



Update to Home Energy Saving Grant Related BERs

Guidance for BER Assessors

May 2010

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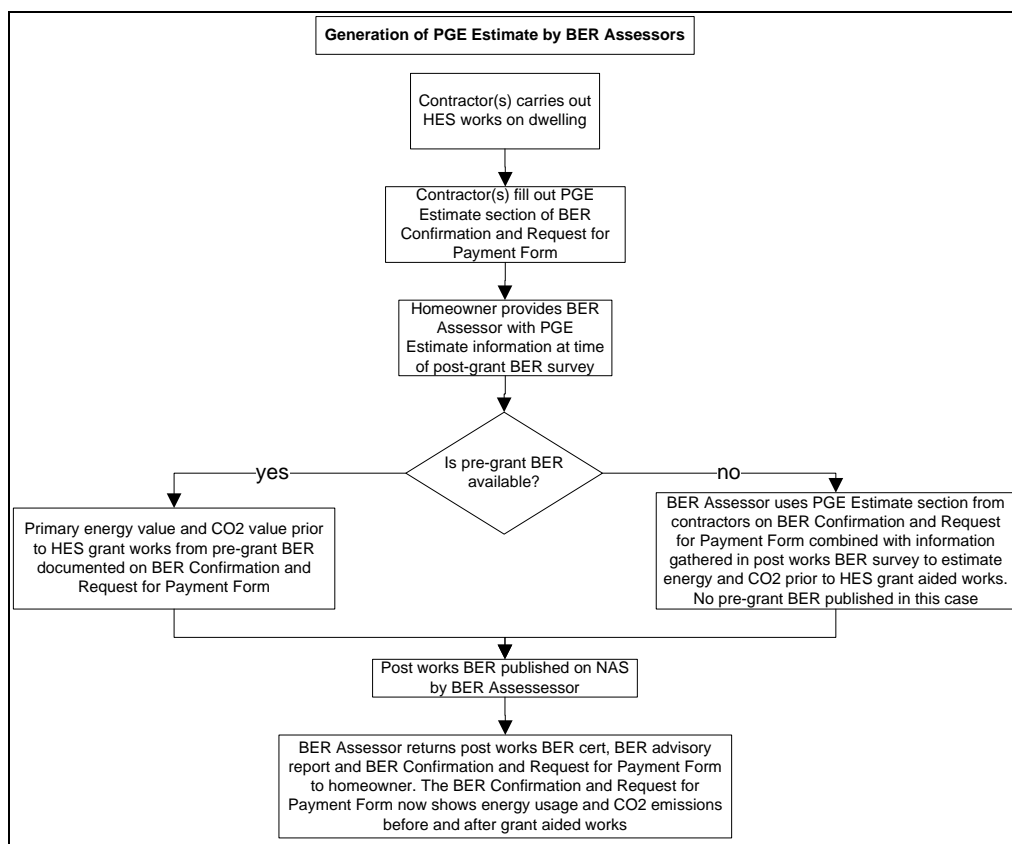
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1 Introduction

From 8th June 2010, a Building Energy Rating (BER) is to be an integral part of all grant applications under the Home Energy Saving scheme, whereby homeowners must undertake a BER on their home **after** grant aided works have been completed in order to measure the impact of the upgrade works. This will give homeowners a thorough and objective assessment of the energy performance of their home following upgrade works, including a rating on an A-G scale. The first such BER assessment will attract grant aid of €100. A published BER certificate is required for **each** application and therefore it is advisable that homeowners apply for, and undertake, all planned grant aided works at the same time to minimize the costs associated with multiple BER assessments. Please note that grant payment can only be claimed once all measures associated with an application have been completed, including the BER assessment.

As part of the BER Confirmation and Request for Payment process, the homeowner will require a Pre-Grant Evaluation (PGE) Estimate. The PGE Estimate is detailed as follows:

- The PGE Estimate information on the "BER Confirmation and Request for Payment Form" when combined with the mandatory post grant works BER allows the typical annual primary energy usage and CO₂ emissions prior to the HES grant measures to be calculated.
- The post works BER must always be carried out strictly within the rules provided in the BER Assessor's Code of Practice, The DEAP Methodology and the DEAP Survey Guide. This includes the requirements on provision of adequate supporting evidence for any use of non-defaults in the post works BER.
- Publication of a pre-grant BER is not a mandatory requirement, but, if a pre-grant BER has been carried out, it may be used to show the annual energy usage and CO₂ emissions prior to the grant aided works. Where the pre-grant BER is not available, then a brief description of the status of roofs, walls, heating system and heating controls prior to the grant works being carried out is used to determine the estimated energy usage of the house prior to works being carried out. This description is given on the BER Confirmation and Request for Payment Form (Section 4) as detailed under www.seai.ie/hes. The information is provided by the contractors who have carried out the HES grant aided works on the dwelling. The process is illustrated in the following diagram:



The guidelines in this document are to be used by BER Assessors to estimate the annual energy use and CO₂ emissions of the dwelling prior to the HES Grant works. This information is entered under Section 3 of the BER Confirmation and Request for Payment Form by the BER Assessor.

2 Estimating energy and CO₂ prior to grant aided measures

Once the BER Assessor has completed the post works BER, one of the following two steps is taken to determine the annual primary energy usage and CO₂ emissions of the dwelling prior to the HES grant works:

- Where a BER is published reflecting the dwelling prior to the grant works being carried out, the primary energy (kWh/m²/yr) and the CO₂ emissions (kg/m²/yr) for the pre-grant BER are to be entered under Section 3 of the BER Confirmation and Request for Payment Form by the BER Assessor.
- In cases where there is no pre-grant BER available, then the assessor must use Section 4 of the BER Confirmation and Request for Payment Form, combined with the information gathered on site during the post works BER survey to estimate the energy and CO₂ emissions of the dwelling. This is entered under Section 3 of the BER Confirmation and Request for Payment Form. This is best done by the following sequence of actions:
 1. Complete the post works BER following the rules in the BER Assessors Code of Practice, the DEAP Methodology and the DEAP Survey Guide. As always, collate supporting evidence for any non-defaults entered in the post works BER assessment. This BER is published on the NAS, reflecting the dwelling as it now stands after the HES works have been carried out.
 2. Use the post works BER XML file as the starting point to estimate the primary energy usage and CO₂ emissions (per m²/yr) of the dwelling prior to the HES grant being carried out. Read the post works assessment XML file into DEAP, and make any changes to the roofs, walls and heating system/controls as shown in Section 4 of the BER Confirmation and Request for Payment Form. The DEAP primary energy usage and CO₂ emissions now reflect the dwelling as it was prior to the HES grant measures being carried out. This file is NOT to be published on NAS as it is not a full BER assessment, and merely is to provide estimated energy usage prior to grant works. This information is entered by the BER Assessor on Section 3 of the BER Confirmation and Request for Payment Form.
 3. In some cases, the homeowner may indicate that an extension was added to the dwelling at the same time as the HES works being carried out. This extension floor area should be copied by the assessor to Section 3 of the BER Confirmation and Request for Payment Form. However, as this new extension is not HES Grant Aided, it does not have an impact on the estimate of energy usage or CO₂ emissions prior to HES grant aided works being carried out.

2.1 Use of the PGE Estimate Information: Part 1: Roofs

Section 4 of the BER Confirmation and Request for Payment Form details the information for carrying out the Pre-Grant Evaluation (PGE) Estimate. Part 1 (Roof area information) shows the roof type, area (m²) and estimated U-value (W/m²K) only for the section of roof which has been upgraded under the HES grant aided works. These values are entered in DEAP under building elements -> roofs, replacing the associated values shown in the post works BER assessment. Typically this would mean that the U-value of a section of roof changes from a lower U-value (with insulation) to a higher U-value (without insulation). This is illustrated in Section 3 of this document.

2.2 Use of the PGE Estimate Information: Part 2: Walls

Section 4 of the BER Confirmation and Request for Payment Form details the information for carrying out the Pre-Grant Evaluation (PGE) Estimate. Part 2 of the PGE Estimate information (Wall area information) shows the insulation type, area (m²) and estimated U-value (W/m²K) only for the section of wall which has been improved under the HES grant aided works. These values are entered in DEAP under building elements -> walls, replacing the associated values shown in the post works BER assessment. Typically this would mean that the U-value of a section of wall changes from a lower U-value (with insulation) to a higher U-value (without insulation). This is illustrated in Section 3 of this document.

2.3 Use of the PGE Estimate Information: Part 3: Heating System

Section 4 of the BER Confirmation and Request for Payment Form details the information for carrying out the Pre-Grant Evaluation (PGE) Estimate. Part 3 of the PGE Estimate information (Heating system information) shows information related to the heating system controls and the heat source itself prior to grant works being carried out. These values are entered in DEAP as outlined in the table below replacing the associated values shown in the post works BER assessment. This is illustrated further in Section 3 of this document. The following table provides further detail:

DEAP Tab	Section in PGE Estimate Form	DEAP Field	How to fill out DEAP field
Water heating	Hot water controls	Is supplementary electric water heating used in summer?	Follow guidance in DEAP manual section 4.6
		Temperature factor unadjusted	Follow guidance in DEAP Table 2
		Temperature factor multiplier	Follow guidance in DEAP Table 2
		Primary circuit loss type	Select appropriate option from DEAP Table 3 (e.g. boiler with uninsulated primary pipework and no cylinder thermostat)
Distribution System Losses and Gains	.Heating controls	Temperature adjustment	Follow guidance in DEAP Table 4
	.Primary space heating system	Heating system control category	
	.Primary heating distribution system	Heating system responsiveness category	Generally follow guidance in DEAP Table 4. Assume that: . Underfloor heating in screed/timber : responsiveness = 2 . Underfloor heating & radiators mixture: responsiveness = 2 . Electric storage heating has responsiveness = 4
	Heating controls	Boiler controlled by room thermostat	Set to "yes" if there are room thermostats
Energy requirements	Primary space heating system	Space heating efficiency	For Gas/oil/LPG boiler: HARP efficiency where available. Otherwise assume the following efficiencies: . Cooker boiler: 60% . Pre-1998: 65% . Non-condensing 1998 or later: 75% . Condensing 1998 or later: 85%
			Electric storage or direct acting electric heaters assumed to be 100% efficient
			Solid fuel appliance efficiency is assumed to be: . Open fire without back boiler: 30% . Open fire with back boiler: 50% . Closed room heater without back boiler: 60% . Closed room heater with back boiler: 65% . Centralised solid fuel boiler: 60% . Solid fuel cooker boiler: 50%
			Renewable appliance efficiency assumed to be: . Ground source heat pump: 300% . Air source heat pump: 250% . Wood pellet/chip boiler: 65%
	.Heating controls .Hot water controls .Primary space heating system .Primary heating distribution system	Efficiency adjustment factor	Follow guidance in DEAP Table 4, paying particular heed to the thermostats and boiler interlock entries in the PGE Estimate Form.
		Secondary space heating	Same values as for post works BER
	Hot water controls	Water heating efficiency and efficiency adjustment factor	Generally the same as for space heating above unless "Immersion is the only water heater" is selected (then water heating efficiency is 100%)
		Fuel types	Usually the same as the post works BER unless entire heating system has changed (e.g. HES works replaced electric heating with a condensing boiler and controls)

3 Example of energy and CO₂ annual estimate prior to HES works

This example shows how an Assessor uses a published BER of a dwelling (post HES grant aided works) combined with the information from the HES grant contractors to estimate the dwelling's energy usage (and CO₂ emissions) prior to the grant aided works being carried out.

3.1 Sample dwelling: background of works carried out

The example is based on a 160m² 1920s house which has HES grant aided work carried out as follows:

- 100m² stone walls dry lined with polyurethane board (65mm) and plasterboard (12.5mm);
- 60m² insulated attic ceiling with 300mm mineral fibre quilt between and above joists;
- Installation of condensing mains gas boiler with 90.2% efficiency (taken from HARP database);
- Separate time/temperature control for hot water cylinder and 2 space heating zones.

The BER Assessor has been supplied with invoices/receipts detailing the type and thickness of wall insulation.

The house has a 2005 extension with 20m² floor area, 20m² flat roof and 25m² cavity walls. The extension has not been retrofitted with insulation under HES as it is relatively new. All of the original stone walls (100m²) and attic ceiling (60m²) have been retrofitted with insulation as detailed above.

The BER assessor carries out the post grant BER survey and publishes the subsequent BER assessment on NAS. As always the DEAP Survey Guide is followed to determine the various non defaults, heating system controls and boiler efficiency for the published post grant BER. Any published BER assessments must follow the usual rules as set out by SEAI in the DEAP survey guide, DEAP methodology and Code of Practice.

The primary energy usage and CO₂ emissions for the post grant BER as indicated by DEAP are as follows:

Results	
Energy Rating:	B3
Energy Value:	138.19 [kWh/m ² /yr]
CO ₂ Emissions Indicator:	26.44 [kgCO ₂ /m ² /yr]

3.1.1 Entry of pre-grant roofs in DEAP

In this case, the BER assessor has deemed that the section of roof insulated as a result of the HES grant works has a U-value of 0.13W/m²K. This figure is derived as a result of the site survey carried out using the DEAP methodology as would be the case for any existing dwelling BER assessment. The usual rules apply in relation to supporting evidence for use of non defaults as outlined in the DEAP Survey Guide. The 60m² newly insulated roof and 20m² roof on the extension are as shown below. These are reflected in the published post grant BER.

Delete	Copy	Roof Type	Roof Description	Age Band	Insulation Thickness	Area m ²	U-Value [W/m ² K]	AU [W/K]
X		Pitched Roof - Insulated on Cei...	300mm fibre insulated ceiling	1900 - 1929	>= 300 mm	60.00	0.13	7.80
X		Flat Roof	Flat roof section on 2005 extension	2005 onwards	Unknown	20.00	0.25	5.00

The information shown in the PGE Estimate Form (Part 1) from the roof insulation contractor shows the area of roof which was grant aided and the estimated U-value prior to grant works being carried out:

Part 1: Roof area information (prior to grant measures)			
Tick roof type being insulated	<input type="checkbox"/> Flat Roof	Enter area of roof with new insulation added (m ²)	60
	<input type="checkbox"/> Sloping rafters		
	<input checked="" type="checkbox"/> Ceiling in attic	Estimated average U-value prior to addition of new insulation (W/m ² K)	2.2

The pitched roof (insulated on ceiling) is therefore changed in DEAP to represent the roof prior to the grant works being carried out. This will be used as part of the estimate of energy usage of the dwelling prior to the grant aided works:

Delete	Copy	Roof Type	Roof Description	Age Band	Insulation Thickness	Area m ²	U-Value [W/m ² K]	AU [W/K]
X		Pitched Roof - Insulated on Cei...	pre grant ceiling insulation (from contractor estimate)	1900 - 1929	Unknown	60.00	2.2	132.0
X		Flat Roof	Flat roof section on 2005 extension	2005 onwards	Unknown	20.00	0.25	5.00

3.1.2 Entry of pre-grant walls in DEAP

Similar to roofs, the BER assessor has deemed that the section of wall insulated as a result of the HES grant works has a U-value of 0.27W/m²K. This figure is derived as a result of the site survey carried out, following the DEAP methodology (and survey guide) as would be the case for any existing dwelling BER assessment. The 100m² newly insulated wall and 25m² wall on the extension are as shown below.

Delete	Copy	Wall Type	Wall Description	Age Band	Wall is semi-exposed	Area m ²	U-Value [W/m ² K]	AU Value [W/K]
X		Stone	Solid with 65mm polyurethane, 12.5mm plaster	1900 - 1929	NO	100.00	0.27	27.00
X		300mm Cavity	2005 insulated cavity wall in extension	2005 onwards	NO	25.00	0.37	9.25

The information shown in the PGE Estimate Form from the wall insulation contractor shows the area of wall which was grant aided and the estimated U-value prior to grant works being carried out:

Part 2: Wall area information (prior to grant measures)			
Tick grant type being insulated	<input type="checkbox"/> Cavity wall insulation	Enter area of wall with new insulation added (m ²)	100
	<input checked="" type="checkbox"/> Internal dry lining		
	<input type="checkbox"/> External wall insulation	Estimated average U-value prior to addition of new insulation (W/m ² K)	1.8

The stone wall is therefore changed in DEAP to represent the wall prior to the grant works being carried out. This will be used as part of the estimate of energy usage of the dwelling prior to the grant aided works:

Delete	Copy	Wall Type	Wall Description	Age Band	Wall is semi-exposed	Area m ²	U-Value [W/m ² K]	AU Value [W/K]
X		Stone	pre grant stone wall (info from contractor estimate)	1900 - 1929	NO	100.00	1.8	180.00
X		300mm Cavity	2005 insulated cavity wall in extension	2005 onwards	NO	25.00	0.37	9.25

3.1.3 Entry of pre-grant heating and controls in DEAP

Section 3.1 above outlines the controls and heating system which are entered in DEAP for the published BER (post grant aided works). The key features of these upgrades are:

- No supplementary electric water heating specified due to independent water heating from the boiler
- Time and temperature control of the hot water cylinder
- Time and temperature control of 2 space heating zones, providing heat to radiators giving:
 - Temperature adjustment of 0°C
 - Heating system control category of 3
 - Responsiveness category of 1
- The boiler is controlled by a room thermostat
- Boiler interlock present
- 90.2% efficiency for main space and water heating (mains gas fuel)

The boiler and controls contractor filled out the relevant section in the PGE Estimate Form as follows:

Part 3: Heating System information (prior to grant measures)

Tick grant type being insulated		Heating Controls Upgrade		<input type="checkbox"/>	High efficiency boiler with controls upgrade	<input checked="" type="checkbox"/>
Details of Pre-works Primary Space Heating System (heats most of dwelling space)						
Select one of A, B, C or D and fill out associated entries						
<input checked="" type="checkbox"/> Gas, oil or LPG central heating boiler (A) Make and Model <u>Flamebrite 2000</u> <input checked="" type="checkbox"/> Efficiency (from HARP database) <u>76.6</u> (%) <input checked="" type="checkbox"/> Pre 1998 <input type="checkbox"/> Cooker/range boiler <input type="checkbox"/> 1998 or later, non-condensing <input type="checkbox"/> 1998 or later, condensing		<input type="checkbox"/> Electric Heating (B) <input type="checkbox"/> Electric storage heating <input type="checkbox"/> Standard Electric heating		<input type="checkbox"/> Solid fuel (C) <input type="checkbox"/> Open fire <input type="checkbox"/> Closed room heater <input type="checkbox"/> With back boiler <input type="checkbox"/> Without back boiler <input type="checkbox"/> Centralised solid fuel boiler <input type="checkbox"/> Solid fuel cooker / range		<input type="checkbox"/> Renewable (D) <input type="checkbox"/> Heatpump (air source) <input type="checkbox"/> Heatpump (ground source) <input type="checkbox"/> Wood pellet/chip boiler
Primary Heating Distribution System <input checked="" type="checkbox"/> Radiators only <input type="checkbox"/> Underfloor heating in concrete slab <input type="checkbox"/> Underfloor heating in screed/timber <input type="checkbox"/> Underfloor heating & radiators			Heating Controls (tick all that apply) <input type="checkbox"/> No controls <input checked="" type="checkbox"/> Programmer / timeclock <input type="checkbox"/> Full zone control <input type="checkbox"/> Load or weather compensator <input type="checkbox"/> Boiler energy management system <input type="checkbox"/> Delay start thermostat <input type="checkbox"/> Boiler interlock <input type="checkbox"/> Appliance thermostat Number of room thermostats Percentage of rads with TRVs (%) <u>20</u>			
Hot Water Controls (tick all that apply) <input type="checkbox"/> Cylinder thermostat <input type="checkbox"/> Independent time control <input checked="" type="checkbox"/> Primary space heating provides hot water <input type="checkbox"/> Hot water from central heating seperable from main space heating <input type="checkbox"/> Immersion is the only water heater						

Using Section 2.3 of this document as guidance, the BER Assessor makes the relevant changes in DEAP to represent the heating system and controls prior to the grant works being carried out. This, combined with the steps above is used to estimate the energy usage of the dwelling prior to the grant aided works.

DEAP Tab	Section in PGE Estimate Form	DEAP Field	Value for pre grant representation of dwelling
Water heating	Hot water controls	Is supplementary electric water heating used in summer?	YES (no independent control of water heating from space heating)
		Temperature factor unadjusted	0.6 (same as the value in post works BER)
		Temperature factor multiplier	1.3 (No separate time or temperature control on cylinder)
		Primary circuit loss type	Boiler with uninsulated primary pipework and no cylinder thermostat
Distribution System Losses and Gains	.Heating controls	Temperature adjustment	0.6 (programmer only without room stats or TRVs on more than half of radiators)
	.Primary space heating system	Heating system control category	1 (programmer only without room stats or TRVs on more than half of radiators)
	.Primary heating distribution system	Heating system responsiveness category	1 (radiators as heat distribution)
	Heating controls	Boiler controlled by room thermostat	No (no room thermostats present)
Energy requirements	Primary space heating system	Space heating efficiency	76.6% (efficiency taken from HARP by contractor)
	.Heating controls	Efficiency adjustment factor	0.95 (no boiler interlock or thermostatic control)
	.Hot water controls		
	.Primary space heating system		
	.Primary heating distribution system		
		Secondary space heating	Same values as for post works BER
	Hot water controls	Water heating efficiency and efficiency adjustment factor	Same as for space heating above (76.6% and 0.95 respectively)
	Fuel types	Same as the post works BER (mains gas) but with electricity for supplementary electric water heating fuel type	

3.1.4 PGE Estimate

The estimated pre grant primary energy usage and CO₂ emissions for this dwelling based on the above changes to the post works BER are as follows (as shown in DEAP):

Energy Value:	[kWh/m ² /yr] 344.14
CO ₂ Emissions Indicator:	[kgCO ₂ /m ² /yr] 65.71

The final step is for the BER assessor to fill out the information on page 2 of the PGE Estimate Form as shown below. This is returned to the homeowner:

Pre Grant Evaluation Results (to be completed by BER Assessor)							
BER number of dwelling	X	X	X	X	X	Primary Energy value (kWh/m ² /yr)	CO ₂ emissions value (kg/m ² /yr)
Dwelling total floor area (m ²) from published BER	160			Prior to HES works		344.14	65.71
Extension floor area (m ²) detailed by homeowner*	0			Published BER after works		138.19	26.44

*This only applies to extension(s) added at the same time as the HES works being carried out

3.2 Extensions built at the same time as HES works

In cases where the dwelling has a new extension added at the time of the HES works, the homeowner details the new extension floor area on Section 2 of the BER Confirmation and Request for Payment Form. Taking the following example (for a different dwelling to that outlined in the previous sections), assume a dwelling to be 242m² total floor area including a 27m² extension added at the time of the HES grant aided works. This would appear on Section 2 of the BER Confirmation and Request for Payment Form as follows:

(a) Homeowner Declaration and Request for Payment	
Was dwelling floor area extended at the same time as HES Grant Works carried out? (Yes/No)	yes
If the answer is yes to the above, what is the floor area of the extension? (m ²)	27

The BER Assessor enters this along with the PGE Estimate results as shown here:

Pre Grant Evaluation Results (to be completed by BER Assessor)							
BER number of dwelling	N	N	N	N	N	Primary Energy value (kWh/m ² /yr)	CO ₂ emissions value (kg/m ² /yr)
Dwelling total floor area (m ²) from published BER	242			Prior to HES works		402.28	74.22
Extension floor area (m ²) detailed by homeowner*	27			Published BER after works		176.45	35.54

*This only applies to extension(s) added at the same time as the HES works being carried out

When the BER assessor generates the estimated figures for primary energy usage and CO₂ emissions for the dwelling prior to HES grant works, the floor area of the new extension (27m²) is included in the dwelling floor area in DEAP.

In other words, the floor area in DEAP should be 242m² for both the post grant BER and the PGE Estimate calculation.

3.3 Retrofit of more than one roof type

In some cases the contractor may have added insulation to more than one roof type as part of the HES grant works. For example a dwelling may have a roof which is partially sloping roof (with retrofitted ceiling insulation) and a flat roof (also retrofitted with insulation). In this case, both the flat roof and ceiling are shown as retrofitted by the contractor:

Part 1: Roof area information (prior to grant measu

Tick roof type being insulated	<input checked="" type="checkbox"/> Flat Roof
	<input type="checkbox"/> Sloping rafters
	<input checked="" type="checkbox"/> Ceiling in attic

In order to account for insulation in the post grant BER assessment, the BER Assessor will have details of the areas which have been retrofitted with insulation either by receipts from the contractor or by observing the newly installed insulation. The Assessor can therefore apply the estimated U-value (prior to retrofit works) to the relevant areas of flat roof and ceiling when calculating the PGE Estimate.