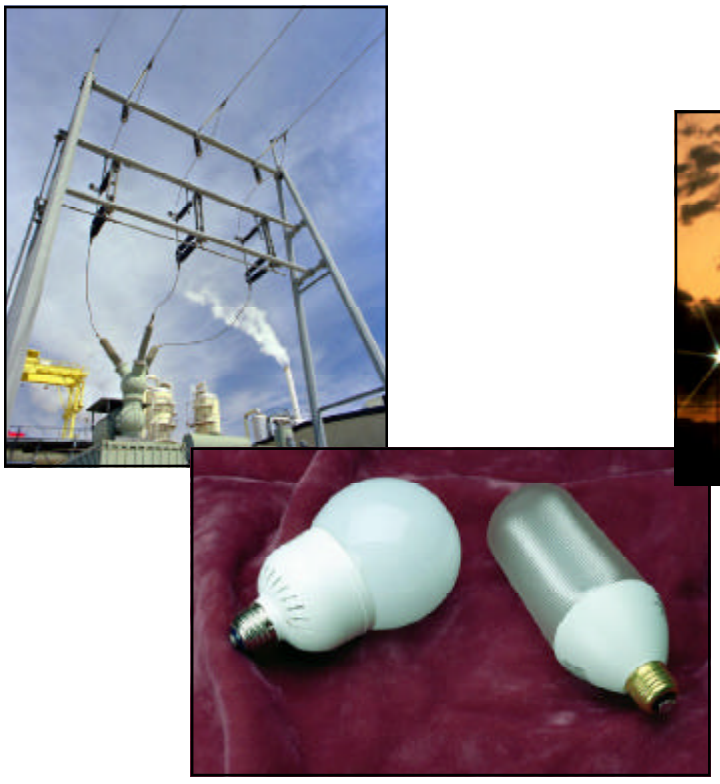
An Approach to a Balanced National Energy Plan



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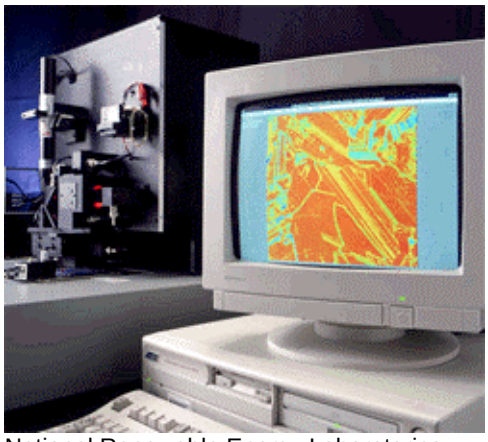


National Renewable Energy Laboratories researches energy efficiency measures

ABOUT NEMA

For more than 70 years, the National Electrical Manufacturers Association has been developing standards for the electrical manufacturing industry and is today one of the leading standards development organizations in the world. As such, it contributes to a high level of electrical product safety and performance. NEMA's 450 member companies manufacture products used in the generation, transmission and distribution, control, and end-use of electricity. Annual shipments of these products total $100 billion.

PRODUCTS ARE KEY

Energy efficiency is a national concern and solutions should be driven by market forces. The litmus test for efficient products and control systems is technological feasibility, economic justification, energy savings, and commercial availability.

NEMA recognizes that a comprehensive national energy policy must address conservation, energy production and distribution, and the promotion of new technologies that promise greater efficiency and environmental protection. NEMA member products are at all stages of the electrical energy process, from generators, transformers, wire and cable, to lighting, motors, and switches at the consumer and end-user points.

THE PRINCIPLES

This booklet provides detailed electrical energy and energy efficiency principles NEMA believes to be a balanced and comprehensive approach to a national energy plan.

Highlighted here are the main principles described in detail throughout this guide:

- A comprehensive electrical energy policy should rely on affordable, proven technology to address energy supply and demand.

- Market-based incentives and solutions should be the primary vehicle to enhance energy efficiency, production and distribution, and conservation. NEMA acknowledges that, on a case-by-case basis, there is value in other interventions such as targeted government research and development, incentives to invest in energy efficient technology, promotion of energy efficiency programs and standards, and removal of barriers to transmission grid improvement and increased generation capacity.

- An efficient transportation network is needed to move energy from producer to consumer. Technologies exist to expand electricity transmission using existing corridors.

Federal Leadership in Energy Efficiency

The Aerospace Center, an Energy Star® Building, at Washington D.C.'s L'Enfant Plaza

POSITION

NEMA supports federal government efforts to set a good example of energy efficiency.

RECOMMENDATIONS

The government should continue to lead by example in the deployment of efficient building systems. The Environmental Protection Agency's Energy Star® Buildings Program has made significant advances in improving the efficiency of commercial buildings. However, the vast majority of existing federal facilities have not yet achieved the Energy Star® rating, a classification given only to the top 25 percent of buildings in terms of watts used per square foot.

HR 4, passed by the House on August 2, 2001, stresses federal procurement of Energy Star® labeled equipment and deployment of energy efficient upgrades in federal building systems. However, the systems approach to energy efficiency offers more potential for significant energy savings than simple procurement of Energy Star® labeled equipment, though energy efficient equipment purchases are clearly a step in the right direction. NEMA supports the Energy Star® Buildings program for existing federal facilities, as well as compliance with ASHRAE/IESNA 90.1-1999, the most current consensus standard for energy efficiency for new buildings.

Congress should extend the Energy Savings Performance Program. This program enables agencies to finance energy efficiency upgrades with the energy savings, thereby creating an "off budget" means of increasing efficiency. HR 4, passed by the House on August 2, 2001, includes the extension of this program.

The government can also serve to improve efficiency by the specification of distribution transformers built to NEMA Standard TP 1, *Guide for Determining Energy Efficiency for Distribution Transformers*, which provides significant energy savings over non-compliant transformers. NEMA continues to support efforts by federal agencies to more heavily utilize private sector voluntary standards for procurement, regulatory reform, and conformity assessment, as set forth in the National Technology Transfer and Advancement Act (NTTAA) (Public Law 104-113).

Transformer Cost-Effectiveness
(25kVa, Single Phase, Low Voltage)

Performance	Base Model	Recommended Level
Efficiency	96.70%	98.00%
Annual Energy Loss	2,600 kWh	1,570 kWh
Annual Energy Loss Cost (6¢/kWh)	$156	$94
Annual Energy Savings	-	1,030 kWh

Federal Leadership in the Use of Energy Efficient Motors

Replacing an inefficient motor

POSITION

NEMA supports federal government procurement and specification of NEMA Premium™ motors.

RECOMMENDATIONS

Congress envisions implementation of this approach through government procurement, which NEMA also advocates. HR 4, passed by the House on August 2, 2001, specifies NEMA Premium™ as the motors of choice. The NEMA standard raises the bar on energy efficiency and covers many more motor types and sizes (up to 500 horsepower) than those covered under the 1992 federally regulated motor program.

The NEMA Premium™ motor program was a collaborative effort with the Department of Energy, motor manufacturers, and electric utilities. It has broad support, as reflected in the recent endorsement from the Consortium for Energy Efficiency. Using DOE data, it is estimated that the NEMA Premium™ efficiency motor program could save over 5,800 gigawatt hours of electricity and prevent the release of nearly 80 million metric tons of carbon into the atmosphere over the next 10 years. That would be the equivalent of keeping 16 million cars off the road.

The provisions of HR 4 that specify Premium Motors for federal procurement represent one of the latest wins for consumers, manufacturers, and the environment, as well as being an important example of the successful implementation of the National Technology Transfer and Advancement Act (NTTAA) (Public Law 104-113) across the many industries using motors.

In addition, section 161 of the Energy Policy Act of 1992, 42 U.S.C. 8262g, requires the inclusion of energy efficient products in the procurement practices of the federal government. Existing law requires GSA, DOD, and the Defense Logistics Agency to identify and designate energy efficient products that offer significant potential savings to the U.S. government, based on life-cycle cost calculations. Further, the agencies are required to issue guidelines to encourage the procurement of identified energy efficient products.

Increasing the deployment of industry consensus programs similar to the NEMA Premium™ motor specification throughout the federal government offers a ready means to significantly reduce energy consumption in federal facilities. Mandating the procurement of such products by the federal government will ensure the most rapid possible introduction of new technologies that meet the advanced energy efficiency standards for electric motors.

Enhanced Building Efficiency

4 Times Square: The first building built in New York in the 1990s, using modern energy efficiency guidelines

POSITION

NEMA supports tax incentives for enhanced efficiency for residential, commercial, and industrial buildings, based on the latest industry consensus standards.

RECOMMENDATIONS

The efficiency levels identified in section 3110 of HR 4 are unrealistic and excessive. The bill would result in higher total energy savings if compliance with ASHRAE/IESNA 90.1-1999 alone were specified.

An energy savings of 50 percent better than the ASHRAE standard would result in unacceptably low light levels, leading to reduced worker productivity and increased eyestrain. Illumination levels would not meet the recommended visibility standard of the Illuminating Engineering Society of North America.

Building upgrades have the potential to produce significant energy savings. The "allowance of deduction for energy efficient commercial building property" in section 3110 of HR 4 applies to new and reconstructed building property placed in service before December 31, 2006. The bill allows up to a $2.25 per square foot tax deduction in the year the property enters service. In order to be eligible, the property must be 50 percent more efficient (on a cost basis) than buildings satisfying ASHRAE 90.1-1999.

In the past there has been some criticism that the previous standard, ASHRAE 90.1-1989, did not stress energy efficiency enough. However, the 1999 edition focuses on increased energy efficiency. For lighting, ASHRAE 90.1-1999 is about 50 percent more efficient than ASHRAE 90.1-1989.

DOE is in the required rule-making process of determining whether the 1999 edition of the standard would save more energy than the previous standard. This determination will begin the process that will eventually lead to required adoption of the new standard by the states, many of which are not considering adopting the 1999 revision on their own. Only a few states have requirements that are essentially equivalent to ASHRAE/IESNA 90.1-1999.

By enacting a tax incentive for builders to meet ASHRAE/IESNA 90.1-1999, energy savings will begin sooner than if the tax incentive is not in place. However, if the bill continues to reward efficiency levels 50 percent over the ASHRAE/IESNA standard, NEMA believes investments will be delayed by several years, and will occur only when the state building code processes run their multi-year adoption and implementation course.

Standby Power Devices

Modern kitchens contain many energy-efficient appliances which may be subject to the proposed "one-watt" rule

POSITION

NEMA supports the creation of sensible standards for electric-powered devices using standby power, based on sound research and consideration of market issues.

RECOMMENDATIONS

As a part of the increased electrification and automation of the home and workplace, numerous devices have been installed that individually use very small amounts of power, typically 1 to 7 watts, when not in use. For example, dishwashers include controls to start after a programmable delay so energy may be used after the evening electric power peak. Controls for buildings, lighting, heating, ventilation, air conditioning, and refrigeration may also be impacted by the proposed "one-watt" rule.

To minimize these small amounts of power use that, when aggregated nationally could amount to significant power usage, the President and Congress are considering setting a one-watt limit on power consumed by individual devices when in "standby."

President Bush issued an Executive Order on July 31, 2001 pertaining to this issue, and the matter is contained in proposed legislation. The Executive Order and the statement by the President give some guidance as to what was intended to be the scope.

The legislative language, however, is vague. Underwriters Laboratories (UL) has estimated that as many as 5,000 products would have to be regulated, and presumably tested, to document energy use at one watt or below. It is clear that substantially more guidance is needed to understand the scope of the proposal and to determine the cost and cost effective solutions. Indeed, in the case of the dishwasher, elimination of the control function could lead to more on-peak electricity use, which would be counter productive.

Mandatory Implementation of the Process Improvement Rule

NEMA President Dr. Malcolm O'Hagan testifies before a House subcommittee

POSITION

NEMA supports mandatory implementation of the process improvement interpretative rule.

RECOMMENDATIONS

The process improvement rule must be applied fully to every consumer, industrial, and commercial product, or we risk returning to the gridlock that characterized the standards program in the past.

In July 1996, the Department of Energy published an interpretive rule setting forth procedures for the consideration of new or revised energy conservation standards for consumer products. The "process improvement" rule was produced with the input of all stakeholders in the appliance and consumer products efficiency standards program.

It was intended to remedy shortcomings in the process previously used by the DOE in carrying out its responsibilities for the establishment of energy conservation standards for a variety of consumer products under the Energy Policy and Conservation Act, as amended.

Of particular importance, the process improvement rule is designed to encourage the emergence of consensus on energy efficiency standards, and to this end includes a series of rebuttable presumptions, agreed to by all sectors of industry and the energy efficiency community, which provide a basis for mutual understanding and cooperation in the development of consensus standards.

At this point, however, the process improvement rule is incorporated in an appendix to DOE's regulations in 10 C.F.R. Part 430, and classified as "procedures, interpretations and policies for consideration of new or revised energy conservation standards for consumer products." Because it is classified as an interpretive rule, it does not impose binding requirements on DOE, and as a result, there is no recourse available to potentially aggrieved parties if the rule is not followed.

The energy efficiency standards program was stalled for several years before the process improvement rule was issued in 1996. Since that time, and pursuant to the process improvement rule, consensus has been reached and new standards promulgated for products including lighting ballasts. If the process improvement rule is not followed or applied fully to every product, however, there is a risk that the gridlock that characterized the standards program in the past will return.

The regulated community requires additional assurance that there will be careful adherence to all aspects of the process improvement rule in all future standard-setting rulemakings for consumer, commercial, and industrial products. Greater certainty will be achieved if the rule is formally incorporated into DOE regulations governing the establishment of energy efficiency standards.

Energy Efficiency in Transmission and Distribution

Steam station in New York set up for cofiring biomass

POSITION

NEMA supports providing rate incentives for energy efficiency.

RECOMMENDATIONS

About 10 percent of the total electrical energy produced is lost in the transmission and distribution systems. At peak times, when the energy is needed most, the losses can be even higher. The annual economic loss, based on 1999 rates, is $25 billion.

Energy legislation under consideration that calls for economic efficiency, which NEMA construes as meaning cost effectiveness, is commendable. However, while the nation is advocating large conservation measures in buildings, we are missing a large opportunity if we neglect transmission and distribution efficiency.

Energy efficiency can be enhanced in conjunction with infrastructure upgrades. For example, power factor improvements reduce the reactive current, which also reduces the losses. System voltage increases reduce losses for the same power transmitted.

NEMA is advocating NEMA TP 1 as the standard for distribution transformers, particularly in dry applications, which would result in substantial energy savings. The standard for liquid filled transformers (typically more efficient than dry transformers) is being revised to require further efficiency improvements that would result in energy savings for typical utility applications, where energy efficiency is more strongly considered in component selection. Dry type distribution transformers are typically used in buildings, where low initial cost is the main selection criteria.

Specification of lower-loss transmission and distribution lines is also encouraged. Today's lower-loss lines typically include conductors of a larger cross section, which therefore cost more. There are additional tradeoffs, as larger overhead conductors have a higher wind loading, so all factors must be carefully considered to provide the most cost-effective energy savings. Promising new technologies on the horizon will further reduce conductor power loss; one example is high temperature superconducting cable that works at liquid nitrogen temperatures.

Increased Transmission Capacity

Electrical transmission lines in front of a coal-fired power plant

POSITION

NEMA supports the use of technology to enhance the capacity of the existing interstate transmission grid, helping to make better use of existing corridors for power lines.

RECOMMENDATIONS

Transmission voltage and capacity enhancements may require significant investment in new equipment, but do not necessarily require new rights-of-way.

There are numerous technologies available, including the following:

- Increasing the transmission and distribution line capacity through the use of higher voltages or larger conductor size.
- Utilizing high voltage direct current transmission to nearly double capacity and improve system stability. Such technology is already in use in the northwest, southwest, and northeast.
- Adding peaking power units at substations, where power goes from sub-transmission to primary distribution. This can enhance system efficiency and reliability.
- Improving power factor through the use of, for example, capacitors or synchronous condensers. This has been done in the San Francisco area.

Addition of multiple conductors per phase and transmission of power at a higher voltage (i.e., 765kV) may also be options under the right circumstances.

Building intelligence into the grid will increase transmission capacity without requiring additional corridors. This would include:

- Installing FACTS (Flexible AC Transmission Systems) and wide area controls, capable of increasing the power on stability limited lines up to 40 percent.
- Using real-time dynamic rating systems of transmission lines based on actual weather conditions and line currents, which can increase the power of thermally limited lines up to 15 percent.
- Applying new analytical software models to better calculate stability and thermal limits in real-time, which can provide increased power transfers by up to 10 percent.
- Burying of transmission and distribution cables underground is an alternative in places where the right of way is not available.

NEMA also urges Congress to ensure that the Department of Energy's Transmission Reliability program, which is devoted to developing technologies and policy options that maintain and enhance reliability, is adequately funded and applied in a manner that complements and encourages private sector efforts. HR 4, passed by the House on August 2, 2001, recommends incentives for infrastructure technologies.

Rate Incentives

Power transmission lines

POSITION

NEMA supports, through the use of rate incentives such as increased rate of return, ensuring that investments in new transmission facilities will be recovered.

RECOMMENDATIONS

NEMA encourages incentives for transmission investment and policies that facilitate transmission siting. Both are necessary to enhance the reliability of the grid.

Incentive or performance-based rates should be used to encourage transmission investments. These incentives should encourage improvements in:

- Reliability
- Availability
- Congestion reduction
- Power factor improvement
- Energy efficiency
- Improvement in customer service

The Federal Energy Regulatory Commission (FERC) should set rates of return that ensure that the market for electricity is efficient. The current allowed rate of return for regulated transmission system investment is three to four points over the prime rate; the rate of return for a deregulated market needs to be about six to eight points over the prime rate to encourage investment.

Annual investments in transmission infrastructure have been decreasing at a rate of almost $120 million per year for the last 25 years. Recently, investments in generation have picked up; however, investments in transmission are not being made due to the high risk and inadequate potential return for investors.

NEMA also recommends that FERC develop model distribution system tax and rate incentives suitable for adoption by the states, recognizing that FERC has authority over transmission facilities crossing state lines and that states have authority over intrastate transmission and distribution.

In part to encourage the efficient expansion of the transmission system, and to ensure regulatory certainty, FERC issued a series of new regulations designed to facilitate the development of regional transmission organizations (RTOs). In FERC Order 2000 and the follow-up 2000A, RTOs would be responsible for, among other things, transmission planning and expansion consistent with applicable state and local siting regulations. The new regulations call for transmission rate incentives designed to facilitate the development of new transmission facilities.

Accelerated Depreciation for T&D Assets


A transformer on a utility pole

POSITION

NEMA supports reducing the tax depreciation period for transmission and distribution assets to 7 years from the current 20 years.

RECOMMENDATIONS

NEMA believes it is very important that the government provide tax incentives for transmission and distribution upgrades. Legislation shortening the allowed depreciation period to seven years has been under consideration, but the payback period should be reduced further, to three to five years, to make investments financially more feasible and the market more competitive. Achieving the shorter payback period would require tax and rate incentives.

In the deregulated market, independent generators are experiencing a payback period of three to five years on new generation equipment. In contrast, transmission investments currently have payback periods of about 30 years.

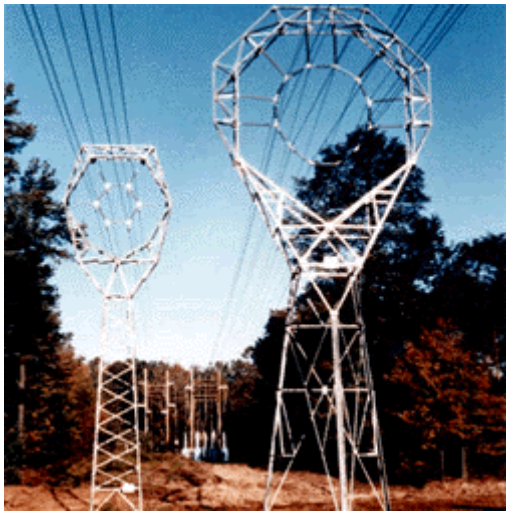
Tax incentives for investment in both gas gathering and distribution lines appear in HR 4. Senate Bills S.389 and S.596 contain similar language, addressing electricity transmission, which was lacking in HR 4. NEMA also supports the inclusion of incentives for electricity transmission and distribution investments.

Annual investments in transmission have been falling for the last 25 years. Electric transmission is the vital link between the customer and the generator. Indeed, some of the blackouts in California occurred because of transmission shortfalls at times when adequate generation was available in California, but could not be wheeled to load centers. The benefits of deregulation—lower electricity prices and the availability of renewable and distributed generation—cannot happen without adequate transmission capacity.

NEMA has proposed legislative language for electric transmission, patterned after the language for gas in HR 4, to accomplish the following:

- Establish a statutory seven-year recovery period and a class life of 10 years for electric utility transmission and distribution property.
- Define electric utility transmission and distribution property to include property used in the transmission and distribution of electricity for sale.

Removal of Siting and Permitting Impediments



High-phase AC transmission lines

POSITION

NEMA supports the removal of siting and permitting impediments that currently serve as a barrier to the construction of new transmission facilities.

RECOMMENDATIONS

Congress should, at a minimum: (1) provide authority to states to allow them to enter into regional compacts to address siting issues and (2) provide the Federal Energy Regulatory Commission with the authority to require utilities to enlarge, extend, or improve transmission facilities upon application and after referring the matter to a joint federal-state board.

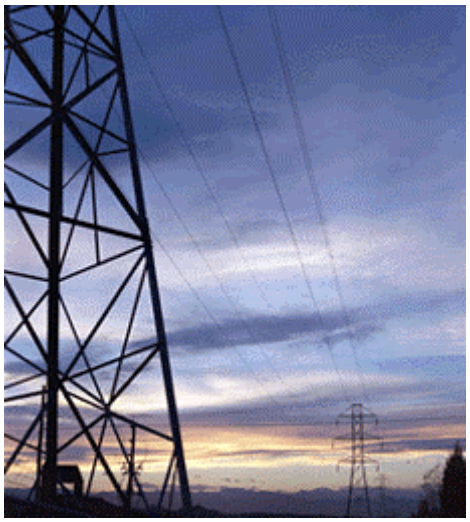
Furthermore, it may be necessary to provide FERC with the authority to approve the siting of transmission facilities and where necessary, permit the exercise of federal eminent domain in order to allow the federal interest in efficient markets to override narrow opposition to new facilities. Senator Landrieu's proposed bill includes the eminent domain backstop position.

In the past, transmission lines were built primarily to meet state requirements to serve a utility's native loads. However, new transmission facilities, in most locations, are no longer likely to be used to directly benefit a particular utility's customers or a regulator's constituents, but for other purposes, such as the support of regional or multi-state power markets.

State commissions and local authorities are less likely to authorize the development and construction of new transmission facilities if they are used for purposes that do not directly benefit a particular utility's customers or regulator's constituents. Transmission line additions have been held up for many years by the siting process. Examples include a 765 kV AEP line through Virginia and West Virginia and a 500 kV line between Georgia and Florida.

In FERC Order 2000 and the follow-up 2000A, regional transmission organizations (RTOs) would be responsible for, among other things, transmission planning and expansion consistent with applicable state and local siting regulations. The commission requires RTOs to accommodate state efforts to create multi-state agreements to review and approve new transmission facilities.

Mandatory Transmission Reliability Standards


Electric power transmission lines at sunset

POSITION

NEMA supports the establishment of a self-regulated entity that establishes and enforces mandatory transmission reliability standards.

RECOMMENDATIONS

NEMA supports policies that create enforceable and mandatory reliability standards to ensure that the interstate transmission grid is operated in a manner that maintains and improves system reliability.

Currently, the utility industry operates under voluntary standards established by the North American Electric Reliability Council (NERC), which address the planning, engineering, and operation of electric systems. Utilities have generally adhered to NERC's guidelines based on a collective concern for the reliable operation of the interstate transmission grid. NERC has no enforcement capability, however, and NERC's guidelines have sometimes been ignored by some market participants.

The continuing development of competitive wholesale power markets has, in some instances, reduced the incentive for utilities to adhere to voluntary reliability guidelines. Failure to follow these guidelines, in combination with other factors such as inadequate capacity, maintenance, and aging infrastructure, contributed to electric power outages, distribution system failures, and other disturbances affecting millions of consumers and thousands of businesses in the Midwest, Northeast, Mid-Atlantic and Southeast in the summer of 1999.

NEMA urges Congress and the Administration to act quickly to enact a bill on electric reliability and recommends that the bill be based on the consensus process language of the Reliability Legislation Coalition, of which NEMA is a part.

NEMA believes that in order to protect consumers, Congress and the Administration should act quickly to enact the NERC consensus language, either as a stand-alone bill that provides a first step towards improving reliability, or as part of comprehensive electric restructuring legislation. A more concise version of the NERC consensus language has recently been drafted, containing the core points of the earlier language in a format that is easier to understand and more appropriate for legislation. Earlier versions of the language appear in S.388, S.597, the draft Landrieu legislation, and HR 2814, introduced by Representatives Sawyer and Burr.

Interconnection Standards for Distributed Generators


Biomass electric plant in Anderson, California

POSITION

NEMA supports interconnection standards for distributed generators that fairly consider the interests of utilities and generators.

RECOMMENDATIONS

Transmission and local distribution companies should be required to interconnect a generating facility, subject to certain requirements. Utilities, through the Edison Electric Institute, and distributed generators, have agreed upon the principles of such requirements. The Institute of Electrical and Electronic Engineers (IEEE) has begun a major effort to develop standards that address the technical implementation of these principles, and NEMA is investigating the need for additional standards for related electrical equipment.

Under current rules, ownership status and geography serve to widely vary transmission and distribution voltage definitions, making investments in distributed generation economically unwise. For example, the two largest California utilities, which are both privately held, define distribution voltage very differently from one another. Investor-owned utilities in Pennsylvania define transmission voltages very differently than do municipal-owned utilities and cooperatives.

S. 597 calls for the interconnection of generators and Senator Landrieu's bill calls for the transmission planning process to consider transmission and generation without preference.

NEMA believes that clarification of interconnection rules will ensure that necessary generation will be able to interconnect to the transmission and distribution systems, thus further ensuring the reliable delivery of power.

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