Johns Manville

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VIA ELECTRONIC MAIL: DOE-QTRmailbox@hq.doe.gov

April 15, 2011

Department of Energy
Office of the Under Secretary for Science (S4)
1000 Independence Ave., SW
Washington, DC 20585.

Re: **Comments on Quadrennial Technology Review Framing Document; DOE–QTR RFI**

Dear Sir:

In a recent Federal Register notice[1] the Department of Energy (DOE) requested public comment on its ***Quadrennial Technology Review Framing Document*** (QTRFD).[2] The QTRFD describes the Nation's energy landscape and challenges, important research, development, and demonstration (RD&D) policy choices to be made, and summarizes the current status of energy technologies and DOE technology program goals. It is intended to serve as the common framework for stakeholder engagement through advisory committees, workshops, and expert discussion groups.

The purpose of this letter is to provide some basic input from Johns Manville on the importance of energy efficiency and to request participation on any appropriate advisory committee or expert discussion group on energy efficiency policy.

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With world headquarters in Denver, JM's 5,000 employees at our forty manufacturing facilities serve North American, European, and Asian markets that include residential and commercial construction, wind energy, aerospace, automotive and transportation, air

[1] See, 76 Fed. Reg. 13,607 (March 14, 2011) at http://www.gpo.gov/fdsys/pkg/FR-2011-03-14/pdf/2011-5794.pdf.
[2] See, http://www.energy.gov/qtr/documents/DOE-QTR_Framing.pdf, March 14, 2011.

handling, appliance, HVAC, pipe and equipment, filtration, waterproofing, flooring, and interiors. Notably, JM is the only manufacturer to offer a complete line of certified Formaldehyde-free™ fiber glass building insulation. JM is the only manufacturer to have a complete line of home insulation products certified to meet the new ***Environmentally Preferable Insulation*** specification developed by U.S. EPA Region 9 and Alameda County, State of California. JM is also the only insulation manufacturer to achieve the status of **Climate Action Leader** and is a member of The Climate Registry.

The QTRFD sets forth seven questions for input. JM offers below a summary response to several of these questions.

2) How can DOE activities best support U.S. leadership in clean energy innovation? In clean energy manufacturing? In clean energy deployment? How do we balance international competitiveness against international cooperation?

DOE could help support leadership in clean energy innovation and deployment in part by promoting energy efficiency as an important form of clean energy. This is described in detail in JM's recent comments on the ***Clean Energy Whitepaper*** issued last month by the Senate Energy and Natural Resources Committee.[3] Those comments are enclosed herewith.

4) What are the optimal roles for the private sector, government laboratories, citizens and academia in accelerating technology innovation?

See the response to Question No. 6, below.

6) A number of non-technical barriers—including federal, state, and local regulations, market failures, and non-technical risks—impact the rate of deployment of energy technologies. What, if any, role should the Department have in addressing these barriers?

Given the current and future state and federal budget difficulties, one of DOE's top priorities should be to work with the private sector to identify and seek changes in any non-technical barriers that are limiting the successful deployment of private sector capital in utility-scale energy efficiency projects. Such projects could include both large-scale retrofits of the millions of American homes and buildings that are underinsulated as well as new construction beyond current and anticipated future energy codes.

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[3] **Clean Energy Standard (CES) White Paper. See, http://energy.senate.gov/public/index.cfm?FuseAction=IssueItems.View&IssueItem_ID=7b61e406-3e17-4927-b3f4-d909394d46de**

The draft DOE ***Strategic Plan***[4] has identified as a High Priority Performance Goal the retrofitting of one million homes through fiscal year 2013;[5] however, that goal is in jeopardy given proposed reductions in the DOE budget. Further, at the goal rate of only 500,000 homes per fiscal year, it will take at least 100 years to retrofit all the underinsulated homes in America.[6] Instead, DOE should begin transitioning much of its activities to facilitating private sector funding of utility-scale energy efficiency projects.

DOE should also strongly encourage the Environmental Protection Agency (EPA) to recognize and promote energy efficiency measures and projects as important emission reduction techniques for large emitting sources. In the context of the planned greenhouse gas (GHG) new source performance standards (NSPS) for utilities and refineries,[7] DOE should encourage EPA to affirmatively repeat and communicate that so-called "off site" or "off source" energy efficiency is an allowed – if not a preferred – method to achieve the emissions reduction requirements to be established in these rulemakings. DOE should also encourage EPA to affirm that such energy efficiency projects are important emission reduction methods for other Clean Air Act programs such as the Clean Air Transport Rule.[8]

The effectiveness and value of energy efficiency is independent of the science on climate change making energy efficiency perhaps the only "no regrets" alternative to reduce GHG emissions. In contrast to many traditional pollution abatement techniques, energy efficiency also has important side benefits. Thus, energy efficiency:

- increases health and comfort of home and building occupants and public health generally (per Harvard University study[9]);
- reduces heating and cooling costs;
- increases affordability of home ownership;
- increases home values; and,
- increases energy security and hence national security.

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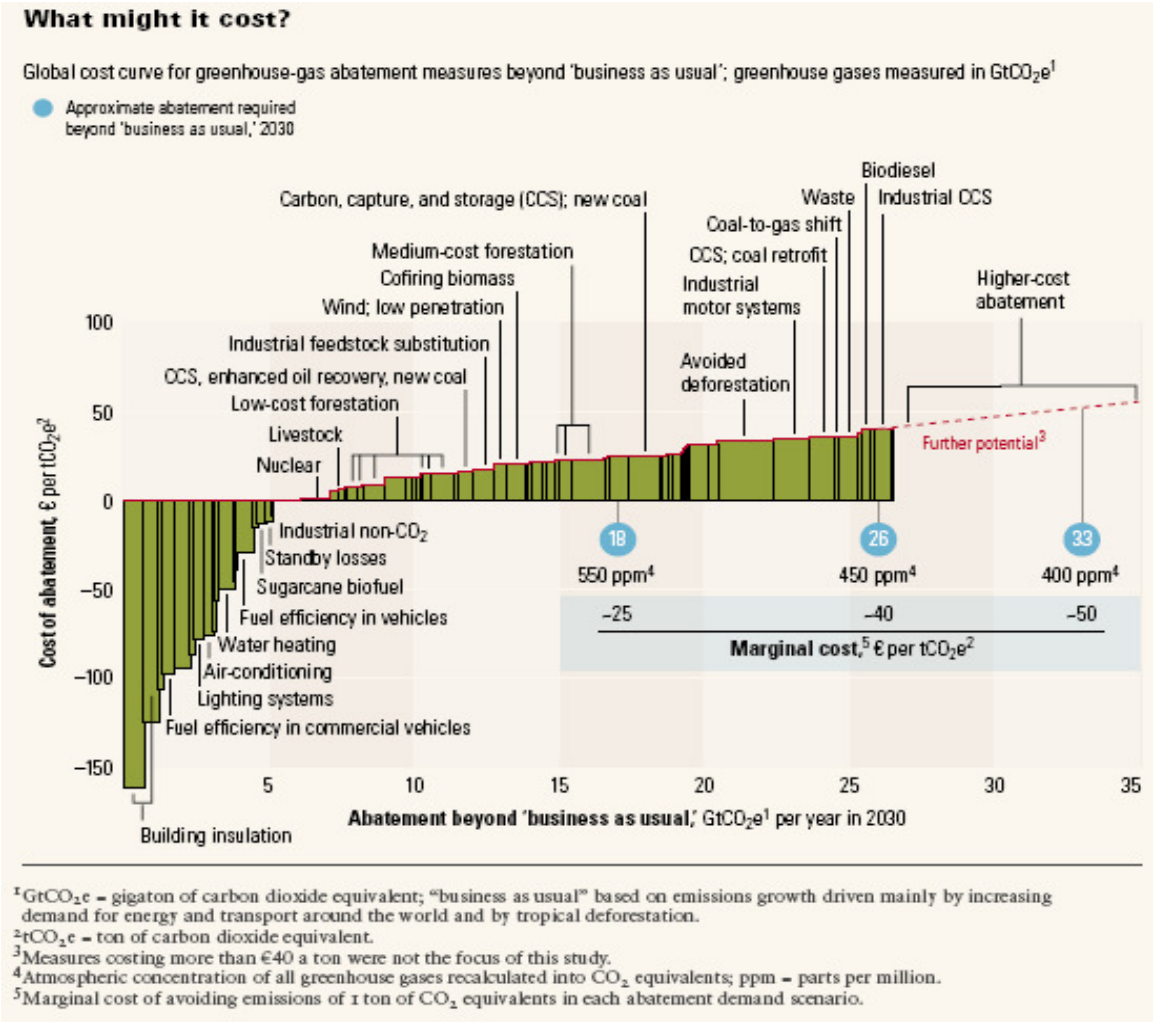
[4] US Department of Energy Strategic Plan (February 2011 draft); see, http://www.energy.gov/media/DOE_StrategicPlan_Draft.pdf
[5] Draft Plan at page 18.
[6] There are at least 50 million underinsulated homes in America. See, Jonathan Il. Levy, Yurika Nishioka and John D. Spengler, "The public health benefits of insulation retrofits in existing housing in the United States, " Environmental Health, April 2003. pp1-16. Study is available at http://www.naima.org/publications/RP061.PDF
[7] See, http://www.epa.gov/airquality/ghgsettlement.html.
[8] See, http://www.epa.gov/airtransport/.
[9] Supra, footnote 6.

Energy efficiency can deliver emissions reductions (and energy "generation") in increments smaller than large abatement devices or fuel switching at utility plants, allowing for greater flexibility. And several studies by McKinsey & Company confirm that energy efficiency is perhaps the cheapest and quickest method to reduce GHG emissions. The compelling "McKinsey Curve"[10] below depicts that, among the array of all GHG emission reduction techniques, energy efficiency from building insulation (both new construction and retrofit) is one of very few that can reduce GHG emissions at "negative cost," *i.e.*, energy efficiency simultaneously reduces GHG emissions, saves energy and saves money.



[1] $GtCO_2e$ = gigaton of carbon dioxide equivalent; "business as usual" based on emissions growth driven mainly by increasing demand for energy and transport around the world and by tropical deforestation.
[2] tCO_2e = ton of carbon dioxide equivalent.
[3] Measures costing more than €40 a ton were not the focus of this study.
[4] Atmospheric concentration of all greenhouse gases recalculated into CO_2 equivalents; ppm = parts per million.
[5] Marginal cost of avoiding emissions of 1 ton of CO_2 equivalents in each abatement demand scenario.

[10] "A cost curve for greenhouse gas reduction," The McKinsey Quarterly (2007), copy enclosed.

EPA's 2004 Guidance[11] on this issue underscores just how important it is to promote energy efficiency as an emission reduction technique under the Clean Air Act. According to the 2004 Guidance:

> EPA supports and wishes to promote the testing of promising new pollution reduction strategies such as energy efficiency and renewable energy measures within the air quality planning process. . . Energy efficiency and renewable energy measures have many benefits. Energy efficiency measures reduce the demand for electricity and renewable energy can supply energy from non- or less-polluting sources. These measures can save money, have other economic benefits, reduce dependence on foreign sources of fuel, increase the reliability of the electricity grid, enhance energy security, and, most importantly for air quality purposes, reduce air emissions from electric generating power plants. Energy efficiency and renewable energy inherently prevent pollution from occurring. Additionally, in many areas, the peak demand for electricity frequently coincides with periods of poor air quality. **It is therefore important to encourage and reward greater application of energy efficiency and renewable energy measures and incorporate the emission reductions that these measures will accrue into the air quality planning process . . .**[12]

(Emphasis added.)

The 2004 Guidance specifically recognizes increasing building energy efficiency via insulation as among the qualifying energy efficiency techniques:

> **What are some examples of specific energy efficiency or renewable energy projects?**
>
> Such projects could include, but are not necessarily limited to, the following:
>
> (A) Demand side management energy efficiency projects, such as: . . .
>
> (2) Programs related to design, construction or reconstruction which by themselves do not use energy, but result in energy savings. For example, reflective roofs, double pane windows, increased insulation, and building codes containing these requirements.[13]

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[11] **"*Guidance on SIP Credits for Emission Reductions From Electric-Sector Energy Efficiency and Renewable Energy Measures*," Air Quality Strategies and Standards Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, (2004) available at http://www.epa.gov/ttncaaa1/t1/memoranda/ereseerem_gd.pdf.**

[12] 2004 Guidance at page 1.

[13] 2004 Guidance at Section A.1.

Of course, there are challenges in linking energy efficiency projects to emissions reductions. Thus, the 2004 Guidance recognizes that:

> There are various reasons (as discussed in this guidance) why it can be difficult to accurately estimate the amount of emission reductions from energy efficiency or renewable energy measures that impact air quality.[14]

Fortunately, EPA notes that it

> ". . . developed this guidance to provide a readily available procedure to quantify and validate emission reductions from specific energy efficiency and renewable energy measures . . .[15]

Finally, greater promotion of energy efficiency as an emission reduction technique is precisely the type of action that DOE and EPA should take to fully implement the recent Executive Order on Improving Regulation and Regulatory Review.[16] That Order notes that

> Our regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation. . . It must identify and use the best, most innovative, and least burdensome tools for achieving regulatory ends. It must take into account benefits and costs, both quantitative and qualitative.[17]

Thank you for the opportunity to submit these comments. If you have any questions, please do not hesitate to contact me.

Sincerely,

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Bruce D. Ray
Associate General Counsel,
Director of Governmental and Regulatory Affairs

Enclosures

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[14] *Id.*
[15] *Id.*
[16] Executive Order 13563, ***Improving Regulation and Regulatory Review*** (**January 18, 2011**) available at http://www.gpo.gov/fdsys/pkg/FR-2011-01-21/pdf/2011-1385.pdf.
[17] Executive Order 13563, Section 1.

Submitter's Name/Affiliation: Johns Manville
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Executive Summary

As the cleanest form of energy, energy efficiency should be included in any clean energy standard. Efficiency is typically cheaper, faster, and better than conventional and renewable energy at reducing greenhouse gas and other emissions.

And where both traditional and renewable energy sources suffer from side-impacts, increasing efficiency in buildings and roofs instead enjoys side-benefits that increase the compelling nature of energy efficiency. These side impacts include at least the following:

- Enhancement of the health and comfort of home and building occupants and public health generally;
- Reduction in heating and cooling costs, which can mitigate any cost increases to ratepayers from switching to costlier fuels or renewable energy;
- Increase in affordability of home ownership; and,
- Increase in home and building values.

Importantly, energy efficiency tends to be more labor-intensive than other forms of energy generation, meaning that potentially more jobs can be created and sustained with energy efficiency. And a trained energy efficiency deployment workforce is available to begin increased efficiency implementation activities.

Consideration should be given to implementing or at least strongly prioritizing, all cost-effective energy efficiency opportunities before significantly expanding the deployment of renewable energy. Most energy efficiency methods are proven effective and in the case of adding insulation to buildings and roofs are literally off-the-shelf technologies that can be deployed at low- or even negative-cost. Putting energy efficiency before renewable energy will help minimize the cost and amount of renewable resources that are ultimately deployed. In contrast, putting renewable energy resources before energy efficiency will tend to increase the cost of energy being wasted.

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Question 2. What resources should qualify as "clean energy"?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- *On what basis should qualifying "clean energy" resources be defined? Should the definition of "clean energy" account only for the greenhouse gas emissions of electric generation, or should other environmental issues be accounted for (e.g. particulate matter from biomass combustion, spent fuel from nuclear power, or land use changes for solar panels or wind, etc.)?*

The "clean" in a clean energy standard should be broadly defined to address all major impacts from the development, deployment, operation, and eventual decommissioning of energy generation facilities and methods. This would include impacts to all environmental media (air, water, land, etc.) as well as impacts to health and biological, aesthetic and cultural resources.

Far too often the side-impacts from renewable energy resources are overlooked or downplayed vs. other forms of energy. Just as existing environmental laws attempt to account for externalities of conventional energy sources (e.g., coal, natural gas, and nuclear) that are not adequately addressed or valued in the market, so should a clean energy standard carefully account for the externalities of renewable and alternative energy sources. Just because those latter sources do not have the obvious environmental impacts of conventional energy sources (e.g., greenhouse gas and other pollutant emissions), does not mean they have no impacts or that their impacts are not potentially significant.

In contrast, a "low-carbon" energy standard would focus principally or solely on the impact of the energy generation on carbon emissions or climate change. But here also renewable energy must be carefully analyzed. Since some renewable energy, e.g., wind, is intermittent, backup energy resources are required that can be deployed when the renewable resource is not available. Both a low-carbon and a clean energy standard should include an assessment of all such companion backup energy resources, including the CO2 and other emissions associated with fossil fuel combustion.

Another reason to broadly define "clean" is that such a broad definition would help include energy generation sources and methods that are less expensive and that could be deployed faster than many renewable sources.

Finally, demand response or demand management resources are now being treated in the market as equal to supply side resources. Accordingly, any effort that cost effectively reduces the use and/or demand of energy rather than requiring more energy generation should also be considered "clean" energy and included in a clean energy standard.

Question 2. What resources should qualify as "clean energy"?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- Should qualifying clean energy resources be expressly listed or based on a general emissions threshold? If it is determined that a list of clean energy resources is preferable, what is the optimal definition for "clean energy" that will deploy a diverse set of clean generation technologies at least cost? Should there be an avenue to qualify additional clean energy resources in the future, based on technological advancements?

A mere list of energy generation sources that are currently available (and that are only currently considered clean) would tend to discourage the development and deployment of revolutionary new sources that are potentially cleaner and most cost effective. Such an express list would be akin to a 1975 list of the very best performing electric typewriters. Instead, consideration should be given to defining a clean energy resource by several major performance characteristics as compared to current conventional energy sources. Such characteristics could include at least all impacts caused per unit of energy generated as well as cost effectiveness and reliability.

Here also, we should consider demand and energy reduction (energy efficiency) prior to bringing on any new generation category because efficiency tends to be the most economic and cleanest choice.

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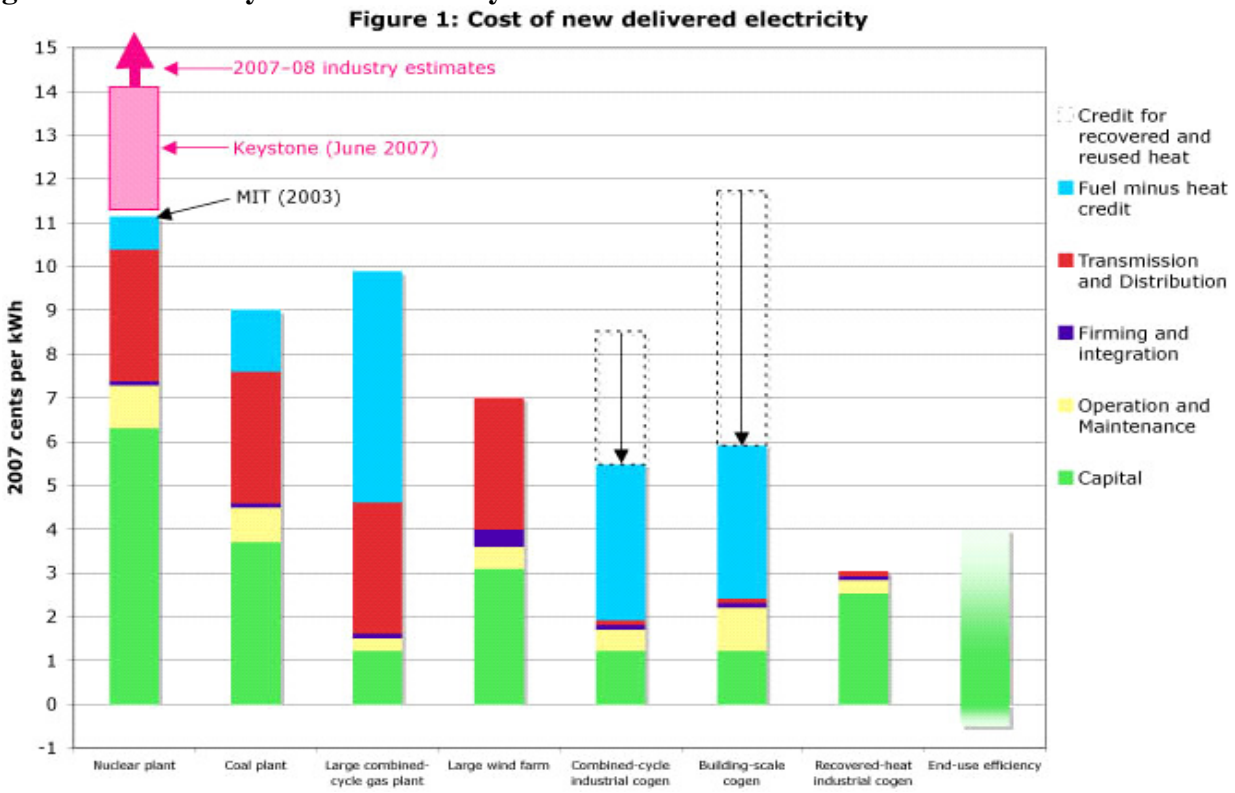
Question 2. What resources should qualify as "clean energy"?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- *What is the role for energy efficiency in the standard? If energy efficiency qualifies, should it be limited to the supply side, the demand side, or both? How should measurement and verification issues be handled?*

Energy efficiency is not only clean but actually the cleanest form of energy generation; accordingly, efficiency should be included in any clean energy standard. To omit efficiency from a clean energy standard would be like omitting the highest SAT scores from college admission criteria.

Including efficiency in a clean energy standard would help to address the disparity in the availability of renewable resources in the United States. For example, utilities in areas without robust wind or solar resources would not have to purchase renewable energy credits from areas with those resources; instead, energy efficiency projects could be deployed thereby benefiting local customers and workers.

Energy efficiency can typically be deployed faster and in increments that are much smaller than either traditional or renewable sources, affording increased flexibility. As shown below, efficiency is typically less costly than either traditional energy generation or renewable energy generation. Note that the end use efficiency bar in the graph extends below zero, which means that there are some end use efficiency opportunities that BOTH generate electricity AND save money.

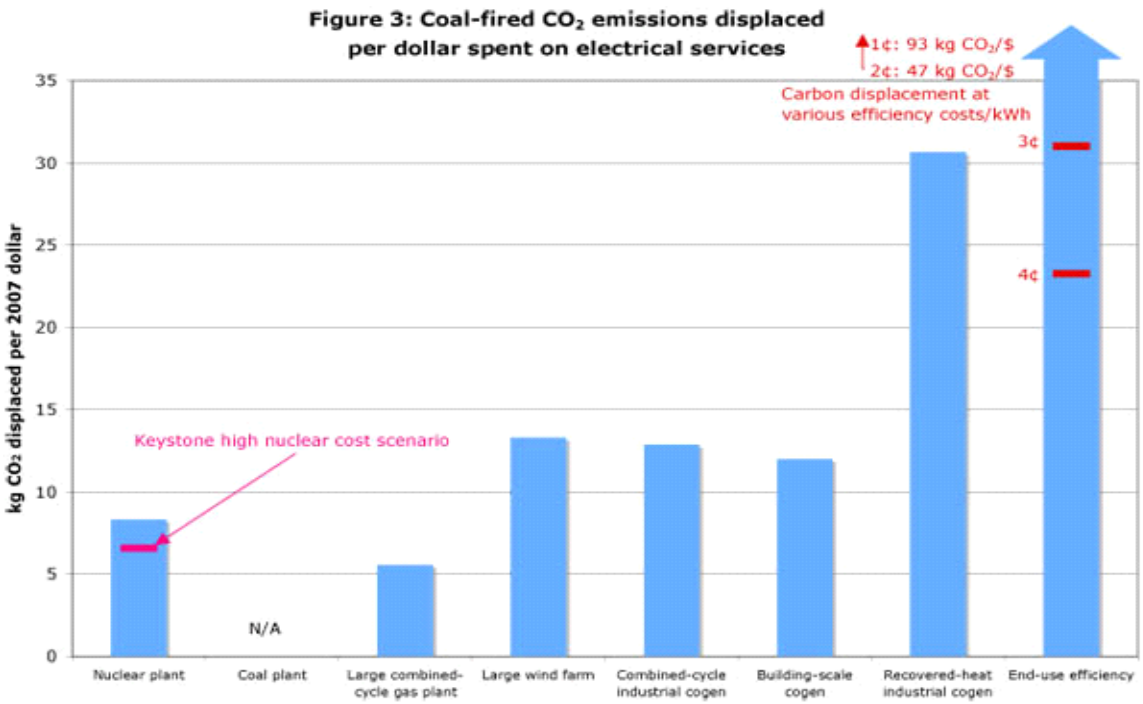


Source: Rocky Mountain Institute

Question 2. What resources should qualify as "clean energy"?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

Logically, all cost-effective energy efficiency opportunities should be exploited prior to widespread deployment of more expensive forms of energy; to do otherwise simply increases the cost of energy being wasted.

And as shown in the graph below, a dollar spent on energy efficiency can reduce greenhouse gas emissions far more than a dollar spent on other forms of alternative energy. In fact, efficiency used to displace coal-fired CO2 emissions cannot even fit on the graph.



Source: Rocky Mountain Institute

And where both traditional and renewable energy sources suffer from side-impacts, increasing efficiency in buildings and roofs instead enjoys side-benefits that increase the compelling nature of energy efficiency. These side impacts include at least the following:

- **Enhancement of the health and comfort of home and building occupants and public health generally;**
- **Reduction in heating and cooling costs, which can mitigate any cost increases to ratepayers from switching to costlier fuels or renewable energy;**
- **Increase in affordability of home ownership; and,**
- **Increase in home and building values.**

Importantly, energy efficiency tends to be more labor-intensive than other forms of energy generation, meaning that potentially more jobs can be created and sustained with energy efficiency. And a trained energy efficiency deployment workforce is available to begin increased efficiency implementation activities.

Question 2. What resources should qualify as "clean energy"?
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In fact, efficiency is so superior to essentially all other forms of energy generation that it may be more appropriate to establish a stand-alone energy efficiency resource standard that would require utilities to source an increasing percentage of their total energy supply from efficiency projects and methods, including especially increasing the energy efficiency of existing buildings and roofs, which account for approximately 40% of all energy usage in the United States.

A clean energy standard with efficiency could use the latest measurement and verification techniques and methods to measure or estimate the amount of energy saved/generated with efficiency projects. These techniques, especially when applied to many small projects for aggregation purposes, can provide generation quantification that, while less precise than actual electricity meters, is sufficiently accurate for planning and compliance purposes.

It is important to note that a reasonably priced and reliable supply of electricity and other energy is essential if the American manufacturing sector is to remain competitive in the world economy. A clean energy standard should not merely deploy high-profile forms of "green" energy that in reality increase the cost of delivered electricity while potentially decreasing reliability. Because there is so much energy available in the form of increasing the efficiency of the existing housing and building stock, energy efficiency should be included in any clean energy standard.

Question 2. What resources should qualify as "clean energy"?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- *Should retrofits or retirements of traditional fossil-fuel plants be included in the standard?*

If enough energy efficiency projects are deployed widely enough, it might be possible to retire certain traditional fossil-fuel plants without increasing cost or decreasing reliability.

Question 2. What resources should qualify as "clean energy"?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- *Should the standard be focused solely on electricity generation, or is there a role for other clean energy technologies that could displace electricity, such as biomass-to-thermal energy?*

Question 3. How should the crediting system and timetables be designed?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- *Should the standard's requirements be keyed to the year 2035 or some other timeframe?*

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- *What interim targets and timetables should be established to meet the standard's requirements?*

Consideration should be given to implementing, or at least strongly prioritizing, all cost-effective energy efficiency opportunities before significantly expanding the deployment of renewable energy. Most energy efficiency methods are proven effective and in the case of adding insulation to buildings and roofs are literally off-the-shelf technologies that can be deployed at low- or even negative-cost. Putting energy efficiency before renewable energy will help minimize the cost and amount of renewable resources that are ultimately deployed. In contrast, putting renewable energy resources before energy efficiency will tend to increase the cost of energy being wasted.

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Question 3. How should the crediting system and timetables be designed?
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- *What are the tradeoffs between crediting all existing clean technologies versus only allowing new and incremental upgrades to qualify for credits? Is one methodology preferable to the other?*

Please begin your response HERE. (no page limit)

Question 3. How should the crediting system and timetables be designed?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- *Should partial credits be given for certain technologies, like efficient natural gas and clean coal, as the President has proposed? If partial credits are used, on what basis should the percentage of credit be awarded? Should this be made modifiable over the life of the program?*

Please begin your response HERE. (no page limit)

Question 3. How should the crediting system and timetables be designed?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- *Is there a deployment path that will optimize the trade-off between the overall cost of the program and the overall amount of clean energy deployed?*

Consideration should be given to implementing, or at least strongly prioritizing, all cost-effective energy efficiency opportunities before significantly expanding the deployment of renewable energy. Most energy efficiency methods are proven effective and in the case of adding insulation to buildings and roofs are literally off-the-shelf technologies that can be deployed at low- or even negative-cost. Putting energy efficiency before renewable energy will help minimize the cost and amount of renewable resources that are ultimately deployed. In contrast, putting renewable energy resources before energy efficiency will tend to increase the cost of energy being wasted.

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Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- *What would be the effect of including tiers for particular classes of technology, or for technologies with different levels of economic risk, and what would be a viable way of including such tiers?*

Consideration should be given to implementing, or at least strongly prioritizing, all cost-effective energy efficiency opportunities before significantly expanding the deployment of renewable energy. Most energy efficiency methods are proven effective and in the case of adding insulation to buildings and roofs are literally off-the-shelf technologies that can be deployed at low- or even negative-cost. Putting energy efficiency before renewable energy will help minimize the cost and amount of renewable resources that are ultimately deployed. In contrast, putting renewable energy resources before energy efficiency will tend to increase the cost of energy being wasted.

Question 3. How should the crediting system and timetables be designed?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- *Should the same credit be available to meet both the federal mandate and an existing state standard or should a credit only be utilized once?*

Please begin your response HERE. (no page limit)

Question 3. How should the crediting system and timetables be designed?
Submitter's Name/Affiliation: Johns Manville – Denver, Colorado

- *Should there be a banking and/or borrowing system available for credits and, if so, for how long?*

The clean energy standard should include energy efficiency and should therefore also include energy efficiency credits that could be banked or sold for purposes of compliance. Because energy savings from making a building or roof more energy efficient are permanent, the credits created by such actions should also be permanent.

Question 5. How should Alternative Compliance Payments, regional costs, and consumer protection be addressed?
Submitter's Name/Affiliation: Johns Manville; Denver, Colorado

- *What are the anticipated effects on state and regional electricity prices of a CES structured according to the President's proposal? What are the anticipated net economic effects by region?*

Please begin your response HERE. (no page limit)

Question 5. How should Alternative Compliance Payments, regional costs, and consumer protection be addressed?
Submitter's Name/Affiliation: Johns Manville; Denver, Colorado

- *Would other CES formulations or alternative policy proposals to meet a comparable level of clean energy deployment have better regional or net economic outcomes?*

Please begin your response HERE. (no page limit)

Question 5. How should Alternative Compliance Payments, regional costs, and consumer protection be addressed?
Submitter's Name/Affiliation: Johns Manville; Denver, Colorado

- *How might various price levels for the ACP affect the deployment of clean energy technologies?*

Please begin your response HERE. (no page limit)

Question 5. How should Alternative Compliance Payments, regional costs, and consumer protection be addressed?
Submitter's Name/Affiliation: Johns Manville; Denver, Colorado

- *What options are available to mitigate regional disparities and contain costs of the policy?*

Including efficiency in a clean energy standard would help to address the disparity in the availability of renewable resources in the United States. For example, utilities in areas without robust wind or solar resources would not have to purchase renewable energy credits from areas with those resources; instead, energy efficiency projects could be deployed thereby benefiting local customers and workers.

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- *What are the possible uses for potential ACP revenues? Should such revenues be used to support compliance with the standard's requirements? Should all or a portion of the collected ACP revenues go back to the state from which they were collected? Should ACP revenues be used to mitigate any increased electricity costs to the consumer that may be associated with the CES?*

  At least part of the ACP revenues should be dedicated to increasing home and building energy efficiency to help offset any cost increases from deploying more renewable energy resources.

Question 5. How should Alternative Compliance Payments, regional costs, and consumer protection be addressed?
Submitter's Name/Affiliation: Johns Manville; Denver, Colorado

- *Should cost containment measures and other consumer price protections be included in a CES?*

Please begin your response HERE. (no page limit)

Question 5. How should Alternative Compliance Payments, regional costs, and consumer protection be addressed?
Submitter's Name/Affiliation: Johns Manville; Denver, Colorado

- *How much new transmission will be needed to meet a CES along the lines of the President's proposal and how should those transmission costs be allocated?*

  Please begin your response HERE. (no page limit)

Question 5. How should Alternative Compliance Payments, regional costs, and consumer protection be addressed?
Submitter's Name/Affiliation: Johns Manville; Denver, Colorado

- *Are there any technological impediments to the addition of significantly increased renewable electricity generation into the electrical grid?*

Arguably, energy efficiency (including increasing the efficiency of buildings and roofs) would pose the least technological impediment; instead, increasing efficiency should generally help improve operation and reliability of the grid.

Question 5. How should Alternative Compliance Payments, regional costs, and consumer protection be addressed?
Submitter's Name/Affiliation: Johns Manville; Denver, Colorado

- *What are the costs associated with replacing or retrofitting certain assets within the existing generation fleet in order to meet a CES?*

  Please begin your response HERE. (no page limit)

Question 5. How should Alternative Compliance Payments, regional costs, and consumer protection be addressed?
Submitter's Name/Affiliation: Johns Manville; Denver, Colorado

- *What level of asset retirements from within the existing generation fleet are anticipated as a result of a CES?*

Please begin your response HERE. (no page limit)