Subject:	Template for ESCo contract – extended version version
Date:	Dec 2014
Description:	Example template (extended) for an “Energy Performance Contract”, here named “Solar Energy Provision Agreement” for services done by an “Energy Service Company” (ESCo.)
Author:	Sabine Putz, S.O.L.I.D. (s.putz@solid.at)
Download possible at:	http://task45.iea-shc.org/fact-sheets

CONTENT

INTRODUCTION

This document gives a rather detailed template for a contract/agreement between the provider of energy and the user of energy. It is meant as inspiration for elaborating real contracts/agreements.

CONTRACT FRONTPAGE

This contract has two parties, the ESCo company (later referred to as ESCO) and the client company (later referred to as the CLIENT).

SOLAR ENERGY PROVISION AGREEMENT
(NR: 00000)

BETWEEN

[[local ESCO, full name]],
[[Country]]

AND

[[CLIENT, FULL NAME]],
[Country]

FOR

[[CLIENT, FULL NAME]] Project XY,
[Country]

PREAMBLE

THIS SOLAR THERMAL ENERGY PROVISION AGREEMENT ("*Agreement*") is entered into as of the DD. MMMM YYYY by and between

[[local ESCO, full name]], ([[ESCO]]), with its registered address at
Street, ZIP Code, Town, Country, Reg. Nr: xxxxxxxx

and

[[client, full name]], ([[CLIENT]]), located at Street, ZIP Code, Town, Country, with its registered address at Street, ZIP Code, Town, Country, Reg. Nr: xxxxxxxx

(together, the "*Parties*").

WHEREAS:

[[ESCO]] is engaged in the business of generating and selling heating and cooling energy through the installation of a Large Solar Thermal ("LST") system and related equipment;

[[CLIENT]] operates an {FACILITY} located in {Country}, which is planned to start its operation in MMMM YYYY ("[[CLIENT]]'s Facilities");

It has been agreed that a LST shall be constructed and owned by [[ESCO]], which in turn shall provide [[CLIENT]] with thermal energy for heating/cooling.

NOW, THEREFORE, in consideration of the premises and mutual covenants, conditions and agreements hereinabove and hereinafter set forth and such other good and valuable considerations, [[CLIENT]] and [[ESCO]], each intending to be legally bound **DO HEREBY AGREE AS FOLLOWS**:

1 DEFINITIONS

Except as otherwise expressly provided herein, all italic and capitalized terms used in this *Agreement* shall have the respective meanings as set forth below:

a) "*Acceptance Certificate*" shall mean the protocol to be signed by the *Parties* in accordance with clause 4 and Annex IV

b) "*Acceptance Date*" shall mean the day when acceptance has occurred in accordance with clause 4 and Annex IV.

c) "*Acceptance Test*" shall mean the test confirming the performance of the LST system as described in Annex IV

d) "*Commissioning Phase*" shall mean the period between MMMM YYYY and MMMM YYYY as per Annex III and Annex IV

e) "*Installer*" shall mean [[ESCO]] or its subcontractor carrying out the installation work for the *Solar Thermal Plant*

f) "*Deed*" shall mean the deed to be signed between [LAND OWNER] and [[ESCO]] as attached in Annex VII

g) "*Confidential Information*" shall mean information of commercial value which has been kept confidential by the Party from whom the information originates and which has not come into the public domain during the term of this *Agreement* in breach of any obligation of confidence

h) "*Documentation*" shall mean a detailed description of the LST and drawings of the entire *Solar Thermal Plant*

i) "VDI 2067" shall mean fundamentals and economic calculations of building installations in accordance to the instruction of VDE (Verein Deutscher Ingenieure) association of German engineers, as per Annex V

j) "*Effective Date*" shall mean the date when this *Agreement* is signed.

k) "*Fee*" shall mean the fees and charges for the provision of hot water as well as of cooling water as set out in clause 9 and Annex VI

l) *"General Contractor"* shall mean the company responsible for construction of the [[CLIENT]]'s facilities, hired by the [[CLIENT]].

m) "*Interfaces*" shall mean the interface between the *Solar Thermal Plant* and the hot water and cooling water distribution system to be installed by [[CLIENT]] as well as the interface between the *Solar Thermal Plant* and the roof of [[CLIENT]]'s Facilities. The I nnterfaces will be set out in the *Documentation*.

n) "*Installation Plan*" shall mean the time schedule set out in Time Table Annex III

o) "*Metering Equipment*" shall mean the meters measuring the quantities of solar energy consumed by [[CLIENT]], as per clause 8.6

p) "*Minimum Off-Take*" shall mean the minimum annual quantity of x,xxx,xxx.00 kWh of cooling water and of yyy,yyy kWh of hot water, to be consumed and paid for by [[CLIENT]].

q) "*Operations*" shall mean the activities as set out in clause 7.3

r) "*Project Manager*" shall mean a nominated representative of each Party who shall have the overall responsibility for the coordination from the installation phase up to *Acceptance Date*.

s) "*Solar Thermal Plant*" shall mean the large solar thermal system including all balance components such as cooling towers, storage tanks, control units [and energy efficiency componoents] to be installed by [[ESCO]] at [[CLIENT]]'s facilities.

t) "*Term*" shall mean the term of this *Agreement* as defined in clause 11.

2 SCOPE

2.1 [[ESCO]] shall install, maintain and operate the *Solar Thermal Plant* at [[CLIENT]]'s facilities for the *Term* and shall provide [[CLIENT]] with water heating and cooling energy in accordance with this *Agreement*.

2.2 [[CLIENT]] shall provide [[CLIENT]]'s Facilities fit for the installation of the *Solar Thermal Plant*, provide all *Interfaces* for such installation and shall procure and pay for its requirements of water heating and cooling energy in accordance with this *Agreement*.

3 CONSTRUCTION OF SOLAR THERMAL PLANT

3.1 [[ESCO]] shall install the Solar Thermal Plant at the premises of [[CLIENT]]'s facilities. Details of the Interfaces and timing are as agreed during tendering/engineering phase and detailed in Annex I and III. Any changes to the location or time shall be discussed and mutually agreed between the Parties. The Parties intend to fulfill their obligations in accordance with the master program as stipulated in the contract between [[CLIENT]] and the General Contractor so as to ensure that the project is not delayed or incurs additional costs.

3.2 The general obligations of [[ESCO]] during the construction, implementation phase and whilst the *General Contractor* has possession of site are detailed in Annex I. [[ESCO]] has employed *Installer* to perform its obligations.

3.3 The installation of the *Solar Thermal Plant* is planned to begin after this *Agreement* becomes effective and be finished in accordance with the *Installation Plan*. If the installation is delayed for any reasons whatsoever, the implementation plan shall be amended to take account of such delay. If [[ESCO]] can demonstrate that the delay has been caused by [[CLIENT]] and/or the *General Contractor* and has resulted in an increase in cost for the installation, [[ESCO]] may at its sole discretion invoice [[CLIENT]] for such cost. The *Parties* agree that such additional entitlement shall be the only consequence for any delay in installation.

3.4 If [[CLIENT]] requests any changes to the agreed upon design of the *Solar Thermal Plant*, the *Parties* shall meet and discuss the impact on time and cost. If such impact is agreed upon, [[ESCO]] shall ensure that the changes are implemented by the *Installer*.

3.5 Both *Parties* shall appoint a *Project Manager*, who shall have the responsibility and commensurate authority for the overall progress of the installation.

3.6 The general obligations of [[CLIENT]] during the *Term* are set out in Annex II. In order for [[ESCO]] to be able to have the *Solar Thermal Plant* installed, [[CLIENT]] shall prepare the *Interfaces* in accordance with [[ESCO]]'s directions.

3.7 [[CLIENT]] shall ensure that its hot and cold water distribution system is installed in accordance with all specifications and measurements and that it is functioning without defaults.

3.8 [[CLIENT]] undertakes to provide [[ESCO]] and the *Installer* during construction and operation of the *Solar Thermal Plant* free of charge with all required infrastructure and consumables such as electricity, water or internet access. Details are set out in Annex II.

3.9 [[CLIENT]] undertakes, within 14 days after the *Effective Date*, to transfer a cash deposit of EUR/USD XX,XXX,XXX ("*Deposit*") as an escrow into a bank account in the name of [[ESCO]] at Raiffeisen-Landesbank Steiermark AG Austria (RLB) as a security for payment of the *Minimum Off-ake*. [[ESCO]] undertakes, within two months after the *Effective Date*, to transfer an amount of EUR/USD xxx,xxx into the *Deposit*, so that the total amount of the *Deposit* shall be EUR/USD x,xxx,yyy. [[ESCO]] shall have the right to offset the *Deposit*, in whole or in part, in the event and to the extent that [[CLIENT]] at any time does not comply with its payment obligations under this *Agreement*. The *Deposit* shall be topped-up by [[CLIENT]] in the amount of any such set-off within thirty days from the date of notice of such set-off by [[ESCO]].

3.10 Once the loans granted by RLB have been repaid by [[ESCO]], but latest on 1 January 20xx , the *Deposit* shall be paid back to [[CLIENT]] in equal annual tranches, such that the *Deposit* is refunded in full by the end of the initial term. [[ESCO]] shall be entitled to earlier repayments. Starting on the day of the first repayment by [[ESCO]] to [[CLIENT]], the *Deposit* shall become interest bearing at the [LIBOR/EURIBOR/..], calculated at the annual average rate.

4 ACCEPTANCE

4.1 Once the TOP has been issued, [[ESCO]] and the Installer shall begin with the commissioning/start up of the LST. [[ESCO]] shall give [[CLIENT]] at least 24 hours' notice of the start of the Acceptance Tests and permits [[CLIENT]] to observe the testing.

4.2 It is intended to have the Acceptance Test performed between April 20xx and June 20xx, so that rectification measures, if any, can be undertaken by [[ESCO]] until August 20xx. An Acceptance Certificate shall be issued by Installer and signed by [[ESCO]] when the Acceptance Test has been performed successfully. The energy produced by the LST from the date of issuance of the Acceptance Certificate shall be consumed and paid by [[CLIENT]].

4.3 Details of the commissioning period and the Acceptance Test as well as rectification measures (Certificates, Checklists), if any requested by [[CLIENT]], are set out in Annex IV.

5 OWNERSHIP OF THE SOLAR THERMAL PLANT

5.1 Title to the Solar Thermal Plant shall remain at all times with [[ESCO]].

5.2 [[CLIENT]] shall either obtain or support [[ESCO]] in obtaining all necessary approvals from relevant authorities for the installation, operation and maintenance of the Solar Thermal Plant.

5.3 [[CLIENT]] shall not remove, alter (except as otherwise required or permitted under this Agreement) or assign, pledge, mortgage, permit any lien to exist on the Solar Thermal Plant. For the avoidance of doubt, [[CLIENT]] unreservedly acknowledges that the Solar Thermal Plant shall not constitute part of the actual building and throughout the Term shall not cause damage to or permit anything which may damage the Solar Thermal Plant.

6 EASEMENT

6.1 [[CLIENT]] shall grant, or cause to be granted, to [[ESCO]], its representatives and/or agents all rights-of-way, access rights, easements, licenses and other rights with respect to [[CLIENT]]'s facilities as are necessary for [[ESCO]] to perform its obligations and exercise under this *Agreement*. [[CLIENT]] shall obtain, or cause to be obtained (in form and substance satisfactory to [[ESCO]]) non-disturbance agreements or, if applicable, waivers and/or consents from each of its mortgagees or landlords with respect to all rights of way, access rights, easements, licenses and other property rights which [[ESCO]] requires to perform its rights and obligations under this *Agreement*.

6.2 Any access shall be in compliance with safety, security and operational requirements of [[CLIENT]].

6.3 The *Parties* shall, upon [[ESCO]]'s request, execute a separate agreement, based on the acceptance of the building owner, for the grant of such rights-of-way, access rights, easements, licenses and other rights in relation to the obligations contained in this *Agreement*, especially unobstructed access to the *Solar Thermal Plant.*

7 OPERATIONS

7.1 Within 10 days of commencement of commissioning and start up of the *Solar Thermal Plant*, [[ESCO]] shall operate the *Solar Thermal Plant* for the *Term*. [[CLIENT]] shall ensure that it can

consume all energy generated by the *Solar Thermal Plant* during the commissioning phase (start up – *Acceptance Date*).

7.2 The full operation and generation of energy is estimated to start DD MMMM YYYY. At this date the *Solar Thermal Plant* shall be handed over from the *Installer* to [[ESCO]]. The generated energy will be charged according to the Tariff as set out in Annex VI from the date of the *Acceptance Certificate*.

7.3 The *Operations* shall consist of the following activities of [[ESCO]]:

a. Annual servicing of the *Solar Thermal Plant* in accordance with the respective specifications of the manufacturer; and
b. Maintenance and repair in case of defects of the *Solar Thermal Plant*; and
c. Constant supervision and optimizing of the operation of the *Solar Thermal Plant* via telemonitoring facilities; and
d. Modifications as well as replacement of non-economical parts of the *Solar Thermal Plant* as deemed necessary by [[ESCO]]; and
e. Provision of online data and the input information of the *Solar Thermal Plant* for the educational system of [[CLIENT]]. The monitoring hardware and graphical displays will be provided by [[CLIENT]].

7.4 In case of any works at the *Solar Thermal Plant*, [[ESCO]] shall be entitled to suspend the provision of water heating and water cooling for the period required to conduct such works. If possible, [[ESCO]] shall notify [[CLIENT]] sufficiently in advance of such works.

7.5 The cost of *Operations* shall be borne by [[ESCO]] and are included in the *Fee*. However, the cost for any defect which has not been caused by the willful misconduct or gross negligence of [[ESCO]] shall be paid for by [[CLIENT]].

7.6 [[CLIENT]] shall ensure that [[CLIENT]]'s facilities, its hot and cold water distribution system as well as all *Interfaces* are at all times properly maintained and fully functioning to supply hot and cold water, in order to ensure the performance of the *Solar Thermal Plant*. [[ESCO]] shall ensure that the LST is at all times properly maintained and fully functioning.

7.7 [[CLIENT]] shall provide the following, free of charge, during the *Term*

7.7.1 a connection (Interfaces) and in house distribution system for hot and cold water of sufficient size and quality, properly maintained at all times, for the supply of hot and cold water; and

7.7.2 electrical connectivity which ensures a secure and undisturbed operation of the Solar Thermal Plant; and

7.7.3 sufficient electric energy/power supply to ensure a proper function of all equipment of the Solar Thermal Plant; and

7.7.4 a water supply and discharge system of sufficient size and quality; and

7.7.5 sufficient water for re-cooling the cooling towers of the Solar Thermal Plant. The demand will be between 8 – 10 liters per kWh cooling production Solar Thermal Plant.

7.7.6 water for the filling of the Solar Thermal Plant; and

7.7.7 all necessary permissions and approvals in the country for the operation of the Solar Thermal Plant as a user

7.7.8 a data link with continuous internet access for the supervision of the Solar Thermal Plant.

7.8 Details are set out in Annex I and II and VI (consumption figures).

8 SUPPLY AND CONSUMPTION OF SOLAR ENERGY

8.1 [[ESCO]] undertakes to provide an annual minimum amount of solar energy equal to the *Minimum Off-Take*. If in any year [[ESCO]] should not be able to provide the *Minimum Off-Take* for reasons [[ESCO]] is responsible for, [[ESCO]] shall be obliged to optimize the *Solar Thermal Plant* over a period of three (3) years.

8.2 [[CLIENT]] undertakes to consume all energy generated by the *Solar Thermal Plant* and provided at the agreed *Interfaces*.

8.3 If [[CLIENT]] is not able, for operational reasons, to take all the energy provided by the *Solar Thermal Plant*, [[CLIENT]] shall be obliged to pay for the *Minimum Off-Take* at the then relevant *Fee*.

8.4 [[CLIENT]] shall, as a back-up, operate its own energy system for cooling and hot water which shall provide energy if and to the extent the energy provided by the *Solar Thermal Plant* is not sufficient to cater for [[CLIENT]]'s needs.

8.5 The *Metering Equipment* as per [country/institution] standard shall be installed and maintained by [[ESCO]] and remain, during the *Term*, the property of [[ESCO]]. All quantities of energy measured at the meter are considered consumed by [[CLIENT]].

8.6 All *Metering Equipment* calibrated to kWh (heat meter) will be tested and calibrated by [[ESCO]] periodically in accordance with the manufacturer's instructions and good industry practice and standards. Test and calibration records will be issued to [[CLIENT]] upon request. Further, [[CLIENT]] may request additional meter tests at any time; provided, however, if a meter is subsequently found to have a variance for accuracy in accordance with EN 1434 (European Standard for heat meters) or adequate country's regulation, [[CLIENT]] will bear the cost of such testing. The country's standards if available shall prevail.

9 FEES

9.1 The fee for the provision of hot water shall consist of a monthly base price and an operating price and shall be calculated in accordance with Annex VI.

9.2 The fee for the provision of cooling water shall consist of a monthly base price and an operating price and shall be calculated in accordance with Annex VI.

9.3 The *Fee* shall be adapted on a semi-annual basis in accordance with the formula set out in Annex VI.

10 PAYMENT

10.1 The *Fee* is net of any taxes, duties or other disbursements, which shall be borne by [[CLIENT]]. However the invoice, stipulating the fee, will include GST, which is payable by [[CLIENT]].

10.2 [[ESCO]] shall issue invoices on a monthly basis. The invoices shall be based on the projected annual off-take of hot and cooling water and the prevailing energy prices. Details are set out in more detail in Annex VI.

10.3 Payments shall be due and payable within 14 days from the date of invoice. In case of delayed payments, interest of 10% above [LIBOR/EURIBOR] shall accrue on a daily basis.

10.4 Within 28 days after the end of each calendar year [[ESCO]] shall provide [[CLIENT]] with an overview of the quantities consumed during the previous year and the respective fee ("Annual Account"). The difference between the payments invoiced during the previous year and the payments calculated based on actual consumption shall be accounted for in the invoice of the month following the provision of the Annual Account.

10.5 Objections against the Annual Account may be raised by [[CLIENT]] within a period of thirty days of receipt of the Annual Account. Thereafter the Annual Account is considered approved.

10.6 [[ESCO]] shall be entitled to demand a pre-payment of the *Fee* up to an amount of two monthly payment rates if payments have been overdue for more than twenty days.

10.7 In case of any damage of the metering equipment [[ESCO]] is entitled to bill on the basis of the *Minimum Off-Take* in respect of the time quantities have not been measured correctly.

11 TERM AND TERMINATION

11.1 This *Agreement* shall be in full force and effect and be legally binding upon the *Parties* and their permitted successors and assigns as of the date hereof and shall remain in effect for a term of twenty (20) years as of the *Acceptance Date* ("*Initial Term*"). After this time this *Agreement* can be extended by mutual agreement at terms to agreed at that time.

11.2 This Agreement may be terminated in writing by registered letter with immediate effect by [[ESCO]]:

11.2.1 if [[ESCO]] is prevented, by [[CLIENT]] or any party claiming rights to [[CLIENT]]'s facilities or the land to which such facilities are attached, from accessing [[CLIENT]]'s facilities and the Solar Thermal Plant and conducting the Operations for a period of no less than two (2) weeks, and [[CLIENT]] has, after being officially informed about such restrictions, not removed such restrictions within a period of two (2) months; or

11.2.2 if payments are overdue for more than three (3) months; or

11.2.3 if [[CLIENT]] does not sign the Deed on or before DD.MMM YYYY.

11.3 This *Agreement* may be terminated in writing by registered letter with immediate effect by either Party, if

- the other Party commits a material or persistent breach of any of its obligations under this *Agreement* and (in the case of a breach capable of being remedied) does not remedy such breach within 30 days of receiving from the other Party written notice of the breach and a request to remedy the breach.
- distress or execution is levied on the other Party's property or if the other Party has a receiver, administrator, administrative receiver or manager appointed over the whole or any part of its assets, becomes insolvent, compounds or makes any arrangement with its creditors, commits any act of bankruptcy, is wound up or goes into liquidation, or if the other Party suffers any analogous proceedings under foreign law

12 RIGHTS AND OBLIGATIONS AFTER TERMINATION

12.1 In case of termination by [[CLIENT]], [[CLIENT]] shall be entitled to (1) either purchase the Solar Thermal Plant at its book value, including cost of financing and further investments as determined in accordance with VDI 2067, if [[ESCO]] could not nominate a successor in title, who undertakes to take over the full obligation (professional operation and maintenance of the LST) of this Agreement, or (2) have the Solar Thermal Plant removed at no cost to [[CLIENT]].

12.2 In case of termination by [[ESCO]], [[ESCO]] shall have the option to (1) sell and [[CLIENT]] shall be obliged to purchase the *Solar Thermal Plant* at its book value, including cost of financing and further investments as determined in accordance with VDI 2067 plus the *Fee* for the *Minimum Off-Take* calculated until the end of the Initial *Term* ; or (2) to remove the *Solar Thermal Plant* from [[CLIENT]]'s facilities with all costs of removal to be borne by [[CLIENT]]. In case of termination by [[ESCO]] under clause 11.2.2, [[CLIENT]] shall be obliged to reimburse all cost incurred by [[ESCO]] in relation to the engineering, installation and equipment up to the date of termination.

12.3 At the end of the Initial *Term* or any extension thereof, [[ESCO]] shall have the choice to either sell the *Solar Thermal Plant* to [[CLIENT]] at its book value, including cost of financing and further investments as determined in accordance with VDI 2067or to remove it from [[CLIENT]]'s Facilities.

12.4 Termination shall not affect or prejudice any right to damages or other remedy which the terminating party may have in respect of the event giving rise to the termination or any other right to damages or other remedy which any party may have in respect of any breach of this *Agreement* which existed at or before the date of termination.

13 [[ESCO]]'S WARRANTIES

13.1 [[ESCO]] warrants that the Solar Thermal Plant will be new, of good quality and of latest state of art of LST systems.

13.2 During installation and building the Solar Thermal Plant [[ESCO]] shall ensure that Installer shall follow strictly the local laws and regulations.

13.3 [[ESCO]] warrants that the *Solar Thermal Plant* during the *Term*, will provide the annual *Minimum Off-Take* quantities, if [[CLIENT]] fulfils its obligations under clause 3 and the *Operations* were not hindered for reasons of Force Majeure or third party's actions or inactions. The sole remedy for breach of the warranty under this clause 13.3 shall be correction of defects by [[ESCO]] within a reasonable time from notification by [[CLIENT]] of the defect.

13.4 The above warranties are in lieu of all other express or implied warranties or conditions including, but not limited to, implied warranties or conditions of merchantability and fitness for a particular purpose. [[ESCO]] specifically denies any implied or express representation that the *Solar Thermal Plant* will be fit

13.4.1 to operate in conjunction with any other *Interfaces* than those identified in the *Documentation* or

13.4.2 to operate uninterrupted or error-free.

13.5 Any unauthorised modifications, use or improper installation of the *Solar Thermal Plant* by [[CLIENT]] shall render all the [[ESCO]]'s warranties and support obligations null and void.

13.6 Subject to clause 13.7, [[ESCO]] shall defend, hold harmless and indemnify [[CLIENT]] against all loss, damage, claims, liabilities, fees, costs and expenses arising out of any action brought against [[CLIENT]] based on a claim that the *Solar Thermal Plant* infringes any intellectual property right of any third party, provided that:

- [[ESCO]] is notified promptly in writing of any such claim;
- [[CLIENT]] makes no admission or settlement of such claim without [[ESCO]]'s prior written consent;
- [[ESCO]] has sole control of the defence and any negotiations for compromise; and
- [[CLIENT]] provides, at [[ESCO]]'s expense, such assistance as [[ESCO]] reasonably requires.

13.7 If the *Solar Thermal Plant* becomes or, in the opinion of qualified legal counsel, is likely to become, the subject of any such claim, [[CLIENT]] will permit [[ESCO]] to replace all or part of the *Solar Thermal Plant* without any charge to [[CLIENT]]; and/or to modify the *Solar Thermal Plant* as necessary to avoid such claim; and/or to procure for [[CLIENT]] a licence from the relevant complainant to continue using the *Solar Thermal Plant*.

13.8 [[ESCO]] shall have no liability for any claim of intellectual property infringement resulting from any unauthorised modification of the *Solar Thermal Plant***.**

14 [[CLIENT]]'S WARRANTIES

14.1 [[CLIENT]] warrants to provide [[CLIENT]]'s facilities fit for the installation of the *Solar Thermal Plant*, provide all *Interfaces* for such installation and to procure and pay for its requirements of water heating and cooling energy in accordance with this *Agreement*.

14.2 [[CLIENT]] warrants not to remove, alter (except as otherwise required or permitted under this *Agreement*) or assign, pledge, mortgage, permit any lien to exist on the *Solar Thermal Plant*.

15 LIABILITY

15.1 To the extent not covered by the insurances described under clause 16.1, [[ESCO]]'s entire liability under this *Agreement* or for any cause of action related to the *Solar Thermal Plant* shall be limited to EUR X,000,000. [[ESCO]] shall not be liable for any incidental, special, direct or consequential damages of any nature, including lost profits and opportunity costs in connection with or resulting from performance or non-performance of their respective obligations under or in connection with this *Agreement*.

15.2 The exclusions in this clause 15 shall apply to the fullest extent permissible at law, but [[ESCO]] does not exclude liability for death or personal injury caused by the negligence of [[ESCO]], its officers, employees, [[ESCO]]s or agents for fraud or any other liability which may not be excluded by law.

16 INSURANCE

16.1 During construction and until *Acceptance Date* [[ESCO]] shall maintain or have maintained such insurances as are required by [the national authorities] to cover the liability of [[ESCO]] in respect of personal injuries or death or damage to property and caused by any negligence, omission, breach of *Agreement* or default of the [[ESCO]], his servants or agents or any person employed or engaged upon or in connection with the installation of the *Solar Thermal Plant*. Furthermore [[ESCO]] shall maintain an insurance to cover the liability of [[ESCO]] in respect of personal injuries or death or damage to property and caused by the operation of the *Solar Thermal Plant*.

16.2 Upon *Acceptance Date*, [[CLIENT]] shall insure and keep insured during the *Term* the *Solar Thermal Plant* in the joint names of [[CLIENT]] and [[ESCO]] against all damage, loss or injury from whatever cause arising up to the value determined by [[ESCO]]. Such insurance shall be effected with an insurer in terms approved by [[ESCO]]. In the event that [[CLIENT]] defaults in taking out or maintaining such insurance policies as aforesaid, [[ESCO]] (without prejudice to any other rights or remedies available) may itself insure against any risk in respect of which the default has occurred and any amount paid by it in respect of premiums shall be recoverable from [[CLIENT]].

17 FORCE MAJEURE

17.1 Neither [[CLIENT]] nor [[ESCO]] shall be in default in respect of any obligation under this *Agreement* if the Party is unable to perform its obligation by reason of an event of Force Majeure, provided that the suspension of performance shall be commensurate with the nature and duration of the event of Force Majeure and the non-performing party is using its best efforts to restore its ability to perform.

17.2 Force Majeure shall mean any event that prevents or delays a Party from performing in whole or in part any obligation arising under this *Agreement* and neither was within the reasonable control of the non-performing Party nor could have been prevented by reasonable actions taken by the non-performing Party, including, without limitation, an act of God, explosion, fire, lightening, earthquake, storm, civil disturbance, strike, lock-out, changes in law, orders of governmental authorities, and equipment failures that are not due to the negligence of the non-performing party.

18 ASSIGNMENT

18.1 Neither Party shall assign this *Agreement* without first having obtained the written consent of the other Party, provided, however, that either Party may assign its rights and delegate its duties hereunder without first obtaining the other Party's consent to any subsidiary or affiliated entity controlled by the assigning party, on the condition that the assignee agrees in writing to assume all of the obligations of the assigning party hereunder.

19 NOTICES

19.1 Any notice required to be given under this *Agreement* shall be sufficiently served if sent by facsimile (subject to confirmation of receipt by the receiving Party), telegram, registered post,

courier or hand and addressed to the principal or registered office of the Party to be served. Any such notice shall be deemed to have been received and given at the time when in the ordinary course of transmission it should have been delivered at the address to which it was sent. However, all official court related process shall be served according to the Rules of Court.

19.2 The initial point of contact shall be as stated in clause 0.

20 CONFIDENTIALITY

20.1 Each of the *Parties* shall treat as confidential all *Confidential Information* of the other Party supplied under or in relation to this *Agreement*. No Party shall divulge any such *Confidential Information* to any person except to its own employees and then only to those employees who need to know the same. Each Party shall ensure that its employees are aware of, and comply with, the provisions of this clause.

20.2 The foregoing obligations shall remain in full force and effect notwithstanding any termination of this *Agreement*.

21 PROMOTION

21.1 The *Solar Thermal Plant* and its utilization by [[CLIENT]] may be used by both *Parties* as a reference project towards third parties. The *Parties* therefore shall undertake all reasonable endeavors to support each other's requests for the presentation of the *Solar Thermal Plant*.

21.2 Both *Parties* agree that each can make use of the LST at [[CLIENT]] facilities for advertising and public relations purposes like: pictures, videos, internet links, visitors of potential clients, etc. However [[CLIENT]] retains the control of visitors, but the permission to visit the LST together with prospective [[ESCO]] clients should not be unreasonably withheld.

22 WAIVER

22.1 No right under this *Agreement* shall be deemed to be waived except by notice in writing signed by the waiving Party. The failure of either Party to enforce, at any time or for any period of time, the provisions hereof or the failure of any Party to exercise any option herein shall not be construed as a waiver of such provision or option and shall in no way affect that Party's right to enforce such provisions or exercise such option. No waiver of any provision hereof shall be deemed a waiver of any succeeding breach of the same or any other provision of this *Agreement*.

23 ENTIRE AGREEMENT, ORDER OF DOCUMENTS

23.1 The Agreement constitutes the entire agreement between the Parties with respect to the matters contained herein and replaces any previous document, agreements and commitment whether oral or written. No amendment or modification hereof shall be binding unless duly executed by both Parties. In case of any discrepancies between this Agreement, its Annexes and the Documentation, the Agreement shall have priority over the Annexes and the Annexes shall have priority over the Documentation.

24 SEVERABILITY

24.1 Any provision hereof that is prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction and to the fullest extent permitted by applicable law, be ineffective to the extent of such prohibition or unenforceability without invalidating the remaining provisions hereof and without affecting the validity or enforceability of any provision in any other jurisdiction.

25 COUNTERPARTS

25.1 This *Agreement* may be executed in separate and several counterparts, each of which shall be deemed an original and all of which shall constitute one and the same instrument.

26 THIRD PARTY RIGHTS

26.1 This *Agreement* and the documents referred to in it, are made for the benefit of the *Parties* to them and their successors and permitted assigns and are not intended to benefit, or be enforceable by, anyone else.

27 AUTHORITY

27.1 Each party warrants that it has full capacity and authority, and all necessary licenses, permits and consents to enter into and perform this *Agreement* and that those signing this *Agreement* are duly authorized to bind the Party for whom they sign.

28 APPLICABLE LAW

28.1 This *Agreement* shall be construed in accordance with and shall be enforceable under the laws of Singapore.

29 DISPUTE RESOLUTION

29.1 Any dispute arising out of or in relation to this *Agreement* shall be referred to and finally resolved by arbitration in [COUNTRY] in accordance with the Arbitration Rules of the [Arbitration Authority] for the time being in force which rules are deemed incorporated by reference to this Clause. The Tribunal shall consist of three arbitrators. The decision of such Tribunal shall be final and binding upon the *Parties*. The language of the arbitration shall be English.

30 CORRESPONDENCE & REGISTERED ADDRESS

All the correspondence, invoices, credit or debit notes, etc., must be issued in the name of [[CLIENT]] must be addressed to:

[[CLIENT, FULL NAME]]
Address
Address
ZIP Code, Town
Email: name@domain.suffix
Tel: +xx yyy zzzzzzzz Mobile: +xx yyy zzzzzzzz Fax: +xx yyy zzzzzzzz

All the correspondence with [[ESCO]] must be duly identified with either of the ESCo *Agreement* or related references and addressed to:

[[local SOLID ESCO subsidiary, full name]]
Address
Address
ZIP Code, Town
Email: name@domain.suffix
Tel: +xx yyy zzzzzzzz Mobile: +xx yyy zzzzzzzz
Fax: +xx yyy zzzzzzzz

IN WITNESS WHEREOF the *Parties* have caused this *Agreement* to be duly executed and delivered as of the date and day first above written

…… ……
Date, Place Date, Place

…… ……..
[[local ESCO, full name]] [[CLIENT, FULL NAME]]

31 Annex I. GENERAL CONSTRUCTION OBLIGATION OF [[ESCO]]

[[ESCO]] shall, with due care and diligence, design, execute and complete the *Solar Thermal Plant* fit for Acceptance as detailed in Annex IV. [[ESCO]] shall provide all superintendence, labour, Plant, Construction Equipment, materials, goods and all other things, whether of a temporary or permanent nature required in and for such design, execution and completion of the *Solar Thermal Plant* as per Clause 3 of this *Agreement* and shall remedy any defects.

Without prejudice to the generality of paragraph (1) of this sub-clause, and to [[ESCO]]'s obligations under the *Agreement*,

a. [[ESCO]] shall be fully responsible for the design of the *Solar Thermal Plant*, and shall complete the design in accordance with [[CLIENT]]'s plans

b. [[ESCO]] shall be fully responsible for the choice of materials, goods, plants, workmanship to enable the *Solar Thermal Plant* to be constructed and completed and/or be fully operational in accordance with [[CLIENT]]'s plans;

c. [[ESCO]] shall be fully responsible for the preparation, development and coordinating of all design *Solar Thermal Plant* and construction at all stages of the *Solar Thermal Plant* from design stage to completion and use of the *Solar Thermal Plant*, including the obtaining of all necessary licenses and approvals as may be required by the authorities or under any enactment, order, ruling or regulation; except Clause 6 of this *Agreement*;

d. [[ESCO]] shall be fully responsible for the adequacy, stability and safety of the installation of the LST ;

31.1 Employment of Qualified Personnel

The [[ESCO]] shall engage suitably qualified installer/personnel as required by relevant applicable laws to install the Solar Thermal Plant. All fees, costs and expenses so incurred by [[ESCO]] shall be deemed to be included in the Agreement Sum.

Where an Accredited Checker or Registered Inspector is required for the Solar Thermal Plant, they shall be engaged by [[CLIENT]].

No person shall be engaged by [[ESCO]] if [[CLIENT]] on reasonable grounds objects to the engagement of such qualified personnel, in which event [[ESCO]] shall promptly nominate and engage other suitably qualified personnel.

31.2 Sufficiency of Solar Thermal Plant

The [[ESCO]] shall be deemed to have satisfied himself before submitting the documentation as to the correctness and sufficiency of the *Solar Thermal Plant*, which shall be deemed to cover all his obligations under the *Agreement* and all matters and things necessary for the proper design, execution, completion and operation of the *Solar Thermal Plant*.

The [[ESCO]] shall be deemed to have reviewed all of the *Agreement* and have satisfied himself that the drawn and written information provided in the *Agreement* are sufficient and adequate to enable him to prepare, complete and bring the [[ESCO]]'s *Solar Thermal Plant* to full completion in accordance with the *Agreement*..

31.3 Design, Specifications and Other Information

[[ESCO]] shall design and provide all necessary specification for the *Solar Thermal Plant* in accordance with the site plans and requirements of [[CLIENT]]. Any design detail, plan, drawing, specification, note, annotation and information required shall be provided by [[ESCO]] in such sufficient format, detail, extent size and scale and within such time as may reasonably be required to ensure effective execution of the *Solar Thermal Plant* and/or as otherwise required by [[CLIENT]]. An overall view of [[ESCO]] concept/design is shown in the enclosed Hydraulic scheme.

31.4 Prior Written Acceptance

[[ESCO]] shall make any material deviation, alteration, addition and/or omission from the accepted design without the prior acceptance in writing by the [[CLIENT]], if it turns out that such alteration is more economical or technically feasible and to the benefit for the parties. Any acceptance or approval by [[CLIENT]] of such submission shall not relieve or in any way limit the responsibility of the [[ESCO]] under the *Agreement*.

31.5 HYDRAULIC SCHEME

32 Annex II. GENERAL OBLIGATION OF [[CLIENT]]

In addition to the obligations and responsibilities of [[CLIENT]] as stipulated in this *Agreement* the following precautions, preparations, coordination, supplies, etc., shall be provided in time by [[CLIENT]]:

1) The in-house ACMV installation must be designed, installed (of state of the art) and in accordance with international standards (Comparable to DIN, ISO, EU standards).

2) Adequate space for the technical rooms (for the solar components, equipment and control units) must be given and allocated for the solar system, provided that these required spaces are requested from the [[CLIENT]] at the earliest possible time.

3) Statics Requirements

    a. Design, supply and mounting of the supporting structures for the installation of the collectors, cooling machine and the cooling tower.

    b. The statics requirements are to be checked by the [[CLIENT]].

    c. The exact weight and size of the above mentioned components will be submitted during detailed engineering phase.

    d. Foundation must be adequate for storage tanks, cooling machine, cooling tower and other heavy equipment.

4) The dimensioning of individual foundations must be in accordance with local building laws and regulations, which shall be carried out by a qualified engineer provided by the [[CLIENT]]. The location of the foundation blocks will be nominated by [[ESCO]].

5) The cranes and operators shall be allocated by [[CLIENT]] to [[ESCO]] for the installation of the collectors (lifting devices, tools and tackles to position chiller and other heavy equipment), in accordance to the time schedule as specified in Annex III.

6) Delivery and mounting of substructure and elevation for collector field.

7) All material for back-filling of pipe trenches

8) Gas connection for preparing domestic hot water backup system.

    a. A gas connection system and an adequate chimney has to be provided by [[CLIENT]]

    b. [[ESCO]] shall be informed in written form by [[CLIENT]] about the type of gas (i.e. liquid gas: propane, butane, or natural gas etc).

9) Allocation of shafts/ducts/trenches for the risers from the roofs to the technical rooms.

10) Distribution system of chilled water:

a. Provision of the whole pipe work after the chilled water pump unit (Pump unit 3).

11) Distribution system of domestic hot water.

a. Provision of the inflow of the cold water pipe into the hot water tank and the outflow of the hot water pipe to the distribution system.

12) Continuous internet connection near the control unit shall be made available.

13) The [[CLIENT]] has to provide the followings for remote monitoring:

a. Network access for internet
b. Broadband access, minimum 56k/bps
c. Dynamic IP address
d. Electricity supply

14) Installation of the power connection for the cooling machine and the pumping groups (wattages will be submitted after detailed engineering and procurement phase).

15) Water supply

a. To supply all utilities, water, personnel (maintenance group) for filling the entire solar system (tanks, pipes, collectors, etc) with water for testing and commissioning of the LST under the supervision of the [[ESCO]].

16) Water treatment

a. The supply of fresh water has to be treated chemically by [[CLIENT]] before it flows into the re-cooling system.

b. [[ESCO]] will take care of the biological treatment after the re-cooling system. (According to EU standards, a biological water treatment is needed after the cooling tower due of the settlement of bacteria in the re-cooling system.) All costs of such treatment shall be borne by [[CLIENT]]

17) Allocation of potential equalizing bar, according to the [COUNTRY] law and regulations.

18) Lightning protection system (if needed according to [COUNTRY] law).

19) Fire preventions as required by [COUNTRY] law.

20) Precautions, proper design of drainage systems in the technical rooms. Special requirements and data will be submitted by the [[ESCO]] during detailed engineering phase.

33 Annex III. TIME TABLE & MASTERPLAN

33.1 Time table

The below timetable only indicates the projected milestones according to the current progress of the project.

Table 1. Synopsis of Milestones and Responsibilities

Milestone	Start Date	End Date	Prerequisite Conditions	Responsible Company
Approval of ESCO Agreement			[[CLIENT]]	[[CLIENT]]
Coming into force ESCo Agreement			Deposit transfer [[CLIENT]]	[[CLIENT]]
Start of installation (Piping)			Coming into force of ESCo *Agreement*, Receipt of Deposit	
Start Procurement of Equipment			Coming into force ESCo *Agreement*	
Delivery of Equipment			Coming into force LoI/ESCo A	
Readiness of Technical Room, Roof Steel Structure & Grand Stand			Acceptance of	[[CLIENT]]
Installation of Equipment & Collectors			Acceptance of	
Function-Test, Start up LST			Testing Filling LST	
Adjusting Optimizing LST (Energy generating)			TOP	
Start up & Performance Tests LST			Functioning & Performance Test LST	
Readiness to Supply Heat & Cold			Readiness of Heat & Cold Distribution System	
Continuous Energy Generating & Delivery			[[CLIENT]]	

33.2 Master Plan of General Contractor

Herewith also is enclosed in this Annex as reference the entire installation plan (Master Plan Rev. XXX) provided by the *General Contractor*, for the [[CLIENT]]'s project.

….

34 Annex IV. PERFORMANCE DATA

The enclosed monthly yield data stipulates the performance of the *Solar Thermal Plant*. During commissioning period the calibrated heat meters (metering equipment) will be jointly inspected and the below list of monthly yield now in MBTU shall be converted according to the units displayed at the heat meters as well as recorded in the control system.

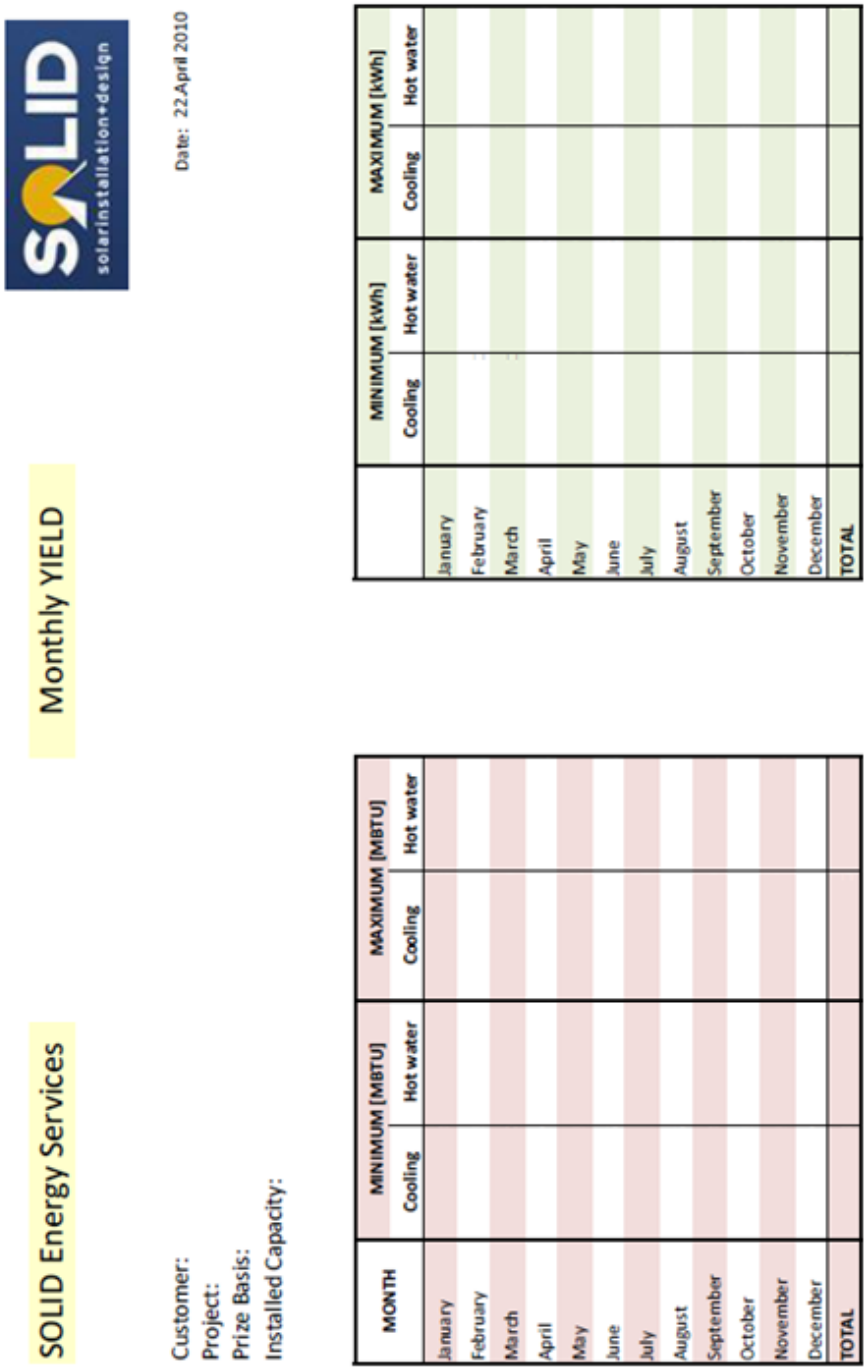

Table 1 Monthly Yield of LST

34.1 Test Procedure, Start-up, Consumption of produced Energy, Optimizing

a) Commissioning
Immediately after completion of the installation (also partly) of LST, the *Installer* will carry out the cleaning and testing. [[CLIENT]] representatives will have the right to participate during Commissioning of the LST at [[CLIENT]] Campus. During the filling, the *Installer* will carry out mechanical functional test of each individual equipment (pump, control valve, motor, control system, etc.) installed and also perform the leakage and tightness tests of the hydraulic system. The Commissioning Period shall be approximately 3-4 months.
After the Commissioning, the LST will be started up and put into operation and all necessary parameters and data for the normal operation to generate Energy shall be met according to estimated average yield as set out in Table 1 under this Annex.

b) *Acceptance Test*s
The *Acceptance Test*s shall be conducted by *Installer* under the supervision of [[ESCO]] International GmbH/Austria. The *Acceptance Test*s shall comprise of a functional test and tests of individual parts of the equipment and/or units of the LST (AC & DHW). The test procedure of the *Acceptance Test*s will be worked out jointly with [[ESCO]] and the *Installer*. [[CLIENT]] will be timely invited to be a witness of the Acceptance test.

After the *Acceptance Test*, equipment or parts which have not met the guaranteed values shall be re-calibrated to improve the performance of the LST. In the event that the guaranteed Monthly Yields as per Table 1. are not met due to reasons outside [[ESCO]] control (weather conditions, etc.), it is agreed that *Acceptance Test*s shall be repeated, but the 1. *Acceptance Certificate* shall be not withheld.

The *Acceptance Certificate* for the LST shall be issued to [[ESCO]] and signed by the *Installer* and as a witness by [[CLIENT]] after the Performance Tests are carried out. Please refer to the drafted Forms as per Annex VIII

c) Consumption of produced Energy (heat ,cold)
The stipulated solar yields mentioned are the average energy outputs over a whole year.
The cooling production XXXX kWh/day is the maximum cooling energy output for one day which can be reached by the *Solar Thermal Plant*. If the [[CLIENT]] needs less cooling energy than this maximum output the mentioned average energy output over a whole year as mentioned in the table could not be reached because it has to be considered that on some days you have surplus of usable solar energy. The *Metering Equipment*s are installed as per technical specification and stipulated in the flow Diagrams.
Even if production during maximum solar radiation- very sunny days- is optimal , or in periods with minimum consumption [[CLIENT]] will also utilize the entire solar energy production.

d) Optimizing, Final Performance Data
The Optimizing Period of 3 years for the LST for [[CLIENT]] will start after the completion of the *Solar Thermal Plant* and the full Operation of the LST. All the performance values will be defined jointly with [[CLIENT]] and [[ESCO]] during the optimising period.
It is mutually agreed that Optimizing Period of another 3 years can be extended if the agreed and stipulated Performance Values are not reached in order to enable [[ESCO]] to make

alteration on the *Solar Thermal Plant*, to gain the optimum output of Energy. [[ESCO]] can decide if is necessary to carry out these alteration.

[[CLIENT]] shall issue the Final *Acceptance Certificate* to [[ESCO]] after the 3 years period, and provided that all the stipulated guaranteed data as specified above are met.

The Final *Acceptance Certificate* shall specify all relevant parameters of the LST as stipulated by [[ESCO]].

All forms of protocols, test reports and other documentation during commissioning can be provided by [[ESCO]] upon request to [[CLIENT]]. Samples see Annex VIII.

35 Annex V. VDI 2067

ICS 91.140.01 VDI-RICHTLINIEN September 2000

VEREIN DEUTSCHER INGENIEURE

Wirtschaftlichkeit gebäudetechnischer Anlagen Grundlagen und Kostenberechnung

Economic efficiency of building installations Fundamentals and economic calculation

VDI 2067

Blatt 1 / Part 1

Ausg. deutsch/englisch
Issue German/English

Die deutsche Version dieser Richtlinie ist verbindlich.

No guarantee can be given with respect to the English translation. The German version of this guideline shall be taken as authoritative.

Inhalt Seite

Contents Page

VDI-Gesellschaft Technische Gebäudeausrüstung

VDI-Handbuch Elektrotechnik (TGA)
VDI-Handbuch Raumlufttechnik
VDI-Handbuch Sanitärtechnik
VDI-Handbuch Wärme-/Heiztechnik

Frühere Ausgabe: 12.83; 02.99 Entwurf, deutsch
Former edition: 12.83; 02.99 draft, in German only
© Verein Deutscher Ingenieure, Düsseldorf 2000
Zu beziehen durch / Available from Beuth Verlag GmbH, 10772 Berlin – Alle Rechte vorbehalten / All rights reserved
Vervielfältigung – auch für innerbetriebliche Zwecke – nicht gestattet / Reproduction – even for internal use – not permitted

36 Annex VI. TARIFF

36.1 Fees/Charges

The enclosed Tariffs stipulates the fees and charges invoiced to [[CLIENT]] for energy generated by the Solar Thermal Plant and to be utilized by [[CLIENT]] at the takeover points (interfaces) and measured by the Heat Meters installed at the interfaces. The parameters (Temperature °C and Flow m³) will be stipulated and agreed upon with [[CLIENT]] and [[ESCO]] during project period and/or optimizing. Please refer to the Consumption Calculation Methodology for LST.

Table 1. Summary of Consumption *Fee*s and Capacity Charges

SOLID Energy service, ESCo Cost Scheme TARIFF

Customer:
Project:
Prize Basis:
Installed Capacity:

Date:

TYPE	Production/Consumption min. [kWh]	Production/Consumption max. [kWh]	Fees/kWh [/kWh]	Fees/Charges with MINIMUM consumption ØConsumption Fee [/year]	Fees/Charges with MINIMUM consumption ØCapacity Charges [/year]	Total/year [ ]	NOTES
COOLING							
HOT WATER							
TOTAL							

ESCo Tariff

Summary of annual consumption fees and capacity charges will be calculated according to the actual prevailing values as follows:

Monthly consumption x electric tariffs for AC (published ¼ year by SP), or gas tariffs for DHW (published frequently by City Gas) + capacity charge = Sum Month 1

The total sum (Annual Account) will be compensated by the estimated advance payment paid by [[CLIENT]] of the year xxxx. The difference, if positive will be considered for the coming year estimated advance payment and is payable to an agreed period to [[ESCO]].

The monthly advance payment of the consumption fee and the capacity charges for the forthcoming year will be calculated by the total of the fees and charges from previous year divided by 12.

36.2 These *Fees*/Charges will be adjusted semiannually according **to below set out formulas:**

P_{xxxx} shall mean the prices/values of fee prevailing in the year xxxx
P_{2009} shall mean the prices/values of fee prevailing in the year 2009
CPI_{xxxx} shall mean the prices/values of the Consumer Price Index published by [COUNTRY]Department of Statistics for the year xxxx
CPI_{2009} shall mean the prices/values of the Consumer Price Index published by [COUNTRY] Department of Statistics for the year 2009
ET_{xxxx} or GT_{xxxx} shall mean the prices/values of the Electric Tariff or Gas Tariff published by [COUNTRY UTILITY] , quarterly for the year xxxx
ET_{2009} or GT_{2009} shall mean the prices/values of the Electric Tariff published by [COUNTRY UTILITY] or Gas Tariff published by City Gas respectively, quarterly for the year 2009

Consumption *Fees*:

$P_{ET\ xxxx} = P_{2009} \times ET_{xxxx}/ET_{2009}$
$P_{GT\ xxxx} = P_{2009} \times GT_{xxxx}/GT_{2009}$

Capacity Charges:

$P_{ET\ xxxx} = P_{2009} \times CPI_{xxxx}/CPI_{2009}$

36.3 Example Equation: (for electricity)

2009 Consumption *Fee* $P_{2009} = 243.908 \times 0{,}22_{2009}/0{,}25_{2008} = 214{,}639$
2009 Capacity Charges $P_{2009} = 369{,}740 \times 100_{2009}/99{,}4_{2008} = 371{,}971$
Total 2008 613,648 "$, €, etc" Total 2009 586,610

36.4 **Example Table – Historical Escalation:** (~ annual changes from the year before)

YEAR	Electric Tariff ET Ø (%)	Gas Tariff GT Ø (%)	Consumer Prices Index CPI (%)
2004	- 6	+/- 0	+ 1,4
2005	+ 20	+ 15	+ 0,5
2006	+ 16	+ 10	+ 1,0
2007-09	Energy prices fall due to international economic crises		
2009	Energy prices ~ + 0,5 % of 2006 Energy prices		

36.5 Energy Consumption Calculation Methodology for LST System

The following Table 2 and Table 3 summarize the key figures which will be used for the energy usage calculation. The metering devices will collect the data on an hourly basis and tabulate the performance for a day. The information collected will be compared to a baseline and the differences from the baseline will indicate the performance of the LST system. The baseline for both Table 2 and 3 are derived accordingly to the load requirements as agreed by [[CLIENT]].

36.5.1 Chiller System

For the chiller system, two key metering devices, installed at the interfaces, namely temperature sensors and the flow rate meter (*Metering Equipment*) will be used to provide information on the supplied chilled water from solar to TRANE main chilled water header. The baseline minimum of 5˚C and a flow rate of chilled water of 254m^3/hr will give a refrigerant capacity of 420 t_{ref}

36.5.2 DHW System

A heat meter (*Metering Equipment*) will be used and placed at the outlet of the domestic hot water tank to determine the amount of heat energy being taken up by the campus load. A minimum consumption per day of 15m^3 at 55˚C is granted by [[CLIENT]] and can be alternatively monitored using two temperature sensors and 1 flow rate meter.

Table 2. Proposed Hourly Data Comparison for Chiller System

	Electric Power Use by Chiller System (kW)	Incoming CHW Temperature from Trane (˚C)	Delta Temperature by Solar Chiller (˚C)	Flow Rate (m^3/hr)	Cooling Tonnage Produced (t_{ref})	Chiller Efficiency (kW/t_{ref})
Baseline	142.8	16	5	254	>420	0.34
Measured 1st hour						
Measured X hour						
Total difference from Base						

Table 3. Proposed Hourly Data Comparison for DHW System

	Electric Energy use by DHW System (kWh/hr)	Incoming PUB Temperature (˚C)	Supply Temperature after Heat Exchanged (˚C)	Flow Rate (m^3/hr)	Total Supply of Hot Water produced (m^3)
Baseline	0.273+B*	20	55	5	15
Measured 1st hour					
Measured X hour					
Total Difference from Base					

*0.273kw is the power requirement for distribution of energy to the hot water storage tank, while B will be gas boiler, which will only be activated if there is insufficient heat energy.

36.6 Use of [[CLIENT]] Utilities

This *Agreement* is based on [[CLIENT]] providing the following electricity and water free of charge.

a. Power Consumption

The assumed power consumption (electricity) of the entire *Solar Thermal Plant* is ~15 % of the total solar production (solar yield). The actual power consumption for LST will be recorded in the power meters, which are located at the control panels.

Specific Energy demand to operate the LST: (LST operating at optimum under full load)

Cooling: 0, 3276 kW/t_{ref}

DHW: 1, 2589 kW/m^3

b. Water Consumption

The estimated water consumption for re-cooling of the cooling tower of the *Solar Thermal Plant* is 8 – 10 l/kWh cooling production

Consumption in excess of these figures materially affects the cost effectiveness of the system. If on an annual basis the consumption is more than 10% higher than the figures set out above and in addition the consumption of [[CLIENT]] of energy has been in line with [[CLIENT]]'s user

profile (as attached), then such additional consumption will be calculated at prevailing rates and without additional charges or penalties deducted from the fees and any payments due.

c. List of estimated power consumption of LST equipment

DESCRIPTION	LOCATION	POWER REQUIRED (KW)	actual Power for cooling hot water i.m operation (kW)	Estimate Operating Hours (Hrs)	Estimated Energy Consumption	LOADING (Amp)	STARTING CURRENT (Amp)	POWER SUPPLY
Pump 1 - Solar Circuit	Chiller plant room							
Pump 2 - Heat Medium	Chiller plant room							
Pump 3 - Chilled Water	Chiller plant room							
Pump 4 - Cooling Tower	Chiller plant room							
Pump 5 - Refilling	Chiller plant room							
Pump 6 - Domestic Hot Water	Domestic hotwater plant room							
Pump Unit 7 - Domestic Hot Water	Domestic hotwater plant room							
Pump Unit 8 - DHW back up	Domestic hotwater plant room							
Pump Unit 9 - DHW back up	Domestic hotwater plant room							
Absorption Chiller	Chiller plant room							
Gasboiler	Domestic hotwater plant room							
Cooling Tower Shiwan	Roof Educational Block 1							

ESTIMATED POWER REQUIREMENT		
Σ for Cooling	kW/T_{ref}	0,3276
Σ for DHW	kW/m³	1,2589

Σ kWh/d 690

PREDONDITION are: Chiller capacity
DHW capacity
Climat Condition as per NASA statistic.

Estimated Power Requirement

37 Annex VII. DEED

Deed with xxx to be attached

38 Annex VIII. FORMS OF CERTIFICATES, CHECKLISTS

1) *Acceptance Certificate*

ACCEPTANCE CERTIFICATE

Issued by: _____ Witnessed by: _____

_____ _____

(SOLID)

Place: _____ Date: _____

_____

Applying Standards/Specification: _____

_____

concerning

_____

(Description of Plant and Agreement Nr, drawing Nr:, etc.)

PERFORMACE DATA:

REMARKS: _____

The Large Solar Thermal as tested fulfil the performance as set out in the Agreement and is ready for operation, the optimising of the LST will be performed until _____
This optimising will only be carried out by SOLID solar specialists and requires a full internet access as mentioned in the Agreement.

Finish date of installation: _____

Acceptance Certificate (Draft) 1 SOLID 2009

2) Inspection Certificate

Inspection Certificate

In Accordance with EN – Standard Nr. 12977 – 1

ACTION:	BUILDING UNIT:

Company Name:			
Address:.			
		Tel.	

Material Overview	Product	Type	Details		Copper	Steel	Stainless steel	Brass	Other Material
Collector									
Piping									
Heat Exchanger									
Hot Water Cylinder			capacity	L					
Buffer Tank			capacity	L					
Fittings			capacity	L					
Expansion Vessel			capacity	L					

Plant Settings (* = Control Unit Input)		Type		Max. Temperature	Temperature Difference	Hysteresis = Δ T (off)
User 1* = eg. Domestic Hot Water Tank				°C	K	K
User 2* = eg. Buffer Tank				°C	K	K
User 3* = eg. Buffer Tank				°C	K	K
User 4* = eg. Swimming Pool				°C	K	K
Actual Collector temp.		°C	Cooling function (from)			°C
Actual Outside temp.		°C	Through-flow	design: l/Std	actual: l/Std	
System Pressure at	°C	bar	PrePressure – Expansion Vessel	design: bar	actual: bar	

Thermal Fluid						
Optical Assessment	ق clear	ق brown	ق black	ق cloudy		
Make/Type			Min. Value	Actual		ق flushed
Capacity	Litre	pH-value				ق filtered
Mix ratio	%	Antifreeze for	°C	°C		ق airbleeded

General Plant Assessment			
Collectors clean	ق ok	Pump operation tested	ق ok
Collectors securely mounted	ق ok	Temp. sensors displaying realistic values	ق ok
No condensation inside collector	ق ok	Plant is properly earthed	ق ok
One-way valves	ق ok	Spare thermal fluid available	ق ok
Domestic hot water mixer	ق ok	Anode checked	ق ok

Heat Meter Nr.		Heat Meter Nr.		Heat Meter Nr.	

User has been trained	ق Yes ق No	Maintenance contract	ق Yes ق No
Maintenance Inspection	ق annually ق	every 2 years :	

Tested by		Date	Customer's Signature

INSPECTION CERTIFICATE SOLID 2009

3) Start-Up Checklist

CHECK LIST FOR START UP
LARGE SOLAR THERMAL (LST)

Contract NR: _____ Client Representative: _____
Location/Building: _____ SOLID Representative: _____
Date: _____ Time: _____

	DATA & ACTION							
	Parameter	check	clean	repaired	Date	until	REMARKS	Signature: L SOLID
Check the HYDRAULIC SYSTEM		(Priliminary and secondary circuit) for						
1 Leakage								
2 Pressure								
3 Antifreeze								
4 pH-Value								
5 Optical check								
6 Insulation								
7 Fixing/Installation								
8 Expansion system(prepressure)								
9 Bleeding								
10 Security systems (safety valves)								

Client _____ SOLID _____ _____

PAGE 1

Template for less detailed and much shorter contract is available from IEA-SHC INFO SHEET 45.C.3, available from http://task45.iea-shc.org/fact-sheets.