selection process, prior to awarding the contract.

30. Clarification of Proposals

To assist in the examination, evaluation and comparison of Proposals, UNDP may, at its discretion, ask any Proposer for a clarification of its Proposal.

UNDP's request for clarification and the response shall be in writing. Notwithstanding the written communication, no change in the prices or substance of the Proposal shall be sought, offered, or permitted, except to provide clarification, and confirm the correction of any

arithmetic errors discovered by UNDP in the evaluation of the Proposals, in accordance with RfP Clause 32.

Any unsolicited clarification submitted by a Proposer in respect to its Proposal, which is not a response to a request by UNDP, shall not be considered during the review and evaluation of the Proposals.

31. Responsiveness of Proposal

UNDP's determination of a Proposal's responsiveness will be based on the contents of the Proposal itself.

A substantially responsive Proposal is one that conforms to all the terms, conditions, TOR and other requirements of the RfP without material deviation, reservation, or omission.

If a Proposal is not substantially responsive, it shall be rejected by UNDP and may not subsequently be made responsive by the Proposer by correction of the material deviation, reservation, or omission.

32. Nonconformities, Reparable Errors and Omissions

Provided that a Proposal is substantially responsive, UNDP may waive any non-conformities or omissions in the Proposal that, in the opinion of UNDP, do not constitute a material deviation.

Provided that a Proposal is substantially responsive, UNDP may request the Proposer to submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the Proposal related to documentation requirements. Such omission shall not be related to any aspect of the price of the Proposal. Failure of the Proposer to comply with the request may result in the rejection of its Proposal.

Provided that the Proposal is substantially responsive, UNDP shall correct arithmetical errors as follows:

a) if there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of UNDP there is an obvious misplacement of the decimal point in the unit price, in which case the line item total as quoted shall govern and the unit price shall be corrected;
b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to the above.

If the Proposer does not accept the correction of errors made by UNDP, its Proposal shall be rejected.

F. AWARD OF CONTRACT

33. Right to Accept, Reject, or Render Non-Responsive Any or All Proposals

UNDP reserves the right to accept or reject any Proposal, to render any or all of the Proposals as non-responsive, and to reject all Proposals at any time prior to award of contract, without incurring any liability, or obligation to inform the affected Proposer(s) of the grounds for UNDP's action. Furthermore, UNDP shall not be obliged to award the contract to the lowest price offer.

UNDP shall also verify, and immediately reject their respective Proposal, if the Proposers are found to appear in the UN's Consolidated List of Individuals and Entities with Association to Terrorist Organizations, in the List of Vendors Suspended or Removed from the UN Secretariat Procurement Division Vendor Roster, the UN Ineligibility List, and other such lists that as may be established or recognized by UNDP policy on Vendor Sanctions. (See http://www.undp.org/content/undp/en/home/operations/procurement/procurement_protest/ for details)

34. Award Criteria

Prior to expiration of the period of proposal validity, UNDP shall award the contract to the qualified Proposer with the highest total score based on the evaluation method indicated in the **Data Sheet** (DS nos. 25 and 32).

35. Right to Vary Requirements at the Time of Award

At the time of award of Contract, UNDP reserves the right to vary the quantity of services and/or goods, by up to a maximum twenty five per cent (25%) of the total offer, without any change in the unit price or other terms and conditions.

36. Contract Signature

Within fifteen (15) days from the date of receipt of the Contract, the successful Proposer shall sign and date the Contract and return it to UNDP.

Failure of the successful Proposer to comply with the requirement of RfP Clause 35 and this provision shall constitute sufficient grounds for the annulment of the award, and forfeiture of the Proposal Security if any, and on which event, UNDP may award the Contract to the Proposer with the second highest rated Proposal, or call for new Proposals.

37. Performance Security

A performance security, if required, shall be provided in the amount and form provided in Section 10 and by the deadline indicated in the **Data Sheet** (DS no. 14), as applicable. Where a Performance Security will be required, the submission of the said document, and the confirmation of its acceptance by UNDP, shall be a condition for the effectivity of the Contract that will be signed by and between the successful Proposer and UNDP.

38. Bank Guarantee for Advanced Payment

Except when the interests of UNDP so require, it is the UNDP's preference to make no advanced payment(s) on contracts (i.e., payments without having received any outputs). In the event that the Proposer requires an advanced payment upon contract signature, and if such request is duly accepted by UNDP, and the said advanced payment exceeds 20% of the total proposal price, or exceed the amount of USD 30,000, UNDP shall require the Proposer to submit a Bank Guarantee in the same amount as the advanced payment.

39. Vendor Protest

UNDP's vendor protest procedure provides an opportunity for appeal to those persons or firms not awarded a purchase order or contract through a competitive procurement process. In the event that a Proposer believes that it was not treated fairly, the following link provides further details regarding UNDP vendor protest procedures:
http://www.undp.org/procurement/protest.shtml

Instructions to Proposers

DATA SHEET

The following data for the services to be procured shall complement, supplement, or amend the provisions in the Instructions to Proposers. In the case of a conflict between the Instructions to Proposers, the Data Sheet, and other annexes or references attached to the Data Sheet, the provisions in the Data Sheet shall govern**.**

DS No.	Cross Ref. to Instruc -tions	Data	Specific Instructions / Requirements
1		Project Title:	Promoting Energy Efficiency in Buildings in Turkey
2		Title of Services/Work:	Renewable Energy Technologies Economic Analysis Tool (RET-EAT) Algorithm and Testing Models Development, Preparations for Tender File, Provision of Post-Handover Support Services during RET-EAT Software Development
3		Country / Region of Work Location:	Ankara / Turkey
4	C.13	Language of the Proposal:	English
5	C.20	Conditions for Submitting Proposals for Parts or sub-parts of the TOR	Not allowed
6	C.20	Conditions for Submitting Alternative Proposals	Shall not be considered
7	C.22	A pre-proposal conference will be held on:	N/A
8	C.21	Period of Proposal Validity commencing on the submission date	120 days
9	B.9.5 C.15.4 b)	Proposal Security	Not Required

10	B.9.5	Acceptable forms of Proposal Security	N/A
11	B.9.5 C.15.4 a)	Validity of Proposal Security	N/A
12		Advanced Payment upon signing of contract	Not allowed
13		Liquidated Damages	For services which are not provided by the Contractor in full compliance with the ToR in terms of quality, timeliness, price, etc. and which therefore are not accepted by UNDP; UNDP reserves the right to proceed with any one or all of the below actions: 1-Procure the subject services from another party at a price comparable to market rates; 2-Request and receive payment of the service price billed by the other party, from the Contractor. 3- Impose a penalty of up to 10% of the total price of the subject service, stated in the contract.
14	F.37	Performance Security	Not Required
15	C.17, C.17 b)	Preferred Currency of Proposal and Method for Currency conversion	United States Dollars (US$)
16	B.10.1	Deadline for submitting requests for clarifications/ questions	7 days before the submission date.
17	B.10.1	Contact Details for submitting clarifications/questions[1]	Focal Person in UNDP: Gökhan Resuloğlu, Finance and Administrative Officer of GEF EE Projects Address: United Nations Development Programme Birlik Mahallesi, 415. Cadde, No: 11, 06610 Çankaya, Ankara - Turkey Fax No. : +90 312 496 1463 E-mail address dedicated for this purpose: gokhan.resuloglu@undp.org
18	B.11.1	Manner of Disseminating Supplemental Information to	Direct communication to prospective Proposers by e-mail or fax, and Posting on the website

[1] *This contact person and address is officially designated by UNDP. If inquiries are sent to other person/s or address/es, even if they are UNDP staff, UNDP shall have no obligation to respond nor can UNDP confirm that the query was officially received.*

		the RfP and responses/clarifications to queries	1-www.tr.undp.org 2-www.un.org.tr 3-www.devbusiness.com 4-www.ungm.org 5-www.undp.org
19	D.23.3	No. of copies of Proposal that must be submitted	Original : 1 Copies: 2
20	D.23.1 D.23.2 D.24	Proposal Submission Address	Ref: UNDP-TUR-RFP-PROJ(EEB)-2015/01 Attention: Gökhan Resuloğlu, Finance and Administrative Officer of GEF EE Projects Address: United Nations Development Programme (UNDP) Turkey, Birlik Mah. 2. Cadde No: 11, 06610, Çankaya Ankara-Turkey
21	C.21 D.24	Deadline of Submission	Date : February 11, 2015 Time : 17:30 (COB)
22	D.23.2	Allowable Manner of Submitting Proposals	Courier/Hand Delivery, Other means of delivery, such as e-mail, will be rejected.
23	D.23.2 D.26	Conditions and Procedures for electronic submission and opening, if allowed	Electronic submission of proposals is not allowed.
24	D.23.1	Date, time and venue for opening of Proposals	Date : February 2015 Venue : UN House, Ankara-Turkey
25	E.29.2 E.29.3 F.34	Evaluation method to be used in selecting the most responsive Proposal	The Evaluation shall be made on the basis of the following, as detailed in Section 9 of this RFP: 1. Meeting **all (each and every one of)** PASS/FAIL CRITERIA and SUBCRITERIA given in Section 9. 2. Combined Scoring Method for the Offerors who have met all PASS/FAIL CRITERIA and SUBCRITERIA, using the 70% - 30% distributions for technical and financial proposals, respectively. For an Offeror to be determined as "technically qualified", that Offeror should secure at least 70% of total maximum attainable technical scores. At the end of the above described evaluation process, the successful proposers shall be identified and ranked according to their combined scores (technical+financial).
26	C.15.1	Required Documents that must	*Failure to satisfy any one of the below requirements may*

		be Submitted to Establish Qualification of Proposers in **Original or Notarized Copy**[2] (In case the Offeror does not submit originals or the notarized copies of these documents with their proposals, UNDP reserves the right to request them in any phase of the evaluation process. Failure to provide originals or the notarized copies of these documents when they are requested by UNDP may result in disqualification of the respective Offeror)	*lead to disqualification of the Offeror.* The requested documents shall be attached to Section 6 "Proposer Information Form". ☐ Certificate of Registration of the business including Articles of Incorporation, or equivalent document if Proposer is not a corporation, which evidences that the proposer has been legally established before 2013 ☐ Tax Registration/Payment Certificate issued by the Internal Revenue Authority evidencing that the Proposer is updated with its tax payment obligations, or Certificate of Tax exemption, if any such privilege is enjoyed by the Proposer ☐ Registration to Chamber of Commerce and Membership to any Association in Turkey or Abroad, if applicable ☐ Power of Attorney, in case the proposal is signed by another person who is not indicated in this power of attorney, an Official Letter of Appointment shall be submitted along with Power of Attorney. ☐ Latest Audited Financial Statement (Income Statement and Balance Sheet) including Auditor's Report ☐ Declaration of Quick Ratio of the Offeror (Lead Partner in case of JV or Consortium) based on latest financial statements certified by a public accountant ☐ Statement of Satisfactory Performance from the Top *5* Clients in terms of Contract Value in the past 3 years (2012, 2013, 2014) ☐ If Joint Venture/Consortium – copy of the Memorandum of Understanding or Letter of Intent to form a JV/Consortium, or Registration of JV/Consortium, if registered
27		Other documents that must be Submitted to Establish Eligibility	N/A
28	C.15	Structure of the Technical Proposal	Please refer to Section 7.
29	C.15.2	Latest Expected date for commencement of Contract	March 23, 2015
30	C.15.2	Expected duration of contract (Target Commencement Date and Completion Date)	550 days between March 23, 2015 and 19 October 2016. (Please refer to Table 4.1 in Section D of the ToR, Section 4 for detailed timeframe)

[2] *If the proposer is a joint venture or consortium, the leading partner is obliged to comply with the requirements.*

31		UNDP will award the contract to:	One Proposer only
32	E.29.2 F.34	Criteria for the Award of Contract and Evaluation of Proposals	The overall evaluation score will be based on a combination of the technical score and the financial offer. The eligible Offeror who secured the highest cumulative score will be considered for the award of contract. The weight of the Technical Evaluation is 70% and the weight of the Financial Evaluation is 30%. Please refer to Technical Evaluation Grid provided in Section 3. The "Grand Total" amount to be quoted by the Offerors shall be the basis of Financial Evaluation.
33	E.29.4	Post-Qualification Actions	N/A
34		Conditions for Determining Contract Effectivity	Upon the signature of the contract by both parties.
35		Payment	UNDP shall affect payments to the Contractor as per the payment schedule provided in Part I-'Scope of Proposal Price and Schedule of Payments' of the TOR given in Section 4 of the RFP. 100% of each payment to the Contractor shall be effected upon acceptance and approval by UNDP, of the respective deliverables and related invoices submitted by the contractor. Invoices shall be paid within 30 (thirty) days of the date of their acceptance by UNDP.
36		Taxation	UN and its subsidiary organs are exempt from all taxes. Therefore Offerors shall prepare their Financial Proposals, excluding VAT. It is the Offeror's responsibility to learn from relevant authorities (Ministry of Finance) and/or to review/confirm published procedures and to consult with a certified financial consultant as needed, to confirm the scope and procedures of VAT exemption application as per VAT Law and Ministry of Finance's Communiqués.
37		Other Information Related to the RfP	**Please refer to Section 9- Instructions for preparation and submission of proposals.**

SECTION 3. EVALUATION METHODOLOGY FOR PROPOSALS

3.1. PASS/FAIL ELIGIBILITY CRITERIA

	Not Applicable*	Pass	Fail
Proposal is submitted in accordance with the instructions set under Section 9.			
Section 5 and Section 6 are fully completed, stamped and signed by the authorized representative of the Offeror without any reservations.			
Certificate of Registration of the business including Articles of Incorporation, or equivalent document if Proposer is not a corporation, which evidences that the proposer has been legally established before 2013.			
Tax Registration/Payment Certificate issued by the Internal Revenue Authority evidencing that the Proposer is updated with its tax payment obligations, or Certificate of Tax exemption, if any such privilege is enjoyed by the Proposer.			
Registration to Chamber of Commerce in Turkey or Abroad, **if applicable*.**			
Power of Attorney, in case the proposal is signed by another person who is not indicated in this power of attorney, an Official Letter of Appointment shall be submitted along with Power of Attorney.			
Latest Audited Financial Statement (Income Statement and Balance Sheet) including Auditor's Report.			
Declaration of Quick Ratio of the Offeror (Lead Partner in case of JV or Consortium) based on 2013 financial statements certified by a public accountant.			
Statement of Satisfactory Performance from the Top 5 Clients in terms of Contract Value in the past 3 years (2012, 2013, 2014)			
**If Joint Venture/Consortium – copy of the Memorandum of Understanding or Letter of Intent to form a JV/Consortium, or Registration of JV/Consortium, if registered			

* Written self-declaration of the offeror is required if such registration is not required in the country that the company is operating.

** No written self-declaration is required for this item.

Important Note: Non-compliance to meet any one of the above pass/fail criteria and sub criteria **leads to disqualification** and any further information provided by those Offerors will not be considered.

3.2. TECHNICAL EVALUATION GRID

Summary of Technical Proposal Evaluation Forms		Score Weight	Points Obtainable
1.	Expertise of Firm / Organization	15%	150
2.	Proposed Methodology, Approach and Implementation Plan	45%	450
3.	Management Structure and Key Personnel	40%	400
	TOTAL		1000

Technical Proposal Evaluation Form 1		**Points obtainable**
Expertise of the Firm/Organization		
1.1	General Organizational Capacity 1.1.1 General Experience (30 pts) 1.1.2 Financial Strength (20 pts)	50
1.2	Relevance 1.2.1 Experience on Similar Programme/Projects (75 pts) 1.2.2 Experience on Projects in the Region/Country (Turkey) (25 pts)	100
	TOTAL PART 1	**150**

Technical Proposal Evaluation Form 2		**Points Obtainable**
Proposed Methodology, Approach and Implementation Plan		
2.1	**Proposed Methodology and Approach**	*250*
2.1.1	Level of compliance of the Offeror's description of the scope of the work and comments on the Terms of Reference, compared to the ToR,)	50
2.1.2	The strength and applicability of the technical methodology and approach, proposed by the Offeror	150
2.1.3	Quality assurance and risks, identified by the Offeror, along with proposed risk mitigation strategies and measures	50
2.2	**Implementation Plan**	*200*
2.2.1	Work flow is clear (step-by-step) and is in line with the ToR	50
2.2.2	Milestones clearly identified, as per ToR	60
2.2.3	Time plan is realistic and achievable, and is in line with the ToR	60
2.2.4	Work flow and time plan is supported by a clear resource schedule (personnel time + equipment (e.g. hardware and software) + data)	30
	TOTAL PART 2	**450**

Technical Proposal Evaluation Form 3			Points Obtainable
Management Structure and Key Personnel			
3.1	**Proposed Team Structure**		*40*
3.2	**Key Personnel** [3]		*360*
3.2.1	**Energy Efficiency and Renewable Energy Expert (Team Leader), as defined in the Terms of Reference**		140
	Suitability for the Project (please refer to Section 4 ToR - Item H)	Sub-Score	
	- General Qualification	*(25)*	
	- Professional Experience	*(45)*	
	- Specific Experience	*(70)*	
3.2.2	**Renewable Energy Expert as defined in the Terms of Reference**		100
	Suitability for the Project (please refer to Section 4 ToR - Item H)	Sub-Score	
	- General Qualification	*(15)*	
	- Professional Experience	*(35)*	
	- Specific Experience	*(50)*	
3.2.3	**IT Expert, as defined in the Terms of Reference**		120
	Suitability for the Project (please refer to Section 4 ToR - Item H)	Sub-Score	
	- General Qualification	*(20)*	
	- Professional Experience	*(40)*	
	- Specific Experience	*(60)*	
		TOTAL PART 3	**400**

[3] In the event that qualifications of a key personnel to be proposed by the Offerors do not meet one of the relevant minimum requirements, he/she shall secure zero (0) points from the evaluation for this respective section.

In the event that qualifications of **two or more key personnel** to be proposed by the Offerors do not meet one of the relevant minimum requirements the Offerors may be disqualified.

UNDP possess the right to ask the Contractor to replace the personnel that do not meet the minimum requirements before contract signature. Signature of the contract will be bound by provision of an expert who fully meets the minimum requirements stated in the ToR. In such case, the contract price to be proposed by the Contractor will remain unchanged.

SECTION 4. TERMS OF REFERENCE (TOR)

A. PROJECT TITLE: PROMOTING ENERGY EFFICIENCY IN BUILDINGS IN TURKEY

B. PROJECT DESCRIPTION

B.1. Background

Between 1990 and 2011, primary energy consumption in Turkey has increased more than double. Turkey's primary energy consumption in 2011 was 114.8 Mtoe, compared to 52.6 Mtoe level in 1990. The rise of income and rapid urbanization has been stimulating the primary energy demand. Recent studies[4&5] estimate that the primary energy demand will increase at an average of 3.5 % annually for the next decade. Turkey's annual electricity demand has tripled since 1990, reaching 229 TWh in 2011. Electricity use in the residential and commercial sector accounts for 25 % of final energy consumption. The largest share of the building sector's energy consumption (75% of the total energy mix) belongs to heating, cooling, and domestic hot water needs.

Regarding final energy consumption, the building sector represents the 2nd largest energy consumer, accounting for 34.5 % of the total final energy consumption in 2011 (equal to 29.9 Mtoe). The amount of energy produced through renewable energy resources is considerably low compared with the overall energy consumption in buildings. The share of renewable energy within the building sector's final energy consumption is around 5%. This amount is almost entirely met from either geothermal resources or solar flat-plate collectors. Furthermore, the energy produced from renewable energy resources (other than geothermal-solar thermal) or energy utilized in a more rational and efficient way (such as through cogeneration or tri-generation) is unknown but estimated to be insignificant compared with the final energy demand.

The energy consumption in building sector leads to significant CO_2 emissions, mostly associated with combustion of fossil fuels. According to the 2010 GHG National Inventory data, the building sector's emissions (calculated according to energy consumption) totaled 38 million tonnes CO_2 or 34% of the total national energy-related CO_2 emissions (112 million tonnes). Therefore, the building sector represents significant opportunities for cost-effective energy savings and CO_2 emissions reduction potential, estimated to be around 35-45 %[6] of the current levels.

Turkey has gone a long way in establishing a regulatory basis that favors investments in energy efficient buildings. Current policies and strategies support the use of energy (including electricity) produced from renewable energy resources (such as wind, hydro, geothermal, solar or biomass) and favor more efficient and rational ways and means of utilizing energy resources (such as through cogeneration/tri-generation systems) through on site or off site applications. Yet there are still a number of critical barriers hampering further development of the market.

In order to overcome some of the barriers to energy efficient buildings, and to promote the use of renewable energy or energy efficient systems in buildings and thereby to reduce the final external energy consumption and associated GHG emissions in buildings sector in Turkey, a "Renewable Energy Technologies Economic Analysis Tool" for buildings is planned to be prepared and made available to the

[4] ABB (2011): Trends in Global Energy Efficiency – Country Report Turkey
[5] 2012 Energy Report, Turkish National Committee of the World Energy Council
[6] Based on estimations by MoENR

building and energy sector. This tool is expected to promote and enhance the utilization of renewable energy resources and energy efficient systems in the buildings, since it will demonstrate the feasibility and economic, environmental and other benefits in a more quantitative and comparable manner.

B.2 Definitions

The following terms, symbols, concepts, acronyms and abbreviations are frequently used in this Terms of Reference:

UNDP: United Nations Development Programme

Employer: UNDP

Contractor: The entity, contracted by UNDP, to perform the services, stipulated in these Terms of Reference

The Assignment: Unless otherwise specifically noted, "the Assignment" refers to the "RET-EAT Algorithm and Testing Models Development, Preparations for Tender File, Provision of Post-Handover Support Services during RET-EAT Software Development"

Terms of Reference (ToR): Section 4 of the Request for Proposal *(This document)* which articulates terms and conditions for the assignment.

ABS: Absorption Cooling System

ADS: Adsorption Cooling System

ASHRAE: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.

BEP: Building Energy Performance

CHP: Combined Heat and Power System

COR: CO_2 Emission Reduction Ratio

DHW: Domestic Hot Water

MGM: General Directorate for Meteorology

EE: Energy Efficiency

EIA: Environmental Impact Assessment

EKB: Building Energy Performance Certificate

EN: European Norm

ENS: Energy Savings

EPDK: Energy Market Regulatory Authority

ERD: Entity Relationship Diagram

ES: Economic Savings

EU: European Union

EXE: Exergy Efficiency

IEEE: Institute of Electrical and Electronics Engineers

IN: Specific Increase in Initial Investment

GEF: Global Environment Facility

GDRE: General Directorate for Renewable Energy

GHG: Greenhouse Gas

MoENR: T.R. Ministry of Energy and Natural Resources

MoEU: T.R. Ministry of Environment and Urbanism

PMU: Project Management Unit staffed by UNDP and other project partner agencies

PV: Photo-voltaic system

PVT: Photo-voltaic and Thermal

REMM: Rational Exergy Management Model

RET-EAT: Renewable Energy Technologies Economic Analysis Tool

SI: International system of units

SE: Solar Energy

SES: Sustainable Energy System

SRS: Software Requirement Specifications

RE: Renewable Energy

TES: Thermal Energy Storage

TG: Tri-generation system

TS: Turkish Standards

Y: Simple Payback Period

WE: Wind Energy

B.3 General Standards and Requirements

The following codes, standards and regulations should be considered as reference during the implementation of the Assignment, which shall not be limited to below:

- Building Energy Performance Regulation (BEP: See Annex VI), MoEU,
- Energy Performance for Buildings Directive (EPBD), EU,
- Standard of Thermal Insulation Requirements for Buildings (TS 825),
- Specification for Architectural and Engineering Design Services, MoEU,
- Mechanical Design Codes of Chamber of Mechanical Engineers, TMMOB/UCTEA,
- Electrical Design Codes of Chamber of Electrical Engineers, TMMOB/UCTEA,
- Surveying Codes of Chamber of Surveying Engineers, TMMOB/UCTEA,
- General Technical Specifications, MoEU,
- General Technical Specifications of Turkish Electricity Distribution Company (TEDAŞ),
- Environmental Impact Assessment (EIA) Regulation, MoEU,
- Regulation for Natural Gas Installations , EPDK (Energy Market Regulatory Authority),
- Related EN Standards (i.e. EN 13779 for Heating, Ventilating, and Air Conditioning of EU).

Unit system of the project will be SI unit system. Any variables, coefficients, equalities or inequalities in the form of other unit systems will not be used. If conversion of data in the form of other unit systems is needed, unit conversions will be presented in an algorithmic structure in accordance with international standards.

C. OBJECTIVE OF THE ASSIGNMENT AND SCOPE OF SERVICES

In order to promote the use of renewable energy resources in buildings and thereby to reduce the final external energy consumption and associated GHG emissions in the buildings sector of Turkey, a "Renewable Energy Technologies Economic Analysis Tool" will be developed within the Promoting Energy Efficiency in Buildings Project.

This tool will be developed in parallel with the Article 22 of the Building Energy Performance Regulation, (*dated 05.12.2008 and numbered 27075 Official Gazette*) and will cover all the energy sources and technologies covered in this article, to say the least.

United Nations Development Programme (UNDP), General Directorate of Renewable Energy (YEGM) under Ministry of Energy and Natural Resources (MoENR) and General Directorate of Professional Services (MHGM) under Ministry of Environment and Urbanism (MoEU) will collaborate to start and sustain a RET-EAT with the below functionalities.

- *Calculation of benefits from RET for buildings, based on hourly energy models and environmental data,*
- *Calculation of related costs and benefits,*
- *Comparison of possible RET implementation scenarios and base building scenarios.*

The RET-EAT will serve as the guidance and calculation tool for the building design sector, promoting better energy performance, higher energy efficiency, and increased level of onsite renewable energy applications in all types of single (stand-alone) buildings, including residential and non-residential, old (to be retrofitted or renovated), new or yet to be built buildings.

The RET-EAT can also be used for large buildings such as airports, hospitals, schools, hotel complexes, apartment complexes as long as they are to be treated as single buildings. However, in the future this methodology is also expected to apply to a cluster of buildings provided that energy and cost allocation is taken care of by an allocation algorithm which will be developed.

RET-EAT will help building designers and future owners to analyze the best cost effective RES alternatives, energy mix and RES system bundling with optimal environmental benefits on a building by building basis.

Within this framework, the overall scope of work regarding the development of this "RET Economic Analysis Tool" (RET-EAT) is split into two stages:

- **STAGE I:** Development of Algorithm and Relevant Annexes, Testing Models and Terms of Reference For RET-EAT Software Development Tender,
- **STAGE II:** Supporting Services during RET-EAT Software Development.

For Stage I, the Contractor will ***deliver detailed algorithm definitions and all additional required technical specifications, testing models[7], a complete program developer's guide and Terms of Reference for the tender document for RET-EAT software development tender (which will be carried out in Stage II);***

For Stage II, the Contractor will ***provide post-handover support services including client (both the Employer and the software developer) training services and software validation services during the development of RET-EAT software.*** The Contractor for the RET-EAT Software Development will be the main responsible party for software development works and will be identified through another tender process.

C.1 Description of Stage I works

In this stage, a detailed algorithm for the RET-EAT will be developed. The purpose of this algorithm is calculation of renewable, waste energy utilization and sustainability performance for:

- Stand-alone (such as PV panels) or hybrid (such as PVT, solar-wind combined systems) renewable energy systems, equipment, or devices,
- Energy efficient and environmentally conscious system solutions such as combined heat and power (CHP)/Tri-generation (TG), heat pumps (HP), thermal energy storage (TES), cooling with heat (ABS or ADS),
- Integrated utilization of the above mentioned systems at their different load share ratios and different clustering alternatives (as detailed in Annex I of ToR),
- Calculation of costs and benefits related to the possible solutions in 10 year time frame perspective, with respect to the fuel and energy supply price estimation methodologies to be developed.

In addition, the algorithm to be developed shall comprise such a structure that it will be able to carry out calculations, evaluations and reporting-archiving activities about the ratio of such investments regarding renewable energy utilization in buildings to the total building costs (*which must be based on the current MoEU unit costs*).

While such projects increase in the future, this algorithmic structure will pave the way to establish and maintain essential data banks that may be used for updating rules and regulations about building evaluation metrics. Furthermore, this algorithmic structure will contribute to the establishment of a nationwide efficient building benchmarking system.

To guide decision makers and energy strategists, the reporting activity shall include overall and broken-down impacts (positive or negative) of each possible system that may be used in a given building regarding building efficiency and pay-back periods in terms of the investment costs of such systems.

Furthermore, CO_2 emissions and exergy efficiency calculations, related analysis reports will be provided on user's request.

[7] Please refer to Annex I Sub-Task 2-24

The broken-down reporting schedule shall also reveal the partial contribution of each renewable energy resource and system to the overall building energy performance.

The algorithm shall also be capable of carrying out analyses and comparisons regarding different types and combinations of systems and equipment that the user may consider to set up in the building based on renewable/sustainable/waste energy resources in terms of economic, environmental, and technical basis with respect to different load sharing figures in that building.

The algorithm for the RET-EAT should also be capable of quantifying the effects of energy efficiency measures and renewable energy technologies together in a broken down format.

Once the algorithm is fully developed and approved, two testing models will be compiled to test the algorithms with all details. The models shall be accompanied with a complete program developer's guide.

Furthermore, a Terms of Reference document will be developed along with the complete set of algorithms and technical specifications.

C.1.1 Preliminary Analysis and Inception Report

The Contractor (with the participation of Team Leader and the relevant key experts) and the Employer (UNDP), project partner agencies (i.e., GDRE and MoEU) and PMU will meet in Ankara for the kick-off meeting.

In this meeting, PMU will brief the Contractor and its key experts on the project, and parties will go over the Terms of Reference and the Contractor's technical proposal with a view to agree on the general timeframe and the expected deliverables.

The Employer and/or key project partners (i.e., GDRE and MoEU) shall furnish the Contractor (successful Offeror) with the available supporting information regarding the project such as beneficiary's requirements and needs assessments, limits of budgeting etc.

An "Inception Report" will be submitted to the Employer by the Contractor describing (a) collected information from relevant institutions (e.g. Employer, project partner agencies, local and national authorities/administrations, PMU etc.); (b) evaluation of the compiled information; (c) comments on the missing and further required information; (d) presentation of the scope and methodology for the services, (e) proposed work schedule and deliverable timeline.

With the approval of the Inception Report, the final scope of the project, the methodology and the revised timeline of works shall also be finalized. Therefore, the approval of the Inception Report shall be **the 1st Milestone** for the overall project.

C.1.2 Algorithm development activities for the RET-EAT

The algorithmic structure shown in Figure A1-1 in Annex I consists of three main modular layers, namely Module A, Module B and Module C, as defined below:

MODULE A-DATA MANAGEMENT MODULE: This modular layer contains all hourly-based building

system loads, either from actual data recorded from an existing building or imported from a suitable building simulation package already being executed by a 3rd party. The hourly data provided into RET-EAT shall be generated by widely accepted software (such as Energy plus, etc).

This module shall contain fixed (one-time calculated) hourly building loads data, which will be used in two separate methods, namely Method 1 (Fast-Track Algorithm), Method 2 (Detailed Analysis Algorithm). All data must cover 365 days of a year and 24 for hours of each day. This module shall contain all relevant information regarding performance analysis, economic evaluation, reporting, energy and fuel price predictions, equipment prices and their predictions for the future, and the basis for benchmarking.

Furthermore, it will contain all cooling degree-hour and all heating degree-hour values of Turkish cities and towns published by MGM.

Regarding predictions in the fuel and energy prices, the database shall cover for at least the next ten years starting from the calendar year of the program that enters into service first. Such predictions in the database shall be updated by the system in every three months. Regarding equipment prices and performance characteristics, the algorithm shall enable the system administrator to update every six months.

For the robust establishment of all these purposes this module shall develop necessary databases to accommodate the collection of all related information, accepting inputted information in prescribed formats, processing these information and enabling to generate information, storing these information in suitable data structures (See Annex III) that makes it possible to update information and to make predictions in suitable media, interfaces, and interactive means. Furthermore, this module shall be an integration of all these information and dynamic data banks, which are capable of establishing all links and coordination among the information and generating default values and updating them.

In this Assignment, **only** relevant algorithms will be developed in suitable formats. The Contractor will determine the needed hourly data, design the relevant database and the relationships between them, however the Contractor will not produce any data and use it. The only exception will be the properties of a base building and its systems, which will be provided by the Employer during Stage I for the testing of the algorithm. Hourly data of this building at different climatic regions will be provided by the Employer and algorithms will be checked during testing stage. No other data will be required from the Contractor.

MODULE B-SYSTEM ANALYSIS MODULE: This modular layer shall basically execute the performance analysis of the renewable/sustainable energy systems/equipment based on designers' selections such as PV, cogeneration, etc. The performance analyses shall use two different methods:

Method 1 – Annual Approach (Fast Track): This method shall provide a faster calculation and analysis algorithm structure with less amount of input regarding building loads and may be equally used at the earlier stages of design like concept design phase of the building for design optimization purposes. This method shall predict sensible heating and cooling loads of the building based on the average overall U value of the building envelope to be separately made available for heating and cooling seasons and the sensible heating and sensible cooling degree-hours issued by the General Directorate for Meteorology (MGM).

Latent cooling loads shall be approximated as a fraction of sensible cooling loads according to a factoring table to be prepared by the Contractor, which shall take into account the climatic conditions of the meteorological point, building type, building function, building size and infiltration, exfiltration characteristics.

Service hot water may be also calculated in a similar format.

Electrical loads may be based on annual values but may also be broken down into hourly values according to a load profile prediction algorithm to be prepared or to be adopted by the Contractor.

This fast-track algorithm shall in the future also generate sufficient data for making a comparative analysis to see the differences between the main analysis algorithm and this one and to make necessary adjustments if necessary to the fast-track algorithm.

Method 2 – Hourly Approach: This is a more accurate and realistic method which uses hourly changing building loads data. This data shall be imported once for each building case as executed by a 3rd party using an energy modeling software. Although the hourly data shall remain fixed in the data base for any given building, the designer or the person carrying out the economic analysis may wish to try several renewable energy/sustainable system options by only varying their load sharing portions and the number and type of them without changing the fixed hourly building loads data, because such changes do not affect the building loads in general.

In addition, Module B shall also prepare the building input data for the building under construction in a vectoral hierarchical manner once the user input is interactively received by the user-computer interface (See Annex III).

MODULE C-EVALUATION AND REPORTING MODULE: All calculations and analyses regarding the system performance evaluation based on defined metrics[8] with respect to economic, environmental and efficiency will be carried out and reported.

Furthermore, algorithm shall also cover data banks regarding information about user feedbacks and benchmarking.

In addition, in order to enable a more accurate and updated prediction about fuel and energy prices, at least three prediction models will be developed or adapted. This shall include ten-year (10-year) prediction algorithms for energy and fuel prices based on these models.

Module C shall also include all necessary algorithms to store and to archive all evaluations in electronic/printed/internet media.

Finally, Module C shall include algorithms about interactive user interfaces at different pre-set authorization/security levels.

In its general structuring, Module C, which can also be defined as a "*Decision Support Mechanism*", is expected to have the following features:

[8] See Annex II.

Module C-I. **SYSTEM ENERGY SAVINGS:** This module shall calculate the energy efficiency and if selected by the user, the exergy efficiency on an hourly operating basis. Based on the current building simulation data, hourly building electrical energy loads related to comfort cooling (if operated by electrical power) and comfort cooling loads and comfort heating loads shall change each year. A study shows that comfort cooling loads shall be increased uniformly for each consecutive year by 3% and comfort heating loads shall be decreased uniformly for each consecutive year by 2% (due to combined effect of global warming and building aging)[9]. Similarly, the percentage ratios regarding the change in cooling loads and heating loads will be researched by the Contractor and will be proposed to the Employer to be used in the algorithms.

Module C-II. **ENVIRONMENTAL CONSCIOUSNESS**: CO_2 emissions reduction potentials shall be calculated based on the energy efficiency and exergy efficiency.

Module C-III. **ECONOMY:** The initial investment burden of installing renewable energy systems and utilizing renewable energy resources in terms of a percent value of the total building cost (which must be based on the current MoEU unit costs) and the pay-back period in the ten-year perspective shall be calculated.

Operating costs and financial revenues of these systems in an overall format and broken-down format for each renewable system and energy resource shall also be reported.

This module shall also include annual maintenance, replacement, and repair costs based on related data bank prescribed in Annex I, Task 2-3: System and Component Unit Data Base.

Module C-IV. **SCENARIO COMPARISON and ANALYSIS:** This algorithmic routine enables the user to consider, evaluate and compare a diversity of different alternative bundles of renewable energy systems and resources in different load sharing modes (based on request by the user) in order to reach a better optimality. This algorithm shall be limited to do simple loops that repeat the process of analyzing a single set of alternative bundle at a time and listing the results such that the user may deduce the optimal solution among the alternatives by using his/her own technical, economical, and environmental expectations and priorities. In other words this routine shall support the user decisions without carrying out an optimization routine. No optimization process is part of the project.

Module C-V. **RESULTS AND OUTPUTS**: In this module, the performance level in terms of all evaluation metrics (See Annex II) derived from all calculations, data and analyses obtained are reported.

If the exergy analysis option is selected by the user, this algorithmic unit shall carry out the calculations according to REMM (Rational Exergy Management Model, See Annex II).

[9] http://www.pnl.gov/main/publications/external/technical_reports/PNNL-17826.pdf

Fast-track results are reported separately with a cautionary remark that the calculations may be highly approximate.

Module C-VI. ALGORITHM and METRIC DEVELOPMENT: This modular layer internally prepares feedbacks for related rules and regulations and the algorithm itself based on the interpretations made internally on the entire data structure. It further prepares and stores in suitable formats the information regarding to the development of possible new metrics about the system performance.

During the Algorithm Development Phase, two (2) "Progress Reports" shall be prepared and include information regarding Sub-tasks from 2-1 to 2-24 as explained in detail in Annex I. In case of urgency, ad hoc reports can also be submitted.

In the 1st Progress Report, **the flow diagrams** and **the specifications for the data requirements** shall be included. Therefore, the approval of the 1st Progress Report shall be **the 2nd Milestone** for the overall project.

In the 2nd Progress Report, **the mathematical functions and subroutines** shall be included in detail. Therefore, the approval of the 2nd Progress Report shall be **the 3rd Milestone** for the overall project

The Progress Reports #1 and #2 should also describe the overall progress of the Algorithm Development Phase, including specific sections regarding the progress on Module A, Module B and Module C. The key issues to be addressed in these reports shall include, as minimum;

- Level of progress regarding algorithm and data structure definitions,
- Sample working sets,
- Quality of works,
- Implementation of work program
- Use of resources, contract administration and cost control.

The Progress Reports #1 and #2 shall also contain sections on;

- Cumulative progress achieved during the last reporting period,
- Progress planned for the next reporting period,
- Any encountered problems and the proposed solutions.

The Progress Reports #1 and #2 shall also include minutes of any meetings between the parties, any other special activity such that missions outside the project location, workshops, training seminars, press conferences etc. held regarding the project.

The percent completion of the Algorithm Development Phase shall be presented in graphical form showing a comparison between actual and scheduled values (as per approved work schedule) from commencement of the Works.

Submittals of the Contractor and approvals of the Employer should also appear in the Progress Reports #1 and #2.

C.I.**3 Development of testing models with a complete program developer's guide**

After the algorithm is developed, two testing models regarding Method 1 (fast track) and Method 2 will be compiled with all details relevant for developing RET-EAT software in Stage II. This will be accompanied by a complete program developer's guide covering both models.

To make sure the models are accurate and fully functioning, sample pre-algorithm alpha test programs will be written in MS Excel or similar compatible software program. All Excel source codes, equations, databases, flowcharts and data transformation methodology will be made available for inspection and approval by the Employer.

The models will be run for a service building located in respectively Ankara, İstanbul and Erzurum according to the general data prepared by the administration. By using these case data, the contractor will run the programs for a typical summer day (21 August) and a typical winter day (21 January) within 24 hours of periods.

The Contractor shall also provide their own evaluation report of results for the three cities for Method 1 and Method 2 with a complementary comparison.

Pending to the Employer's approval and suggestions, the Contractor shall modify the algorithms with respect to necessary development, arrangement and update. This will provide the two testing models.

The approval of the two testing models in MS Excel and the complete software developer's guide marks **the 4th Milestone** for the overall project.

In addition, a brief algorithmic proposal regarding the energy and cost allocation methodology to execute this program for a cluster of buildings shall also be delivered along with the final excel models.

C.I.4 Preparation of Terms of Reference for software tender

Furthermore, a Terms of Reference document will be developed along with the complete set of algorithm and technical specifications. The complete set of technical specifications for the RET-EAT shall cover the below:

- Specification of the required functionality of software tool,
- Description of the required algorithms, data transfer and interface specifications,
- Flowcharts and pseudo codes for the calculation algorithms of the RET-EAT,
- Specification of the software architecture, database design and required network infrastructure,
- Definition of the non-functional requirements such as the performance and security requirements,
- Description of applicable internationally recognized standards,
- Any other required annexes.

In Terms of Reference, it should be noted that RET-EAT will be a web based system. It shall also be user friendly to the extent that an able engineer may understand it quickly and use it easily.

It should also be stated in Terms of Reference that for a certain amount of time the maintenance/improvements to the tool, which comprises the datasets, the calculations and the interface shall be the responsibility of the software developer to be contracted in Stage II.

The approval of the Terms of Reference for software tender shall be **the 5th Milestone** for the overall project.

C.2 Description of Stage II works

Once the Stage I is completed, a software development tender will be carried out for the selection of another contractor for the software development works. The Contractor for this RfP will have no part in selection process of this second contractor.

The Contractor for this RfP will subsequently deliver two (2) days of familiarization training (1 day in Ankara and 1 day via web conference) with the two testing models in Excel to the Employer, Project Partners and the Software Development Contractor in Ankara.

The delivery of the familiarization training for the two testing models shall be **the 6th Milestone** for the overall project.

The Contractor who will be responsible for developing the algorithm will closely work and cooperate with the Contractor that will be chosen to develop the RET-EAT Software during software development works. The aim of this cooperation is to provide post-handover support by delivering consultancy and monitoring services. In this respect, both contractors shall have a minimum of three (3) meetings during the course of software development project. This support will be done through web-conferencing services. Subsequently, the Contractor will provide three (3) follow-up evaluation reports regarding the software development process to the Employer.

Towards the end of Stage II, the Contractor will also provide software validation services by two (2) rounds of testing of the software and comparing with the Excel models. The Contractor will also provide brief evaluation reports regarding software validation.

The approval of the 2nd software validation report shall be **the 7th and the final Milestone** for the overall project.

D. EXPECTED OUTPUTS AND TARGET COMPLETION DATES

The Contractor shall commence and complete the works for Stage I within 250 days and Stage II works within 180 days.

These time periods **include** the time required for technical and administrative approvals but **exclude** the time required for software development tender (which will be fully undertaken by the Employer).

D.1 Expected Outputs and Target Completion Dates

D.1.1 Main Deliverables

The following table lists the activities and deliverables against required timeframes. The "Deliverables" are the minimum requirements and will be supplemented and complemented by additional studies/annexes, as appropriate.

Table 4.1: Main Deliverables and Estimated Target Dates

STAGE	Step	Phase	Deliverables*	Estimated Submission Dates
I	1	Inception	Inception Report	Day 20

	2	**Algorithm Development Phase**	Progress Report # 1 for Algorithm Development Phase	Day 70
			Progress Report # 2 for Algorithm Development Phase	Day 140
	3	**Testing Models Development Phase**	Two testing models and a complete software developer's guide (including the full set of final algorithms)	Day 210
	4	**Preparation of ToR**	Terms of Reference for software development tender	Day 250
TENDER PROCESS FOR RET-EAT SOFTWARE DEVELOPMENT WORKS (UNDERTAKEN BY UNDP)				***Day 250-370***
II	**5**	**Post-handover Support Services ****	Familiarization training	Day 370
			Web based conference # 1 with software developer and follow –up evaluation report # 1	Day 400
			Web based conference # 2 with software developer and follow –up evaluation report # 2	Day 430
			Web based conference # 3 with software developer and follow –up evaluation report # 3	Day 460
			Software validation services and Evaluation Report – Round 1	Day 510
			Software validation services and Evaluation Report – Round 2	Day 550

* UNDP *may require additional Annexes as applicable.*

*** The submission dates indicated in this table for Step 5 are based on the successful and timely completion of tender process for the software development, the signature of the contract with the vendor to be identified and the commencement of the software development project works. Therefore the estimated timeframe for Step 5 may shift according to the actual provision of Software Development services.*

D.1.2 Language of Deliverables

The deliverables shown in Table 4.1 shall be prepared in Turkish or in English.

E. INSTITUTIONAL ARRANGEMENT

E.1 Submission of Deliverables and Reporting in Stage I

The Contractor will submit the deliverables in accordance with the "Deliverables and Estimated Timeframes Table" (Table 4.1) in Section D.1.1 of the Terms of Reference.

The Contractor will submit an Inception Report and two (2) evaluation reports during algorithm development process to the Employer and the project partner agencies. The reports shall be prepared electronically.

At the relevant milestones, *such as inception report, algorithms, two testing models, complete software developer's guide and Terms of Reference for software development tender*, the Contractor will obtain feedback and/or approval of the Employer and/or key project partners.

The feedback and/or approval procedures for Stage I activities are expected to proceed as below:

The deliverables will be submitted by the Contractor to the employer and the project partner agencies. The deliverables will be evaluated by the employer and the project partner agencies. The Employer will coordinate the evaluation and gathering of feedback from the project partner agencies. The Employer returns to the contractor with feedbacks in a time period of not more than one week. After the feedback provided by the Employer and the project partner agencies, the necessary improvements to the report shall be made by the Contractor within one week and resubmitted to the Employer and the project partner agencies. The resubmissions and approval procedure may not exceed three weeks. Within this

maximum period, resubmissions and feedbacks may be repeated to finalize the deliverables.

E.2 Submission of Deliverables and Reporting in Stage II

The Contractor will submit three (3) brief evaluation reports during software development process and two (2) brief evaluation reports for each round of software validation works to the Employer and the project partner agencies.

The reports shall be prepared electronically and include the findings of the Contractor regarding software development process, the Contractor's recommendations and corrective measures, if any, to be taken especially to ensure the compliance of the software with the intended algorithm. These reports might also include proposals for change orders regarding the software development works.

At the relevant milestones, the Contractor will obtain feedback and/or approval of the Employer and/or key project partners.

The feedback and/or approval procedures for Stage II activities are expected to proceed as below:

The deliverables will be submitted by the Contractor to the Employer and the project partner agencies. The deliverables will be evaluated by the employer and the project partner agencies. The Employer will coordinate the evaluation and gathering of feedback from the project partner agencies. The Employer returns to the Contractor with feedbacks in a time period of not more than one week. After the feedback provided by the Employer and the project partner agencies, the necessary improvements to the report shall be made by the Contractor within one week and resubmitted to the Employer and the project partner agencies. The resubmissions and approval procedure may not exceed three weeks. Within this maximum period, resubmissions and feedbacks may be repeated to finalize the deliverables.

F. DURATION OF THE WORK

The Assignment is *envisaged* to start in March 2015. Service periods for different components of the contract are as follows;

F.1. Stage I: Inception, Algorithm Development, two testing models and ToR Preparation

The scope of the services for Stage I of the project is expected to be completed in 250 days from the commencement date. Out of this 250 days period, 170 days are envisaged for:

- Inception works,
- Algorithm Development works,
- Development of Testing Models and Complete Developer's Guide, and
- Preparation of Tender Files.

Maximum 80 days additional are envisaged for the **technical and administrative approval** of the deliverables by UNDP and Project Partners.

F.2. Stage II: Post-handover Support Services

The tendering procedure for software development works is expected to take 120 days and it will be carried out between Days 250-370.

Subsequently, Stage II activities will start at Day 370 for the Contractor with the intended familiarization

training.

The total duration for Stage II regarding post-handover support services is expected to take 180 days (i.e. between Days 370-550).

G. LOCATION OF WORK

Location of the Assignment is Ankara, Turkey and the Offeror's home-base. The Contractor will participate in several meetings with UNDP, the Project Partner Agencies and the Contractor, who will be responsible for RET-EAT software development works, during Stage I and Stage II, as explained below:

G.1 Meetings for Stage I: Inception, Development of the Algorithm and Relevant Required Annexes for the RET-EAT Software Development Tender

The Team Leader and/or relevant key personnel will attend the below meetings during Stage I as explained below and also in Annex VIII:

- One (1) kick-off meeting at the beginning of Step 1 - Inception Phase for one (1) day (in Ankara),

The dates and the length of the meeting are subject to change and can be mutually rearranged based on the circumstances and the needs.

G.2 Meetings for Stage II: Development of the Software of the RET-EAT,

The Team Leader and/or relevant key personnel will attend several meetings during Stage II as explained below and also in Annex VIII:

- Two (2) days of testing models familiarization training (1 day in Ankara and 1 day via web conference)
- Three (3) half-day web-conferences (home-based) with the RET-EAT software development contractor during software development works,

The dates and length of meetings are subject to change and can be mutually rearranged based on the circumstances and the needs.

G.3 Additional Meetings

The Team Leader and/or relevant key personnel may also be requested to attend additional meetings during Stage I and Stage II (The number of the meetings may vary depending on the circumstances) with designated staff of UNDP and Project Partner Agencies.

The additional meetings can be mutually arranged based on the circumstances and the needs.

Travel and accommodation costs for these additional meetings (if expected to take place in Ankara) for Team Leader and/or relevant key personnel will be borne by UNDP and will be charged against the project budget. Travel costs (economy class flight and full board accommodation expenses at 4* or higher hotel) for the additional meetings will be arranged and borne by UNDP through UNDP's official Travel Agency. No other travel related expenses will be paid or reimbursed to the Contractor.

H. QUALIFICATIONS OF THE SUCCESSFUL SERVICE PROVIDER AT VARIOUS LEVELS

H.1 Contractor & Project Team

The Contractor shall provide adequate international and/or national staff in terms of expertise and time allocation as well as needed equipment in order to complete the activities required under the scope of the Assignment and to achieve the overall and the specific objectives of the Assignment in terms of time, costs and quality.

Contractor's personnel (i.e. experts to be mobilized by the Contractor to deliver the Assignment) that have a crucial role in implementing the contract are referred to as key personnel. CVs, copies of diplomas, and relevant certifications of key personnel shall be included in the Technical Proposal.

CVs shall list all the relevant activities for the entire time period mentioned in their CVs as years of experience.

Hereinafter, the profiles of the key personnel are presented. Note the minimum requirements and the assets. The minimum requirements refer to the qualifications that the personnel to be proposed by the Offeror should definitely possess.

- In the event that qualifications of a key personnel to be proposed by the Offerors do not meet one of the relevant minimum requirements, he/she shall secure zero (0) points from the evaluation for this respective section.
- In the event that qualifications of **two or more key personnel** to be proposed by the Offerors do not meet one of the relevant minimum requirements the Offerors may be disqualified.
- UNDP possess the right to ask the Contractor to replace the personnel that do not meet the minimum requirements before contract signature. Signature of the contract will be bound by provision of an expert who fully meets the minimum requirements stated in the ToR. In such case, the contract price to be proposed by the Contractor will remain unchanged.

"Assets" are preferred qualities and qualifications of the personnel. Proposed personnel that possess the minimum requirements will obtain 70% of the maximum obtainable points, whereas proposed personnel that also possess the "assets", in addition to all the minimum requirements, may secure up to 100% of the maximum obtainable points.

The below defined key experts are the main responsible persons for the tasks defined in this Assignment.

The list of key experts and required general/specific professional experiences are shown in the following table (Table 3.2):

Table 4-2: Key Personnel

Team Members	Education	Professional Experience (years)	
		General	Specific
Energy Efficiency and Renewable Energy Expert (Team Leader)	Energy, Electrical or Mechanical Engineer	8	5

Team Members	Education	Professional Experience (years)	
		General	Specific
Renewable Energy Expert	Energy, Electrical or Mechanical Engineer	6	4
Information System Analysis and Design Expert	Engineer/IT/Mathematician	6	4

The Offerors are strongly encouraged to detail these job descriptions in their technical proposals to include the division of labor, reporting and coordination lines, etc.

The detailed job descriptions for each key personnel are given below;

H.1.1 Energy Efficiency and Renewable Energy Expert (Team Leader)

The Team Leader shall be responsible for the overall coordination of the implementation of the entire project activities, including but not limited to;

- Manage the team, coordinate the team of experts, and allocate the tasks,
- Maintain continuous communications with counterparts,
- Primary contact for all communications, elaboration and delivery of reports,
- Responsible for the delivery of all necessary inputs for ensuring proper implementation of the activities in accordance with governing rules and regulations,
- Responsible for the identification of eventual obstacles for the implementation of projects and taking necessary correcting action accordingly,
- Financial management and reporting, and other tasks as required,
- Lead the goals of the Algorithm development, equipment efficiency, economy, performance and evaluation criteria,
- Lead the alpha tests per required in the ToR, evaluate and report the results implement and delegate all necessary corrections, modifications, deletions and additions to the algorithms concerned,
- Identify and suggest all the energy efficiency parameters, metrics and renewable energy system bundle options,
- Develop the economic analysis tool,
- Develop/adopt economic forecasting models,
- Identify the economic parameters to be collected and used within the models and the analyses.

Required Skills and Experience

	Minimum Requirements	Assets
General Qualifications	- University degree in Energy, Mechanical, Electrical Engineering or relevant discipline (if the education does not directly fit above, 4 additional years of relevant work experience will be required),	- Graduate degree in a related field

	Minimum Requirements	Assets
	- Fluency in English - Computer literacy	
Professional Experience	- A minimum of 8 years of professional experience in computer-based design, analysis, and evaluation of renewable energy systems - Proven experience as the project coordinator and/or team leader	- More than 12 years of experience - Experience with financial & economic analyses of RE projects
Specific Experience	- At least 5 years of experience in mechanical system design of buildings - Proven experience in the design of energy efficient buildings	- More than 8 years of experience in design of energy efficient buildings - Proficient knowledge in at least one prominent software program such as Retscreen, Homer, SAM (System Advisor Model), Energy Plus - Proven experience with heat pump, solar technology, cogeneration, wind energy, energy storage systems - Experience with the Energy Performance of Buildings Directive and/or relevant regulations (state specifically)

H.1.2 Renewable Energy Expert

- Collection of characteristic parameters and classification of performance/economic data (with the economist) PV, PVT, Solar Collector, wind energy, heat pump technology, boilers, cogeneration systems, energy storage.
- Write all commands and steps of all algorithms, interfaces, and subroutines described in this document
- Develop all techno economical evaluation and rating metrics
- Verify and evaluate alpha test results
- Design and prepare data trees,
- Prepare all standard terminology, variable, vector, matrix names
- Prepare all logical and mathematical pointers (reverse and forward) in the data base and data processing/evaluation units
- Develop/adopt all fuel and energy price projection models with Information System Analysis and Design Expert and/or Financial Expert
- Develop the economic analysis tool algorithm with integrated format with all other sub algorithms and routines developed by him/her.
- Develop greenhouse gas emission models (including exergy analysis) and CO_2 emissions prediction algorithm and integrate these routines to the main algorithm

- Develop all user-machine interfaces and screen designs for easy, clear, fast, and understandable man-machine interfacing
- Prepare all program developer manuals to explain the details of all the algorithms to be prepared

Required Skills and Experience

	Minimum Requirements	Assets
General Qualifications	- University degree in Energy, Mechanical or Electrical Engineering or relevant discipline (if the education does not directly fit above, 4 additional years of relevant work experience will be required), - Fluency in English - Computer literacy	- Advanced university degree from a related field
Professional Experience	- A minimum of 6 years professional experience in one or several fields of computer-based design, analysis and evaluation of renewable energy systems	- More than 9 years of experience
Specific Experience	- Minimum 4 years of experience in thermal systems & renewable energy systems, - Proven Experience on CO_2 emissions calculations for energy efficient buildings, - Proven knowledge and experience in PV, Solar Collector, wind energy, heat pump technology, boilers, cogeneration systems, energy storage	- EnergyPlus, Design Builder, similar building simulation codes literacy - Proven experience with software development/use environment like Retscreen, Homer, etc.

H.1.3 Information System Analysis and Design Expert

- In coordination with the team leader and other key experts, carry out the complete analysis for the software, consulting and evaluating all stakeholders' comments and feedback on the RET-EAT software,
- Evaluate and present main information flow and user action scenarios with UNDP and/or project partners,
- Define of the requirements specification of the software with respect to the required standards,
- Define the way data will be imported and exported to the software system, including the metadata, acceptable formats for outside information etc.,
- Evaluate and define the way the algorithms can be best integrated to the software system and the database,

- Analyze and report the possible uses of various mathematical modeling and calculation tools for the possible integration with the system,
- Define and present the possible software and database architecture options for the proposed system,
- Define the sustainability requirements including the information and software system maintenance personnel requirements

Required Skills and Experience

	Minimum Requirements	Assets
General Qualifications	- University degree in Computer, Software, Electronics or Electrical Engineering, Mathematics or relevant discipline (if the education does not directly fit above, 6 additional years of relevant work experience will be required), - Fluency in English	- Advanced university degree from a related field
Professional Experience	- A minimum of 6 years of professional experience in software analysis, design and development	- More than 8 years of professional experience

Specific Experience	- A minimum 4 years of experience in
	  - web based software systems analysis and design
	  - implementation of complex mathematical algorithms for software projects
		- Experience with the Energy Performance of Buildings Directive and/or relevant regulations (state specifically)
		- Proven knowledge of IEEE STD 830-1998 Recommended Practice for Software Requirements (state specifically)

H.1.4 Short-Term Experts (Non-Key Experts)

The Contractor will mobilize additional experts and technicians as per the requirements of the various phases of the assignment. All the engineers should have an engineering degree and the technicians should have relevant degrees. All short-term experts should have at least 5 years of professional experience, and should have at least 3 years of similar specific work experience.

The Contractor is fully responsible to mobilize non-key experts as may be needed for successful and timely completion of the works defined in this RfP. The cost of backstopping and non-key experts must be included in the daily rates of the key experts and hence in the total Contract Price.

I. SCOPE OF PROPOSAL PRICE AND SCHEDULE OF PAYMENTS

The payments will be made on lump sum basis for the respective deliverables specified in Stage I and Stage II upon the completion of necessary approval steps described under Section 4, E. Institutional Arrangement.

Milestone activities of the contract price are shown below:

Stage Nr.	Step Nr.	Phase	Deliverables	Estimated Payment Date	Payment Weight (%)*
I	1	Inception	Inception Report	N/A	0
	2	Algorithm Development	Progress Report # 1	N/A	0
			Progress Report # 2	N/A	0
	3	Development of two testing models	Two testing models and a complete software developer's guide	Day 230	60
	4	Preparation of ToR	Terms of Reference for software development tender	Day 270	10
II	5	Post-handover Support Services	Familiarization training	Day 390	15
			Web based conference # 1 with software developer and follow – up evaluation report # 1	N/A	3
			Web based conference # 2 with software developer and follow – up evaluation report # 2	N/A	3
			Web based conference # 3 with software developer and follow – up evaluation report # 3	N/A	3
			Software validation services and Evaluation Report – Round 1	N/A	3
			Software validation services and Evaluation Report – Round 2	Day 570	3
	TOTAL				**100%**

J. ANNEXES TO THE TOR

There are 9 Annexes to the ToR as below:

ANNEX I: DETAILED DEFINITION OF SUBTASKS FOR ALGORITH DEVELOPMENT PHASE UNDER STAGE I

ANNEX II: EQUIPMENT, SYSTEM AND BUILDING PERORMANCE EVALUATION METRICS

ANNEX III: HIERARCHICAL DATA BASE STRUCTURE

ANNEX IV: ELECTRO-MECHANICAL SYSTEM OPERATON TEMPLATES TO TEST THE ALGORITHM

ANNEX V: HOURLY PERFORMANCE SIMULATION AND ANALYSIS ALGORITHM

ANNEX VI: INFORMATION ON LEGISLATIVE BACKGROUND

ANNEX VII: BUILDING ELECTRO-MECHANICAL SYSTEM BASE SCENARIO

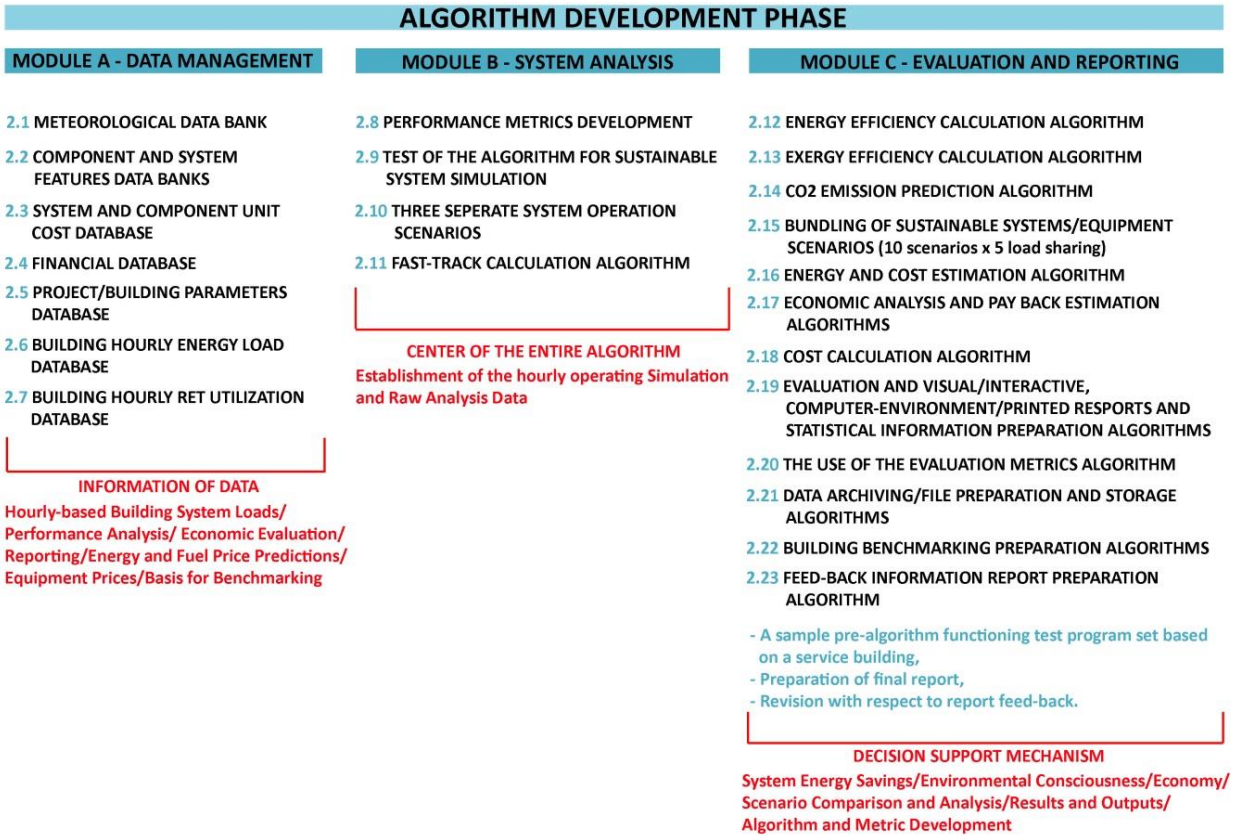
ANNEX VIII: ESTIMATED MEETINGS AND EXPECTED PARTICIPATION BY TEAM MEMBERS

ANNEX IX: ESTIMATED TIMELINE OF THE ASSIGNMENT (FOR STAGE I AND STAGE II)

ANNEX I. Detailed Definition of Subtasks for Algorithm Development Phase under Stage I

The Contractor is responsible to carry out all phase activities mentioned below. Phase activities are grouped in three categories, namely A, B, and C, which are described in detail in Figure A1-1.

Figure A1-1: Conceptual description of the works for algorithm development (Step 2)



Module A: Data Management Module

In this step, algorithmic and contextual sub structures of databases and data sets, which consist of all raw, semi-processed and processed data used in project software, will be prepared. Required data input, data processing and data storage activities will be organized with interactive man-computer interface where it is needed. Although work of filling up data banks and data sets is out of this project's scope, in order to verify the operation of algorithm and sub-algorithms, minimum 3 kinds and 3 different (3x3=9 different entries) sample data for every renewable energy system will be collected. These sample data will be entered into system, in compliance with required level and quality for the final trial set stated in Work Package 3-12. Nonetheless, in the scope of this project, contractor will document and provide all sorts of information, document, literature and explanation that will help project writer in the following programming phases.

The definition of the database structure and metadata of the A-Data Management Module will be specified. The specifications which include, the sources, amount, acquisition frequency (if any),

completeness, accuracy etc. of the data shall be presented within progress and final reports for the Algorithm Development Phase.

These reports should include the Entity Relationship Diagram (ERD) of the database, which defines the relations among the different data tables and forms the basis for the information system development.

Sub Task	Definition
2-1	**Meteorological Data Bank:** Fundamental structure of the data bank which consists of hourly dry and wet bulb temperatures, relative humidity, atmospheric pressure information, covering the entire Turkey, will be developed. Algorithms of how and where these information will be obtained and how programming algorithm of updating, correction, verification and addition will be prepared and information of at least 10 province centers will be entered to a sample sub-program. The algorithm, which provides real time usage and seamless integration of this information into the other parts of the main algorithm, will be developed in appropriate units (SI) and nomenclature. This data bank shall also include heating degree-hour and cooling degree-hour values for Turkish cities and towns published by DMİ. These data shall be arranged by the contractor in a separate data base and shall contain the unit costs of renewable/sustainable systems and equipment only.
2-2	**Component and System Features Data Banks:** Blank data banks, which cover whole components and systems in number and content, will be generated. Method, interface, resource and data entry safety of filling information in these data banks and data verification systematic will be developed on algorithmic base. As a case study, sample software providing minimum 10 different renewable energy technologies and/or energy-efficient system and component data entry will be developed and the data will be entered. During the application, user data entry safety and data verification techniques and authorization systematic will also be algorithmically developed. Required input data for every system and component will be determined and common definitions (such as polynomial expression of energy efficiency variation according to load or meteorological conditions), interfaces/algorithms will be developed.
2-3	**System and Component Unit Cost Data Base:** Interfaces which provides entry of unit costs of components and systems, including maintenance, repair and replacement costs, mentioned in 2-2 to the data bank will be defined. Transfer method and infrastructure of automatic updating of information in 6-month periods regarding necessary unit costs from the web-based MoEU database will be developed.
2-4	**Financial Database:** The real and estimated fuel and energy prices will be stored in the database, which will be periodically updated using the algorithms in Module 2. These price figures will serve as the basis for the economic analysis and reporting algorithms.
2-5	**Project/Building Parameters Database:**

	In a hierarchical relational database structure, system and equipment data will be stored by defining all required parameters and data fields. The information on the analyzed building/project will include: - All required project parameters, including location and detailed user information, - the RET components and system/equipment selections including their project specific variables, - the reference to the hourly energy load database (Method 1 or Method 2), This database structure will have sufficient flexibility such that this structure maybe modified by the administrator and/or the user (pending administrator approval) for cases where new parameters of data fields will need to be stored by the system.
2-6	**Building Hourly Energy Load Database:** In Method 1, hourly degree-hour information shall be used to generate hourly building load data. Latent cooling loads however shall be a certain amount of the sensible cooling loads according to a methodology to be developed by the contactor taking into account several factors including but not limited to the climatic point, season of the year, building type, and function. Domestic hot-water loads shall be also predicted according to the season, building type size, and function. Electrical loads may be broken down with annual or seasonal loads by an algorithm to be developed by the contactor. In Method 2, the fixed hourly building load data shall be imported into the RET-EAT from an external energy modeling simulation tool's output file. The data set shall include the heating, cooling, electricity, hot water, steam, cold water consumption amounts in kWh unit for each hour in the year. The format of the data to be imported shall be specified and if necessary. Data format conversion and pre-processing sub-routine will be prepared according to the format designed for the algorithm input face.
2-7	**Building Hourly RET Utilization Database:** Based on the available building information, RET Tool parameters, hourly building loads and the results of the calculation algorithms, a data set will store hourly based information on the energy saved in kWh unit from each of the independent or combined RET systems/equipment in the building. This database will have reference to the project; RET component, hourly and yearly information and the amount of energy supplied by them in a broken-down form and summations. The database will store information for the 3 different scenarios of the analysis.

Module B: System Analysis Module

In this step, necessary commands, algorithmic arrangements and rating processes will be carried out for generation and updating of information and data; admission of user and/or library entry of information and data; directing, processing, analyzing and calculating the information; generating and reporting the results; and generating categorized feedback data base.

Sub Task	Work Definition
2-8	**Performance Metrics Development:** Performance evaluation metrics will be developed for each RET and energy efficient equipment/system according to first and second laws of thermodynamics. RET systems dimensions, calculation functions, if any inequality values, dimensional limits and their relations with database variables will also be defined.
2-9	**Test of The Algorithm For Sustainable System Simulation:** An algorithm shall be described, which is based on the hourly building loads and shall calculate the necessary hourly operating hours of RET systems and equipment, related energy loads, efficiencies, consumption values and similar relevant parameters. This analysis algorithm shall also permit to factor in the local effects on the wind and solar radiation data based on the site and specific environment conditions.
2-10	**Three Separate System Operation Scenarios:** Each scenario shall define a separate cluster among all provisional RET and energy efficient equipment/system. Each scenario will include the logical basis and algorithm for decision making regarding the startup and operational priorities on an hourly basis (a sample is given in Annex IV).
2-11	**Fast-track calculation algorithm:** A fast-track algorithm shall also be developed. This algorithm shall substitute other algorithms whenever requested. Yet this method may be highly approximate. In this algorithm, heating loads shall be directly based on heating degree-hour values and the overall U (heat-transfer coefficient of the building envelope) value of the building. Electrical loads shall be inputted by the user on a yearly total basis. Cooling loads shall be calculated by the cooling degree-hour values. Because the cooling degree-hour method only gives the sensible cooling loads, it must be adjusted by a factor of 1,75 for Aegean, Marmara, Mediterranean, and South East Anatolia, and by a factor of 1,4 for other remaining geographic regions of Turkey. These factors are based on a 50% fresh outdoor air. Standard base temperatures shall be 24oc for comfort cooling and 22oC for comfort heating.

Module C: Analysis, Calculation and Evaluation, Reporting Module

In this work package, in addition to energy efficiency, optionally exergy efficiency and total CO_2 emission predictions, evaluation charts and algorithms for a period of 10 years predictions of energy and fuel costs, economy calculations, additional investment costs, pay-back year calculations will be prepared, a report within the scope of whole main algorithms will be prepared and required assessments, suggested technical information and literature support about programming activities in further stages will take place in this report. Furthermore, by developing required methods for classifying and archiving of all information of evaluated buildings, generating data sets, developing building benchmark and feedback, algorithms about these methods will be prepared.

Sub Task	Work Definition
2-12	**Energy Efficiency Calculation Algorithm:** In this algorithm, regarding the building hourly loads concerning systems and components installed/going to be installed within the renewable energy systems structure, three operation scenarios prepared in Work Package 2-9 will be analyzed on an hourly basis (See Annex V). The predicted savings from hourly fuel and energy consumptions will be calculated in hourly-basis compared to the reference base scenario for the system (no renewables) described in See Annex VII. The factors such as the systems and components which are put into use or not according to their operation scenarios or meteorological conditions (as an example, shutting down of wind turbines when there is no adequate wind or no electricity production in photovoltaic cells in night time), and furthermore, efficiency losses of components and systems that work in its partial capacity, capacity losses that occur due to meteorological conditions (like cogeneration systems) or change in COPs of heat pump with respect to demanded temperatures, will all be taken into consideration. Performances of these components will be corrected according to data given in Work Package 2-2. Hourly energy and fuel savings or losses corresponding to every three scenarios will be converted to monetary cost depending on that year's predicted fuel and energy costs. A simple CO_2 emission decreases will be calculated connected with fuel and energy savings. Algorithms of all of these activities will be developed in this work package. Storage of excess thermal energy will be in the scenarios as an option. Electricity cost predictions will be arranged according to double or triple electricity price schedules if it is applied in that zone. On/off load tracking specifications of equipment, especially electricity-producing equipment like cogeneration plants (combined heat and power) will be updated in hourly based, according to the electricity price schedules. In consequence, transferring hourly savings to the three scenarios x 3 cost prediction matrix, most and least profitable probability cases out of 9 probabilities will be reported and a reliability analysis will be carried out. All of the results will be arranged as they can be reported in hourly, daily, weekly, monthly and annual basis and all required algorithms of these will be developed and reported, whole flow charts and programming steps will be

	declared. This last activity is valid for all Work Packages and Sub -Work Packages. A sample analysis chart is shown in **Annex V.**
2-13	**Exergy Efficiency Calculation Algorithm:** This Sub Work Package depends on administration or user's choice. When this option is used, exergy efficiency will be calculated in a similar approach to **2-10 Package.** Rational Exergy Management Model, equalities and calculation method will be used in this algorithm.
2-14	**CO_2 Emission Prediction Algorithm:** In the case of validation of 2-11 option, this work package will be arranged as it is activated during usage and emissions will be calculated in hourly basis. Cost of emission savings in carbon market will be calculated in annual basis.
2-15	**Bundling of Sustainable Systems/Equipment Scenarios (10 scenarios x 5 load sharing):** This unit shall generate a maximum number of ten different bundling (composition of renewable systems and equipment) scenarios regarding different systems and equipment and five load sharing scenarios. This 10 x 5 matrix of combinations shall be analyzed on a one-by-one basis loop of a calculation and evaluation sub-algorithm, which outputs economical merit, investment cost, pay-back period, energy efficiency, annual share of energy supplied by the renewable energy systems and equipment in the annual total consumptions in a broken-down format in terms of individual RET systems and equipment besides the total share, CO_2 emissions reduction figures in the form of tables, figures and a visual/written (on demand) report.
2-16	**Energy and Cost Estimation Algorithm:** Algorithms that use three different estimation models with regard to past 10 years data will be developed and they will be updated in every three months. Fuels: Natural gas, coal, lignite, fuel-oil, gas, diesel and liquid natural gas. Estimation algorithm will be prepared based on local fuel cost estimations, especially for solid fuels.
2-17	**Economic Analysis and Pay Back Estimation Algorithms:** After cost of energy and fuel savings is calculated, these algorithms will be developed in order to calculate additional investment costs of all systems and components, which contribute to these savings directly / indirectly. Energy and fuel savings and additional investment costs will be used in simple pay back year calculations. So, pay back years algorithm will be prepared. This algorithm will be developed as showing two optimistic and pessimistic pay back year according to cost values obtained from 3x3 matrixes in 3-1 Sub Work Package. Moreover, these calculations may be displayed separately for each energy saving system or component.
2-18	**Cost Calculation Algorithm:** Algorithms related to all kinds of cost calculations and estimations in **Sub Work Package 2-15** will be prepared on components basis.
2-19	**Evaluation and User Friendly Reports Preparation Algorithms:** In this work package, all

	necessary and relevant algorithms that will enable the user to follow, visualize, compare all the results, interactively change some data (only by authorized users) and compare their impacts on the results, receive printed results on these items, prepare output reports, electronic storage, transmittal/sharing, printing and archiving, reduction and interpretation of the results and collection of all information after their categorization, in electronic storage and retrieval media shall be prepared.
2-20	**The Use Of The Evaluation Metrics Algorithm:** Standard metrics of the building regarding environmental, economic and energy/exergy efficiency will be developed, related and potentially useful metrics will be surveyed in the literature and an array of evaluation metrics will be developed. The algorithm shall also be open to future updates, developments, and improvements of the metrics and shall include algorithmic write-ups for such purposes.
2-21	**Data Archiving/File Preparation and Storage Algorithms:** Described in the above work packages.
2-22	**Building Benchmarking Preparation Algorithms:** Once sufficient data will be collected in the future programs using these algorithms a building benchmarking system will be established. In order to lay down the foundation of this future objective a building performance benchmarking and information storage data base preparation algorithm will be developed.
2-23	**Feedback Information Report Preparation Algorithm:** For the case of once the program to be developed in the future steps using the algorithms described herein will be kept to be used, a dedicated feed-back algorithm from then on will be devised, which will be able to establish a data bank regarding collection, store, and evaluation of the future problems of the program, user inputs, and complaints**.**
2-24	After the algorithm is developed, a sample pre-algorithm functioning **alpha test program set,** written in MS Excel or similar compatible software program, based on a service building in respectively Ankara, İstanbul and Erzurum according to the general data prepared by the administration in the last month of the project will be provided with all the source codes, databases and computational results. By using these case data, the contractor will run the program for a typical summer day (21 August) and a typical winter day (21 January) within 24 hours of periods on an hourly basis. The Contractor shall also provide their own evaluation report of results and pending to the Employer's approval and suggestions, the Contractor shall modify the algorithms with respect to necessary development, arrangement, and update.

ANNEX II. EQUIPMENT, SYSTEM and BUILDING PERFORMANCE EVALUATION METRICS

Performance of all sustainable energy systems (SES, including energy efficient systems like CHP using fossil fuels or not), equipment, and components in the electro-mechanical system of the building will be compared to the Electro-Mechanical System Base Scenario according to the hourly loads during operation of the building. In space heating the base mechanical system involves central panel radiator heating system with outdoor temperature compensated condensing boiler with natural gas. (See **Annex VII**). In space cooling the reference system is vapor compression-cycle chillers operated with electric power delivered from the national power grid and fan-coils with condensate trays in the zones. In both cases it will be assumed that the electrical system demand of the building will be satisfied from the national power grid.

Heat Pump

In order to calculate the primary fuel savings of any heat pump the *Heating Coefficient of Performance* (COP_H) and the *Cooling Coefficient of Performance* (COP_C) are considered first. These coefficients depend upon the resource temperature and the demand temperature at the application point, and must be expressed by second-order polynomials in terms of the difference of these temperatures for a given type or model of the heat pump available in the market. In this Project, an algorithm for the generation of a data base that will be used to store and process all the relevant information about a given heat pump performance will be developed according to the format described in **Annex III** such that all data and design information will be arranged in a specific format in addressable and directly accessible form and stored in this data base in vector arrangement. For the common base comparison, the heat pump in consideration shall be assumed to receive/expel heat from/to a ground (or air) source according to the mode of operation (heating or cooling respectively), depending on its type and model at the source temperature at that hour and deliver it to the panel radiators at a supply temperature corrected (compensated) with respect to the same outdoor temperature. In the cooling mode the supply temperature shall be fixed at 7^oC (12^oC return temperature). In the heating mode the return temperature shall be corrected according to the outdoor air temperature during that hour based on 20^oC design temperature drop at 65^oC design supply temperature. The hourly value of the COP_H used in these calculations will be obtained from the second-order polynomial described above. In the cooling mode, the reference case will be based on grid electric power operated chillers. A similar algorithm for COP_c will be developed for the common base comparison of the heat pump during its cooling mode.

For all sustainable/efficient energy systems that may be described with a performance coefficient (*COP*) like heat pumps the main performance metric is the *Primary Energy Ratio*, *PER*. *PER* is the product of the coefficient of performance (COP_c, or COP_H) at a given hourly period and the overall energy conversion, power transmission, and distribution efficiency, η_T between the point where the primary energy source is inputted and the final point of energy use of the system like the heat pump.

$$PER = \eta_T \cdot COP \qquad \{\text{for all systems with a definition of } COP\} \tag{1-1}$$

For example, if the electric power for the heat pump comes from a distant thermal power plant this overall efficiency, η_T is the product of all energy conversion, power transmission and distribution efficiencies on the entire way between the power plant and up to the heat pump. For on-site sustainable/efficient power generation systems based on renewable energy systems like solar PV and Wind Turbine Systems η_T may be taken unity. For on-site Combined Heat and Power (CHP) systems using

fossil fuels, η_T may be taken equal to 1 times the power generation efficiency of that CHP. For example, if an on-site natural gas-engine CHP has a power generation efficiency of 0.4, then *PER* of a heat pump in the building deriving its power from that CHP will be 0.4 x *COP*.

Combined Heat and Power System

It is not a necessity that CHP (Combined Heat and Power) and TG (Trigeneration: combined heat, power, and cold) systems operate on fossil fuels. A PVT (Photo-Voltaic Thermal) system using solar radiation is a perfect CHP system without any dependence on fossil fuels, because it generates both electric power and heat. In the same token if part of the electric power generated by an on-site wind turbine is utilized by a ground-source heat pump then this system is also a CHP.

For any fossil fuel-based CHP system, EU 20014/8/EC Directive defines a primary energy savings ratio, *PES*. This definition does not cover second law of thermodynamics and other outputs like steam, cold etc. In order to overcome this issue, a modified and extended PES_{RCHP} given by Eq. (1-2) must be used.

$$(1\text{-}2)\quad PES_{RCHP} = \left[1 - \frac{1}{\left(\frac{\mathrm{CHPH}\eta}{\mathrm{RefH}\eta} + \frac{\mathrm{CHPS}\eta}{\mathrm{RefS}\eta} + \frac{\mathrm{CHPE}\eta}{\mathrm{RefE}\eta} + \sum \frac{PER}{RefPER}\right) \times \frac{(2 - \mathrm{Ref}\,\psi_{RCHP})}{(2 - \psi_{RCHP})}}\right] \mathrm{x}100$$

The reference value of the CHP or TG, namely Refψ_{RCHP} *is* 0.204. Some of the reference values in Eq. (1-2) are not available in the EU Directive. These missing reference values are given below with the assumption of η_T = 0.32:

- For cooling with *COP* defined equipment *Ref*PER = 0.32·4 = 1.28
- For cooling with *COP* defined equipment *Ref*PER = 0.32·3 = 0.96
- For steam generation RefSη = 0,75

It must be noted that in Eq. (1-2) the CHP or TG system may produce more than one energy outputs like cooling, heating, cold air etc. through the use of several heat or power operated machines having *COP* definitions (or *PER*) like a heat pump, absorption chiller etc.

According to EU directive:
REfEη = 0.52,
RefHη = 0.90.

Partial efficiencies for heat, power, and cold (based on single-effect absorption chiller) generation of any CHP or TG system will be obtained from manufacturer catalogs or their technical manuals as a function of the load level (like 40 % load, full load, half-load capacity etc.). Hourly calculations of efficiencies will be based on the load percentage of the CHP or TG during that hour on average. If cold or steam is generated from the heat output of the CHP, the CHPHη value is decreased accordingly in terms of the amount of steam and cold generation.

ψ_{RCHP} value depends on where different CHP or TG outputs (like power, heat, steam, cold) are allocated in satisfying different building loads and in what cascaded order. Default value is 0.35. This value corresponds to a case where heat output is first used in space heating, then comfort heating with a single stage absorption cooler (COP_C is 0.6), then satisfying DHW loads and electric power is utilized primarily at useful work points (high exergy) like electric motors, electric machinery, tools etc. and then lighting. However if the exact supply-demand service points are known in a given hourly period the actual value of corresponding to that hourly period must be calculated according to Rational Exergy Management Model (REMM).

Supplementary Heat: If the CHP or TG system receives a fossil fuel based supplementary heat from an external source, the efficiency of that source must be encountered in Eq. (1-3):

(1-3)
$$PES_{RCHP} = \left[1 - \frac{1}{\left(\frac{\text{CHPH}\eta}{\text{RefH}\eta} + \left\{ -\frac{\text{r} \cdot \text{H}_\text{s}\eta}{\text{RefH}\eta} \right\} + \frac{\text{CHPS}\eta}{\text{RefS}\eta} + \frac{\text{CHPE}\eta}{\text{RefE}\eta} + \sum \frac{PER}{RefPER} \right) \times \frac{(2 - \text{Ref}\,\psi_{RCHP})}{(2 - \psi_{RCHP})}} \right] \text{x100}$$

Here,

$H_s\eta$: First law efficiency of the system which externally provides the supplementary heat.

r : The ratio of supplementary heat to the heat generated by the CHP.

$RefH_s\eta$: Reference efficiency of the supplementary heat generation system (For example for an appropriate system listed in the EU Directive if available).

According to REMM, there are two conditions in evaluating CHP, TG and all other systems whether based on renewable energy sources or not:

Condition I- Exergy destruction takes place prior to useful application in the building (like a heat generating boiler without power generation first). See Figure A2-1.

Condition II- Exergy is destroyed following the useful application (like a PV module which generates electric power but not hot water afterwards). See Figure A2-2.

If Exergy is destroyed before the useful application

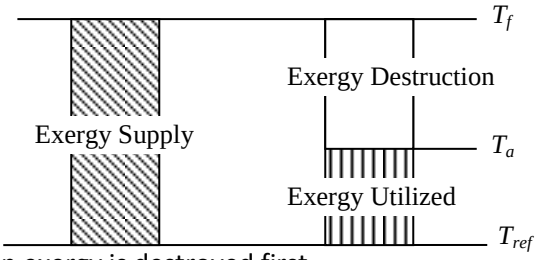


Figure A2-1. The condition when exergy is destroyed first.

Here, T_a is the DB air temperature, which is based for calculating the exergy demand, ε_{dem} of the building for comfort according to the ideal Carnot cycle. In comfort cooling, outdoor air DB temperature is also considered.

(1-4) $$\varepsilon_{dem} = \left(1 - \frac{T_{ref}}{T_a}\right) \quad \{\text{Heating}\}$$

(1-5) $$\varepsilon_{dem} = \left[\left(1 - \frac{T_{ref}}{T_o}\right) - \left(1 - \frac{T_{ref}}{T_a}\right)\right] \quad \{\text{Cooling}\}$$

If Eq. (1-5) yields a negative value, the absolute value may be used.

Unit exergy values on the supply side, ε_{sup} are calculated from the equations given below.

(1-6) $$\varepsilon_{\text{sup}} = \left(1 - \frac{T_{ref}}{T_f}\right) \quad \{\text{Heat}\}$$

(1-7) $$\varepsilon_{\text{sup}} = \left[\left(1 - \frac{T_{ref}}{T_o}\right) - \left(1 - \frac{T_{ref}}{T_f}\right)\right] \quad \{\text{Cold}\}$$

(1-8a) $$\psi_R = \frac{\varepsilon_{dem}}{\varepsilon_{\text{sup}}}$$

If exergy is destroyed after the useful application

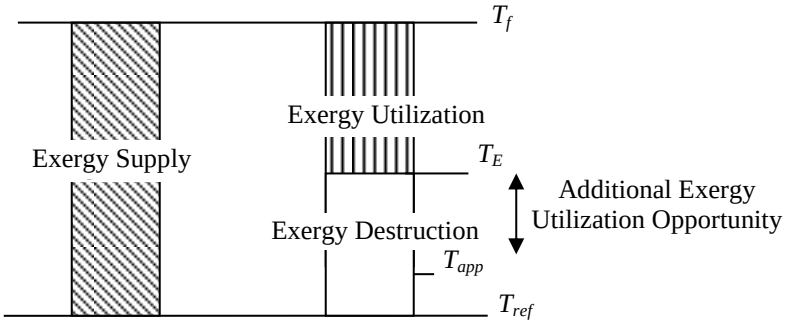


Figure A2-2. The condition when the exergy is destroyed after the useful application.

(1-8b) $$\psi_R = 1 - \frac{\varepsilon_{dst}}{\varepsilon_{\text{sup}}}$$

(1-9) $$\varepsilon_{dst} = \left(1 - \frac{T_{ref}}{T_E}\right) \quad \{\text{In heating } T_E \geq T_{app}\}$$

If a fossil fuel-based CHP or TG system is hybridized with sustainable energy systems in the building, then the weighted *PES* value must be used:

$$PES_{RA} = PES_{RCHP} + \left(\frac{Q_{AH}\varepsilon_{AH} + Q_{AE}}{Q_H\varepsilon_{HH} + Q_E}\right)(100 - PES_{RCHP}) \qquad (1\text{-}10)$$

Here, Q_{AH} is the amount of heat/cold (kW-h) supplied from renewable energy resources at a unit exergy value of ε_{AH}. Q_{AE} is the electrical energy supplied from renewable energy resources. Unit exergy of electric power may be defaulted to 1 (a more accurate value is 0.95). Q_H and Q_E are the thermal and electrical loads of the building, respectively. ε_{HH} is the average unit exergy of the building thermal loads (like space heating and DHW). Then *AER* (Alternative Energy Ratio) becomes a new evaluation metric. For the base reference case ψ_R is 0.04 for comparison purposes.

$$AER = \psi_R \times \left(\frac{Q_{AH}\varepsilon_{AH} + Q_{AE}}{Q_H \varepsilon_{HH} + Q_E} \right) \qquad (1\text{-}11)$$

One needs to define Carnot Cycle-based equivalent supply temperature for wind and solar energy systems in order to carry out the above calculations. Below, η_I is the wind energy to electrical energy conversion efficiency of a wind turbine.

$$\frac{I}{1366} = \frac{\left(1 - \frac{T_{ref}}{T_f}\right)}{\left(1 - \frac{T_{ref}}{5800K}\right)} \qquad (1\text{-}12)$$

$$T_f = \frac{T_{ref}}{(1 - \eta_I)} \qquad (1\text{-}13)$$

Here, *I* is the solar irradiation intensity on collectors (W/m^2) where 5800 K is the average surface temperature of the sun. For all applications and equations give above, the reference temperature T_{ref} may be equated to $_{\text{the}}$ average soil temperature like 283 K.

Other Sustainable Energy Systems

All above mentioned procedures and algorithm development activities shall also be applied to all sustainable energy systems listed in **Table 1**, **Annex III**.

Building

All performance improvements, economic benefits, and other parameters regarding the building, which may be attributable to sustainable energy systems and renewable energy resources will be evaluated on an hourly basis over a ten-year period. These evaluations will be reported both in broken-down values for each individual system or resource based on annual sums and ten-year grand total values. In order to accomplish these goals the following minimum number of metrics will be used.

- Energy Savings, ***ENS***. Energy savings in kWh units (sum of electrical energy, heat and cold) is calculated on hourly basis. These calculations will be referenced to the Building Electro-Mechanical System Reference Scenario (**Annex VII**).

- Economic Savings, ***ES***. It is calculated based on energy savings. Each type of energy savings (in heat, cold, electrical energy, steam generation terms etc.) over each hourly period will be multiplied by their associated conventional energy or power prices in the market and divided by the corresponding hourly efficiencies of the reference equipment specified in **Annex VII**. If there are more than one power price tariff is applicable for that building during the day (like peak tariff etc.), the power price corresponding to that specific time period will be used. Ten-year fuel cost and power cost projections with at least three prediction models will be carried out. Monthly, yearly and a grand ten-year period sum of economic savings will be reported.

- First Law Efficiency, ***η***. This is the ratio of the sum of all energy inputs to the building during a given one-hour period to the all building loads satisfied during that time period. Additionally the first law efficiency of each individual system and equipment are calculated according to the load allocated to them during the same one-hour period (part load, full load etc.: efficiency changes with the level of the system or equipment loading).

- Specific Increase in Initial Investment, ***IN.*** It is the ratio of the increase in initial investment cost attributable to all sustainable energy systems and renewable energy resources involved in the building to the 10-year grand total economic savings.

- Simple pay-back period in years, ***Y***.

- Rational Exergy Management Efficiency, $\boldsymbol{\psi_R}$: If the user has requested the exergy analysis option of the algorithm another additional metric is the *Rational Exergy Management Efficiency* (ψ_R). Depending upon the type of the application either Eq. (1-8a) or Eq. (1-8b) must be used. If there are a multitude of renewable energy sources/sustainable energy systems or fossil fuel-based conventional systems in the building and each of them share a part of the loads then an average value is calculated:

$$\overline{\psi}_R = \frac{\sum_{i=1}^{d}\sum_{j=1}^{s}\psi_{rij} \times Q_{ij}}{\sum_{i=1}^{d}\sum_{j=1}^{s}Q_{ij}} \qquad (1\text{-}14)$$

In the above equation, the subscript *j* represents any load in the building, the subscript *i* represents any energy resource or system. Q_{ij} is the energy transfer between a supply point *i* and supply point *j*. ψ_{Rij}

is the partial Rational Exergy Management Efficiency between points *i* and *j*. The desired value for Eq. (1-14) is 0.70 or above.

- CO_2 Emission Reduction Ratio, ***COR***. This ratio is calculated and shown in annual sums over ten-year period besides broken-down values corresponding to each sustainable energy system and renewable energy resource. CO_2 reduction ratio is based on dividing CO_2 emissions (kg/h) attributable to sustainable energy systems and renewable energy resources during the building operation to the CO_2 emissions attributable to the reference systems prescribed in **Annex VI** that satisfy the same building loads. On an hourly basis, CO_2 emissions are given by the following equation.

$$CO_2 = \sum \frac{c_i}{\eta_i} Q_i + \frac{c_j}{\eta_j \eta_T} E_{ex} \qquad (1\text{-}15)$$

This value is calculated for all systems and equipment and summed on an hourly basis.

Here:
c_i : The specific CO_2 emission value of the fossil fuel (if there is any) used by any system or equipment (*i*) during operation in the building (based on lower heating value in kg CO_2/kWh).
Q_i : Heat plus electrical energy (if generated) supplied to the building by the equipment (*i*) (kWh).
η_i : First law efficiency of the equipment (*i*). This is the sum of partial efficiencies for heat and power (if generated).
c_j : Average specific CO_2 emission value of the conglomerate of the power plants that may externally supply power to the building. In this calculation only the amount of power supplied externally (from the national grid) E_{ex} is considered.
$\eta_j\eta_T$: Average national power generation, transmission and distribution efficiency (0.27).
E_{ex} : Electrical energy supplied from the national grid, kWh

If $\overline{\psi}_R$ has been calculated the following equation is used:

$$CO_2 = \sum \frac{c_i}{\eta_i} Q_i \left(2 - \overline{\psi}_R\right) + \frac{c_j}{\eta_j \eta_T} E_{ex} \qquad (1\text{-}16)$$

ANNEX III. HIERARCHICAL DATA BASE STRUCTURE

In the Project, all systems whether sustainable or not, whether they use renewable energy resources or not will be defined individually in a hierarchical data base structure. Table 1 shows a sample main system and equipment description data base. This is called the *Main System/Equipment Description Data Base*. The algorithm shall be so prepared that the administration may change, add, and delete equipment and systems. The algorithm must permit three different types and/or capacities from each category.

Table A3-1. General Format of the Main System/Equipment Description Data Base

No	SYSTEM/EQUIPMENT CATEGORY	Address	Quantity/ Capacity [kW]	Address	Quantity/ Capacity [kW]	Address	Quantity/ Capacity [kW]
1	CHP	11	1/60	12	1/80	13	….
2	Heat Pump	21		22		22	
3	Absorption Chiller	…		…		…	
4	Adsorption Chiller						
5	Waste Heat Boiler						
6	PV Module						
7	Flat-Plate Collector						
8	Concentrating solar Collector						
9	PVT (Photo-Voltaic Thermal) Module						
10	PVTC (Photo-Voltaic Thermal and Cooling) Module						
11	PHVT (Photo-Heat Voltaic and Thermal) Module						
12	Biogas Reactor						
13	Wind Turbine						
14	Hot Water Tank						
15	Cold Water Tank						
16	Thermal Storage (Pebble tank, PCM tank labyrinth etc.)						
17	Ice tank						
18	Chiller						
19	Boiler						
20	Steam Generator						
21	Mechanical energy storage (Flywheel, pressure tank etc.)						
22	Electrical Energy Storage (Battery, Flow Battery etc.)						
23	Cooling Tower						
24	Hydraulic Energy Storage						
25	Radiator						
26	TEG (Thermo-electric Generator)						

Table A3-2. Sample System/Equipment Vectoral Data Base (for CHP engine).

Data Number	Description	Symbol	Variable(s)
1	Enter here type and model	*T*	
2	Standard Capacity	*E*	kWe
3	Altitude Capacity Factor curve (in 2nd order polynomial form)	*h*	polynomial coefficients: ho,h1,h2
4	Air Temperature Factor	*t*	to,t1,t2
5	Humidity Factor	*n*	n0,n1,n2
6	Air Pressure Factor	*p*	p0,p1,p2
7	Power to Heat Ratio*	*C*	co,c1,c2
8	Steam to Power Ratio*	*B*	bo,b1,b2
9	Exhaust Temperature Curve	*TEX*	so,s1,s2
10	Cooling Water Temperature Curve	*TC*	to,t1,t2
11	Total Efficiency Curve	*EFFH*	e0, e1,e2
12	Steam Generation Efficiency Curve	*EFFS*	es0,es1,es2
13	Power Generation Efficiency Curve	*VE*	vo,v1,v2
14	Cut-off load (percent of the full load)	*SI*	so,s1,s2

*Hourly calculated according to the actual load applied (in terms of full load) (**Annex V**).

ANNEX IV. ELECTRO-MECHANICAL SYSTEM OPERATON TEMPLATES TO TEST THE ALGORITHM

The entirety of this algorithm to be developed in this Project will be tested by the following electro-mechanical system operation basic templates that will be applied to the building investigated, based on three different sustainable/efficient energy systems and renewable energy resources (Scenarios 1 to 3 below). In order to accomplish this task, a simple (like Excel program) yet an alpha test program, which includes all algorithmic steps and decision making mechanisms will be developed. In order to test the complete algorithm, the program will be run for three basic templates (scenarios 1 to 3 given below) for the virtual buildings to be defined by the administration in reference to the Building Electro-Mechanical System Base Scenario given in **Annex VII** and all computer analyses will be overviewed. All equations and calculations will be verified for sample days on an hourly basis by hand calculations for typical summer and winter day. I any errors are found, they will be algorithmically corrected and they are reported to the administration.

A copy of the latest alpha test program, all computer results, with hand calculations and their comparisons, and all flow charts will separately be submitted to the administration.

Scenario 1

Operation decision making rules are given in Table 1. For the building under consideration only the systems and equipment that apply to that building will be accounted. If there is a CHP system or systems in the building the total nominal power capacity will be assumed to be equal to the peak (annual) power demand multiplied by 0.50.

Table A4-1. Scenario 1

System	System/Equipment	Decision Making Process
1	Electrical Energy Storage System (Battery, flow battery etc.)	Is there electrical energy load? Is there more that 20 % energy stored with respect to the full storage capacity? If both answers are yes use the storage capacity.
2	Hot Water Tank	Is there hot water/space heating loads? Is there more that 20 % energy stored with respect to the full storage capacity? If both answers are yes use the storage capacity.
3	Combined Heat and Power (CHP)	Are there coincident electrical and thermal power loads (space heating, hot water, steam etc.)? If the answer is yes calculate the power to heat load ratio for the corresponding hour of operation. How compatible is this ratio with the nominal ratio of the CHP system? How much is the difference? If there is power generation surplus can it be sold? Can surplus heat may be stored in existing tanks at that hour? If the answers are yes operate the CHP. Choose the operating load according to the largest of heat or power load of the building in that hourly period. According to the level of the load calculate the partial load (or full load, whichever applicable) efficiency and all other performance values of CHP. Assume to utilize the thermal output in the sequence of cooling, heating, hot water loads. If the electrical energy supply has a deficit, then make it up from the national grid at the coincident price tariff corresponding to

		that hour. If the electrical power generation has a surplus, and the thermal loads are not satisfied yet operate the heat pump with the surplus power. If there remains power surplus store it in the available electrical energy storage media. The remaining power may be assumed to be sold back to the grid if permitted during that hour.
4	Heat Pump	Assume that the heat pump will be started if: Thermal storage tanks have less than or equal to 20 % of their full capacity, CHP is operating but thermal loads are not satisfied yet. If PV, PVT, PVTC modules are coincidentally generating power operate the heat pump from the power supplied from them. Make up the deficit from the CHP if it is operating. The remaining power demand will be supplied from the national grid.
5	Absorption Machine	If there is a cooling load and the CHP is operating use its thermal output. If the cooling loads are not satisfied and there is more than 20 % useful capacity in the ice or cold water tanks use the stored cold first. Otherwise, if the temperature in the hot water tank is above 70^{o}C use the thermal energy stored. If the absorption machine provides surplus cold store it in the cold storage media (cold water tank only) if tanks are not full.
6	Adsorption Machine	If the cold demand is not satisfied yet operate the adsorption machine in tandem. Use supplementary heat from the hot water tanks if there is heat available (more than 20 % of the total storage capacity).
7	Boiler	Operate only when all sustainable systems/equipment do not collectively satisfy the total thermal demand of the building.
8	PV Cells	If at the coincident hour, there is solar insolation use or store PV power output first of all.
9	Flat-plate Collectors	If at the coincident hour, there is solar insolation, use or store the thermal output first of all.
10	Concentrating Solar Collectors	If at the coincident hour, there is solar insolation use or store thermal power output first of all.
11	PVT (Photo-Voltaic Thermal)	If at the coincident hour, there is solar insolation use or store both the electrical and thermal power output.
12	PVTC (Photo-Voltaic Thermal and Cooling)	If at the coincident hour, there is solar insolation use or store heat, cold, and electrical power outputs. If there is not any cold demand use the system like PVT (TEG units off).
13	PHVT (Photo-Heat Voltaic and Thermal)	If at the coincident hour, there is solar insolation use or store electrical power. Use the heat for the preheating of the utility water for preparing DHW. If there not any such demand use the system like a PV module.
14	Wind Turbine	If there is sufficient wind power use, store or sell the electrical power.

15	Hot Water Tank	
16	Cold Water Tank	
17	Thermal Storage (Pebble Stones, labyrinth etc.)	
18	Ice Storage Tank	Assume that it will be charge during night time with its dedicated deep chiller.
19	Chillers	If all cooling loads are not satisfied in complete by the sustainable or efficient systems/equipment, then start gas compression chillers. If there exists electrical power supply from sustainable/efficient systems and equipment use these power supplies first. If there is a power deficiency, then make it up from the national grid.
20	Hot Water Boiler	If there is space heating load that is not satisfied use the heat in this tank if the coincident tank temperature is compatible.
21	Steam Generator	If steam demand is not satisfied by the above systems and equipment.

Scenario 2

Operational priorities and decision making mechanisms are given in Table 2. The top priority in this scenario is the heat pump (There is not any CHP system). The design capacity of the heat pump will be either 70% of the peak (annual) heat load or 60 % of the peak (annual) cooling load, whichever is the highest. It will be assumed that the heat pump shall supply heat or cold to the building comfort system described in **Annex VII**.

Table A4-2. Scenario 2

Sy	System/Equipment	Decision Making Process
1	Heat Pump	If not heat available in thermal storage tanks, start heat pump and use renewable power and batteries first
2	Hot Water Storage Tank	Is there hot water/space heating loads? Is there more that 20 % energy stored with respect to the full storage capacity? If both answers are yes use the storage capacity.
3	Boiler	Operate only when all sustainable systems/equipment do not collectively satisfy the total thermal demand of the building.
4	PV Cells	All the systems/equipment below are subject to the same decisions given in Table 1.
5	Flat-plate Collectors	
6	Concentrating Solar Collectors	
7	PVT (Photo-Voltaic Thermal)	

8	PVTC (Photo-Voltaic Thermal and Cooling)	
9	PHVT (Photo-Heat Voltaic and Thermal)	
10	Wind Turbine	
11	Cold Water Storage Tank	
12	Thermal Storage (Pebble Stones, labyrinth etc.)	
13	Ice Storage Tank	
14	Chillers	
15	Hot Water Boiler	
16	Steam Generator	
17	Electrical Energy Storage System (Battery, flow battery etc.)	

Scenario 3

This scenario is identical with Scenario except that the assumed capacity of the CHP system will be 75% of the peak (annual) power demand of the building.

ANNEX V. HOURLY PERFORMANCE SIMULATION AND ANALYSIS ALGORITHM

All relevant variables from the data banks, all information about the corresponding capacities efficiencies, and other performance data of service ready sustainable systems/equipment during a given hourly period are collected and processed in such a manner that processed information and hourly performance details are exhibited and stored in an hourly matrix. Each hour occupies a single horizontal line in that matrix (**see Table A5-1**). These lines repeat downwards for the number of hours in a day and the number of days in a year and extend to 10 years. So the yearly matrix has 365 x 24 lines. **Table A5-1** gives a sample matrix for one day (24 hours). Building loads of all applicable types are directly imported from the hourly building loads to be obtained from an external building simulation program. The number of columns depends upon economic analysis, broken down system/equipment performance data, power and fuel price predictions, hourly CO_2 emission responsibility, hourly reduction of CO_2 emissions etc. The final design of the matrix will be carried out by the vendor. In addition, the matrix includes information about electrical energy demand, applicable power tariffs for different hours of a day, thermal storage data and their performance (if there are any).

Table A5-1. Sample Hourly Performance Analysis and Evaluation Matrix for a Single Day.

			COGENERATION CAPACITY =		*723.95*			*kW*
Time	**Heating**	**Electricity**	**0.5 (Desired ratio for cogeneration / Peak Load)**					
HOUR	***HEATING LOAD [kW]***	***ELECTRICAL LOAD [kW]***	***Cogeneration Capacity Electricity [kW]***	***Generated Electricity [kW]***	***Generated Heat [kW]***	***Electricity Shortage [kW]***	***Heating Shortage [kW]***	***Load***
1:00:00	5012.8467	1029.3946	618.9799	618.9799	773.724924	-410.415	-4239.1217	100%
2:00:00	4117.6267	1029.3946	618.2560	618.2560	772.819982	-411.139	-3344.8067	100%
3:00:00	4960.8333	1029.3946	617.5320	617.5320	771.915041	-411.863	-4188.9183	100%
4:00:00	4667.1767	1029.3946	618.2560	618.2560	772.819982	-411.139	-3894.3567	100%
5:00:00	5098.3767	1029.3946	618.2560	618.2560	772.819982	-411.139	-4325.5567	100%
6:00:00	3970.3433	1029.3946	618.2560	618.2560	772.819982	-411.139	-3197.5234	100%
7:00:00	4772.0633	1029.3946	617.5320	617.5320	771.915041	-411.863	-4000.1483	100%
8:00:00	4018.8433	989.4090	616.8081	616.8081	771.010099	-372.601	-3247.8332	100%
9:00:00	4820.8333	1397.8587	616.8081	616.8081	771.010099	-781.051	-4049.8232	100%
10:00:00	5314.9333	1397.6170	616.0841	616.0841	770.105158	-781.533	-4544.8282	100%
11:00:00	4453.5067	1397.3016	614.6362	614.6362	768.295275	-782.665	-3685.2114	100%
12:00:00	4812.1067	1397.1791	614.6362	614.6362	768.295275	-782.543	-4043.8114	100%
13:00:00	4491.4600	1412.9468	613.1883	613.1883	766.485392	-799.758	-3724.9746	100%
14:00:00	4799.1367	1397.5811	613.1883	613.1883	766.485392	-784.393	-4032.6513	100%
15:00:00	4592.0167	1397.8288	613.1883	613.1883	766.485392	-784.640	-3825.5313	100%
16:00:00	4714.9133	1397.9701	613.1883	613.1883	766.485392	-784.782	-3948.4279	100%
17:00:00	4665.7167	1447.9063	612.4644	612.4644	765.580451	-835.442	-3900.1362	100%
18:00:00	4145.1833	1052.4932	612.4644	612.4644	765.580451	-440.029	-3379.6029	100%
19:00:00	3973.9033	1029.3946	615.3602	615.3602	769.200217	-414.034	-3204.7031	100%
20:00:00	4010.8267	1029.3946	616.8081	616.8081	771.010099	-412.587	-3239.8166	100%
21:00:00	4479.6300	1029.3946	615.3602	615.3602	769.200217	-414.034	-3710.4298	100%
22:00:00	3835.0967	1029.3946	614.6362	614.6362	768.295275	-414.758	-3066.8014	100%
23:00:00	3954.0300	1029.3946	616.0841	616.0841	770.105158	-413.310	-3183.9248	100%
0:00:00	4779.2967	1029.3946	615.3602	615.3602	769.200217	-414.034	-4010.0965	100%
	Peak Load	= 1447.91	Min Load =	989.41				

ANNEX VI. INFORMATION ON LEGISLATIVE BACKGROUND

BY-LAW ON ENERGY PERFORMANCE OF BUILDINGS (relevant sections)

- **DEFINITION OF RENEWABLE ENERGY**: **Renewable energy** shall mean non-fossil energy resources such as hydraulic, wind, solar, geothermal, biomass, biogas, wave, current and tidal energy,

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- **PART TEN:**
  (Amendment of title: Official Journal- 01.04.2010- 27539)
  Use of renewable energy sources, Heat Pump and Cogeneration Systems

  Use of renewable energy sources, heat pump, cogeneration and micro generation systems
  (Amendment of title: Official Journal- 01.04.2010- 27539)

  ARTICLE 22- (1) **(Amendment: Official Journal- 01.04.2010- 27539)** In order to meet total or partial energy needs for heating, cooling, ventilation, hot water, electricity and lighting for new buildings with a total useful floor area over 20.000m ^{2}, system solutions such as use of renewable energy sources, heat pump sourced from soil, air and water, cogeneration and micro generation systems shall be analyzed by designers at designing phase. After analyzing the unit prices published by the Ministry, one or a combination of those applications shall be established in the way that its cost is at least 10% of total cost of the building.

  (2) **(Abrogated: Official Journal- 01.04.2010- 27539)**
  (3) **(Abrogated: Official Journal- 01.04.2010- 27539)**
  (4) **(Abrogated: Official Journal- 01.04.2010- 27539)**
  (5) Provisions of standards TS EN 12975-1 and TS 3817 shall be followed in the use of solar energy collectors.
  (6) **(Abrogated: Official Journal- 01.04.2010- 27539)**
  (7) **(Abrogated: Official Journal- 01.04.2010- 27539)**

  Cogeneration Systems
  ARTICLE 23-(Abrogated: Official Journal- 01.04.2010- 27539)

- **PART THIRTEEN:**
  Annual Energy Need
  ARTICLE 27 – (1) **(Amendment: Official Journal- 01.04.2010- 27539)** Respective principles and procedures regarding the calculation of annual energy need with heating, cooling, lighting and hot water having priority, are determined by communiqué to be published by the Ministry in official journal.
  (2) (Abrogated: Official Journal- 01.04.2010- 27539)
  (3) (Abrogated: Official Journal- 01.04.2010- 27539)
  (4) (Abrogated: Official Journal- 01.04.2010- 27539)
  (5) (Addition: Official Journal- 01.04.2010- 27539) New buildings to have energy certificate cannot have D class, high energy consumption and high CO_2 emissions.

ANNEX VII. BUILDING ELECTRO-MECHANICAL SYSTEM BASE SCENARIO

It is essential to calculate, evaluate, and proportion the contributions of sustainable electro-mechanical systems/equipment in the building to economy, environment, and fuel savings and to determine their pay back periods based on a reference electro-mechanical system composed of conventional systems and equipment. In this respect a base electro-mechanical system will be defined. In this base system there will be no any sustainable/efficient system and equipment and no renewable energy input. Instead of these the base system will be composed of natural gas operated condensing boiler, hot water (DHW) boiler (non-condensing type), steam generator, gas compression electric power driven chillers. Default performance values of these systems and equipment are given in the following table. All performance correction factors like altitude, seasonal average outdoor temperature, outdoor pressure, outdoor relative humidity etc. shall be applicable in the algorithm.

Table A7-1. Base Scenario System Data

System/Equipment	Average Efficiency or *COP*	Rational Exergy Management Efficiency	Notes
Condensing Boiler	0.85	0.08	
Non-Condensing Boiler	0.75	0.06	
Steam Generator	0.75	0.12	Used only for steam based applications.
Hot Water Tank and Boiler	0.70	0.05	
Gas Compression, electric Power Driven Chiller	2.5	0.08	Comfort Cooling

The cost of electrical energy will be based on its unit price at that hour or in the day and assumed to be delivered from the national grid; will be selectable according to the building type and applicable daily tariffs. Electrical energy prices will be forecasted for ten years by at least three different models.

Higher Heating Value of Natural Gas (for condensing boiler): 9155 kcal/m^3
Lower Heating Value of Natural Gas (for condensing boiler): 8264 kcal/m^3

The unit price of natural gas will be converted to per kW-h price instead of m^3 base using data obtained from EPDK. All calculations shall be based on kW-h. The unit price again will be based on the type of the building and its function. Daily minor price fluctuations will not be considered. Yet natural gas prices shall also be forecasted for ten years by at least three different models.

ANNEX VIII. ESTIMATED MEETINGS AND EXPECTED PARTICIPATION BY TEAM MEMBERS

Stage No.	Step No.	Phase	# Days to be required for each participant for meetings	Energy Efficiency and Renewable Energy Expert (Team Leader)	Renewable Energy Expert	Information System Analysis and Design Expert	Total # of roundtrips required	Total # of days to be spent for meetings
I	1	Kick-off meeting (1 day in Ankara)	1	X	X	X	3	3
	TOTAL							
II	2	Familiarization trainings (1 day in Ankara)	1	X	X	X	3	3
	TOTAL						**6**	**6**

ANNEX IX. ESTIMATED TIMELINE OF THE ASSIGNMENT (FOR STAGE I AND STAGE II)

STAGE	Step	Phase	Activity	Estimated Timeframes
			Signing of the contract	**Day 0**
I	1	**Inception Phase**	Kick-off meeting	Day 5
			Submission of Inception Report	Day 20
			Technical and Administrative approval process for the Inception Report	Day 20-40 *
	2	**Algorithm Development Phase**	Submission of Progress Report # 1 for Algorithm Development Phase	Day 70
			Technical and Administrative approval process for the Progress Report # 1	Day 70-90 *
			Submission of Progress Report # 2 for Algorithm Development Phase	Day 140
			Technical and Administrative approval process for the Progress Report # 2	Day 140-160 *
	3	**Testing Models Development Phase**	Submission of two testing models and a complete software developer's guide (including the full set of final algorithms)	Day 210
			Technical and Administrative approval process for two testing models and a complete software developer's guide	Day 210-230 *
	4	**Preparation of ToR**	Submission of Terms of Reference for software development tender	Day 250
TENDER PROCESS FOR RET-EAT SOFTWARE DEVELOPMENT WORKS (UNDERTAKEN BY UNDP)				***Day 250-370***
II	5	**Post-handover Support Services ****	Familiarization training	Day 370
			Web based conference # 1 with software developer and follow –up evaluation report # 1	Day 400
			Web based conference # 2 with software developer and follow –up evaluation report # 2	Day 430
			Web based conference # 3 with software developer and follow –up evaluation report # 3	Day 460
			Software validation services and Evaluation Report – Round 1	Day 510
			Software validation services and Evaluation Report – Round 2	Day 550

* *Please refer to E.1 of Terms of Reference*

*** Please refer to E.2 of Terms of Reference. The submission dates indicated in this table for Step 5 are based on the successful and timely completion of tender process and the commencement of the software development project works. Therefore the estimated timeframes for Step 5 may shift according to the realization of precedents and the actual provision of services.*

SECTION 5. PROPOSAL SUBMISSION FORM[10]

[insert: *Location, Date*]

To: [*insert: Name and Address of UNDP focal point]*

Dear Sir/Madam:

We, the undersigned, hereby offer to provide professional services for [*insert: title of services*] in accordance with your Request for Proposal dated [*insert: Date*] and our Proposal. We are hereby submitting our Proposal, which includes the Technical Proposal and Financial Proposal sealed under a separate envelope.

We hereby declare that:

a) All the information and statements made in this Proposal are true and we accept that any misrepresentation contained in it may lead to our disqualification;
b) We are currently not on the removed or suspended vendor list of the UN or other such lists of other UN agencies, nor are we associated with, any company or individual appearing on the 1267/1989 list of the UN Security Council;
c) We have no outstanding bankruptcy or pending litigation or any legal action that could impair our operation as a going concern; and
d) We do not employ, nor anticipate employing, any person who is or was recently employed by the UN or UNDP.
e) We are not in the circumstances of disqualification or restriction set forth in the Laws No. 4734 and 4735 (or as per the relevant laws of the country in which we operate) and not in the circumstances of those that cannot participate in the procurement as per the same Law (or as per the relevant laws of the country in which we operate).
f) We are not associated, or have not been associated in the past, directly or indirectly, with entities or any of their affiliates, which have been engaged by the Employer to provide consulting services for the preparation of the design specifications, other documents and/or the present RFP.

We confirm that we have read, understood and hereby accept the Terms of Reference describing the duties and responsibilities required of us in this RFP, and the General Terms and Conditions of UNDP's Contract for Professional Services.

We agree to abide by this Proposal for *[insert: period of validity as indicated in Data Sheet]*.

We undertake, if our Proposal is accepted, to initiate the services not later than the date indicated in the Data Sheet.

We fully understand and recognize that UNDP is not bound to accept this proposal, that we shall bear all costs associated with its preparation and submission, and that UNDP will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the evaluation.

Yours sincerely,

Authorized Signature [*In full and initials*]: _____
Name and Title of Signatory: _____
Name of Firm: _____
Contact Details: _____

[10] *No deletion or modification may be made in this form. Any such deletion or modification may lead to the rejection of the Proposal.*

[please mark this letter with your corporate seal, if available]

SECTION 6. DOCUMENTS ESTABLISHING THE ELIGIBILITY AND QUALIFICATIONS OF THE PROPOSER

Proposer Information Form[11]

Date: *[insert date (as day, month and year) of Proposal Submission*]
RfP No.: *[insert number]*
Page _____ of_____ pages

1. Proposer's Legal Name *[insert Proposer's legal name]*		
2. In case of Joint Venture (JV), legal name of each party: *[insert legal name of each party in JV]*		
3. Actual or intended Country/ies of Registration/Operation: *[insert actual or intended Country of Registration]*		
4. Year of Registration: *[insert Proposer's year of registration]*		
5. Countries of Operation	6. No. of staff in each Country	7.Years of Operation in each Country
8. Legal Address/es in Country/ies of Registration/Operation: *[insert Proposer's legal address in country of registration]*		
9. Value and Description of Top five (5) Biggest Contract for the past three (3) years		
10. Latest Credit Rating (if any)		
11. All information regarding any past and current litigation during the last two (2) years, in which the Proposer is involved, indicating the parties concerned, the subject of the litigation, the amounts involved, and the final resolution if already concluded.		
12. Proposer's Authorized Representative Information Name: *[insert Authorized Representative's name]* Address: *[insert Authorized Representative's Address]* Telephone/Fax numbers: *[insert Authorized Representative's telephone/fax numbers]* Email Address: *[insert Authorized Representative's email address]*		
13. Are you in the UNPD List 1267.1989 or UN Ineligibility List ? (Y / N)		

[11] *The Proposer shall fill in this Form in accordance with the instructions. Apart from providing additional information, no alterations to its format shall be permitted and no substitutions shall be accepted.*

14. All document requested in the Data Sheet

a) Certificate of Registration of the business including Articles of Incorporation, or equivalent document if Proposer is not a corporation, which evidences that the proposer has been legally established before 2013
b) Tax Registration/Payment Certificate issued by the Internal Revenue Authority evidencing that the Proposer is updated with its tax payment obligations, or Certificate of Tax exemption, if any such privilege is enjoyed by the Proposer
c) *Registration to Chamber of Commerce and Membership to any Association in Turkey or Abroad, if applicable
d) Power of Attorney, in case the proposal is signed by another person who is not indicated in this power of attorney, an Official Letter of Appointment shall be submitted along with Power of Attorney.
e) Latest Audited Financial Statement (Income Statement and Balance Sheet) including Auditor's Report
f) Declaration of Quick Ratio of the Offeror (Lead Partner in case of JV or Consortium) based on 2013 financial statements certified by a public accountant
g) Statement of Satisfactory Performance from the Top 5 Clients in terms of Contract Value in the past 3 years (2012, 2013, 2014)
h) **If Joint Venture/Consortium – copy of the Memorandum of Understanding or Letter of Intent to form a JV/Consortium, or Registration of JV/Consortium, if registered

* Written self-declaration of the offeror is required if such registration is not required in the country that the company is operating.
** No written self-declaration is required for this item.

Joint Venture Partner Information Form (if Registered)[12]

Date: *[insert date (as day, month and year) of Proposal Submission*]
RfP No.: *[insert number]*
Page _____ of_ _____ pages

1. Proposer's Legal Name: *[insert Proposer's legal name]*		
2. JV's Party legal name: *[insert JV's Party legal name]*		
3. JV's Party Country of Registration: *[insert JV's Party country of registration]*		
4. Year of Registration: *[insert Party's year of registration]*		
5. Countries of Operation	6. No. of staff in each Country	7.Years of Operation in each Country
8. Legal Address/es in Country/ies of Registration/Operation: *[insert Party's legal address in country of registration]*		
9. Value and Description of Top three (3) Biggest Contract for the past five (5) years		
10. Latest Credit Rating (if any)		
1. Brief description of litigation history (disputes, arbitration, claims, etc.), indicating current status and outcomes, if already resolved.		
13. JV's Party Authorized Representative Information Name: *[insert name of JV's Party authorized representative]* Address: *[insert address of JV's Party authorized representative]* Telephone/Fax numbers: *[insert telephone/fax numbers of JV's Party authorized representative]* Email Address: *[insert email address of JV's Party authorized representative]*		
14. Attached are copies of original documents of: *[check the box(es) of the attached original documents]* i) Certificate of Registration of the business including Articles of Incorporation, or equivalent document if Partner is not a corporation, which evidences that the partner has been legally established j) Tax Registration/Payment Certificate issued by the Internal Revenue Authority evidencing that the Partner is updated with its tax payment obligations, or Certificate of Tax exemption, if any such privilege is enjoyed by the Partner k) *Registration to Chamber of Commerce and Membership to any Association in Turkey or Abroad, if applicable l) Power of Attorney of the Partner, in case the Memorandum of Understanding or Letter of Intent to form a JV/Consortium is signed by another person who is not indicated in this power of attorney, an Official Letter of Appointment shall be submitted along with Power of Attorney. * Written self-declaration of the offeror is required if such registration is not required in the country that the company is operating.		

[12] *The Proposer shall fill in this Form in accordance with the instructions. Apart from providing additional information, no alterations to its format shall be permitted and no substitutions shall be accepted.*

SECTION 7. TECHNICAL PROPOSAL FORM

TECHNICAL PROPOSAL FORMAT

Renewable Energy Technologies Economic Analysis Tool (RET-EAT) Algorithm and Testing Models Development, Preparations for Tender File, Provision of Post-Handover Support Services during RET-EAT Software Development

Note: Technical Proposals not submitted in this format may be rejected. The financial proposal should be included in separate envelope.

Name of Proposing Organization / Firm:	
Country of Registration:	
Name of Contact Person for this Proposal:	
Address:	
Phone / Fax:	
Email:	

SECTION 1: EXPERTISE OF FIRM/ ORGANISATION

Sub-Section 1.1: Organizational Capacity: This section should provide corporate orientation, including but not limited to the year and state/country of incorporation and a brief description of the Offeror's activities. It should focus on services related to the Proposal. Offeror should attach company profile, which should not exceed ten (10) pages, including printed brochures.

1.1.1 General Experience: A brief description of corporate background and orientation with a focus on relevant experience and services (e.g. application and/or design of green and sustainable buildings, sustainable and renewable energy technologies, building simulation, energy analysis of buildings, cogeneration/tri-generation/heat pump) delivered to multinational and international organizations.

1.1.2 Financial Strength: This section should describe Offeror's current financial capabilities. Offeror shall provide Latest Audited Financial Statement (Income Statement and Balance Sheet) including Auditor's Report

Sub-Section 1.2: Relevance:

1.2.1 Experience on Similar Programme/Projects: This section should initially provide a narrative presentation of the Offeror's experience in similar undertakings, preferably focusing on the Offeror's recent activities (2012 and onwards).

For the purposes of this RFP, in order to be considered "similar",

- A referenced work experience should include application and/or design of green and sustainable buildings, sustainable and renewable energy technologies, building simulation, energy analysis of buildings, cogeneration/tri-generation/heat pump,
- Successfully or substantially completed in 2012 or later in the public or private sector,
- If the referenced work experience concerns development of algorithms and calculation methodologies, additional points may be obtained during the evaluation of proposals,
- If the employer of the referenced experience is an international organization (e.g. UN Agencies, European Commission, World Bank, European Investment Bank, European Bank for Reconstruction and Development etc.) or if the source of funding or co-funding is an international organization and the employer deploys the procurement rules and procedures of the financier international organization, additional points may be obtained during the evaluation of proposals.

1.2.2 Experience on Projects in the Region/Country (Turkey): This section should provide a summary of the Offeror's experience in similar undertakings in the region/country (Turkey).

SECTION 2 – PROPOSED METHODOLOGY, APPROACH AND IMPLEMENTATION PLAN

This section should demonstrate the Offeror's responsiveness to the Terms of Reference by identifying the specific components proposed, addressing the requirements, as specified, point by point; providing a detailed description of the essential performance characteristics, proposed warranty; and demonstrating how the proposed methodology meets or exceeds the Terms of Reference (Section 2 of Technical Proposal Form should not exceed 10 pages, excluding the forms in the relevant section of this RfP).

Sub-section 2.1: Proposed Methodology and Approach: This section should focus on the (a) comments on the Terms of Reference; (b) the Technical Approach and Methodology; proposed by the Offeror; (c) Quality Assurance Mechanisms to be deployed; and Risks, identified, along with proposed risk mitigation strategies.

2.1.1 Comments on the Terms of Reference: The Offeror shall initially provide a description of the scope of the work, demonstrating the Offeror's understanding of the Terms of Reference.

Additionally, the Offeror shall present and justify here any improvement to the Terms of Reference it is proposing to improve performance in carrying out the assignment. Such suggestions should be concise and to the point, and incorporated in the Proposal.

2.1.2 Technical Approach and Methodology: Here the Offeror shall explain its understanding of the objectives of the assignment, approach to the services, methodology for carrying out the activities and obtaining the expected output, and the degree of detail of such output.

Offeror should highlight the problems being addressed and their importance, and explain the technical approach it would adopt to address them. Offeror should also explain the methodologies it proposes to adopt and highlight the compatibility of those methodologies with the proposed approach.

2.1.3 Quality Assurance and Risks: This sub-section should focus on the quality assurance mechanism to be proposed by the Offeror and risks to be identified by the Offeror, along with proposed risk mitigation strategies and measures.

Sub-section 2.2: Implementation Plan: In this sub-section the Offeror should propose the main activities of the Assignment, their content and duration, phasing and interrelations, milestones, and delivery dates of the reports, calculations, drawings, technical specifications, bills of quantities, any other technical documents regarding the Terms of Reference, tendering documents and any other deliverable regarding the successful and timely completion of the Assignment. The proposed work plan should be consistent with the technical approach and methodology, showing understanding of the Terms of Reference and ability to translate them into a feasible working plan. A list of the final documents, including reports, drawings and tables to be delivered as final output, should be included here.

2.2.1 Work Flow: Here the Offerors are expected to provide a logically sequenced, step-by-step work flow that demonstrates the inter-dependencies between the various steps of the Assignment in line with the ToR.

2.2.2 Milestones: This sub-section should clearly identify and list the critical milestones of the Assignment.

2.2.3 Time plan: The Offerors are expected to present a time plan in the form of Gantt-Chart (Form 2.2.3), consistent with sub-section 2.2.1 and sub-section 2.2.2, and in line with the ToR.

2.2.4 Resource Schedule: This sub-section should demonstrate the resources (human resources and capital assets), required to be deployed by the Offeror in order to achieve the contract objectives in a timely manner. Here the Offerors are expected to fully explain their resources in terms of equipment (e.g. hardware and software) to be provided for successful completion of the Contract.

SECTION 3: PERSONNEL

This section should fully explain the Offeror's resources in terms of personnel and facilities necessary for the performance of this requirement. It should describe the Offeror's current capabilities/facilities and any plans for their expansion.

Sub-section 3.1 Proposed Team Structure: This sub-section should introduce the team that will fulfill the services within the scope of the Terms of Reference, and focus on the division of labor among the team members (job descriptions of key personnel), including management of contractual and technical relations with the Employers.

Sub-section 3.2 Key Personnel: Provide CVs of the proposed key personnel, and copies of the diploma(s), documents demonstrating professional experience, and documents demonstrating membership to relevant chambers of the team members.

In case an Offeror plans to engage additional personnel to this assignment, it will provide detailed description of works to be performed by these additional personnel and their working relations with the key personnel.

CVs should demonstrate qualifications in areas relevant to the Scope of Services.

The operational and technical part of the Proposal should not contain any pricing information whatsoever on the services offered. Pricing information shall be separated and only contained in the appropriate Price Schedules.

Offeror's Proposal numbering system shall correspond with the numbering system used above. All references to descriptive material and brochures should be included in the appropriate response paragraph, though material/documents themselves may be provided as annexes to the Proposal/response.

Information which the Offeror considers proprietary, if any, should be dearly marked "proprietary" next to the relevant part of the text and it will then be treated as such accordingly.

SECTION 8. FINANCIAL PROPOSAL FORM[13]

The Proposer is required to prepare the Financial Proposal in an envelope separate from the rest of the RfP as indicated in Section 9.

The Financial Proposal must provide a detailed cost breakdown. Provide separate figures for each functional grouping or category.

UN and its subsidiary organs are exempt from all taxes. Therefore Offerors shall prepare their Financial Proposals, excluding VAT. It is the Offeror's responsibility to learn from relevant authorities (Ministry of Finance) and/or to review/confirm published procedures and to consult with a certified financial consultant as needed, to confirm the scope and procedures of VAT exemption application as per VAT Law and Ministry of Finance's Communiqués.

The format shown on the following pages is a requirement for the preparation of the Financial Proposal. Any deviation from this format may result in disqualification of the Offeror.

The payments will be made on lump sum basis for the deliverables specified both in Stage I and Stage II upon the completion of necessary approval steps described under Section 4, E. Institutional Arrangement.

The Proposer shall reflect in detail the cost items such as Administrative, Human Resources, Operational, etc. costs in "Other" line. UNDP reserves the right to request further clarification and/or supporting documentation for these items as well as the right to exclude these items from contract to be signed based on the assessment of the necessity of these cost items for performance of the contract.

Regardless of the amount quoted for each step in the following table, payments shall be effected to the Contractor as per 'Payment' Clause in the Data Sheet.

[13] *No deletion or modification may be made in this form. Any such deletion or modification may lead to the rejection of the Proposal.*

TABLE 8.1 - PRICE SCHEDULE :

Stage	Step	Phase	Deliverables[14]	Unit Name	No of Units [15,16]	Unit Price (USD)[17]	Total Price (USD)
I	1	Inception	Inception Report	Energy Efficiency and Renewable Energy Expert (Team Leader)			
				Renewable Energy Expert			
				Information System Analysis and Design Expert			
				Travel (Please specify the route for each trip in one separate row)			
				Accommodation			
				Other (Please specify main expenses)			
						SUB TOTAL - STEP 1	
	2	Algorithm Development	Progress Report # 1 Progress Report # 2	Energy Efficiency and Renewable Energy Expert (Team Leader)			
				Renewable Energy Expert			
				Information System Analysis and Design Expert			
				Other (Please specify main expenses)			
						SUB TOTAL - STEP 2	
	3	Testing Models Development	Two testing models and a complete software developer's guide (including the full set of final algorithms)	Energy Efficiency and Renewable Energy Expert (Team Leader)			
				Renewable Energy Expert			
				Information System Analysis and Design Expert			
				Other (Please specify main expenses)			
						SUB TOTAL - STEP 3	
	4	Preparation of ToR	Terms of Reference for software development tender	Energy Efficiency and Renewable Energy Expert (Team Leader)			
				Renewable Energy Expert			
				Information System Analysis and Design Expert			
				Other (Please specify main expenses)			
						SUB TOTAL - STEP 4	
II	5	Post-handover Support Services	- Familiarization training - Web based conference # 1 with software developer and follow – up evaluation report # 1 - Web based conference # 2 with software developer and follow – up evaluation report # 2 - Web based conference # 3 with software developer and follow – up evaluation report # 3 - Software validation services and Evaluation Report – Round 1 - Software validation services and Evaluation Report – Round 2	Energy Efficiency and Renewable Energy Expert (Team Leader)			
				Renewable Energy Expert			
				Information System Analysis and Design Expert			
				Travel (Please specify the route for each trip in one separate row)			
				Accommodation			
				Other (Please specify main expenses)			
						SUB TOTAL - STEP 5	
						GRAND TOTAL:	

[14] *The Contractor shall not be entitled to any payments relating to any Step, unless the deliverables linked to that Step are submitted to UNDP on time and in full compliance with the Terms of Reference given in Section 4, and approved by UNDP.*

[15] *The Offerors shall quote the number of man/days to be invested by each of its personnel in each deliverable and the quantities for other items.*

[16] *The transportation, accommodation and other expenses of Contractor's personnel to be incurred in relation to meetings throughout Step 1 and Step 5 shall be included in the Price Proposal., in line with the TOR.*

[17] *The unit prices specified in the above table shall be in line with the unit prices specified in Table 8.2 of Section 8.*

TABLE 8.2: UNIT PRICES FOR COST ITEMS:

Stage Number	Step Number	Description of Item	Unit Price (USD/day)
I	Step 1	Energy Efficiency and Renewable Energy Expert (Team Leader)	
	Step 1	Renewable Energy Expert	
	Step 1	Information System Analysis and Design Expert	
	Step 1	Travel (Please specify the route for each trip in one separate row)	
	Step 1	Accommodation	
	Step 1	Other (Please specify main expenses)	
	Step 2	Energy Efficiency and Renewable Energy Expert (Team Leader)	
	Step 2	Renewable Energy Expert	
	Step 2	Information System Analysis and Design Expert	
	Step 2	Other (Please specify main expenses)	
	Step 3	Energy Efficiency and Renewable Energy Expert (Team Leader)	
	Step 3	Renewable Energy Expert	
	Step 3	Information System Analysis and Design Expert	
	Step 3	Other (Please specify main expenses)	
	Step 4	Energy Efficiency and Renewable Energy Expert (Team Leader)	
	Step 4	Renewable Energy Expert	
	Step 4	Information System Analysis and Design Expert	
	Step 4	Other (Please specify main expenses)	
II	Step 5	Energy Efficiency and Renewable Energy Expert (Team Leader)	
	Step 5	Renewable Energy Expert	
	Step 5	Information System Analysis and Design Expert	
	Step 5	Travel (Please specify the route for each trip in one separate row)	
	Step 5	Accommodation	
	Step 5	Other (Please specify main expenses)	

We hereby confirm that we read and understood the instructions and conditions provided in "Section 8 - Financial Proposal Form" and our proposal prepared and submitted in accordance with them.

Signature
Duly authorized to sign Proposal for and on behalf of

_____
(Name of Company)

_____
Signature/Stamp of Entity/Date
Name of representative:
Address:
Telephone/Fax:
Email:

SECTION 9. INSTRUCTIONS FOR PREPARATION AND SUBMISSION OF PROPOSALS

A) PREPARATION OF PROPOSALS

The Offerors shall prepare their proposals **in exactly the same envelopes, order and numbering/referencing stipulated in this RFP.**

Each envelope shall contain **1 (one) original and 2 (two) copies** of the required content for that envelope in terms of information/documentation, etc.

The Offerors shall prepare **'Indexes'** for each envelope which shows the proposal parts corresponding to the sections in the RFP and TOR.

INNER ENVELOPES

The Proposal shall comprise the following inner envelopes with the required documentation/information:

a) **Inner Envelope I:**

This is the envelope for the documents that will be evaluated with respect to ***'PASS/FAIL ELIGIBILITY CRITERIA'.***

The Offerors shall fill out, sign and stamp the Section 5 "Proposal Submission Form" and Section 6 "Documents Establishing the Eligibility and Qualifications of The Proposer" templates given in this RFP. All administrative documents requested in this RFP shall be submitted along with Section 6 as its annexes.

The 'Proposal Submission Form' given in Section 5 and Section 6 of the RFP shall not contain any price information. It shall be signed and stamped by the Offerors and placed in Inner Envelope I.

Lack of any one of the information/documentation required under PASS/FAIL ELIGIBILITY CRITERIA will result in rejection of the proposal without further technical/financial evaluation.

b) **Inner Envelope II:**

This is the envelope for **"Section 7-Technical Proposal Submission Form".**

The Offeror shall respond to each and every section/subsection given in the Technical Proposal Form, given in Section 7 of this RFP. Each section/subsection of the Offeror's proposal shall be placed in a separate section of the file **in exactly the same order given in the 'Technical Proposal Submission Form'**

and shall be listed in the index with its respective number in the Technical Proposal Form.

"Technical Part of the Proposal" shall be placed in Inner Envelope II and shall not contain any price information.

c) **Inner Envelope III:**

This is the envelope for **'PRICE PROPOSAL'**.

The Offerors shall fill out, sign and stamp the 'Price Schedules', templates of which are given in Section 8 of this RFP.

OUTER ENVELOPE

The above listed three envelopes (Inner Envelope I, Inner Envelope II and Inner Envelope III) shall be placed in an 'Outer Envelope'.

B) SEALING AND MARKING OF PROPOSALS

The Offerors shall seal the Proposals in 1 (one) outer and 3 (three) inner envelopes, as detailed below:

a) The outer envelope:

The outer envelope shall contain 3 (three) inner envelopes and shall be addressed to UNDP Turkey Country Office. The outer envelope shall bear the following information on it:

United Nations Development Programme (UNDP)
UN House, Birlik Mah. 415. Cadde
No: 11, 06610,
Çankaya, ANKARA

RFP: Renewable Energy Technologies Economic Analysis Tool (RET-EAT) Algorithm and Testing Models Development, Preparations for Tender File, Provision of Post-Handover Support Services during RET-EAT Software Development

REF: "UNDP-TUR-RFP-PROJ(EEB)-2015/01"

LEGAL NAME and ADDRESS OF THE OFFEROR:

b) The inner envelopes:

All three inner envelopes shall bear the below information:

Name and Address of the Offeror: **Envelope Nr:** **Envelope Content:** (as described above)

Note, if the outer and inner envelopes are not sealed and marked as per the instructions in this clause, the procuring UNDP entity will not assume responsibility for the Proposal's misplacement or premature opening.

SECTION 10. CONTRACT FOR PROFESSIONAL SERVICES

THIS IS UNDP'S TEMPLATE FOR CONTRACT FOR THE PROPOSER'S REFERENCE. ADHERENCE TO ALL TERMS AND CONDITIONS IS MANDATORY.

Date _____

Dear Sir/Madam,

Ref.: _____/ _____/ _____ **[INSERT PROJECT NUMBER AND TITLE OR OTHER REFERENCE]**

The United Nations Development Programme (hereinafter referred to as "UNDP"), wishes to engage your [**company/organization/institution**], duly incorporated under the Laws of _____ **[INSERT NAME OF THE COUNTRY]** (hereinafter referred to as the "Contractor") in order to perform services in respect of _____ **[INSERT SUMMARY DESCRIPTION OF THE SERVICES]** (hereinafter referred to as the "Services"), in accordance with the following Contract:

1. Contract Documents

1.1 This Contract is subject to the UNDP General Conditions for Professional Services attached hereto as Annex I. The provisions of such Annex shall control the interpretation of this Contract and in no way shall be deemed to have been derogated by the contents of this letter and any other Annexes, unless otherwise expressly stated under section 4 of this letter, entitled "Special Conditions".

1.2 The Contractor and UNDP also agree to be bound by the provisions contained in the following documents, which shall take precedence over one another in case of conflict in the following order:

a) this Letter;

b) the Terms of Reference [ref. .....dated.....], attached hereto as Annex II;

c) the Contractor's Proposal [ref....., dated .....]
d) The UNDP Request for Proposal [ref……, dated……]

1.3 All the above shall form the Contract between the Contractor and UNDP, superseding the contents of any other negotiations and/or agreements, whether oral or in writing, pertaining to the subject of this Contract.

2. Obligations of the Contractor

2.1 The Contractor shall perform and complete the Services described in Annex II with due diligence and efficiency and in accordance with the Contract.

2.2 The Contractor shall provide the services of the following key personnel:

Name	Specialization	Nationality	Period of service
….	……	…….	……
….	……	…….	……

2.3 Any changes in the above key personnel shall require prior written approval of _____ **[NAME and TITLE],** UNDP.

2.4 The Contractor shall also provide all technical and administrative support needed in order to ensure the timely and satisfactory performance of the Services.

2.5 The Contractor shall submit to UNDP the deliverables specified hereunder according to the following schedule:

[LIST DELIVERABLES]	**[INDICATE DELIVERY DATES]**
e.g.	
Progress report	../../….
…….	../../….
Final report	../../….

2.6 All reports shall be written in the English language, and shall describe in detail the services rendered under the Contract during the period of time covered in such report. All reports shall be transmitted by the Contractor by _____ **[MAIL, COURIER AND/OR FAX]** to the address specified in 9.1 below.

2.7 The Contractor represents and warrants the accuracy of any information or data provided to UNDP for the purpose of entering into this Contract, as well as the quality of the deliverables and reports foreseen under this Contract in accordance with the highest industry and professional standards.

3. Price and Payment

3.1 In full consideration for the complete and satisfactory performance of the Services under this Contract, UNDP shall pay the Contractor a fixed contract price of _____ **[INSERT CURRENCY & AMOUNT IN FIGURES AND WORDS]**.

3.2 The price of this Contract is not subject to any adjustment or revision because of price or currency fluctuations or the actual costs incurred by the Contractor in the performance of the Contract.

3.3 Payments effected by UNDP to the Contractor shall be deemed neither to relieve the Contractor of its obligations under this Contract nor as acceptance by UNDP of the Contractor's performance of the Services.

3.4 UNDP shall effect payments to the Contractor after acceptance by UNDP of the invoices submitted by the Contractor to the address specified in 9.1 below, upon achievement of the corresponding milestones and for the following amounts:

MILESTONE	AMOUNT	TARGET DATE
Upon…..	……	./../….

…… …… ../../….

Invoices shall indicate the milestones achieved and corresponding amount payable.

4. Special conditions

4.1 The responsibility for the safety and security of the Contractor and its personnel and property, and of UNDP's property in the Contractor's custody, rests with the Contractor.

4.2

4.3

4.4

5. Submission of invoices

5.1 An original invoice shall be submitted by mail by the Contractor for each payment under the Contract to the following address:
.....

5.2 Invoices submitted by fax shall not be accepted by UNDP.

6. Time and manner of payment

6.1 Invoices shall be paid within thirty (30) days of the date of their acceptance by UNDP. UNDP shall make every effort to accept an invoice or so advise the Contractor of its non-acceptance within a reasonable time from receipt.

6.2 All payments shall be made by UNDP to the following Bank account of the Contractor:

_____ [NAME OF THE BANK]

_____ [ACCOUNT NUMBER]

_____ [ADDRESS OF THE BANK]

7. Entry into force. Time limits.

7.1 The Contract shall enter into force upon its signature by both parties.

7.2 The Contractor shall commence the performance of the Services not later than _____ **[INSERT DATE]** and shall complete the Services within _____ **[INSERT NUMBER OF DAYS OR MONTHS]** of such commencement.

7.3 All time limits contained in this Contract shall be deemed to be of the essence in respect of the performance of the Services.

8. Modifications

8.1 Any modification to this Contract shall require an amendment in writing between both parties duly signed by the authorized representative of the Contractor and _____ **[NAME AND TITLE]** UNDP.

9. Notifications

For the purpose of notifications under the Contract, the addresses of UNDP and the Contractor are as follows:

For the UNDP:

Name
Designation
Address
Tel. No.
Fax. No.
Email address:

For the Contractor:

Name
Designation
Address
Tel. No.
Fax. No.
Email address:

If the above terms and conditions meet with your agreement as they are typed in this letter and in the Contract Documents, please initial every page of this letter and its attachments and return to this office one original of this Contract, duly signed and dated.

Yours sincerely,

[INSERT NAME AND DESIGNATION]

For **[INSERT NAME OF THE COMPANY/ORGANIZATION]**

Agreed and Accepted:

Signature _____
Name: _____
Title: _____
Date: _____

UNDP
GENERAL CONDITIONS OF CONTRACT FOR SERVICES

1.0 LEGAL STATUS:

The Contractor shall be considered as having the legal status of an independent contractor vis-à-vis the United Nations Development Programme (UNDP). The Contractor's personnel and sub-contractors shall not be considered in any respect as being the employees or agents of UNDP or the United Nations.

2.0 SOURCE OF INSTRUCTIONS:

The Contractor shall neither seek nor accept instructions from any authority external to UNDP in connection with the performance of its services under this Contract. The Contractor shall refrain from any action that may adversely affect UNDP or the United Nations and shall fulfill its commitments with the fullest regard to the interests of UNDP.

3.0 CONTRACTOR'S RESPONSIBILITY FOR EMPLOYEES:

The Contractor shall be responsible for the professional and technical competence of its employees and will select, for work under this Contract, reliable individuals who will perform effectively in the implementation of this Contract, respect the local customs, and conform to a high standard of moral and ethical conduct.

4.0 ASSIGNMENT:

The Contractor shall not assign, transfer, pledge or make other disposition of this Contract or any part thereof, or any of the Contractor's rights, claims or obligations under this Contract except with the prior written consent of UNDP.

5.0 SUB-CONTRACTING:

In the event the Contractor requires the services of sub-contractors, the Contractor shall obtain the prior written approval and clearance of UNDP for all sub-contractors. The approval of UNDP of a sub-contractor shall not relieve the Contractor of any of its obligations under this Contract. The terms of any sub-contract shall be subject to and conform to the provisions of this Contract.

6.0 OFFICIALS NOT TO BENEFIT:

The Contractor warrants that no official of UNDP or the United Nations has received or will be offered by the Contractor any direct or indirect benefit arising from this Contract or the award thereof. The Contractor agrees that breach of this provision is a breach of an essential term of this Contract.

7.0 INDEMNIFICATION:

The Contractor shall indemnify, hold and save harmless, and defend, at its own expense, UNDP, its officials, agents, servants and employees from and against all suits, claims, demands, and liability of any nature or kind, including their costs and expenses, arising out of acts or omissions of the Contractor, or the Contractor's employees, officers, agents or sub-contractors, in the performance of this Contract. This provision shall extend, inter alia, to claims and liability in the nature of workmen's compensation, products liability and liability arising out of the use of patented inventions or devices, copyrighted material or other intellectual property by the Contractor, its employees, officers, agents, servants or sub-contractors. The obligations under this Article do not lapse upon termination of this Contract.

8.0 INSURANCE AND LIABILITIES TO THIRD PARTIES:

8.1 The Contractor shall provide and thereafter maintain insurance against all risks in respect of its property and any equipment used for the execution of this Contract.

8.2 The Contractor shall provide and thereafter maintain all appropriate workmen's compensation insurance, or the equivalent, with respect to its employees to cover claims for personal injury or death in connection with this Contract.

8.3 The Contractor shall also provide and thereafter maintain liability insurance in an adequate amount to cover third party claims for death or bodily injury, or loss of or damage to property, arising from or in connection with the provision of services under this Contract or the operation of any vehicles, boats, airplanes or other equipment owned or leased by the Contractor or its agents, servants, employees or sub-contractors performing work or services in connection with this Contract.

8.4 Except for the workmen's compensation insurance, the insurance policies under this Article shall:

8.4.1 Name UNDP as additional insured;

8.4.2 Include a waiver of subrogation of the Contractor's rights to the insurance carrier against the UNDP;

8.4.3 Provide that the UNDP shall receive thirty (30) days written notice from the insurers prior to any cancellation or change of coverage.

8.5 The Contractor shall, upon request, provide the UNDP with satisfactory evidence of the insurance required under this Article.

9.0 ENCUMBRANCES/LIENS:

The Contractor shall not cause or permit any lien, attachment or other encumbrance by any person to be placed on file or to remain on file in any public office or on file with the UNDP against any monies due or to become due for any work done or materials furnished under this Contract, or by reason of any other claim or demand against the Contractor.

10.0 TITLE TO EQUIPMENT: Title to any equipment and supplies that may be furnished by UNDP shall rest with UNDP and any such equipment shall be returned to UNDP at the conclusion of this Contract or when no longer needed by the Contractor. Such equipment, when returned to UNDP, shall be in the same condition as when delivered to the Contractor, subject to normal wear and tear. The Contractor shall be liable to compensate UNDP for equipment determined to be damaged or degraded beyond normal wear and tear.

11.0 COPYRIGHT, PATENTS AND OTHER PROPRIETARY RIGHTS:

11.1 Except as is otherwise expressly provided in writing in the Contract, the UNDP shall be entitled to all intellectual property and other proprietary rights including, but not limited to, patents, copyrights, and trademarks, with regard to products, processes, inventions, ideas, know-how, or documents and other materials which the Contractor has developed for the UNDP under the Contract and which bear a direct relation to or are produced or prepared or collected in consequence of, or during the course of, the performance of the Contract, and the Contractor acknowledges and agrees that such products, documents and other materials constitute works made for hire for the UNDP.

11.2 To the extent that any such intellectual property or other proprietary rights consist of any intellectual property or other proprietary rights of the Contractor: (i) that pre-existed the performance by the Contractor of its obligations under the Contract, or (ii) that the Contractor may develop or acquire, or may have developed or acquired, independently of the performance of its obligations under the Contract, the UNDP does not and shall not claim any ownership interest thereto, and the Contractor grants to the UNDP a perpetual license to use such intellectual property or other proprietary right solely for the purposes of and in accordance with the requirements of the Contract.

11.3 At the request of the UNDP; the Contractor shall take all necessary steps, execute all necessary documents and generally assist in securing such proprietary rights and transferring or licensing them to the UNDP in compliance with the requirements of the applicable law and of the Contract.

11.4 Subject to the foregoing provisions, all maps, drawings, photographs, mosaics, plans, reports, estimates, recommendations, documents, and all other data compiled by or received by the Contractor under the Contract shall be the property of the UNDP, shall be made available for use or inspection by the UNDP at reasonable times and in reasonable places, shall be treated as confidential, and shall be delivered only to UNDP authorized officials on completion of work under the Contract.

12.0 USE OF NAME, EMBLEM OR OFFICIAL SEAL OF UNDP OR THE UNITED NATIONS:

The Contractor shall not advertise or otherwise make public the fact that it is a Contractor with UNDP, nor shall the Contractor, in any manner whatsoever use the name, emblem or official seal of UNDP or THE United Nations, or any abbreviation of the name of UNDP or United Nations in connection with its business or otherwise.

13.0 CONFIDENTIAL NATURE OF DOCUMENTS AND INFORMATION:

Information and data that is considered proprietary by either Party, and that is delivered or disclosed by one Party ("Discloser") to the other Party ("Recipient") during the course of performance of the Contract, and that is designated as confidential ("Information"), shall be held in confidence by that Party and shall be handled as follows:

13.1 The recipient ("Recipient") of such information shall:

13.1.1 use the same care and discretion to avoid disclosure, publication or dissemination of the Discloser's Information as it uses with its own similar information that it does not wish to disclose, publish or disseminate; and,

13.1.2 use the Discloser's Information solely for the purpose for which it was disclosed.

13.2 Provided that the Recipient has a written agreement with the following persons or entities requiring them to treat the Information confidential in accordance with the Contract and this Article 13, the Recipient may disclose Information to:

13.2.1 any other party with the Discloser's prior written consent; and,

13.2.2 the Recipient's employees, officials, representatives and agents who have a need to know such Information for purposes of performing obligations under the Contract, and employees officials, representatives and agents of any legal entity that it controls, controls it, or with which it is under common control, who have a need to know such Information for purposes of performing obligations under the Contract, provided that, for these purposes a controlled legal entity means:

13.2.2.1 a corporate entity in which the Party owns or otherwise controls, whether directly or indirectly, over fifty percent (50%) of voting shares thereof; or,

13.2.2.2 any entity over which the Party exercises effective managerial control; or,

13.2.2.3 for the UNDP, an affiliated Fund such as UNCDF, UNIFEM and UNV.

13.3 The Contractor may disclose Information to the extent required by law, provided that, subject to and without any waiver of the privileges and immunities of the United Nations, the Contractor will give the UNDP sufficient prior notice of a request for the disclosure of Information in order to allow the UNDP to have a reasonable opportunity to take protective measures or such other action as may be appropriate before any such disclosure is made.

13.4 The UNDP may disclose Information to the extent as required pursuant to the Charter of the UN, resolutions or regulations of the General Assembly, or rules promulgated by the Secretary-General.

13.5 The Recipient shall not be precluded from disclosing Information that is obtained by the Recipient from a third party without restriction, is disclosed by the Discloser to a third party without any obligation of confidentiality, is previously known by the Recipient, or at any time is developed by the Recipient completely independently of any disclosures hereunder.

13.6 These obligations and restrictions of confidentiality shall be effective during the term of the Contract, including any extension thereof, and, unless otherwise provided in the Contract, shall remain effective following any termination of the Contract.

14.0 FORCE MAJEURE; OTHER CHANGES IN CONDITIONS

14.1 In the event of and as soon as possible after the occurrence of any cause constituting force majeure, the Contractor shall give notice and full particulars in writing to the UNDP, of such occurrence or change if the Contractor is thereby rendered unable, wholly or in part, to perform its obligations and meet its responsibilities under this Contract. The Contractor shall also notify the UNDP of any other changes in conditions or the occurrence of any event that interferes or threatens to interfere with its performance of this Contract. On receipt of the notice required under this Article, the UNDP shall take such action as, in its sole discretion; it considers to be appropriate or necessary in the circumstances, including the granting to the Contractor of a reasonable extension of time in which to perform its obligations under this Contract.

14.2 If the Contractor is rendered permanently unable, wholly, or in part, by reason of force majeure to perform its obligations and meet its responsibilities under this Contract, the UNDP shall have the right to suspend or terminate this Contract on the same terms and conditions as are provided for in Article 15, "Termination", except that the period of notice shall be seven (7) days instead of thirty (30) days.

14.3 Force majeure as used in this Article means acts of God, war (whether declared or not), invasion, revolution, insurrection, or other acts of a similar nature or force.

14.4 The Contractor acknowledges and agrees that, with respect to any obligations under the Contract that the Contractor must perform in or for any areas in which the UNDP is engaged in, preparing to engage in, or

disengaging from any peacekeeping, humanitarian or similar operations, any delays or failure to perform such obligations arising from or relating to harsh conditions within such areas or to any incidents of civil unrest occurring in such areas shall not, in and of itself, constitute force majeure under the Contract..

15.0 TERMINATION

15.1 Either party may terminate this Contract for cause, in whole or in part, upon thirty (30) days notice, in writing, to the other party. The initiation of arbitral proceedings in accordance with Article 16.2 ("Arbitration"), below, shall not be deemed a termination of this Contract.

15.2 UNDP reserves the right to terminate without cause this Contract at any time upon 15 days prior written notice to the Contractor, in which case UNDP shall reimburse the Contractor for all reasonable costs incurred by the Contractor prior to receipt of the notice of termination.

15.3 In the event of any termination by UNDP under this Article, no payment shall be due from UNDP to the Contractor except for work and services satisfactorily performed in conformity with the express terms of this Contract.

15.4 Should the Contractor be adjudged bankrupt, or be liquidated or become insolvent, or should the Contractor make an assignment for the benefit of its creditors, or should a Receiver be appointed on account of the insolvency of the Contractor, the UNDP may, without prejudice to any other right or remedy it may have under the terms of these conditions, terminate this Contract forthwith. The Contractor shall immediately inform the UNDP of the occurrence of any of the above events.

16.0 SETTLEMENT OF DISPUTES

16.1 Amicable Settlement: The Parties shall use their best efforts to settle amicably any dispute, controversy or claim arising out of this Contract or the breach, termination or invalidity thereof. Where the parties wish to seek such an amicable settlement through conciliation, the conciliation shall take place in accordance with the UNCITRAL Conciliation Rules then obtaining, or according to such other procedure as may be agreed between the parties.

16.2 Arbitration: Any dispute, controversy, or claim between the Parties arising out of the Contract or the breach, termination, or invalidity thereof, unless settled amicably under Article 16.1, above, within sixty (60) days after receipt by one Party of the other Party's written request for such amicable settlement, shall be referred by either Party to arbitration in accordance with the UNCITRAL Arbitration Rules then obtaining. The decisions of the arbitral tribunal shall be based on general principles of international commercial law. For all evidentiary questions, the arbitral tribunal shall be guided by the Supplementary Rules Governing the Presentation and Reception of Evidence in International Commercial Arbitration of the International Bar Association, 28 May 1983 edition. The arbitral tribunal shall be empowered to order the return or destruction of goods or any property, whether tangible or intangible, or of any confidential information provided under the Contract, order the termination of the Contract, or order that any other protective measures be taken with respect to the goods, services or any other property, whether tangible or intangible, or of any confidential information provided under the Contract, as appropriate, all in accordance with the authority of the arbitral tribunal pursuant to Article 26 ("Interim Measures of Protection") and Article 32 ("Form and Effect of the Award") of the UNCITRAL Arbitration Rules. The arbitral tribunal shall have no authority to award punitive damages. In addition, unless otherwise expressly provided in the Contract, the arbitral tribunal shall have no authority to award interest in excess of the London Inter-Bank Offered Rate ("LIBOR") then prevailing, and any such interest shall be simple interest only. The Parties shall be bound by any arbitration award rendered as a result of such arbitration as the final adjudication of any such dispute, controversy, or claim.

17.0 PRIVILEGES AND IMMUNITIES:

Nothing in or relating to this Contract shall be deemed a waiver, express or implied, of any of the privileges and immunities of the United Nations, including its subsidiary organs.

18.0 TAX EXEMPTION

18.1 Section 7 of the Convention on the Privileges and Immunities of the United Nations provides, inter-alia that the United Nations, including its subsidiary organs, is exempt from all direct taxes, except charges for public utility services, and is exempt from customs duties and charges of a similar nature in respect of articles imported or exported for its official use. In the event any governmental authority refuses to recognize the United Nations exemption from such taxes, duties or charges, the Contractor shall immediately consult with the UNDP to determine a mutually acceptable procedure.

18.2 Accordingly, the Contractor authorizes UNDP to deduct from the Contractor's invoice any amount representing such taxes, duties or charges, unless the Contractor has consulted with the UNDP before the payment thereof and the UNDP has, in each instance, specifically authorized the Contractor to pay such taxes, duties or charges under protest. In that event, the Contractor shall provide the UNDP with written evidence that payment of such taxes, duties or charges has been made and appropriately authorized.

19.0 CHILD LABOUR

19.1 The Contractor represents and warrants that neither it, nor any of its suppliers is engaged in any practice inconsistent with the rights set forth in the Convention on the Rights of the Child, including Article 32 thereof, which, inter alia, requires that a child shall be protected from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical mental, spiritual, moral or social development.

19.2 Any breach of this representation and warranty shall entitle UNDP to terminate this Contract immediately upon notice to the Contractor, at no cost to UNDP.

20.0 MINES:

20.1 The Contractor represents and warrants that neither it nor any of its suppliers is actively and directly engaged in patent activities, development, assembly, production, trade or manufacture of mines or in such activities in respect of components primarily utilized in the manufacture of Mines. The term "Mines" means those devices defined in Article 2, Paragraphs 1, 4 and 5 of Protocol II annexed to the Convention on Prohibitions and Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects of 1980.

20.2 Any breach of this representation and warranty shall entitle UNDP to terminate this Contract immediately upon notice to the Contractor, without any liability for termination charges or any other liability of any kind of UNDP.

21.0 OBSERVANCE OF THE LAW:

The Contractor shall comply with all laws, ordinances, rules, and regulations bearing upon the performance of its obligations under the terms of this Contract.

22.0 SEXUAL EXPLOITATION:

22.1 The Contractor shall take all appropriate measures to prevent sexual exploitation or abuse of anyone by it or by any of its employees or any other persons who may be engaged by the Contractor to perform any services under the Contract. For these purposes, sexual activity with any person less than eighteen years of age, regardless

of any laws relating to consent, shall constitute the sexual exploitation and abuse of such person. In addition, the Contractor shall refrain from, and shall take all appropriate measures to prohibit its employees or other persons engaged by it from, exchanging any money, goods, services, offers of employment or other things of value, for sexual favors or activities, or from engaging in any sexual activities that are exploitive or degrading to any person. The Contractor acknowledges and agrees that the provisions hereof constitute an essential term of the Contract and that any breach of this representation and warranty shall entitle UNDP to terminate the Contract immediately upon notice to the Contractor, without any liability for termination charges or any other liability of any kind.

22.2 The UNDP shall not apply the foregoing standard relating to age in any case in which the Contractor's personnel or any other person who may be engaged by the Contractor to perform any services under the Contract is married to the person less than the age of eighteen years with whom sexual activity has occurred and in which such marriage is recognized as valid under the laws of the country of citizenship of such Contractor's personnel or such other person who may be engaged by the Contractor to perform any services under the Contract.

23.0 SECURITY:

23.1 The Contractor shall:

(a) Put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the services are being provided;

(b) Assume all risks and liabilities related to the Contractor's security, and the full implementation of the security plan.

23.2 UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this contract. Notwithstanding the foregoing, the Contractor shall remain solely responsible for the security of its personnel and for UNDP's property in its custody as set forth in paragraph 4.1 above.

24.0 AUDITS AND INVESTIGATIONS:

24.1 Each invoice paid by UNDP shall be subject to a post-payment audit by auditors, whether internal or external, of UNDP or the authorized agents of the UNDP at any time during the term of the Contract and for a period of three (3) years following the expiration or prior termination of the Contract. The UNDP shall be entitled to a refund from the Contractor for any amounts shown by such audits to have been paid by the UNDP other than in accordance with the terms and conditions of the Contract. Should the audit determine that any funds paid by UNDP have not been used as per contract clauses, the company shall reimburse such funds forthwith. Where the company fails to reimburse such funds, UNDP reserves the right to seek recovery and/or to take any other action as it deems necessary.

24.2 The Contractor acknowledges and agrees that, at anytime, UNDP may conduct investigations relating to any aspect of the Contract, the obligations performed under the Contract, and the operations of the Contractor generally. The right of UNDP to conduct an investigation and the Contractor's obligation to comply with such an investigation shall not lapse upon expiration or prior termination of the Contract. The Contractor shall provide its full and timely cooperation with any such inspections, post-payment audits or investigations. Such cooperation shall include, but shall not be limited to, the Contractor's obligation to make available its personnel and any documentation for such purposes and to grant to UNDP access to the Contractor's premises. The Contractor shall require its agents, including, but not limited to, the Contractor's attorneys, accountants or other advisers, to reasonably cooperate with any inspections, post-payment audits or investigations carried out by UNDP hereunder.

25.0 ANTI-TERRORISM:

25.1 The Contractor agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received under this Contract are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via

http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm. This provision must be included in all sub-contracts or sub-agreements entered into under this Contract.

26.0 AUTHORITY TO MODIFY:

Pursuant to the Financial Regulations and Rules of UNDP, only the UNDP Authorized Official possesses the authority to agree on behalf of UNDP to any modification of or change in this Agreement, to a waiver of any of its provisions or to any additional contractual relationship of any kind with the Contractor. Accordingly, no modification or change in this Contract shall be valid and enforceable against UNDP unless provided by an amendment to this Agreement signed by the Contractor and jointly by the UNDP Authorized Official.