Undertaking 164: To determine if there were calculation errors in the spreadsheet underlying Mr . Colton's cost calculations for a low-income fixed credit percentage of income-based program:

## RESPONSE:

A corrected cost calculation for a fixed credit percentage of income-based program is attached. Since the corrected calculation increases the cost, the corrected cost calculation is presented in three parts:
> Part \#1 presents the cost calculation assuming a 6\% affordable heating burden. Under this scenario, the non-heating affordable burden is $50 \%$ of the heating burden, or $3 \%$ of income.
> Part \#2 presents the cost calculation assuming an $8 \%$ affordable heating burden. Under this scenario, the non-heating burden is $50 \%$ of the heating burden, or $4 \%$ of income.
> Part \#3 presents the cost calculation assuming a $10 \%$ affordable heating burden. Under this scenario, the non-heating burden is $50 \%$ of the heating burden, or $5 \%$ of income.

In addition to the corrected calculations, this undertaking presents the following line-by-line description of the calculation. References to "Columns" are references to the Column labels in the first line of each spreadsheet.

Before starting the column-by-column description of the calculation, the seven different income levels of the calculation should be noted. The low-income population is divided into seven tiers with the percentage of low-income customers in each income tier presented. The distribution of low-income customers over income tiers was provided to RCM/TREE in response to discovery:

- Less than \$10,000: 9.13\%
- \$10,000 to \$20,000: 39.66\%
- \$20,000 to \$30,000: $24.90 \%$
- $\$ 30,000$ to $\$ 40,000: 13.14 \%$
- \$40,000 to \$50,000: 9.50\%
- \$50,000 to \$60,000: 3.06\%
- \$60,000 or more: 0.61\%

The total of the percentage is $100 \%$, representing $100 \%$ of the low-income population. The calculations described below are identical for each income range.

Given this overview, a column-by-column description of the calculation is presented.

1. Column A: Bill ranges for the Company, distributed by increments of $\$ 250$.
2. Column B: The total number of low-income electric heating customers in each bill range. This number was provided by the Company in response to discovery.
3. Column C : The number of electric heating customers in each bill range for that income range. Column B $\times$ the percentage in the income range identified immediately above (e.g., for the income range of "less than $\$ 10,000$," multiply Column B $\times 9.13 \%$, rounded to 0 places).
4. Column D : The average electric heating bill for each specific bill range. This number was provided by the Company in response to discovery (e.g., the average electric heating bill for the bill range of " $<\$ 250$ " is $\$ 222$ ).
5. Column E: The total number of low-income electric baseload (i.e., non-heating) customers by bill range. This number was provided by the Company in response to discovery.
6. Column F: The total number of low-income electric baseload customers in each bill range for that income range. Column Exthe percentage in the income range identified above (e.g., for the income range of "less than $\$ 10,000$," multiply Column F by $9.13 \%$, rounded to 0 places).
7. Column G: The average electric baseload bill for each specific bill range. This number was provided by the Company in response to discovery (e.g., the average electric baseload bill for the bill range of "less than $\$ 250$ " was $\$ 230$ ).
8. Column H: The mid-point of the income range. For example, the mid-point of the income range of "less than $\$ 10,000$ " is set at $\$ 5,000$; the mid-point of the income range of " $\$ 10,000-\$ 20,000$ : is set at $\$ 15,000$. The "over $\$ 60,000$ ) income is top-coded at $\$ 60,000$.
9. Column I: The affordable burden as a percentage of income for electric space heating. In Part \#1, the affordable burden is set at 6\% of income. In Part \#2, the affordable burden is set at 8\% of income; in Part 3, the affordable burden is set at $10 \%$ of income.
10. Column J: The affordable bill (in dollars) for electric space heating. The affordable bill (in dollars) is calculated by multiplying the income mid-point (Column H) by the affordable burden (Column I). For example, in the "less than $\$ 10,000$ " income range, the mid-point is $\$ 5,000$ and the affordable burden is $6 \%$, resulting in an affordable bill of $\$ 300(\$ 5,000 \times .06=\$ 300)$.
11. Column K: The individual household electric heating shortfall. The "individual shortfall" is the average bill for each bill range (Column D) minus the affordable bill (Column J). For example, in the "less than $\$ 10,000$ " income range, the actual electric heating bill for the bill range of " $\$ 251$ $\$ 500$ " is $\$ 414$. The "affordable bill" is $\$ 300$, yielding an "individual shortfall" of $\$ 114$. Some "individual shortfalls" are (negative) numbers, indicating that the affordable bill exceeds the average bill. For example, in the "less than $\$ 10,000$ " income range, the actual electric heating bill for the bill range of "less than $\$ 250$ " is $\$ 222$, and the affordable bill is $\$ 300$, yielding an individual shortfall of neqative $\$ 78$.
12. Column L: The aggregate shortfall for electric heating. The aggregate electric heating shortfall is the "individual shortfall" for electric space heating customers (Column K) multiplied by the number of electric space heating customers in the specific income range and bill range (Column C) multiplied by the participation rate ( $60 \%$ ). The aggregate electric heating shortfall (Column L) is a positive number only if the individual household electric heating shortfall (Column K ) is a positive number. If the individual household electric heating shortfall is a negative number, the aggregate shortfall (Column L ) is set at $\$ 0$. The participation rate is a number provided based on historical experience. For example, in the "less than $\$ 10,000$ " income range, the "individual shortfall" in the bill range of $\$ 251-\$ 500$ " is $\$ 114$. The number of customers in the income range of "less than $\$ 10,000$ " and bill range of " $\$ 251-\$ 500$ " is 195 . The aggregate shortfall is thus 195 customers $\times 60 \%$ participation $\times \$ 114=\$ 13,344$ (taking into account rounding).

Column M through Column O repeat the calculations, except for electric base load customers.
13. Column M : The affordable burden as a percentage of income for electric baseload customers. The affordable burden for baseload customers is defined to be $50 \%$ of the affordable burden for electric space heating customers. The affordable baseload burden is thus Column I x 50\%. Accordingly, in Part \#1, the affordable baseload burden is set at 3\%. In Part \#2, the affordable baseload burden is set at $4 \%$. In Part \#3, the affordable baseload burden is set at $5 \%$ of income.
14. Column N: The affordable bill (in dollars) for electric baseload customers. The affordable bill (in dollars) is calculated by multiplying the income mid-point (Column H) by the affordable burden (Column M). For example, in the "less than $\$ 10,000$ " income range, the mid-point is $\$ 5,000$ and the affordable burden is $3 \%$, resulting in an affordable bill of $\$ 150(\$ 5,000 \times 0.03=\$ 150)$.
15. Column O: The individual shortfall for electric baseload customers. The "individual shortfall" is the average bill for each bill range (Column G ) minus the affordable bill (Column N ). For example, in the "less than $\$ 10,000$ " income range, the actual electric baseload bill for the bill range of " $\$ 251-\$ 500$ " is $\$ 328$. The "affordable bill" is $\$ 150$, yielding an "individual shortfall" of $\$ 178$. Some "individual shortfalls" are (negative) numbers, indicating that the affordable bill exceeds the average bill. For example, in the "\$10,000-\$19,999" income range, the actual electric heating bill for the bill range of "less than $\$ 250$ " is $\$ 230$, and the affordable bill is $\$ 450$, yielding an individual shortfall of negative $\$ 220$.
16. Column P: The aggregate shortfall for electric baseload. The aggregate electric baseload shortfall is the "individual shortfall" for electric baseload customers (Column O) multiplied by the number of electric baseload customers in the specific income range and bill range (Column F) multiplied by the participation rate ( $60 \%$ ). The aggregate electric baseload shortfall (Column P ) is a positive number only if the individual electric baseload shortfall (Column O ) is a positive number. If the individual household electric heating shortfall is a negative number, the aggregate shortfall (Column $P$ ) is set at $\$ 0$. The participation rate is a number provided based on historical experience. For example, in the "less than $\$ 10,000$ " income range, the "individual shortfall" in the bill range of $\$ 251-\$ 500$ " is $\$ 178$. The number of customers in the income range of "less than $\$ 10,000$ " and bill range of " $\$ 251-\$ 500$ " is 738 . The aggregate shortfall is thus 738 customers $\times 60 \%$ participation $\times \$ 178=\$ 78,818$ (taking into account rounding).
17. Columns $Q, R, S$ and $T$ are not used in the calculations.

Given the calculations described above, the program cost calculations would be as follows:

- Part 1 (6\% burden for heating; $3 \%$ for baseload): $\$ 39,945,085$
- Part 2 ( $8 \%$ for heating; $4 \%$ for baseload): $\$ 31,451,034$
- Part 3: ( $10 \%$ for heating; $5 \%$ for baseload): $\$ 24,979,189$

If these program costs are deemed to be "too high," additional savings can be generated by limiting the participation in the program. For example, rather than extending the program to LICO125, the program could be extended to LICO100. Rather than allowing a participation rate of up to $60 \%$, a total participation cap equal to $50 \%$ or $40 \%$ of the total eligible participation could be imposed.

One alternative available, for example, would involve imposing a ceiling on bill credits. If the program imposed a ceiling of $\$ 2,000$ on individual electric heating credits (Column K ), and $\$ 1,000$ on electric baseload credits (Column O), the program cost calculations would be as follows:

- Part 1/Alternative \#1) (6\% burden for heating; $3 \%$ for baseload): $\$ 31,193,862$
- Part 2/Alternative \#1) ( $8 \%$ for heating; $4 \%$ for baseload): $\$ 25,238,861$
- Part 3/Alternative \#1) ( $10 \%$ for heating; $5 \%$ for baseload): $\$ 20,391,012$

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Part 1

| Discounts | $\$ 39,945,085$ |
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| Arrears | $\$ 2,678,400$ |
| Total | $\$ 42,623,485$ |
| Crisis \% | $5 \%$ |
| Crisis Dollars | $\$ 2,131,174$ |
| Admin \% | $10 \%$ |
| Admin Dollars | $\$ 4,475,466$ |
| Total program | $\$ 49,230,125$ |

Part 2
Discounts \$31,451,034
Arrears $\quad \$ 2,678,400$

Total \$34,129,434
Crisis \% 5\%
Crisis Dollars $\quad \$ 1,706,472$
Admin \% 10\%
Admin Dollars $\$ 3,583,591$
Total program \$39,419,496

Part 3
Discounts \$24,979,189
Arrears $\quad \$ 2,678,400$
Total \$27,657,589
Crisis \% 5\%
Crisis Dollars $\quad \$ 1,382,879$
Admin \% 10\%
Admin Dollars $\$ 2,904,047$
Total program \$31,944,516


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| Part 1 |  |
| :--- | ---: |
| Discounts | $\$ 31,193,862$ |
| Arrears | $\$ 2,678,400$ |
| Total | $\$ 33,872,262$ |
| Crisis \% | $5 \%$ |
| Crisis Dollars | $\$ 1,693,613$ |
| Admin \% | $10 \%$ |
| Admin Dollars | $\$ 3,556,588$ |
| Total program | $\$ 39,122,463$ |

Part 2
Discounts $\quad \$ 25,238,861$
Arrears $\quad \$ 2,678,400$

Total \$27,917,261
Crisis \% 5\%
Crisis Dollars \$1,395,863
Admin \% 10\%
Admin Dollars $\quad \$ 2,931,312$
Total program \$32,244,436

Part 3
Discounts \$20,391,012
Arrears $\quad \$ 2,678,400$
Total \$23,069,412
Crisis \% 5\%
Crisis Dollars $\quad \$ 1,153,471$
Admin \% 10\%
Admin Dollars $\$ 2,422,288$
Total program $\$ 26,645,170$

