	Definition and Scope	Answer/Comment
1	What significant policy challenges are likely to remain unaddressed if we employ Title XIII's definition?	The following points are not referencedd in EISA 1301. ・Power provider should also control the output fluctuation of renewable resources. ・The end user should have the choice of which form of power storage to be used. Certain types of energy conservation and storage could work better in different applications (e.g. not only electricity power but also stored thermal energy which is more efficient for some purpose.)
2	If the definition is overly broad, what policy risks emerge as a result?	In that case, the budget will be much greater in scale. Certain smart grid investments may not be as cost effective and could get lost in the overall investment in technologies. The government is at risk of investing in ineffective domains.
3	Should smart grid technologies be connected or use the same communications standard across a utility, state, or region?	The power grid contains the legacy equipment, which follows legacy communications standard(s). Moreover, standards will evolve as the future growth of usage and technology expand. Therefore, it is impossible to construct the power grid that uses the same communications standards. The important point is not to use the "same standard" but have a "harmonized standard." And clearly "harmonized standard" is important to enhance the customer's benefit and reduce the cost to build the Smart Grid infrastructure.
4	How does this vary between transmission, distribution, and customer-level standards? For example, is there need to go beyond ongoing standards development efforts to choose one consumer-facing device networking standard for states or regions so that consumers can take their smart appliances when they move and stores' smart appliance will work in more than one service area?	**For the transmission level:** Clearly inter-region interoperability is required and a "harmonized standard" should be applied among region. **For the distribution level**: Each utility can decide the geographic area of interoperability. However, if the utility wants to cut the development cost of the Smart Grid system, equipments based on international standards will help to reduce OEM manufacturing costs. **For the customer level** :for smart appliances and EV's, inter-region interoperability is required. The standards should be set so that transportable devices can be interoperable throughout the country.
	Interactions With and Implications for Consumers	Answer/Comment
5	For consumers, what are the most important applications of the smart grid? What are the implications, costs and benefits of these applications? What new services enabled by the smart grid would customers see as beneficial? What approaches have helped pave the way for smart grid deployments that deliver these benefits or have the promise to do so in the future?	Real time pricing and TOU applications will be most important to residential consumers, because it gives the consumer the power to reduce overall energy costs by shifting usage periods. The installation of two way communications through smart meters have enabled the ability for utilities to utilize smart appliances and thermostats.
6	How well do customers understand and respond to pricing options, direct load control or other opportunities to save by changing when they use power? What evidence is available about their response? To what extent have specific consumer education programs been effective? What tools (e.g. education, incentives, and automation) increase impacts on power consumption behavior? What are reasonable expectations about how these programs could eshape consumer power usage?	Consumers do not yet fully understand the benefits of real time pricing options. Participation has proven to be very low at utilities offering these programs, however those consumers who understand the benefits of the program have successfully reduced consumption. Education and ease of use of the technology will be key to successful implementations.
7	To what extent might existing consumer incentives, knowledge and decision-making patterns create barriers to the adoption or effective use of smart grid technologies? For instance, are there behavioral barriers to the adoption and effective use of information feedback systems, demand response, energy management and home automation technologies? What are the best ways to address these barriers? Are steps necessary to make participation easier and more convenient, increase benefits to consumers, reduce risks, or otherwise better serve customers? Moreover, what role do factors like the trust, consumer control, and civic participation play in shaping consumer participation in demand response, timevarying pricing, and energy efficiency programs? How do these factors relate to other factors like consumer education, marketing and monthly savings opportunities?	If the power reduction costs are substantial and if the technology is easily understood, then consumer adoption rates will be significantly higher. Consumer incentives and education will also be keys to successful projects.
8	How should combinations of education, technology, incentives, feedback and decision structure be used to help residential and small commercial customers make smarter, better informed choices? What steps are underway to identify the best combinations for different segments of the residential and commercial market?	Same as above.
9	Are education or communications campaigns necessary to inform customers prior to deploying smart grid applications? If so, what would these campaigns look like and who should deploy them? Which related education or public relations campaigns might be attractive models?	Communication campaigns would be beneficial, but not necessary in all cases. Local utilities should be responsible for communicating specific benefits of their smart grid deployment, especially if the project is AMI related with customer interfaces.
10	What should federal and state energy policymakers know about social norms (e.g. the use of feedback that compares a customers' use to his neighbors) and habit formation? What are the important lessons from efforts to persuade people to recycle or engage in other environmentally friendly activity? What are the implications of these insights for determining which tasks are best automated and which should be subject to consumer control? When is it appropriate to use social norm based tools?	If there is substantial financial incentives for recycling, then participation rates will be much higher. Based on the historical and current social norm in the US, the habitual commitment to engage in smart grid activities as compared to recycling or environmentally friendly activity will be very low. Consumers can feel "Energy Conservation" by visualization of the relationship between actual actions and the results (effect). It would be effective to select volunteers to participate in a trial program which continuously monitor how energy conservation activities affect the efficient usage of energy, and make its result visual by public. (Enabling detail review such as real-time visualization, monthly trend review, etc. may activate mental incentive.) This type of visualization, reviewing tool or automatic checking and advising tool/service may become one of new businesses including sensor equipment and tools to support energy conservation and reduce payments of households.
11	How should insights about consumer decision-making be incorporated into federal-state collaborative efforts such as the Federal Energy Regulatory Commission's (FERC) National Action Plan on Demand Response?	Insights should come from organizations like US consumer union representatives and incorporated into regulatory policy.
	Interaction With Large Commercial and Industrial Customers	Answer/Comment
12	What is benefits from, and challenges to, smart grid deployment?	<Benefits> - A more reliable electricity infrastructure will enable a more stable business environment. - Demand response will decrease the overall cost of energy by decreasing capital investment requirements for future peak generation sources. - Renewable energy will decrease the overall carbon emissions and will become a reliable resource with the introduction of energy storage technology. - The use of cleantec energy is expected to improve the corporate image. <Challenge> - Implementation of distributed renewable generation sources at the commercial and residential levels could lead to instability of the grid when these percentages reach higher levels. Standards should be implemented to control the reliability, efficiency and quality of the power being generated and
13	What is unmet smart grid infrastructure or policy needs for large customers?	In other countries, large multi-location customers generate/save the electricity in multiple communities and trade them each other through the grid. Are those trades governed by regulations?

Assessing and Allocating Costs and Benefits		Answer/Comment
14	How should the benefits of smart grid investments be quantified? What criteria and processes should regulators use when considering the value of smart grid applications?	The percentage of people who participate and benefit from smart grid project should be considered, and the magnitude of benefit relative to cost. Criteria should include improvements in reliability of service, environmental impact, and security assessment.
15	When will the benefits and costs of smart grid investments be typically realized for consumers? How should uncertainty about whether smart grid implementations will deliver on their potential to avoid other generation, transmission and distribution investments affect the calculation of benefits and decisions about risk sharing? How should the costs and benefits of enabling devices (e.g. programmable communicating thermostats, in home displays, home area networks (HAN), or smart appliances) factor into regulatory assessments of smart grid projects? If these applications are described as benefits to sell the projects, should the costs also be factored into the costbenefit analysis?	Generally, the timing of benefits should equal the payback of the system, depending on the scale of the project. Off-setting other capital investments for generation, T&D should most definitely be included in the calculation of benefits, since one of the primary goals of demand response is to offset peak demand loads during critical periods. The type of enabling devices for AMI deployments should be considered according to overall impact of the individual device. In-home appliances will likely account for a relatively small portion of the demand response overall value, but thermostats will play a larger roll and should be considered to be of higher value.
16	How does the notion that only some customers might opt in to consumerfacing smart grid programs affect the costs and benefits of AMI deployments?	Costs of consumer education programs will increase to maximize the participation rate of the program. Most consumers do not fully understand the benefits and/or are too lazy to enroll in program. Automatic inclusion programs with an opt-out program could be a better way to increase participation.
17	How do the costs and benefits of upgrading existing AMR technology compare with installing new AMI technology?	Depending on the type and scale of the upgrade, generally an upgrade should be considerably less capital intensive, because the smart meter can be retro-fitted with new communication modules. Given the fact that AMR is one way communication, certain benefits already exist and lessons have already been learned within a utility for implementing the system. The additional benefits of two way communication with demand response capabilities should be enough to justify the business case. However, the specific goals of the project would dictate the payback time period.
18	How does the magnitude and certainty of the cost effectiveness of other approaches like direct load management that pay consumers to give the utility the right to temporarily turn off air conditioners or other equipment during peak demand periods compare to that of AMI or other smart grid programs?	This would depend on regional customer loads and geographic environment. Generally, direct load management for larger industrial customers will be much more cost effective than deploying capital intensive AMI deployments.
19	How likely are significant cost overruns? What can regulators do to reduce the probability of significant cost overruns? How should cost overruns be addressed?	The risk of cost overruns will likely have a direct relationship to the scale of the project and the type of technology being implemented. Technology that already exists in the field with lessons already learned from other utilities should pose a considerably less risk, whereas, newer innovative yet unproven technologies will be more prone to unforeseen issues during installation. Regulators should be very careful in the assessment of the business case and benefit analysis. They should look for clear sources for previous successes with the technology for larger scale projects. Newer technologies should be piloted with possible government funding to prove the benefits and cost effectiveness of the technology.
20	With numerous energy efficiency and renewable energy programs across the country competing for ratepayer funding, how should State Commissions assess proposals to invest in smart grid projects where the benefits are more difficult to quantify and the costs are more uncertain?	Based on future predicted load requirements and predicted future capital investments with environmental impacts.
21	What are appropriate ways to track the progress of smart grid implementation efforts? What additional information about, for example, customer interactions should be collected from future pilots and program implementations? How are State Commissions studying smart grid and smart meter applications in pilots? In conducting pilots, what best practical approaches are emerging to better ascertain the benefits and costs of realistic options while protecting participants?	Tracking of technology effectiveness, deployment progress milestones, and overall cost savings and gained efficiencies as defined in the initial business case should be considered.
22	How should the costs of smart grid technologies be allocated? To what degree should State Commissions try to ensure that the beneficiaries of smart grid capital expenditures carry the cost burdens? Which stakeholder(s) should bear the risks if expected benefits do not materialize? How should smart grid investments be aligned so customers'expectations are met?	If possible, the smart grid technologies should be paid for by expected cost savings and the difference offset by temporary rate increases. The utilities and consumers should share equally in the risk if benefits do not materialize. For tools related to the balance between demand and supply, it is necessary to have consensus by having easy to understand visual explanations to explain the scenario/strategy that deploying battery energy storage systems, in addition to peak shaving and/or shifting by energy consumers, may minimize building new power generation plants which needs long term and big investments.
23	When should ratepayers have the right to opt out of receiving and paying for smart grid technologies or programs like meters, in home displays, or critical peak rebates? When do system-wide benefits justify uniform adoption of technological upgrades? How does the answer depend on the nature of the offering? How should regulators address customer segments that might not use smart grid technologies?	With respect to base AMI deployments, there should not be an opt-out option for consumers. However, special rate based programs during critical peak periods should have an opt-out option at any time.
24	How might consumer-side smart grid technologies, such as HANs, whether controlled by a central server or managed by consumers, programmable thermostats, or metering technology (whether AMR or AMI), or applications (such as dynamic pricing, peak time rebates, and remote disconnect) benefit, harm, or otherwise affect vulnerable populations? What steps could ensure acceptable outcomes for vulnerable populations?	These smart grid deployments will affect the consumer in the case of system wide failures. Redundant or backups systems could help to mitigate the risk to end consumers.
Utilities, Device Manufacturers and Energy Management Firms		Answer/Comment
25	How can state regulators and the federal government best work together to achieve the benefits of a smart grid? For example, what are the most appropriate roles with respect to development, adoption and application of interoperability standards; supporting technology demonstrations and consumer behavior studies; and transferring lessons from one project to other smart grid projects?	The device manufacturers and utilities need to drive the industry standards and utilize government involvement/funding for proof of concepts and standards.
26	How can federal and state regulators work together to better coordinate wholesale and retail power markets and remove barriers to an effective smart grid (e.g. regional transmission organization require that all loads buy ''capacity'' to ensure the availability of power for them during peak demand periods, which makes sense for price insensitive loads but requires price sensitive loads to pay to ensure the availability of power they would never buy)?	The device manufacturers and utilities need to drive the industry standards and utilize government involvement/funding for proof of concepts and standards.
27	How will programs that use pricing, rebates, or load control to reduce consumption during scarcity periods affect the operations, efficiency, and competiveness of wholesale power markets? Will other smart grid programs have important impacts on wholesale markets? Can policies improve these interactions?	The device manufacturers and utilities need to drive the industry standards and utilize government involvement/funding for proof of concepts and standards.
28	Do electric service providers have the right incentives to use smart grid technologies to help customers save energy or change load shapes given current regulatory structures?	The device manufacturers and utilities need to drive the industry standards and utilize government involvement/funding for proof of concepts and standards.

29	What is the potential for third-party firms to provide smart grid enabled products and services for use on either or both the consumer and utility side of the meter? In particular, are changes needed to the current standards or standard-setting process, level of access to the market, and deployment of networks that allow add-on products to access information about grid conditions? How should the interaction between third-party firms and regulated utilities be structured to maximize benefits to consumers and society?	When third-party firms intervene between customers and utilities, we can expect to have new business models for energy production and delivery. For example, a third party might enter into a contract with an end customer to reduce their overall utility bill by a certain percentage in exchange for a fee. In such cases, it is necessary to standardize mechanisms for access control and privacy protection, and build the network infrastructure to implement those mechanisms in order to safely provide information about customers and utilities to third-party firms. Participation of third-party firms will bring maximal results for both reducing electricity charge and stabilizing power supply, leading to reduced carbon emission which is of benefit to society. However, unlike business customers, the effect of reduced electricity charge may not be very large for household customers, so in this case government-provided incentives may be necessary in order to promote energy conservation.
30	How should customer-facing equipment such as programmable communicating thermostats, feedback systems, energy management systems and home area networks be made available and financed? Are there consumers behavior or incentive barriers to the market achieving efficient technology adoption levels without policy intervention?	Cost reductions will be the primary motivation for technology adoption. However, if cost-cutting and the benefits are less certain, it is not economically and psychologically easy for consumers to accept the initial costs. It is more acceptable that electricity service providers bear the initial costs and installation fees. Consumers could then reimburse the utilities over time by paying installments back to the utilities based upon their monthly savings. Consumers would still be paying less on their monthly bills and utilities would get reimbursed over time.
31	Given the current marketplace and NIST Smart Grid Interoperability Panel efforts, is there a need for additional third-party testing and certification initiatives to assure that smart grid technologies comply with applicable standards? If there is a need for additional certification, what would need to be certified, and what are the trade-offs between having public and private entities do the certification? Is there a need for certifying bodies to oversee compliance with other smart grid policies, such as privacy standards?	For the first question: NIST Smart Grid Interoperability Panel is a panel to gain consensus among stakeholders. After building consensus on the procedure that ensures the Interoperability of the Smart-Grid equipment, one or more permanent entity(s) will be required for executing the procedure. Third party certification may be required, depending on the type and critical nature of the equipment. Each utility should be able to specifiy if the equipment needs third party certification or if self-certification is sufficient. For the second question:The third party test lab should check if the equipment is “interoperable” by executing the procedure that will be built at SGTCC under the consensus. Real certification procedures should be executed by the private sector and the public sector should “supervise” to ensure this procedure is properly executed. For the third question: Yes, this is the role of public sector.
		Answer/Comment
32	What are the most promising ways to integrate large amounts of electric vehicles, photovoltaic cells, wind turbines, or inflexible nuclear plants? What approaches make sense to address the possibility that large numbers of other consumer devices that might simultaneously increase power consumption as soon as power prices drop? For instance, what is known about the viability of and tradeoffs between frequently updated prices and direct load control as approaches to help keep the system balanced? How do factors like the speed of optimization algorithms, demand for reliability and the availability of grid friendly appliances affect those trade-offs?	To maximize the integration of large amounts of EV, renewable energy and inflexible nuclear plants, the utilization of energy storage, including V2G for peak shift will be of great importance. The utilization of V2G could potentially minimize the investment of costly energy storage systems, but we should consider the following issues: a) Improvement of regulation or market rules to encourage the utilization of G2G and V2G. b) To secure enough available transfer capability (ATC) between eastern and western grids, concentrated investment of transmission line construction. Any power flow fluctuation caused by changable power output from PV and WF should be controlled in the local or adjacent grid by the local enegy storage system. To realize the efficient control of the fluctuation, the following issues should be considered: a) R&D investment for the development of optimal dispatching methods of energy storage and EV batteries. b) R&D investment for the development of more advanced management scheme for DERs, FEMS, BEMS and HEMS.. c) Investment for Energy Management Systems in each smart community to utilize the above methods.
33	What are these strategies'implications for competition among demand response, storage and fast reacting generation? What research is needed to dentify and develop effective strategies to manage a grid that is evolving to, for example, have an increasing number of devices that can respond to grid conditions and to be increasingly reliant on variable renewable resources?	The cost of secondary batteries like NAS, LiON, etc. is the most important matter. Acceleration of development for the production of lower cost, larger capacity, and longer life batteries will be increasingly important. It is also important to build a good consensus among electricity consumers on the new revised regulation and electricity market rules including penalties and incentives.
34	What policies, if any, are necessary to ensure that technologies that can increase the efficiency of ancillary services provision can enter the market and compete on a level playing field?	Same as above.
35	What policies, if any, are necessary to ensure that distributed generation and storage of thermal and electrical energy can compete with other supply and demand resources on a level playing field?	Same as above.
36	What barriers exist to the deployment of grid infrastructure to enable electric vehicles? What policies are needed to address them?	The high cost levels of secondary batteries are the main barrier now. It is highly necessary that a short term and sufficient investment for low cost, long life and large capacity battery cell be achieved ASAP.
Reliability and Cyber-Security		Answer/Comment
37	What policies are needed to facilitate the data sharing that will allow sensors (e.g., phasor measurement units) and grid automation to achieve their potential to make reliability and performance improvements in the grid? Is there a need to revisit the legal and institutional approaches to generation and transmission system data collection and interchange?	Unambiguous policy to define access control rules for the shared data is needed. The rule is especially important if industrial secrets (control algorithm, specific parameters, etc.) can be derived by analyzing the shared data. In this case, it is preferable that the access range be defined by the data owner. In addition, if the shared data includes personal information, the policy of privacy protection should be considered from the aspect of secure procedure and that of security technologies.
38	What is the role of federal, state, and local governments in assuring smart grid technologies are optimized, implemented, and maintained in a manner that ensures cyber security? How should the Federal and State entities coordinate with one another as well as with the private and nonprofit sector to fulfill this objective?	The government should play the following roles: • To establish and administrate information sharing functions which provides details of cyber incident in power control system domains to enable improvement of cyber security. • To establish and administrate key management institutions which have the responsibility of generation, distribution, certification, updates and revocation of keys used as a basis of cyber security through bulk generation, transmission, distribution, and consumer side devices. In addition, the federal government should have the function to provide information of cyber security regulations established by each state and/or local government.
Managing Transitions and Overall Questions		Answer/Comment
39	What are the best present-day strategies for transitioning from the status quo to an environment in which consumer-facing smart grid programs (e.g., alternative pricing structures and feedback) are common? What has been learned from different implementations? What lessons fall into the ‘‘it would have been good to know that when we started’’ category? What additional mechanisms, if any, would help share such lessons among key stakeholders quickly?	First the infrastructure and the system(e.g. alternative pricing structure and feedback) should be introduced in a limited area. And we should research how much change in usage pattern (e.g. time zone, amount・・・) of electricity power. We also should estimate the profits in that case. It is necessary to have previous results from pioneering utilities before alternative pricing structures become common in the marketplace. It is possible that our expectations will not be aligned with the real outcome. For example, the present off-peak hour is now on-peak because of rate changes implemented for the purpose of electricity load leveling.

40	Recognizing that most equipment on the electric grid, including meters, can last a decade or more, what cyber security, compatibility and integration issues affect legacy equipment and merit attention? What are some strategies for integrating legacy equipment into a robust, modernized grid? What strategies are appropriate for investing in equipment today that will be more valuable if it can delay obsolescence by integrating gracefully with future generations of technology?	Non-standardized products are being introduced into the current grid even with the progress of standardization activities is being made in the Smart Grid. And it is also difficult to upgrade functionality for most existing legacy equipment on the grid. Therefore this may create a communication compatibility issue between legacy equipment and future equipment. In addition, non-upgradability will cause a serious cyber security issues, which means that security vulnerability can not be fixed. We should encourage vendors/utilities to introduce the upgradability guaranteed products for integrating and harmonizing different legacy models of equipment. Nevertheless, in the case of integrating non-upgradable legacy equipment into a modernized grid, we should consider keeping legacy equipment in a quarantine area and installing an Internet Firewall-like gateway device. The gateway device, which is located on the border between the modernized equipment area and legacy equipment area, will provide compatibility and protect against cyber attacks.
41	How will smart grid technologies change the business model for electric service providers, if at all? What are the implications of these changes?	・Their service will be changed to provide not only electricity, but also solutions based on consumer's needs. (e.g. categorized consumer's usage pattern, change the pricing structure, and suggest the way of cost saving.) As for now, the growth of consumed power can lead to increased profits. However, consumed power will be decreased and their profit profile will have to be changed. Alocation of investments will be more important than frequent investments. ・Creating a microgrid environment with the aggregation of power within a community can lead to lower cost power and create an environment that benefits the people by increasing reliability and improving the ability to implement newer technologies like battery storage and distributed renewable
42	What are the costs and benefits of delaying investment in metering and other smart grid infrastructure while the technology and our understanding of it is rapidly evolving? How does that affect the choice of an appropriate time to invest?	There are few benefits of delaying investment in existing smart grid products. The process of standardization of Smart Grid technologies needs a certain time to be guided by market principles. However, market competition may be able to make advances in technologies and accelerate the standardization, which can help expedite the commercialization of standardized products.
43	What policy changes would ensure that the U.S. maintains global competitiveness in smart grid technology and related businesses?	These activities of DOE will enhance U.S. global competitiveness. The standardization process of smart grid technologies and system should be open to all global stakeholders as now and the superior technology should be utilized.
44	What should be the priority areas for federally funded research that can support smart grid deployment?	1. Energy storage is useful for stable and efficient operation of power grids. Utilization of energy storage at T&D grids, commercial buildings, or community storage is the key for smarter and more efficient grids. Taking that in consideration, the following research should be given priority for federal funding. - Verifying the effectiveness of virtualization, state management, remote control of a large number of broadly distributed electrical storages by field testing. - Investigating the effectiveness of community level EMS (CEMS) functionalities which include above-mentioned remote management and control of broadly distributed electrical storages, and effectiveness of collaborative control by CEMS with upper level power grids and large-scale demand side systems such as commercial buildings. 2. It is necessary to provide facilities for verifying interoperability among equipments or systems based on distinct standardizations, and for giving proper certifications to them.