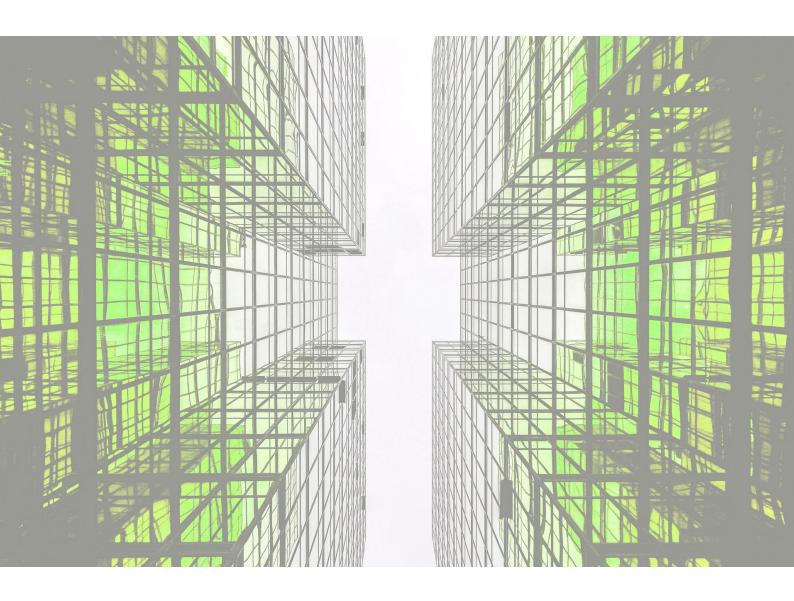
Sustainability and Energy Strategy

Darwin Court

Prepared for Airspace Group Ltd January 2024







Revision	Date	
A	17th January 2024	

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EXECUTIVE SUMMARY

- This Sustainability and Energy Statement, has been prepared by Envision on behalf of Airspace Group Ltd and is submitted in support of a full planning application for the construction of a single-storey roof extension to the properties comprising Darwin Court, to provide residential units together with a range of upgrades to the existing buildings including accessibility enhancements, fire safety upgrades, waste and refuse store enhancements, landscaping, and other works.
- 2. The primary purpose of this document is to explain how the scheme can meet the London Plan's and the London Borough of Camden's sustainability policies. Envision has undertaken a review of the relevant policies and worked with the design team to determine and agree the relevance and approach that should be taken to fulfil each policy.

Summary of Sustainability Strategy

- 3. The scheme will deliver a series of sustainability measures which are compatible with both the London Plan and the London Borough of Camden's requirements for sustainable design and construction:
 - Sustainable material selections with timber to be procured with Forest Stewardship Council
 accreditation and the main contractor to adopt best practice measures to reduce water
 and energy use through construction;
 - The development of a Site Waste Management Plan to ensure waste generation is minimised during construction;
 - No car parking and cycle storage to promote sustainable modes of transport, has been incorporated.
 - Development of a sustainable procurement plan by the contractor to maximise the environmental performance of chosen materials; and
 - Water conservation measures within the units to comply with 105 litres / bedspace per day.

Summary of Energy Strategy

- 4. In line with the policy CC1, the applicant has sought to make the fullest contribution to minimising CO₂ emissions whilst following the London Plan Energy Hierarchy.
- 5. Envision has produced Part L1 2021 compliant SAP models in order to determine the energy and CO₂ emissions for the proposed development. These have been calculated using Elmhurst 10.2 Software with detailed calculations provided in the Appendix. This is in line with the 'Part L 2021 and the Energy Assessment Guidance 2022'.
- 6. Policy CC1 requires all developments to follow the energy hierarchy to reduce carbon emissions through the specification of highly efficient fabric and renewable energy. In this development carbon savings will be made through the following:



- This will be achieved through the incorporation of passive design measures, and efficient fabric including triple-glazed windows.
- Reduced Air Permeability, lower than standard Buildings Regulations;
- High efficiency LED throughout the development;
- Efficient, electric systems have been specified including highly efficient heat pump systems for the heating and hot water and a PV array.

Carbon Savings Predicted

7. As seen in the table below, the new residential aspect of the development reduces CO₂ emissions by 5.23 tonnes.CO₂.year, equal to a 73.13% saving beyond the Part L Target. The development also demonstrates a 39.83% saving from the inclusion of renewable energy, therefore complying with Camden's Local Policy.

Table A.1 - Final CO₂ Reductions Chart

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO ₂ per annum)		
	Regulated Unregulated		
Baseline: Part L 2021 of the Building Regulations Compliant Development	7.16	3.09	
After energy demand reduction	4.77	3.09	
After heat network / CHP	4.77	n/a	
After renewable energy	1.92	3.09	
	1		

	Regulated domestic carbon dioxide savings (Tonnes CO ₂ per (%) annum)		
Savings from energy demand reduction	2.38	33.30%	
Savings from renewable energy	2.85	39.83%	
Cumulative on-site savings	5.23	73.13%	



1 INTRODUCTION

1.1 Envision has been appointed by Airspace Group Ltd to produce a Sustainability and Energy Statement in support of a full planning application for the construction of a single-storey roof extension to the properties comprising Darwin Court, to provide residential units together with a range of upgrades to the existing buildings including accessibility enhancements, fire safety upgrades, waste and refuse store enhancements, landscaping, and other works.

Scope

- 1.2 The primary purpose of this statement is to explain how best practice sustainable design and construction measures would be incorporated in the proposed development to ensure alignment with local planning policy.
- 1.3 Section 4 (Energy Assessment) sets the parameters of detailed design, but remains at a strategic level. The calculations in this document are an indication of system size and carbon emissions based on guidance documents, approved software and practical experience. They are not design calculations but establish the viability and feasibility of various technologies for the proposed development.
- 1.4 This statement is structured as follows:
 - The remainder of this section provides a description of the site and the development proposals;
 - Section 2 provides a description of the main sustainability and energy policies relevant to the application;
 - Section 3 details the sustainable design measures incorporated into the design;
 - Section 4 includes the Energy Statement, including measures proposed to reduce energy demand and carbon dioxide in operation;
 - Section 5 provides a concluding summary.

Site Location and Existing Situation

- 1.5 Darwin Court, located at 2-24 Gloucester Avenue, comprises 5 x flat roofed apartment buildings constructed in the 1970s. The buildings are constructed in a linear form and are set within large plots with areas of soft landscaping.
- 1.6 The buildings contribute to the varied character of Gloucester Road, which includes a range of buildings with varying heights, age and architectural style.
- 1.7 The site is located within the Primrose Hill Conservation Area. None of the buildings are statutory listed, and the buildings are noted as making a negative contribution to the character and appearance of the Conservation Area.





Figure 1.1 – Site Location

The Proposed Development

- 1.8 The proposed development would seek the construction of a single-storey roof extension to each of the five existing buildings to provide eight self-contained residential dwellings (6 x two-bedroom units and 2x three-bedroom units). The proposal would also deliver improvements to the existing entrances to the buildings.
- 1.9 The proposed development provides an opportunity to optimise an existing residential building and provide significant upgrades to the existing building to benefit existing residents.

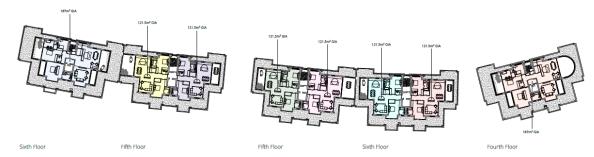


Figure 1.2 – Proposed Site Layout – 8th Floor



2 SUSTAINABILITY & ENERGY POLICY CONTEXT

2.1 Many definitions of sustainable development exist, although the common objective for all is the integration of economic, social and environmental issues to ensure a better quality of life for people today, without compromising the needs of future generations. A key mechanism for delivering the principles of sustainable development lies within the UK planning system, which is implemented through national guidance and local planning policies. A review of all the relevant policy, regulatory and energy guidance documents was undertaken to gain an understanding of the guiding requirements for sustainability.

National Planning Policy Framework

- The revised National Planning Policy Framework (NPPF) was released on 20th July 2021. This replaces the previous National Planning Policy Framework published in March 2012, revised in July 2018 and updated in February 2019. It sets out the framework for all planning policy in England and how these policies are expected to be applied. At a very high level, the objective of sustainable development can be summarised as meeting the needs of the present without compromising the ability of future generations to meet their own needs. At a similarly high level, members of the United Nations including the United Kingdom have agreed to pursue the 17 Global Goals for Sustainable Development in the period to 2030. These address social progress, economic well-being and environmental protection.
- 2.3 The NPPF sets out a presumption in favour of sustainable development, and the need to support economic growth through the planning system. Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):
 - a. an economic objective to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;
 - b. a social objective to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering well-designed, beautiful and safe places, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and
 - c. an environmental objective to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.
- 2.4 Planning plays a key role in helping shape places to radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure.



This is central to the economic, social and environmental dimensions of sustainable development. The NPPF does not include detailed measures on sustainable design codes and standards to apply, although expects that when setting any local requirement for a building's sustainability, local planning authorities should do so in a way consistent with the national technical standards.

London Plan Policy

- 2.5 The London Plan (2021) sets out the Mayor's vision for London. In accordance with the NPPF, it promotes economic development, and endorses the principles of sustainable development. It is the main vehicle for strategic decision-making on London's development, including development decisions. The Plan contains a number of policies directly related to a development's sustainable design and energy reduction, including:
 - Policy G1 Green Infrastructure;
 - Policy G5 Urban Greening;
 - Policy G 6 Biodiversity and Access to Nature;
 - Policy SI 1 Improving Air Quality;
 - Policy SI 2 Minimising greenhouse gas emissions;
 - Policy SI 3 Energy Infrastructure;
 - Policy SI 4 Managing heat risk;
 - Policy SI 7 Reducing Waste and supporting the circular economy;
 - Policy SI 12 Flood Risk Management;
 - Policy SI 13 Sustainable Drainage; and
 - Policy T 5 Cycling.
 - Policy T6.1 Residential Parking.
- 2.6 Of particular importance to the CO₂ and Energy reductions required for a development is *Policy SI-2: Minimising carbon dioxide emissions*.
- 2.7 Policy SI2 requires that development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:
 - a. Be Lean: use less energy and manage demand during operation;
 - b. Be Clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly; and
 - c. Be Green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site.



London Borough of Camden

- 2.8 The Council aims to tackle the causes of climate change in the borough by ensuring developments meet the highest feasible environmental standards.
- 2.9 The London Borough of Camden's Local Plan Policy CC1 Climate Change Mitigation states that developments should be meeting the following requirements:

CE1: The Council recognises the Government's targets to reduce national carbon dioxide emissions by 34 per cent against 1990 levels by 2020 in order to meet a 80 per cent reduction by 2050 and will require development to make a significant contribution towards this target.

- 2.10 To deliver this the Council will:
 - a. promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;
 - b. require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;
 - c. ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;
 - d. support and encourage sensitive energy efficiency improvements to existing buildings;
 - e. require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and
 - f. expect all developments to optimise resource efficiency.
- 2.11 Camden's local plan also states that developments over 5 units are expected to demonstrate a 20% reduction in carbon emissions from onsite renewables.
- 2.12 The development will follow the energy hierarchy, as per the London plan, ensuring savings are achieved at each of these stages. The proposal is not classed as a major development so any Policies referring to major developments do not apply.



GLA Guidance on Preparing Energy Assessments

- 2.13 The GLA guidance on preparing energy assessments (2022) provides a detailed methodology on how to demonstrate a reduction in CO₂ emissions for new development. The new guidance explains how London Plan policies apply now that Part L 2021 has taken effect, and the updates made to the GLA's carbon emissions reporting spreadsheet and how to determine the CO2 emissions baseline under Part L 2021.
- 2.14 This explains the updates made to the GLA's carbon emissions reporting spreadsheet and how to determine the CO₂ emissions baseline under Part L 2021. This guidance document explains how to prepare an energy assessment to accompany strategic planning applications referred to the Mayor. Although primarily aimed at strategic planning applications, London boroughs are encouraged to apply the same structure for energy assessments related to non-referable applications and adapt it for relevant scales of development.
- 2.15 Applicant's in London must continue to meet the London Plan net zero carbon target by following the energy hierarchy (Policy SI 2), the heating hierarchy (Policy SI 3) and by maximising on-site carbon reductions. Planning applicants will be expected to demonstrate that at each stage of the energy hierarchy they have maximised opportunities for carbon reduction to achieve as close to zero as possible. An on-site carbon reduction of at least 35 per cent beyond Part L 2021 of building regulations should be achieved. Once it has been demonstrated that carbon reductions have been maximised, any remaining emissions to zero should be offset by a contribution to the relevant borough's carbon offset fund.
- 2.16 This sustainability and energy statement draws from this guidance, in particular for the calculation of energy performance against the new building regulations.



3 SUSTAINABILITY STATEMENT

- 3.1 This section includes a review of the scheme against the relevant policies in section 2 and identifies a series of practical measures that would be brought forward in design and construction which contribute to the developments' sustainability.
- 3.2 The review is structured against the following thematic areas:
 - Climate Change Mitigation;
 - Climate Change Adaptation;
 - Reducing Waste and Supporting a Circular Economy;
 - Sustainable Transport;
 - Pollution Control; and
 - Sustainable Construction

Climate Change Mitigation

- 3.3 Climate change mitigation involves a radical reduction in carbon emissions released from the built environment. This relates to both energy use in buildings and energy embodied within the construction process.
- 3.4 The London Plan sets out an established energy hierarchy in Policy SI2 which is relevant to new build projects. This focuses on how new development can reduce regulated energy demands. The strategy is presented in the next section (section 4).

Climate Change Adaptation

Overheating Risks

3.5 The risk of overheating in buildings is anticipated to rise as a result of climate change. A number of passive design measures have been specified in order to reduce the risk of overheating and are discussed in the table below.



Cooling Method	Measures Employed
Minimise internal heat generation through energy efficient design	 U-values specified in excess of the Part L Building Regulations minimum targets
Reducing the amount of heat entering the building in summer	 Glazing configuration optimised to limit solar gains. The g-value of all installed glazing will be as low as economically and feasibly possible. External Glazing has been offset into the external structure to provide further shading. The development is surrounded by a number of tall trees which will provide external shading to the development.
Use of high ceilings to manage the heat within the building	Floor-to-ceiling heights are maximised within the dwellings
Mechanical ventilation	 Mechanical ventilation with heat recovery has been proposed to serve all office spaces. MVHR units shall incorporate a full summertime bypass to allow for 'free cooling' when possible.

3.6 In addition the new units will be built to comply with Building Regulations Part O to ensure the risk of overheating is limited.

Water Conservation Measures

- 3.7 Water fittings will be specified with the following or similar flow rates to meet the target water consumption of 105 l/p/day for the development:
 - Wash basin taps 6.5 l/min
 - Showers 7.5 l/min
 - Bath 120l to overflow
 - Dishwasher 1.2 l/place setting
 - Washing machine 9 l/kg load
 - WC 6/4 litre dual flush
 - Kitchen taps 6.5 l/min

Water meters will be installed to encourage residents to limit their consumption.

Flood Risk and Sustainable Drainage



Play Space

Primtose Hill

Play Space

3.8 The development has been identified to be in Flood Zone 1, which has a low risk of flooding.

Figure 3.1 – Site Location from Environment Agency Flood Map

Reducing Waste and Supporting a Circular Economy

Sustainable Materials

- 3.9 Materials will be specified to reduce the embodied carbon of the development, including re-use and specifying materials with recycled content wherever possible.
- 3.10 Insulating materials will be specified to maximise thermal performance whilst still paying attention to the environmental impact of the materials used. If possible, materials with a high recycled content will be specified.
- 3.11 Responsible sourcing will also be pursued. All timber used on-site during the construction phase and within the building will be from legal sources. All timber will be FSC or equivalent responsibly sourced timber. Sourcing of other materials will include products where the manufacturer employs an environmental management system such as ISO 14001 or BES 6001, inline with the sustainable procurement plan. Where possible, materials will be sourced locally.
- 3.12 Non-toxic materials will be used wherever possible, including the specification of products with low VOC content in line with European testing standards.

Construction Waste Management

- 3.13 Consideration has been given to rationalising material use in the structure of the building, including the structural frame and envelope as part of an ongoing design optimisation exercise.
- 3.14 A Resource Management Plan will be developed which sets out procedures for managing waste on the site, including setting the total waste and landfill diversion targets which will be monitored throughout the build.



3.15 It is also anticipated that at least 95% by volume of construction waste and non-hazardous demolition waste will be diverted from landfill. This is in accordance with London Plan Policy SI7 of the London Plan.

Operational Waste

3.16 The buildings will have sufficient space for their own waste storage facilities. Waste will be sorted to provide storage for both general, recyclable and food waste. The bins will be labelled to provide guidance on what can be included in waste stream.

Sustainable Transport

3.17 Transport for London's (TfL) Web-based Connectivity Assessment Toolkit (WebCAT) recognises that the site has a Public Transport Accessibility Level (PTAL) rating of 5.

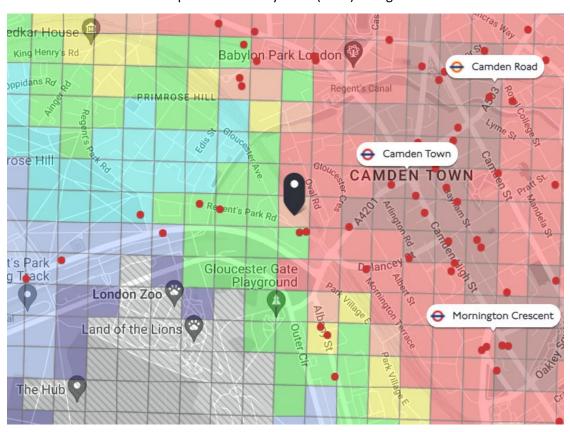


Figure 3.2 Local Public transport options and walking times

3.18 The development has a number of transport modes within a 10- minute proximity. This includes over 5 Bus stops and Camden Town Station within a 7 minute walk.



Pollution Control

3.19 Any new development can potentially lead to detrimental environmental effects; as is the nature of construction. These potential effects have been considered during the planning stages of this proposal. The development is not of the scale that would require an Environmental Impact Assessment (EIA), however the measures as outlined in this section, and subsequently implemented, will ensure that any potential impacts can be appropriately controlled.

Air Quality

- 3.20 The construction site will be managed in such a way that the environmental impact is minimised. This includes following best practice policies for dust pollution by using dust sheets, covering skips and damping down where appropriate.
- 3.21 A fully electric system has been specified, with heat pumps providing the heating and hot water system. This will result in zero NOx Emissions for the operation of the development.

Noise

3.22 The development will comply with Building Regulations Part E, providing a good level of sound insulation. All windows are to be specified as high efficiency triple glazing to minimise the transmission of noise between the property and surrounding area.

Light Pollution

3.23 All lighting will be low energy light fittings specified to have a luminous efficacy greater than 120 lm/W for residential. All external lighting will be appropriately controlled to ensure that spaces not lit during daylight hours, with PIR sensors to provide light when the area is occupied. The proposed development is in an urban location, and therefore will not significantly contribute to increasing the effects of light pollution.

Sustainable Construction

- 3.24 The construction phase of the development can have a significant effect on the quality of the site and its surroundings, including the local environment, neighbouring residents, surrounding employees and the general public. Sustainable construction involves the prudent use of existing and new resources, the efficient management of the construction process, and consideration of potential adverse environmental impacts on local sensitive receptors.
- 3.25 It is not considered that the construction phase will yield an adverse level of disturbance, particularly given the surrounding land uses, although various measures adopted by the contractor will ensure that any potential disturbance is minimised. The principal contractor will be required to deliver high standards of sustainable construction, which will be achieved through the following:
 - Registering the site against the Considerate Constructors Scheme, and;



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b	Managing the construction site to reduce environmental effects, this will include adopting est practice measures to protect water and air quality, monitoring water and energy use rom construction activities.



4 ENERGY STATEMENT

- 4.1 In line with the London Plan policies this energy statement will follow the following energy hierarchy to make best endeavours to reduce carbon dioxide onsite:
 - a. Be Lean: use less energy and manage demand during operation;
 - b. Be Clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly;
 - c. Be Green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site.

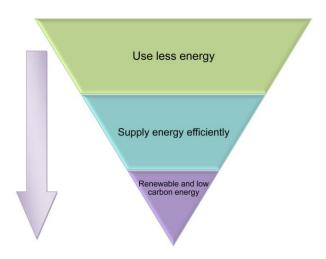


Fig 4.1 - 'Energy Hierarchy'

Methodology

- 4.2 Local planning validation requires that applicants should demonstrate how the energy hierarchy has been applied to make the fullest contribution to CO2 reduction in line with Policy SP6.
- 4.3 In accordance with NCM guidance, the appropriate methodology for calculating the energy performance of the domestic portion is "The Government's Standard Assessment Procedure for Energy Rating of Dwellings". This procedure was undertaken using Stroma FSAP 10 which is a Department of Communities and Local Government (DCLG) approved methodology and software for undertaking SAP assessments.

Establishing the Target Emission Rate (TER)

- 4.4 The total emissions savings calculated in this report for the new-build development is expressed against a Building Regulation Target Emission Rate. This is the Baseline against which the measures implemented must show an improvement.
- 4.5 The Target Emission Rates for the development have been established using The Standard Assessment Procedure for the Energy Rating of Dwellings (SAP).
- 4.6 The calculated carbon emissions and total energy demand for the Target Emission Rate are illustrated below for the development. The calculated figures demonstrate a Part L1 Building Regulations 2021 compliant model.



Table 4.1 - Target CO₂ emissions

Unit	Total Floor Area (m²)	TER	Total Target CO2 (tn.CO2.yr)	TPER	Total Target Primary Energy (kWh.yr)
3 Bed Unit	382	5.61	2.14	32.34	12,353.88
2 Bed Unit (SE)	372	7.17	2.66	39.4	14,656.80
2 Bed Unit (NW)	372	6.31	2.34	34.73	12,919.56
		Total =	7.16		39,930.24

4.7 The figure of 7.15 tn.CO₂.yr the targets that must be reached and improved upon by the proposals in this Energy Assessment in order to comply with Part L Building Regulations. This will be achieved through the implementation of fabric efficiency, energy-reduction and carbon-saving measures as outlined in the ensuing sections.

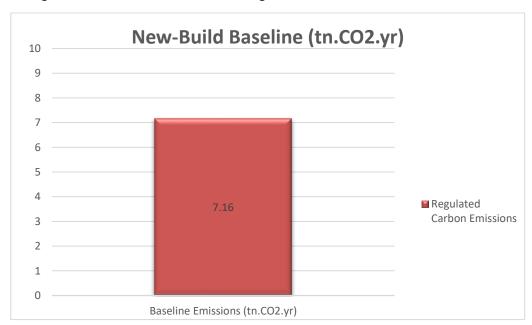


Fig 4.2 - Target CO₂ emissions

Applying the London Plan Energy Hierarchy: Stage 1 – Be Lean

4.8 The Greater London Authority seeks a 'fabric first' approach to reducing the carbon footprint of London's built environment. This is achieved through buildings using less energy by improving uvalues, air-tightness and lighting efficiency amongst others. This is the first step to consider in reducing a building's carbon emissions before the efficient delivery of power, heat or renewables are considered by a design-team.



Fabric Efficiency

4.9 U-Values, are used to measure how effective elements of a buildings fabric are as insulators. That is, how effective they are at preventing heat from transmitting between the inside and the outside of a building. Very broadly, the better (i.e. lower) the U-value of a buildings fabric, the less energy is required to maintain comfortable conditions inside the building. The following U-Values are proposed for the residential aspect of the development:

Table 4.3 - Proposed U-Values

Domestic				
Elements	New Building Elements: U-Values – W/m² K	Comment		
External Wall	0.13	n/a		
Corridor Walls	0.15	n/a		
Roof	0.11	n/a		
External Windows	Triple Glazed	Frame factor of 0.8		
	U-Values: 0.8	G-Values: 0.57		
External Solid Doors	1	n/a		
Thermal Bridges	Y= 0.08			
	To be calculated at the detailed design stage			

Air Permeability

4.10 The designed Air Permeability Rate (APR) has been set at 3 m³/h.m² @ 50Pa for the entire development.

Lighting Strategy – Domestic

4.11 The Light fittings will be specified as LED, low-energy with local manual switching and if appropriate, occupancy sensing. The light fittings have been specified as to have a 100 lm/W efficiency.

Ventilation Strategy

4.12 The development will include mechanical ventilation with heat recovery (MVHR). This has been assumed as a MRXBOX90L MVHR system which incorporates a full summertime bypass to assist with overheating in the summer.



Space & Water Heating

4.13 In line with the 'GLA guidance on preparing Energy Assessments' methodology, a base case has been generated for the Be Lean Case, utilising a gas boiler with an efficiency of 92.3%.

Be Lean Stage CO₂ Reductions

- 4.14 The Part L 2021 GLA carbon emissions reporting spreadsheet has been used to collate the information and offer consistent and transparent process for presenting part L 2021 carbon emission performance. This includes an offset of the energy saving technologies applied to the notional building at Lean stage to highlight the passive design savings.
- 4.15 The following tables and graphs represent the Be-Lean improvements for the new-build apartments over the TER and TPER emissions.

Table 4.7 - Be-Lean Emissions - Domestic

Unit	Total Floor Area (m²)	DER	Total CO2 (tn.CO2.yr)
3 Bed Unit	382	9.99	1.38
2 Bed Unit (SE)	372	11.50	1.90
2 Bed Unit (NW)	372	10.41	1.49
		Total =	4.77
		Difference over Baseline	2.38
		% Difference	33.30%

As detailed above, the measures as taken at the 'Be-Lean' stage enable the residential aspect of the development to achieve a 33.30% reduction in regulated CO₂ emissions over the Part L Target Emission Rate. This has been achieved by adopting the lowest U-Values feasible, a low air permeability rate and high performance-glazed windows.



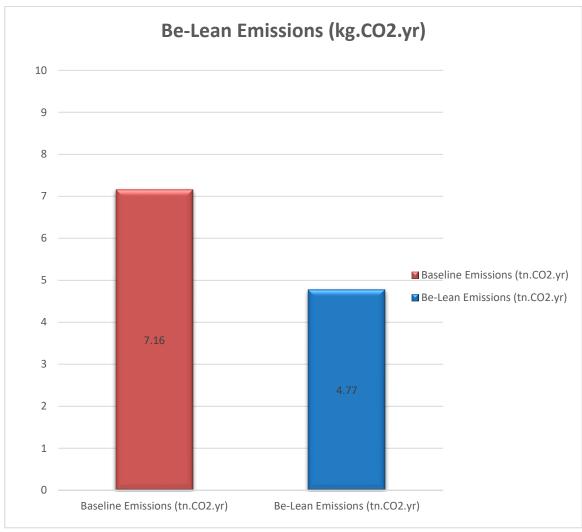


Fig 4.4 – Be-Lean Stage Reductions - Domestic

Applying the London Plan Energy Hierarchy: Stage 2 - Be Clean

4.17 As part of the Be Clean approach, the use of energy-efficient equipment, heat networks and community heating has been considered. As this development is a minor development, district heating networks and community heating systems are not viable. As a result, no savings are made at the Be Clean stage.



Applying the London Plan Energy Hierarchy: Stage 3 – Be Green

4.18 An analysis of low carbon/renewable technologies was undertaken to determine which would be suitable for application in a development of this size and nature. This determined that the renewable systems deemed to be the most suitable for the development is the use of an Air-Source Heat Pump providing renewable heating and hot water for the residential units.

Low-Carbon/Renewable Technology 1 – Domestic Air Source Heat Pump

- 4.19 The low-carbon/renewable energy proposed for development is an air-source heat pump (ASHP) providing space heating and hot water. ASHPs with the following specifications have been assumed:
 - The modelled ASHP to provide space heating is an ECODAN 8.5 kW system for each 2 bed residential unit and a 11.2 kW for each 3 bed unit.
 - The ASHP will be selected to operate on R32 which is an F-Gas compliant refrigerant;
 - These units will need to be placed on the roof of the development and external access will need to be provided.
- 4.20 The hot water will be provided by an equivalent unit. The following system has been assumed:
 - The cylinder will have a volume of 210l and a measured loss of 1.77kw/day for the 2 bed units.
 - The cylinder will have a volume of 300l and a measured loss of 2.09kw/day for the 3 bed units.

Low-Carbon/Renewable Technology 2 - PV

- 4.21 The development will also include a PV array on the roof of each block. The following array will be linked to each of the new build units and the remainder of the arrays will be utilised to provide energy to the existing block. These units will include an export capable meter.
- 4.22 The total PV array on the development is 69kWp covering an area of 300m².
 - a. Block A: 60 sqm PV Area (30 panels @ 2000x1000mm
 - b. Block B: 60 sqm PV Area (30 panels @ 2000x1000mm)
 - c. Block C: 60 sqm PV Area (30 panels @ 2000x1000mm)
 - d. Block D: 60 sqm PV Area (30 panels @ 2000x1000mm)
 - e. Block E: 60 sqm PV Area (30 panels @ 2000x1000mm)



Table 4.8 – PV for new build units

Served Area	PV Area	PV Peak Power (kWp)	PV Energy Generation (kWh.annum)
3 Bed Units – Per Unit	11.6m²	2.2	1635.81 kWh
2 Bed Units – Per Unit	10.5m ²	2	1392.71 kWh
Total PV for New Build Units	86.2m ²	16.4	11,627.88 kWh

Be-Green CO2 Reductions

4.23 The following tables and graphs represent the Be-Green improvements for the residential units of the development over the Target Emission Rate (TER) baseline emissions:

Table 4.9 –Be-Green Improvement over TER – Domestic

Unit	Total Floor Area (m²)	DER	Total CO ₂ (tn.CO2.yr)	DPER	Total Building Primary Energy (kWh.yr)
3 Bed Unit	382	2.21	0.84	26.39	10,080.98
2 Bed Unit (SE)	372	1.60	0.59	21.59	8,031.48
2 Bed Unit (NW)	372	1.30	0.48	18.62	6,926.64
		Total =	1.92		25,039.10
		Be-Green Savings	2.85		92033.10
		% Difference	59.72%		78.61%
		Difference over Baseline	5.23		14891.14
		% Difference	73.13%		37.29%

4.24 As detailed above, the measures as taken at this stage would result in a 73.13% reduction in the new-build residential regulated CO_2 emissions over the Building Regulations Part L Target Emission Rate.



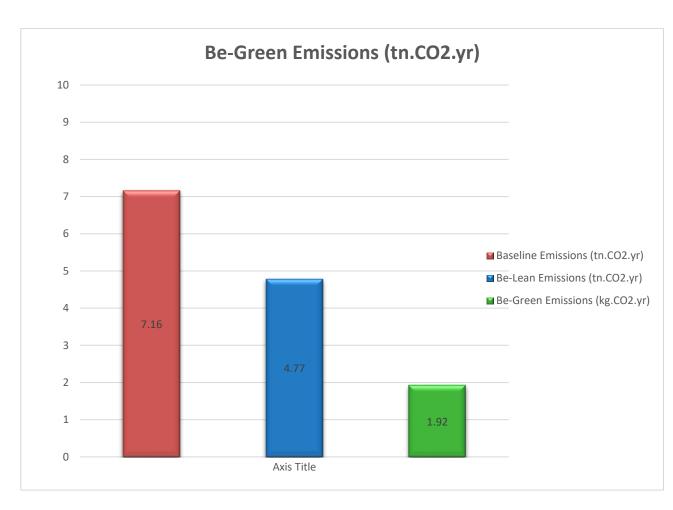


Fig 4.6 –Be-Green Reductions – Domestic

Final CO₂ Reduction Charts

4.25 In accordance with the 'GLA guidance on preparing energy assessments', the final carbon emissions and predicted savings are presented below for the development.



Table 4.10 – Final CO₂ reductions – Domestic

		ns for domestic buildings per annum)
	Regulated	Unregulated
Baseline: Existing development	7.16	3.09
After energy demand reduction	4.77	3.09
After heat network / CHP	4.77	n/a
After renewable energy	1.92	3.09
	Regulated domestic c	arbon dioxide savings
	(Tonnes CO2 per annum)	(%)
Savings from energy demand reduction	2.38	33.30%
Savings from renewable energy	2.85	39.83%
Cumulative on-site savings	5.23	73.13%

4.26 The residential aspect of the development has achieved a 73.13% saving overall. The development utilises an efficient ASHP and PV array to demonstrate a 39.83% carbon saving from the inclusion of renewable energy.



5 CONCLUSION

- 5.1 This Sustainability and Energy Statement, has been prepared by Envision on the behalf of Airspace Group Ltd and is submitted in support of the full planning application for the construction of 8 additional residential flats on top of an existing residential block.
- 5.2 The most relevant policy when considering the sustainability of the application of CC1 of the Local Plan. This requires all development to follow the London Plan requirements and to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation.
- 5.3 The Local Plan details that the energy hierarchy should be followed, and that savings should be made through energy efficient fabric and renewable and LZC technologies.
- 5.4 The Energy Statement presented in Section 4 of this report explains the approach which has been taken to minimise carbon emissions. A reduction in emissions has been achieved through adopting efficient building fabric, including new insulation and highly efficient glazing. Measures are also incorporated to minimise pollution, footprint of the development and reduce water use.
- 5.5 The scheme will incorporate a range of energy-saving measures and is to achieve a 73.13% reduction in carbon emissions, compared to a notional existing building baseline. A 39.83% saving has been achieved through the inclusion of highly efficient ASHPs and PV.
- 5.6 The development is considered to comply with the London Borough of Camden's Energy and Sustainability policies, along with those found within the London Plan (2021).



APPENDIX I – SAP CALCULATIONS



Property Reference	e	D	velling 3							Issued on Da	ate	25/06/2024	
Assessment Refer	ence		velling 1_Be G	reen_Copy				Prop Type R	ef				
Property		SI	17 1AD										
SAP Rating					92 A		DER	1.3	11	TER		6.31	
Environmental					99 A		% DER < TEI)			79.24	
CO ₂ Emissions (t/y	/ear)				0.11		DFEE	34.	.40	TFEE		37.66	
Compliance Check					See BREL		% DFEE < TF					8.63	
% DPER < TPER					45.99		DPER	18.	.76	TPER	₹	34.73	
Accessor Details		Ma Cam	\A/=II:-							A 2 2 2	oor ID	DAEC 000	04
Assessor Details Client		Mr. Sam	vvailis							Asse	ssor ID	BA56-00	U1
SAP 10 WORKSHEET CALCULATION OF D	FOR New B	uild (As I	esigned) R REGULATIO	(Version 10	.2, February								
1. Overall dwell Ground floor	ing charac	teristics						Area (m2)		rey height (m) 2.6500	(2b) =	Volume (m3) 328.6000	(1b) - (3b
Total floor area Dwelling volume 2. Ventilation r)+(1b)+(1c	:)+(1d)+(1e)	(1n)		4.0000			3a)+(3b)+(3c)	+(3d)+(3e)	(3n) =	328.6000	(4) (5)
											n	n3 per hour	
Number of open c Number of open f Number of chimme Number of flues Number of flues Number of blocke Number of interm Number of passiv Number of fluele	lues ys / flues attached t attached t d chimneys ittent ext e vents	o solid fu o other he ract fans	el boiler	fire							0 * 80 = 0 * 20 = 0 * 10 = 0 * 20 = 0 * 35 = 0 * 20 = 0 * 10 = 0 * 10 = 0 * 40 =	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	(6b) (6c) (6d) (6e) (6f) (7a) (7b)
Infiltration due Pressure test Pressure Test Me Measured/design Infiltration rat Number of sides	thod AP50 e	ys, flues	and fans	= (6a)+(6b)	+(6c)+(6d)+(6e)+(6f)+	(6g)+(7a)+	(7b)+(7c) =		0.0000	/ (5) =	es per hour 0.0000 Yes Blower Door 3.0000 0.1500	(17)
Shelter factor Infiltration rat	e adjusted	to includ	de shelter i	factor					(20) = 1 -	[0.075 x 21) = (18)		0.9250 0.1388	
Wind speed Wind factor Adj infilt rate	Jan 5.1000 1.2750	Feb 5.0000 1.2500	Mar 4.9000 1.2250	Apr 4.4000 1.1000	May 4.3000 1.0750	Jun 3.8000 0.9500	Jul 3.8000 0.9500	0.9250	1.0000	Oct 4.3000 1.0750	Nov 4.5000 1.1250	Dec 4.7000 1.1750	(22a)
Balanced mechan If mechanical ve If exhaust air h If balanced with	ntilation eat pump u	sing Apper	ndix N, (23k	o) = (23a) x				(23b) = (23b)		0.1492	0.1561	0.1630 0.5000 0.5000 71.2000	(23a) (23b)
Effective ac	0.3209	0.3174	0.3140	0.2966	0.2932	0.2758	0.2758		0.2827	0.2932	0.3001	0.3070	
3. Heat losses a Element	nd heat lo	ss paramet	er		Openings	Net	 :Area	U-value	Ах		-value	АхК	
door Window (Uw = 0.8 external wall corridor wall external roof Total net area o Fabric heat loss Party Wall 1 Party Floor 1	f external		1	m2 99.6400 29.6800 24.0000	m2 50.0900 2.0000	2. 50. 49. 27. 124. 253.	m2 .0000 .0900 .5500 .6800 .0000	W/m2K 1.0000 0.7752 0.1300 0.1500 0.1100 (30) + (32) 0.0000	2.000 38.829 6.441 4.152	K 00 95 5 20 00	kJ/m2K	kJ/K	
Thermal mass par Thermal bridges Point Thermal br Total fabric hea	(User defi idges				area)				(:	33) + (36)	(36a) = + (36a) =	120.0000 20.2656 0.1500 85.4786	(36) (36a)

SAP 10 Online 2.13.6 Page 1 of 7



	eat loss ca	lculated mo	nthly (38)m	= 0 33 x	(25)m x (5)								
(38)m	Jan 34.7984	Feb 34.4223	Mar 34.0461	Apr 32.1654	May 31.7893	Jun 29.9086	Jul 29.9086	Aug 29.5324	Sep 30.6608	Oct 31.7893	Nov 32.5416	Dec 33.2939	(38)
Heat transfer Average = Sum	120.2770	119.9008	119.5247	117.6440	117.2678	115.3871	115.3871	115.0110	116.1394	117.2678	118.0201	118.7724 117.5499	(39)
-	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP HLP (average) Days in mont	0.9700	0.9669	0.9639	0.9487	0.9457	0.9305	0.9305	0.9275	0.9366	0.9457	0.9518	0.9578 0.9480 31	(40)
Days in mone	31	20	31	30	31	30	31	31	30	31	30	31	
4. Water heat	ing energy	requirement	s (kWh/year)									
Assumed occup- Hot water usa	ancy											2.8775	(42)
Hot water usa	90.5832 ge for bath	89.2219 s	87.2383	83.4429	80.6420	77.5185	75.7430	77.7117	79.8697	83.2234	87.1003	90.2362	
Hot water usa	31.2862 ge for othe 44.0988	30.8216 r uses 42.4952	30.1673 40.8916	28.9608	28.0575 37.6844	27.0558 36.0808	26.5147 36.0808	27.1644 37.6844	27.8719	28.9437 40.8916	30.1750 42.4952	31.1805 44.0988	
Average daily				39.2000	37.0044	30.0000	30.0000	37.0044	39.2000	40.0910	42.4552	152.6118	
Daily hot wat		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte Energy conten		162.5387 231.4530	158.2972 243.2969	151.6918 207.6584	146.3839 197.0608	140.6551 172.9518	138.3386 167.3085	142.5606 176.5198	147.0296 181.3022	153.0588 207.6993 Total = S	159.7706 227.6225 um(45)m =	165.5154 259.1572 2534.8836	
Distribution	39.4280	= 0.15 x (34.7180	45)m 36.4945	31.1488	29.5591	25.9428	25.0963	26.4780	27.1953	31.1549	34.1434	38.8736	(46)
Water storage Store volume a) If manufa		ared loss f	actor is kn	own (kWh/	4au) •							210.0000	
Temperature Enter (49) or	factor fro (54) in (5	m Table 2b		(2011/	27 -							0.5400 0.9558	(49)
Total storage	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	(56)
If cylinder c	29.6298 23.2624	26.7624 21.0112	29.6298 23.2624	28.6740 22.5120	29.6298 23.2624	28.6740 22.5120	29.6298 23.2624	29.6298 23.2624	28.6740 22.5120	29.6298 23.2624	28.6740 22.5120	29.6298 23.2624	
Combi loss Total heat re	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
WWHRS	315.7454 0.0000	279.2266 0.0000	296.1891 0.0000	258.8444 0.0000	249.9530 0.0000	224.1378 0.0000	220.2007 0.0000	229.4120 0.0000	232.4882	260.5915 0.0000	278.8085 0.0000	312.0494 0.0000	(63a)
PV diverter Solar input FGHRS	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	(63c)
Output from w		279.2266	296.1891	258.8444	249.9530	224.1378	220.2007	229.4120	232.4882	260.5915	278.8085	312.0494	
12Total per y		ar)						Total p	er year (kW	h/year) = S	um (64) m =	3157.6466 3158	
Electric show	0.0000	0.0000	0.0000	0.0000	0.0000 al Energy u	0.0000	0.0000	0.0000	0.0000 wer(s) (bWh	0.0000 /wear) = Su	0.0000 m(64a)m =	0.0000	
Heat gains fr		ating, kWh/ 115.1770		109.9952	107.8365	98.4553	97.9438	101.0066	101.2318	111.3738	116.6333	128.4835	
Metabolic gai	ains (see T	able 5 and	5a)										
Metabolic gai	ains (see T ns (Table 5 Jan 143.8766	able 5 and), Watts Feb 143.8766	5a) Mar 143.8766	Apr 143.8766	May 143.8766	Jun 143.8766			Sep 143.8766	Oct 143.8766	Nov 143.8766	Dec 143.8766	(66)
Metabolic gai (66)m Lighting gain	ains (see T ns (Table 5 Jan 143.8766 s (calculat 146.4397	able 5 and), Watts Feb 143.8766 ed in Appen 162.1297	Mar 143.8766 dix L, equa 146.4397	Apr 143.8766 tion L9 or 151.3211	May 143.8766 L9a), also: 146.4397	Jun 143.8766 see Table 5 151.3211	Jul 143.8766 146.4397	Aug 143.8766		143.8766			
Metabolic gai	ains (see T ns (Table 5 Jan 143.8766 s (calculat 146.4397 ins (calcul 290.3331	able 5 and), Watts Feb 143.8766 ed in Appen 162.1297 ated in App 293.3459	Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913	May 143.8766 L9a), also: 146.4397 or L13a), a. 249.1890	Jun 143.8766 see Table 5 151.3211 lso see Tab 230.0137	Jul 143.8766 146.4397 le 5 217.2035	Aug 143.8766 146.4397	143.8766 151.3211	143.8766 146.4397	143.8766	143.8766	(67)
Metabolic gain (66)m Lighting gain Appliances ga Cooking gains Pumps, fans	ains (see T Table 5 Jan 143.8766 s (calculat 146.4397 ins (calcul 290.3331 (calculate 37.3877 0.0000	able 5 and), Watts Feb 143.8766 ed in Appen 162.1297 ated in App 293.3459 d in Append 37.3877 0.0000	Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 dix L, equat 37.3877 0.0000	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000	May 143.8766 L9a), also: 146.4397 or L13a), a. 249.1890	Jun 143.8766 see Table 5 151.3211 lso see Tab 230.0137 see Table	Jul 143.8766 146.4397 le 5 217.2035	Aug 143.8766 146.4397 214.1907 37.3877	143.8766 151.3211	143.8766 146.4397	143.8766 151.3211	143.8766 146.4397	(67) (68) (69)
Metabolic gai (66)m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e	ains (see T S (Table 5 Jan 143.8766 6 (calculat 146.4397 ins (calcul 290.3331 (calculate 37.3877 0.0000 vaporation -115.1013	able 5 and	Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 dix L, equat 37.3877 0.0000 ralues) (Tab	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5)	May 143.8766 L9a), also: 146.4397 or L13a), a: 249.1890 L15a), also 37.3877	Jun 143.8766 see Table 5 151.3211 Iso see Tab 230.0137 see Table 37.3877 0.0000	Jul 143.8766 146.4397 le 5 217.2035 5 37.3877 0.0000	Aug 143.8766 146.4397 214.1907 37.3877 0.0000	143.8766 151.3211 221.7828 37.3877 0.0000	143.8766 146.4397 237.9453 37.3877 0.0000	143.8766 151.3211 258.3476 37.3877 0.0000	143.8766 146.4397 277.5229 37.3877 0.0000	(67) (68) (69) (70)
Metabolic gain (66)m Lighting gain Appliances ga Cooking gains Pumps, fans	ains (see T 	able 5 and	Mar 143.8766 dix L, equa 146.4397 endix L, equa 285.7539 dix L, equat 37.3877 0.0000 alues) (Tab -115.1013	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 0.0000	Jun 143.8766 see Table 5 151.3211 lso see Table 230.0137 see Table 37.3877 0.0000	Jul 143.8766 146.4397 le 5 217.2035 5 37.3877 0.0000	Aug 143.8766 146.4397 214.1907 37.3877 0.0000	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013	(67) (68) (69) (70) (71)
Metabolic gai (66)m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e	ains (see T	able 5 and	Mar 143.8766 dix L, equa 146.4397 vendix L, eq 285.7539 dix L, equat 37.3877 0.0000 values) (Tab -115.1013	Apr 143.8766 tion L9 or 151.3211 vaction L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013	May 143.8766 L9a), also: 146.4397 or L13a), a: 249.1890 L15a), also 37.3877 0.0000	Jun 143.8766 see Table 5 151.3211 lso see Tab 230.0137 see Table 37.3877 0.0000 -115.1013	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929	(67) (68) (69) (70) (71) (72)
Metabolic gai (66)m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna	ains (see T	able 5 and	Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 lix L, equa 37.3877 0.0000 alues) (Tab -115.1013 165.6048 663.9614	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 ile 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 0.0000 -115.1013 144.9415 606.7333	Jun 143.8766 see Table 5 151.3211 Sso see Tab 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929	(67) (68) (69) (70) (71) (72)
Metabolic gai (66)m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e	ains (see T	able 5 and	Mar 143.8766 dix L, equa 146.4397 endix L, equa 285.7539 dix L, equat 37.3877 0.0000 alues) (Tab -115.1013 165.6048 663.9614	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 0.0000 -115.1013 144.9415 606.7333	Jun 143.8766 see Table 5 151.3211 lso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412	Jul 143.8766 146.4397 le 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929	(67) (68) (69) (70) (71) (72)
Metabolic gai (66)m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna	ains (see T	able 5 and	5a) Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 lix L, equat 37.3877 0.0000 alues) (Tab -115.1013 165.6048 663.9614	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 ile 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 0.0000 -115.1013 144.9415 606.7333	Jun 143.8766 see Table 5 151.3211 Iso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907 637.8223	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929	(67) (68) (69) (70) (71) (72)
Metabolic gai (66)m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna	ains (see T. Jan 143.8766 s (calculat 146.4397 o.0000 vaporation -115.1013 gains (Tab 174.3447 l gains 677.2805	able 5 and	Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 dix L, equat 37.3877 0.0000 alues) (Tab 663.9614	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 0.0000 -115.1013 144.9415 606.7333	Jun 143.8766 see Table 5 151.3211 Iso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959 600.2440 Acce fact Table	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907 637.8223	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929 662.8185	(67) (68) (69) (70) (71) (72) (73)
Metabolic gai (66) m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna	mins (see T- ms (Table 5 Jan 143.8766 s (calculat 146.4397 ins (calcul) 290.3331 (calculate 37.3877 0.0000 vaporation -115.1013 gains (Tab 174.3447 l gains 677.2805	able 5 and	5a) Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 dix L, equat 37.3877 0.0000 alues) (Tab 663.9614 A 4.0 30.55 15.5	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also 146.4397 or L13a), a 249.1890 L15a), also 37.3877 0.0000 -115.1013 144.9415 606.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938	Jun 143.8766 see Table 5 151.3211 Iso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959 600.2440	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907 637.8223	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929 662.8185	(67) (68) (69) (70) (71) (72) (73)
Metabolic gai (66) m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna 6. Solar gain [Jan] Northeast Southeast Southwest	ains (see T	able 5 and	5a) Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 dix L, equas 37.3877 0.0000 calues) (Tab 663.9614 4.0 30.5 15.5	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 0.0000 -115.1013 144.9415 606.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938	Jun 143.8766 see Table 5 151.3211 lso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 fic data Table 6b 0.5700 0.5700 0.5700	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .8000	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959 600.2440 Acce fact Table 0.77 0.77	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907 637.8223 ss or 6d 00 00 00 659.6353	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929 662.8185 Gains W 14.3333 354.8605 180.8021	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83)
Metabolic gai (66)m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna 6. Solar gain [Jan] Northeast Southeast Southwest	ains (see T	able 5 and	5a) Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 dix L, equas 37.3877 0.0000 calues) (Tab 663.9614 4.0 30.5 15.5	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 0.0000 -115.1013 144.9415 606.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938	Jun 143.8766 see Table 5 151.3211 lso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 fic data Table 6b 0.5700 0.5700 0.5700	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .8000	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959 600.2440 Acce fact Table 0.77 0.77	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907 637.8223 ss or 6d 00 00 00 659.6353	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929 662.8185 Gains W 14.3333 354.8605 180.8021	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83)
Metabolic gai (66) m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna 6. Solar gain [Jan] Northeast Southeast Southwest	mins (see T- ns (Table 5 Jan 143.8766 s (calculat 146.4397 ins (calculate 37.3877 0.0000 vaporation -115.1013 gains (Table 174.3447 1 gains 677.2805	able 5 and	5a) Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 lix L, equat 37.3877 0.0000 alues) (Tab -115.1013 165.6048 663.9614	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also 146.4397 or L13a), a 249.1890 L15a), also 37.3877 0.0000 -115.1013 144.9415 606.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938 36.7938	Jun 143.8766 see Table 5 151.3211 Iso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci or	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 fic data Table 6b 0.5700 0.5700 0.5700	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .8000	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959 600.2440 Acce fact Table 0.77 0.77	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907 637.8223 ss or 6d 00 00 00 659.6353	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929 662.8185 Gains W 14.3333 354.8605 180.8021	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83)
Metabolic gai (66)m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna 6. Solar gain [Jan] Northeast Southeast Southeast Southeast Southast Total gains 7. Mean inter	mins (see T- ms (Table 5 Jan 143.8766 s (calculat 146.4397 ins (calculat 290.3331 (calculate 37.3877 0.0000 vaporation -115.1013 gains (Tab 174.3447 l gains 677.2805	able 5 and	5a) Mar 143.8766 dix L, equa 146.4397 endix L, equa 285.7539 dix L, equat 37.3877 0.0000 alues) (Tab -115.1013 165.6048 663.9614 A.0.0 30.5 15.5 1300.9943 1964.9556	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also 146.4397 or L13a), a 249.1890 L15a), also 37.3877 0.0000 -115.1013 144.9415 606.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938 36.7938	Jun 143.8766 see Table 5 151.3211 Iso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci or	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 fic data Table 6b 0.5700 0.5700 0.5700	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab 0 0 0 1612.0293 2174.5843	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .8000	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959 600.2440 Acce fact Table 0.77 0.77	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907 637.8223 ss or 6d 00 00 00 659.6353	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929 662.8185 Gains W 14.3333 354.8605 180.8021 470.1209 1132.9394	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83) (84)
Metabolic gai (66) m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna 6. Solar gain [Jan] Northeast Southeast Southwest Solar gains Total gains Total gains	ains (see T ns (Table 5 Jan 143.8766 s (calculat 146.4397 ins (calculate 37.3877 0.0000 vaporation -115.1013 gains (Table 174.3447 l gains 677.2805	able 5 and	5a) Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 lix L, equat 37.3877 0.0000 alues) (Tab -115.1013 165.6048 663.9614 4.00 30.5 15.5 1300.9943 1964.9556	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also 146.4397 or L13a), a 249.1890 L15a), also 37.3877 0.0000 -115.1013 144.9415 606.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938 36.7938 1848.6578 2455.3910	Jun 143.8766 see Table 5 151.3211 Iso see Tab 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci or 1843.7994 2428.0407	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 fic data Table 6b 0.5700 0.5700 0.5700	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .8000	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959 600.2440 Acce fact Table 0.77 0.77 0.77 1044.0865 1644.3304	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907 637.8223 ss or 6dd 00 00 00 659.6353 1297.4576	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929 662.8185 Gains W 14.3333 354.8605 180.8021 470.1209 1132.9394	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83) (84)
Metabolic gai (66) m Lighting gain Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna 6. Solar gain [Jan] Northeast Southeast Southeast Southwest 7. Mean interna 7. Mean interna	ains (see T	able 5 and	5a) Mar 143.8766 dix L, equa 146.4397 endix L, eq 285.7539 dix L, equat 37.3877 0.0000 calues) (Tab -115.1013 165.6048 663.9614 A 4.0 30.5 15.5 1300.9943 1964.9556	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 0.0000 le 5) -115.1013 152.7711 639.8465	May 143.8766 L9a), also 146.4397 or L13a), a 249.1890 L15a), also 37.3877 0.0000 -115.1013 144.9415 606.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938 36.7938 2455.3910	Jun 143.8766 see Table 5 151.3211 lso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci or 1843.7994 2428.0407 Th1 (C) Jun 35.8214	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 gfic data Table 6b 0.5700 0.5700 0.5700 1774.0779 2335.5290	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab 0 0 0 1612.0293 2174.5843	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .415.8363 1995.7028	143.8766 146.4397 237.9453 37.3877 0.0000 -115.1013 149.6959 600.2440 Acce fact Table 0.77 0.77 1044.0865 1644.3304	143.8766 151.3211 258.3476 37.3877 0.0000 -115.1013 161.9907 637.8223 ss or 6d 00 00 059.6353 1297.4576	143.8766 146.4397 277.5229 37.3877 0.0000 -115.1013 172.6929 662.8185 Gains W 14.3333 354.8605 180.8021 470.1209 1132.9394 21.0000 Dec 34.8004	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83) (84)

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	0.9126	0.8267	0.7174	0.5699	0.4274	0.3004	0.2164	0.2418	0.3903	0.6449	0.8502	0.9277	(86)
Living Non living 24 / 16	19.8705 18.7981 0	20.2309 19.2367 0	20.5292 19.5899 0	20.7575 19.8581 0	20.8597 19.9678 0	20.8983 20.0172 0	20.9065 20.0236 0	20.9054 20.0257 0	20.8822 19.9990 0	20.7211 19.8290 0	20.2774 19.3122 0	19.8020 18.7217 0	
24 / 9 16 / 9 MIT	28 20.4222	0 0 20.2309	0 0 20.5292	0 0 20.7575	0 0 20.8597	0 0 20.8983	0 0 20.9065	0 0 20.9054	0 0 20.8822	0 0 20.7211	0 0 20.2774	0 10 19.9696	
Th 2 util rest of h	20.1084 house 0.9009	0.8075	0.6909	20.1263 0.5372	0.3909	20.1416	20.1416	0.1974	20.1365	0.6062	20.1237	20.1186	
MIT 2 Living area fi	19.5860	19.2367	19.5899	19.8581	19.9678	20.0172	20.0236	20.0257	19.9990	19.8290 Living are	19.3122	18.9734 0.4508	(90)
MIT Temperature ac	19.9630	19.6849	20.0133	20.2636	20.3699	20.4144	20.4216	20.4223	20.3971	20.2312	19.7473	19.4225	
adjusted MIT		19.6849	20.0133	20.2636	20.3699	20.4144	20.4216	20.4223	20.3971	20.2312	19.7473	19.4225	(93)
8. Space heat:													
Utilication	Jan 0.8989	Feb 0.7974	Mar	Apr	May 0.4011	Jun	Jul 0.1883	Aug 0.2119	Sep 0.3585	Oct 0.6109	Nov 0.8200	Dec 0.9088	(94)
Utilisation Useful gains Ext temp. Heat loss rate	1103.1409 4.3000		0.6877 1351.3087 6.5000	0.5425 1233.1001 8.9000	984.9476 11.7000	0.2737 664.6712 14.6000	439.7049 16.6000	460.7069 16.4000	715.4624	1004.5619			(95)
Space heating	1883.8953	1772.7198	1615.1749	1336.8568	1016.7011	670.9114	440.9665	462.6089	731.3458	1129.4245	1492.6415	1808.0115	(97)
Space heating Space heating Solar heating	580.8813 requiremen		196.3165 er year (kW)	74.7049 h/year)	23.6246	0.0000	0.0000	0.0000	0.0000	92.8978	308.6720	579.1383 2171.5352	(98a)
Solar heating Space heating	0.0000 contributi	0.0000 on - total p	0.0000 per year (k	0.0000 Wh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Space heating	580.8813	315.2998 t after sola		74.7049 tion - total	23.6246 L per year	0.0000 (kWh/year)	0.0000	0.0000	0.0000	92.8978	308.6720	579.1383 2171.5352	(98c)
Space heating	per m2									(98c) / (4) =	17.5124	(99)
9a. Energy red	quirements	- Individua	l heating s	ystems, incl	luding micr	O-CHP							
Fraction of sp Fraction of sp Efficiency of Efficiency of	pace heat f pace heat f main space main space	rom seconda: rom main sy: heating sy: heating sy:	ry/supplements stem(s) stem 1 (in stem 2 (in stem 2)	ntary system %) %)								0.0000 1.0000 274.2634 0.0000	(202) (206) (207)
Efficiency of	Jan	Feb	ry neating : Mar	system, * Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	0.0000 Dec	(208)
Space heating	requiremen			74.7049	23.6246	0.0000	0.0000	0.0000	0.0000	92.8978	308.6720	579.1383	(98)
Space heating	efficiency	(main heat:		1)	274.2634	0.0000	0.0000	0.0000	0.0000	274.2634	274.2634	274.2634	
Space heating	fuel (main			27.2384	8.6139	0.0000	0.0000	0.0000	0.0000	33.8717	112.5458	211.1614	
Space heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating Water heating	requiremen	+											
Efficiency of	315.7454	279.2266	296.1891	258.8444	249.9530	224.1378	220.2007	229.4120	232.4882	260.5915	278.8085	312.0494 279.6279	
	279.6279	279.6279	279.6279	279.6279	279.6279	279.6279	279.6279	279.6279	279.6279	279.6279	279.6279	279.6279	
Space cooling		rement	105.9226	92.5675	89.3877		78.7478	82.0419	83.1420	93.1923	99.7070		
(221)m Pumps and Fa	0.0000 42.3221	0.0000 38.2264	0.0000 42.3221	0.0000 40.9569	0.0000 42.3221	40.9569	0.0000 42.3221	0.0000 42.3221	0.0000 40.9569	0.0000 42.3221	0.0000 40.9569	0.0000 42.3221	(231)
Lighting Electricity ge		22.7135 PVs (Append -57.1881					10.5578	13.7234	17.8253	23.3878	26.4164		
(233a)m Electricity ge (234a)m		wind turbin					0.0000	-96.7059 0.0000	-82.7267	-66.1839 0.0000	-43.0555 0.0000	-32.9691	
Electricity ge (235a)m		hydro-elect						0.0000	0.0000	0.0000	0.0000	0.0000	
Electricity us (235c)m		electricity				N) (negati			0.0000	0.0000	0.0000		(235c)
Electricity ge	enerated by		dix M) (neg	ative quanti	ity)				-73.7364	-40.6620	-16.3543	-8.9448	
Electricity ge (234b)m		wind turbing				ty)	0.0000	0.0000	0.0000	0.0000	0.0000		(234b)
Electricity ge						gative quant		0.0000	0.0000	0.0000	0.0000	0.0000	
Electricity us (235d)m						N) (negati			0.0000	0.0000	0.0000	0.0000	
Annual totals Space heating	kWh/year											791.7701	
Space heating Space heating	fuel - mai	n system 2										0.0000	(213)
Efficiency of Water heating	water heat											279.6279 1129.2317	(219)
Space cooling	fuel											0.0000	
	WithHeatRec	overy, Datal		e factor = 1	L.1000, SFE	e = 1.2430)							
Total electric	city for th		h/year	2430)								498.3088 498.3088	(231)
Electricity fo												228.5002	(232)
Energy saving, PV generation		technologie	es (Appendi	ces M ,N and	i Q)							-1727.2394	
Wind generation Hydro-electric	c generatio											0.0000	(235a)
Electricity ge Appendix Q - s			whheuarx N)									0.0000	(233)

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Energy saved or Energy used Total delivered		r all uses										-0.0000 0.0000 920.5713	(237)
12a. Carbon diox	kide emiss	ions - Indi	vidual heat:	ing systems		micro-CHP							
								Energy kWh/year	kg		k	Emissions g CO2/year	
Space heating - Total CO2 associ Water heating (c	iated with	community :	systems					791.7701		0.1578		124.9210 0.0000 159.2364	(373)
Space and water Pumps, fans and	heating							498.3088		0.1387		284.1573 69.1216	(265)
Energy for light Energy saving/g		tochnologi	0.5					228.5002		0.1443		32.9796	(268)
PV Unit electric	city used	in dwelling						-927.4925 -799.7469		0.1337 0.1242		-124.0139 -99.3377	
Total Total CO2, kg/ye EPC Dwelling Car	ear		Pate (DER)									-223.3516 162.9069 1.3100	(272)
DIO DWOILING OUL	2000 210011	do 2.112022011	11400 (2211)									1.0100	(270)
13a. Primary ene	ergy - Ind	ividual hear	ting systems	s including	micro-CHP								
								Energy 1	Primary energy kg			nary energy kWh/year	
Space heating - Total CO2 associ	iated with	community :	systems					791.7701		1.5840		1254.1464	(275) (473)
Water heating (c Space and water	heating							1129.2317 498.3088		1.5214		1718.0366 2972.1830 753 8415	(279)
Pumps, fans and Energy for light	erectric ing	reeh-uor						498.3088 228.5002		1.5128 1.5338		753.8415 350.4812	
Energy saving/g PV Unit electric PV Unit electric	city used	in dwelling						-927.4925 -799.7469		1.4941 0.4559		-1385.7826 -364.5905 -1750.3731	
Total Total Primary en Dwelling Primary												2326.1326 18.7600	(286)
1 Overall dual													
1. Overall dwell	ling chara	cteristics						Area	Storey	y height		Volume	
Ground floor Total floor area	a TFA = (1	a) + (1b) + (1c))+(1d)+(1e)	(1n)	1	24.0000		(m2) 124.0000	(1b) x	(m) 2.6500	(2b) =	(m3) 328.6000	(1b) - (3b
Dwelling volume								(3a	a)+(3b)+(3c)+	(3d) + (3e)	(3n) =	328.6000	(5)
2. Ventilation r													
											n	3 per hour	
Number of open of Number of open f											0 * 80 = 0 * 20 =	0.0000	
Number of chimne Number of flues	eys / flue attached	to solid fue	el boiler	ire							0 * 10 = 0 * 20 =	0.0000	(6c) (6d)
Number of flues Number of blocke Number of interm	ed chimney	S	ater								0 * 35 = 0 * 20 = 4 * 10 =	0.0000 0.0000 40.0000	(6f)
Number of passiv Number of fluele	e vents										0 * 10 = 0 * 40 =	0.0000	(7b)
Infiltration due			and fonc	= (60)±/65)	+(60)+(64)+	(60)±(64);	6a) + 17a) + 17	h)+(7a) =		40 0000	Air change	s per hour 0.1217	(8)
Pressure test Pressure Test Me		∟y∍, ⊥⊥ues a	unu taliS =	- (ua) + (bb)	, (UC) + (BQ) +	(UE) T (UI) + (og, 1 (/a) + (/.	ω) · (/ ∪) =		-10.0000		Yes Slower Door	
Measured/design Infiltration rat Number of sides	te											5.0000 0.3717 1	
Shelter factor Infiltration rat	ie adjuste	d to include	e shelter fa	actor					(20) = 1 - (21)		x (19)] = x (20) =	0.9250 0.3438	
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000	(22)
Wind factor Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Effective ac	0.4384 0.5961	0.4298 0.5924	0.4212 0.5887	0.3782 0.5715	0.3696 0.5683	0.3267 0.5534	0.3267 0.5534	0.3181 0.5506	0.3438 0.5591	0.3696 0.5683			

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Element TER Opaque door TER Opening Type (Uw = 1.20) external wall corridor wall external roof Total net area of external elements Aum(A, m2 Fabric heat loss, W/K = Sum (A x U) Party Wall 1	m2 99.6400 29 29.6800 2 124.0000	m2 29.0000 70.0000 2°.122.255	m2 2.0000 2.0000 0.6400 0.6800 4.0000 3.3200 (26)	U-value W/m2K 1.0000 1.1450 0.1800 0.1800 0.1100 (30) + (32) 0.0000	A x W 2.00 33.20 12.71 4.98 13.64 = 66.54 0.00	/K 000 61 52 24 00	K-value kJ/m2K	A x K kJ/K	(26) (27) (29a) (29a) (30) (31) (33) (32)
Thermal mass parameter (TMP = Cm / TFA) in kJ List of Thermal Bridges K1 Element E2 Other lintels (including other ste E3 Sill E4 Jamb E7 Party floor between dwellings (in E14 Flat roof E16 Corner (normal) E17 Corner (inverted - internal area E18 Party wall between dwellings Thermal bridges (Sum(L x Psi) calculated usin Point Thermal bridges Total fabric heat loss	el lintels) blocks of flats) greater than externa	al area)		21 21 33 48 48 21 15	.1000 .1000 .3000 .8000 .8000 .2000 .9000	Psi-value 0.0500 0.0500 0.05500 0.0700 0.0800 0.0900 -0.0900 0.0600 33) + (36)	Tot 1.05 1.05 1.66 3.41 3.90 1.90 -1.47 0.31 (36a) = + (36a) =	50 550 60 40 80	(36) (36a)
Ventilation heat loss calculated monthly (38) Jan Feb Mar	m = 0.33 x (25) m x Apr May	(5) Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m 64.6399 64.2353 63.8386 Heat transfer coeff	61.9756 61.63	270 60.0044	60.0044	59.7039	60.6294	61.6270	62.3322	63.0694	
143.2237 142.8190 142.4224 Average = Sum(39)m / 12 =	140.5593 140.23	138.5881	138.5881	138.2876	139.2131	140.2108	140.9159	141.6531 140.5577	(39)
Jan Feb Mar		Jun 1.1176 31 30	Jul 1.1176 31	Aug 1.1152 31	Sep 1.1227 30	Oct 1.1307 31	Nov 1.1364 30	Dec 1.1424 1.1335 31	(40)
4. Water heating energy requirements (kWh/yea	r)							2.8775	(42)
72.4666 71.3776 69.7906 Hot water usage for baths	66.7543 64.5	136 62.0148	60.5944	62.1693	63.8958	66.5787	69.6803	72.1889	(42a)
31.2862 30.8216 30.1673 Hot water usage for other uses			26.5147	27.1644	27.8719	28.9437	30.1750	31.1805	
44.0988 42.4952 40.8916 Average daily hot water use (litres/day)	39.2880 37.6	36.0808	36.0808	37.6844	39.2880	40.8916	42.4952	44.0988 135.9089	
Jan Feb Mar Daily hot water use	Apr May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
147.8516 144.6944 140.8495 Energy conte 234.1608 206.0428 216.4805 Energy content (annual)			123.1900 148.9876	127.0182 157.2751	131.0557 161.6048	136.4141 185.1126 Total = 8	142.3505 202.8044 Sum(45)m =	147.4682 230.8996 2257.4179	
Distribution loss (46)m = 0.15 x (45)m 35.1241 30.9064 32.4721	27.7219 26.30	23.0832	22.3481	23.5913	24.2407	27.7669	30.4207	34.6349	(46)
Water storage loss: Store volume a) If manufacturer declared loss factor is k Temperature factor from Table 2b Enter (49) or (54) in (55) Total storage loss	nown (kWh/day):							210.0000 1.7016 0.5400 0.9188	(48) (49)
28.4842 25.7277 28.4842 If cylinder contains dedicated solar storage	27.5653 28.48	342 27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842	(56)
28.4842 25.7277 28.4842 Primary loss 23.2624 21.0112 23.2624 Combi loss 0.0000 0.0000 0.0000 Total heat required for water heating calcula	22.5120 23.20 0.0000 0.00	524 22.5120	28.4842 23.2624 0.0000	28.4842 23.2624 0.0000	27.5653 22.5120 0.0000	28.4842 23.2624 0.0000		28.4842 23.2624 0.0000	(59)
285,9074 252.7817 268.2270 WWHRS -33.1287 -29.2993 -30.6805 PV diverter -0.0000 -0.0000 -0.0000 Solar input 0.0000 0.0000 0.0000 FGHRS 0.0000 0.0000 0.0000 Output from w/h	234.8899 227.09 -25.4047 -23.66 -0.0000 -0.00 0.0000 0.00	763 -20.2599 000 -0.0000 000 0.0000 000 0.0000	-0.0000 0.0000 0.0000	-20.1945 -0.0000 0.0000 0.0000	-20.9617 -0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-27.9952 -0.0000 0.0000 0.0000	-32.5152 -0.0000 0.0000 0.0000	(63a) (63b) (63c) (63d)
252.7787 223.4824 237.5465 12Total per year (kWh/year) Electric shower(s)	209.4852 203.4.	193 183.7056	181.7437				224.8865 Sum(64)m =	2558.8743	
0.0000 0.0000 0.0000		0.0000 gy used by inst				0.0000 /year) = Si		0.0000	
Heat gains from water heating, kWh/month 119.2558 105.9003 113.3770				93.6912			107.4943	118.1714	(65)
5. Internal gains (see Table 5 and 5a) Metabolic gains (Table 5), Watts					0	0	N	Dee	
Jan Feb Mar (66)m 143.8766 143.8766 143.8766 Lighting gains (calculated in Appendix L, equ		766 143.8766		Aug 143.8766	Sep 143.8766	Oct 143.8766	Nov 143.8766	Dec 143.8766	(66)
146.4397 162.1297 146.4397 Appliances gains (calculated in Appendix L, e	151.3211 146.43 quation L13 or L13a	397 151.3211 , also see Tak	146.4397 ole 5			146.4397		146.4397	
290.3331 293.3459 285.7539 Cooking gains (calculated in Appendix L, equa	269.5913 249.18 tion L15 or L15a), a	390 230.0137 also see Table	217.2035 5			237.9453		277.5229	
37.3877 37.3877 37.3877 Pumps, fans 3.0000 3.0000 3.0000	3.0000 3.00		37.3877 0.0000	37.3877 0.0000	37.3877 0.0000	37.3877 3.0000		37.3877 3.0000	
Losses e.g. evaporation (negative values) (Ta -115.1013 -115.1013 -115.1013 Water heating gains (Table 5)		013 -115.1013	-115.1013	-115.1013	-115.1013	-115.1013	-115.1013	-115.1013	(71)
### ##################################	140.9890 134.00	126.7079	122.2253	125.9291	130.2715	138.3699	149.2977	158.8325	(72)
666.2258 682.2283 653.7450	631.0643 598.7	982 574.2057	552.0315	552.7225	569.5383	591.9179	628.1293	651.9581	(73)

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6. Solar gains					
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[Jan]			rea m2	Solar flux Table 6a W/m2	Speci or		Specific or Tab		Acce fact Table	or	Gains W	
Northeast Southeast Southwest		2.33 17.6 9.00	300 700			0.6300 0.6300 0.6300	0	.7000 .7000 .7000	0.77 0.77 0.77	00	8.0343 198.6934 101.2021	(77)
Solar gains 307.9298 52 Total gains 974.1556 120		728.4088 1382.1538		1035.0660 1633.8642		993.3116 1545.3431	902.5714 1455.2939		584.5652 1176.4831	369.3149 997.4442	263.2093 915.1673	
7. Mean internal temperature												
Temperature during heating p Utilisation factor for gains	periods i	in the livi	ng area fro	m Table 9, 5							21.0000	(85)
tau 28.8593 2	Feb 28.9411 2.9294	Mar 29.0217 2.9348	Apr 29.4063 2.9604	May 29.4794 2.9653	Jun 29.8246 2.9883	Jul 29.8246 2.9883	Aug 29.8894 2.9926	Sep 29.6907 2.9794	Oct 29.4794 2.9653	Nov 29.3319 2.9555	Dec 29.1793 2.9453	
util living area	0.9215	0.8718	0.7821	0.6584	0.5059	0.3794	0.4156	0.6074	0.8216	0.9282	0.9623	(86)
	19.2617 19.9588	19.7368 19.9614	20.2740 19.9735	20.6630 19.9758	20.8899 19.9864	20.9651 19.9864	20.9537 19.9884	20.8028 19.9823	20.2741 19.9758	19.4774 19.9712	18.7941 19.9664	
util rest of house 0.9486	0.9095	0.8525	0.7501	0.6097	0.4382	0.2976	0.3319	0.5405	0.7877	0.9152	0.9561	(89)
Living area fraction	17.9808 18.5582	18.5688	19.2216	19.6648	19.9057 20.3494	19.9686 20.4179	19.9632	19.8254 fLA = 20.2660	19.2408 Living are 19.7066	18.2670 a / (4) = 18.8127	17.4016 0.4508 18.0294	(91)
Temperature adjustment	18.5582	19.0954	19.6960	20.1148	20.3494	20.4179	20.4097	20.2660	19.7066	18.8127	0.0000	
8. Space heating requirement												
Utilisation 0.9317	Feb 0.8894	Mar 0.8336	Apr 0.7406	May 0.6167	Jun 0.4632	Jul 0.3331	Aug 0.3676	Sep 0.5601	Oct 0.7776	Nov 0.8966	Dec 0.9404	
Useful gains 907.5922 107 Ext temp. 4.3000 Heat loss rate W	4.9000	6.5000	8.9000	11.7000	744.1851 14.6000	514.7691 16.6000	534.9565 16.4000	763.0154 14.1000	914.7771 10.6000	894.2932 7.1000	860.6277 4.2000	
1976.4950 195 Space heating kWh					796.7934	529.1111	554.4916		1276.8466			
795.2637 58 Space heating requirement - Solar heating kWh			268.4570 h/year)	128.1308	0.0000	0.0000	0.0000	0.0000	269.3797	544.4711	817.1686 3888.3175	(98a)
	0.0000 - total p	0.0000 per year (ki	0.0000 Wh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Space heating kWh 795.2637 58 Space heating requirement af					0.0000 (kWh/year)	0.0000	0.0000	0.0000	269.3797	544.4711	817.1686 3888.3175	(98c)
Space heating per m2									(98c) / (4) =	31.3574	(99)
9a. Energy requirements - Ir	ndividual	l heating s	ystems, inc	luding micro	o-CHP							
Fraction of space heat from Fraction of space heat from Efficiency of main space heat Efficiency of main space heat Efficiency of secondary/supp	main sys ating sys ating sys	stem(s) stem 1 (in s stem 2 (in s	%)	m (Table 11)						0.0000 1.0000	
Jan		rv neating :									92.3000 0.0000	(206) (207)
Space heating requirement	Feb	ry neating : Mar		May	Jun	Jul	Aug	Sep	Oct	Nov	92.3000	(206) (207)
795.2637 58	87.9764	Mar 477.4703	Apr 268.4570	May 128.1308	Jun 0.0000	Jul 0.0000	Aug 0.0000	Sep 0.0000	Oct 269.3797	Nov 544.4711	92.3000 0.0000 0.0000 Dec	(206) (207) (208)
Space heating efficiency (ma	87.9764 ain heati 92.3000	Mar 477.4703 ing system 3 92.3000	Apr 268.4570	=			=	-	269.3797		92.3000 0.0000 0.0000 Dec	(206) (207) (208)
Space heating efficiency (ma 92.3000 Space heating fuel (main heat 861.6075 GS Space heating efficiency (ma 92.3000 Space heatin	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati	Mar 477.4703 ing system 1 92.3000 stem) 517.3026 ing system 2	Apr 268.4570 1) 92.3000 290.8526 2)	128.1308 92.3000 138.8199	0.0000 0.0000 0.0000	0.0000	0.0000	0.0000	269.3797 92.3000 291.8523	544.4711 92.3000 589.8928	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398	(206) (207) (208) (98) (210) (211)
Space heating efficiency (mag 92.3000 g 92.30000 g 92.300000 g 92.30000 g 92.300000 g 92.30000 g 92.30000000 g 92.30000 g 92.300000 g 92.30000 g 92.300000 g 92.30000 g 92.3000000000 g 92.3000000000000000000000000000000000000	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys	Mar 477.4703 ing system : 92.3000 stem) 517.3026 ing system : 0.0000 stem 2)	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000	128.1308 92.3000 138.8199 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	269.3797 92.3000 291.8523 0.0000	544.4711 92.3000 589.8928 0.0000	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000	(206) (207) (208) (98) (210) (211) (212)
Space heating efficiency (ma 92.3000 °S pace heating fuel (main hea 861.6075 63 pace heating efficiency (ma 0.0000 °S pace heating fuel (main hea 0.0000 °S pace heating fuel (secondary fuel (secondary fuel (secondary fuel (secondary fuel secondary fuel (secondary fuel secondary fuel (secondary fuel secondary fuel secondary fuel secondary fuel secondary fuel secondary fuel secondary fuel fuel fuel fuel fuel fuel fuel fuel	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.0000	Mar 477.4703 ing system 92.3000 stem) 517.3026 ing system 0.0000	Apr 268.4570 1) 92.3000 290.8526 2)	128.1308 92.3000 138.8199	0.0000 0.0000 0.0000	0.0000	0.0000	0.0000	269.3797 92.3000 291.8523	544.4711 92.3000 589.8928	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398	(206) (207) (208) (98) (210) (211) (212) (213)
Space heating efficiency (may 22.3000 good per leading fuel (main heat 861.6075 63 good heating efficiency (may 0.0000 good heating fuel (main heat 0.0000 good heating fuel (secondar 0.0000 good heating fuel (secondar 0.0000 good heating fuel (secondar 0.0000 good fuel (secondar 0.0000 good fuel fuel fuel fuel fuel fuel fuel fuel	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.0000 ry)	Mar 477.4703 ing system 92.3000 stem) 517.3026 ing system 0.0000 stem 2) 0.0000	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000 0.0000	128.1308 92.3000 138.8199 0.0000	0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000	269.3797 92.3000 291.8523 0.0000	544.4711 92.3000 589.8928 0.0000 0.0000	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000	(206) (207) (208) (98) (210) (211) (212) (213)
Space heating efficiency (mg 92.3000 95	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.0000 ry) 0.0000	Mar 477.4703 ing system 92.3000 stem) 517.3026 ing system 0.0000 stem 2) 0.0000	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000 0.0000	128.1308 92.3000 138.8199 0.0000	0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000	269.3797 92.3000 291.8523 0.0000	544.4711 92.3000 589.8928 0.0000 0.0000	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000 0.0000	(206) (207) (208) (98) (210) (211) (212) (213) (215)
Space heating efficiency (may 22.3000 % 92.300	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.0000 ry) 0.0000	Mar 477.4703 ing system: 92.3000 stem) 517.3026 ing system: 0.0000 stem 2) 0.0000	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000 0.0000 0.0000	128.1308 92.3000 138.8199 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000	269.3797 92.3000 291.8523 0.0000 0.0000	544.4711 92.3000 589.8928 0.0000 0.0000	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000 0.0000	(206) (207) (208) (98) (210) (211) (212) (213) (215)
Space heating efficiency (me 92.3000 °S pace heating fuel (main heat 861.6075 65 space heating efficiency (ma 0.0000 space heating fuel (main heat 0.0000 space heating fuel (secondar 0.0000 space heating fuel (secondar 0.0000 space heating fuel secondar 1252.7787 22 space secondar space spac	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.0000 23.4824 86.1249 /month 59.4865 ent	Mar 477.4703 ing system: 92.3000 stem) 517.3026 ing system: 0.0000 stem 2) 0.0000 237.5465 85.5929 277.5306	Apr 268.4570 92.3000 290.8526 0.0000 0.0000 209.4852 84.6171 247.5684	128.1308 92.3000 138.8199 0.0000 0.0000 203.4193 83.0530 244.9269	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 183.7056 79.8000 230.2075	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 181.7437 79.8000 227.7490	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 188.8272 79.8000 236.6256	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 190.7204 79.8000 238.9980	269.3797 92.3000 291.8523 0.0000 0.0000 212.1477 84.5965 250.7759	544.4711 92.3000 589.8928 0.0000 0.0000 0.0000 224.8865 85.9660 261.5994	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000 0.0000 250.1310 79.8000 86.5133 289.1242	(206) (207) (208) (98) (210) (211) (212) (213) (215) (64) (216) (217) (219)
Space heating efficiency (mm 92.30000 92.30000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.30	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.0000 23.4824 86.1249 /month 59.4865 ent 0.0000	Mar 477.4703 ing system: 92.3000 stem) 517.3026 ing system: 0.0000 stem 2) 0.0000 237.5465 85.5929 277.5306 0.0000 7.3041	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000 0.0000 209.4852 84.6171 247.5684 0.0000 7.0685	128.1308 92.3000 138.8199 0.0000 0.0000 203.4193 83.0530 244.9269 0.0000 7.3041	0.0000 0.0000 0.0000 0.0000 0.0000 183.7056 79.8000 230.2075 0.0000 7.0685	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 181.7437 79.8000 227.7490 0.0000 7.3041	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 188.8272 79.8000 236.6256 0.0000 7.3041	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 190.7204 79.8000 238.9980 0.0000 7.0685	269.3797 92.3000 291.8523 0.0000 0.0000 212.1477 84.5965 250.7759 0.0000 7.3041	544.4711 92.3000 589.8928 0.0000 0.0000 224.8865 85.9660 261.5994 0.0000 7.0685	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000 0.0000 250.1310 79.8000 86.5133 289.1242 0.0000 7.3041	(206) (207) (208) (98) (210) (211) (212) (213) (215) (64) (217) (219) (221) (231)
Space heating efficiency (mm 92.3000 9	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.0000 23.4824 86.1249 /month 59.4865 ent 0.0000 6.5973 24.4099 s (Appencis).0730	Mar 477.4703 ing system: 92.3000 stem) 517.3026 ing system: 0.0000 stem 2) 0.0000 237.5465 85.5929 277.5306 0.0000 7.3041 21.9784 ing My (negging)	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000 0.0000 209.4852 84.6171 247.5684 0.0000 7.0685 16.1023 attached 1-153.9064	128.1308 92.3000 138.8199 0.0000 0.0000 0.0000 203.4193 83.0530 244.9269 0.0000 7.3041 12.4379 ity) -153.8763	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 183.7056 79.8000 230.2075 0.0000 7.0685 10.1619	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 181.7437 79.8000 227.7490 0.0000 7.3041 11.3463	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 188.8272 79.8000 236.6256 0.0000 7.3041 14.7483	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 190.7204 79.8000 238.9980 0.0000 7.0685 19.1566	269.3797 92.3000 291.8523 0.0000 0.0000 212.1477 84.5965 250.7759 0.0000 7.3041 25.1345	544.4711 92.3000 589.8928 0.0000 0.0000 224.8865 85.9660 261.5994 0.0000	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000 0.0000 0.0000 250.1310 79.8000 86.5133 289.1242	(206) (207) (208) (98) (210) (211) (212) (213) (215) (64) (216) (217) (219) (221) (231) (232)
Space heating efficiency (mg 92.3000 9	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.0000 23.4824 86.1249 /month 59.4865 ent 0.0000 6.5973 24.4099 (3.0730 0.0000 15.0730 0.0000	Mar 477.4703 ing system: 92.3000 stem) 517.3026 ing system: 0.0000 stem 2) 0.0000 237.5465 85.5929 277.5306 0.0000 7.3041 dix M) (negral of the control of	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000 0.0000 209.4852 84.6171 247.5684 0.0000 7.0685 16.1023 ative quant -153.9064 ix M) (nega 0.0000	128.1308 92.3000 138.8199 0.0000 0.0000 0.0000 203.4193 83.0530 244.9269 0.0000 7.3041 12.4379 ity) -153.8763 tive quanti 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 183.7056 79.8000 230.2075 0.0000 7.0685 10.1619 -139.4095 ty)	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 181.7437 79.8000 227.7490 0.0000 7.3041 11.3463 -137.4796 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 188.8272 79.8000 236.6256 0.0000 7.3041 14.7483	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 190.7204 79.8000 238.9980 0.0000 7.0685 19.1566	269.3797 92.3000 291.8523 0.0000 0.0000 212.1477 84.5965 250.7759 0.0000 7.3041 25.1345	544.4711 92.3000 589.8928 0.0000 0.0000 224.8865 85.9660 261.5994 0.0000 7.0685 28.3893	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000 0.0000 250.1310 79.8000 86.5133 289.1242 0.0000 7.3041 31.2730	(206) (207) (208) (98) (210) (211) (212) (213) (215) (64) (217) (219) (221) (231) (232) (233a)
Space heating efficiency (may 22.3000 92.3000	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.0000 23.4824 86.1249 /month 59.4865 ent 0.0000 6.5973 24.4099 s (Append 15.0730 nd turbiir 0.0000 dro-elect 0.0000	Mar 477.4703 ing system: 92.3000 stem) 517.3026 ing system: 0.0000 stem 2) 0.0000 237.5465 85.5929 277.5306 0.0000 7.3041 21.9784 dix M) (nega-150.7193 nes (Append: 0.0000 ric general 0.0000	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000 0.0000 209.4852 84.6171 247.5684 0.0000 7.0685 16.1023 ative quant -153.9064 ix M) (nega 0.0000 tors (Appen. 0.0000 tors (A	128.1308 92.3000 138.8199 0.0000 0.0000 0.0000 203.4193 83.0530 244.9269 0.0000 7.3041 12.4379 ity) -153.8763 tive quanti 0.0000 dix M) (neg,	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 183.7056 79.8000 230.2075 0.0000 7.0685 10.1619 -139.4095 ty) 0.0000 ative quant	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 181.7437 79.8000 227.7490 0.0000 7.3041 11.3463 -137.4796 0.0000 ity)	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 188.8272 79.8000 236.6256 0.0000 7.3041 14.7483 -135.2578 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 190.7204 79.8000 238.9980 0.0000 7.0685 19.1566	269.3797 92.3000 291.8523 0.0000 0.0000 212.1477 84.5965 250.7759 0.0000 7.3041 25.1345	544.4711 92.3000 589.8928 0.0000 0.0000 224.8865 85.9660 261.5994 0.0000 7.0685 28.3893 -94.3423	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000 0.0000 0.0000 250.1310 79.8000 86.5133 289.1242 0.0000 7.3041 31.2730 -78.9051	(206) (207) (208) (98) (210) (211) (212) (213) (215) (64) (216) (217) (219) (221) (231) (232) (233a) (233a) (233a)
Space heating efficiency (me 92.3000 9 Space heating fuel (main hea 861.6075 65 Space heating efficiency (me 0.0000 Space heating fuel (main hea 0.0000 Space heating fuel (secondar 0.0000 Space heating fuel (secondar 0.0000 Water heating fuel (secondar 0.0000 Water heating requirement 252.7787 22 Efficiency of water heater (217)m 86.4484 8 Fuel for water heating, kWh, 292.4041 25 Space cooling fuel requiremen (221)m 0.0000 Pumps and Fa 7.3041 Lighting 30.4273 2 Electricity generated by PVG (233a)m -89.6649 -11 Electricity generated by wir (234a)m 0.0000 Electricity generated by hyd (235a)m 0.0000 Electricity used or net elected by the second of the sec	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.00000 23.4824 86.1249 /month 59.4865 ent 0.0000 6.5973 24.4099 s (Appent) 5.0730 ating sys 0.0000 chidal sys 0.00000 chidal sys 0.00000 chidal sys 0.0000 c	Mar 477.4703 ing system: 92.3000 stem: 0.0000 stem: 0.0000 237.5465 85.5929 277.5306 0.0000 7.3041 21.9784 dix M) (neg-150.7193 nes (Appendio 0.0000 tric generated 10.0000 generated 10.0000 generated 10.0000	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000 0.0000 209.4852 84.6171 247.5684 0.0000 7.0685 16.1023 ative quant -153.9064 ix M) (nega 0.0000 tors (Appen 0.0000 by micro-CH 0.0000	128.1308 92.3000 138.8199 0.0000 0.0000 0.0000 203.4193 83.0530 244.9269 0.0000 7.3041 12.4379 ity) -153.8763 tive quanti 0.0000 0.0000 P (Appendix 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 183.7056 79.8000 230.2075 0.0000 7.0685 10.1619 -139.4095 ty) 0.0000 ative quant	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 181.7437 79.8000 227.7490 0.0000 7.3041 11.3463 -137.4796 0.0000 ity)	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 188.8272 79.8000 236.6256 0.0000 7.3041 14.7483 -135.2578 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 190.7204 79.8000 238.9980 0.0000 7.0685 19.1566 -130.2876 0.0000	269.3797 92.3000 291.8523 0.0000 0.0000 212.1477 84.5965 250.7759 0.0000 7.3041 25.1345 -123.3131 0.0000	544.4711 92.3000 589.8928 0.0000 0.0000 224.8865 85.9660 261.5994 0.0000 7.0685 28.3893 -94.3423 0.0000	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000 0.0000 250.1310 79.8000 86.5133 289.1242 0.0000 7.3041 31.2730 -78.9051 0.0000	(206) (207) (208) (98) (210) (211) (212) (213) (215) (64) (217) (219) (221) (231) (232) (233a) (234a) (235a)
Space heating efficiency (me 92.3000 Space heating fuel (main heat 861.6075 6: Space heating efficiency (me 0.0000 Space heating fuel (main heat 0.0000 Space heating fuel (secondar 0.0000 Space heating fuel fuel fuel fuel fuel fuel fuel fuel	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.0000 23.4824 86.1249 /month 59.4865 ent 0.0000 6.5973 24.4099 s (Appenca 10.0000 dturbir 0.0000 ctricity 0.0000 s (Appenca 6.3766 nd turbir	Mar 477.4703 ing system: 92.3000 stem) 517.3026 ing system: 0.0000 ctem 2) 0.0000 237.5465 85.5929 277.5306 0.0000 7.3041 21.9784 dix M) (negrally and see (Appendix 0.0000) ric generated 1 0.0000 dix M) (negrally and see (Appendix 0.0000) generated 1 0.0000 dix M) (negrally and see (Appendix 0.0000)	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000 0.0000 209.4852 84.6171 247.5684 0.0000 7.0685 16.1023 ative quant -153.9064 ix M) (nega 0.0000 tors (Appen 0.0000 by micro-CH 0.0000 by micro-CH 0.0000 ative quant -522.1453 ix M) (nega 1.0000 by micro-CH 0.0000 by micro-CH 0.0000 ative quant -522.1453 ix M) (nega 1.0000 ative quant -522.1453 ix M) (nega 1.0000 by micro-CH 0.0000 ative quant -522.1453 ix M) (nega 1.0000 by micro-CH 0.0000 ative quant -522.1453 ix M) (nega 1.0000 by micro-CH 0.0000 ative quant -522.1453 ix M) (nega 1.0000 by micro-CH 0.0000 ative quant -522.1453 ix M) (nega 1.0000 by micro-CH 0.0000 ative quant -522.1453 ix M) (nega 1.0000 by micro-CH 0.0000 ative quant -522.1453 ix M) (nega 1.0000 by micro-CH 0.0000 ative quant -522.1453 ix M) (nega 1.0000 by micro-CH 0.0000 by micro-CH 0.0	128.1308 92.3000 138.8199 0.0000 0.0000 0.0000 203.4193 83.0530 244.9269 0.0000 7.3041 12.4379 ity) -153.8763 tive quanti 0.0000 Qix M) (negrous dive dive dive dive dive dive dive dive	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 183.7056 79.8000 230.2075 0.0000 7.0685 10.1619 -139.4095 ty) 0.0000 ative quant 0.0000 N) (negati 0.0000 -673.6997 ty)	0.0000 0.0000 0.0000 0.0000 0.0000 181.7437 79.8000 227.7490 0.0000 7.3041 11.3463 -137.4796 0.0000 ity) 0.0000 ve if net g 0.0000 -665.9026	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 188.8272 79.8000 236.6256 0.0000 7.3041 14.7483 -135.2578 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 190.7204 79.8000 238.9980 0.0000 7.0685 19.1566 -130.2876 0.0000 0.0000 0.0000	269.3797 92.3000 291.8523 0.0000 0.0000 212.1477 84.5965 250.7759 0.0000 7.3041 25.1345 -123.3131 0.0000 0.0000 -260.9227	544.4711 92.3000 589.8928 0.0000 0.0000 224.8865 85.9660 261.5994 0.0000 7.0685 28.3893 -94.3423 0.0000 0.0000 -120.7179	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000 0.0000 0.0000 250.1310 79.8000 86.5133 289.1242 0.0000 7.3041 31.2730 -78.9051 0.0000 0.0000 0.0000 -73.2280	(206) (207) (208) (98) (210) (211) (212) (213) (215) (64) (216) (217) (221) (231) (232) (233a) (234a) (235c) (235c) (233b)
Space heating efficiency (me 92.3000 Space heating fuel (main heat 861.6075 63.5 Space heating efficiency (me 0.0000 Space heating fuel (main heat 0.0000 Space heating fuel (secondar 252.7787 22.5 Space cooling fuel requirement 2217)m 86.4484 Space cooling fuel requirement 2210 m 0.0000 Space fuel fuel fuel fuel fuel fuel fuel fue	87.9764 ain heati 92.3000 ating sys 37.0275 ain heati 0.0000 ating sys 0.00000 23.4824 86.1249 /month 59.4865 ent 0.0000 6.5973 24.4099 s (Appenc) 0.0000 dro-elect 0.0000 dro-olect 0.0000	Mar 477.4703 ing system: 92.3000 stem) 517.3026 ing system: 0.0000 stem 2) 0.0000 237.5465 85.5929 277.5306 0.0000 7.3041 21.9784 dix M) (negral of the control of the co	Apr 268.4570 1) 92.3000 290.8526 2) 0.0000 0.0000 0.0000 209.4852 84.6171 247.5684 0.0000 7.0685 16.1023 ative quant -153.9064 ix M) (nega 0.0000 tors (Appen 0.0000 by micro-CH 0.0000 by micro-CH 0.0000 ative quant -522.1453 ix M) (nega 0.0000	128.1308 92.3000 138.8199 0.0000 0.0000 0.0000 203.4193 83.0530 244.9269 0.0000 7.3041 12.4379 ity) -153.8763 tive quanti: 0.0000 P (Appendix 0.0000 P (Appendix 0.0000) ity) -675.6025 tive quanti: 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 183.7056 79.8000 230.2075 0.0000 7.0685 10.1619 -139.4095 ty) 0.0000 ative quant 0.0000 N) (negati 0.0000 -673.6997 ty)	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 181.7437 79.8000 227.7490 0.0000 7.3041 11.3463 -137.4796 0.0000 ity) 0.0000 ve if net g 0.0000 -665.9026 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 188.8272 79.8000 236.6256 0.0000 7.3041 14.7483 -135.2578 0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 190.7204 79.8000 238.9980 0.0000 7.0685 19.1566 -130.2876 0.0000 0.0000	269.3797 92.3000 291.8523 0.0000 0.0000 212.1477 84.5965 250.7759 0.0000 7.3041 25.1345 -123.3131 0.0000 0.0000	544.4711 92.3000 589.8928 0.0000 0.0000 224.8865 85.9660 261.5994 0.0000 7.0685 28.3893 -94.3423 0.0000 0.0000	92.3000 0.0000 0.0000 Dec 817.1686 92.3000 885.3398 0.0000 0.0000 0.0000 250.1310 79.8000 86.5133 289.1242 0.0000 7.3041 31.2730 -78.9051 0.0000 0.0000	(206) (207) (208) (98) (210) (211) (212) (213) (215) (241) (231) (232) (233a) (235a) (235a) (234b) (234b)

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(235d)m 0.0000 Annual totals kWh/year Space heating fuel - main Space heating fuel - main Space heating fuel - secor Efficiency of water heater	system 2 ndary	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 4212.6951 0.0000 0.0000 79.8000	(211) (213)
Water heating fuel used Space cooling fuel	=										3056.9961	
Electricity for pumps and Total electricity for the Electricity for lighting	above, kWh/		L)								86.0000 245.5656	
Energy saving/generation t PV generation Wind generation Hydro-electric generation Electricity generated - Mi Appendix Q - special featu	(Appendix N Ecro CHP (Ap)	s M ,N and	Q)							-6129.0107 0.0000 0.0000 0.0000	(234) (235a)
Energy saved or generated Energy used Total delivered energy for											-0.0000 0.0000 1472.2461	(237)
12a. Carbon dioxide emiss	ions - Indiv	idual heati	ng systems	including r	micro-CHP							
							Energy	Emissi	on factor		Emissions	
							kWh/year		g CO2/kWh	k	g CO2/year	
Space heating - main syste							4212.6951		0.2100		884.6660	
Total CO2 associated with		ystems					2056 2061		0.0100		0.0000	
Water heating (other fuel) Space and water heating							3056.9961		0.2100		641.9692 1526.6351	
Pumps, fans and electric	keep-hot						86.0000		0.1387		11.9293	
Energy for lighting							245.5656		0.1443		35.4427	
B		_										
Energy saving/generation PV Unit electricity used in		8				_	-1502.2350		0.1367		-205.3185	
PV Unit electricity export							-4626.7757		0.1268		-586.7670	
Total											-792.0856	
Total CO2, kg/year EPC Target Carbon Dioxide	Emission Da	+^ (TED)									781.9216 6.3100	
AFC Target Carbon Dioxide											6.3100	(273)
13a. Primary energy - Indi	ividual heat	ing systems	including	micro-CHP								
								imary ener			ary energy	
Space heating - main syste	em 1						kWh/year 4212.6951	K	1.1300		kWh/year 4760.3454	(275)
Total CO2 associated with	community s	ystems									0.0000	
Water heating (other fuel)							3056.9961		1.1300		3454.4056	
Space and water heating Pumps, fans and electric b	seep-hot						86.0000		1.5128		8214.7510 130.1008	
Energy for lighting							245.5656		1.5338		376.6567	
Energy saving/generation	technologio	c										
PV Unit electricity used i		~				-	-1502.2350		1.5052		-2261.2266	
PV Unit electricity export						-	-4626.7757		0.4656		-2154.0223	
Total											-4415.2490	
Total Primary energy kWh/y Target Primary Energy Rate											4306.2596 34.7300	
	\/										22.7000	/

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Property Reference		Dwelling 3						1	ssued on Da	te	25/06/2024	
Assessment Reference		Dwelling 1_Be	Lean_Copy				Prop Type Re	ef				
Property		SE17 1AD										
SAP Rating				86 B		DER	10.4	1 1	TER		6.31	
Environmental				90 B		% DER < TEF	2				-64.98	
CO ₂ Emissions (t/year)				1.11		DFEE	34.4	10	TFEE		37.66	
Compliance Check				See BREL		% DFEE < TF	EE				8.63	
% DPER < TPER				-74.93		DPER	60.7	75	TPER		34.73	
Assessor Details Client	Mr.	Sam Wallis							Asses	sor ID	BA56-00)1
SAP 10 WORKSHEET FOR N CALCULATION OF DWELLIN 1. Overall dwelling ch Ground floor Total floor area TFA = Dwelling volume	Wew Build (F	s Designed) FOR REGULAT	(Version 1	0.2, February	7 2022) 		Area (m2) 124.0000			(2b) =		(1b) - (3
umber of open chimney umber of open flues umber of chimneys / fumber of flues attach umber of flues attach umber of blocked chim umber of intermittent umber of passive vent umber of flueless gas	lues attached to soliced to other neys.	med to closed I fuel boiler								m 0 * 80 = 0 * 20 = 0 * 20 = 0 * 35 = 0 * 20 = 0 * 10 = 0 * 10 = 0 * 10 = 0 * 10 = 0 * 10 = 0 * 40 =	0.0000 0.0000 0.0000	(6a) (6b) (6c) (6d) (6e) (6f) (7a) (7b)
nfiltration due to ch	imneys, flu	es and fans	= (6a)+(6b)+(6c)+(6d)+((6e) + (6f) +	(6g)+(7a)+(7b)+(7c) =		0.0000	Air change / (5) =	s per hour 0.0000	(8)
ressure test ressure Test Method easured/design AP50 nfiltration rate umber of sides shelte	red									В	Yes lower Door 3.0000 0.1500	(17)
helter factor								(20) = 1 -			0.9250	
nfiltration rate adju	sted to inc	lude shelter	factor					(21	.) = (18) >	(20) =	0.1388	(21)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
ind speed 5.100 ind factor 1.275	0 5.000	0 4.9000	4.4000	4.3000 1.0750	3.8000 0.9500	3.8000 0.9500	3.7000 0.9250	4.0000	4.3000 1.0750	4.5000 1.1250	4.7000 1.1750	
dj infilt rate				0.1492	0.1318	0.1318	0.1283	0.1388	0.1492	0.1561	0.1630	
Balanced mechanical v f mechanical ventilat	entilation					0.1010	0.1203	3.2500		3.1301	0.5000	
f exhaust air heat pu	mp using Ap							a)			0.5000	(23b)
If balanced with heat	_	_	_								71.2000	
ffective ac 0.320	9 0.317	4 0.3140	0.2966	0.2932	0.2758	0.2758	0.2723	0.2827	0.2932	0.3001	0.3070	(25)
. Heat losses and hea												
										****	2	
lement cor indow (Uw = 0.80) tternal wall pridor wall tternal roof otal net area of exte abric heat loss, W/K arty Wall 1 arty Floor 1			Gross m2 99.6400 29.6800 124.0000	Openings m2 50.0900 2.0000	2. 50. 49. 27. 124. 253.	TArea m2 .0000 .0900 .5500 .6800 .0000 .3200 (26) (8300 .0000	U-value W/m2K 1.0000 0.7752 0.1300 0.1500 0.1100 30) + (32) 0.0000	A x C W/F 2.0000 38.8295 6.4415 4.1520 13.6400 = 65.0630 0.0000	() ; ; ;	-value kJ/m2K	A x K kJ/K	
hermal mass parameter											120.0000	
hermal mass parameter hermal bridges (User oint Thermal bridges otal fabric heat loss	defined val			area)				(33	3) + (36) +	(36a) = - (36a) =	20.2656 0.1500 85.4786	(36) (36a)

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	eat loss ca	lculated mo	onthly (38)m	= 0 33 x	(25)m x (5)								
(38) m	Jan 34.7984	Feb 34.4223	Mar 34.0461	Apr 32.1654	May 31.7893	Jun 29.9086	Jul 29.9086	Aug 29.5324	Sep 30.6608	Oct 31.7893	Nov 32.5416	Dec 33.2939	(38)
Heat transfer Average = Sum	120.2770	119.9008	119.5247	117.6440	117.2678	115.3871	115.3871	115.0110	116.1394	117.2678	118.0201	118.7724 117.5499	(39)
-	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP HLP (average) Days in mont	0.9700	0.9669	0.9639	0.9487	0.9457	0.9305	0.9305	0.9275	0.9366	0.9457	0.9518	0.9578 0.9480 31	(40)
Days in mone	31	20	31	30	31	30	31	31	30	31	30	31	
4. Water heat	ing energy	requirement	s (kWh/year)									
Assumed occupa	ancy											2.8775	(42)
Hot water usa	90.5832 ge for bath	89.2219 s	87.2383	83.4429	80.6420	77.5185	75.7430	77.7117	79.8697	83.2234	87.1003	90.2362	
Hot water usa	31.2862 ge for othe 44.0988	30.8216 r uses 42.4952	30.1673 40.8916	28.9608	28.0575 37.6844	27.0558 36.0808	26.5147 36.0808	27.1644 37.6844	27.8719	28.9437 40.8916	30.1750 42.4952	31.1805 44.0988	
Average daily				39.2000	37.0044	30.0000	30.0000	37.0044	39.2000	40.0910	42.4932	152.6118	
Daily hot wate		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte Energy conten	t (annual)	162.5387 231.4530	158.2972 243.2969	151.6918 207.6584	146.3839 197.0608	140.6551 172.9518	138.3386 167.3085	142.5606 176.5198	147.0296 181.3022	153.0588 207.6993 Total = S	159.7706 227.6225 um(45)m =	165.5154 259.1572 2534.8836	
Distribution :	39.4280	= 0.15 x (34.7180	36.4945	31.1488	29.5591	25.9428	25.0963	26.4780	27.1953	31.1549	34.1434	38.8736	(46)
Water storage Store volume a) If manufa		ared loss f	actor is kn	own (kWh/	lav).							210.0000	
Temperature Enter (49) or	factor fro (54) in (5	m Table 2b		(Anii/	27 -							0.5400 0.9558	(49)
Total storage	29.6298	26.7624	29.6298	28.6740	29.6298	28.6740	29.6298	29.6298	28.6740	29.6298	28.6740	29.6298	(56)
If cylinder co	29.6298 23.2624	26.7624 21.0112	29.6298 23.2624	28.6740 22.5120	29.6298 23.2624	28.6740 22.5120	29.6298 23.2624	29.6298 23.2624	28.6740 22.5120	29.6298 23.2624	28.6740 22.5120	29.6298 23.2624	
Combi loss Total heat re	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
WWHRS	315.7454 0.0000	279.2266 0.0000	296.1891 0.0000	258.8444 0.0000	249.9530 0.0000	224.1378 0.0000	220.2007 0.0000	229.4120 0.0000	232.4882	260.5915 0.0000	278.8085 0.0000	312.0494 0.0000	(63a)
PV diverter Solar input FGHRS	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	(63c)
Output from w		279.2266	296.1891	258.8444	249.9530	224.1378	220.2007	229.4120	232.4882	260.5915		312.0494	
12Total per ye		ar)						Total p	er year (kW	h/year) = S	um (64) m =	3157.6466 3158	
Electric show	er(s) 0.0000	0.0000	0.0000	0.0000	0.0000 al Energy u	0.0000	0.0000	0.0000	0.0000 wer(s) (bWh	0.0000 /wear) = Su	0.0000 m(64a)m =	0.0000	
Heat gains from		ating, kWh/ 115.1770		109.9952	107.8365	98.4553	97.9438	101.0066	101.2318	111.3738	116.6333	128.4835	
5. Internal ga	ains (see T	able 5 and	5a)										
5. Internal games Metabolic gain (66) m	ains (see T ns (Table 5 Jan 143.8766	able 5 and), Watts Feb 143.8766	5a) Mar 143.8766	Apr 143.8766	May 143.8766	Jun 143.8766			Sep 143.8766	Oct 143.8766	Nov 143.8766	Dec 143.8766	(66)
5. Internal general Metabolic gain (66) m Lighting gain:	ains (see T 	able 5 and), Watts Feb 143.8766 ed in Appen 162.1297	Mar 143.8766 dix L, equa 146.4397	Apr 143.8766 tion L9 or 151.3211	May 143.8766 L9a), also: 146.4397	Jun 143.8766 see Table 5 151.3211	Jul 143.8766 146.4397	Aug 143.8766		143.8766			
5. Internal games Metabolic gain (66) m	ains (see T ns (Table 5 Jan 143.8766 s (calculat 146.4397 ins (calcul 290.3331	able 5 and), Watts Feb 143.8766 ed in Appen 162.1297 ated in App 293.3459	Mar 143.8766 ddix L, equa 146.4397 pendix L, eq 285.7539	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913	May 143.8766 L9a), also: 146.4397 or L13a), also: 249.1890	Jun 143.8766 see Table 5 151.3211 lso see Tab 230.0137	Jul 143.8766 146.4397 le 5 217.2035	Aug 143.8766 146.4397	143.8766 151.3211	143.8766 146.4397	143.8766	143.8766	(67)
5. Internal g. Metabolic gain (66)m Lighting gain: Appliances ga. Cooking gains Pumps, fans	ains (see T Table 5 Jan 143.8766 s (calculat 146.4397 ins (calcul 290.3331 (calculate 37.3877 3.0000	able 5 and	Mar 143.8766 ddix L, equa 146.4397 pendix L, eq 285.7539 dix L, equat 37.3877 3.0000	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000	May 143.8766 L9a), also: 146.4397 or L13a), also: 249.1890	Jun 143.8766 see Table 5 151.3211 lso see Tab 230.0137 see Table	Jul 143.8766 146.4397 le 5 217.2035	Aug 143.8766 146.4397 214.1907 37.3877	143.8766 151.3211	143.8766 146.4397	143.8766 151.3211	143.8766 146.4397	(67) (68) (69)
5. Internal game (66)m (19) (19) (19) (19) (20) (20) (20) (20) (20) (20) (20) (20	ains (see T	able 5 and	Mar 143.8766 ddix L, equa 146.4397 vendix L, eq 285.7539 dix L, equat 37.3877 3.0000 values) (Tab	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5)	May 143.8766 L9a), also: 146.4397 or L13a), a. 249.1890 L15a), also 37.3877	Jun 143.8766 see Table 5 151.3211 Iso see Tab 230.0137 see Table 37.3877 0.0000	Jul 143.8766 146.4397 le 5 217.2035 5 37.3877 0.0000	Aug 143.8766 146.4397 214.1907 37.3877 0.0000	143.8766 151.3211 221.7828 37.3877 0.0000	143.8766 146.4397 237.9453 37.3877 3.0000	143.8766 151.3211 258.3476 37.3877 3.0000	143.8766 146.4397 277.5229 37.3877 3.0000	(67) (68) (69) (70)
5. Internal g. Metabolic gain (66)m Lighting gain: Appliances ga. Cooking gains Pumps, fans	ains (see T	able 5 and	Mar 143.8766 ddix L, equa 146.4397 vendix L, equ 285.7539 dix L, equat 37.3877 3.0000 values) (Tab	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000	Jun 143.8766 see Table 5 151.3211 lso see Table 230.0137 see Table 37.3877 0.0000	Jul 143.8766 146.4397 le 5 217.2035 5 37.3877 0.0000	Aug 143.8766 146.4397 214.1907 37.3877 0.0000	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013	(67) (68) (69) (70) (71)
5. Internal gametabolic gain (66)m Lighting gain: Appliances gametabolic gains Pumps, fans Losses e.g. et Water heating	ains (see T	able 5 and Feb 143.8766 ed in Appen 162.1297 ated in Appen 293.3459 d in Append 37.3877 3.0000 (negative v -115.1013 le 5) 171.3944	Mar 143.8766 ddix L, equa 146.4397 yendix L, eq 285.7539 dix L, equat 37.3877 3.0000 ralues) (Tab -115.1013	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013	May 143.8766 L9a), also: 146.4397 or L13a), a: 249.1890 L15a), also 37.3877 3.0000	Jun 143.8766 see Table 5 151.3211 lso see Tab 230.0137 see Table 37.3877 0.0000 -115.1013	Jul 143.8766 146.4397 le 5 217.2035 5 37.3877 0.0000 -115.1013	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929	(67) (68) (69) (70) (71) (72)
5. Internal gametabolic gain (66)m Lighting gain: Appliances ga. Cooking gains Pumps, fans Losses e.g. er Water heating Total internal	ains (see T	able 5 and	Mar 143.8766 ddix L, equa 146.4397 sendix L, equa 285.7539 tix L, equat 37.3877 3.0000 ralues) (Tab -115.1013	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333	Jun 143.8766 see Table 5 151.3211 Iso see Tab 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929	(67) (68) (69) (70) (71) (72)
5. Internal gametabolic gain (66)m Lighting gain: Appliances gametabolic gains Pumps, fans Losses e.g. et Water heating	ains (see T	able 5 and), Watts Feb 143.8766 ed in Appen 162.1297 ated in Appen 293.3459 d in Append 37.3877 3.0000 (negative v -115.1013 le 5) 171.3944 696.0329	Mar 143.8766 ddix L, equa 146.4397 endix L, equ 285.7539 dix L, equat 37.3877 3.0000 ralues) (Tab -115.1013 165.6048 666.9614	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333	Jun 143.8766 see Table 5 151.3211 lso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412	Jul 143.8766 146.4397 le 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929	(67) (68) (69) (70) (71) (72)
5. Internal g. Metabolic gain (66)m Lighting gain: Appliances ga. Cooking gains Pumps, fans Losses e.g. e. Water heating Total interna.	ains (see T	able 5 and), Watts Feb 143.8766 ed in Appen 162.1297 ated in Appen 293.3459 d in Append 37.3877 3.0000 (negative v -115.1013 le 5) 171.3944 696.0329	Mar 143.8766 ddix L, equa 146.4397 pendix L, equa 285.7539 tix L, equat 37.3877 3.0000 ralues) (Tab -115.1013 165.6048 666.9614	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333	Jun 143.8766 see Table 5 151.3211 Iso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959 603.2440	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907 640.8223	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929	(67) (68) (69) (70) (71) (72)
5. Internal gametabolic gain (66)m Lighting gain: Appliances ga Cooking gains Pumps, fans Losses e.g. er Water heating Total internal	ains (see T	able 5 and	Mar 143.8766 ddx L, equa 146.4397 yendix L, eq 285.7539 dix L, equat 37.3877 3.0000 values) (Tab 666.9614	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333	Jun 143.8766 see Table 5 151.3211 Iso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959 603.2440 Acce fact Table	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907 640.8223	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929 665.8185	(67) (68) (69) (70) (71) (72) (73)
5. Internal g. Metabolic gain (66)m Lighting gain: Appliances ga. Cooking gains Pumps, fans Losses e.g. e Water heating Total interna.	ains (see T	able 5 and	Mar 143.8766 dix L, equa 146.4397 vendix L, eq 285.7539 dix L, equat 37.3877 3.0000 values) (Tab -115.1013 165.6048 666.9614 A 4.0 30.5 15.5	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938	Jun 143.8766 see Table 5 151.3211 Iso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959 603.2440	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907 640.8223	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929 665.8185	(67) (68) (69) (70) (71) (72) (73)
5. Internal g. Metabolic gain (66)m Lighting gain: Appliances ga: Cooking gains Pumps, fans Losses e.g. e Water heating Total interna. 6. Solar gain: [Jan] Northeast Southwest Solar gains	ains (see T	able 5 and	Mar 143.8766 ddx L, equa 146.4397 vendix L, eq 285.7539 dix L, equas 37.3877 3.0000 values) (Tab -115.1013 165.6048 666.9614 4.0 30.5 15.5	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938	Jun 143.8766 see Table 5 151.3211 so see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .8000	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959 603.2440 Acce fact Table 0.77 0.77	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907 640.8223 ss or 6d 00 00 00 00	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929 665.8185 Gains W 14.3333 354.8605 180.8021	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83)
5. Internal gametabolic gain (66)m Lighting gain: Appliances ga. Cooking gains Pumps, fans Losses e.g. er Water heating Total internal 6. Solar gain: [Jan] Northeast Southeast Southwest	ains (see T	able 5 and	Mar 143.8766 ddx L, equa 146.4397 vendix L, eq 285.7539 dix L, equas 37.3877 3.0000 values) (Tab -115.1013 165.6048 666.9614 4.0 30.5 15.5	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465	May 143.8766 L9a), also: 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938	Jun 143.8766 see Table 5 151.3211 so see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .8000	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959 603.2440 Acce fact Table 0.77 0.77	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907 640.8223 ss or 6d 00 00 00 00	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929 665.8185 Gains W 14.3333 354.8605 180.8021	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83)
5. Internal g. Metabolic gain (66)m Lighting gain: Appliances ga: Cooking gains Pumps, fans Losses e.g. e Water heating Total interna. 6. Solar gain: [Jan] Northeast Southwest Solar gains	ains (see T	able 5 and	Mar 143.8766 dix L, equa 146.4397 sendix L, equa 285.7539 lix L, equat 37.3877 3.0000 calues) (Tab -115.1013 165.6048 666.9614 4.00 30.5 15.5	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465	May 143.8766 L9a), also 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938 36.7938 1848.6578 2458.3910	Jun 143.8766 see Table 5 151.3211 Iso see Tab 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci or 1843.7994 2428.0407	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 fic data Table 6b 0.5700 0.5700 0.5700 1774.0779 2335.5290	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .8000	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959 603.2440 Acce fact Table 0.77 0.77	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907 640.8223 ss or 6d 00 00 00 00	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929 665.8185 Gains W 14.3333 354.8605 180.8021	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83)
5. Internal g. Metabolic gain (66)m Lighting gain: Appliances ga Cooking gains Pumps, fans Losses e.g. e Water heating Total interna 6. Solar gain: [Jan] Northeast Southeast Southwest 7. Mean interna	ains (see T	able 5 and	Mar 143.8766 dix L, equa 146.4397 sendix L, equa 285.7539 lix L, equat 37.3877 3.0000 calues) (Tab -115.1013 165.6048 666.9614 4.0.0 30.5 15.5 1300.9943 1967.9556	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465	May 143.8766 L9a), also 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938 36.7938	Jun 143.8766 see Table 5 151.3211 Iso see Table 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci or 1843.7994 2428.0407	Jul 143.8766 146.4397 le 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 fic data Table 6b 0.5700 0.5700 0.5700 1774.0779 2335.5290	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab 0 0 0 1612.0293 2174.5843	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .8000	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959 603.2440 Acce fact Table 0.77 0.77	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907 640.8223 ss or 6d 00 00 00 00	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929 665.8185 Gains W 14.3333 354.8605 180.8021 470.1209 1135.9394	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83) (84)
5. Internal gametabolic gain (66)m Lighting gain: (66)m Cooking gains Pumps, fans Losses e.g. e Water heating Total international form of the southeast Southeast Southeast Southeast Total gains Total gains Total gains Total gains	ains (see T	able 5 and	5a) Mar 143.8766 dix L, equa 146.4397 sendix L, equa 285.7539 lix L, equat 37.3877 3.0000 (alues) (Tab -115.1013 165.6048 666.9614 4.0. 30.5 15.5 1300.9943 1967.9556	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465	May 143.8766 L9a), also 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938 36.7938 1848.6578 2458.3910	Jun 143.8766 see Table 5 151.3211 180 see Tabl 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci or 1843.7994 2428.0407	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 fic data Table 6b 0.5700 0.5700 0.5700	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .8000	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959 603.2440 Acce fact Table 0.77 0.77 0.77 1044.0865 1647.3304	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907 640.8223 ss or 66d 00 00 00 659.6353 1300.4576	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929 665.8185 Gains W 14.3333 354.8605 180.8021 470.1209 1135.9394	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83) (84)
5. Internal gametabolic gain (66)m Lighting gain: (66)m Lighting gains Cooking gains Pumps, fans Losses e.g. e Water heating Total international formula for the southeast Southeast Southeast Southeast Total gains Total gains Total gains Total gains Temperature difference of the southeast Southeast Southeast Southeast Southeast Southeast Southeast Total gains Total gains Total gains Total gains	ains (see T	able 5 and	5a) Mar 143.8766 dix L, equa 146.4397 sendix L, equa 285.7539 dix L, equas 37.3877 3.0000 ralues) (Tab -115.1013 165.6048 666.9614 A 4.0 30.5 15.5 1300.9943 1967.9556	Apr 143.8766 tion L9 or 151.3211 uation L13 269.5913 ion L15 or 37.3877 3.0000 le 5) -115.1013 152.7711 642.8465 rea m2 200 200 500 1633.1915 2276.0380	May 143.8766 L9a), also 146.4397 or L13a), a 249.1890 L15a), also 37.3877 3.0000 -115.1013 144.9415 609.7333 Solar flux Table 6a W/m2 11.2829 36.7938 36.7938 36.7938 1848.6578 2458.3910	Jun 143.8766 see Table 5 151.3211 lso see Tab 230.0137 see Table 37.3877 0.0000 -115.1013 136.7434 584.2412 Speci or 1843.7994 2428.0407 Th1 (C) Jun 35.8214	Jul 143.8766 146.4397 1e 5 217.2035 5 37.3877 0.0000 -115.1013 131.6449 561.4511 fic data Table 6b 0.5700 0.5700 0.5700 1774.0779 2335.5290 Jul 35.8214	Aug 143.8766 146.4397 214.1907 37.3877 0.0000 -115.1013 135.7615 562.5550 Specific or Tab 0 0 0 1612.0293 2174.5843	143.8766 151.3211 221.7828 37.3877 0.0000 -115.1013 140.5997 579.8665 FF data le 6c .8000 .8000 .415.8363 1995.7028	143.8766 146.4397 237.9453 37.3877 3.0000 -115.1013 149.6959 603.2440 Acce fact Table 0.77 0.77 0.77 1044.0865 1647.3304	143.8766 151.3211 258.3476 37.3877 3.0000 -115.1013 161.9907 640.8223 ss or 66d 00 00 059.6353 1300.4576	143.8766 146.4397 277.5229 37.3877 3.0000 -115.1013 172.6929 665.8185 Gains W 14.3333 354.8605 180.8021 470.1209 1135.9394 21.0000 Dec 34.8004	(67) (68) (69) (70) (71) (72) (73) (75) (77) (79) (83) (84)

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The column													
Mathematical Property Math	0.9121	0.8261	0.7168	0.5693	0.4269	0.3004	0.2164	0.2418	0.3903	0.6441	0.8495	0.9273	(86)
Company Comp	Th 2 20.1084												
Company Comp	0.9004												
Part	Living area fraction								fLA =	Living are	a / (4) =	0.4508	(91)
	Temperature adjustment											-0.1500	
Property	aajaseea mii 15.1545	19.5500	13.0044	20.1140	20.2201	20.2011	20.2710	20.2723	20.24/1	20.0013	13.3333	19.0017	(33)
Martine Mart													
	8. Space heating requirem	nent											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Extraction					0.3944								
Second Deciding	Heat loss rate W												
Second particular construction Second Seco	Space heating kWh												
	Space heating requirement				22.0568	0.0000	0.0000	0.0000	0.0000	87.9803	298.8123		
Strong S	0.0000				0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
		306.4742	189.4533	71.1853	22.0568	0.0000	0.0000	0.0000	0.0000	87.9803	298.8123		
Pacific and pure Pacific and Pacific a		after sol	ar contribu	tion - total	per year	(kWh/year)				(980	(4) =		
Pacific and pure Pacific and Pacific a													
Franction of paper heat from secondary supplementary system (Falls 1) 1 1 1 1 1 1 1 1 1													
Pacticiancy of anii space heatt growth (1 th s) 1.000 1000													
### Part	Fraction of space heat fr	om main sy	stem(s)		n (Table 11)						1.0000	(202)
The proper content	Efficiency of main space	heating sy	stem 2 (in	%)								0.0000	(207)
Secretary Secr					Mav	Jun	Jul	Aug	Sep	Oct	Nov		(=++/
Space heating Efficiency California Space Sp	Space heating requirement	:											(98)
Solito S	Space heating efficiency	(main heat	ing system		92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000		
Space heating fuel Gain heating system Space Space heating fuel Gain heating system Space heating system	Space heating fuel (main	heating sy	stem)										
Page					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Nater heating Nater heatin				0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Mathemating Requirement Section Sectio			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Signature Sign													
C217m S2.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 92.3000 02.300	315.7454	279.2266	296.1891	258.8444	249.9530	224.1378	220.2007	229.4120	232.4882	260.5915	278.8085		
Square S	(217)m 92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000	92.3000		
C211m	342.0860	302.5207	320.8982	280.4382	270.8050	242.8362	238.5707	248.5503	251.8832	282.3310	302.0677	338.0817	(219)
Lighting 28.3128 22.7135 20.4510 14.9831 11.9735 9.4557 10.5578 13.7234 17.8253 23.3788 26.464 29.0997 (232) Electricity generated by PWS (Appendix M) (negative quantity) (234a)m 0.0000 0	(221)m 0.0000	0.0000											
C33a m 0.0000 0	Lighting 28.3128	22.7135	20.4510	14.9833	11.5735								
C334a	(233a)m 0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
C35a m	(234a)m 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
C35c)	(235a)m 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	(235a)
C33b) m	(235c)m 0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m 0.000 0.0000 0.	(233b)m 0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.0	Electricity generated by	hydro-elec	tric genera	tors (Append	dix M) (neg	ative quant:	ity)				0.0000	0.0000	(234b)
Annual totals kWh/year Space heating fuel - main system 1 2213.5006 (211) Space heating fuel - secondary 0.0000 (213) Space heating fuel - secondary 0.0000 (215) Efficiency of water heater 92.3000 Water heating fuel used 3421.0689 (219) Space cooling fuel 3421.0689 (219) Space coolin	Electricity used or net e	electricity	generated	by micro-CHE	(Appendix	N) (negativ	ve if net ge	eneration)					
Space heating fuel - main system 2 0.0000 (213) Space heating fuel - secondary 0.0000 (215) Efficiency of water heater 92.3000 Water heating fuel used 3421.0689 (219) Space cooling fuel 0.0000 (221) Electricity for pumps and fans:	Annual totals kWh/year		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
Efficiency of water heater 92.3000 Water heating fuel used 3421.0689 (219) Space cooling fuel 0.0000 (221) Electricity for pumps and fans:	Space heating fuel - mair	system 2										0.0000	(213)
Space cooling fuel 0.0000 (221)	Efficiency of water heate											92.3000	
(BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 1.2430) mechanical ventilation fans (SFP = 1.2430) central heating pump Total electricity for the above, kWh/year Electricity for lighting (calculated in Appendix L) Energy saving/generation technologies (Appendices M ,N and Q) PV generation Wind generation Hydro-electric generation (Appendix N) Electricity generated - Micro CHP (Appendix N) Appendix Q - special features Energy saved or generated Fenergy saved or generated -0.0000 (236)													
mechanical ventilation fans (SFP = 1.2430) 498.3088 (230a) central heating pump 41.0000 (230c) Total electricity for the above, kWh/year 539.3088 (231) Electricity for lighting (calculated in Appendix L) 228.5002 (232) Energy saving/generation technologies (Appendices M ,N and Q) 70.000 (233) Wind generation 90.000 (233) Wind generation (Appendix N) 90.000 (234) Hydro-electric generation (Appendix N) 90.000 (235a) Electricity generated 90.0000 (235a) Energy saved or generated 90.0000 (235b) Energy saved or generated 90.0000 (236b)			baaa. in ua	o footon - 1	1000 CED	- 1 2420)							
Total electricity for the above, kWh/year Electricity for lighting (calculated in Appendix L) Energy saving/generation technologies (Appendices M ,N and Q) PV generation Wind generation Wind generation Hydro-electric generation (Appendix N) Electricity generated - Micro CHP (Appendix N) Energy saved or generated Energy saved or generated -0.0000 (235)	mechanical ventilation				, 588	- 1.2430)							
Energy saving/generation technologies (Appendices M , N and Q) PV generation Wind generation Hydro-electric generation (Appendix N) Electricity generated - Micro CHP (Appendix N) Appendix Q - special features Energy saving/generated - Micro CHP (Appendix N) Electricity generated - Micro CHP (Appendix N) E	Total electricity for the			ix T.)								539.3088	(231)
PV generation 0.000 (233) Wind generation 0.000 (234) Hydro-electric generation (Appendix N) 0.0000 (235a) Electricity generated - Micro CHP (Appendix N) 0.0000 (235) Appendix Q - special features - 0.0000 (235) Energy saved or generated -0.0000 (236)					1 ()							220.3002	(22)
Hydro-electric generation (Appendix N) 0.0000 (235a) Electricity generated - Micro CHP (Appendix N) 0.0000 (235) Appendix Q - special features Energy saved or generated -0.0000 (236)	PV generation		(uppend)	n all	- ×1								
Appendix Q - special features Energy saved or generated -0.0000 (236)	Hydro-electric generation												
	Electricity generated - N											0.0000	(235a)
Energy used 0.0000 (237) Total delivered energy for all uses 6402.3784 (238)	Appendix Q - special feat	Micro CHP (i cures										0.0000	(235a) (235)

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12a. Carbon dio	xide emissi	ons - Indiv	vidual hea	ting systems	including m			Energy		n factor		Emissions	
Space heating -			avetome.					kWh/year 2213.5006		0.2100		g CO2/year 464.8351 0.0000	
Total CO2 associated with community systems Water heating (other fuel) Space and water heating 3421.0689							3421.0689		0.2100		718.4245 1183.2596	(264)	
Pumps, fans and Energy for light	ting	teep-hot						539.3088 228.5002		0.1387 0.1443		74.8088 32.9796	(268)
Total CO2, kg/ye EPC Dwelling Ca:		de Emission	Rate (DER)								1291.0480	
13a. Primary end	ergy - Indi	vidual heat	ting system	ms including	micro-CHP								
Space heating -	main syste	sm 1						Energy kWh/year 2213.5006				ary energy kWh/year 2501.2556	
Total CO2 assoc: Water heating (iated with	community s	systems					3421.0689		1.1300		0.0000 3865.8079	(473)
Space and water Pumps, fans and	heating electric k							539.3088		1.5128		6367.0635 815.8663	(279) (281)
Energy for light Total Primary en Dwelling Primary	nergy kWh/y							228.5002		1.5338		350.4812 7533.4110 60.7500	(286)
Dwelling Illmar	y chergy he	ree (DIER)										00.7300	(207)
SAP 10 WORKSHEE	T FOR New E	Build (As De											
CALCULATION OF	TARGET EMIS	SSIONS 											
1. Overall dwell								 Area	Storey	y height		Volume	
Ground floor Total floor area Dwelling volume		a)+(1b)+(1c)	+(1d)+(1e))(1n)	12	24.0000		(m2) 124.0000		(m) 2.6500 (3d)+(3e)			(1b) - (3b) (4) (5)
2. Ventilation	rate										m	3 per hour	
Number of open of Number of open in Number of chimme Number of flues Number of flues Number of block Number of inter Number of passi Number of fluel	flues eys / flues attached t attached t ed chimneys mittent ext ve vents	to solid fue to other hea tract fans	el boiler	fire							0 * 80 = 0 * 20 = 0 * 10 = 0 * 20 = 0 * 35 = 0 * 20 = 4 * 10 = 0 * 10 = 0 * 40 =	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 40.0000 0.0000	(6b) (6c) (6d) (6e) (6f) (7a) (7b)
Infiltration due Pressure test Pressure Test Me Measured/design Infiltration rat Number of sides	ethod AP50 te	eys, flues a	and fans	= (6a)+(6b)	+(6c)+(6d)+	(6e)+(6f)+((6g)+(7a)+(7b)+(7c) =		40.0000	Air change) / (5) = B	0.1217 Yes lower Door 5.0000 0.3717	(8)
Shelter factor Infiltration rate		l to include	e shelter :	factor					(20) = 1 - (21)		x (19)] = x (20) =	0.9250 0.3438	(20)
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000		Sep 4.0000	Oct 4.3000		Dec 4.7000	
Wind factor Adj infilt rate	1.2750	1.2500	1.2250 0.4212	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750		1.1750 0.4040	
Effective ac	0.5961	0.4298	0.4212		0.5683	0.5534	0.5534	0.5506		0.5683		0.5816	
3. Heat losses													
Element				Gross	Openings	Net	Area	U-value	AxU		K-value	A x K	
TER Opaque door TER Opening Type external wall corridor wall external roof Total net area Fabric heat loss	e (Uw = 1.2	elements A		m2 99.6400 29.6800 124.0000	m2 29.0000 2.0000	2. 29. 70. 27. 124. 253.		W/m2K 1.0000 1.1450 0.1800 0.1800 0.1100 30) + (32)			kJ/m2K	kJ/K	(26) (27) (29a) (29a) (30) (31) (33)
Party Wall 1 Thermal mass pa:		MP = Cm / TH	FA) in kJ/ı	n2K		5.	8300	0.0000	0.0000			120.0000	(32)
List of Thermal K1 Eleme								I	Length Ps:	i-value	Tot	al	

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E3 Sill E4 Jamb E7 Part E14 Fla E16 Cor E17 Cor	y floor be t roof ner (norma ner (inver ty wall be (Sum(L x ridges	etween dwel	lings	locks of fl	n external a	rea)		21 33 48 48 21 15	.1000 .1000 .3000 .8000 .8000 .2000 .9000 .3000	0.0500 0.0500 0.0500 0.0700 0.0800 0.0900 -0.0900 0.0600	1.05 1.05 1.66 3.41 3.90 1.90 -1.43 0.31 (36a) = + (36a) =	50 50 60 40 80	(36a)
Ventilation hea	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(20)
(38)m Heat transfer c Average = Sum(3	143.2237		63.8386	61.9756	61.6270	60.0044 138.5881	60.0044 138.5881	59.7039 138.2876	60.6294	61.6270	62.3322	63.0694 141.6531 140.5577	
HLP HLP (average) Days in mont	Jan 1.1550	Feb 1.1518 28	Mar 1.1486	Apr 1.1335	May 1.1307	Jun 1.1176	Jul 1.1176	Aug 1.1152 31	Sep 1.1227	Oct 1.1307	Nov 1.1364	Dec 1.1424 1.1335 31	(40)
4. Water heatin	g energy r	equirement	s (kWh/year)									
Assumed occupan Hot water usage	су											2.8775	(42)
Hot water usage			69.7906	66.7543	64.5136	62.0148	60.5944	62.1693	63.8958	66.5787	69.6803	72.1889	
Hot water usage	31.2862 for other 44.0988	30.8216 uses 42.4952	30.1673 40.8916	28.9608	28.0575 37.6844	27.0558 36.0808	26.5147 36.0808	27.1644 37.6844	27.8719 39.2880	28.9437 40.8916	30.1750 42.4952	31.1805 44.0988	
Average daily h				33.2000	37.0044	30.0000	30.0000	37.0044	33.2000	40.0310	42.4332	135.9089	
Daily hot water		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte Energy content	(annual)	144.6944 206.0428	140.8495 216.4805	135.0032 184.8126	130.2555 175.3489	125.1514 153.8882	123.1900 148.9876	127.0182 157.2751	131.0557 161.6048	136.4141 185.1126 Total = S	142.3505 202.8044 um(45)m =	147.4682 230.8996 2257.4179	
Distribution lo Water storage l	35.1241	= 0.15 x (30.9064	45) m 32.4721	27.7219	26.3023	23.0832	22.3481	23.5913	24.2407	27.7669	30.4207	34.6349	(46)
Store volume a) If manufact Temperature f	urer decla actor from	Table 2b	actor is kn	own (kWh/c	lay):							210.0000 1.7016 0.5400	(48) (49)
Enter (49) or (Total storage 1		25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	0.9188	
If cylinder con Primary loss Combi loss				27.5653 22.5120 0.0000	28.4842 23.2624 0.0000	27.5653 22.5120 0.0000	28.4842 23.2624 0.0000	28.4842 23.2624 0.0000	27.5653 22.5120 0.0000	28.4842 23.2624 0.0000	27.5653 22.5120 0.0000	28.4842 23.2624 0.0000	(57) (59)
Total heat requ						203.9656	200.7342	209.0217 -20.1945	211.6821 -20.9617	236.8592 -24.7116	252.8817 -27.9952	282.6462 -32.5152	(62)
PV diverter Solar input FGHRS	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	-0.0000 0.0000 0.0000	(63b) (63c)
	252.7787	223.4824	237.5465	209.4852	203.4193	183.7056	181.7437		190.7204 er year (kW	212.1477 h/year) = S		250.1310 2558.8743	
12Total per yea Electric shower	(s)		0.0000	0 0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2559	
Heat gains from	0.0000	0.0000	0.0000	0.0000 Tot	0.0000 al Energy u	0.0000 sed by inst	0.0000 antaneous e	0.0000 lectric sho		0.0000 /year) = Su	0.0000 m(64a)m =	0.0000	
				101.5121	99.7008	91.2297	90.9356	93.6912	93.7955	102.9472	107.4943	118.1714	(65)
5. Internal gai	ns (see Ta	ble 5 and	5a)										
Metabolic gains	(Table 5)	, Watts							_			_	
(66)m Lighting gains	143.8766		143.8766	143.8766	May 143.8766	143.8766	143.8766	Aug 143.8766	Sep 143.8766	Oct 143.8766	Nov 143.8766	Dec 143.8766	(66)
Appliances gain	146.4397	162.1297	146.4397	151.3211	146.4397	151.3211	146.4397	146.4397	151.3211	146.4397	151.3211	146.4397	(67)
	290.3331	293.3459	285.7539	269.5913	249.1890	230.0137	217.2035 5	214.1907		237.9453	258.3476	277.5229	(68)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	37.3877 3.0000	37.3877 0.0000	37.3877 0.0000	37.3877 0.0000	37.3877 0.0000	37.3877 3.0000	37.3877 3.0000	37.3877 3.0000	
Losses e.g. eva - Water heating g	115.1013	-115.1013			-115.1013	-115.1013	-115.1013	-115.1013	-115.1013	-115.1013	-115.1013	-115.1013	(71)
	160.2900		152.3885	140.9890	134.0064	126.7079	122.2253	125.9291	130.2715	138.3699	149.2977	158.8325	(72)
	666.2258	682.2283	653.7450	631.0643	598.7982	574.2057	552.0315	552.7225	569.5383	591.9179	628.1293	651.9581	(73)
6. Solar gains													
[Jan]	-		A		Solar flux Table 6a W/m2				FF data le 6c	Acce fact Table	or	Gains W	
Northeast Southeast Southwest					11.2829 36.7938 36.7938					0.77 0.77 0.77	00	8.0343 198.6934 101.2021	(77)
Solar gains Total gains			728.4088	914.4152	1035.0660	1032.3512	993.3116	902.5714	792.7118	584.5652	369.3149	263.2093	(83)

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7. Mean intern			ing season)										
Temperature du Utilisation fa						Th1 (C)						21.0000	(85)
tau alpha	Jan 28.8593 2.9240	Feb 28.9411 2.9294	Mar 29.0217 2.9348	Apr 29.4063 2.9604	May 29.4794 2.9653	Jun 29.8246 2.9883	Jul 29.8246 2.9883	Aug 29.8894 2.9926	Sep 29.6907 2.9794	Oct 29.4794 2.9653	Nov 29.3319 2.9555	Dec 29.1793 2.9453	
util living ar	0.9558	0.9215	0.8718	0.7821	0.6584	0.5059	0.3794	0.4156	0.6074	0.8216	0.9282	0.9623	(86)
MIT Th 2 util rest of h	18.8591 19.9561	19.2617 19.9588	19.7368 19.9614	20.2740 19.9735	20.6630 19.9758	20.8899 19.9864	20.9651 19.9864	20.9537 19.9884	20.8028 19.9823	20.2741 19.9758	19.4774 19.9712	18.7941 19.9664	
MIT 2 Living area fr	0.9486 17.4770	0.9095 17.9808	0.8525 18.5688	0.7501 19.2216	0.6097 19.6648	0.4382 19.9057	0.2976 19.9686	0.3319 19.9632	0.5405 19.8254	0.7877 19.2408 Living area	0.9152 18.2670	0.9561 17.4016 0.4508	(90)
MIT Temperature ad	18.1001	18.5582	19.0954	19.6960	20.1148	20.3494	20.4179	20.4097	20.2660	19.7066	18.8127	18.0294	
adjusted MIT	18.1001	18.5582	19.0954	19.6960	20.1148	20.3494	20.4179	20.4097	20.2660	19.7066	18.8127	18.0294	(93)
8. Space heati	ng require	ment											
Utilisation Useful gains Ext temp.	Jan 0.9317 907.5922 4.3000	Feb 0.8894 1075.6845 4.9000	Mar 0.8336 1152.1005 6.5000	Apr 0.7406 1144.6270 8.9000	May 0.6167 1007.6239 11.7000	Jun 0.4632 744.1851 14.6000	Jul 0.3331 514.7691 16.6000	Aug 0.3676 534.9565 16.4000	Sep 0.5601 763.0154 14.1000	Oct 0.7776 914.7771 10.6000	Nov 0.8966 894.2932 7.1000	Dec 0.9404 860.6277 4.2000	(95)
	1976.4950	1950.6494	1793.8616	1517.4839	1179.8427	796.7934	529.1111	554.4916	858.3945	1276.8466	1650.5031	1958.9726	(97)
Space heating Space heating Solar heating	795.2637 requiremen	587.9764 t - total p		268.4570 Wh/year)	128.1308	0.0000	0.0000	0.0000	0.0000	269.3797	544.4711	817.1686 3888.3175	(98a)
Solar heating Space heating	0.0000 contributi	0.0000 on - total	0.0000 per year (}	0.0000 (Wh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Space heating Space heating	795.2637 requiremen		477.4703 lar contribu		128.1308 1 per year	0.0000 (kWh/year)	0.0000	0.0000	0.0000	269.3797 (98c)	544.4711	817.1686 3888.3175 31.3574	
9a. Energy req	uirements	- Individua	al heating s		luding mic	ro-CHP						0.0000	(001)
Fraction of sp Fraction of sp Efficiency of Efficiency of Efficiency of	ace heat f main space main space	rom main sy heating sy heating sy	ystem(s) ystem 1 (in ystem 2 (in	%) %)	m (Table I	1)						0.0000 1.0000 92.3000 0.0000 0.0000	(202) (206) (207)
Cross besting	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating Space heating	795.2637	587.9764		268.4570	128.1308	0.0000	0.0000	0.0000	0.0000	269.3797	544.4711	817.1686	(98)
Space heating	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating	861.6075	637.0275	517.3026	290.8526	138.8199	0.0000	0.0000	0.0000	0.0000	291.8523	589.8928	885.3398	(211)
Space heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating	0.0000 fuel (seco	0.0000 ndary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating Water heating	252.7787	223.4824	237.5465	209.4852	203.4193	183.7056	181.7437	188.8272	190.7204	212.1477	224.8865	250.1310	
Efficiency of (217)m	86.4484	86.1249	85.5929	84.6171	83.0530	79.8000	79.8000	79.8000	79.8000	84.5965	85.9660	79.8000 86.5133	
Fuel for water Space cooling	292.4041	259.4865	277.5306	247.5684	244.9269	230.2075	227.7490	236.6256	238.9980	250.7759	261.5994	289.1242	(219)
(221)m Pumps and Fa Lighting	0.0000 7.3041 30.4273	0.0000 6.5973 24.4099	7.3041 21.9784	0.0000 7.0685 16.1023	0.0000 7.3041 12.4379	0.0000 7.0685 10.1619	0.0000 7.3041 11.3463	0.0000 7.3041 14.7483	0.0000 7.0685 19.1566	0.0000 7.3041 25.1345	0.0000 7.0685 28.3893	0.0000 7.3041 31.2730	(231)
Electricity ge (233a)m	-89.6649	-115.0730	-150.7193	-153.9064	-153.8763		-137.4796	-135.2578	-130.2876	-123.3131	-94.3423	-78.9051	(233a)
Electricity ge (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity ge (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity us (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	N) (negati 0.0000	ve if net g 0.0000	eneration) 0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity ge (233b)m	-91.8955	-186.3766	-358.4731	-522.1453	-675.6025		-665.9026	-570.5230	-427.2889	-260.9227	-120.7179	-73.2280	(233b)
Electricity ge (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity ge (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity us (235d)m Annual totals	0.0000	0.0000			0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Space heating Space heating Space heating Efficiency of Water heating	fuel - mai fuel - mai fuel - sec water heat fuel used	n system 2 ondary										4212.6951 0.0000 0.0000 79.8000 3056.9961	(213) (215) (219)
Space cooling Electricity fo Total electric	r pumps an	e above, kl										0.0000	(231)
Electricity fo Energy saving/	r lighting	(calculate	ed in Append		d 0)							245.5656	(232)
crgy saving/	50		(ubbeng)	m , m all	- ×/								

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PV generation Wind generation Hydro-electric generation (Appendix N) Electricity generated - Micro CHP (Appendix N) Appendix Q - special features Energy saved or generated Energy used Total delivered energy for all uses			-6129.0107 0.0000 0.0000 0.0000 -0.0000 -0.0000 1472.2461	(234) (235a) (235) (236) (237)
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP				
Space heating - main system 1 Total CO2 associated with community systems Water heating (other fuel) Space and water heating Pumps, fans and electric keep-hot Energy for lighting Energy saving/generation technologies PV Unit electricity used in dwelling PV Unit electricity exported Total Total CO2, kg/year	Energy kWh/year 4212.6951 3056.9961 86.0000 245.5656 -1502.2350 -4626.7757	0.2100 0.2100 0.1387 0.1443	Emissions kg CO2/year 884.6660 0.0000 641.9692 1526.6351 11.9293 35.4427 -205.3185 -586.7670 -792.0856 781.9216	(373) (264) (265) (267) (268)
EPC Target Carbon Dioxide Emission Rate (TER) 13a. Primary energy - Individual heating systems including micro-CHP			6.3100	(273)
Space heating - main system 1 Total CO2 associated with community systems Water heating (other fuel) Space and water heating Pumps, fans and electric keep-hot Energy for lighting	Energy Pr kWh/year 4212.6951	timary energy factor kg CO2/kWh 1.1300 1.1300 1.5128 1.5338	Primary energy kWh/year 4760.3454 0.0000 3454.4056 8214.7510 130.1008 376.6567	(473) (278) (279) (281)
Energy saving/generation technologies PV Unit electricity used in dwelling PV Unit electricity exported Total Total Primary energy kWh/year Target Primary Energy Rate (TPER)	-1502.2350 -4626.7757	1.5052 0.4656	-2261.2266 -2154.0223 -4415.2490 4306.2596 34.7300	(286)

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