[Revision of the Preliminary Proposal for Upgrading the Air Conditioning Unit, New Wing, Bio-Medical Building Center for Energy and Environment Research, Rio Piedras, Puerto Rico, February 1979. Prepared by: University of Puerto Rico, U.S. Department of Energy Center for Energy and Environment Research]

CEER P5-24 Revision of the Proposal for Upgrading the Air Conditioning Unit, New Wing, Bio-Medical Building Center for Energy and Environment Research, Rio Piedras, Puerto Rico, February 1979. Prepared by:

1. Purpose and Source of Funds

The purpose of this revised proposal is to describe the requirements to upgrade the Air Conditioning System in the New Wing of the Bio-Medical building, Center for Energy and Environment Research (CEER), Rio Piedras, Puerto Rico; to define the facilities in engineering terms and establish a reasonable budget cost estimate and time schedule, and to recommend an appropriate method of accomplishment. Three main items will be addressed with this proposal:

1. Provide a reliable air conditioning system that will meet the needs of the laboratory and office building.
2. Use the thermal waste heat available from the 50,000 sq ft Solar Photovoltaic Concentrator Array to be installed at the CEER, under a nationwide program sponsored by the U. S. Department of Energy.
3. Upgrade the building envelope and building ventilation and air handling systems to be in accordance with the present energy conservation regulations now being implemented in Puerto Rico.

As a final result of this proposal, a dramatic reduction in operating cost for the air conditioning system in the New Wing of the CEER will be obtained. We propose that the design and construction for this work will be charged to General Plant Project FY-1978 under Sub-program 39-RP.

2. Justification of Basic Needs

A. Evaluation of the New Wing's current air conditioning system.

The air conditioning installation in the new wing of the Center for Energy and Environment Research (CEER) was originally designed in

1968.

Figure E. Power Flow Diagram during Peak Hour Insolation, including Solar Cooling #7, General Information for Economic Analyses

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A. C.B.E.R, New Wing Building Cooling Load Estimates
B. New Wing Cooling Load Profiles
C. Schematic of the Solar Array piping system in Conjunction with the Absorption Chillers
D. Schematic of the Chilled water and Condensing Water Piping system
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Although some energy conservation features were included in the original design, application of more advanced know-how and new technology can reduce the energy consumption in the building significantly. The building houses mainly laboratory facilities and office areas. The actual components of the building envelope are:

Windows: Solar bronze glass (22 percent of wall area).
Walls:
   a) Combination of insulated glass with concrete block back wall.
   b) Concrete with cement plaster.
Roof Areas: Concrete with 2" rigid insulation.

The main component of the actual air conditioning load is the fresh air load. In accordance with the original drawings, 20,600 CFM of outside air is supplied to the building as ventilation. This constitutes 65%...

percent of the total air circulation. The peak design load was 200 TR, and 50 percent of this load was outside air load. A terminal reheat with hot water was included in the original design to maintain room conditions. The existing air conditioning system consists of two chiller units, each having two 60-ton reciprocating compressors and two condenser fan units with a total installed capacity of 240 TR. The chiller provides chilled water to the air handling units and circulating system which comprise the remainder of the air conditioning system.

1B. Evaluating system operation

The fresh air intake to the main air handling unit was blocked in order to reduce the outside air load. Actual building internal conditions, due to this action, are unpleasant because the necessary fresh air for the laboratory hoods enters the building across windows, open doors, cracks, and return duct openings as infiltration with a resulting high humidity room condition. The terminal reheat system is out of service completely. The central chilled water plant is always partially or totally out of service. The four existing compressors are Worthington Model EVCS-S2 and are of poor design. They have had a history of unreliability since first installed, being subject to multiple internal breakdowns causing complete destruction of their interior mechanisms. This has resulted in partial or complete loss of chilled water for the system, for periods of three to four months while parts were procured and repairs made. The maintenance history of this plant shows that on average two compressors have been down continuously, awaiting spare parts and repair over the past five years. Major plant breakdowns occurred in 1972 and in 1976 when all compressors were down for a period of four months each due to compressor failure. At that time, it was necessary to augment the system with window type air conditioners in laboratories where temperature-humidity sensitive equipment was being used. The compressors have required the

The constant service of an air conditioning mechanic and the expenditure of large sums of money for maintenance and replacement parts have been necessary to keep the system operational over the past six years. Maintenance problems have been compounded by the fact that the compressors are no longer manufactured, making spare parts difficult to find.

The following is a breakdown of expenditures made by the C.E.E. from operating funds to keep the chiller unit operational:

Fiscal Year	Materials & Supplies	Air Condition Mechanic
1972	$ 9,100	
1973	$ 9,200	
1974	$ 9,100	
1975	$ 9,200	
1976	$ 9,100	
1977	$ 4,500	
Total	$39,600	$50,000
Grand Total	$69,600	

The annual cost of maintenance of this unit has taken such a large portion of the maintenance budget for the Bio-Medical building that it has been necessary to cut back on essential maintenance of the physical plant in order to have sufficient funds to keep the chiller unit operational. It is not considered economical or feasible to keep expending large amounts of money to repair a chiller system which is of inherently poor design and incapable of reliable operation.

The real loss is to the laboratory and treatment areas for the Nuclear Medicine Programs which require a continuous and reliable source of air conditioning in order to promote scientific research and patient comfort.

Electric energy consumption of the existing central chilled water plant. An estimate of more than 40,000 kWh per month is actually used to operate just the central chilled water plant in the New Wing of the C.E.E. This electric energy with a total cost of more than $2,800.00 per month is

used to operate a non-reliable system with the result of an uncomfortable environmental condition inside the building.

III. General Description of the Proposed Revision

A. Building upgrade for energy conservation. In order to reduce the air conditioning load the following energy conservation measures seem to be imperative and are strongly recommended:

1) Provide all glass areas with shock tint solar control.

Refrigeration work will be 197,750 TR x Hi/year of 697,941 mat.

© Concentrating Photovoltaic for the land and its journey to the 104 revision. This project consists of a Solar Photovoltaic Concentrator Application for the Commonwealth of Puerto Rico. The application is unique in several aspects. First, it represents a total energy system designed to provide the electrical, cooling, and thermal energy requirements for the Center for Energy and Environment Research (CEER), as well as the hot water needs of the adjacent Oncological and University in San Juan. Second, the application is a collaboration. The project team consists of the Energy Office of the Commonwealth of Puerto Rico, the Center for Energy and Environment Research of the University of Puerto Rico, TEAM Inc., BHMG/Engineers, the AA Corporation, and Solarex Corporation.

The proposed system consists of an 8 20/1 concentrating first stage and a compound parabolic second stage that produces hot water at 190°F. The total peak power demand of the CEER is about 425 KW. The majority of the load is for air conditioning (~85%). The electric and thermal energy generated by the photovoltaic array will be used to run a 70-ton electric direct expansion split system and power a 120-ton absorption chiller respectively to meet the air conditioning demand of the CEER, and to supply the hospitals with 110°F hot water.

The photovoltaic array will be interfaced in parallel with the utility (PRWRA) power grid through a low commutated inverter, supplying electrical power when there is insufficient solar radiation. Excess power generated on holidays or otherwise will be fed back into the grid and credited to the CEER. This mode of operation eliminates the large investment and maintenance costs associated with conventional batteries, providing a practical solution that addresses the technical, environmental, and social issues involved in fostering widespread adoption of photovoltaic power systems.

D. Conceptual design schematic: In the solar collector piping diagram (Attachment #3), all

Elements indicated by single lines are parts of the photovoltaic project. These are: CS SCR ACRE photovoltaic collector array, hot water storage tank, solar collector water recirculation pump, solar collector supply lines, solar collector return lines, air cooled flute cooler, steam heating coil, surge tank and hot water services to hospitals. All elements indicated by double lines in the same diagram, as well as all elements included in the chilled water and condensing water piping diagram (Attachment #4) are parts of note NE-2 POA P22 in this revision. These are: absorption chiller #1, absorption chiller #2, hot water supply pump, hot water supply pump, hot water supply lines, hot water return line, cooling tower condensing water pump, condensing water pump, chilled water supply lines.

GM = chilled water return lines, CR = condensing water supply lines, CR = condensing water return lines, ACRCH = air cooled reciprocating chiller. To provide a reliable system, two (2) backup units are included as follows:

1. A steam heating coil (SU) will be included as part of the Photovoltaic project inside the hot water storage tank (HH) to provide hot water services to hospitals in case of any failure in the solar array hot water system. This steam heating coil will also provide the backup for the absorption air conditioning system when necessary.

2. One single air cooled reciprocating chiller (ACRCH) will be included as part of this project to provide the backup based on electric energy in case of a failure in any of the absorption chillers or in the steam supply to the area.

F. Alternatives in case the Photovoltaic Project is not funded: In the case CHER does not receive the funding for the solar project, the absorption chiller will be operated via a direct connection to the steam lines of the Medical Center. The existing steam distribution lines of the Central Steam Plant provide a simple connection port close to the location of the proposed absorption chillers. In this case, a small modification of the generator will be required.

It is necessary to operate the absorption chillers with steam. The use of absorption chillers energized by a steam supply from a large central steam plant is standard in the mainland U.S. The existing central steam plant at the Puerto Rico Medical Center is one of the largest in the Caribbean and has plenty of excess capacity available.

210. The absorption chillers' capacity will go up to 140 TR each when operated by direct steam. With this alternative, a single absorption chiller will be able to handle the air conditioning load of the New Wing. The second unit will be ready for backup purposes. In addition, the reciprocating chiller (AcRGH) will provide a second backup in case of a failure in the steam supply to the area. Based on the actual cost the Medical Center charges CEER for the steam, the use of electrical cooling systems is generally more cost-effective than using steam systems. However, for large uses of

steam, a new contract can be negotiated with the Medical Center to obtain a lower cost for the purchased steam.

System Main Components and Their Location:

The main components of the photovoltaic project and of this project are shown in the plan of Attachment #5. The absorption chillers (AcH-1 and AcH2), the hot water supply pumps (P2-1 and P2-2), all the controls for the chilled water system and the condensing water system will be located inside the existing machine shop building in an area to be prepared for this purpose. The cooling tower (CT), the condensing water pumps (P3-1 and P3-2), and the air-cooled reciprocating chiller will be located inside the existing chiller.

Thermal Energy Available from the Photovoltaic Array to Operate the Absorption Chillers:

1. Peak Hour Considerations: As indicated in the Energy Flow diagram of Attachment #6, the thermal power available from the collector array at the peak average hour is 1021 Kw (3.47 x 108 BTU/h). If the proposed solar cooling system is utilized, 594 Kw of this thermal power can be used to operate the absorption.

Breakdown of 0.70. This is 1120 of the peak hourly air conditioning load indicated in section more (23 t.R.).

2. Daily and Yearly average Considerations: Considering an average total direct radiation of 1300 Brv/sa. Ft- per day, and a collector area of 2179.8 m2 operating at 44% efficiency, the available thermal energy per day is Typ = 5754 H/day. During the weekdays, the hot water demand for the oncologic and Pediatric Hospitals can be estimated as uD = 2324 wW.H/day. Thus, the available thermal energy to operate the absorption chillers during a weekday is Tp = Typ - uD = 3430 kW.H/day.

For an estimated 250 working days per year, the total available thermal energy to operate the air conditioning of the new wing is: Tay = 857,500 HH per year. Additional energy will be available from the hot water storage tank (20,000 gallons) on Monday mornings. During the weekend, the Photovoltaic array will operate without the thermal load of the solar cooling system and will maintain an average tank temperature close to 190°. Thus, a minimum of 63 MWh will be available per weekend.

For the 52 weekends of the year, the energy available from the storage tank will be: Tyg = 33,124 wH. And the total for the year Tx = Tan + Tay + Tyg = 690,626 kW per year.

The estimated thermal waste energy from the Photovoltaic array is estimated to be 897,000 MWh/year. Thus, the thermal waste energy from the Photovoltaic array is in accordance with the above figures. However, some reduction in the solar contribution to the air conditioning system has to be considered because the efficiencies of the solar collector and the Photovoltaic array are not identical.

Analysis of Safety and Pollution aspects: Personnel will be thoroughly instructed in the method of shutting down the equipment and in the use of fire extinguishers for electrical fires. In addition, there are telephones available in the adjacent offices for calling the Fire Department, if needed.

Personnel injuries will be controlled by providing safety shields and guards around moving parts of the equipment. Personnel will be thoroughly instructed in the operation of the equipment.

Equipment, safety procedures, and first aid. The potential pollutants in this area would consist of liquid lithium bromide solution used as the absorbent in the absorption chiller unit and oil and grease used to service the pump and motors. The lithium bromide is a non-toxic salt at standard atmospheric pressure and temperature. The refrigerant in the absorption cycle is distilled water. The charging of this system with lithium bromide would be done by trained personnel using proper equipment. Should an inadvertent spill happen, it will be quickly dispersed with a wash-down with soap and water and disposed of through the floor drain to the sewage system. The proposed air-cooled reciprocating chiller is a factory charged unit, and no freon leakage is expected from this one. Oil and grease are kept in approved metal containers and stored in a metal locker when not being used. Oil spills will be cleaned with degreaser and washed down the floor drain with soap and water. The proposed absorption chiller operation will substantially reduce the electric energy consumption, which for the island of Puerto Rico, will result in a reduction in pollution. Consideration has been given to the use of existing facilities. The existing chiller units will be eliminated, the rest of the existing air conditioning installation will be maintained in service with small modifications to upgrade the operation.

4. Proposed equipment specifications ACH-1, ACH-2 absorption chiller:
a) Nominal capacity: 148.7 BTU
b) Actual capacity for low temperature application: 63.4 BTU
c) Generator:
   - Passes: 2
   - Flow: 320 GPM
   - Inlet Temperature: 190°F
   - Outlet Temperature: 162.5°F
d) Condensing water:
   - Flow: 353 GPM
   - Inlet Temperature: 85°F
   - Outlet Temperature: 95°F
e) Chilled water:
   - Flow: 160 GPM
   - Inlet Temperature: 55°F
   - Outlet Temperature: 45°F
f) Power input: (4.2 30)
   - Frame model ABSC-018 or similar
g) Cooling power:
   - Capacity to cool 353 GPM of water from 95°F to

The text seems to be a mix of technical specifications and cost estimates for a cooling system project. Here is the revised version:

The outside temperature is 85°F with 80°F wet bulb.

3) Power input is 7-1/2 HP (6.6 kW) from a Baltimore Air Coil (BAC) CET 2413 or similar ATROH AIR COOLED equipment.

9) The unit has a capacity of 69.9 TR with 90° entering air at the condenser and 45°F leaving chilled water temperature.

B) The total power input is 63.1 KW.

C) A similar model would be Trane OG AA 7506 E.

Preliminary Cost Estimate for Project C.E.E.R. New Wing Air Conditioning Upgrading:

Mechanical Equipment:

1) Absorption Chillers, each at $238,000. Total: $76,000.00
2) Air-cooled Chillers, each at $221,000. Total: $22,000.00
3) Cooling Tower, each at $9,000. Total: $19,000.00
4) Hot water supply powers, each at $1,500. Total: $3,000.00
5) Condensing water supply pumps, each at $2,000. Total: $4,000.00

Mechanical Equipment Total: $113,000.00

Mechanical-Electrical Contract:

1) Equipment Installation, total price: $5,000.00
2) 5% Chilled Water Lines with 1" Methane Insulation, total price: $5,000.00
3) 35% Condensing Water Lines, total price: $3,800.00
4) Water Lines, total price: $3,000.00
5) Hot Water Lines with 2" Methane Insulation, total price: $2,400.00
6) Lines, total price: $2,000.00

Mechanical-Electrical Contract Continued:

7) Cooling Tower and Pumps Connection, total price: $11,000.00
8) Absorption Chillers Air Conditioning Installation, total price: $110,000.00
10) Modifications in Shop Building, total price: $5,000.00
12) Insulation Addition to Roof Level with 3" Fiberglass, total price: $10,000.00
13) Safety Switch and Connection for Absorption Units, total price: $10,000.00
14) Safety Switch and Power Electrical Connection for Reciprocating Chiller, total price: $1,000.00
15) Combination Magnetic Electrical Connection for Hot Water Pumps, total price: $1,400.00
16) Combination Magnetic Starters and Connection for Cooling Tower and Condensed Water Pumps, total price: $3,000.00
17) Air Handling Unit and Duct Work Upgrading, total price: $5,000.00

Mechanical-Electrical Contract Continued:

18) Hot Water and Chilled Water System Upgrading, total price: $5,000.00
19) System Balance and

The text is fixed as follows:

Test is $4,000.00
19. Air conditioning system control upgrading: 5 units at $8,000.00 each
20. Control chilled water plant controls: 1 unit at $2,000.00
Total: $78,600.00
Additional costs: $23,500.00
Grand Total: $102,280.00

SUMMARY OF PRELIMINARY COST ESTIMATE

Description, Quantity, Unit Price, Total

1. Mechanical Equipment
2. Mechanical Electrical Contract
3. 10% contingencies on Mechanical Equipment
4. 20% contingencies on Mechanical Electrical Contract

Sub-total: $246,926.00
Engineering and Project management at 12% of total: $25,614.00

Grand Total: $272,730.00

The initial investment for this project, as per the revised proposal of April 2, 1977, is higher than the previous proposal. However, the "Uniform Annual Cost" is substantially lower due to the use of waste thermal energy from the photovoltaic array.

19. Upgrading of air distribution system, reheat system, and controls: $12,500.00
Estimated steam cost, 526,000 lb/year at $17/1000 lb: $3,682.00
Estimated yearly refrigeration: 3.5×10^5 BTU
Estimated electric energy to operate the air-cooled centrifugal chiller: 4.55×10^5 kWh
Estimated first year cost at $3.07 per kWh: $31,850.00
Estimated first year cost for maintenance, spare parts, etc.: $4,000.00
Calculated uniform annual cost without terminal value over 20-year lifetime (for more detail, see computer print-out "Alternative A"): $140,292.40

Data for the Revised Proposal, February 1979 (Alternative: Solar energized absorption chillers, each 148 TR)

Estimated design and project management cost: $25,814.00
Estimated project cost (investment): $246,916.00

Upgrading of air

Distribution System and Controls: Estimated steam cost, 263,000 lb/year at $7/1000 lb, $1,842.00. Estimated electrical energy to operate the absorption chillers, auxiliary equipment, and the air-cooled refrigeration chiller to provide 15% of the cooling: 3.06 * 10^5 kWh. Estimated first-year cost at $.07 per kWh, $7,420.00. Estimated first-year cost for maintenance, spare parts, etc.: $4,000.00. Calculated uniform annual cost without terminal value over a 20-year lifetime. For more detail, see computer printout for "Alternative B": $63,408.61.

Computations on both alternatives (A and B) clearly show the significant economical advantage of solar cooling. The uniform annual cost difference is about $76,004. Over a lifetime of twenty years without the terminal value, the relative savings will be $1,536,000 in 1978 dollars. In terms of "relative payback", the solar system will pay back in less than 3 years. We define "relative payback" as follows: The time during which the summation of the difference in recurring costs equals the difference in non-recurring cost of the first year.

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Design and Construction Schedule: The U.S. Department of Energy will announce the winners of the Second Phase of the Concentrating Photovoltaic Projects around the first of May, 1979. It is imperative for the Oak Ridge Operations Office to receive the final decision at least one month prior to that date, i.e. by April 1, 1979. The proposed design and construction schedule for the upgrading of the New Wing air conditioning system follows: April 2 - April 16 - Choose an Engineering/Architect firm to perform the design and project management.

'April 16 - April 23: Complete final equipment selection and request equipment quotations.

April 23 - April 30: Select equipment supplier and prepare purchase orders.

May 1 - May 7: Prepare final construction drawings and bidding documents.

May 7 - May 28: Contractor bidding time and contract award.

May 28 - August 6: Construction time.

August 6 - August 20: Receive and install chillers.

August 20 - September 3: System balance, test, and acceptance. Ready to interface with photovoltaic array.

Conclusions:

A. Reliability: The proposed revision will provide a more reliable system than the proposal of April 1977. The absorption refrigeration units have practically no moving parts. One small hermetic pump is the only moving part in these chillers. In contrast, the proposal of April 1977 involves a large centrifugal chiller with a rotor-impeller assembly moving at 8000 RPM. The revised proposal will include two different backup systems. The proposal of April 1977 considered the reuse of existing reciprocating units as backup. According to the same proposal, this equipment is of poor design and has had a history of unreliability since the first day it was installed. The compressors for these units are no longer manufactured and finding parts is almost impossible.

B. Cost Effectiveness: The comparative "Economic Analysis" included in Section VIII indicates that the new proposal is more cost-effective than the previous proposal.

C. Energy Conservation: A dramatic reduction in electric energy consumption will be obtained with the revised proposal.

D. Pollution Aspects: The use of non-polluting solar energy to operate the system will be a step towards improving the overall environmental condition on the island of Puerto Rico.

E. System Completeness: With the provisions included in the proposal of April 1977, the attempt to upgrade the C.E.B.R. New Wing air conditioning system would be incomplete. An improvement of the existing

The conditions inside the building should be a part of the overall effort. This revised proposal includes the improvement of the conditions inside the building.

Part D. Energy Savings
Substantial energy savings will be obtained with the revised proposal. A yearly total of 3.44 x 10^1 H of electrical energy can be saved.

With the solar air conditioning.

Part G. Total Savings Over the 20 Years Life
Total savings over the 20 years lifetime of the solar equipment will exceed 1.5 million in 1978 dollars.

Attachment $1 C.E.R. New Wing Building Hourly Cooling Load Estimates

C.E.R. New Wing Summary
NW-1 January
NW-2 February
NW-3 March
NW-4 April
NW-5 May
NW-6 June

NW-7 July
NW-8 August
NW-9 September
NW-10 October
NW-11 November
NW-12 December
Building Hourly Cooling Load Estimate: 20 23 26 29 32 35 38

Anticipate Free Energy Load per Hour

Building Data
Winter Space: 6500
Orientation: 26689 Feet

Average Relative Humidity: 40

BSA Cooling Date: 2008 Dec.
Humidity 2AT: 2.0nd6
Heating Date: 5029

Evaporative Cooling Load: Yes

Winter Sun: Yes

Lighting Load: 7A
Proposed Load: ?85e

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I'm sorry, but the provided text seems to be a mix of random words, numbers, and symbols and it's hard to understand the context or meaning. Could you please provide more information or a clearer version of the text you want me to fix?

I'm sorry, but the text provided is quite disordered and seems to consist of different combinations of symbols, numbers, and words. It's unclear what the text is meant to convey. Please provide a more coherent text or context for me to assist you better.

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"Site 3 accusatory lighting. Story 8m 3 gg. Ge MH - 2 St, Anderson, LAT 255. Load profile row 2 percent to reds. Site altitude of photovoltaic pressure = 74,921. Air-density factor: Bool tasks, ventilation = equation. Air change/hr 9400. Diversity factor 9.80. Five BUN options used. E219 C1 OL.

ERTAEE RIG Consultants. T.C. Dh Engineering. Capacity testing and tasks. Puncher = 8405. Built in 17/7. Heat loss. The fluctuations of...

For the rest of the document, the text is too scrambled to correct without further information or context. I recommend providing a clearer version of the text or offering more information about its content.

I'm sorry, but the text you provided seems to be a random mixture of letters, numbers, and symbols, making it impossible to correct without context. Please provide a clearer text or give more information about what the corrected text should convey.

Sorry, but the text you provided is too garbled and inconsistent to be corrected. Could you provide more context or a cleaner version of the text?

I'm sorry, but the text provided is too garbled and lacks a clear context. It appears to contain a mix of random words, codes, and numbers, making it impossible to correct. Could you provide more information or a clearer version of the text?

I'm sorry, but the provided text is too garbled and seems to include a mixture of words, numbers, and symbols that don't form a coherent sentence or paragraph. The lack of context makes it impossible to fix. Please provide a clearer version or context for the text.

The Calculation Guide (GP]CHBACETESSAGTIN. Area ages SAC Juan AP RS Donget = a9 CENTED and factory & government research LO/12/ building LAAS. Germany : Meat Sat = Cooling heat loss semester latent heating. Kintra gets up in two years. == 1997196 Mh rate. Renew Solar 7 global or WAE AAN O TO on the year the Darnerins Plane =-- AFINA. The filtration Lraurs 2670764 287076 ERE 2423. ‘addl Tancre 70008 A, S7000- A 582800, = LMM HT A Today wear AE Vente 545s total Sasuee $445 ATUH/SE SFeS. Meat patio humid 554287 - Fefene aint 79-944 ey ee skylight meat to 04he ES 100811, Heating EKUYID 404-€e¢ 3890 ————-———tepoety “loss less ints GaIK Beams COV Oe Lpanaa, loss LSE intes+Solar meat factor Leon —tiaina apehjonaasion loan —saseanaye tons of PREMISERATION Fo REEFOPNCE UAL Yoh annn nnn : STUN/SE PTUM/Ce SF ORR Crw/sr aRFA GOL MEAT —COOL MEAT TON WHH COOL, NAU 33540 3.1 2. 2 Heating 000 060 total slag 13546 5405 Sel Res IFLA

Aurowaten, Seen Dig Consultants Inc y Wire Calculation ANCCHILT(99) CABACRTESMAUTIN and ARSe SAY JUAAPES pensect = 84 CENTFS E02 CarvGY R CIVEeOEvENT Research LOI777® Pare eUTunine seuney ¢ In Loans (#eMLDG, FFG. Includes ventilation) wer a 1 ry 2 seeraue MIM BANE ~—— mere y EiNIME APRA NBBEZE LAL aT enUn2 2545h6 arzeu, 254052) lACRL Lem AL 3756) 7837, 461422 4152s BTHPRL_SOUTTG BEGE/CETLING = 859g mm SRR 379, ~ 82708 5770. Fleas on OT nec OF OT IMEHL “ne a (ISNT Th BY DRIOTS, PATNI 22715. 267776 Benoye na23, 3073. 7159, 6750 APOL TANCE 8700%-——e70100 7940,» a7. TOTAL INCL PAPTITICNS) 947734 4432026 Bema7ie — 45u852e UaTesT Teerut o o. 6 oe o BEneLe tea 8 oRaP8y nae ~ emg ~ R023, ABOU ANCE o ot 3 a a sorat 2s, 8473278 rwate #0735 TTAL Lone auntoey 4nia?5, AS37ATy ARIATT, 20582, 462075s sung ofece # [instess| ffosatea] fireasa.] [Tisscail ffiowass: T7F9017] “To0s" TBI 7. [23 3 sow uw 5 16 v7 as 1 A epvepnte * wre Peane poze. 70719, are, 20719, tnaele «145424 win Eouae 17554, iseeas —929e3y lasts Lomza. 3° a ____tnige- 54790) <= 62502! Bone /eeILING | A3TOLAIASs — MRLSs Mas «WOLTOL S039 Fano a a.

Sorry, the text provided seems to be a mix of random characters, numbers, and symbols with no context or coherent meaning. Could you please provide more information or a different text to fix?

I'm sorry, but the text provided is too jumbled and doesn't provide enough context for me to make accurate corrections. Could you provide a clearer version or more details?

I'm sorry, but the provided text appears to be a jumbled mixture of numbers, letters, and phrases with no clear context or meaning. It's hard to correct it without knowing the context or the intended message. Could you please provide more information?

I'm sorry, but the text you've provided is quite jumbled and it's difficult to decipher the intended meaning. If you could provide more context or a clearer version of the text, I'd be glad to assist you.

This text appears to be heavily distorted and mismatched, making it difficult to correct without any context. However, I can attempt to correct the spelling of some words.

Please provide more context or clearer text for a more accurate correction.

I'm sorry but the provided text seems to be heavily scrambled or may contain multiple errors and non-English words. Could you please provide more context or clarify the content you want to be corrected?

I'm sorry, but the text you provided appears to be a mix of random characters, symbols, and numbers, with many spelling errors and no clear context or meaning. Could you please provide more information or clarify what you need assistance with?

Per year, benefits accrue. This is calculated by dividing the total present value cost by the sum of the present value factors of the years in which the benefits accrue.