ClimateWorks FOUNDATION

# Economic Impacts of the HOME STAR Program

# ECONOMIC IMPACTS OF THE HOME STAR PROGRAM

This document presents a brief overview of the economic impacts of the HOME STAR program. These impacts have been calculated by ClimateWorks using external models provided by REMI and McKinsey & Co. All results and implications are those of ClimateWorks; neither REMI nor McKinsey endorses the inputs or outputs of this analysis.

## Details of the HOME STAR program

The program we modeled consists of $6B in subsidies for home retrofits spread over a two year period. These subsidies would be provided to home owners in one of two ways: a prescription-based program that would give homeowners up to $3,000 – $1,000 per measure selected from a menu of 8 measures – to apply towards total costs (Silverstar program), and a performance-based program that would give homeowners subsidies of $3,000-$12,000 depending on the level of efficiency their retrofit achieves (Goldstar program).

We have taken as a given the following assumptions:

- The full offered value of subsidies would be claimed during the two-year life of the program. Achieving this would require the rate of home retrofits to rise roughly 15x from its current level of 200,000 per year to a new level of close to 3 million each year – an ambitious goal that requires aggressive policy measures.
- Two-thirds of the subsidies would be claimed by Silverstar participants and one-third by Goldstar participants. All of the Silverstar retrofits would occur in Year 1 of the program, while one-third of the Goldstar retrofits would occur in Year 1 and two-thirds in Year 2.
- Subsidy recipients would match funding on an approximately 1:1.1 basis, so that the $5.4B in subsidies (total program budget minus administrative expenses) would imply a total spending of approximately $11B on home retrofits.
- The average spending per home under Silverstar would be $2800 and would result in an 11% reduction in home energy consumption, while the average spending per home under Goldstar would be $7200 and would result in a 22% reduction in home energy consumption. According to McKinsey's report "*Unlocking Energy Efficiency in the U.S. Economy,"* an economically optimal retrofit approach in the categories addressed by the HOME STAR program could obtain a national-average 24% energy savings in the first year, at a cost of under $2000 per home, so these assumptions seem safely conservative.
- Administrative and other costs will comprise 10% of the total program budget, and will include direct administrative costs as well as quality assurance.
- We assumed that the government financed or guaranteed $2B worth of loans taken by homeowners to pay for the unsubsidized portion of the retrofit cost. These loans will therefore cover about one-third of the total unsubsidized amount. The loans were extended at a rate of 5% per year with a repayment period of 5 years.

Overall these assumptions are plausible but will require an aggressive and well-designed policy. The jobs and economic results of this assessment are most sensitive to the total subsidized spending, and the results are not sensitive to the level of efficiency gains achieved.

## Model methodology

We linked two external models to estimate the economic impacts of this spending, one from REMI and one from McKinsey & Co.

The first model is the granular database of energy efficiency opportunities in the United States that was created as part of McKinsey's 2009 report "*Unlocking Energy Efficiency in the U.S. Economy.*" This stock-and-flow model contains detailed information on the cost and savings potential of 675 different efficiency measures within each region of the United States. Retrofitting measures—such as duct sealing, weatherization, improved insulation and windows, etc.—make up a substantial portion of the measures in McKinsey's model.

The second model is a 50-state macroeconomic model of the United States provided by REMI[1]. This widely-used model traces the ripple effects as policy changes affect the U.S. economy. For example, if spending on construction is increased, the model will calculate the increased jobs for workers in construction companies, plus the increase in jobs from these workers' spending of their new earnings (e.g., more jobs in restaurants near construction sites), plus the increased jobs as the additional workers in those restaurants spend their new earnings, and so on. It also traces the negative effects of reduced spending in some categories (e.g. energy) when spending is increased in other areas (e.g. insulation).

Linking these models together in a three-step process created a detailed view of the sector-level and state-level economic impacts of the HOME STAR program.

- Step 1: estimate implied direct impacts on spending in the U.S. under the HOME STAR program. The first step is to understand how spending in the HOME STAR program would be distributed across different categories.
    - **Capital expenses:** By combining the energy efficiency database with expert opinion, we estimate that capital expenditure for the retrofits will be divided as follows: 70% for passive measures such as wall and attic insulation, air sealing, duct sealing, and window replacement; 25% for improved heating and cooling equipment and systems; and 5% for improved appliances (e.g., water heaters). We assume that the government's portion of the expense (the subsidy) comes from an increase in external debt rather than from increased taxes or reduced spending in other categories. Consumers pay for their portion of the capital expense upfront through reduced spending in other areas.
    - **Operating expenses:** The reduction in energy consumption in each household reduces monthly utility bills and allows consumers to redirect spending toward other categories. Because spending is shifted from one consumption category to another, this has no net impact on overall spending, although it does improve quality of life for program participants and does have a small impact on the distribution of output across different industries.

[1] Regional Economic Modeling, Inc., a leading provider of macroeconomic models of the U.S. Their models are widely used by state governments, regional agencies, the federal government (e.g. EPA), utilities, universities, and consulting companies to estimate the economic impacts of different policies.

- Step 2: calculate incremental spending by subtracting the level of retrofitting activity that would have occurred in the absence of the HOME STAR program. According to McKinsey's report *Unlocking Energy Efficiency in the U.S. Economy*, roughly 200,000 homes are currently being retrofitted each year. We assume that this level of retrofitting would continue in the future even without the HOME STAR program. When HOME STAR is available, these retrofitters act as "free-riders" by claiming the allowed subsidy even though the availability of the subsidy did not affect their decision to retrofit. The retrofit spending that these free-riders would have spent without the HOME STAR program is subtracted from the spending estimates obtained in Step 1 to obtain the net incremental impact of the program. The presence of these free-riders means that the net incremental impact of the HOME STAR program is only about 95% as large as it otherwise would be.

- Step 3: use the REMI model to calculate full effects of the incremental HOME STAR spending. We then calculate the policy's implied economic impacts by feeding the calculated spending changes into the REMI model. As discussed above, this model calculates the induced and indirect impacts of each policy by tracing the impacts of the incremental spending on the U.S. economy as a whole.

## Key results

Taking the approach and assumptions outlined above, we estimate that the HOME STAR program would have the following economic impacts:

- Creation of 168,000 jobs over the two years of the program (139,000 in Year 1 and 29,000 in Year 2). Job increases would largely be concentrated in categories that currently have large unemployment rates (e.g. construction workers), as shown in Exhibit 1.

**Exhibit 1: 168,000 jobs are created in a variety of categories as a result of the HOMESTAR program**

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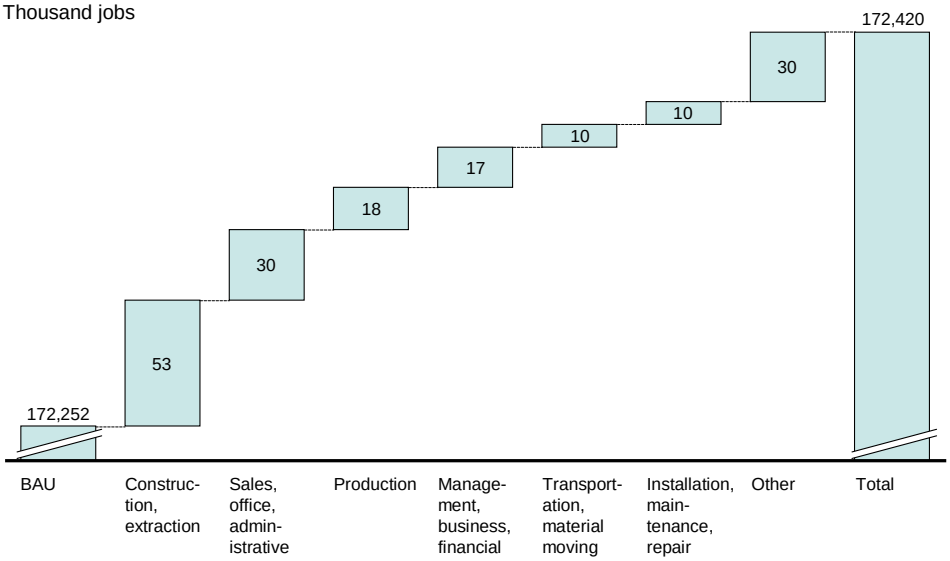
**Jobs created over two years**
Thousand jobs




SOURCE: HOMESTAR 2/2 Scenario Run

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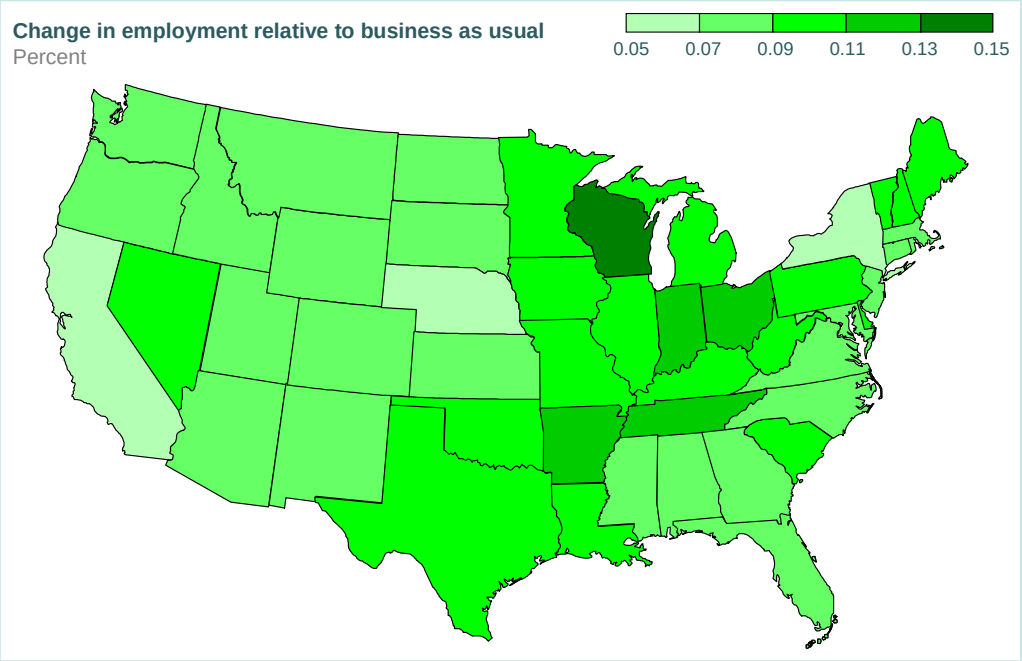
- Increases in employment rates of 0.05 to 0.15 percentage points in all states during the first year of the program (Exhibit 2).

## Exhibit 2: The HOMESTAR program has a positive effect on jobs across all states in Year 1

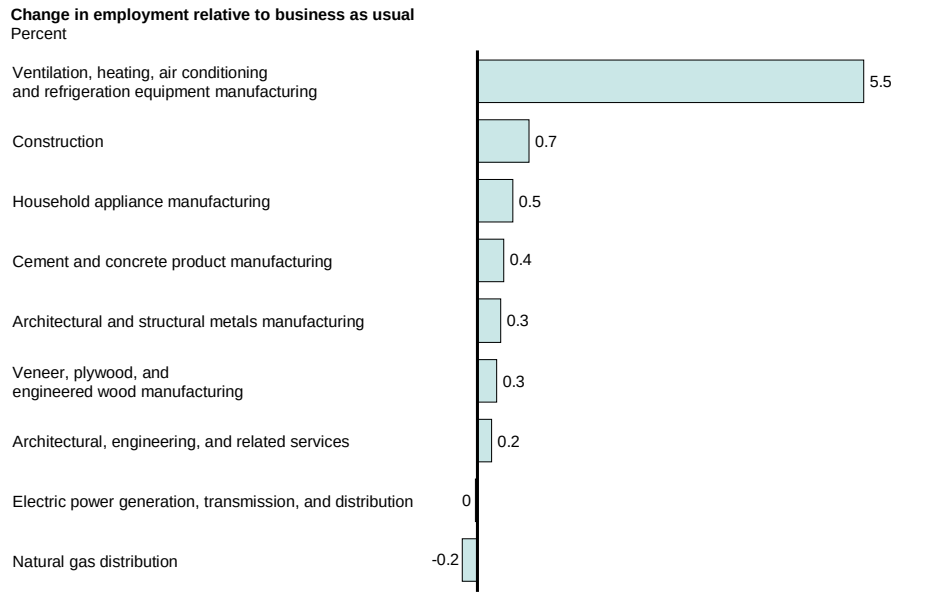



SOURCE: HOMESTAR 2/2 Scenario Run



- Significant short term boosts to several industries (e.g., HVAC and appliance manufacturing, construction, architecture/engineering services,) coupled with demand reductions in other industries (Exhibit 3). The primary demand losses are in natural gas, which experiences reduced demand as houses become more efficient.

## Exhibit 3: HOMESTAR industry winners and losers in Year 1




SOURCE: HOMESTAR 2/2 Scenario Run

- Reduction of 4 million tonnes of carbon dioxide equivalent emissions per year compared to business as usual. HOME STAR would abate about 1% of the total residential buildings sector potential in 2015, and would avoid about 40 million tonnes of cumulative emissions by 2020.

## Summary

Provided the HOME STAR program can be scaled up at the rapid rate assumed above, this integrated economic assessment estimates that it would be an effective way to create jobs at the state and national level. 168,000 jobs would be created in the U.S. The net government spending per job created ($35,700) compares favorably with many alternatives.

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