



# BUILD

Building Initiative for Low-Emissions Development Program

## BUILD Calculator Instructions

*Disclaimer: BUILD is administered by the California Energy Commission in collaboration with the California Public Utilities Commission. It is authorized by Senate Bill 1477 (2018, Stern) and funded by the four California gas corporations apportioned according to each gas corporation's percentage share of allocated Cap-and-Trade Program allowances. Reservations are approved on a first come, first served basis, and regional funding availability is based on the utilities' contribution to the program.*



# BUILD

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## Introduction

The California Energy Commission (CEC) administers the [Building Initiative for Low-Emissions Development \(BUILD\) Program](#), a residential building decarbonization program providing incentives and technical assistance to support the adoption of advanced building design and near-zero-emission technologies in new all-electric low-income homes. BUILD incentives are based on a project's anticipated modeled greenhouse gas (GHG) emission reduction as compared to the mixed-fuel 2022 Energy Code prescriptive standards. Projects receiving BUILD incentives cannot result in higher utility bills for building occupants.

BUILD staff developed the BUILD Calculators for an applicant's use in estimating the incentive amounts for the building design, as described in the BUILD Guidelines. These instructions show how to use the BUILD Calculator to calculate incentives for newly constructed buildings. Staff may update these instructions should any changes be made to the calculator. Such changes will be outlined on the BUILD Incentives page accessed by going to the [BUILD webpage](#) and clicking "More Information" under Incentives.

If there are any questions concerning any of the content in these instructions, please contact BUILD staff at [BUILD@energy.ca.gov](mailto:BUILD@energy.ca.gov).



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# BUILD

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## 1. Getting Started

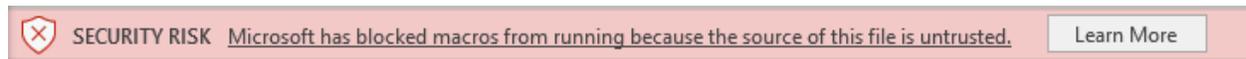
To use the newest version of the BUILD Calculator, download the zip file from BUILD Incentive webpage and unzip to a new folder. The zip file will contain these instructions and the calculator, which is an Excel spreadsheet embedded with macros and formulas, so the user will need the appropriate software to load the spreadsheet. The user may encounter several warnings when loading the spreadsheet due to first-time use and containing macros.

Figure 1



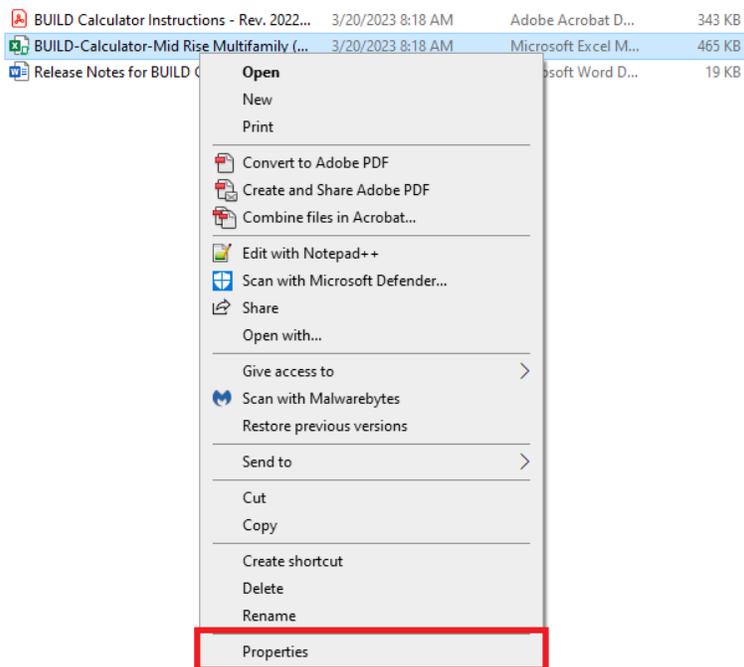
Click the “Enable” button for the warnings to continue.

Figure 2



Right-click the file name and go to Properties. In the General tab, go to Security and check “Unblock”. You will need to close and re-open the excel file.

Figure 3





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Figure 4

### BUILD Calculator

Low-Rise Multifamily Residential (1-3 stories)  
Version LR-1.1.2  
3/20/2023 8:31

**Legend**

- Pale Yellow: Applicant Input
- Light Blue: Calculated Values
- Light Green: Calculated Incentives
- Light Pink: Error (select value in drop down menu)

**Step 1: Use the drop down option to complete project information and building features.**

**Project Information**

Project Name:

Building Name:

Project Address:

Project Zip Code:

Check this box if all tenants will not pay electric utility bills, such as Master Metered building

Select Climate Zone	Select Gas Utility	Select Electric Utility	Total Conditioned Residential Floor Area	No. of Stories	Total No. of Units	Total No. of Bedrooms
CZ	Gas Utility	Elec Utility	Sq Ft	2	50	52
6	SG	SGE	6,551			

**HVAC System**

Select HVAC System Type	Select Heat Pump Efficiency	Select AC Efficiency
HVAC	HSPF	SEER
Split	8.2	14

**DHW System**

Select DHW Type	Select DHW Eff.	Select DHW Location	Select DHW/HR Yes/No
Indiv.	TIER 4	OUTSIDE	NO

**Envelope Measures**

Select Window	Select Ext. Wall Foamboard
U-Factor	R-Value
0.28	R-0

**Laundry**

Select Laundry Type
Central

**Battery System**

Select Battery Upgrade
kWh
14.00

**Step 1a (optional): Include any kickers to qualify for additional incentives.**

**Kicker Incentive (see the BUILD Guidelines requirements for more information)**

No. of Smart Thermostats	No. of IA-13 Compliant HPWHs	Lbs of Lower GWP Refrigerant (<150)	Lbs of Lower GWP Refrigerant (<750)	No. of Electric Induction Cooktops	No. of Heat Pump Clothes Dryers	Size of Battery System
\$50/unit	\$500/unit	\$1,500/lb	\$500/lb	\$300/unit	\$150/unit	\$250/kWh
0	0	0	0	0	0	0
\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

No. of EVSE	No. of Smart EVSE*	No. of Bi-Directional EVSE
\$300/unit	\$600/unit	\$1,000/unit
0	0	0
\$ -	\$ -	\$ -

\*For the purpose of the BUILD program, smart EVSE are capable of managing charging based on electricity rates, greenhouse gas signals, and/or other dynamic grid signals.

**Step 2: Confirm your project meets the program's modeled resident utility cost savings requirement.**

Project meets modeled resident utility cost savings requirements: **NO**

NOTE: Additional building enhancements and/or PV allocated to tenants is needed to meet the programs modeled resident utility costs savings requirement. The calculated PV system size (boxed below) is based on the efficiencies selected, you may reduce or eliminate the PV by improving selections in Step 1. Otherwise, you must agree to allocate the PV to tenants to meet requirements.

Minimum PV system size allocated to tenants to meet requirements:	64.38 kW DC
Estimated PV from code requirement:	63.91 kW DC
Estimated PV eligible for the incremental PV incentive:	0.47 kW DC

Select "Yes" if you agree to allocate the minimum PV system size (boxed above):

As Modeled Prior to Incremental PV	
Monthly Modeled Resident Utility Cost Difference =	\$0.46
Modeled Utility Cost Savings =	4%

As Modeled with Identified Incremental PV, If chosen

As Modeled with Identified Incremental PV, If chosen	
Monthly Modeled Resident Utility Cost Difference =	\$0.75
Modeled Utility Cost Savings =	5%

**Step 3: Review results and estimated incentive amount.**

Use the print button for a digital copy of your result and to attach to your application.

Estimated % Better than Title 24	7.1 %
Estimated Avoided GHG of Building	20.4 MT per year

**Incentive Calculation**

GHG Base Incentive over 30 years (\$150/MT)	\$	91,800	*based on avoided GHG x 30 years
Increased Building Efficiency Incentive (up to \$1000/bt/m)	\$	36,920	*based on % better than Title 24
Incremental PV Incentive (\$1.3 per watt)	\$	611	*based on Incremental PV in Step 2
Total Kicker Incentive	\$	0	*based on results from Step 1a
<b>Total BUILD Incentive</b>	<b>\$</b>	<b>129,331</b>	<b>per building</b>
			<b>2,487 per bedroom</b>

The calculations and incentives are based on the building performance of predetermined outcomes using CBECC-Res 2019 v2.0 SP1 for the combinations selected. Prescriptive assumptions that are not selectable have been used in the models that, if different from the applicant's building, will change the results and incentive amounts.

PRINT TO PDF

SAVE AS XLSX  
REQUIRED FOR  
APPLICATION

The calculator will open on the screen displayed above. Enter information on the left side in sequential order (top-to-bottom, left-to-right) as it pertains to the building. The spreadsheet can be renamed and saved or click the "Print to PDF" button for archival purposes and a "Save as XLSX..." button for application submittal.

## Step 1: Project Information and Building Features

Complete the applicant input boxes by entering in the project information or using the drop-down options.

### Step 1.1: Project Information

Figure 5

**Project Information**

Project Name:

Building Name:

Project Address:

Project Zip Code:

Check this box if all tenants will not pay electric utility bills, such as Master Metered building

**Project Name:** Enter the project name. If this information is not available yet, enter "N/A".



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**Building Name:** Enter the building name or names if representing multiple buildings (e.g., “Building 1” or “Buildings 1-5”). If this information is not available or not applicable, enter “N/A”.

**Project Address:** Enter the project address. If this information is not available yet, enter “N/A”.

**Project Zip Code:** Enter the project zip code.

For buildings that are master-metered or where all the tenants will not pay electric utility bills, check the box and the Tool will skip Step 2, described below.

Figure 6

Select Climate Zone	Select Gas Utility	Select Electric Utility	Total Conditioned Residential Floor Area	No. of Stories Above Grade	No. of Stories Below Grade	Total No. of Units SingleFamily=1	Total No. of Bedrooms
CZ	Gas Utility	Elec Utility	sq ft				
12	PG&E	PG&E	7320	2	0	8	12

**Climate Zone:** Use the drop-down menu to select the climate zone. An applicant may use the [CEC’s climate zone tool](#) to determine the climate zone.

**Gas Utility:** Use the drop-down menu to select the gas utility. If the project’s utility is not listed in the drop-down menu, choose the closest investor-owned utility available in the drop-down.

**Electric Utility:** Use the drop-down menu to select the electric utility. If the project’s utility is not listed in the drop-down menu, choose the closest investor-owned utility available in the drop-down.

**Total Conditioned Residential Floor Area:** Enter the total square footage for the conditioned residential floor area. This includes residential common areas such as hallways and laundry rooms.

**No. of Stories Above Grade:** Enter the total number of stories above grade.

**No. of Stories Below Grade:** Enter the total number of stories below grade.

**Total No. of Units:** Enter the total number of dwelling units for the entire project. This box does not apply to the single-family calculator.

**Total No. of Bedrooms:** Enter the total number of bedrooms for the entire project.



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## Step 1.2: Heating Ventilation Air Conditioning (HVAC) System

Figure 7

HVAC System		
Select HVAC Type	Select Heat Pump Efficiency	Select AC Efficiency
HVAC	HSPF2	SEER2
Split	7.5	14.3

**HVAC System Type:** Select the HVAC system from the drop-down menu. The options are as follows:

Table 1

Acronym	Term	Calculator Type
Split	Central split heat pump	All
PTHP	Packaged terminal heat pump	All Multifamily
VCHP	Variable compressor heat pump	All
VRF	Variable refrigerant flow	All Multifamily

**Heat Pump Efficiency:** Select the heat pump efficiency from the drop-down menu. Please note the VCHP will not require an efficiency selection. (Round down to the nearest number if the exact efficiency value is not listed.)

Table 2

Acronym	Term	HVAC Type
HSPF2	Heating Seasonal Performance Factor	Split
COP	Coefficient of Performance	PTHP, VRF

**AC Efficiency:** Select the AC efficiency from the drop-down menu. For mid- and high-rise, the AC efficiency will auto-select to the corresponding heat pump efficiency. (Round down to the nearest number if the exact efficiency value is not listed.)

Table 3

Acronym	Term	HVAC Type
SEER2	Seasonal Energy Efficiency Ratio	Split
EER/EER2	Energy Efficiency Ratio	PTHP, VRF



## Step 1.3: Domestic Hot Water (DHW) System

Figure 8

DHW System	
Select DHW Type	Select DHW Eff.
Indiv.	DHW TIER 3

**DHW Type:** Select the domestic hot water type from the drop-down menu. The single-family calculator does not have an option for central.

Table 4

Acronym	Term
Indiv.	Individual (Unitary) Heat Pump Water Heater
Central	Central Heat Pump Water Heater

**DHW Eff.:** Select the domestic hot water efficiency from the drop-down menu. The single-family calculator does not have an option for central.

Table 5

Acronym	Term	DHW Type
TIER 3	NEEA Tier 3 Rated	Unitary HPWH
TIER 4	NEEA Tier 4 Rated	Unitary HPWH
UEF Rated	Uniform Energy Factor Rated	Central HPWH
Non UEF	Non Uniform Energy Factor Rated	Central HPWH



### Step 1.4: Envelope Measures

Figure 9

Envelope Measures	
Select Window	Select Ext. Wall Foamboard
U-Factor	R-Value
0.30	R-5

**Window:** Select the window U-factor from the drop-down menu.

**Ext. Wall Foamboard:** Select the exterior wall foamboard from the drop-down menu.

### Step 1.5: Laundry (for all multifamily)

Figure 10

Laundry
Select Laundry Type
In-Unit

**Central Laundry:** Select whether the building has central laundry for tenants or in-unit laundries.

### Step 1.6: Battery System (for single family and low-rise multifamily)

Figure 11

Battery System
Select Battery Upgrade
kWh
0.00



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**Battery Upgrade:** Select the battery size from the drop-down menu. Currently, there are only two selections available. If a battery system will be installed, select the nearest kWh above 0.

## Step 1a (optional): Additional Technology for Kicker Incentives

This step is optional and is for any technology qualifying for kicker incentives. For more information on the kicker incentives and minimum requirements, refer to the BUILD Guidelines.

Figure 12

Kicker Incentive (see the BUILD Guidelines requirements for more information)						
No. of Smart Thermostats	No. of JA-13 Compliant HPWHs	Lbs of Low GWP Refrigerant (<150)	Lbs of Lower GWP Refrigerant (<750)	No. of Electric Induction Cooktops	No. of Heat Pump Clothes Dryers	Size of Battery System
\$50/unit	\$500/unit	\$1,500/lb	\$500/lb	\$300/unit	\$150/unit	\$250/kWh
0	0	0	0	0	0	0
\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

No. of EVSE	No. of Smart EVSE*	No. of Bi-Directional EVSE
\$300/unit	\$600/unit	\$1,000/unit
0	0	0
\$ -	\$ -	\$ -

**No. of Smart Thermostats:** Enter the number of smart thermostats.

**No. of JA-13 Compliant HPWHs:** Enter the number of Joint Appendix 13 compliant unitary heat pump water heaters.

**Lbs of Low GWP refrigerant (<150):** Enter the total pounds of refrigerant with less than 150 global warming potential used in the building.

**Lbs of Lower GWP refrigerant (<750):** Enter the total pounds of refrigerant between 150 and 750 global warming potential used in the building.

**No. of Electric Induction Cooktops:** Enter the number of electric induction cooktops. Count only permanent fixtures, including slide in ranges.

**No. of Heat Pump Clothes Dryers:** Enter the number of heat pump clothes dryers.



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**Size of Battery System:** Enter the size of the battery system in kWh. This value does not need to match the value in Step 1.6.

**No. of EVSE:** Enter the number of electric vehicle supply equipment.

**No. of Smart EVSE:** Enter the number of smart electric vehicle supply equipment.

**No. of Bi-Directional EVSE:** Enter the number of bi-directional electric vehicle supply equipment.

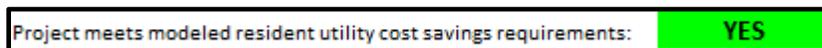
## 2. Calculations

Review calculations to ensure modeled resident utility cost savings requirements are met.

### Step 2: Modeled Resident Utility Cost Savings Requirement

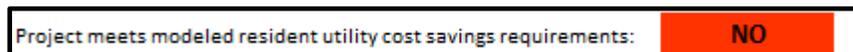
Projects meeting the modeled resident utility cost savings requirement based on the selections from the previous steps will see a green "YES" box. The applicant may move onto Step 3.

Figure 13



Projects not meeting the modeled resident utility cost savings requirement will see a red "NO" box.

Figure 14



### Step 2.1 Options to Meet Modeled Resident Utility Cost Savings

If the project does not meet requirements, an applicant has the option to incorporate additional building energy efficiency enhancements and/or install additional photovoltaic (PV) capacity for tenants. Below are the three options an applicant can take to meet the modeled resident utility cost savings requirement:

1. Increasing energy efficiency measures.  
An applicant may go back to Step 1 and increase the energy efficiency of the mechanical and/or envelope measures.



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2. Installing or allocating PV to tenants.  
An applicant can agree to install/allocate the automatically calculated minimum PV system size needed to meet requirements (boxed in the calculator) by selecting "Yes" from the selection box.
  
3. Combination  
An applicant may do a combination of efficiency measures or installing/allocating PV to tenants to meet requirements. As the efficiency measures increase energy efficiency, the minimum PV system size needed to meet requirements should decrease.

Figure 15

Minimum PV system size needed to meet requirements:	2.95 kW DC
<i>Estimated PV from code requirement:</i>	2.49 kW DC
<i>Estimated PV eligible for the incremental PV incentive:</i>	0.46 kW DC

(For Multifamily) **Minimum PV system size allocated to tenants to meet requirements:**

OR

(For Single Family) **Minimum PV System size needed to meet requirements:**

The minimum amount of PV needed to meet the program modeled resident utility cost savings requirement. For multifamily, this is the minimum amount needed to be allocated to benefit the tenants; and for single family, this is the minimum amount needed to be installed.

In cases where PV is not required by the Energy Code, the italicized PV information displayed below will not be seen and all PV required by BUILD is eligible for the incremental PV incentive as described in the BUILD Guidelines.

***Estimated PV from code requirement (if applicable):*** The estimated amount of PV required for the project based on the 2022 Energy Code. This estimate is for informative purposes only and is not intended to replace the required amount of PV under the Energy Code for the actual building.



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**Estimated PV eligible for the incremental PV incentive (if applicable):** The amount of PV eligible for the incremental PV incentive. To qualify for this incentive, the PV must be used to meet the modeled resident utility cost savings requirement and only the additional PV above code is eligible.

Figure 16

Select "Yes" if you agree to installing the total PV System Size (boxed above):

### Select "Yes" if agreeing to install the total PV System Size (boxed above):

This section appears when the modeled resident utility cost savings requirement is not met. The "Yes" must be selected to agree to installing or allocating the minimum PV system size needed to meet requirements (boxed in the calculator) and/or increase the building energy efficiency measures in Step 1 of the calculator.

Figure 17

**Step 2: Confirm your project meets the program's modeled resident utility cost savings requirement.**

Project meets modeled resident utility cost savings requirements: **YES**

NOTE: Additional building enhancements and/or PV is needed to meet the programs modeled resident utility costs savings requirement. The calculated PV system size (boxed below) is based on the efficiencies selected, you may reduce or eliminate the PV by improving selections in Step 1. Otherwise, you must agree to install the total PV to meet requirements.

Minimum PV system size needed to meet requirements:	2.95 kW DC
Estimated PV from code requirement:	2.49 kW DC
Estimated PV eligible for the incremental PV incentive:	0.46 kW DC

Select "Yes" if you agree to installing the total PV System Size (boxed above):

## Step 2.2 Cost Savings Difference

Figure 18

<b>As Modeled Prior to Incremental PV</b>	
Monthly Modeled Resident Utility Cost Difference =	-\$1.14
Modeled Utility Cost Savings =	-5%
<b>As Modeled with Identified Incremental PV, if chosen</b>	
Monthly Modeled Resident Utility Cost Difference =	\$1.05
Modeled Utility Cost Savings =	5%

**Monthly Modeled Resident Utility Cost Difference:** Estimated modeled difference between the monthly utility cost of a 2022 Energy Code prescriptive standard mixed



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fuel building and the monthly utility cost of the all-electric building, per tenant. A positive dollar amount is cost savings, and a negative dollar amount is a cost increase. The example above is a negative \$1.14 prior to incremental PV, therefore the utility bill for the all-electric model is \$1.14 more expensive than the mixed fuel.

**Modeled Utility Cost Savings:** Estimated modeled percent difference between the monthly utility cost of a 2022 Energy Code prescriptive standard mixed fuel building and the monthly utility cost of the all-electric building per tenant bill. A positive percentage is cost savings; a negative percentage is a cost increase. The example above is a negative 5%, therefore the utility bill for the all-electric bill is 5% more expensive than the mixed fuel. It needs to be positive 5% to meet the cost savings requirements of the BUILD Guidelines.

### 3. Review and Save Results

An applicant can review and save results for the application.

#### Step 3: Review Results and Estimated Incentive Amount

An applicant may go back to step 1 to the revise the project inputs.

##### Step 3.1: Percent Better Than Title 24 and GHG Results

Figure 19

Estimated % Better than Title 24	2.791 %
Estimated Avoided GHG of Building	1.28 MT per year

**Estimated % Better than Title 24:** The percentage above the minimum energy code compliance for increased building envelope and efficiency measures. All projects must comply with the California Energy Code to qualify for incentives.

**Estimated Avoided GHG of Building:** The estimated avoided GHG is the difference between the total annual GHG emissions of the mixed-fuel baseline building and the all-electric building.



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## Step 3.2 Incentive Calculation

Figure 20

Incentive Calculation		
GHG Base Incentive over 30 years (\$150/MT)	\$ 18,285	*based on avoided GHG x 30 years
Increased Building Efficiency Incentive (up to \$1000/bdrm)	\$ 6,785	*based on % better than Title 24
Incremental PV Incentive (\$1.3 per watt)	\$ 0	*based on incremental PV in Step 2
<b>Total Kicker Incentive</b>	<b>\$ 0</b>	<b>*based on results from Step 1a</b>
<hr/>		
<b>Total BUILD Incentive</b>	<b>\$ 25,071</b>	<b>per building</b>
	<b>\$ 2,089</b>	<b>per bedroom</b>

**GHG Base Incentive over 30 years:** The base incentive is calculated from the building’s avoided GHG emissions. The incentive amount is calculated by multiplying the total estimated annual avoided GHG emissions, in metric tons, by \$150 and then multiplying by 30 which represents the 30-year effective life of the building.

**Increased Building Efficiency Incentive:** This incentive is based on the performance of the building when compared to the Title 24 Part 6 standard design, known as the compliance margin. This is calculated by approved compliance software and can be found on the CF1R-PRF-01E or NRCC-PRF-01-E shown as a percentage.

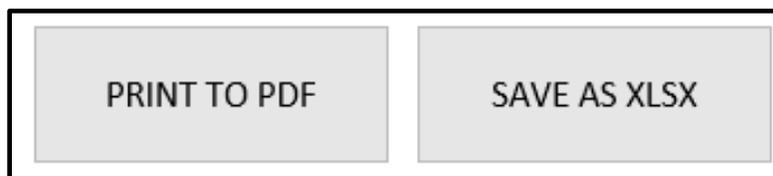
**Incremental PV Incentive:** This incentive is calculated by multiplying the amount of additional PV, in Watts DC, by \$1.30 for buildings where PV is already required by the Energy Code.

**Total Kicker Incentive:** This incentive is calculated by summing all the kicker incentives from Step 1a.

**Total BUILD Incentive:** The total BUILD incentive is the total of all the incentives. There are two totals, one for the entire building and one on a per bedroom basis.

## Step 3.3 Save a Copy

Figure 21





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The applicant should save the results as a smaller .XLSX file (a file without the macro and underlying formulas), for future reference and to attach and upload to the BUILD incentive reservation application. Use the Save as XLSX button and follow the prompts to save.

An applicant may also print a PDF of the calculator for future references. Use the print button and follow the prompts to save.