

THE DEVELOPMENT OF A VOLUNTARY DISPLAY ENERGY CERTIFICATE SCHEME (VoIDECs) FOR COMMERCIAL OFFICES

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Summary

Voluntary Display Energy Certificates (VoIDECs) are a new and innovative voluntary operational energy rating scheme designed for commercial office buildings. They have been developed by a partnership between Phil Jones of Building Energy Solutions and the National Energy Foundation. This not-for-profit scheme is for the benefit of the whole industry. Initial development has been funded by Legal & General and piloted on some of their larger buildings. VoIDECs are based on relatively simple data, making them inexpensive and quick to produce. The aim is to provide something easy and simple to engage property owners and operators quickly with an opportunity to display on a voluntary basis where appropriate.

Many commercial landlords and building owners do not have an appropriate means of measuring and highlighting energy performance in a relevant, straightforward and consistent way. VoIDECs use the same methodology as statutory DECs and provide a similar certificate layout with an A-G scale, but that's where the similarity ends. VoIDECs take all the good features of statutory DECs and make them better, easier and more informative, also allowing tailoring for sectors and clients. VoIDECs also provide a simple way of rating the landlord energy performance separately from the tenants in order to identify who is best placed to take action.

This paper sets out the thinking behind VoIDECs and shows the resulting VoIDEC ratings from some pilot buildings. The paper also discusses the likely future developments of VoIDECs.

KEYWORDS: Display energy certificates, DECs, Metering, monitoring, energy efficiency, energy performance, carbon emissions, landlord energy, tenant energy

1. Background

Display Energy Certificates (DECs) have been a statutory requirement in large public buildings across England and Wales since 2009. This requires all buildings over 1,000m² occupied by public authorities and regularly visited by the public to display an energy certificate¹. This requirement has been widened through a reduction in the floor area limit to 500m² in 2013 and 250m² in 2015². CIBSE carried out an analysis of the DEC database in 2010 followed by a much more detailed analysis of 120,000 DECs in 2013 by UCL³. The latter in particular shows the value and success of DECs in encouraging improvement in energy performance.

In 2012 the UK government was considering rolling DECs out into commercial buildings. Indeed there was very strong industry wide support for this⁴. However, the government

¹ <http://ec.europa.eu/energy/en/topics/energy-efficiency/buildings>

² <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0031&from=EN>

³ https://www.bartlett.ucl.ac.uk/energy/news/documents/CIBSE__Analysis_of_Display_Energy_Certificates_for_Public_Buildings_.pdf

⁴ Carbon reductions in Existing Non Domestic Buildings – UKGBC (March 2011)

ultimately decided not to mandate DEC's in commercial buildings and this gave rise to the voluntary DEC scheme for commercial buildings discussed in this paper. The basic premise was that if government will not mandate DEC's then the industry should do it anyway.

Independent energy consultant Phil Jones of Building Energy Solutions developed early ideas and a business plan for a voluntary not-for profit scheme and then formed a partnership with the National Energy Foundation (NEF) to take this forward. A pilot project was then funded and tested by Debbie Hobbs at Legal & General Property. The technical specification behind the VolDEC scheme has been developed by Phil Jones and NEF and the scheme IP resides with them in a 'not for profit' partnership for the benefit of the whole industry.

Many commercial landlords and building owners do not have an appropriate means of measuring and highlighting energy performance in a relevant, straightforward and consistent way. They suffer from a lack of relevant benchmarks to enable performance to be measured and compared sensibly and consistently.

The scheme responds directly to Government's U-turn on its commitment to extend DEC's to commercial buildings. Based on Display Energy Certificates (DEC's), this represents an innovative approach for private sector owners/operators of commercial property and addresses the absence of a government rating scheme. A manifesto for a voluntary scheme was drawn up at an early stage to set down some principles about the scheme and its objectives, as shown below. The scheme also responds to a need to improve DEC's and to address the on-going landlord-tenant energy issue. VolDEC's use the same methodology as statutory DEC's and a similar certificate layout with an A-G scale, but that's where the similarity ends.

2. The need for VolDECs

Although this scheme has come about to fill a void left by a government decision, there are many other reasons why VolDECs are necessary and needed. VolDECs aim to address some key on-going problems that have held back energy performance. Firstly, the need for a simple entry-level engagement tool that is easy to understand, without which building managers and occupants fail to engage in energy management. Secondly, the commercial sector has been dogged by the landlord-tenant issue where landlords often fail to reveal energy usage, tenants are either not aware or don't care and each believe it is the other's problem. VolDECs for commercial office provide a solution to this.

Key reasons for a self funded Voluntary DEC Scheme are to:

- engage building managers and encourage action on energy efficiency in buildings
- provide a soft-start for the commercial sector to begin measuring performance
- improve the benchmarks that underpin all DEC's
- set common standards through an industry wide scheme but tailored to sectors

MANIFESTO

For a Voluntary Display Energy Certificate Scheme

The government's decision not to mandate DEC's in commercial buildings, and the minimalist approach to EPBD2, leaves most buildings without an appropriate means of measuring energy performance. It is therefore in the hands of industry to take a Voluntary Display Energy Certificate Scheme forward:

- to highlight building energy performance
- to provide a clear driver for improving performance
- to give reputational and financial value to energy performance
- to provide a simple soft-start, leading building operators towards more sophisticated benchmarking
- to encourage greater retrofitting, resulting in better buildings, economic activity and jobs
- to establish a consistent methodology and QA checks across the industry
- to provide annual scheme reporting, league tables and greater transparency
- to establish an independent centre of excellence on building energy performance
- to continually develop the methodology and conduct benchmarking research
- to provide a single body to engage, encourage and attract more organisations to measure energy performance
- to provide ownership of a single industry wide scheme, the methodology and benchmarks
- to allow industry to operate, manage and develop the scheme for its own benefit without government constraint.

The scheme should be not-for-profit, industry wide, industry backed and for the benefit of the industry at large. This manifesto calls for industry to come together to set up and support a Voluntary Display Energy Certificate Scheme.

- encourage deeper analysis to benefit building operators, designers and the whole industry

Issues for Landlord and tenants:

- Energy usage is often hidden in service charges
- No split between Landlord and Tenant
- Statutory DEC only show whole building performance, one DEC unlikely to be relevant to either landlord or tenant
- Cannot show improvements (or poor performance) in what landlord and tenant control
- DECs use one benchmark for all offices, not a good match for many office types
- Many commercial offices are 'stuck' at G and cannot show improvement

VolDECs are based on relatively simple data, making them inexpensive and quick to produce. Separating out tenant energy usage from that used in the common parts of a building provides property owners and operators with cost-effective user-friendly energy ratings for areas that are within their control to improve.

The A-G scale has been extended to include G1 to G4 ratings, providing low ranking buildings with a more defined rating in order to encourage improvement, as well as a 'U' (Unclassified) rating for buildings where performance or data is exceptionally poor. VolDECs also include a certificate quality rating to encourage improvements in data quality.

3. The VolDEC scheme

Phase one of the scheme has been focused on the commercial office sector and has already been successfully tested on 13 Legal and General's major multi-tenanted office properties. Phase two of the pilot project is currently involving other forward-thinking partners to expand the sample of offices and to extend the scheme to other asset classes such as shopping centres and retail parks. VolDEC is a 'not for profit' scheme for the benefit of the industry and hopes to gain the backing of the whole industry using sector specific benchmarks. The key aim is to highlight building energy performance and encourage improvement but also to conduct research to gradually improve our benchmarks. Overall objectives of the scheme include:

- Voluntary system without government constraints
- Not for profit industry partnership for the benefit of the industry
- Based on revenue streams fed back into the development process
- Industry wide, industry backed, tailored by sector
- Soft start for the commercial sector into measuring performance
- Independent & authoritative centre of excellence
- Lower cost with future online self input
- Using authoritative sector specific benchmarks
- To highlight building energy performance and encourage improvement
- To conduct benchmarking research for the industry, by the industry
- Encourage deeper analysis to benefit building operators, designers and the whole industry

Key features of the scheme:

- Easy access, quick, low cost
- No lodgement, no site visit, no advisory report
- Uses the existing DEC methodology as the calculation basis
- Uses a 'similar' (improved) DEC certificate layout with A-G scale extended to include G1-G4 and U = Unclassified
- Includes a certificate quality rating: HIGH/MEDIUM/LOW to encourage better data quality
- Immediate feedback to encourage data quality improvement

- Better (& improving) benchmarks and categories, working with sectors
- Allows more comparables but only where energy is sub-metered

4. What is a VoIDEC

The VoIDEC Solution

VoIDECs use the same methodology as statutory DEC's and provide a similar certificate layout with an A-G scale, but that's where the similarity ends. VoIDECs take all the good features of statutory DEC's and make them better, easier and more informative but allowing tailoring for sectors and clients. A comparison of VoIDECs and statutory DEC's is shown in Figure 1.

	Statutory DEC	VoIDEC
Methodology	Produced using the methodology described in CIBSE TM47	Produced using the methodology described in CIBSE TM47
Benchmarks	Uses CIBSE TM46 benchmarks. This provides only one benchmark for all office types.	Uses CIBSE ECON19 benchmarks for offices. This provides four different office types plus energy is broken down by end use for each type.
Landlord / tenant split	Unable to provide a separate landlord tenant DEC in the same building	Uses the granular energy breakdown in CIBSE ECON19 to provide composite landlord and tenant benchmarks for 5 different building scenarios.

Figure 1 – Comparison of statutory DEC's and VoIDEC's

By separating out tenant energy outputs from those produced by the common parts of a building it is possible to provide property owners/ operators with cost-effective, user-friendly energy ratings for just those areas of an asset that are within their control to improve.

Figure 2 shows a typical 'whole building' VoIDEC certificate.

VOLUNTARY DISPLAY ENERGY CERTIFICATE

How efficiently is this building operated?



LANDLORD RATING

Building Number 1

RATING QUALITY: Medium

Certificate No: NEF2014L

Overall Energy Performance

More energy efficient

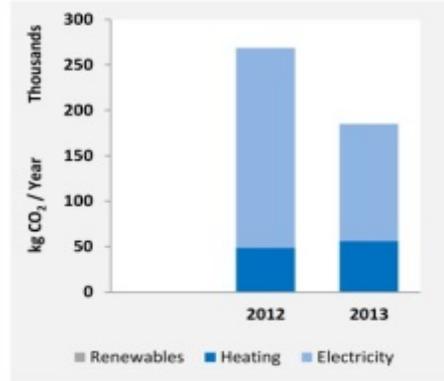


Less energy efficient

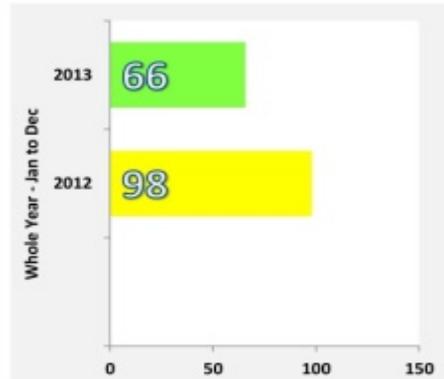
Technical & Administrative

VolDEC Selected Scenario	S4 – Air Conditioned, Tenant FCUs
ECO19 Building Type	TYPE 3 Standard A/C
Gross Internal Floor Area (m ²)	3479
Main Heating Fuel	Gas
Whole Building Rating	128 (Good rating is: 55)
Landlord Rating	66 (Good rating is: 53)
Tenant Rating	207 (Good rating is: 58)
HMG Statutory OR	253
Asset Rating	N/A
Assessor name	NEF
Energy monitored in the year	2013
Issue Date	05 March 2014
Nominated Date	05 March 2014
Valid Until	05 March 2015

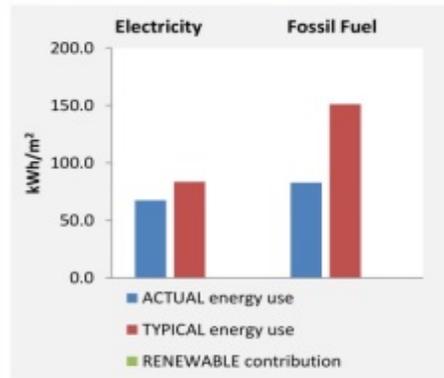
Total CO₂ Emissions



Previous Operational Rating



Energy Performance by Fuel



SEPARABLES REMOVED: None



VolDEC Certificates are co-produced by The National Energy Foundation and Building Energy Solutions, on behalf of Legal & General. 2014

Figure 2 – Typical Whole building VolDEC

Figure 2 clearly shows the extended scale to G1 to G4 ratings down to an operational rating of 250, providing low-ranking buildings with a more granular rating in order to encourage

improvement. Below an operational rating of 250 buildings are rated as 'U' (Unclassified) rating for buildings where performance or data is exceptionally poor. VoIDECs can be produced for the whole building, or total landlord energy use and total tenant use. They can be displayed individually or on the same certificate as shown in Figure 3.

The VoIDEC certificate itself has a cleaner less cluttered appearance with less administrative text than statutory certificates. Figure 2 shows a typical Landlord VoIDEC with the familiar A-G scale but based on ECON19⁵ benchmarks, with a typical building sitting at the D-E boundary. Annual VoIDECs use ECON19 benchmarks to provide the granular data required to build a more specific benchmark as opposed to the single office benchmark category shown in CIBSE TM46⁶.

The last three years CO₂ and operational ratings are shown in a similar way to statutory DEC. However, the VoIDEC also shows a chart of the current annual kWh/m² compared to the relevant benchmarks. This often presents more clues as to what is going wrong in a building than the overall operational rating.

The VoIDEC certificate also shows (middle bottom) any separables that have been removed from the benchmarking calculation but this is only allowed if the separable has been sub-metered. VoIDECs allow many more separable types whereas the statutory DEC scheme is quite restricted in this sense.

Quality Rating

VoIDECs also include a certificate quality rating: High, Medium and Low, to encourage improvements in data quality. This is shown on the VoIDEC certificate in Figure 2 (middle top). This is an overall rating of the certificate/data quality to indicate to the building manager whether this is a reasonably robust rating or not. Indeed, one of the key features of the VoIDEC process is to cleanse the data as much as possible to identify obvious data issues that are commonly highlighted. In particular, the first time a VoIDEC is attempted it often highlights poor floor area and energy data. The process therefore feeds back a quality rating indicating to the Facilities Manager that 'we have produced a certificate but we would not recommend displaying it – check the data first.' The quality rating is defined as:

- HIGH – Well categorised, good energy data, good floor area data (FOR DISPLAY)
- MEDIUM – Concerns about categorisation, energy or floor area data (FOR DISPLAY - prompting improved data)
- LOW – Missing/poor categorisation, energy or floor area data (ISSUE TO FM – NOT FOR DISPLAY)

The data required to develop a VoIDEC is:

- Building postcode
- Floor area
- Approximate hours of occupancy
- Annual energy use – landlord & Tenant
- Data year
- Main heating fuel type
- Office type (ECON 19)

VoIDECs therefore provide a robust methodology and benchmarking approach. In addition, its flexibility brings the added benefit of a separate landlord and tenant benchmark, tailored to different building scenarios.

⁵ Energy Consumption Guide 19: Energy use in offices (2003)

⁶ Energy Benchmarks CIBSE TM46 (2008)

5. Landlord-tenant VoIDECs

If the facilities manager can provide an overall split between landlord and tenant energy then it is possible to develop a landlord tenant VoIDEC, as shown in Figure 3. VoIDECs use five building scenarios, reflecting typical landlord/tenant building services splits, to classify a building.

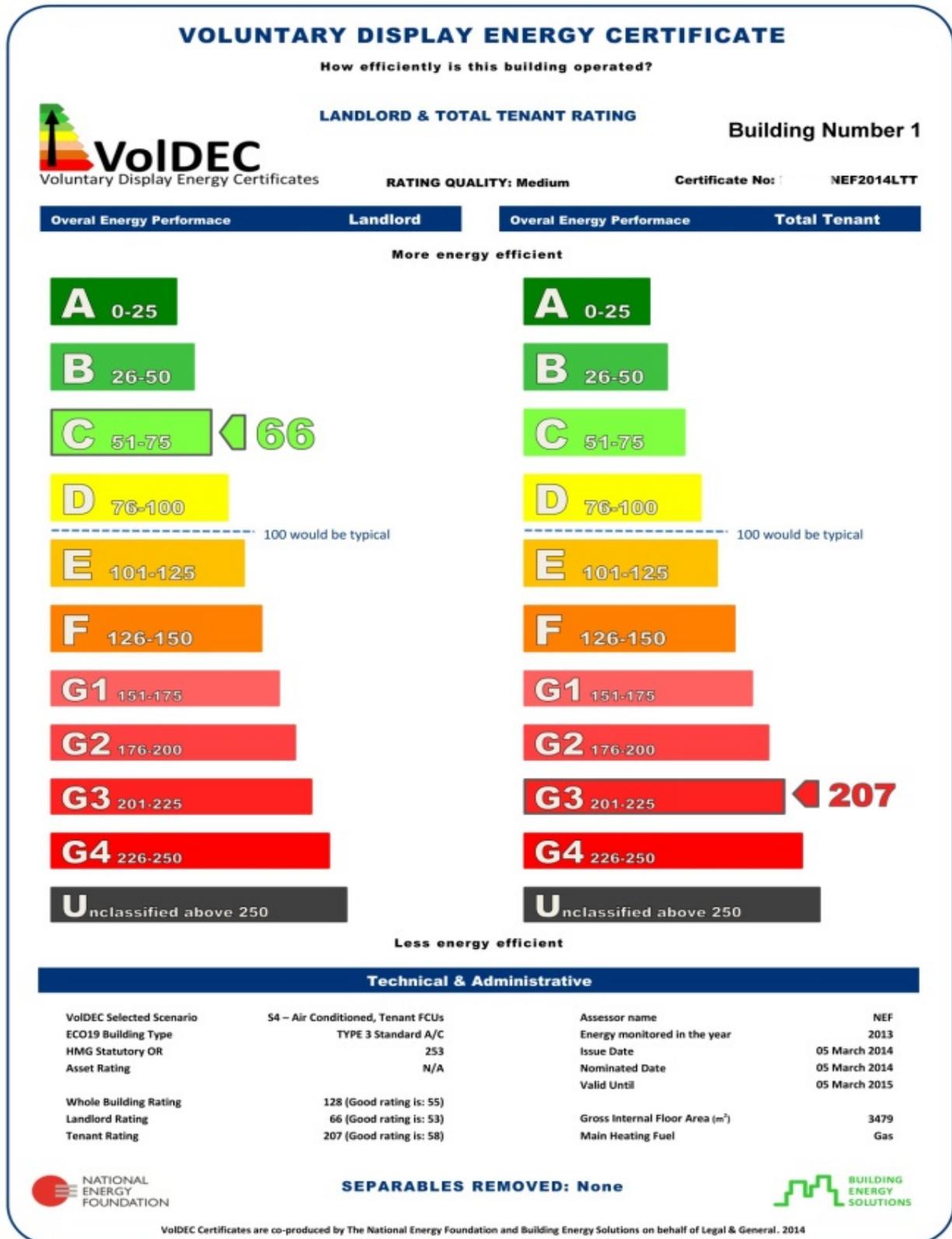


Figure 3 – Typical Landlord-tenant VoIDEC

Figure 3 shows an example for a scenario S4 building where the main chillers and boilers are operated by the landlord but the tenants have their own fan coil units. Each scenario has a different benchmark, built from ECON19 data but assuming a split of energy usage based on the scenarios.

The landlord tenant scenarios can be summarised as follows:

S5 – Air Conditioned, all Landlord

- Landlord central gas boiler (Space Heating & 100% DHW)
- Landlord central chiller
- Landlord FCU's
- Landlord 100% Electric DHW & catering
- Central restaurant included in S5

S4 – Air Conditioned, Tenant FCU's

- Landlord central gas boiler (Space Heating & 50% DHW)
- Landlord central chiller & central fans
- Tenant FCU's
- Tenant 50% Electric DHW & catering
- Central restaurant included in S4

S3 – Air Conditioned, Tenant cooling

- Landlord central gas boiler (Space Heating & 50% DHW)
- Tenant Local Air Conditioning (Cooling Only)
- Tenant 90% Electric DHW & catering
- No central restaurant in S3

S2 – Air Conditioned, Tenant Split Units

- Tenant Local split units (Heating & cooling)
- Tenant 90% Electric DHW & catering
- No central restaurant in S2
- No central boiler in S2
- Space heating & DHW based on adjusted gas benchmark

S1 – Naturally ventilated, all Landlord

- Landlord central gas boiler (Space Heating & 100% DHW)
- Landlord 100% Electric DHW & catering
- Central restaurant included in S1

Figure 4 shows a schematic of these scenarios where 'L' is the landlord responsibility and 'T' is the tenants responsibility.

There are two additional items of data required when carrying out a landlord tenant VolDEC

- Overall split of each incoming energy between landlord and tenant
- Landlord-tenant office scenario

The split is usually available as the landlord measures this for tenant billing purposes. Figure 5 shows a decision tree to help decide which scenario the building falls into.

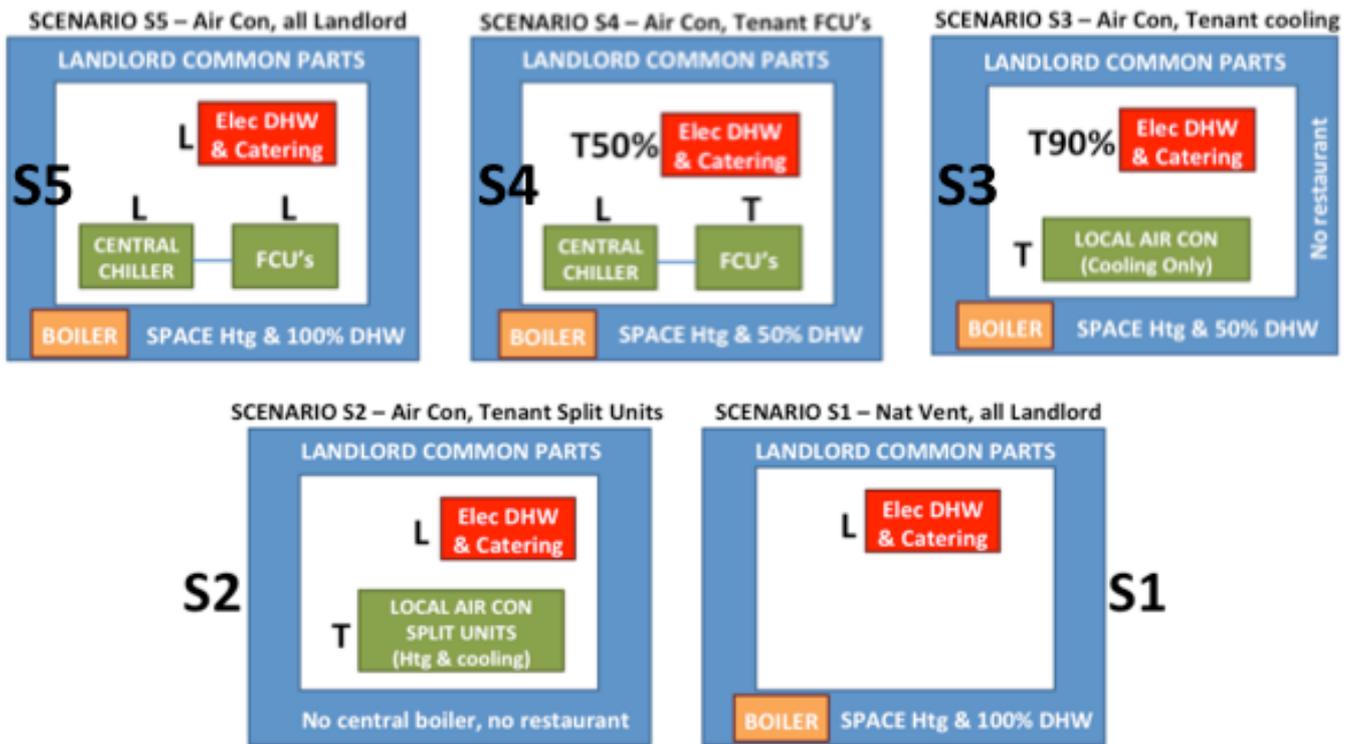


Figure 4 – Landlord tenant scenarios

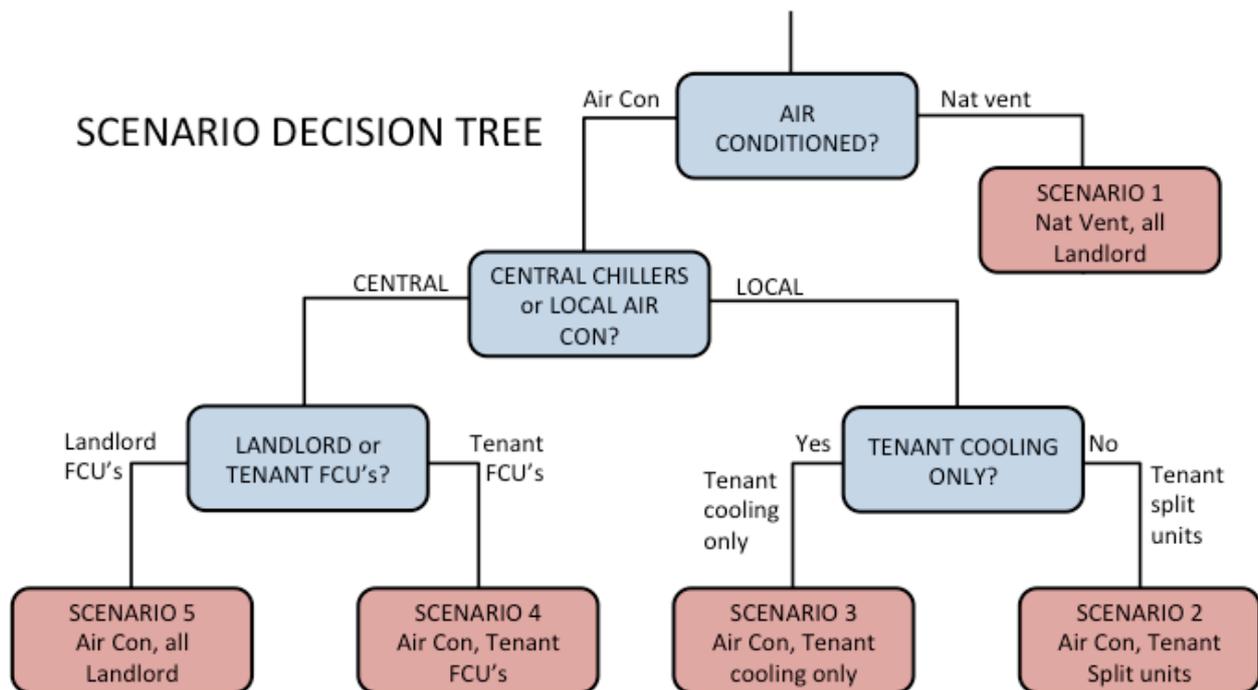


Figure 5 – Landlord tenant Scenario decision tree

Assumptions

VolDECs are based on some key assumptions:

- Ratings are based on 'Typical' ECON 19 benchmarks
- ECON 19 benchmarks are converted to Gross floor area using Econ 19 factors for each building type
- Gas DHW is 20 kWh/m² of total gas where there is a restaurant S5, S4, S1 (Landlord)
- Gas DHW is 10 kWh/m² of total gas where there is no central restaurant S3, S2
- Electric DHW & Catering is 100% Landlord in S5 & S1, 50% in S4 and 10% in S3 & S2

Data quality

VolDECs are carried out remotely, based on data provided by the client. This keeps the process quick and easy but means that there is no site visit. The quality of the data submitted is therefore a key concern. Firstly guidance is provided to the client on how to collect the necessary data and its provenance. This includes data requirements and definitions for floor area, annual energy data, building type and scenario.

Secondly the VolDEC process includes two levels of audit:

- Standard checks on all VolDECs to identify spurious data leading to unexpected results
- Landlord to tenant rating ratio check to spot wide disparity - often implying poor data or poor choice of scenario.

VolDECs are an early engagement tool and if they indicate poor performance or data problems then they should be followed up with a more detailed site survey. However, avoiding a site visit makes VolDECs cheaper, quicker and easier in order to engage more building owners and occupants.

6. Pilot results

VolDECs have been piloted on 13 Legal and General properties and the results are shown in Figure 6.



Figure 6 - Pilot VolDEC results

Some buildings only have Landlord ratings as the tenant data was not available. As with statutory DEC's a rating of 100 at the D-E boundary corresponds to a 'typical' building energy performance rating i.e. exactly equal to the typical benchmark. Building A is indicating a poor tenant rating at 'G2' scoring almost 200 whereas the landlord rating is a 'D' scoring close to typical at 100. However, the overall building is a poor 'F' scoring 142. Clearly, the poor energy performance and opportunity for saving rests with the tenant not the landlord in this particular building.

Buildings B, C and E appear to be performing well overall with fairly equal energy performance between the tenant and the landlord. Building K appears to have a poor landlord performance

at 'G1' compensated by a good tenant performance 'C' leading to an overall building rating of 'E' scoring 123, somewhat worse than typical. In this case the problem probably rests with the landlord in the common areas.

This shows the value of the landlord-tenant VoIDEC in helping to understand where the responsibility for poor performance sits. It also shows the value of the G1-G4 scale in providing more granularity on the poorly performing buildings and providing incentives for a G4 to become a G3 for example.

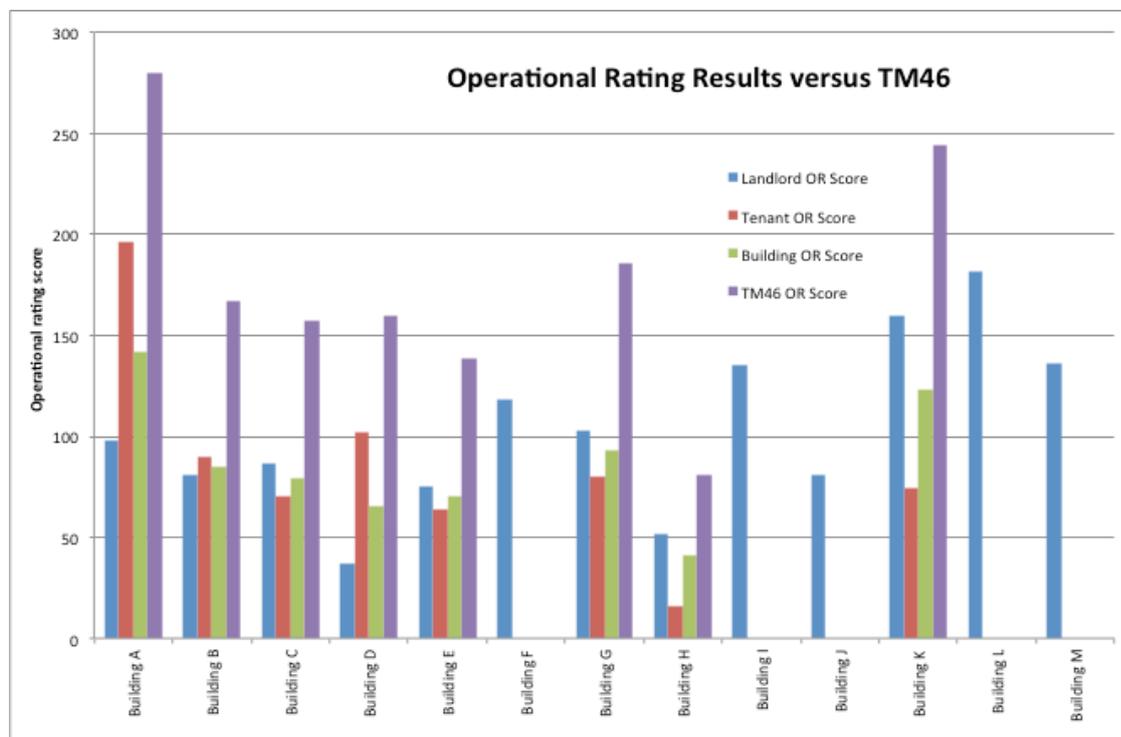


Figure 7 - VoIDEC results compared to TM46

Figure 7 shows the same VoIDEC results compared to statutory DEC's based on TM46 benchmarks. This indicates the value of using ECON19 benchmarks. The TM46 figures significantly overestimate the rating of these heavily serviced offices as they are based on a single all-encompassing office benchmark.

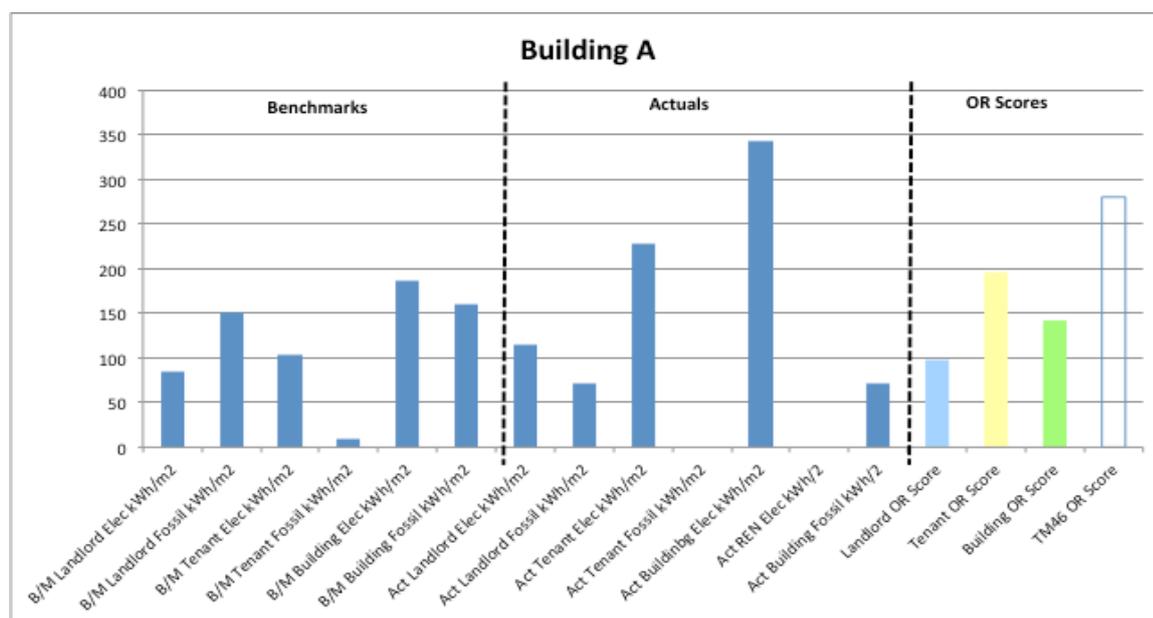


Figure 8 – Detailed results for Building A

Figure 8 shows a more detailed analysis of Building A which is a TYPE 3 Standard air conditioned office and a SCENARIO S4 – Landlord boilers chillers and tenant fan coil units. This shows the VoIDEC benchmarks on the left that have come from the scenario split versus the split in actual consumption shown in the middle. The right hand section shows the statutory DEC rating based on TM46. It is clear that high electricity usage by the tenants is leading to a poor overall building rating. This more detailed analysis also plays a part in the initial data cleansing and often confirms that the results are within reasonable expectations.

7. VoIDEC cost and benefits

Benefits

There are clear benefits from the VoIDEC process:

- Simple and straightforward use of available data, delivering easy access low cost approach
- Stand-alone entry level engagement tool – simple, easy to produce and inexpensive
- Uses robust DEC method but with more appropriate benchmarks
- Provide a simple soft-start in commercial buildings, leading building operators towards more sophisticated investigations and benchmarking.
- Provides landlords and tenants with a comparative energy performance of the areas that they control.
- Gives reputational and financial value to energy performance.
- Establishes a consistent methodology and quality assurance across the industry.
- Supports the development of improved and relevant building energy benchmarks.
- Highlights energy performance and provides a clear driver for improving performance
- Highlights anomalies and the need for more sophisticated benchmarking

How people use VoIDECs:

- As a promotional device, clearly indicating performance
- As an enhancement when combined with an energy promotional campaign
- Engagement and culture/behaviour change
- Competitions between buildings/occupants
- Live dashboards
- Simple message easily included in reports and documents
- Clear indication of use and trends over time
- League tables across a portfolio

Costs

Indicative costs for VoIDECs are in the range £75-£250 per building depending upon the number of buildings and what form the data is in. Anything over say 50 buildings presented in an easy to manage spreadsheet would be at the lower end of this range. One-off buildings and buildings requiring some initial data processing would be at the higher end of the range.

The cost also depends on data quality. It is often the case that an initial analysis without producing the certificate can show an obvious error in the data e.g. floor area far too high leading to very low ratings. This needs additional effort to question (cleanse) the data resulting in additional time and costs. However, most building managers find this very useful in gradually improving the quality of their data leading to a better understanding of the building performance. The above indicative costs therefore exclude any re-analysis or reproducing certificates due to bad data

It is also possible to tailor the VoIDEC certificate for particular client organisations and sectors e.g. adding logos, adding additional information etc. However, these tailoring services have a cost implication.

8. Conclusions

This relatively simple tool provides a 'soft start' for the commercial sector to measure performance and aims to set common standards through an industry wide scheme but tailored by sector. It will ultimately encourage deeper analysis to benefit building operators, designers and the whole industry.

We believe that VolDECs are a good first step in engaging managing agents and tenants to improve energy performance. At a lower cost than most statutory DEC's, we feel that it is truly cost effective to roll out across large portfolios. VolDECs allow the annual operational rating of our assets to be determined in order to ensure that our supply chain is managing them effectively but most importantly to act if any exceptions show up.

VolDECs offer a simple approach to measuring and highlighting the in-use energy performance of commercial buildings. They can offer new benefits to building owners, operators and tenants by providing simple energy rating benchmarks that more closely match their buildings and areas of influence. The separate Landlord/Tenant rating offers an entirely unique approach in addressing a key problem in commercial offices. We hope that VolDECs will also contribute to the development of better benchmarks to benefit the wider industry.

9. Future strategy

This project has been ground breaking in developing a building performance rating scheme for the industry, by the industry. The VolDEC partners hope to roll the approach out to other portfolios in the very near future and to expand into other sectors such as retail, hotel and leisure. Anyone wishing to get involved should contact the partners (see below for details).

Current and future developments include:

- Water and waste (Environmental VolDEC)
- Floor by floor (individual tenant VolDEC)
- Additional office scenarios
- Shopping centres (new sector)
- On-line self-input
- Annual benchmarking analysis and organisational reports

It is clear that if the built environment sector is going to improve energy performance then industry needs to carry this forward themselves without depending upon statutory requirements, otherwise our industry will not progress to the next level.

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