



## Testimony of Lowell W. Ungar, Ph.D.

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SUBCOMMITTEE ON ENERGY OF THE U.S. HOUSE COMMITTEE ON ENERGY AND COMMERCE  
HEARING ON SAVING ENERGY: LEGISLATION TO IMPROVE ENERGY EFFICIENCY AND STORAGE

FEBRUARY 12, 2020

### Summary

Energy efficiency policies are essential to save consumers money, improve economic competitiveness and create jobs, cut air pollution and global warming, boost health, and strengthen energy security and resilience. The efficiency bills at today's hearing would make an important contribution to achieving these goals. They also have earned broad support. H.R. 3962, the *Energy Savings and Industrial Competitiveness Act*, is a well-vetted set of buildings and industrial efficiency provisions. In our recently updated analysis, we found that selected provisions would save over \$50 billion in energy bills after needed investments and reduce carbon dioxide emissions by 1.3 billion metric tons – about the emissions of all U.S. cars and light trucks in a year (cumulative for measures implemented through 2050). Key provisions include:

- Stronger support for effective state and local building energy codes, key to reducing waste in new homes and commercial buildings
- Improvements to mortgage underwriting to enable financing of efficiency improvements by accounting for the energy bill savings
- Expansion of Industrial Assessment Centers, which train students to conduct energy audits in order to help small and medium-sized manufacturers and create a trained industrial workforce

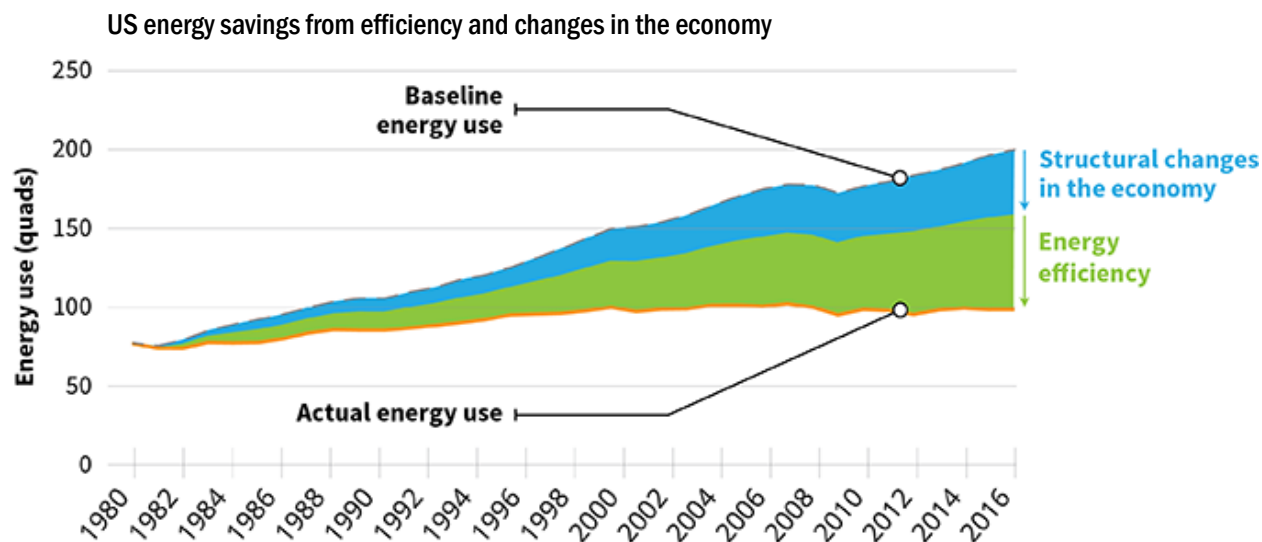
We also support H.R. 5650, the *Federal Energy and Water Management Performance Act of 2020* (also included in H.R. 3962), which would help reduce energy waste in federal facilities, and H.R. 5758, the *Ceiling Fan Improvement Act of 2020*, which would make technical improvements to the efficiency standard for large ceiling fans. Together with other bills the subcommittee has passed and bills that are still in preparation, these bills would make a down payment on the large potential savings from energy efficiency.

### Introduction

Thank you for the opportunity to testify on important energy efficiency legislation. The American Council for an Energy-Efficient Economy (ACEEE), a nonprofit 501(c)(3) organization, acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors. We produce more than 30 reports and other research products each

year on energy-saving technologies, programs, and policies. We have a long history providing input to Congress, federal agencies and state and local policy makers based on our research.

Energy efficiency in every economic sector has been critical to our energy system, reducing costs to consumers, improving business competitiveness, creating jobs, cutting air pollution and greenhouse gas emissions, benefitting public health, reducing strain on the electric grid, and cutting fuel imports. Without the efficiency improvements we have made since 1980 the United States would be using two-thirds more energy than we do now, at an additional cost of nearly \$800 billion per year at current energy prices.<sup>1</sup>



Source: ACEEE 2017.

Energy efficiency policies proposed by this subcommittee with bipartisan support, including important laws signed by Presidents Ronald Reagan, George H.W. Bush, and George W. Bush, have spurred a significant portion of these savings. And more than 2.3 million people work at least in part on energy efficiency, more than work on production of all electricity and fuels combined.<sup>2</sup>

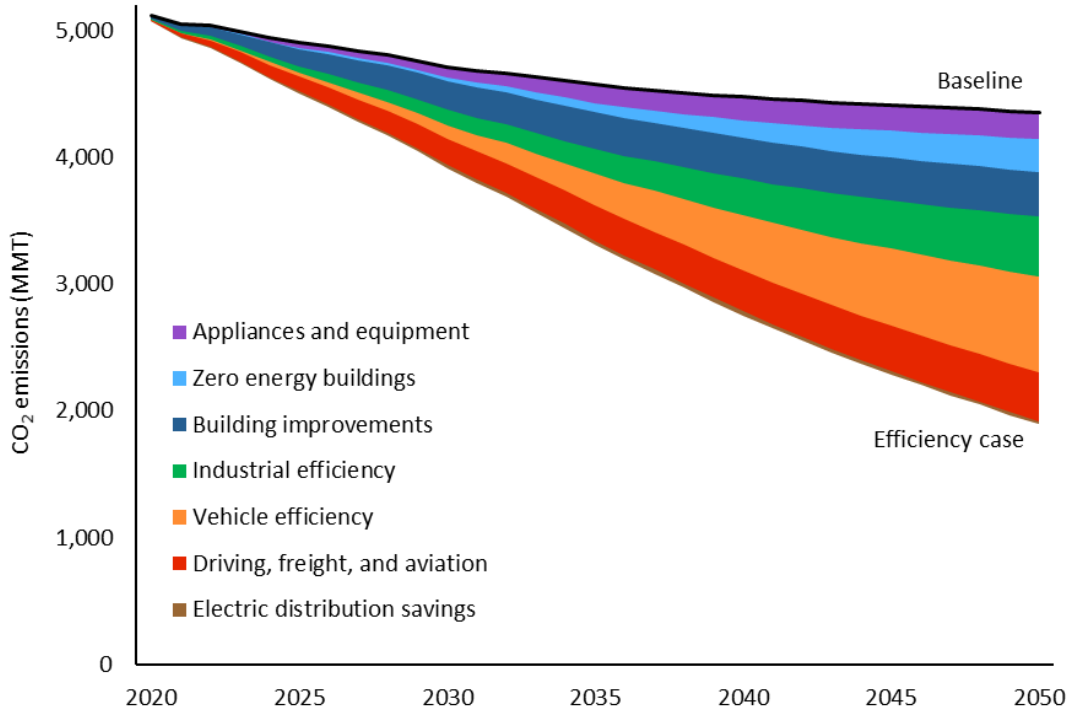
The potential is even greater. In a recent analysis we found that additional energy efficiency throughout the economy could cut projected energy use and greenhouse gas emissions in half by 2050. New aggressive policies could help achieve nearly all of the savings.<sup>3</sup>

<sup>1</sup> See [www.aceee.org/blog/2017/05/doing-more-less-how-us-economy-grows](http://www.aceee.org/blog/2017/05/doing-more-less-how-us-economy-grows). Updated numbers available in the *Energy Efficiency Impact Report* (2019), [energyefficiencyimpact.org/](http://energyefficiencyimpact.org/).

<sup>2</sup> National Association of State Energy Officials and Energy Futures Initiative, *U.S. Energy and Employment Report* (2019), [www.usenergyjobs.org/](http://www.usenergyjobs.org/).

<sup>3</sup> S. Nadel and L. Ungar, *Halfway There: Energy Efficiency Can Cut Energy Use and Greenhouse Gas Emissions in Half by 2050* (ACEEE 2019), [aceee.org/halfway-there](http://aceee.org/halfway-there).

### Potential US CO<sub>2</sub> reductions from energy efficiency



Source: ACEEE 2019.<sup>3</sup>

These savings include some electrification using highly efficient equipment and vehicles. Efficiency is needed in order to achieve the greenhouse gas abatement but reduce the cost and the peak demand spikes from electrification.

The bills before the subcommittee today would make a down payment on the investments needed to reap the tremendous economic and environmental benefits from efficiency.

### Energy Savings and Industrial Competitiveness Act (H.R. 3962)

The most important energy efficiency bill to be considered at this hearing is the *Energy Savings and Industrial Competitiveness Act* (ESICA), and I will devote most of my remarks to this bill. We commend Congressmen Welch and McKinley for their long work on this important measure.

ESICA is broadly supported by dozens of businesses, environmental organizations, and state officials, as well as energy efficiency advocates, ranging from the U.S. Chamber of Commerce to the Natural Resources Defense Council. This support is because the bipartisan sponsors here, and on the Senate side, have led an exemplary open process to gather input from a wide range of stakeholders, including for improvements before reintroduction last year.

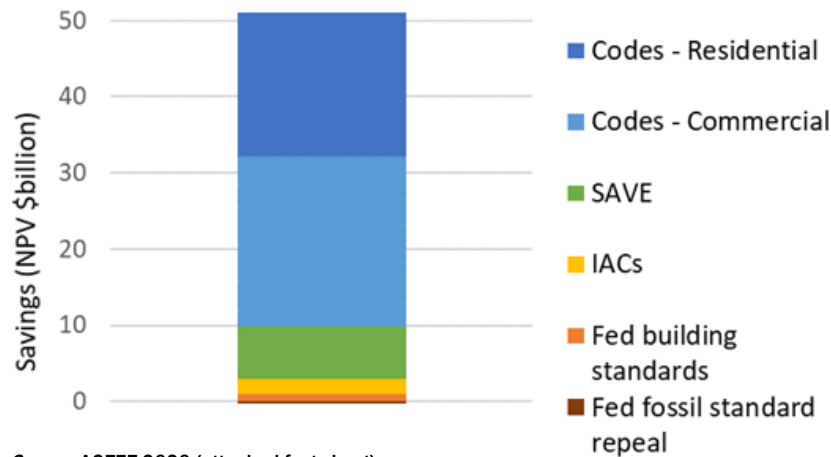
We recently updated our analysis of key provisions of ESICA. A fact sheet is appended to this testimony. We estimate that these provisions, if enacted, would (over the lifetime of measures taken through 2050):

- Cut energy waste by more than 30 quadrillion British thermal units, almost the total energy use of U.S. industry in a year
- Save over \$50 billion in energy bills after needed investments
- Reduce carbon dioxide emissions by 1.3 billion metric tons, about the emissions of all U.S. cars and light trucks in a year

Although we did not estimate employment impacts this time, we have previously found that the bill would also result in the creation of tens of thousands of additional jobs.

The savings from the bill are due to multiple provisions. I discuss those provisions we analyzed below, but we support the bill in its entirety.

#### Net energy bill savings after investment from ESICA



#### SECTIONS 101–102: BUILDING ENERGY CODES

Sections 101–102, the major provision on building energy codes and a new grant program for codes implementation, would yield a large majority of the total savings from the bill in our analysis, saving consumers over \$40 billion (net present value after needed investments). They would direct the Department of Energy (DOE) to seek greater energy savings in new homes and commercial buildings, but the provisions would not directly impose requirements on states or on homeowners.

Building energy codes are an essential tool to manage the 40% of energy use that occurs in homes and commercial buildings and to protect home buyers, renters, and businesses from excessive energy bills. Codes set a minimum level of energy efficiency – or in other words a maximum level of energy waste – for new homes and commercial buildings and for new construction in existing buildings. They do so in a flexible and performance-based way. They also can make homes and offices healthier and more comfortable, improve resilience to disasters, limit electric demand peaks, and help ready homes and buildings for future energy innovations. And it is cheapest to build these features in at the time of construction.

Builders do not pay the energy bills and most home buyers and businesses have no way of even knowing what their energy bills will be. If we compare current codes to those of ten years ago in Illinois, meeting energy codes may add \$2000 to the home cost but will save homeowners more than \$400 in energy bills each year. Most of the extra cost will be spread over the life of a mortgage, but a small portion will be added to the down-payment. The energy savings will pay back the extra down payment so that homeowners come out ahead after eight months and save almost \$6000 net over 30 years. In Michigan homeowners come out ahead after only five months and ultimately save close to \$9000.<sup>4</sup>

Even more energy savings are available. About 97,000 new homes were Energy Star certified in 2017, typically achieving 20% savings compared to model codes. Almost 19,000 homes were built to be “zero net energy” (generating as much energy in a year from solar panels as the homes use) or be “zero energy ready” (with similarly low levels of energy use).<sup>5</sup>

Building energy codes are implemented in a complicated process. Independent organizations develop model codes and standards in open stakeholder processes. States, Indian tribes, and some local governments adopt the energy provisions into their building codes. And local governments lead on enforcement and compliance. DOE provides technical assistance at every step of the process on a shoestring budget.

The tremendous potential of codes has been only partly realized. Improvements in the model codes are intermittent, adoption in some states has been slow, and compliance—when it is measured—is not universal. The national impacts on the electric grid, other energy systems, air pollution, and global warming are not effectively considered, nor are benefits for health and comfort.

ESICA would keep this existing process but would direct DOE to provide more guidance and assistance to further energy savings:

- DOE would set energy savings targets for model codes and would propose amendments to meet the targets. DOE would also support “stretch” codes for jurisdictions that want to achieve greater savings, especially important for those that have adopted climate goals.
- DOE would increase assistance to states in updating codes. As they do now, states would report to DOE on the status of updating their codes, which can help ensure that they regularly consider updates. But states and localities would continue to decide which codes to adopt.
- ESICA would also set goals for improved compliance and authorize a new grant program to support codes collaboratives, which in several states have effectively

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<sup>4</sup> Derived from analysis by Pacific Northwest National Laboratory at [https://www.energycodes.gov/development/residential/iecc\\_analysis](https://www.energycodes.gov/development/residential/iecc_analysis).

<sup>5</sup> *Energy Efficiency Impact Report*, <https://energyefficiencyimpact.org/>.

brought a wide range of stakeholders together to provide training and resources that help builders meet codes and code officials enforce them.

The homes and commercial buildings that are built now will last for decades. We owe it to the owners and renters and to our energy system not to lock in energy waste for that time.

#### SECTION 424: SAVE ACT

Energy bills are typically the second or third largest cost of owning a home, after the mortgage, but comparable to property taxes.<sup>6</sup> But they are not considered in the mortgage underwriting process. Home buyers are limited in how large a mortgage they can obtain by their ability to repay (debt-to-income ratio) and by the value of the home (loan-to-value ratio). Owners with lower energy bills can afford to pay a higher monthly mortgage payment. And home buyers are willing to pay more for an efficient home. But the underwriting simply does not even consider these factors. Thus, builders complain that although their buyers want more efficient homes, the appraisals come back too low so the extra cost sometimes cannot be added to the loan.

This provision, which also was previously introduced as the Sensible Accounting to Value Energy (SAVE) Act by Rep. King and Rep. Perlmutter, would improve the accuracy of underwriting and help home buyers and homeowners finance improved energy efficiency in their mortgages. It would direct the Department of Housing and Urban Development (HUD) to develop guidelines that would apply to HUD (including Federal Housing Administration loans), other federal agencies, and government sponsored enterprises Fannie Mae and Freddie Mac. A borrower could voluntarily ask that energy savings be factored into the mortgage caps, with the monthly savings reducing estimated expenses and the present value of future savings added to the appraised home value.

In order to determine the likely energy bills, the borrower would submit a Home Energy Rating System (HERS) report or another method approved by HUD. HERS ratings quantify the energy efficiency of a home using an inspection and approved software and were developed in part for use in mortgages. They are overseen by a nonprofit, the Residential Energy Services Network (RESNET), with consensus-based standards and a quality assurance process. According to RESNET, almost 242,000 homes were rated last year, about one fifth of all new homes.<sup>7</sup>

By enabling financing of energy efficiency improvements, home prices to reflect the value of efficiency, and builders and homeowners to see a return on their energy efficiency investments, the SAVE Act will result in greater home energy efficiency. It also will help ensure builders and homeowners can pay for investments needed to meet stronger energy codes under section 101.

#### SECTION 202: INDUSTRIAL ASSESSMENT CENTERS

DOE Industrial Assessment Centers (IACs) meet two critical needs of industry. They provide workforce development by training engineering and other college students on energy management and efficiency. And the students and advisors provide energy audits for small and

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<sup>6</sup> Institute for Market Transformation, "The SAVE Act" (2015), <https://www.imt.org/resources/save-act-fact-sheet/>.

<sup>7</sup> 2019 Ratings by state are at [www.resnet.us/articles/over-241000-homes-hers-rated-in-2019/](http://www.resnet.us/articles/over-241000-homes-hers-rated-in-2019/).

medium-sized industrial facilities, thus lowering energy costs for these plants and making them more competitive. Since 1981 IACs have conducted more than 19,000 assessments and recommended more than 66,000 measures that the plants then implemented, which were estimated to save an average of almost \$45,000 annually for each plant.<sup>8</sup> We estimate the program is saving 800 million kWh of electricity, 30 million therms of natural gas, and 500,000 tons of CO<sub>2</sub> each year.<sup>9</sup>

ESICA would expand and strengthen this important program. It would authorize IACs at trade schools, community colleges, and union training programs. It would also designate up to five of the strongest IACs as Centers of Excellence, to help strengthen the capabilities of the other centers and build the capacity of the new ones. It would add internship and apprenticeship programs to further train graduates of the program. It would strengthen outreach and coordination. And it would direct the Small Business Administration to expedite consideration for their loans for plants that have received audits, so that the plants are able to implement more of the IAC recommendations.

Industrial efficiency is critical to our economy and our environment, but it receives less legislative attention than building and vehicle efficiency do. This provision would take one important step to help our industrial sector thrive.

#### SECTIONS 301–302, 421–423: FEDERAL ENERGY MANAGEMENT

As you may have heard, the federal government is the single largest energy user in the country. ESICA would take a number of steps to improve the energy efficiency of federal buildings. It includes both basic measures in H.R. 5650, which I will discuss a bit more below: energy and water savings targets for federal agencies and authorization of the Federal Energy Management Program. It would modify a provision for large federal buildings to require implementation of cost-effective measures identified in energy audits. It would clarify legislative language on standards for new federal buildings and apply the standards to major renovations of federal buildings. It would require goals and implementation strategies for the federal use of energy efficiency information technology and would strengthen an existing provision for efficient data centers.

The bill also would repeal an existing standard requiring new federal buildings and buildings with major renovations to be designed to achieve zero fossil fuel-generated energy consumption by 2030. This provision has never been implemented since it was enacted in 2007; as the law is currently drafted, writing a rule to do so has proven challenging. But it was intended to set an important direction to design buildings that result in zero net greenhouse gas emissions.

In our analysis the savings from the energy management provisions and the lost savings due to repeal of the standard partially offset each other, resulting in a relatively small net energy impact.

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<sup>8</sup> Detailed information on the audits is available at [iac.university/statistics](http://iac.university/statistics).

<sup>9</sup> ACEEE, *The Impact of Federal Energy Efficiency Programs* (updated 2019), [www.aceee.org/fact-sheet/federal-ee-programs](http://www.aceee.org/fact-sheet/federal-ee-programs).

## Other Energy Efficiency Bills

We also support the other energy efficiency bills up for consideration in this hearing.

### FEDERAL ENERGY AND WATER MANAGEMENT PERFORMANCE ACT OF 2020 (H.R. 5650)

H.R. 5650, the *Federal Energy and Water Management Performance Act of 2020*, includes two federal energy management provisions also included in ESICA and thus mentioned above. It would restore energy and water savings targets for agencies through 2027 in order to focus management attention on improving efficiency in existing buildings. There have been a series of energy targets since at least the 1980s. Although agencies often have not met the targets, they have significantly reduced the energy intensity of their buildings. The bill also would authorize the existing DOE Federal Energy Management Program, an important resource for all federal agencies and implementer of laws in this area.

### CEILING FAN IMPROVEMENT ACT OF 2020 (H.R. 5758)

H.R. 5758, the *Ceiling Fan Improvement Act of 2020*, would make a technical improvement to the ceiling fan standard that just went into effect. The current standard has an efficiency requirement (airflow produced divided by power used) that depends on fan diameter for different fan size categories. But as airflow is increased, the power needed goes up much faster than the airflow, and as a result for large diameter fans (over seven feet) this metric could both allow inefficient fans with low airflow to meet the standard and make it difficult or impossible for any fans with high airflow to meet the standard. Since the standard was finalized in 2017, the industry has developed an improved metric, the Fan Energy Index (under ANSI/AMCA Standard 208), to fairly measure the efficiency of large fans with different air flows. The bill would set a standard using the Fan Energy Index in lieu of the current standard for large fans, thus increasing energy savings for low airflow fans and enabling high airflow fans to meet the standard. The change is broadly supported among manufacturers and efficiency proponents.

## Conclusion

The energy efficiency bills that are the subject of today's hearing will make an important down payment on the potential of efficiency to save consumers money, make businesses more competitive, create jobs, slash greenhouse gas emissions, improve health, and strengthen resilience. The bills also have broad support from businesses, efficiency advocates, and both sides of the aisle. ESICA in particular has been thoroughly vetted and includes important measures for buildings and industrial efficiency. We urge you to pass this legislation and look forward to supporting you on further energy efficiency measures.

Thank you again for the opportunity to testify today.





## Impacts of the Energy Savings and Industrial Competitiveness Act

(S. 2137 Portman-Shaheen / HR 3962 Welch-McKinley)

The Energy Savings and Industrial Competitiveness Act includes important provisions to improve the energy efficiency of homes and commercial buildings, industry, and federal buildings. If passed, it would be the most significant energy efficiency policy law since 2007.

ACEEE estimated the impact of several of the most important provisions. Combined, over the lifetime of measures implemented through 2050 they would save more than \$50 billion (after needed investments), reduce as much carbon dioxide emissions as caused by all U.S. cars and light trucks in a year, and cut energy waste by almost the total energy use of U.S. industry in a year. A previous study from ACEEE estimated that the legislation also would create more than 100,000 additional jobs. Key provisions include:

*Combined cumulative impacts of selected provisions through 2050*

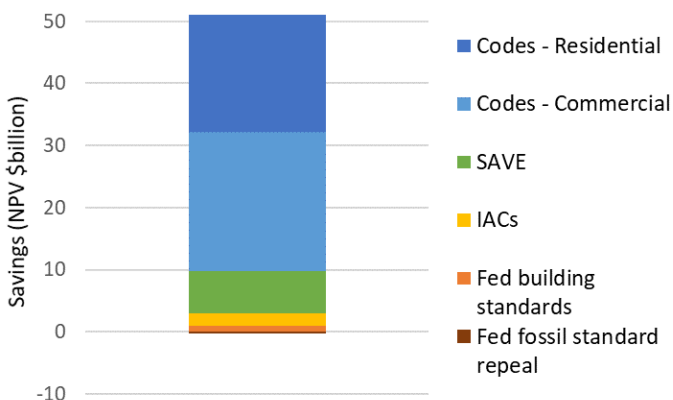
- **\$51 billion** savings (net present value)
- **32 quadrillion Btu** of energy saved
- **1.3 billion tons** of CO<sub>2</sub> emissions avoided

**Sections 101–102. Building energy codes** would have by far the largest impact on energy efficiency. These provisions would direct the Department of Energy (DOE) to work with states, Indian tribes, local governments, code and standards developers, and others through a rulemaking process to develop energy savings targets for model building energy codes. DOE would also assist state and tribal adoption of these codes and implement a new grant program to help homebuilders, contractors, trades, code officials and others cost-effectively implement updated building energy codes. Code adoption remains voluntary and at the discretion of state, tribal, and local governments.

**Section 424.** The **SAVE Act** would support home energy efficiency by accounting for energy savings when underwriting mortgage loans through the Federal Housing Administration and other federal mortgage programs including Fannie Mae and Freddie Mac. This would enable homeowner energy cost savings to be realized in the value of the home.

**Section 202** would expand and strengthen DOE **Industrial Assessment Centers (IACs)**, which train college students and conduct energy audits at small and medium-size manufacturing plants. It would authorize new IACs at community colleges and at training programs, Centers of Excellence to help other IACs, internships and apprenticeships to further student training, and implementation assistance through Small Business Administration loans. Sec. 111 would also create similar centers for building efficiency.

**Sections 421–423** would replace the never-implemented fossil fuel standard for new and renovated federal buildings with other **federal energy management** provisions. They would extend overall building energy intensity and water reduction targets for federal agencies through 2027 and 2030 respectively, require agencies to implement cost-effective measures identified in energy audits, expand standards for new buildings to cover major retrofits, and authorize the existing Federal Energy Management Program.



Net energy bill savings after investment (cumulative for lifetime of measures through 2050)

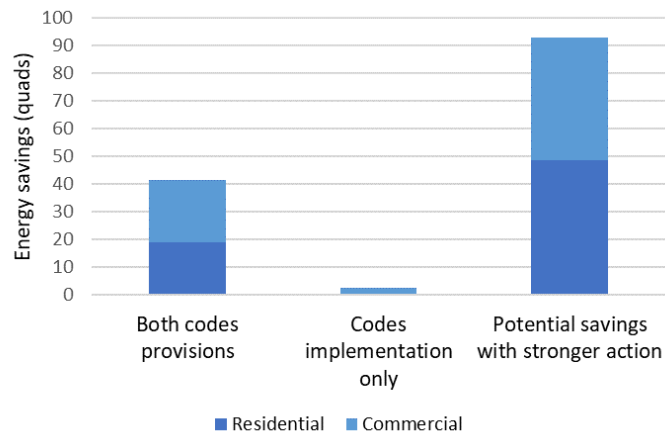
## Methodology and Detailed Results

The estimated savings for each provision is the difference between energy use in likely scenarios with and without enactment of the bill. We also estimated the added investment needed to achieve the savings. For the baseline scenarios, we used the Energy Information Administration’s *Annual Energy Outlook 2019* and other sources on current energy use. For the specific impacts of each provision, we generally used expert judgment on likely implementation and effects.

### Estimated cumulative impacts of selected provisions of ESICA (for the lifetime of measures through 2050)

	Net savings (\$billion NPV)	Benefit: cost ratio	Cumulative energy savings (quads)	Electricity savings (TWh)	Natural gas savings (Tbtu)	CO <sub>2</sub> emissions reductions (MMT)
Codes - Residential	18.9	2.4	11.0	861	3,184	484
Codes - Commercial	22.5	2.2	17.0	1,725	2,066	696
SAVE	6.7	2.6	2.8	239	710	125
IACs	2.0	2.7	1.1	88	259	47
Fed building standards	1.0	1.7	0.5	47	109	25
Fed fossil standard repeal	-0.3	0.9	-0.8	-70	-167	-34
<b>Total</b>	<b>50.8</b>	<b>2.2</b>	<b>31.6</b>	<b>2,891</b>	<b>6,160</b>	<b>1,343</b>

We also considered two side cases on building energy codes: We estimated the impact from Sec. 102 on codes implementation without Sec. 101 and estimated the potential impact if DOE and the states made a strong push for better codes under the combined codes provisions. The figure below shows these results as “Codes implementation only” and “Potential savings with stronger action,” respectively. Sec. 102 achieves only a fraction of the estimated savings from Sec. 101 and 102 combined because the potential from improved compliance is only a small percentage of the available savings from better codes. However, its savings would still be comparable to our estimates for SAVE or IACs. The aggressive implementation case shows the large savings potential, which could more than double the already large savings we estimated for the likely impact.



Energy savings for various building energy codes scenarios (cumulative for lifetime of measures through 2050)

Contact Pasha Majdi at (202) 507-4037 or [pmajdi@aceee.org](mailto:pmajdi@aceee.org) for more information.

*The American Council for an Energy-Efficient Economy acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors.*