Executive Summary

Purpose of the report

In response to queries from industry on differences between EPC rating methodologies between England and Jersey, the Government of Jersey (GoJ) commissioned BRE to produce a report that will provide simplified explanations of how EPC ratings are produced for dwellings, and how compliance is assessed for new dwellings, in each of Jersey and England, highlighting the differences between the two administrations.

To illustrate the methodology differences, the GoJ also requested the report to include findings of a modelling exercise where one dwelling is modelled following the England SAP methodology and the Jersey SAP (JSAP) methodology, to compare outcomes for key metrics (energy use and running costs, CO_2 emissions and Asset Ratings and bands).

Content overview

Section "*SAP underlying principles*" summarises underlying principles of the building energy performance calculations common to both England and Jersey. It provided a summary of how SAP calculates the energy demand, energy consumption per end-use, and how fuel factors and fuel costs are then applied to produce CO_2 emission rates and running costs.

Section "*Compliance methodology comparison*" provided a summary of differences between England and Jersey's methodologies for assessing compliance for new dwellings.

In section "*EPC rating methodology comparison*" the differences between England and Jersey's cost and CO_2 based Asset Ratings are summarised, and the modelling exercise presented in "*Section B – Modelling analysis*" illustrates the main differences.

When referring to 'Jersey' we refer to the regulations specified in Building Bye-Laws 2007 supported by Technical Guidance Document 11.1A 2016 edition (BBL2007 TGA11.1A 2016).

When referring to 'England' we refer to the Building Regulations 2010 and Approved Document L1A 2013 edition (BR2010 and ADL1A 2013).

Key findings

1. <u>Compliance methodology comparison</u>

Fuel type of the Notional/Reference dwelling: The space and water heating in England's Notional dwelling are fuelled by mains gas, whereas in Jersey's Reference dwelling, space and water heating are fuelled by electricity.

Compliance metric: England assesses compliance of the overall energy efficiency of the dwelling based on the Target Emission Rate ($CO_2/m^2.yr$), whereas Jersey assesses compliance of the overall energy efficiency of the dwelling based on the Target Delivered Energy Rate ($kWh/m^2.yr$).

2. <u>EPC Asset Rating methodology comparison</u>

The Cost-based rating (also called SAP rating) and the CO_2-based rating (also called Environmental Impact rating) are calculated according to the same principles in England and Jersey, the main driving factors for diverging Asset ratings is the different fuel costs and CO_2 factors between Jersey and England.

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Introduction

The Standard Assessment Procedure (SAP) is the methodology used for evaluating energy performance of domestic buildings for Building Regulations compliance assessments and for Energy Performance Certification purposes.

In England, the compliance of new dwellings with Building Regulations is currently evaluated following the SAP10.2 methodology. This methodology is used for producing the Building Regulations Part L Report (BREL) as well as an 'on-construction' Energy Performance Certificate. Energy Performance Certificates (EPCs) for existing dwellings are produced following the Reduced-data SAP (RdSAP) 9.94 methodology.

RdSAP allows assessors to model an existing dwelling following the SAP methodology based on a site survey when a limited data set is available. The RdSAP methodology details a system of data collection and a series of defaults and inferences which allows to expand the reduced data inputs into full SAP inputs for the calculation and producing the EPC outputs. Note that whether an assessment is conducted with RdSAP inputs or SAP inputs, so long as the RdSAP expanded inputs align with the SAP inputs, the results will be identical. Multiple accredited software providers have implemented the SAP and RdSAP methodologies[1].

In Jersey, the Jersey-SAP (JSAP) methodology was largely based on England SAP2012 v9.92, with exceptions outlined in this report. There are no published specifications of the JSAP methodology, as there is only one software available in Jersey for compliance checking of new dwellings which is www.jsap.je. The same JSAP webtool and methodology may be used for assessing compliance against Building By-Laws and for producing EPCs for new and existing dwellings. Although we understand there is currently a tool developed and maintained by Quidos that implements a version of RdSAP where inferences were modified to reflect differences in construction in Jersey from the rest of the UK.

This report will highlight methodology differences between SAP and JSAP for compliance assessment and for EPC ratings and bands. As JSAP is largely based on SAP2012 v9.92, the report is focusing on methodology differences between JSAP and SAP2012 v9.92, although a summary of updates between SAP2012 v9.92 and SAP10.2 is provided in Appendix A.

Section "*Compliance methodology comparison"* provided a summary of differences between England and Jersey's methodologies for assessing compliance for new dwellings.

Section "*EPC rating methodology comparison*" focuses on EPC outputs and outlines differences in EPC ratings and bands between JSAP and SAP2012 v9.92.

Finally, to illustrate the outcome of methodology differences between JSAP and SAP on EPC outputs, a dwelling was modelled with both methodologies, the outcome of the study is summarised in "*Section B Modelling Analysis*".

Notes on vocabulary:

- The building being modelled and assessed is referred to as the Actual dwelling.
- JSAP is used interchangeably to refer to the methodology behind the JSAP webtool, and the JSAP webtool itself. In this report, JSAP refers to the series of steps the software follows to output results.

[1] Lists of accredited software providers are available on the BRE website at SAP - Standard Assessment Procedure - BRE Group

- The JSAP methodology was developed to assess compliance and produce EPC documents in accordance with the Building Bye-Laws 2007 supported by Technical Guidance Document 11.1A (TGA11.1A) 2016 edition. When referring to 'Jersey' we refer to the regulations specified in BBL2007 TGA11.1A 2016.

  JSAP is largely based on SAP2012 v9.92. This version of SAP was developed in accordance with the Building Regulations 2010 for England and supporting practical guidance in Approved Document L1A 2013 edition. When referring to 'England', we refer to the BR2010 and ADL1A 2013. Although it is worth noting that these have been superseded, the current regulations in place are Building Regulations 2010 for England and supporting practical guidance in Approved Document L1A 2021 edition with 2023 amendments.

- Dwelling and building are used interchangeably and refer to a domestic property.

Background

In 2014, the Government of Jersey contracted BRE to develop the JSAP webtool for implementing Jersey's version of SAP2012 v9.92. This tool was made public in September 2015. The following webpage JSAP Latest News[2] details updates to JSAP since its launch in 2015.

Prior to this, BRE had developed an excel spreadsheet for implementing Jersey's version of SAP 2005.

All versions of SAP methodology for England are available on the BRE website at SAP - Standard Assessment Procedure - BRE Group[3]

Section A – England vs Jersey methodology comparison

SAP underlying principles

The Standard Assessment Procedure outlines the steps to follow for undertaking energy performance compliance assessments and energy certification of dwellings. Although results obtained following the SAP methodology may assist in the design process, they are not representative of how the building will be operated in reality, and they should not be used to make strategic design decisions. SAP is not a design tool.

The SAP methodology details the series of steps to undertake to calculate monthly energy use, CO_2 emissions, and fuel costs under standardised conditions.

The standard conditions are:

- The number of occupants, which is estimated based on the total floor area.
- The number of occupants is also used to estimate hot water, lighting, cooking and appliances requirements.
- The heating schedule which dictates the average monthly internal air temperature.
- The weather dataset (external air temperature, solar data, wind speeds and wind directions).

The assessor collects information on a dwelling's geometry, fabric, systems and combined with standard assumptions, the methodology details how to calculate monthly energy use.

In brief, the SAP methodology provides the steps to calculate:

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2 https://www.jsap.je/index.php?page=00091

3 https://bregroup.com/sap/

- the lighting energy use and associated heat gains into the space, based on a standardised illuminance level, taking into account the glazing area, glazing properties, and light source properties (SAP2012 9.92 Appendix L1)
- the heat gains contribution of cooking and appliances (SAP2012 9.92 Appendix L2 and L3)
- the water heating energy use and associated heat gains, based on a standardised hot water requirement, taking into account system performance, and storage and distribution losses (SAP2012 v9.92 section 4)
- the energy use and associated heat gains or losses for ventilation fans, pumps, and controls (auxiliary energy) based on a standardised fresh air rate, taking into account systems performance, etc. (SAP2012 v9.92 Section 2.6)
- the space heating and cooling energy use by first carrying out an energy balance to calculate the heating and cooling demands using heat gains and losses from systems, fabric performance, infiltration rates etc. taking into account the required internal air temperature and weather conditions. (SAP2012 v9.92 Sections 9 and 10)
- The offset from contributions from any renewable on-site systems such as solar thermal systems, PV systems, wind turbines, and hydro-electric generators, where applicable (SAP2012 v9.92 Appendix M)
- The aggregated monthly energy consumed by fuel source and to convert it into equivalent CO_2 emissions by applying the fuel's carbon factor ($kgCO_2/kWh$) to the corresponding energy use figure as follows:

  CO_2 emissions ($kgCO_2$) = Energy use (kWh) * CO_2 emission Factor ($kgCO_2/kWh$)

  Note that carbon factors are established for each fuel type, and for electricity, the factor will be dependent on the local electricity mix (what fuel sources contribute to the electricity grid). Each administration has a different electricity mix, and therefore the carbon factor of electricity can vary greatly between administrations.

  The fuel costs and primary energy consumption are calculated in a similar manner by simply replacing the carbon factor by a fuel cost factor or a primary energy factor in the above equation.

The SAP modelling principles are the same in England and Jersey. However, in Jersey there was an additional method added for modelling a Jersey specific electricity tariff, Economy 20 tariff (E20). This follows a similar approach to other off-peak electricity tariffs mentioned in SAP2012 but allows for modelling how the E20 on-peak and off-peak fraction is split over the day.

Some of the SAP modelling principles are not available through the JSAP interface as not applicable to dwellings in Jersey, such as modelling community heating systems.

Compliance methodology comparison

In Jersey, the current regulation requirements concerning conservation of fuel and power within the Building Bye-Laws 2007 supported by Technical Guidance Document 11.1A (TGA11.1A) 2016 edition is largely comparable to Building Regulations 2010 for England and supporting practical guidance in Approved Document L1A 2013 edition. In both respective guidance documents Criterion 1 is mandatory for demonstrating the energy efficiency requirements and a calculation and rating of the dwelling energy performance is needed for this. Both refer to SAP2012 as the required method to use to determine targets to demonstrate meeting criteria 1. Therefore, this section outlines methodology differences between England and Jersey based on SAP2012 v9.92.

The procedure for new domestic buildings in both England and Jersey to demonstrate compliance with Building Regulations under criteria 1 is by comparing the annual energy use or CO_2 emissions of the Actual building against those of a ‘Notional’ or ‘Reference’ building. The specification of the Notional/Reference building is a comparable building of the same size, geometry, and use as the Actual building but with fabric and services efficiencies specified in accordance with compliance regulations.

The choice of the terminology used i.e. “Notional” or “Reference” belongs to the administration, but in effect the purpose is the same; The Notional/Reference building model serves to generate target delivered energy, emission, or primary energy rates which the Actual building must meet or better. The choice of the metric to assess compliance can vary among administrations, depending on policy goals.

In Jersey, the building used for generating compliance targets is referred to as the ‘Reference’ building. In England, this building is referred to as the ‘Notional’ building.

Table 1 provides a summary of differences between the reference dwelling values that make up the Notional and Reference building specifications in England and Jersey respectively. Similarities between Notional/Reference building specifications are not listed here. A table with the full list of reference values can be found in both respective guidance documents, Table 3 in TD 11.1A 2016 edition for Jersey and Table 4 in ADL1A 2013 edition for England (extracts are provided in Appendix B).

Table 1 summary of differences between the Jersey Reference and England Notional buildings reference value specifications compatible with SAP2012 calculations.

	England Notional dwelling	Jersey Reference dwelling
Weather	UK average	Jersey average
Heating System	**Mains gas** boiler with radiators	Direct **electric** room heaters
Heating Controls	For single storey where living area is greater than 70% of total floor area, the Notional building uses a programmer and room thermostat. For any other building types, it uses time and temperature zone control. Which usually leads to a slightly lower average internal air temperature set point in England than Jersey.	Programmer and appliance thermostat
Hot Water System	Same **gas** boiler as space heating	**Electric** immersion

Both administrations use two metrics for assessing compliance in criteria 1:

- one for assessing the overall energy efficiency of the building,
- one for assessing the building’s fabric performance only.

For checking compliance of the overall performance of the building, England chose to assess the performance in terms of carbon dioxide emissions, whereas Jersey chose to assess the energy performance in terms of energy use (delivered energy). In this regard:

- in **England**, the Actual dwelling’s annual emissions in $kgCO_2$/m2, referred to as the **Dwelling Emission Rate (DER)** is assessed against a target, **Target Emission Rate (TER).** The TER is derived from the Notional dwellings’ annual emissions in $kgCO_2$/m2 multiplied by a fuel factor based on the fuel used for space and water heating in the actual dwelling as described in the Approved Document paragraphs 2.4 and 2.5 of ADL1A 2013.

- In **Jersey**, the Actual building's annual delivered energy rate (kWh/m2), referred to as the **dwelling Delivered Energy Rate (also called DER)** is assessed against the Reference dwelling's delivered energy rate known as the **Target Delivered Energy Rate (also called TER).**

For checking compliance of the fabric performance only, both administrations calculate the **Fabric Energy Efficiency of the Actual Dwelling (DFEE)** and compare it against a target (TFEE) derived from the **Fabric Energy Efficiency of the Notional/Reference Dwelling (FEE).** The Fabric Energy Efficiency is defined as the space heating and cooling requirements per square meter of floor area (kWh/m^2.yr), under standardised conditions for weather, ventilation, heating schedules, window overshading, and there are no additional gains from hot water, pumps and fans and other systems. Both use a formula to determine the TFEE:

$$TFEE = 1.15 * FEE_{Notional/Reference}$$

EPC rating methodology comparison

In both England and Jersey, the EPC document reports:

- an Energy Cost rating (also known as SAP rating) and band,
- an Environmental Impact Rating (EI rating) and band (CO_2 emissions-based rating).

The methodology for converting the annual running costs and CO_2 emissions into ratings and bands are identical in both instances – extracts of the SAP2012 v9.94 methodology for calculating the ratings are given in Figure 1, Figure 2 and Figure 3 below.

13 ENERGY COST RATING

The SAP rating is related to the total energy cost by the equations:

$$ECF = \text{deflator} \times \text{total cost} / (TFA + 45) \qquad (9)$$

$$\text{if } ECF \geq 3.5, \quad SAP\ 2012 = 117 - 121 \times \log_{10}(ECF) \qquad (10)$$

$$\text{if } ECF < 3.5, \quad SAP\ 2012 = 100 - 13.95 \times ECF \qquad (11)$$

where the total cost is calculated at (255) or (355) and TFA is the total floor area of the dwelling at (4).

The SAP rating takes into account energy for lighting, and also energy generated in the dwelling using technologies like micro-CHP or photovoltaics.

The SAP rating scale has been set so that SAP 100 is achieved at zero-ECF. It can rise above 100 if the dwelling is a net exporter of energy. The SAP rating is essentially independent of floor area.

The SAP rating is rounded to the nearest integer. If the result of the calculation is less than 1 the rating should be quoted as 1.

Energy efficiency rating bands are defined by the SAP rating according to Table 14.

Figure 1 Extract of SAP2012 v9.92 methodology for calculating the Energy Cost Rating also known as SAP rating in England and Jersey

14 CARBON DIOXIDE EMISSIONS AND PRIMARY ENERGY

CO_2 emissions attributable to a dwelling are those for space and water heating, ventilation and lighting, less the emissions saved by energy generation technologies.

The calculation should proceed by following the appropriate section of the SAP worksheet, designed for calculating carbon dioxide emissions for:
a) individual heating systems and community heating without combined heat and power (CHP); or
b) community heating with CHP or utilising waste heat from power stations.

The Environmental Impact Rating (EI rating) is related to the annual CO_2 emissions by:

$$CF = (CO_2 \text{ emissions}) / (TFA + 45) \qquad (12)$$

if $CF >= 28.3$ EI rating $= 200 - 95 \times \log_{10}(CF)$ (13)
if $CF < 28.3$ EI rating $= 100 - 1.34 \times CF$ (14)

where the CO_2 emissions are calculated at (272) or (383) and TFA is the total floor area of the dwelling at (4).

The EI rating scale has been set so that EI 100 is achieved at zero net emissions. It can rise above 100 if the dwelling is a net exporter of energy. The EI rating is essentially independent of floor area.

The EI rating is rounded to the nearest integer. If the result of the calculation is less than 1 the rating should be quoted as 1.

Environmental impact rating bands are defined by the EI rating according to Table 14.

Figure 2 Extract from SAP2012 v9.92 methodology for calculating the Environmental Impact Rating (CO2 emissions-based rating) in England and Jersey.

Table 14: Rating bands

The rating is assigned to a rating band according to the following table. It applies to both the SAP rating and the Environmental Impact rating.

Rating	Band
1 to 20	G
21 to 38	F
39 to 54	E
55 to 68	D
69 to 80	C
81 to 91	B
92 or more	A

Figure 3 Extract from SAP2012 v9.92 methodology for assigning a Rating Band from a SAP rating or a EI rating.

The differences between the two administrations lie in the core methodology for calculating the energy use. Significant differences are:

- **The weather datasets:** Jersey uses a bespoke Jersey dataset whereas in England, a UK average data set is used (based on East Pennines) for EPC SAP rating and EI rating. In England, an additional calculations reported on the EPC for a "potential rating" are modelled using a local weather dataset (one of the weather locations given in SAP2012 v9.92 Table U1).
- **The fuel prices and CO_2 factors:** In England, the fuel prices and factors are provided in SAP2012 v9.92 Table 12 (a copy of which is in Appendix C Figure 9). In Jersey, the current fuel prices and factors are provided in Appendix C Table 3. Note that the JSAP webtool allows the Government of Jersey to directly edit the fuel costs as they see fit. Table 2 below provides a summary of differences for common fuels in Jersey. It is important to note the electricity CO_2 factor is much lower for Jersey than England, because the electricity mix in Jersey is predominantly composed of low-carbon French nuclear, while England's electricity mix relies more on fossil fuels.

Table 2 Fuel prices and CO_2 factors in England and Jersey, for common heating fuels in Jersey.

	England		Jersey	
	CO_2 factor ($kgCO_2/kWh$)	Cost	CO_2 factor ($kgCO_2/kWh$)	Cost
Heating oil	0.298	Standing charge (£): 0.0 Unit price (p/kWh): 5.44	0.298	Standing charge (£): 0.0 Unit price (p/kWh): 10.55
Electricity	0.519	Standing charge (£): 54 Unit price (p/kWh): 13.19	0.08	Standing charge (£): 68 Unit price (p/kWh): 17.13

Section B – Modelling analysis

Methods

In order to contrast the ratings dwellings will achieve under the Jersey and England methodologies and provide a reference as to why values are different, one dwelling was modelled following each of:

- The JSAP methodology, using the JSAP webtool
- The SAP2012 v9.92 methodology

The selected dwelling is a three-bedroom semi-detached house with an oil-fuelled boiler for space heating and hot water.
The following output key metrics were compared for the Actual dwelling:

- The energy use, CO_2 emissions, and fuel costs
- The EPC cost-based rating and band
- The EPC CO_2-based rating and band

Results

Figure 4 shows the annual energy use of the detached house model ran through each of JSAP and the UK's SAP2012. The slight difference in energy use may be explained by the different weather datasets[4]. England SAP calculation uses a UK average weather dataset (East Pennines), whereas JSAP uses a Jersey weather dataset.

Figure 5 shows the annual running costs of the detached house model ran through JSAP and SAP2012. As per Table 2, the energy costs of heating oil and electricity are cheaper in England than Jersey, particularly for heating oil which is the fuel used for both space and water heating in the dwelling. This, in turn, contributes to the difference in the cost-based ratings shown in Figure 6.

Figure 7 shows that modelling the detached house in JSAP produces slightly lower CO_2 emissions than when the house is modelled with SAP2012. This can be explained by the fact that the main fuel used in this dwelling is heating oil (~90% energy use) and as per Table 2, the CO_2 emission factor for heating oil is the same in England (SAP2012) and Jersey (JSAP). The remaining energy use (~10%) is fuelled by electricity, which has a much lower emission factor in Jersey (Table 2), and therefore results in less CO_2 emissions in Jersey than England.

Therefore, as shown in Figure 8, the detached house model has a slightly better Environmental Impact (CO_2-based) rating and band in Jersey than England.

The full EPC output documents are provided in Appendix D.

[4] Note that having to model the detached house through two different tools means there is a possibility for slight input differences, however inputs were double checked, and input errors were not identified. If an unspotted error remains, it should not affect results significantly.

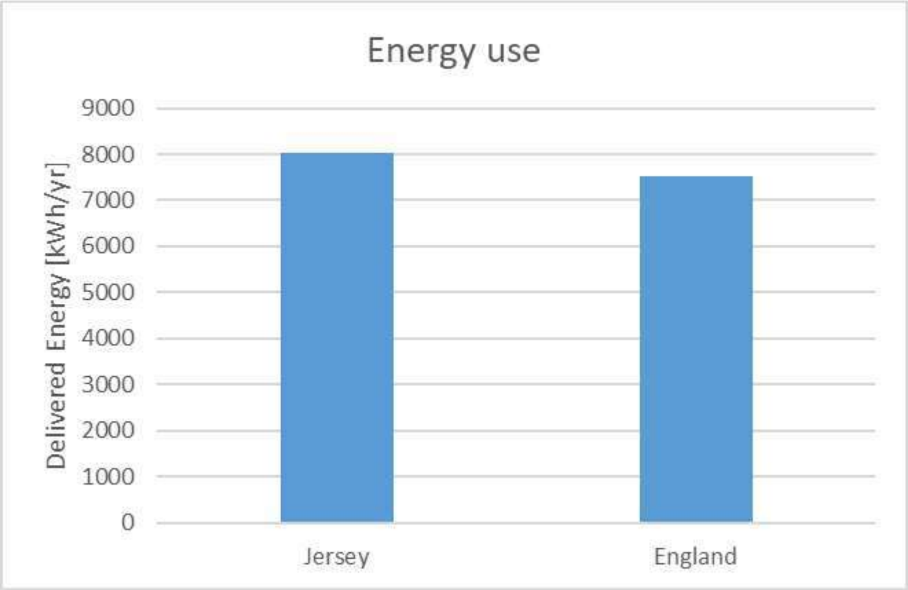


Figure 4 Annual energy consumption for the 3-bedroom detached house modelled with JSAP (Jersey) and SAP2012 v9.92 (England).

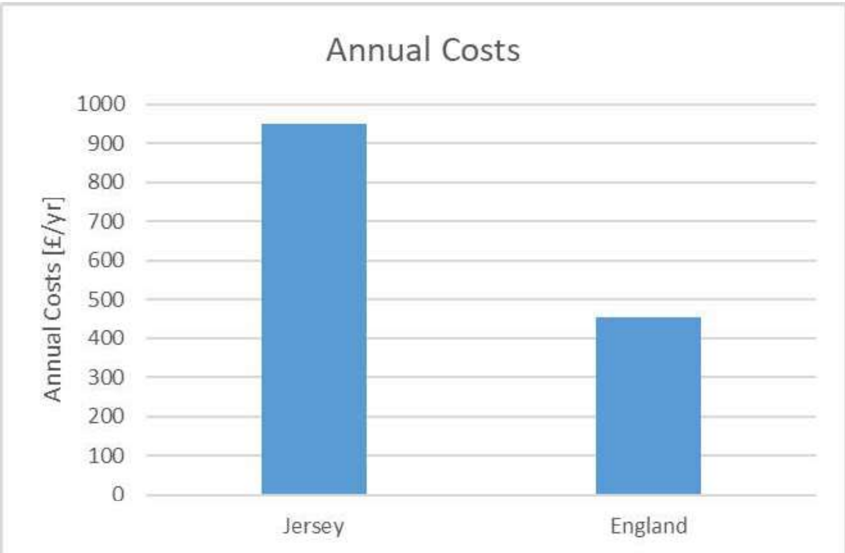


Figure 5 Annual running costs for the 3-bedroom detached house modelled with JSAP (Jersey) and SAP2012 v9.92 (England).

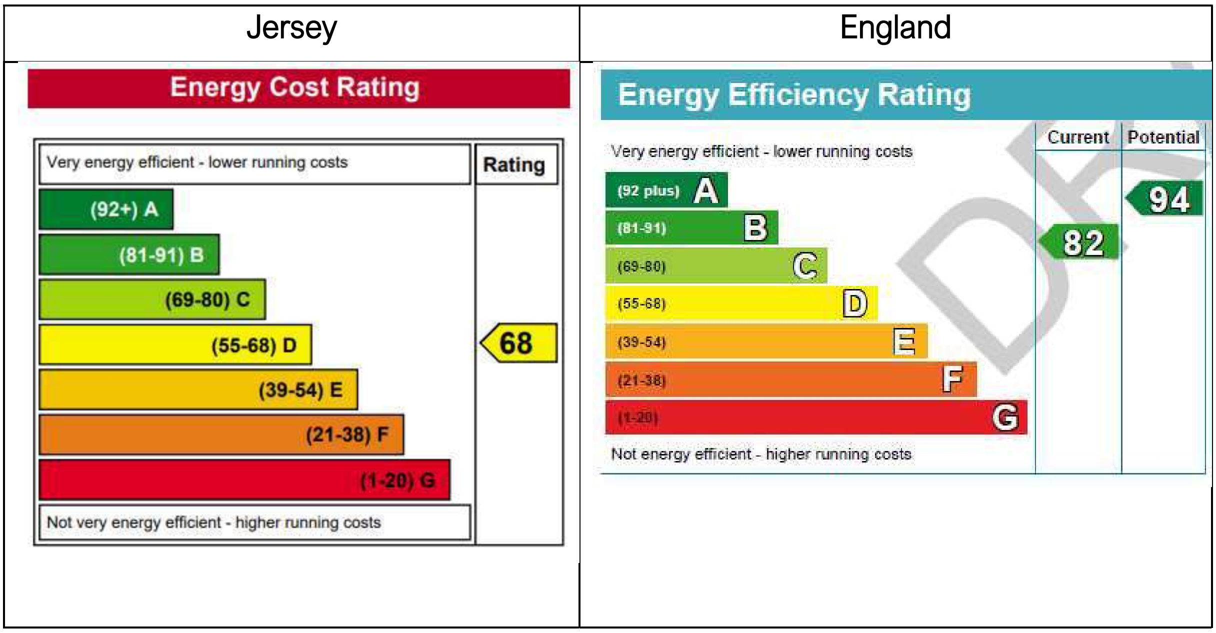


Figure 6 Energy cost rating of the detached house model in Jersey (left) and England (right).

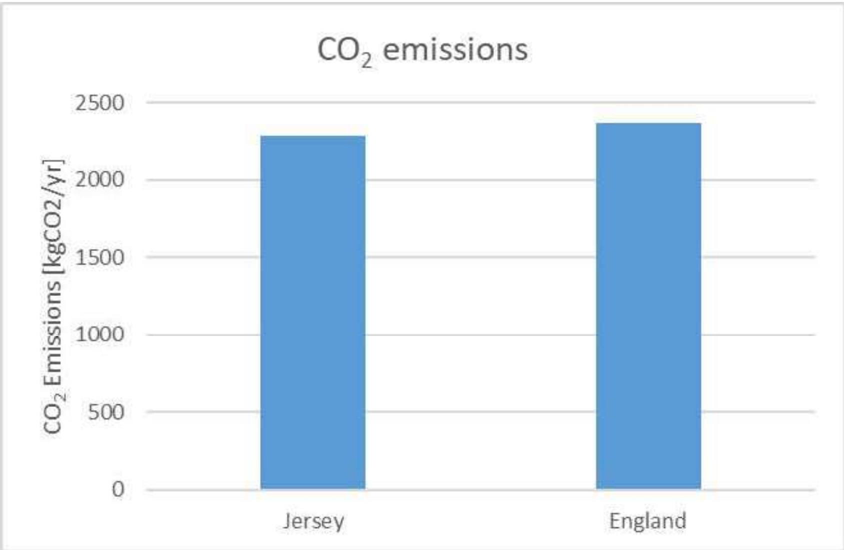
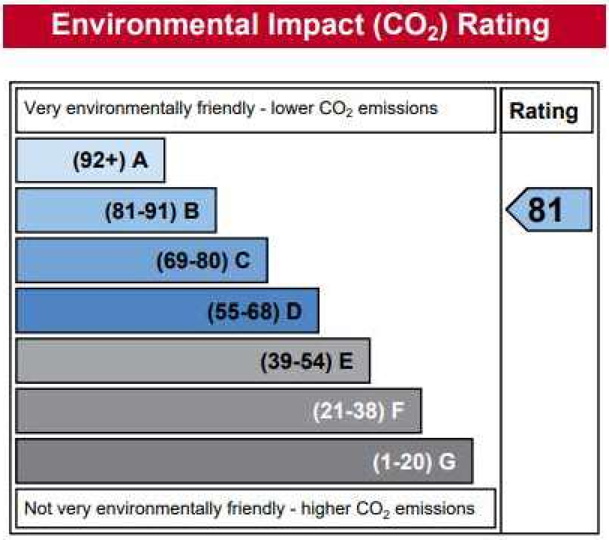


Figure 7 Annual CO_2 emissions for the 3-bedroom detached house modelled with JSAP (Jersey) and SAP2012 v9.92 (England).

Jersey



England

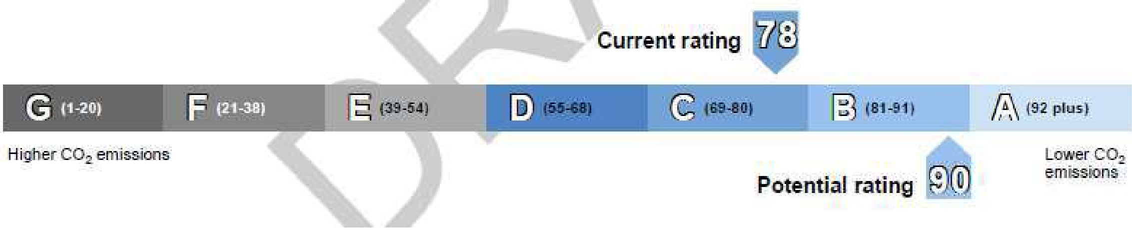


Figure 8 Environmental Impact rating (CO2-based rating) of the detached house model in Jersey (top) and England (bottom).

Discussion

As shown in the *Results* section, the fuel prices and factors are the main driver for differing ratings in England and Jersey. In the detached house modelled for this exercise, the heating fuel is heating oil, which has the same CO_2 emission factor in England and Jersey, leading to an almost identical Environmental Impact rating. However, it is essential to note that the dominant fuel in use greatly influences the rating. For instance, if the dwelling were to utilize electricity instead of heating oil for space and water heating, the Environmental Impact rating in Jersey would surpass that in England. This is attributed to the significantly lower CO_2 factor associated with electricity in Jersey compared to England (Table 2).

Indeed, it is important to acknowledge the broader spectrum of alternatives and consider potential variations based on factors such as the dominant fuel in use and the size of the dwelling. Different fuels may yield distinct outcomes in comparison, and the energy usage pattern can vary for dwellings of different sizes, such as flats, where hot water and lighting might dominate energy consumption.

Looking at the Cost-based rating, again the difference can be largely explained by the lower fuel costs in England than Jersey (Table 2). In this regard, it should be noted that the fuel cost factors are periodically edited by the Government of Jersey (GoJ) directly via the JSAP interface, whereas in England, the fuel Cost factors used for the SAP rating are fixed/standardised until the SAP methodology gets revised.

Further, as the SAP methodology gets revised, the fuel Cost Deflator (see Figure 1) also gets revised to account for the general rate of fuel price inflation and ensure buildings assessed based on older versions of SAP still score similarly with new versions of SAP. If it were not applied, as fuel prices inflate over time, the SAP ratings of dwellings would drift lower.

These considerations are explained by the fact that England tailored the methodology for producing EPCs to existing dwellings whereas in Jersey, JSAP appears to be tailored for new builds.

The GoJ decided the EPC should provide the most up to date information when it is issued and should be an accompanying report for new dwelling assessments. It would appear that consistency of the ratings between old EPCs and new EPCs is not a concern in Jersey.

In England, the strategy of tailoring the EPCs for existing dwellings is also fulfilled by providing a list of potential measures which the owner could undertake to improve the energy efficiency of the dwelling (see EPC outputs in Appendix D). In England, the up-to-date/current energy costs are only used for providing an estimation of the savings that could be achieved if the suggested measures were implemented. Note in Figure 6 and Figure 8 a 'potential rating' is displayed on the rating scales of England. This is the rating the dwelling could achieve if the owner implemented all the suggested measures.

Conclusions

The purpose of this report was to provide simplified explanations of the methodologies for how compliance is assessed and how EPC ratings are produced for dwellings in each of Jersey and England, highlighting the differences between the two.

To do so, Section "*SAP underlying principles*" summarised the underlying principles of the SAP methodology common to both England and Jersey. It provided a summary of how SAP can be used to calculate the energy use per end-uses and how fuel prices and CO_2 factors are then applied to produce CO^2 emission rates and running costs.

Section "*Compliance methodology comparison*" provided a summary of the differences between England and Jersey's methodologies for assessing compliance. The main points being:

- the space and water heating in England's Notional dwelling are fuelled by mains gas, whereas in Jersey's Reference dwelling, space and water heating are fuelled by electricity.
- England assesses compliance of the overall energy efficiency of the dwelling based on the Target Emission Rate (CO_2/m^2.yr), whereas Jersey assesses compliance of the overall energy efficiency of the dwelling based on the Target Delivered Energy Rate (kWh/m^2.yr).

Section "*EPC rating methodology comparison*" detailed the differences in methodologies between England and Jersey for calculating the EPC Asset ratings: the Cost-based rating (also called SAP rating) and the CO_2-based rating (also called Environmental Impact rating). The modelling exercise presented in Section B Modelling analysis illustrated that the main driving factor for diverging Asset ratings is the different fuel prices and factors between Jersey and England.

References

- SAP2012 v9.92 (https://files.bregroup.com/SAP/SAP-2012_9-92.pdf)
- Jersey Building Bye-Laws 2007 supported by Technical Guidance Document 11.1A (TGA11.1A) 2016 edition (https://www.gov.je/PlanningBuilding/LawsRegs/Technical/Pages/11ConservationFuelPower.aspx#anchor-0)
- England Building Regulations 2010 and supporting practical guidance in Approved Document L1A 2013 edition (https://webarchive.nationalarchives.gov.uk/ukgwa/20190213060753/https:/www.gov.uk/government/publications/conservation-of-fuel-and-power-approved-document-l)

Appendix A Summary of changes between SAP2012 v9.92 and SAP10.2

Extract from the SAP10.2 document available at SAP 10.2 - 11-04-2023.pdf (bregroup.com)

The present edition is SAP 10.2. Significant changes compared to SAP 2012 include:

- fuel prices, CO2 emissions and primary energy factors have been updated
- the monthly variation of CO2 and primary energy factors is now taken into consideration
- the calculation of hot water consumption has been adjusted to take account of the shower flow rate
- the calculation of lighting energy has been updated to allow for the lighting efficacy and amount
- the treatment of distribution loss factors associated with communal heating networks has been revised
- the air flow rates associated with chimneys and flues have been updated
- the treatment of mechanical ventilation system heat recovery and aerodynamic performance has been revised
- additional flow temperature options have been provided for heat pumps and condensing boilers and a means to recognise hybrid heat pump/boilers added
- the self-use factor for electricity generated by photovoltaic (PV) systems has been revised and allows for the effects of battery storage and PV diverters
- the ability to include solar thermal space heating has been added
- the assumed standard heating pattern has been adjusted to better match UK practice
- provision has been made to include heat interface units (for heat networks), new heating controllers and additional fuels in the PCDB
- the reference building characteristics have been updated
- results from low pressure pulse testing have been allowed for in the calculation of infiltration rate
- Appendix P (summer gains check) has been removed
- the efficiency of waste water heat recovery systems has been made to vary with shower flow rate

Appendix B Tables of reference specifications for the Notional (England) and Reference (Jersey) dwelling

Extract from Jersey Building Bye-Laws 2007 supported by Technical Guidance Document 11.1A (TGA11.1A) 2016 edition

Table 3 Reference Dwelling Values

Element or system	Value
Climate data	Jersey
Size and shape	Same as actual dwelling
Opening areas (windows, roof windows and doors)	Same as actual dwelling up to a maximum for total area of openings of 25% of total floor area. If the total area of openings in the actual dwelling exceeds 25% of the total floor area, reduce to 25% as follows: 1) Include all opaque and semi-glazed doors with the same areas as the actual dwelling (excluding any doors not in exposed elements, e.g. entrance door to a flat from a heated corridor). 2) Reduce area of all windows and roof windows by a factor equal to [25% of total floor area less area of doors included in 1)] divided by [total area of windows and roof windows in actual dwelling].
External walls including semi-exposed walls	U = 0.18 W/m²K
Party walls	U = 0
Floors	U = 0.13 W/m²K
Roofs	U = 0.13 W/m²K
Opaque door (<30% glazed area)	U = 1.0 W/m²K
Semi-glazed door (30%-60% glazed area)	U = 1.2 W/m²K

Table 3 **Reference Dwelling Values**

Element or system	Value
Windows and glazed doors with >60% glazed area	U = 1.4 W/m²K Frame factor = 0.7 Solar energy transmittance = 0.63 Light transmittance = 0.80 Orientation same as actual dwelling Overshading same as actual dwelling
Roof windows	U = 1.4 W/m²K (Adjustment factor of +0.3 W/m²K applied to roof window as described below Table 6e of SAP 2012; resultant U value = 1.7 W/m²K) Other parameters as for windows
Curtain wall	Curtain walling to be treated as standard glazing and opaque wall with the same areas as the actual dwelling. When the total opening area exceeds 25% of floor area the glazed area to be reduced to 25% as for opening areas above. U-value of opaque wall = 0.18 W/m²K U-value of glazing = 1.5 W/m²K (which includes an allowance of 0.1 for thermal bridging within the curtain wall)
Thermal mass	Medium (250 kJ/m²K)
Living area	Same as actual dwelling
Number of sheltered sides	Same as actual dwelling
Allowance for thermal bridging	1 If the thermal bridging in the actual dwelling has been specified by using the default y-value of 0.15 W/m²K, the thermal bridging is defined by y = 0.05 W/m²K. 2. Otherwise the thermal bridging allowance is calculated using the lengths of junctions in the actual dwelling and the psi values in Table R2 of SAP 2012. **Note:** Where the area of openings is > 25% of the total floor area the lengths of junctions in the notional dwellings remain the same as the lengths in the actual dwelling, even though window area is reduced as described for 'Opening areas' above.
Ventilation system	Natural ventilation with intermittent extract fans
Air permeability	5 m³/h·m² at 50 Pa
Chimneys	None
Open flues	None
Extract fans / passive vents	2 extract fans for total floor area up to 70 m², 3 for total floor area > 70 m² and up to 100 m², 4 for total floor area > 100 m²
Main heating fuel (space and water)	Standard electricity (SAP code 30)
Heating system	Direct electric room heaters, panel convector or radiant heaters (SAP code 691) 100% efficient
Heating system controls	Programmer and appliance thermostats (SAP code 2603)
Hot water system	Electric immersion (SAP code 903) Single immersion No separate time control for space and water heating
Hot water cylinder	If cylinder specified in actual dwelling: volume of cylinder in actual dwelling Otherwise: 150 litres Declared loss factor = 0.85 x (0.2 + 0.051 $V^{2/3}$) kWh/day, where V is the volume of the cylinder in litres
Primary water heating losses	None
Water use limited to 125 litres per person per day	Yes
Secondary space heating	None
Low energy light fittings	100% of fixed outlets
Air conditioning	None

Extract from England Building Regulations 2010 and supporting practical guidance in Approved Document L1A 2013 edition

Table 4 Summary of concurrent notional dwelling specification

Element or system	Values
Opening areas (windows and doors)	Same as actual dwelling up to a maximum proportion of 25% of total floor area[1]
External walls (including opaque elements of curtain walls)	0.18 W/(m²·K)
Party walls	0.0 W/(m²·K)
Floor	0.13 W/(m²·K)
Roof	0.13 W/(m²·K)
Windows, roof windows, glazed roof-lights and glazed doors	1.4 W/(m²·K) (whole window U-value)[2] g-value = 0.63[3]
Opaque doors	1.0 W/(m²·K)
Semi-glazed doors	1.2 W/(m²·K)
Airtightness	5.0 m³/(h·m²)
Linear thermal transmittance	Standardised psi values – see SAP 2012 Appendix R, except use of y = 0.05 W/(m²·K) if the default value of y = 0.15 W/(m²·K) is used in the actual dwelling
Ventilation type	Natural (with extract fans)[4]
Air-conditioning	None

Table 4 Summary of concurrent notional dwelling specification *(continued)*

Element or system	Values
Heating system	Mains gas If combi boiler in actual dwelling, combi boiler; otherwise regular boiler Radiators
	Room sealed
	Fan flue
	SEDBUK 2009 89.5% efficient
Controls	Time and temperature zone control[5] Weather compensation
	Modulating boiler with interlock
Hot water storage system	Heated by boiler (regular or combi as above) If cylinder specified in actual dwelling, volume of cylinder in actual dwelling If combi boiler, no cylinder. Otherwise 150 litres Located in heated space Thermostat controlled Separate time control for space and water heating
Primary pipework	Fully insulated
Hot water cylinder loss factor (if specified)	Declared loss factor equal or better than $0.85 \times (0.2 + 0.051\ V^{2/3})$ kWh/day
Secondary space heating	None
Low-energy lighting	100% low-energy lighting
Thermal mass parameter (TMP)	Medium (TMP = 250)

Notes:

1. The Building Regulations do not specify minimum daylight requirements. However, reducing window area produces conflicting impacts on the predicted CO_2 emissions: reduced solar gain but increased use of electric lighting. As a general guide, if the area of glazing is much less than 20% of the total floor area (TFA), some parts of the dwelling may experience poor levels of daylight, resulting in increased use of electric lighting.
2. The orientation of the elemental building is the same as the actual building. In plotting buildings onto a site designers should consider the benefits of orientating buildings to the south (with large windows orientated south and smaller windows orientated north) to benefit from passive solar gains through having lower space heating demands. Designers should be aware of the risk of overheating through excessive solar gain in the summer and design shading to avoid excessive summer heat gain.
3. Higher g-values would also comply with the recipe as increasing solar gains reduces the space heat load. However, designers should be aware of the impact of g-value on the risk of overheating and optimise their choice accordingly. The U-value is set to 1.5 W/(m²K) for curtain walling glazed areas, as an allowance for thermal bridging.
4. See SAP 2012 Section 11: 2 fans for TFA up to 70 m²; 3 fans for TFA > 70–100 m²; 4 fans for TFA > 100 m². A recipe approach can be followed if extract fans are replaced with the same number of passive vents.
5. In order for a system to be specified with time and temperature zone control, it must be possible to programme the heating times of at least two heating zones independently, as well as having independent temperature controls. These two heating zones must be space heating zones. For single-storey open-plan dwellings in which the living area is greater than 70% of TFA, sub-zoning of temperature control is not appropriate and the recipe will default to programmer and room stat.

Appendix C Fuel Factors

Table 12: Fuel prices, emission factors and primary energy factors

Fuel	Standing charge, £ (a)	Unit price p/kWh	Emissions kg CO_2 per kWh (b)	Primary energy factor	Fuel code
Gas:					
mains gas	120	3.48	0.216	1.22	1
bulk LPG	70	7.60	0.241	1.09	2
bottled LPG		10.30	0.241	1.09	3
LPG subject to Special Condition 18 (c)	120	3.48	0.241	1.09	9
biogas (including anaerobic digestion)	70	7.60	0.098	1.10	7
Oil:					
heating oil		5.44	0.298	1.10	4
biodiesel from any biomass source (d)		7.64	0.123	1.06	71
biodiesel from vegetable oil only (e)		7.64	0.083	1.01	73
appliances able to use mineral oil or biodiesel		5.44	0.298	1.10	74
B30K (f)		6.10	0.245	1.09	75
bioethanol from any biomass source		47.0	0.140	1.08	76
Solid fuel: (g)					
house coal		3.67	0.394	1.00	11
anthracite		3.64	0.394	1.00	15
manufactured smokeless fuel		4.61	0.433	1.21	12
wood logs		4.23	0.019	1.04	20
wood pellets (in bags for secondary heating)		5.81	0.039	1.26	22
wood pellets (bulk supply for main heating)		5.26	0.039	1.26	23
wood chips		3.07	0.016	1.12	21
dual fuel appliance (mineral and wood)		3.99	0.226	1.02	10
Electricity: (a)					
standard tariff	54	13.19	0.519	3.07	30
7-hour tariff (high rate) (h)	24	15.29	0.519	3.07	32
7-hour tariff (low rate) (h)		5.50	0.519	3.07	31
10-hour tariff (high rate) (h)	23	14.68	0.519	3.07	34
10-hour tariff (low rate) (h)		7.50	0.519	3.07	33
18-hour tariff (high rate) (h)	40	13.67	0.519	3.07	38
18-hour tariff (low rate) (h)		7.41	0.519	3.07	40
24-hour heating tariff	70	6.61	0.519	3.07	35
electricity sold to grid		13.19 (i)	0.519	3.07	36
electricity displaced from grid			0.519 (i)	3.07 (i)	37
electricity, any tariff (j)					39
Community heating schemes: (k)	120 (l)				
heat from boilers – mains gas		4.24	0.216	1.22	51
heat from boilers – LPG		4.24	0.241	1.09	52
heat from boilers – oil		4.24	0.331 (m)	1.10	53
heat from boilers that can use mineral oil or biodiesel		4.24	0.331	1.10	56
heat from boilers using biodiesel from any biomass source		4.24	0.123	1.06	57
heat from boilers using biodiesel from vegetable oil only		4.24	0.083	1.01	58
heat from boilers – B30D (f)		4.24	0.269	1.09	55
heat from boilers – coal		4.24	0.380 (n)	1.00	54
heat from electric heat pump		4.24	0.519	3.07	41
heat from boilers – waste combustion		4.24	0.047	1.23	42
heat from boilers – biomass		4.24	0.031 (o)	1.01	43
heat from boilers – biogas (landfill or sewage gas)		4.24	0.098	1.10	44
waste heat from power station		2.97	0.058 (p)	1.34	45
geothermal heat source		2.97	0.041	1.24	46
heat from CHP		2.97	as above (q)	as above (q)	48
electricity generated by CHP			0.519 (i)	3.07 (i)	49
electricity for pumping in distribution network			0.519	3.07	50

Energy Cost Deflator (r) = 0.42

Figure 9 Table of fuel factors extracted from SAP2012 v9.92

Table 3 JSAP list of current fuel prices, CO2 emissions and Primary energy factors. Differences between England SAP2012 v9.92 and JSAP are highlighted in red.

Additional standing charge in £	Unit price in p/kWh	Emissions factor in kg CO2 per kWh	Primary energy factor in kWh per kWh	Fuel code	Fuel name in SAP 2012	Fuel name for Jersey if different
136	17.56	0.241	1.09	1	Gas: mains gas	
129	14.02	0.241	1.09	2	Gas: bulk LPG	
143	16.91	0.241	1.09	3	Gas: bottled LPG	
0	10.55	0.298	1.1	4	Oil: heating oil	
70	7.6	0.098	1.1	7	Gas: biogas (including anaerobic digestion)	
143	16.91	0.241	1.09	9	~~Gas: LPG subject to Special Condition 18~~	Gas: LPG metered cylinders
0	8.00	0.226	1.02	10	Solid fuel: dual fuel appliance (mineral and wood)	
0	10.00	0.394	1	11	Solid fuel: house coal	
0	17.20	0.433	1.21	12	Solid fuel: manufactured smokeless fuel	
0	8.20	0.394	1.01	15	Solid fuel: anthracite	
0	13.70	0.019	1.04	20	Solid fuel: wood logs	
0	6.00	0.016	1.12	21	Solid fuel: wood chips	
0	13.80	0.039	1.26	22	Solid fuel: wood pellets (in bags, for secondary heating)	
0	11.00	0.039	1.26	23	Solid fuel: wood pellets (bulk supply for main heating)	
68	17.13	0.08	1.4	30	~~Electricity: standard tariff~~	Electricity: general domestic
0	9.06	0.08	1.4	31	~~Electricity: 7-hour tariff (off-peak)~~	Electricity: economy 7 (off-peak)
12	17.91	0.08	1.4	32	~~Electricity: 7-hour tariff (on-peak)~~	Electricity: economy 7 (on-peak)
0	9.40	0.08	1.4	33	~~Electricity: 10-hour tariff (off-peak)~~	Electricity: comfort heat (off-peak)
12	14.95	0.08	1.4	34	~~Electricity: 10-hour tariff (on-peak)~~	Electricity: comfort heat (on-peak)
73	10.70	0.08	1.4	35	Electricity: 24-hour heating tariff	
0	7.39	0.08	1.4	36	Electricity: electricity sold to grid	

0	0	0.08	1.4	37	Electricity: electricity displaced from grid	
12	17.13	0.08	1.4	38	~~Electricity: 18-hour tariff (on-peak)~~	Electricity: economy 20 (on-peak)
0	0	0	0	39	Electricity: electricity, unspecified tariff	
0	11.98	0.08	1.4	40	~~Electricity: 18-hour tariff (off-peak)~~	Electricity: economy 20 (off-peak)
120	4.24	0.08	1.4	41	Community heating schemes: heat from heat pump	
120	4.24	0.047	1.23	42	Community heating schemes: heat from boilers – waste combustion	
120	4.24	0.031	1.01	43	Community heating schemes: heat from boilers – biomas	
120	4.24	0.098	1.1	44	Community heating schemes: heat from boilers – biogas (landfill or sewage gas)	
120	2.97	0.058	1.34	45	Community heating schemes: waste heat from power stations	
120	2.97	0.041	1.24	46	Community heating schemes: geothermal heat source	
0	0	0	0	47	Community heating schemes: not from CHP	
120	2.97	0	0	48	Community heating schemes: heat from CHP	
120	0	0.08	1.4	49	Community heating schemes: electricity generated by CHP	
120	0	0.08	1.4	50	Community heating schemes: electricity for pumping in distribution network	
120	4.24	0.241	1.09	51	Community heating schemes: heat from boilers – mains gas	
120	4.24	0.241	1.09	52	Community heating schemes: heat from boilers – LPG	

120	4.24	0.331	1.1	53	Community heating schemes: heat from boilers – oil	
120	4.24	0.38	1	54	Community heating schemes: heat from boilers – coal	
120	4.24	0.269	1.09	55	Community heating schemes: heat from boilers – B30D	
120	4.24	0.331	1.1	56	Community heating schemes: heat from boilers that can use mineral oil or liquid biofuel	
120	4.24	0.123	1.06	57	Community heating schemes: heat from boilers using biodiesel from any biomass source	
120	4.24	0.083	1.01	58	Community heating schemes: heat from boilers using biodiesel from vegetable oil only	
0	7.64	0.123	1.06	71	Oil: biodiesel from any biomass source	
0	7.64	0.083	1.01	73	Oil: biodiesel from vegetable oil only	
0	5.44	0.298	1.1	74	Oil: appliances able to use mineral oil or liquid biofuel	
0	6.1	0.245	1.09	75	Oil: B30K - for appliances that specifically use a blend of 30% biodiesel from cooking oil and 70% kerosene	
0	47	0.14	1.08	76	Oil: bioethanol from any biomass source	

England EPC for the semi-detached house modelled as part of the modelling exercise in Section B - Modelling Analysis.

Energy Performance Certificate (EPC)

PREVIEW
NOT FOR ISSUE

SAP

xx, xx, B1 9EH

Dwelling type:	Semi-detached house	**Reference number:**	0000-0000-0000-0000-0000
Date of assessment:	05 October 2023	**Type of assessment:**	SAP, new dwelling
Date of certificate:	05 October 2023	**Total floor area:**	100 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient
- Find out how you can save energy and money by installing improvement measures

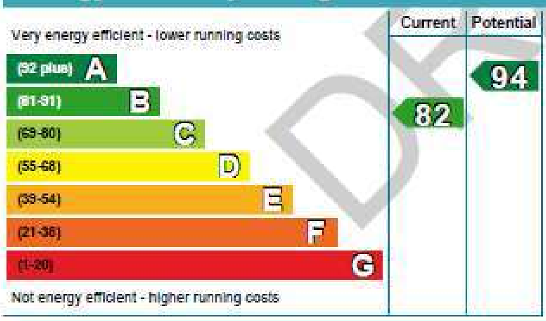
Estimated energy costs of dwelling for 3 years	**£1,098**
Over 3 years you could save	**£159**

Estimated energy costs of this home

	Current costs	Potential costs	Potential future savings
Lighting	£204 over 3 years	£204 over 3 years	You could save £159 over 3 years
Heating	£534 over 3 years	£540 over 3 years	
Hot water	£360 over 3 years	£195 over 3 years	
Totals:	£1,098	£939	

These figures show how much the average household would spend in this property for heating, lighting and hot water. This excludes energy use for running appliances like TVs, computers and cookers, and any electricity generated by microgeneration.

Energy Efficiency Rating



The graph shows the current energy efficiency of your home.

The higher the rating the lower your fuel bills are likely to be.

The potential rating shows the effect of undertaking the recommendations on page 3.

The average energy efficiency rating for a dwelling in England and Wales is band D (rating 60).

Actions you can take to save money and make your home more efficient

Recommended measures	Indicative cost	Typical savings over 3 years
1 Solar water heating	£4,000 - £6,000	£159
2 Solar photovoltaic panels	£5,000 - £8,000	£798

Page 1 of 4

Summary of this home's energy performance related features

Element	Description	Energy Efficiency
Walls	Average thermal transmittance 0.18 W/m²K	★★★★★
Roof	Average thermal transmittance 0.13 W/m²K	★★★★★
Floor	Average thermal transmittance 0.13 W/m²K	★★★★★
Windows	High performance glazing	★★★★★
Main heating	Boiler and radiators, oil	★★★☆☆
Main heating controls	Programmer and room thermostat	★★★☆☆
Secondary heating	None	–
Hot water	From main system	–
Lighting	Low energy lighting in all fixed outlets	★★★★★
Air tightness	Air permeability 5.0 m³/h.m² (as tested)	★★★★☆

Thermal transmittance is a measure of the rate of heat loss through a building element; the lower the value the better the energy performance.
Air permeability is a measure of the air tightness of a building; the lower the value the better the air tightness.

Current primary energy use per square metre of floor area: 91 kWh/m² per year

Low and zero carbon energy sources

Low and zero carbon energy sources are sources of energy that release either very little or no carbon dioxide into the atmosphere when they are used. Installing these sources may help reduce energy bills as well as cutting carbon. There are none provided for this home.

Recommendations

The measures below will improve the energy performance of your dwelling. The performance ratings after improvements listed below are cumulative; that is, they assume the improvements have been installed in the order that they appear in the table. Further information about the recommended measures and other simple actions you could take today to save money is available at **www.direct.gov.uk/savingenergy**. Before installing measures, you should make sure you have secured the appropriate permissions, where necessary. Such permissions might include permission from your landlord (if you are a tenant) or approval under Building Regulations for certain types of work.

Recommended measures	Indicative cost	Typical savings per year	Rating after improvement
Solar water heating	£4,000 - £6,000	£53	B 85
Solar photovoltaic panels, 2.5 kWp	£5,000 - £8,000	£266	A 94

About this document

The Energy Performance Certificate for this dwelling was produced following an energy assessment undertaken by a qualified assessor, accredited by [scheme name]. You can get contact details of the accreditation scheme at [scheme website address], together with details of their procedures for confirming authenticity of a certificate and for making a complaint. A copy of this EPC has been lodged on a national register. It will be publicly available and some of the underlying data may be shared with others for compliance and marketing of relevant energy efficiency information. The Government may use some of this data for research or statistical purposes. Green Deal financial details that are obtained by the Government for these purposes will not be disclosed to non-authorised recipients. The current property owner and/or tenant may opt out of having their information shared for marketing purposes.

Assessor's accreditation number: [accreditation number]
Assessor's name: [assessor name]
Phone number: [phone]
E-mail address: [e-mail]
Related party disclosure: No related party

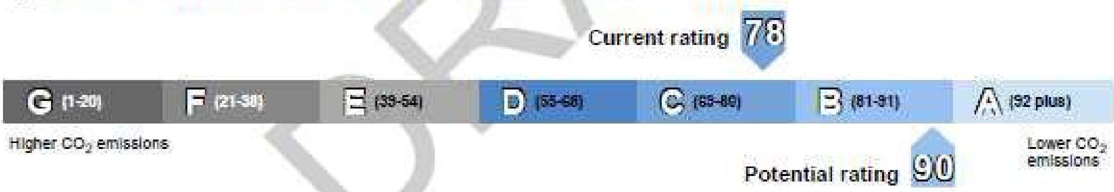
Further information about Energy Performance Certificates can be found under Frequently Asked Questions at **www.epcregister.com**.

About the impact of buildings on the environment

One of the biggest contributors to global warming is carbon dioxide. The energy we use for heating, lighting and power in homes produces over a quarter of the UK's carbon dioxide emissions.

The average household causes about 6 tonnes of carbon dioxide every year. Based on this assessment, your home currently produces approximately 2.3 tonnes of carbon dioxide every year. Adopting the recommendations in this report can reduce emissions and protect the environment. If you were to install these recommendations you could reduce this amount by 1.3 tonnes per year. You could reduce emissions even more by switching to renewable energy sources.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.



Your home's heat demand

If you built your own home and, as part of its construction, you installed a renewable heating system, you could receive Renewable Heat Incentive (RHI) payments. The estimated energy required for space and water heating will form the basis of the payments. For more information, search for the domestic RHI on the www.gov.uk website.

Heat demand

Space heating (kWh per year)	3,061
Water heating (kWh per year)	2,110

Jersey EPC for the detached house modelled as part of the modelling exercise in Section B – Modelling Analysis.

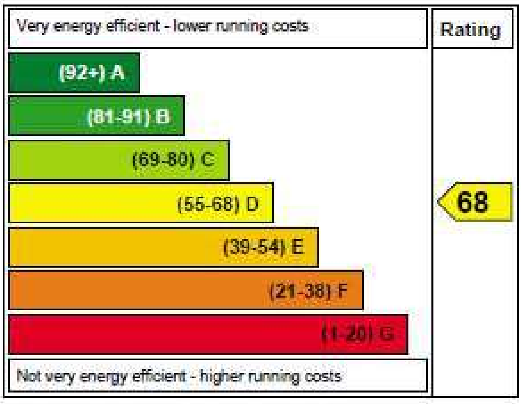
JERSEY ENERGY PERFORMANCE CERTIFICATE

ENG/JRS comparison (100m2 semi-detached house, xx

Dwelling type:	House - Semi-detached	Building Permit No.:	A/2017/0000
Date of assessment:	05 Oct 2023	Total floor area:	100 m^2
Type of assessment:	new dwelling		

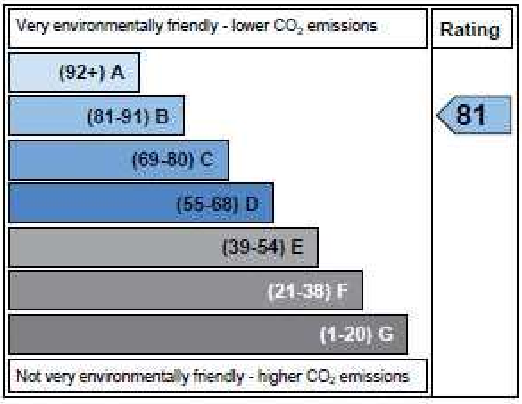
This certificate has been produced for the purposes of demonstrating compliance with the Part 11 requirements of the Building Bye-laws (Jersey). It shows this home's performance in terms of the energy used per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon (CO_2).

Energy Cost Rating



The energy cost rating is a measure of the overall cost of energy used in the home. The higher the rating the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

Estimated energy use, carbon dioxide (CO_2) emissions and fuel costs of this home

Energy use	81 kWh/m^2 per year
CO_2 emissions	2.03 tonnes per year
Lighting	£70 per year
Heating	£342 per year
Hot Water	£358 per year

Using the fuel costs shown below, and based on standardised assumptions about occupancy and heating patterns, the above table provides an indication of how much it will cost to provide lighting, heating and hot water to this home. This certificate has been produced for building bye-law purposes only and enables one home to be compared with another at the time of construction.

Fuels used in the dwelling and their prices

general domestic electricity	17.13 p/kWh
heating oil	10.55 p/kWh

JSAP Version Number: www / JSAP 0.3.10 / JSAP 1.0.0.13

Report Ends