

Submitter's Name/Affiliation: National Association of Clean Water Agencies (NACWA)/California Association of Sanitation Agencies (CASA)

Contact: Patricia Sinicropi, Legislative Director/ Eric Sapirstein, Federal Advocate

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Phone: 202-533-1823

Provide an executive summary of your response(s). **Do not exceed the remainder of this page.**

Attached are the National Association of Clean Water Agencies' (NACWA) and the California Association of Sanitary Agencies' (CASA) comments regarding the development of national Clean Energy Standard (CES). NACWA and CASA have answered questions 1, 2, 4, 5 and 6 including 12 sub-questions.

Biogas and solids produced by the municipal wastewater treatment process must be defined as eligible renewable energy resources under any Federal CES. Fourteen states already include biomass and biogas from wastewater treatment processes in their states' Renewable Electricity Portfolio Standard. The energy potential contained in wastewater and biosolids exceeds by ten times the energy used to treat it, and can potentially meet up to 12% of the national electricity demand. That is enough to power New York City, Houston, Dallas and Chicago annually. Domestic wastewater treatment plants currently produce only a small quantity of the energy they need due to financial limitations. In order to broaden new energy creation so that every community can take advantage of these opportunities, the wastewater sector should be part of the nation's efforts to promote clean and renewable energy sources. Researchers have measured the energy content of raw wastewater samples and determined that it exceeds the electricity requirements for treatment by a factor of 9.3 to 1.

The broader use and acceptance of biogas and solids produced at publicly-owned treatment works (POTWs) as renewable energy sources could lead to significant offsets to the use of conventional sources of energy and reduce greenhouse gas emissions. Wastewater biogas and solids are available in abundance across all regions of the United States, as POTWs serve a significant majority of the U.S. population. There are over 16,000 POTWs in the United States that produce over 7 million metric tons of "dry solids" annually. Currently, only 6 percent of these resources are used for energy creation purposes. Greater utilization of these sources could have significant environmental benefits. For example, the U.S. Environmental Protection Agency's Combined Heat and Power (CHP) partnership indicates that 2.3 million metric tons of carbon dioxide emissions, equivalent to 430,000 personal vehicles, could be offset if existing wastewater treatment plants (with capacity over 5 million gallons per day) that employ anaerobic digestion installed energy recovery facilities. These reductions could be incentivized by including biogas and biosolids as renewable energy sources in a CES.

As we have observed in states that have Renewable Portfolio Standards, a national CES that includes biogas and biosolids would incentivize development of renewable energy at POTWs in multiple ways. The availability of clean energy credits would provide a direct revenue stream for POTWs that would support their investment in installing technology to produce electricity. In addition, the CES would drive utilities to pay a premium to POTWs for the renewable electricity they produce in excess of their demand that can be fed to the grid, and for biogas that has been conditioned to pipeline quality and fed into the natural gas network. Above and beyond providing clean energy credits, NACWA and CASA also encourages the Committee to make available grants, or similar financial incentives, for large-scale trials or pilot projects utilizing these energy sources. Such incentives would aid in the research and development of these technologies and speed their commercialization in the marketplace.

Question 1. What should be the threshold for inclusion in the new program?

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- *Should there be a threshold for inclusion or should all electric utilities be subject to the standards set by a CES?*

Please submit your response [HERE](#). (no page limit)

Publicly-owned treatment works (POTWs) operate in every region of the country and in every state and therefore purchase electricity from every electric utility. We would strongly recommend that all electric utilities be subject to the standards set by the CES so that the playing field remains level for all POTWs.

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- *Should any states or portions of states be specifically excluded from the new program's requirements?*

Please begin your response HERE. (no page limit)

POTWs operate in all states and in all regions of states. Therefore, NACWA and CASA believe that all States and all regions of States should be able to participate in a Federal CES.

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- *How should a federal mandate interact with the 30 existing state electricity standards?*

A federal CES mandate should act as a floor and allow states with their own Clean Energy Standard or Renewable Electricity Portfolio Standard to maintain those standards if they are equal to or exceed the federal mandate. States that exceed the federal standard should be allowed to maintain those standards. Thirteen states plus the District of Columbia already include electricity generated by biogas and solids produced at wastewater treatment plants as part of their states' Renewable Electricity Portfolio Standard: Arizona, California, Connecticut, Delaware, Florida, Hawaii, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts and Michigan.

A federal CES should be consistent with these standards including their resource eligibility guidelines.

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Question 2. What resources should qualify as “clean energy”?

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- 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.)?

For consistency with existing state programs, NACWA and CASA believe that the definition of “clean energy” resources should focus on those resources that are considered renewable or carbon neutral. This includes waste-derived fuels such as biogas and biosolids. In the event that "clean energy" is defined based on greenhouse gas emissions, emissions of biogenic CO₂ from combustion of biogas and biosolids resources should not be counted because they are carbon neutral.

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- 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?

NACWA and CASA believe that sources should be expressly listed to avoid any confusion as to what sources qualify for Renewable Energy Credits (RECs). This will not only diversify eligible sources but will also ensure that policies and regulations are implemented with greater ease and minimal confusion. Biogas and biosolids should specifically be included as eligible resources. However, any policy should also be adaptable so that regulations and policies can easily encompass new sources of energy and energy producing technologies as they develop to meet the nation’s growing energy needs.

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- *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?*

NACWA and CASA believe that if energy efficiency is considered, it should include demand side. Inclusion of demand side energy efficiency in the standard will provide a driver for utilities to incentivize energy efficiency at POTWs. Metering should be utilized to determine if a POTW has reduced their overall consumption of energy from sources utilizing fossil fuels. Credits should be awarded to a POTW that has reduced its consumption of fossil fuel based energy with renewable sources available at the POTW site.

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

Please begin your response HERE. (no page limit)

Not applicable to POTWs

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- *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?*

NACWA and CASA would strongly recommend that technologies that enable combined heat and power generation at POTWs qualify for the CES as well as straight energy production. Use of excess heat from the combustion of biosolids and biogas at POTWs can be used to heat facilities and significantly reduce POTWs’ demand for conventional energy sources and therefore overall demand from the grid. A federal CES should provide credit for these technologies and approaches.

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Question 4. How will a CES affect the deployment of specific technologies?

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- *How valuable would clean energy credits have to be in order to facilitate the deployment of individual qualified technologies?*

Clean energy credits will provide significant value to the development and use of biogas and solids produced by the wastewater treatment process as a renewable energy source. Any value provided for this source of energy will encourage Publicly-owned Treatment Works (POTWs) to develop energy generation capabilities to assist in meeting the nation's annual energy needs. Establishing a market for this source of energy will incentivize POTWs to install the technology needed to convert their biogas and solids to electricity.

Above and beyond providing clean energy credits, NACWA also encourages the Committee to make available grants, or similar financial incentives, for large-scale trials or pilot projects utilizing these energy sources. Such a framework would expand the experience base with these sources while increasing understanding and awareness of the benefits provided by these sources.

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- *How might a CES alter the current dispatch order of existing generation (such as natural gas-fired power plants), which has been driven by minimization of consumer costs, historically?*

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- *What is the expected electricity generation mix for a target of 80 percent clean energy by 2035, under the President's proposal or an alternative construct?*

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- *Could different crediting and requirements than those proposed by the President be more effective in deploying clean technologies?*

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Question 5. How should Alternative Compliance Payments, regional costs, and consumer protection be addressed?

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- *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?*

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

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

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

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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?*

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

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- *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?*

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

There are no major technological impediments associated with increased renewable electricity generation from biosolids and biogas. Specifically, the combustion of biosolids as a feedstock is an established activity that has occurred at wastewater treatment utilities for decades. In most new applications and retrofits the ability to recover heat from this operation is present. The technology is mature and commonly used however it has been underutilized given the lack of renewable energy credits provided for this activity. Similar opportunities exist for biogas which can be used directly as a fuel or can be used to generate electricity through co-generation activities involving internal and external combustion engines, micro-turbines and in limited cases fuel cells. All of these technologies, with the exception of fuel cell energy production can be implemented with currently available technologies and processes.

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

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

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Question 6. Are there policies that should be considered to complement a CES?

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- *To what extent does a CES contribute to the overall climate change policy of the United States, and would enactment of a CES warrant changes to other, relevant statutes?*

A CES should promote the reduction of greenhouse gas emissions in the United States by incentivizing clean renewable energy generation which reduces fossil fuel combustion. With proper incentives through a CES, POTWs could be generating renewable energy from biosolids and biogas, reducing their use of fossil fuel energy. For example, the U.S. Environmental Protection Agency's Combined Heat and Power (CHP) partnership indicates that 2.3 million metric tons of carbon dioxide emissions, equivalent to 430,000 personal vehicles, could be offset if existing wastewater treatment plants (with capacity over 5 million gallons per day) that employ anaerobic digestion installed energy recovery facilities. Enactment of a CES may warrant changes to other, relevant statutes, such as the Clean Air Act and the Resource Conservation and Recovery Act to ensure that elements of these statutes that impact the disposal of biogas and solids produced at municipal wastewater treatment plants are consistent with the goals of the CES.

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- *What are the specific challenges facing individual technologies such as nuclear, natural gas, CCS, on- and offshore wind, solar, efficiency, biomass, and others?*

Currently, the lack of financial incentives and support at the federal level represents a large impediment to broad applications of biosolids and biogas energy recovery technology. Installing energy recovery technology at municipal wastewater treatment facilities can be quite costly. Because these costs are ultimately paid for by ratepayers such as homeowners and local businesses, operators of publicly-owned treatment works (POTWs) are careful to make investments that they are certain will provide ratepayer value. Enabling biogas and solids produced at municipal wastewater treatment plants to qualify for a Clean Energy Standard would provide a critical market incentive for POTWs and their ratepayers to make these investments. Any CES should not discriminate against solids and biogas produced through the wastewater treatment process and as such should provide federal assistance towards research, development and commercialization of these technologies.

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- *Will the enactment of a CES be sufficient for each technology to overcome its individual challenges?* Enactment of a CES that includes biogas and solids produced at municipal wastewater treatment plants would go a long way toward overcoming impediments to adoption of energy generation technologies currently on the market for these plants. There are emerging technologies that would enable greater energy generation to occur at a wastewater treatment plant. Any CES should not discriminate against these technologies and any federal incentives for research, development and commercialization should be available to speed their market deployment.

Below is a summary of current technologies available to POTWs and the degree to which they are available for use:

Mature technologies underutilized by the wastewater treatment sector include:

Anaerobic Digestion - An established technology to process biosolids is anaerobic digestion which produces biogas (methane). Just like with biogas, the methane from anaerobic digestion of wastewater is used to generate electricity, heat or power. The biogas can be used to generate electricity. The technologies used to co-generate electricity from biogas include internal combustion engines, external combustion engines (Stirling), micro turbines, and fuel cells (emerging). The engines also generate heat which can be recovered. Biogas can also be used to produce heat required for treatment or to operate boilers. This is mature technology and commonly used. However, as of 2004, 1006 public wastewater facilities out of a total of 16,583 facilities used anaerobic digestion but only 19% of these facilities recapture the methane and use it for energy production.

Hydraulic Head Loss - Energy in the form of hydraulic head loss is available in most wastewater systems. This is the energy from water stored at a higher level as it flows to a lower level. Turbines are used to convert the energy from flowing water to electric current. A few treatment plants, such as San Diego, CA, can use large turbines to capture this energy and produce electricity. A more recently popular technology, applicable in more systems, are micro (mini hydro) turbines which use low head loss to generate electric current. This is mature technology and available for widespread use.

Thermal Energy - Energy in the form of thermal energy can be extracted from most domestic wastewaters as the temperature of the water is warmer than the air and ground. Heat pumps are used to extract this energy which can be used by the wastewater treatment facility to offset their demand for heat. This technology works best in cold climates, and has been used in Scandinavia. Some applications are underway in the US (Aspen, CO). This is mature technology but not yet commonly used in the U.S.

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Biosolids Combustion- Solids are removed from domestic wastewater in the treatment plant. Several types of technologies can be used to recover energy from these solids. Dry solids can be burned or incinerated. This is an established technology but new designs make this process more efficient and reduce the need for additional energy sources to keep the process going. In most new applications and retrofit incinerator designs, there is the ability to recover heat. This is mature technology and commonly used, but still considered underutilized.

Biogas as Fuel - Recently, biogas generated by the wastewater treatment process has been sold to natural gas suppliers and used to fuel vehicles retrofitted to run on natural gas. Biogas can be used to run direct drive engines which power pump, etc. but do not produce electricity. This is mature technology but not commonly used.

Gasification - New technologies are on the market that convert wastewater solids to combustible gases through *pyrolysis* or gasification. These gases are carbon-based but are not methane. Gasification is the transformation of solids under high temperatures into a carbon-rich substance called "char", which is subsequently gasified producing a gas called syngas that can be used as fuel to generate electricity and heat. Pyrolysis is a process used to produce oil from sludge. These combustible gases can be used in engines to generate electricity similar to the process for biogas. Heat can be generated and recovered. Sometimes these gases can be used as feedstock to produce combustible products such as oil and syngas.

Emerging technologies that require more research:

Nutrient-rich Algae - The constituents in wastewater also have energy recovery potential, but little has been done beyond the research stage at this time. The nutrient- rich effluent can be used to grow algae. The algae can be harvested and used to generate fuel feed stocks. Sunnyvale, CA, harvests algae and co-digests the algae with other solids to generate biogas. This is emerging technology that still requires research and development.

Microbial Fuel Cells - A new technology emerging from laboratory research is the microbial fuel cell. A small amount of electricity is released during microbial transformation of both carbon and nitrogen compounds in wastewater during treatment. New advances in nanotechnology allow this energy to be recovered. This is an emerging technology and there are no full scale applications yet, but it looks promising.

Nitrous Oxide Capture from Biological Nitrogen Removal for Power - Biological nitrogen removal processes are based on microbial conversions that release nitrous oxide as a byproduct. It may be possible to capture the nitrous oxide emitted from these processes and burn the nitrous oxide to generate additional power or electricity. This technology is also in the research stages and has not been applied at any treatment facility.

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Question 6. Are there policies that should be considered to complement a CES?

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- *Should there be an examination of energy-connected permitting?*

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- *Are there specific supporting policy options that should be considered for coal, nuclear, natural gas, renewable energy, and efficiency?*

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- *What is the current status of clean energy technology manufacturing, and is it reasonable to expect domestic economic growth in that sector as a result of a CES?*

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