MEMORANDUM

To: Mayor and Members of the City Council

From: Rich Olson, City Manager

Date: July 7, 2016

Re: Consideration – Modifications to Weatherization Program with Regard to Price Per Square Footage and Allowance for Foam Insulation

BACKGROUND:

During the City Council Work Session held on June 27, 2016, Dennis Gordon presented an overview of the weatherization program. During his presentation, a number of questions arose; and staff was asked to provide some additional information. Although I was on vacation and not able to watch all of Dennis' presentation by live streaming, I believe there was some confusion concerning insulation.

ANALYSIS:

The Council needs to remember that the cost to insulate a resident's home amounts only to about 25% of the cost to perform all the weatherization work that is done. The majority of the expense is associated with preventing air intrusion or extrusion. Under the City's weatherization contracts, we pay for the cost of materials and $45 per hour for labor costs. Most homes weatherized require several boxes of caulking in addition to the labor to do this work. This process is very labor intensive.

The cost to weatherize a home can also be broken down into the various costs of insulation and the labor to install it. As mentioned in Dennis' presentation, the cost to blow in insulation is $891 for a 1,000 square foot home; while the cost to install batts or rolled insulation is $1530 per 1,000 square foot home. The cost of these materials is similar, but the amount of labor (time) to install batt insulation is considerably higher than with blown in insulation.

The cost to spray foam insulation is the most expensive because the material is more expensive. Furthermore, the labor cost is considerably higher. Spray foam insulation needs to be applied in layers of approximately one inch. The cost is roughly $1.00 per inch in board feet. In addition, multiple applications may need to be done, which increases the labor costs.

During his presentation, Dennis provided you with a cost of $2,677 for a 1,000 square foot home using spray foam. City staff estimates that only a very small percentage of the homes the City weatherizes would require foam insulation. I have included some information from the Department of Energy that also addresses this issue. Due to the additional cost, we do not see a benefit to the City by allowing this method. However, in those cases where Dennis Gordon deems it would be the best method to insulate a house, he would recommend it. If a property owner demands that foam insulation be used we would, through the Scope of Work, remove the cost to insulate the home, but all other weatherization functions would be done on the home. A payment of $900 would be offered to the homeowner, but would not be paid until the work has been performed and inspected. Any cost above $900 would be borne by the resident.

The City specifies an R38 value for our weatherization program instead of the standard R30 value. Attached you will find a chart from the Department of Energy recommending the appropriate insulation value for the location where you live. Elizabeth City has a recommended value of R38.

To expand the weatherization program, the City Council voted several years ago to eliminate the income guidelines. However, it is proven that 45% of the homes weatherized are still owned or occupied by individuals who are considered low and moderate income. It also follows that most of our residents who are classified by HUD guidelines as being of low to moderate income are living as tenants in rental housing. Because of this, it makes it harder to reach these citizens since it is actually the property owner (landlord) that would agree to the weatherization work. Another point to remember is that every residential utility customer pays the same rate for electric service and all rate payers should be treated equally. The weatherization program is funded by the Electric Fund, although some members of the Council mistakenly attribute the weatherization program to property tax revenue and the General Fund.

The Council needs to remember that with the sale of our generating assets to Duke Energy Progress, we now pay $19.24 per kWh. I sent a memo to the City Council on July 17, 2015 (attached) which explains how <u>all</u> citizens benefit through the City's weatherization program.

Finally, I have included the information that was presented to the Council in the agenda packet for the June 27, 2016 Work Session as additional information. This memo provides additional information about the average amount spent per square footage when weatherizing a home.

FINANCIAL:

The Finance Committee discussed this matter during their meeting of July 7, 2016 and forwarded it to the City Council for discussion without recommendation.

Although the City offers a <u>standalone</u> insulation rebate program for those residents who do not want to participate in the weatherization program yet still wish to do insulation work themselves, the Finance Committee recommended that this program not be included in the weatherization insulation discussion.

References to that standalone program have been removed from this staff write-up.

STAFF RECOMMENDATION:

By motion, amend the City's Weatherization Program policy to provide for a $900 cash payment (after inspection) for those citizens who have their home weatherized by the City, but prefer to engage a foam insulation contractor on their own for their insulation work; and

Further, provide direction to staff regarding the adoption of a maximum allowance per square foot for weatherization services of $4.00 per square foot.

RCO/vdw

Guide to Home Insulation

Insulation material, when properly used, can make your home more comfortable and energy-efficient, and can significantly reduce heating and cooling bills throughout the year.

Benefits of Insulation

On average, you can save up to 20% on your home's heating and cooling costs or up to 10% on its total energy costs by adding insulation to attics, floors, crawl spaces, and accessible basement rim joists, and by reducing unwanted air leaks all around your house.

Types of Insulation

Insulation comes in many different forms, some of which are listed below:

- **Blankets, including batts and rolls:** Whether as continuous rolls or pre-cut panels called batts, blanket insulation is perhaps the most common type used in homes in the United States.
- **Loose fill:** This adaptable type of insulation can conform to any space without disturbing any structures or finishes.
- **Sprayed or foamed-in-place:** This type allows you to fill even the smallest cavities.
- **Rigid insulation:** This insulates your home from the roof to the foundation, reducing energy losses through the house frame.
- **Reflective insulation:** This type of insulation is most effective in reducing downward heat flow.
- **Radiant barrier:** Especially useful in hot, sunny climates, this type helps keep homes cooler.

R-Value

Insulation is important because of its ability to reduce the amount of heat that flows between the inside and outside of your home. The ability of insulation material to reduce heat flow is called its R-value. The greater the R-value, the more this heat flow is reduced.

Cost of Insulation

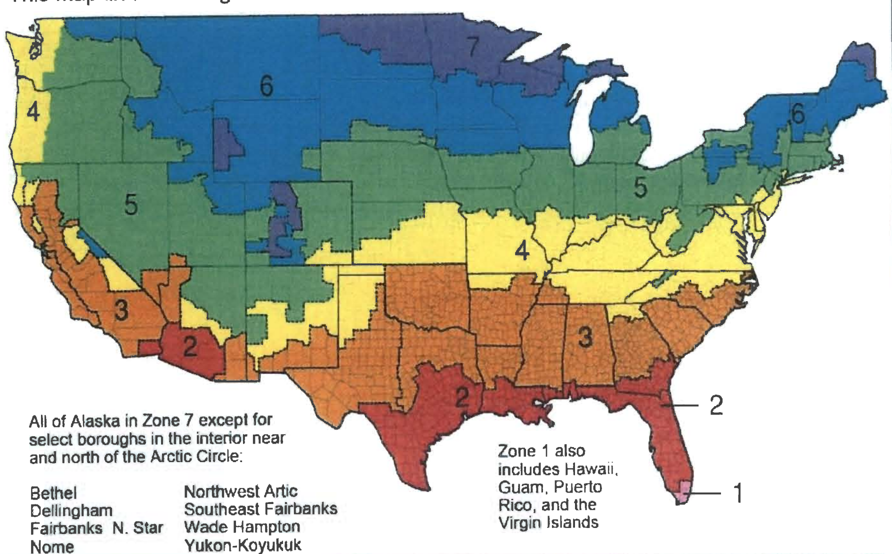
Insulation costs depend on R-value and type of material, and costs vary greatly at the retail level. The table below contains very general averages. Prices for loose-fill and spray foam are based on professional installation and reflect both material and labor costs. Check with a local supplier and/or contractor for actual costs.

Material type	R-value	Cost per square foot	Cost per square foot per R-value
Fiberglass batt (3.5 - 12 inches thick)	13	$0.20 to $0.40	$0.02
	30	$0.60 to $1.00	$0.03
Loose fill such as fiberglass, cellulose, and mineral wool (8 - 23 inches thick)	30	$0.45 to $1.35	$0.03
	50	$0.75 to $2.25	
Open cell polyurethane spray foam (3.5 inches thick)	12.6	$1.70 to $2.50	$0.17
Closed cell polyurethane spray foam (1 inch thick)	6.5	$1.30 to $2.00	$0.25
Expanded polystyrene foam board (1 inch thick)	3.8 – 4.4	$0.20 to $0.35	$0.07
Extruded polystyrene foam board (1 inch thick)	5	$0.40 to $0.55	$0.10
Polyisocyanurate foam board (1 inch thick)	6.5	$0.60 to $0.70	$0.10

continued >

R-Values by Zone

This map illustrates eight U.S. zones that determine how much insulation homes need.



Zone	Attic		Floor	Wall	
	Uninsulated Attic	Existing 3-4 Inches of Insulation	Uninsulated Floor	Uninsulated Wood-Frame Wall	Insulated Wood-Frame Wall
1	R30 to R49	R25 to R30	R13	*	N/A
2	R30 to R60	R25 to R38	R13 to R19		
3	R30 to R60	R25 to R38	R19 to R25	* and add R5 insulative wall sheathing beneath the new siding	
4	R38 to R60	R38	R25 to R30		Add R5 insulated sheathing before installing the new siding
5	R49 to R60	R38 to R49	R25 to R30	* and add R5 to R6 insulative wall sheathing beneath the new siding	
6					
7					
8					

* Whenever exterior siding is removed from an uninsulated wood-frame wall, drill holes in the sheathing and blow insulation into the empty wall cavity before installing the new siding.

Determining R-Value

New Homes

Building a new home offers more opportunities for properly installing insulation. Doing so requires you to know the places that need insulation and their recommended R-values. The R-values are based on both a region's climate and the type of heating and cooling system installed.

Oak Ridge National Laboratory offers a ZIP-Code Insulation Program, listed under *Further Reading*, to help determine your R-value and cost estimates. This program allows you to decide the types and forms of insulation that will work best for you.

Existing Homes

If your home already has insulation installed, a certified contractor can evaluate your house's current R-value and recommend whether additional R-value is needed and appropriate types of insulation.

The table opposite suggests R-values by zone as indicated in the map of the United States. It also suggests R-values when adding insulation to uninsulated or under-insulated attics, crawl spaces, and walls.

Further Reading

DOE Energy Savers: Insulation
www.energysavers.gov/insulation

Lawrence Berkeley National Laboratory Home Energy Saver Calculator
www.hes.lbl.gov/consumer

Oak Ridge National Laboratory R-Value Recommendations Calculator
www.ornl.gov/sci/roofs%2bwalls/insulation/ins_16.html

Oak Ridge National Laboratory ZIP-Code Insulation Program
www.ornl.gov/~roofs/Zip/ZipHome.html

Financial Incentives

Tax credits, incentives, and rebates may be available in your area. Please visit **www.energysavers.gov/taxcredits** for more information.

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DOE/EE-0340 • October 2010

MEMORANDUM

To: Mayor and City Councilors

From: Rich Olson, City Manager

Date: July 17, 2015

Re: Benefits of Weatherization Program

There have been concerns voiced by some City Councilors regarding increasing funding for the City's weatherization program in fiscal year 2015-2016. With the installation of the Nexgrid system, City staff has begun using the data provided to quantify the City's savings as a result of being involved in the weatherization program.

Approximately one-half of the City's power bill cost comes from the City's demand charges – or what is commonly known in the electrical industry as Coincident Peak (CP) kW. The Nexgrid system has allowed us to determine that the average CPkW per residential home is 6.8 kW, based on our existing sample size. Industry standards allow us to determine that one-half of household demand can be directly attributed to either the heating or cooling load during the CP, which means that the residential kW associated with a home would be 3.4 kW. By lowering this 3.4 kW residential demand through the weatherization program, ALL citizens benefit through decreased power bills.

The City's historical data on the weatherization program since its inception shows that a weatherized home will experience a reduction of 25% on the utility bill. This means that .85 kW is saved by each household weatherized. The City will now pay $19.24 per kW for demand charges, pursuant to our Power Supply Agreement with Duke Energy Progress. If we save .85 kW per month per home weatherized, this equates to a $16.35 savings per household per month or $196.20 per year per household weatherized.

Since starting the program, the City has weatherized 180 homes. Extrapolating this out means an annual savings for the City of $35,316.00. Whether or not their home is weatherized, all citizens of Elizabeth City receive a benefit from the program. Some homes receive the direct benefit, but everyone receives the secondary benefit of lower utility bills.

The City has approximately 8,000 residential customers. If we spent $3,500 weatherizing all homes in Elizabeth City, the total cost to the City would be

$28,000,000. However, the City would only receive $1,569,600 per year in savings, which equates to a return on investment of 17.84 years. This length of time to realize a return on the investment would not warrant doing all homes. We need to only concentrate on those homes with the highest energy consumption numbers.

RCO/vdw

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MEMORANDUM

TO: Mayor and Members of the City Council

FROM: Rich Olson, City Manager
Dennis Gordon, Energy Officer

DATE: June 23, 2016

REF: Presentation/Discussion – Insulation and Weatherization

BACKGROUND:

During the City Council meeting of June 13, 2016, Councilman Stimatz brought up concerns regarding the City's weatherization program. His primary concern was the City requiring that its weatherization contractors use either blown in or batts insulation for attics. Councilman Stimatz mentioned that for older homes, foam insulation would be better due to the type of wiring in the house.

Under the City's weatherization program, Dennis Gordon has developed a Thermal Bypass Checklist, which is attached. During your Work Session, Dennis will be able to explain the benefits to our customers and the City by using this checklist.

INSULATION:

The blown in and batts insulation used by the City's weatherization contractors is installed to provide an R value of 38. Foam insulation is much more expensive. Due to the nature of the foam installation process, the maximum R value that can be achieved is 22, depending on the application. In addition, our existing weatherization contractors do not have the expertise or equipment to install foam insulation due to its limited use. Contractors that do have the equipment and expertise are in very short supply in our area.

As a comparison of the various insulation process methods, the following expenses to insulate a 1,000 square foot house have been calculated for your information.

Installation of Blown-in-Cellulose	$ 891
Installation of Batt, Rolled or Reflective Insulation	$1,530
Installation of Spray Foam Insulation	$2,677

For the City's weatherization program, $900 has been the average spent to insulate a home using blown cellulose. This method is consistently applied to 99% of all homes weatherized. It is the most cost effective method.

To address Councilman Stimatz' concerns, staff has identified two methods to provide for the usage of foam insulation. First, if a citizen elects to utilize foam insulation and Dennis Gordon concurs that foam would be the proper method to use, that individual would receive a rebate of $500 rather than a rebate of $250, which is currently provided under the City's Attic Insulation Rebate Program (attached).

Secondly, if the home is being weatherized by one of the City's certified contractors, the contractor would forgo installing blown in or batts insulation and inform the citizen that the City would pay $900 if they wanted a foam contractor to do the work.

Once the work is completed and signed off on by one of our inspectors, a check would be cut to the property owner for the agreed-upon amount.

AVERAGE COST TO WEATHERIZE HOMES:

In previous presentations to the Council on the City's Weatherization Program, it has been reported that the <u>average</u> expenditure by the City per home is $4,000. Quite naturally, a smaller square footage home would be less costly to weatherize than a larger square footage home simply because of the size of the building envelope.

Recently, the issue of "fairness" has been discussed by some members who are of the opinion that the same total amount of weatherization funding should be provided for each resident. In doing so, the City would not meet its goal to help our citizens reduce their energy bills by increasing the energy efficiency of their home, regardless of the size.

Dennis Gordon has calculated the average cost per square foot of all homes weatherized over the life of the City's program, which is $4.04. In order to provide examples of the costs to weatherize various sized homes based on this average, the following chart is provided:

Square Footage	**Cost to Weatherize at $4.04 per square foot**
1,000	$4,040
1,200	$4,848
1,500	$6,060
2,000	$8,080
2,500	$10,100

You will recall the Council's previous discussions regarding the Arts of the Albemarle Designer House. The City spent $10,596.36 to weatherize this home, located 2000 Rivershore Road, in 2012. This home, built in 1966, has 3,897 square feet of conditioned living space. In applying the $4.04 average cost to 3,897 square feet, the total would be $15,743.88, which is considerably more than the City's actual expenditure.

To address the perceived issue of fairness, the Council may wish to consider adopting a $4.00 maximum amount per square foot allowance for each home weatherized by the City. Of course, some homes would not require the total allowance based on the Scope of Work developed by Dennis Gordon.

STAFF RECOMMENDATION:

By motion, amend the City's Attic Insulation Rebate Program policy to provide for installation of foam insulation pursuant to the two methods described herein.

Further, provide direction to staff regarding the adoption of a maximum allowance per square foot for weatherization services.

RCO/vdw

City of Elizabeth City

Weatherization Assistance Program

Thermal Bypass Checklist

1. Overall Air Barrier and Thermal Alignment.
    a. Overall Alignment throughout unit
    b. If applicable Garage Band joist Air barrier
    c. Attic Eave Bafflers
    d. Air barrier at Band Joist
2. Walls Adjoining Exterior Walls or Unconditioned Spaces.
    a. Walls behind Showers or Tubs
    b. Fireplaces
    c. Insulated Attic Slopes/walls
    d. Walls adjoining porches
    e. Staircase walls
    f. Double walls
3. Floors between Conditioned and Exterior Spaces.
    a. Air barrier in installed at any exposed fibrous insulation edges
    b. Insulation is installed to maintain permanent contact
    c. Blanket insulation have no gaps, voids, compressions, misalignments, wind intrusions.
    d. Blown in insulation blown to density
    e. Floor insulated above garage if applicable.
4. Shafts/ Opening to unconditioned space are fully sealed
    a. Duct shaft
    b. Piping penetrations
    c. Flue shafts
5. Attic/Ceiling /Knee Walls Interface
    a. Attic access panels has gaskets and insulated
    b. Moveable insulation fits properly in opening and proper air barrier achieved
    c. Attic dropdown stairs sealed and insulated to area standards
    d. Dropped ceiling and soffits air barrier achieved and insulated to standard
    e. Recessed lighting fixtures sealed and insulated to standard if not ICAT
6. Common Walls
    a. Seal all tops at exterior and interior walls