

<b>Richard Wunderlich</b>	Director, Smart Grid Activities of Siemens Canada, Energy Sector
<b>Ken Nakahara</b>	Senior Manager, Smart Grid and Network Policy, Ontario Ministry of Energy
<b>Reji Pillai Kumar</b>	President, India Smart Grid Forum
<b>Jennifer Hiscock</b>	Science & Technology Advisor, Natural Resources Canada

Speaker (Male): Welcome to the Webinar. Thank you and the pre [indiscernible] [00:00:06] Solution Center and the International Smart Grid Action Network are happy to welcome our presenters from Canada and India. I am receiving some chat messages that our audience can hear us so that is great. We have resolved our technical difficulties. I am going to ask Vickie Hilly from the Green Energy Solution Center to begin. My name is McKay Miller. I will be the moderator of today's webinar and Vickie I will hand it over to you.

Vickie: Okay.

Speaker (Male): For an introduction to Clean Energy Solution Center.

Vickie Healey: Great. Thanks so much McKay so hello everyone. I am as McKay mentioned Vickie Healey and I am with the National Renewable Energy Laboratory and I just like to welcome all of you to today's webinar, which is posted in partnership by the Green Energy Solutions Center and also the International Park Action Network. Our discussions today are going to be centered on Unlocking Markets and Supporting Innovation in Smart Grids and we are fortunate to have a great panel representing the international Smart Grid Action Network otherwise known as SGAN presenting today. So Heather, next slide please.

Before we get started one important note I'd mention is that the Clean Energy Solutions Center does not endorse or recommends specific products or services but the informations that will be provided in this webinar will be featured in the [Solution Center resource site](#). It is one of many best practices at resources reviews and so I'd just like to add local experts and so that is one quick little housekeeping note that I mentioned that we need to provide the audience.

*Next slide please.*

So before we begin today I am just going to go over a few housekeeping items and quickly go over some of the webinar features. First for audio you have two options. You can listen either through your computer or over your telephone and if you choose to listen through your computer please select the mike and speakers sign on the audio pan which is located on the right hand side screen of your computer monitor. And by doing so you will, you know, of course help eliminate the possibility of feedback and ego and other background noises And if you select the telephone option which is also in the box on the right hand side it will display a telephone number and audio sound that you will need to use when you dial in. So again we ask that you please mute your audio device before the presentation begins and if you're having any difficulty with the webinar please contact the 'go to webinar' help desk and they can help walk you through any technical difficulties you're having. Their phone number is 88-259-3826. Okay so first our presenters... I just want to make a quick note of mention. Our presenters have provided a fact sheet to accompany the information you're going to hear in today's presentation and you may download this fact sheet at your [indiscernible] [00:03:29] provided at the top of the screen and I've also provided the URL via the chat feature which is on the right hand side panel of your screen and you can go there and copy and paste only through your browser so that you can view this fact sheet as the presenters go through their material. And speaking of the chat feature we welcome you to introduce yourself and you may do so by typing into the chat ping located on your screen and McKay if you wouldn't mind would you just demonstrate that feature by introducing yourself through the chat box. That would be great. Let's see. So again if you... one other feature if you would like to ask a question we ask that rather than using the chat ping that you use the question ping where you may type in your question. And if you are having difficulty doing any of the materials that are provided through the webinar portal you can find PDF copies of the presentation at [cleanenergysolutions.org/training](http://cleanenergysolutions.org/training) and you can go there and follow along as our speakers present. Also I just want to let you know these presentations will be posted to the Solutions Center training website and an audio recording will be posted to the Solutions Center training page within a few weeks. So, on our agenda today we have a very exciting agenda prepared. Let's focus on building this smart grid that is reliable stay, more sustainable and market are economic growth and innovation. Our panelists will discuss how policy makers around the world are approaching this challenge and I am very pleased to announce that we are fortunate to have [indiscernible] [00:05:19] who is senior manager of the Smart Grid Network Policy of ministry of energy Canada. We have Ritchie Kumar Pillai who is president of the NPF Smart Grid Forum and Richard Wunderlich who is director of the smart grid activities of Siemens Canada Energy Factor. So before the speakers begin their presentation I just want to provide a short informative overview of what this Clean Energy Solutions Center is and talk a little bit

about our services products and features that we provide. And then I will turn the webinar back over to McKay who will present an overview on the International Smart Grid Action Network and then following the presentation today we will have a question and an answer session and wrap up the discussion and closing remarks.

*Next slide please.*

So this slide provides a bit of background in terms of how the solution center change be. The solution center is an initiative of the Clean Energy Ministerial and it is supported through a partnership with fuel and energy. It was launched in April of 2011 and it's primarily led by Australia, the United States and others in partners. Outcomes of this unique partnership include support of developing countries through enhancement of resources on policies relating to energy access, no cost expert quality assistance, and peer-to-peer learning and training tools such as the webinar you are attending today.

*Next slide please.*

Okay the solution center... we have four primary goals. The first goal is to serve as a clearinghouse of clean energy policy resources. We all serve to share policy that practices data and analysis tools specific to clean energy policies and programs. Another goal the solution center delivers dynamic services that enable expert assistance learning, peer to peer sharing of experiences and lastly but certainly not the least they foster dialogue on emerging policy issues and innovations occurring around the globe. Our primary audience includes energy policy makers and analyst from governments and technical organizations in all countries but we also strive to engage the private sector, NGOs and civil society.

*Next slide please.*

Market feature I think that we have at the solution center is that we provide expert policy assistance related to clean energy policy. We have the service and we provide it through what we call ask an expert which is a very valuable service offered with the solution center and we've established a broad team of over 30 experts in various areas of clean energy policy from around the globe who are available to provide remote policy advice and analysis to all countries and best of all at no cost. If you have a need for clean energy policy assistance we welcome and encourage you to use this useful service and again this assistance is provided free of charge and to request assistance you may submit your request. It's a very simple process by registering through our 'ask an expert' feature at [cleanenergysolutions.org/expert](http://cleanenergysolutions.org/expert). And we also... we really encourage and invite you to spread the word about the service to those in your network and organization. And just to list a few... some of the broad factors

covered by our experts they include energy access, renewable energy, energy efficiency, micro grid, smart grid, regulations and utilities and clean transportation.

*Next slide please.*

So you may be wondering how you might become involved with the solution center and just a few examples of ways you could do that would be to request for assistance or you could request tailored technical resources for your country or region. Another way is by what you are doing today which is participating in webinars and other training activities and participating with our policy network. We also ask and encourage that you offer advice and suggest resources to share on the solution center and we do have a newsletter and we invite you to sign up for that as well.

*Next slide please.*

One other feature that we have is what we call a policy forum and it is a location on our site where very important and informative blog type articles are located. And on this policy form you will find many interesting and informative articles that discuss progress of clean energy policy development and implementation occurring in countries around the world and we also follow similar articles posted by our partners which include the renewable energy and energy efficiency partnership also known as REEEP, Leonardo energy and we also include and follow pot case that are developed by one of our partners which is bloom bird new energy finance.

*Next slide please.*

So now I think we are at a point where I will turn the webinar back over to McKay Miller who is a research analyst here in Realm and McKay will provide an overview now of his team and also serve as moderator as he mentions for the remainder of the agenda. McKay I am going to turn things back over to you.

Speaker (Male):

Thank you Vickie and welcome to all attendees. We are very excited to have you. We will move into the need of the programming. The International Smart Grid Action Network is a mechanism for bringing high-level government attention and action to accelerate the development and deployment of smarter electricity grids around the world. Canada and India are key partners, is gaining project and we're happy to have them here presenting this morning. I won't spend too much time on it again and quickly move to the next slide.

We will see a map of the participants, the participating governments. In there is Canada as you can see we've got good coverage around the world. This is really the premier inter governmental smart grid effort around the world. We also have a sister organization, the Global Smart Grid

Federation which is convened by private sector partners and we will continue to put together exciting webinars and events between the governments and our private sector partners over the coming years. So please stay tuned to our webinar calendar, which is posted both at [iea-doitagain.org](http://iea-doitagain.org) as well as on the Clean Energy Solutions Center site.

*Next slide please.*

I will be your moderator today. I am a research analyst at the National Renewable Energy Laboratory in Golden, Colorado. We do a wide range of renewable energy efficiency and smart grid work.

*Next slide please.*

I will briefly introduce our three presenters today — Ken Nakahara. He oversees the ministry \$59 smart grid fund that manages the policy group focused on Smart grid and the electricity distribution factor. His career stands both the energy and environmental factors having looked at throughout the [indiscernible] [00:12:57] the ministry environment and the ministry of energy. Over the last ten years Ken has been active in key energy and environmental issues such as electricity market key regulation, cap and trade regulations for regional air pollutant and the green economy and green economy act. Ken is MBA from the Philip School of Business focused on sustainability issues and Bsc in environmental science from University of Toronto. He will be our first presenter.

*Next slide please.*

Reji Pillai Kumar is president of the India Smart Grid forum. He is a renowned expert in electric sector with 30+ years of international experience in the electricity industry in diverse functions across the entire value chain. He has been a key member of many multi disciplinary teams engaged in the formal restructuring of power and water utilities in Asia, Middle East, and Africa. In October of 2011 Mr. Philia was unanimously elected as the president of the India Smart Grid form public and private initiative of the government of India works tolerated development of smart grid technologies in the Indian power sector. He serves for a two-year term. As much Philia has build successful enterprises in India and the UAE and has actually done... presently he is founder and managing director with [indiscernible] [00:14:16] Venture a \$100 million India focused fund to foster innovation in green technologies with a mission to build globally successful enterprises out of India in emerging green tech revolution. He is also an active member of the India Agent Network. He has advanced education in engineering, finance, management and law and has worked with NPPFE and IBM and has been a senior consultant with the Asian's development bank world bank and [indiscernible] [00:14:43] AID.

*Next slide please.*

And our final panelist for the day will be Richard Wunderlich director of Smart Grid Activity at SIEMENS Canada energy sector. He was appointed director as of October 1<sup>st</sup> 2010 as part of other Siemens program. His responsibilities today reside in the Siemens infrastructure at city sector and include over a strategic initiative that specifically include energy automation, communication, card real electrification, building automation, merging smart grid applications along with the facilitation of the Siemens smart grid partner eco system. Prior to October 2010 Richard was responsible for North American market development in the energy sector with Siemens IT solutions and services. He had over the previous ten years played a key role in extending Siemen by key capability in the energy sector by leveraging the global domain knowledge at Siemens and its R&D to develop and launch unique offerings to the market including solutions for customer care, smart grid integration and enablement, strategic grid management and generation for the optimization. Richard has been with Siemens since 1988 and is graduate of the University of McMaster holding a bachelors of commerce degree focused on marketing and economics. With those biographies out of the way we are very happy to hand the presentation over to our colleagues in Ontario where they will begin to tell us a bit about both the context for promoting innovation in smart grid in Canada and we got through the strategic steps that they are taking to accomplish that. So Jen and Ken welcome.

Jennifer Hiscock:

Good morning. Thanks McKay. So my name is Jen Hiscock and I am with the government of Canada with the department of natural resources and I thought I would take the opportunity to give a little bit of a Canadian context before Ken who works at the provincial government level would then provide you with the subject of discussion today and so for Canada we are a country of provinces and territories and at the federal level I have been able to see what the drivers for smart grid are across the country and I thought I'd give the audience a bit of a taste for that. So if you look for example at the east coast where we're developing a lot of off shore winds the province of New Brunswick where it has a utility there leading commercial and residential demands response project to help with the integration of winds. And we also have the wind energy institute looking at storage technologies to help with the integration of winds in Prince [indiscernible] [00:17:30] islands and other province there. If you look at Central Canada the province of Ontario has almost entirely hydropower and that's an almost non-emitting grid. So for them bringing down emissions of transportation is a major driver for smart grid and they have a smart zone project to demonstrate both optimization to reduce losses and the benefits of smart grid for various types of EV charging. And then if you look to the west coast in British Columbia we have our mountainous terrain there, which increases the cost of transmission and distribution upgrade across the province beyond the cost that you normally expect. And there we have a

demonstration of better storage with a sub station to differ the need for more generation capacity, sub station upgrades, and transmission upgrades. So this kind of gives you an appreciation for the different types of drain and I guess context of setting that we find smart grid happening in Canada. And while the drivers of smart grid may vary across the country what's common is the redefining of the relationship between the utility and the customer and what the customer can expect in their smart homes and smart communities in the future. No expectation will be both shaped and driven by innovation in the market place from utilities and companies with new products and services. But today the government of Canada is a participant on it. We thought it would be neat to share with you how Ontario is looking to unlock its market for smart grid innovation and it hopes to do this in part through the development of a clean energy institute. So innovating in a regulated sector is a challenge faced by jurisdictions across Canada and around the world. So we just felt that this would be an exciting opportunity to share a sort of living case study with our colleagues in smart grid around the world. So I am pleased to hand this webinar to Ken Macara now who will give you a sense of the smart grid environment in Ontario and how they hope to accelerate growth in this new economy.

Speaker (Male):

Thanks very much Jen. Good morning and good evening to everybody depending on where you're calling in from. I am extremely pleased that we are able to participate in this webinar and share with you our ideas, our challenges and our program to implementing a more intelligent electricity grid here on Ontario. As Jen said we think our challenge is a shared one with any jurisdiction that's seeking to achieve very high renewable energy targets, ambitious conservation goals and to do so in a progressive and a cost effective manner because many of you are calling in from an international audience I'd like to give you some context for what is happening here in Ontario before I dive in to discussion about how we in Ontario are trying to ensure continued innovation in smart grid. I think my discussion will contrast very nicely with Ridge's following presentation on India's ambition in [indiscernible] [00:20:24]. And I am very grateful to have you in the room with me, Richard Wunderlich from Siemens Canada who I think will be to bring you private sector perspective on this as well. So Ontario is home to 15 million people but with striking differences in terms of the distribution across the province which covers over 900,000 square kilometers. We have some of North America's dense and urban areas in places like Toronto with over a thousand customers per square kilometer even as the overall density is closer to five customers per square kilometer for the province as a whole. And this has significant implications for the nature of electricity distribution in our energy policy discussions. In November of 2010 the government of Ontario released a 20-year planning effort called the Long Term Energy Plan. In the run up to its development the province faced a unique set of circumstances as it relate to the life of energy acid in the province. About 80% of the

generation assets were projected to be nearing their end of life over the near term, requiring decisions about retirement over reimbursement. So what they did is it identified a clear opportunity to the province to make significant policy decisions about the type of energy system that we wanted to have going forward. And at the end of this discussion was the multi political party consensus about the need to shut down the coal fire facilities in the province. Since 2003 there has been about 18 billion dollars invested in new and refurbish generation and over nine billion in transmission and generation systems. And over the 20-year time frame of the long-term energy plan an additional 87 billion dollars in system wide investments are expected including conservation efforts and smart grid. These next pie charts really tell the story of our evolution of the energy system. Nuclear power is projected to continue to play a steady part of Ontario's generation. Goal really goes away but renewables and conservation, expanding dramatically over the next 20 years. Even that recently in last year wind and solar alone produced more electricity than coal and while in 2003 we had 50 megawatts of wind power being produced by ten [indiscernible] [00:22:36] across the province now we have over a thousand. So there are various policy priorities and initiatives that have spurred in us to take an even greater interest in smart grid and when otherwise be the case. Ontario was seeking to increase its share of non-hydro renewables over 10,000 megawatts by 2018 and achieve over 7000 megawatts of conservation to keep the man reduction by 2035. In addition Ontario has one of the largest smart meter in times of new pricing programs which I'd like to go into a bit more detail in a bit and you've heard to encourage the adoption of electric vehicles. I believe there are significant economic benefits that could be realized for our public if we continue to leverage our leading edge smart critics expertise that reside not only in our utilities but also in our academic institutions, in our companies. Our utility they are at the forefront of this effort both in the smart meter deployment of course and central to our overall conservation and smart grid activity. By the green energy act they receive mandatory conservation target to be achieved over a four year period and are part of a 1.2 billion dollar conservation program effort over the next four years targeting residential, commercial and industrial opportunities to do a common preventional branding effort called save on energy customers across the province are helping to build over 1700 megawatts of conservation over the chief of that as of the end of 2010. In addition at least two of these are starting to develop smart grid plans of their own. So that's the end of sort of the context [indiscernible] [00:24:16] just discussed a little bit about how the government is hoping to accelerate a smart grid going forward and I think one way to look at grid modernization efforts is to break it into three parts- the policy framework, the regulatory environment and the strategic implementation at the utility level. Of course all of these intersect but as we discussed the opportunities for unlocking smart grid markets and ensuring continued innovation in smart grid we can review each of those



from looking at those perspectives. The first one is a quality framework, I think Ontario is on a pretty good spot on the basis of there is explicit unification of three key focused areas- forced market grid in the green energy act which was a landmark piece of legislation. And those are customer-controlled powers in flexibility in adaptive infrastructure. Each of these relate to specific customer face outcome which you can see in the slide.

The second perspective is from a regulatory environment and we have a very progressive regulatory here in the Ontario energy board with undertaking a road to review process. In part to address requirement put in place through the green energy act. This includes the requirement for smart grid plans to be put in place by every utility and to outline the manner in which that could be valued. The final of that three parts is this strategic implementation level and the focus of the rest of my remarks. So because of the positive policy framework the... you need drivers that Ontario has for one to achieve a smart grid is lots of activity. There are lots of activities in the traditional energy sector and from players beyond the usual cast of characters. Getting them to work in concert to where the common goal of smart grid innovation and developing local and global opportunity is a challenge. For example Ontario has several leading academic institutions conducting various smart grid researches. However the research can be thought of as being fragmented at times and not always linked to specific commercial opportunities. Ontario also has several and new and innovated companies developing new technologies and services who are clambering to offer solutions. However they don't always understand the issue that utility is faced and is to say they don't always speak the same language and we need to bridge it up. Even when these entrepreneurs are successful at getting demonstration project utilities the business development opportunities are limited within the current regulatory market in making business strategic, making business strategies and business models that certain. We're seeing leadership from distribution companies on demonstrations and pilots and partnership with entrepreneurs and industry players. However typically the projects are largely owned with the largest in distribution companies and often only on a still basis. Projects are limited in scale and scope because utilities are hesitant to invest and ask for right recovery on their projects. We're seeing investment and interest from the larger more established power sector players. However the utilities are the target market and those utilities struggle to make a strategic business takes for smart grid investment in the current market. Our market has begun to develop relatively quickly with 4.7 million smart meters installed and time of new pricing in the sector for all of its retail customers. However these customers themselves are only just beginning to understand what smart grid is all about and the value of potential smart grid services to a customer is still being discovered. Surrounding this market is a legacy of regulations that was originally intended to keep electricity rate slow which then enter innovation and

some of these are being addressed by a regulatory form. Some by market development efforts and I want to describe one particular market development effort that the province is undertaking. This smart grid fund is a \$15 million competitive ramp program for which we now have about a dozen companies involved in. It's really to take the companies to the last stage of commercialization efforts by partnering them with a low utility and we've got [indiscernible] [00:28:27] and projects ranging from home managing management initiative to grid automation to data management. So over the next two years we're going to be working very closely with these companies, the utilities to bring on a next wave of technological innovation in the province. So the question remains will this be enough to unlock smart grid market and hence per long innovation? There are real and eminent drivers for innovation. For example the chart on the right here is a forecast of renewable energy that I took them online in the next few years. Distribution connected renewable energy as represented by the light yellow and the light green will become increasingly important and an essential part of achieving our ambitious renewable targets. The importance of a modern distribution grid that can accommodate distributed energy sources is on top of the need for such a modern grid to achieve conservation targets. And whether its energy storage you put the green grid integration or the next emerging technologies Ontario has increasingly motivated to accelerate it's market efforts. So there are some limitations in terms of our factor capacity to modernize. The chart on the right is from our recent policy paper done here locally looking at R&Ds spent related to revenues. You see the utility sector is amongst the lowest and we have a very vibrant utility sector but only a few of those utilities in the province have a sufficient customer based required to attract large skill technology vendors and a sufficiently strong balance sheet to pursue innovation. A rapidly evolving technology to last date is challenging for the regulator and I think it is also hampered by the fragmentation of utility efforts. So the fancier question is how do we bridge the gap between our local strengths and the global opportunities that we think are within our grasp. As we surveyed some of your jurisdictions such as Germany, US, Japan and Korea we noted in some instances the existence of efforts to increase collaboration and coordination. It was a conscious effort to explore new partnerships amongst academia, utilities and businesses. It was an opportunity to collaborately identify strategic priorities on the basis of local strengths and global market opportunities. In June of this year the government of Ontario announced the partnership with the Mar discovery district to assess the potential for establishing an Ontario clean energy institute. Such an institute would have a two-fold mandate. One to foster and support innovation in the energy sector domestically and two to advance economic development objectives by helping Ontario companies to make inroads into global energy technology expert markets. Over the course of the next few months the government is hoping to examine the potential for

Ontario's leadership in areas such as smart grid to become an economic development driver. We take this world-class expertise in our utilities, in our companies and in our academic institutions and we like to work with them and with some of your own institutes around the world to explore that further.

This slide here really cements the rationale for such an integrated strategy. On the innovation side there is a need to improve linkages amongst various sectors. We think Ontario has very high quality utility sector and very high quality ICT sector but again this cultural differences, the language differences so that collaborative effort is needed. It is an opportunity to further align the local market amongst our utilities as well as align academic research with project partners and international commercial opportunities. In terms of international strategy although we're trying to get out there more and this is certainly one of those venues to communicate what we think Ontario is strong at, this generally we think low of wearing this global of expertise that's build up in Ontario around distribute generation, smart grid and conservation. So we'd like to get out there more both to attract strategic energy companies to invest in Ontario and also to open up markets for current companies. Overall this represents an economic development opportunity and an opportunity to continued developed cutting edge projects in Ontario with global companies. And if I were to identify four potential activities of this proposed institute they would be as follows. One is certainly to link what I think is a fragmented market to develop industry road maps and to help assist Ontario companies need to at least figure out what are the three, four, five strategic key priorities for Ontario. What are we going to be particularly good at and contribute to the global market, improvement towards market grids. And on the basis of a road map I think we could see the regulator being appreciative of collaboration and coordination efforts. I think we could have companies understanding utility issues much better and academic institutions promoting our research that is about near term and long-term benefit factor. The second preactivity would be around partnering with foreign institutes to make sure that our institute has immediately an international focus, is looking at global market opportunities and how to contribute to the global move towards smarter grids and sustainable energy systems. The third area would be to identify strategic priorities and co-fund demonstration projects with the utility and incorporate partners. Again on the basis of a collaborately established road map to do larger scale demonstration projects that have more meaning in terms of asking us proof points for Ontario's particular expertise in smart grid. And the fourth is really a reflection on we saw some of the other global institutes organizing their industry around censorship, recognizing that the customer at the end in other jurisdictions are not looking for peace meal solution to larger problem and to see whether our industry could be organizing a similar fashion to provide integrated solutions rather than individual components. I've spoken a little bit about our companies and utilities so I

did want to mention the world-class research that's going on in Ontario. These are just some examples of different focused areas, different researchers up there right now doing work related to smart grid, storage, renewable, etc. And I would be more than happy to follow up with anybody else on this call in terms of our corporate utility and academic expertise to share that a little bit further. So in conclusion Ontario is really using these domestic challenges and our ambitions towards becoming increasing the renewable and conservation focused to push innovation, to continue to be on the leading edge domestically and also to start to leverage our utility and corporate expertise, project expertise international economic success. Thank you very much for the opportunity to share this with you and I look forward to receiving some questions and some follow ups over the days and weeks to come.

Speaker (Male): Thank you Ken. We do have one question from the audience so I'll encourage all attendees to enter questions into the question panel. I can then convey them to the presenters. This question is from [indiscernible] [00:36:27]. The question is how practical is it to invest in smart grid when the basic T&T infrastructure maybe suffering due to capacity issues and if I could add an editorial there I think the question also points to the issues of general capacity constrain that maybe coming under strain as renewable energy increases and it also overlaps this question of aging acid infrastructure generally. What is Canada's view on how smart grid into this larger question of aging grid and capacity can stay fit? If you could comment on that.

Speaker (Male): Sure. I will take a stab. It's a very comprehensive question, very good question so I think...first of all I would start off by saying that smart grid is just modernization by another turn of phrase so smart grids are going to come whether we make conservative effort to do so or not. It's about when utility need to go out to market now and make the investments to shore up this thing asset. They are going to go and get modern equipment. Having said that I think that a concerned effort towards accelerated modernization is important given the renewable and conservation targets that we certainly have and I think many other jurisdictions are imposing upon themselves from a public policy perspective. So in terms of the T&T situation if you reflect back on that graph that I was showing about the amount of distributed resources coming on to distribution grid there are plenty of reasons to have the whole fronts, to shower up transmission lines to allow for more renewable energy to come on line and to work at the distribution level to make sure that smart grid is there to enable the distribution connected resources and achieve the conservation shares. I think maybe Richard wants to chime in here as well.

Speaker (Male): So I have to say a complimentary statement with respect to Canada overall. Canada really is ten provinces with very different capacities and capabilities. For instance Cubic and [indiscernible] [00:38:54] two

provinces have the highest electrical intensity in North America and their grids are actually very well designed, high capacity grids right into the distribution networks because of the high electrical intensity. So it's not a statement that can be made on behalf of Canada. Each region has a different legacy of investments in different focus areas and I think what's interesting is that the country is recognizing their strength and weaknesses and taking the appropriate actions to account for that.

Speaker (Male): Thanks Ritchie and I think that points to a feature of smart grid globally that we are seeing is that diversity of existing assets, the diversity of system configurations is substantial and really drives strategy. I think that's something that suddenly emerged over the past five years of collaboration. I have one more question before I move on to our next presenter. Now this comes from Jose. It's a question for Ken. What is your timetable for rolling out the institute?

Speaker (Male): Great. Thanks very much Jose for that question. I think we're trying to move fairly quickly. We were planning to have a broad sequel of our engagement session in mid January. A friend that Mars will convene the key utility, academic and incorporate leaders out there today to hear about the instituting greater detail and to get us some feedback. So I think we're... we've got conceptually an idea of what it should be about but also it needs to be supported from the stakeholders at large. They need to see value in this and while governments are ready to step in to kick start the institute it needs to be backed by the community as a whole. So mid January we'd have a large stakeholder session and then over the course of I'd say two or three months get some firms understanding about how to proceed and be in a position to launch it.

Speaker (Male): That's great. We are now ready to make a transition to a different context. We will be welcoming the comments from Ritchie Kumar Pillai so Ritchie are you ready?

Speaker (Male): Yes sir.

Speaker (Male): Thank you.

Speaker (Male): Greetings from India to everybody on the webinar and thanks Raphael for inviting me to make this presentation today. Before I... Vickie you will be changing the slide.

Come to slide number two, please. Yeah, India's smart grid forum. So this is a public-private partnership initiative of government of India. This slide shows a partial list of levels of our members. Today we have more than 105 members. Another big powerful logo around the world you can find here electrical engineering communities for IG, automation companies from all across the world, the Europe, America, India. Let's talk more

about the members and how we are organized later. So this covers primarily some of the government institutions in India who are responsible for policy and planning for [indiscernible] [00:42:37] sector and some academic institutions, utilities, regulatory commissions, industry and some industry associations.

*Next slide please.*

Before I talk about smart grid, why smart grid for India I should give a brief about the Indian policy system. This is the fourth largest power system in the world in terms of in-store capacity. Today we have 210 gigawatt of installed capacity with utilities with another 38 gigawatt of active generation of one megawatt and above in size. Smaller five kilowatt, ten kilowatt, hundred kilowatt set of things maybe another 100 gigawatt and above in size. Smaller five kilowatt, ten kilowatt, 100 kilowatt set of things maybe another 100 gigawatt we have in [indiscernible] [00:43:23] generation all across because utility could not meet the demands. In the last two decades we have almost doubled the power system both in terms of capacity as well as in terms of number of consumers added to the grid and also extended the grid to larger and larger geographical areas. We have already electrified five million... sorry half a million villages and still above seven to 8000 villages are actually electrified. These are big numbers. I should say that last year in terms of energy produced and consumed we are fifth in the world. It is one side of the story. Look at the other side of the story. The per capita electricity consumption in India is one-third of the world average and 300 to 400 million people are not connected to the grid. And 800 million people who are connected to the grid they experience power cut almost everyday. So this is the down side of it. This is the challenge. This is the reason why we are into smart grid. We would like to leverage smart grid technologies and leave for traditional infrastructure build out wherever possible to give access to energy to our people and also build a reliable electricity supply system. And the business here is largely dominated by government owned utilities. At the time of independence in 1947-48 we had only 1300 megawatts which are primarily in three-four metropolitan cities or the middle towns which were powering actually a small community under mills, quarter mills and the [indiscernible] [00:45:19] mills. So over this 60 years we have build about 200-10,000 megawatt and it was made possible because government can offer to do that. And in India the electricity is in the concurrent list of the constitution meaning both federal government as well as state governments can make policies on electricity business. So we have 29 states, seven union territories under federal government. All of them have some play or a large play in the electricity sector. The generation, private companies are into generation in all parts of India but their total capacity in the private sector is about 20% maximum. Transmission almost 100% is owned by almost... 100% is owned by federal government own the institutions and state government

owned institutions. And distribution business except in some metropolitan cities and the two states Delhi and Orissa. Rest everything is done by state, respective state government owned entities. So these entities were there... government's priority was to extend electricity coverage to more and more villages and new connections to millions of households so without adding capacity, generation capacity to the grid and also without going through the sound engineering principles these utilities which are owned by respective state governments in the 70s and 80s they are compelled, under compulsion to extend the grid to new connections to millions of homes. So after result we are sitting with a grid which is not build to solve engineering principles. So on the regulatory side we have a central electricity regulatory commission and we have almost all major states have their own state regulatory commissions and some other smaller states they have gone for ensuring electricity regulatory commissions. From the transmission side we have a very good transmission grid. At this point I maintain despite a large grid failure which happened in the end of July this year. We have a modern grid because we [indiscernible] [00:47:45] in the recent past and we have more than 10%. Now we are building 700kb and 800 kb, internet kb and 800 kb HOTC network. On the distribution side as I told you we have the biggest problem here. One side of the electricity fund into the network is lost in the wires. A good percentage is lost because as I just mentioned we would run a network, electrical network which is build to sound engineering principal meaning that the high voltage line to low voltage line ratio STLT ratio which in many advanced countries you will find 1:1 and the worst is 1:4. But when you go to rural parts of India you will find it is more than 1:10. As a result an 11 kb line in the far end of the line you will see operating at seven kb or eight kb and as a result the ice bare are lost for the transmission distribution losses are very high and also a good percentage of this percentage loss is stolen by people. And in some states it is more than 50% of the electricity is lost and as I already mentioned 400 million people have no access to power, not connected to the grid and large parts in the country experiences several hours of power cut everyday. Since the supply is not reliable people keep standing arrangements like TV set and inverters and also power quality being poor I told you about the end of the line around eight kb or seven kb. As a result the voltage quality is poor. People need to have work stabilizers and UPS and such equipments. Huge amount of inefficiency in the economy this all contribute to.

*Next slide please.*

Yeah, so before I come to the smart grid area I should mention about the program which the government of India has been following in the last two to five years. The first ten to five year plan which started in 2002 to 2007 and their program called APTRP accelerated power [indiscernible] [00:50:09] Reforms Program which talk about five million dollars for select distributions, urban distributions factors. There are about 400 total

electricity factors in the country of which 56 factors are connected and they were given about five million dollars to improve their electrical network which was a very successful program. However what happened was that IT automation systems were not build in these places so the loss of in many places, the network losses, the G&T losses which has gone up in many of these places here they invested money. So in the 11 five year plan which started in 2007 and ended in March this year, this five year period time that same program has been doubled in outlet for five billion dollar to ten billion dollar to improve the electrical network. This time we selected 1401 pounds which are population about 30,000 and above 2001 census so 1401 pounds electrical network up gradation 10 billion dollar given. In addition to that we call it as the restructured APRP, Accelerated Power and Response Program. So here two billion dollars were added as a 100% grants from government and [indiscernible] [00:51:27] state government owned the distribution utilities for implementing or building effective IT infrastructure and IT solutions. Here under part A of this program for the first time many of these utilities they have had an IT network that is set under other networks. And also some of the applications which are being done here is that we are conducting a multi network of electrical assets on the GS smart automated meter reading. We are not going for EMI at that stage. It is automated meter reading for all the distribution transformers and freelance in this 1401 pound so that energy accounting can be done at a better understanding of where this 30% electricity is lost. And the set of applications for meter reading, billing and connection, CRM etc and also in mega pounds with 400,000 and above population of 350 million units and above electricity consumption we got in this also. So this program in this 1401 pounds is almost in the final stages of commissioning. Most of the states will complete it by middle of 2013 and some of them may still in 2014. Though some of them were late in getting technology partners to do this job. Another part of this ten million dollar program some money has been kept for the technology trials and capacity building. Under that policy 14 smart grid pilot projects are recently been allocated to 14 different states. Each one of them are fairly large in size, 10,000 to 30,000 consumers are involved and also the value is two million to ten million dollar. A total about \$80 million for this 14 pilot program, 50% of this money has been promised by government of India free money and the balance respective utilities will do it. At that point in time I mean many of the components of this [indiscernible] [00:53:32] program are the basic building blocks of smart grid project anywhere else in the world. And when these projects are successfully completed the distribution utilities in India will have an enabling infrastructure to assent to the next level of smart grid journey.

*Next slide please.*

So what are the priorities for India? What are the drivers in India for smart grid? The number one from the customer's perspective expand electricity to access to everybody. The 400 million people who are not connected by



grid how can we leverage the emerging new technologies like micro grid and other technologies to give electricity connection to this 400 million people. How can we improve reliability of supply to the consumers so that there will be no load shedding or power cuts that people may not invest on TV sets and inverters for storage facilities and improve quality of supply so that consumers need not invest in all these [indiscernible] [00:54:36] privileges and unnecessary assets and also have better user friendly interface between the utilities and the consumers. For the utilities the 30% plus loss which I said it is almost 2% of the GDP in the country and some [indiscernible] [00:54:55] the loss or accumulated loss of the 63 distribution utilities the last year is over \$40 million. So every year they are running at a loss of one of the main reason and it is a huge network loss. Our problems which we have that because of political compulsions the tariff is not constructive of the cost. As I said the supply and demand gap is increasing continuously so the secured management is a major [indiscernible] [00:55:26] we actually switch off [indiscernible] [00:55:30]. That's the reason why people have some other arrangements. So here how can instead of switching off a fan if we can switch off selected load in consumers premises while consumers premises through demand response. That will avoid disconnecting millions of homes during peak hours and also utilities that pay big money for buying stop hour from the peak hour time from the market and from other peaking power plans that the asset management increased grid visibility. These are the utilities, priorities and we also have one of the largest renewable program. Last year 2011 India added maximum grid connected megawatts scale, solar plants in the world so we are pursuing a program called the Jawaharlal Nehru National Solar Mission which is 20 gigawatt of grid connected solar power adding to the grid by 2020. Today in that I told you about 2010 gigawatt is installed partly by capacity around 12% which is mainly wind and solar and bio mass. For government and regulators they want such spread customers. They want financially sound utilities otherwise every year government of India and the respective state governments they are funding utilities for their expenses and they need neutral system up grid and modernization, reduction and emission intensity. Government of India voluntarily agreed to reduce the mission intensity by upto 25% by 2020 from the 2005 levels. And what smart grid forum has done we are operational for only last one year. We have prepared a road map, a smart grid mission and road map and submitted the final recommendation to government of India. As I mentioned that we have 29 state governments and the federal government all of them have a constitutional right to make policies in the electricity domain. We cannot push it down the throat of state governments. So in by and large the time frame we try to align this road map to next 15 years aligning the three five year plans, 12 five year plan which started this year to the 14 five year plan. And many of the priorities which we addressed here as per the short term and the long term targets and also worked out on the sub projects what needs to be done in

the 12<sup>th</sup> five year plan and the 13<sup>th</sup> five year plan to achieve these targets. So this is now under discussion in the various stakeholders including regulators and others. Come to the next slide please.

I will just speak about this market forum. As I mentioned it's a public-private partnership initiative of ministry of power. This was actually launched in 2010 but this is registered as not for profit society under Indian Society Act and this is a kind of society to enroll members however that security procurement for that for the members to pay the membership fee. It took a while and by October 2011 we had 37 members. That was the time when the elections were held and the management of operation of this forum has been handed over to the elected body which I describe in the next slide.

Along with that what the government of India has done is that they've also set up an inter ministerial task force called India's Smart Grid Task Force headed by a very high profile personality like Mr. Sam Gupta who is considered to be the father of India's telecom revolution and he is also an advisor to government of India on knowledge and also head the India Knowledge Commission with the cabinet minister's fund. So our output, the recommendations which India's Smart Grid Forum prepare works as an input to India's smart grid task force which work with the different arms of the government to convert that into programs and policies.

*Next slide please.*

Hello. Yeah, so this is a voluntary public-private conversion of government agencies, utilities, technology and service providers, regulators, research and academy and other stakeholders. Government of India is a patron and they retain the chairmanship with a vita power there. So it's by and large ministry and the big brother's hand above us. They set up a society and today we have more than 105 members and we have more than 20-21 recurs spending and prime objective is to accelerate development of smart grid technologies in the Indian power sector or recommendations are advisory in nature.

*Next slide please.*

There are seat fund that was promised by ministry of power of a \$100,000 which we have not thrown but that's there as a back up money. We have more than 100 members of which 60-65 people are paying members. So we have enough money for our current operations. The founding members were ministry of power, the power finance corporation and the electricity authority which is planning for the electricity sectors. Before creation of the regulatory commission they used to read the regulation also and the [indiscernible] [01:01:26] electricity regulatory availability commission is our and central power substitute. We are of [indiscernible] [01:01:30]

efficiency. They are the six founding members that we have available members, utility category who pay one-tenth and industry members. Here again we have those who have more than five million dollar in annual ten hour they pay this category fee otherwise the industry comes under the capillary of limited members. They pay much less money. Five lakhs for this is around \$10,000 and its limited mandate is 1.5 lakh rupees. It is about \$3000 and associate members they pay fee and we have about 30+ associate members here. Many of the educational institutions like IATs, state regulatory commission, the state availability commission are our members and there are some endural members. I am one of the endural members actually. I was invited to join as an endural member. I was also elected unanimously at the concern of this association. International members, nobody has joined yet. They have to pay a fee. A couple of people, they are the associations from China and there are a couple of lapse like the LPNL from USA being requesting to join and also made a request wave of this available in \$1000 fee which we will be doing when we otherwise my loss.

*Next slide please.*

That is the office bearers. I said that the chairmanship is retained by ministry of power. The director incharge of distribution will be run by chairman all the time and I am the president. We have a secretary who was selected from at that point in time from Central electric. They have the same [indiscernible] [01:03:14] forum so for the interim we have appointed one of the governess person there. We find that I have forum members from the industry. Three of them are from IT companies like Microsoft, SAP and Tata Consulting Services. One from the midland companies. We have two utility positions. One is vacant. One is for the [indiscernible] [01:03:35] India's largest distribution company. It is about 20 million consumers and the man in charge of IT there, the senior general manager. He is the member from there. From [indiscernible] [01:03:44] academy [indiscernible] [01:03:49] and on the person. It is from IAT [indiscernible] [01:03:54]. He is in our board. The elected teams are generally for two years which is from 2011 to this year.

*Next slide please.*

We have ten working groups and each one of them focusing on different domains within the smart grid. This advanced transmission, advanced distribution, communications, metering, load control, regulatory and policy, architecture and defence pirates and business models, renewables and micro grids, cyber security. These are ten working groups headed by very senior people from very renowned institutions from various companies which you can see and there results in such deliverables that [indiscernible] [01:04:46] of all these working groups have been finalized. Earlier when the forum was launched there was a limitation that numbers

could be... industry number could be there only in three or four working groups. Now recently we have removed all those restrictions. Any member can be in as many working groups as possible so next slide please.

Speaker (Female): Ritchie that was your last side. So we are ready for McKay to take over questions.

Speaker (Male): We will take question and answers later. Thank you.

Speaker (Female): Thank you.

Speaker (Male): Thank you very much Ritchie. We do have a number of questions from the audience. I will put a couple of them to you now. We may save a couple for the end. The first has... in this case there are a couple of different audience members regarding rural electrification. Could you speak a bit more about the view of smart grid in their application to rural electricity? In particular... I see you have a working group around micro grid. If you could say a bit more about that working group and whether or not it will consider storage that will... and the storage question also came up from another question with regards to the line losses and power quality problem. So I wonder if you could say a bit more about the mini and micro grids working group and whether or not storage is seen as a viable technical solution for rural electricity.

Speaker (Male): That's a very, very interesting question. So parallelly I would request the audience to look at the [www.indiasmartgridforum.com](http://www.indiasmartgridforum.com). This is a website which we have and on the right side you will see news and new [indiscernible] [01:06:49] problem window. One of the items there you will find is a smart grid mission and broad map for India, final recommendations from India's smart grid forum. So that's a [indiscernible] [01:07:04] that consist of more than 70 slides. Here we have described what are our focus, what are the projects which we undertake and we also have done a benchmarking with other countries what they are doing, what are their drives, what are they finding. So this is parallelly which our audience could do particularly about the rural electrification India has more than 600,000 villages. So under it program called the Rajiv Gandhi [indiscernible] [01:07:32] which we started somewhere in 2002 which is still continuing. A six billion dollars has been spend. At that point in time the numbers were that about 120,000 villages were not electrified in 2002. The rest of the villages were electrified. That [indiscernible] [01:07:53] statistics which were there and we allocated about three or four million dollars at that point in time to electrify the remaining villages. And when the actual work started found that the earlier definition of the village electrification, the village definition itself is very interesting. Any armlet which has more than 500 people is a village and there are many places where there are not so, so such kind of armlets we have more than 600,000. So that the definition of [indiscernible]

[01:08:21] of education at that point in time was that if electricity is distribution line is coming to a village and at least one household or a public institution- school or government office is electrified it means that they have electrified. That was the definition and thereafter they never give connection to more people. Those who really have that influence could get it so that way if [indiscernible] [01:08:50] which happened prior to 2002. Then they realized that almost half a million villages which are electrified 90% of the people do not have electricity so they changed the definition. Now the definition is I don't recollect. I think 20 or 30% of household, all the government institutions, public institutions they are electrified and even the lowest category of the poorest of the poor who live in slums even they have new electricity. Then only a village is classified as an electrified village so under the reclassification they found the total village is electrified much less than the 500,000 which they were talking before 2002. So then came this program called the RPGYN and they allocated by now almost six million dollar has been spend on electrifying these villages. So the village electrification has been done very good progress and new electrical distribution system laid out to the far off villages. The sub transmission and transmission system also has been spend to support this kind of an electrification. But the problem is the supply and demand gap. The poor people in the village they want electricity during the evening hours. They want electricity to extend the day from together household cost so that electricity many times midnight or many times not even one day in a week. So this is the main problem today really electricity in rural areas [indiscernible] [01:10:23] other than some states they have done very well like Gujarat and some other states in the south. But when you go to the north and eastern states you will find many of them don't get electricity at home for weeks together. So how can we leverage smart grid technologies to give at least light line supply to these middle households and that is where the micro grid comes into rather importance. I think I have mentioned about 38 megawatt and above, maybe more than 38 megawatt of one megawatt and above capacity distributed generation existed industrial parks and in other commercial complexes and other communities, better communities. It does [indiscernible] [01:11:09] the people who have standard generation capacity they can be incentivized to isolate from the main grid at least during evening peak hours and rely on their standard generation and also control their load, whatever load which can be shifted to not cover shift those load, control their load and the minimum essential load for which from their standard [indiscernible] [01:11:41] capability and their available storage capacity. Available [indiscernible] [01:11:47] can be given to millions of homes to give them the light and supply. This is one of the priorities for the government so we have to come up with appropriate policies and programs, how the communities which have standard generation can be incentivized to either can the grid during peak hours. That would answer the question?

Speaker (Male): Yeah, that's a very concrete answer. I think the... the presence of so much strength by generation in India is a bit fast way dimension to this change. If I can I will move on to just two more questions and then we will move to our next presenter but I do have an interesting question here from it sounds like an entrepreneur in India [indiscernible] [01:12:38] works at business integrator in India, CIIE [indiscernible] [01:12:46] so they have incubated one of the companies associated with the firm equilibrium and the question is that so a lot of innovation is coming out of these technical institutes of has a lot of trouble reaching the consumer. How does the firm support these innovators? Is there a set of approach to actually supporting some of the technical innovation that's coming out of the great technical institutes of India?

Speaker (Male): Well equilibrium energy is the new company which they are talking about and yeah, even before the forum I know them and they are our members. Our activities are not [indiscernible] [0:13:29] when we come back technology sessions where we invite our members as well as other technology [indiscernible] [01:13:36] in each of the area. Like last week in Bombay we had a two-day workshop on lab connectivity. We invited all technology [indiscernible] [01:13:43] for the last wi-fi [indiscernible] [01:13:49] and many other are not our members and that technology companies [indiscernible] [01:13:55] they have presented. The denied response area where [indiscernible] [01:14:03] is actually specialized in is a very cheap priority. You must have heard what I said. We should be incentivizing people to [indiscernible] [01:14:11] from my progress and also encourage people with the large consumers in megawatts people to mandatory implement demand response programs. So if you look at that document which I send we are already recommending from this year itself those who have more than one megawatt and above they should have mandatory demand response infrastructure. So this policy intervention by the [indiscernible] [01:14:41] I strongly believe. Number one the factor is under the government and number two without policy intervention from government many of these technologies will take a long time to be implemented and one very important point I forgot to mention. The business case, I talked about the prices. The business case for us is much clear. The matter of places where this 30% is generating down to 20% to 15% that will [indiscernible] [01:15:09] for millions of dollars of investment for the transformation. Another area in 1950s when India was newly independent more people in villages have no electricity. That time our government came out with a program of subsidizing kerosene but rational [indiscernible] [01:15:30] subsidizing kerosene oil was due to the poor people for [indiscernible] [01:15:35] for lighting cars and lamps so [indiscernible] [01:15:40] small village in Kerala more villages are not electrified. Upto class seven I studied with the kerosene lamp, the lanterns, kerosene lanterns. So today what is actually happening these [indiscernible] [01:15:54] kerosene subsidy by government of India and a large percentage of this kerosene percentage in the villages that goes

[indiscernible] [01:16:04] in diesel and petrol. So the building [indiscernible] [01:16:08] fuel incentive is that can be channelized to village electrification and giving them even free electricity in the living when that itself is great. So there are different drivers for us. Our drivers are different. Our business case is different. Our productivity is also much harder so that is the reason [indiscernible] [01:16:29] is strongly into promoting smart grids in India.

Speaker (Male): Thank you Ritchie and before we hand it over to Richard Wunderlich two very brief questions but first is the India road map available to the public. So maybe you have a website that you can point that leads to.

Speaker (Male): If it's public India's smartgridforum.com on the right side you will see a window, news and events in which one of the scrolling item is smart grid mission and road map for India with final recommendations from government from India's smart grid forum to government of India. So this is the road map but it is still not the policy of the government. It will be the policy of the government and as I said the central government cannot make it as a compulsory to the state government conducting regional [indiscernible] [01:17:28] and utilities [indiscernible] [01:17:37]. There the regulators are already convened all the stakeholders and in June itself... sorry July itself they have launched something like [indiscernible] [01:17:44] which they have done. It is Maharashtra's smart grid pollination community involving all the stakeholders and they want permanent policies for demand response and things like that. So each of the states will come out with their own road map but by and large this will be the umbrella road map. The numbers, we have written about some numbers [indiscernible] [01:18:05] five years plan some \$15 should be spend exclusively on smart grid development. The number may change. Maybe four, it may be six, it may be two. That is under final discussion and also somebody else had asked the question earlier without strengthening the transmission and distribution system how can smart grid solutions be implemented. Perfect answer for that can be seen from all the different aspects of the grid modern session which has been recommended under this detailed program of 12 five-year plan which we have written in the smart grid road map which you can download. We will see all these approaches the first grid needs to be done. Like in countries like India where the grid is expanding eight to 10% every year and also adding millions we need to do more work on the electrical network whereas in advanced economies smart grid is more about better communication, integration analytic. But here we need to do more work on the electrical network itself in addition... at the same time we need to do the advanced solutions like EMI and Tata communication and other things. Our task is much more challenging and we need the support of ESCAN and everybody else. Thank you very much.

Speaker (Male): Thank you Richard and we do have other questions. We will save those for the end of the webinar. At this time I would like to hand it to Richard Wunderlich who is director of energy activities at Siemens so here we go. Richard.

Speaker (Male): Thank you McKay. I am going to be a little brief respecting everyone's time. We're running close to the end here but I think it's really significant to contrast a little bit say Ken's story of Ontario and where Canada is in comparison to where India is. But really it's a clear example of how different jurisdictions have different priorities that are going to be enabled to different policies in the stakeholder engagement. So unlocking and innovating the smart grid market is really a complex question. Some people say it's a question really of bringing together the stakeholders in a common understanding and often that common understanding is hard to establish. Many people are approaching smart grid from very specific perspectives. What Siemens does is really enjoys a position of operating globally but we talk about smart grid really from a perspective of the business objectives that utilities need to be able to address and how those align with the policies and the initiatives of their jurisdiction, what do those business objectives need as capabilities and which technologies might support those and it's really interesting if you would look at the global map to look at different focus areas and different initiatives and different countries. You will see how policy really drives that but behind those policy questions are really every region of the world looking for ways to enable a better quality of life in really recognizing the mega trends that are out there, the pressure on energy overall and the cost of energy overall and the impact of energy pricing in everyone's daily lives. It really causes us to ask how can we improve how we use energy, how can we disconnect our quality of life from the amount of energy we use by using energy more efficiently, more effectively and the right energy at the right time. So, you know, we're in the middle of I think sorting how to establish sustainable energy systems around the world and a lot of people say "What is smart grid?" You know the interesting perspective is understanding when you are successful and enabling smart grid. There is a new power era coming. Electricity is going to become more and more significant as fossil fuel cost most likely will continue to increase and the important aspect is going to be the paradigm change of how the grid actually operates itself. It's not going to be generation follows load in the future. It's going to be load follows generation with intelligent customer engagement, consumer's understanding what the cost of electricity are, systems and automation in place to facilitate grid automation so that in fact we do consume electricity at the right time to optimize and support the grid performance. And that's going to be further facilitated by producing consumers and Ritchie's comments about, you know, what to do with all of the world communities and individuals. You know there is going to be a lot of micro grid initiatives distributed generation initiatives, distributed energy resources online and that's going to be ranging from,



you know, say very, very adapt consumers and stakeholders to small or medium and large industry. More actively participating in upping into the electricity sectors so those are going to be big changes coming and the fact is that these changes are all about the communities that are needed to be supported by electricity. A lot of people are talking about smart grid and electricity in the context of transforming cities and, you know, the trends are for urbanization of our populations but also the trend is for medium sized cities and medium size community centers to become more significant. And we need to consider how is grid electrification enabling actually all of the infrastructure, enabling buildings, enabling transportation, the inter connections between communities and also the impacts it is going to have on personal transportation and vehicle electrification. So around the world in that context there are different initiatives underway but a key to unlocking smart grid and innovation is really understanding how all the different pieces of infrastructure are supported by the electricity grid and how the electricity grid supports all the other complimentary infrastructure. So, you know, it's going beyond traditional energy technology and it is needing to be a conversation about what is the utility of the future needs to be capable of in order to address its constituency. In the highlights, the challenges are on the left side of the slide. They are not unknown but they are of different priority in different regions. The solutions are really going to be those types of solutions that facilitate intelligent load management, that facilitate interactive communications on the grid to facilitate the notion of the producing consumer. So we're moving I think in the paradigm change from the dark ages of the grid, the last 120 years to a new kind of grid and it will be a grid that does facilitate more renewable energy sources and more customer participation. And the challenge today is really how to bridge that and I think one of the unlocking opportunities is for the regulator to understand what is innovative technology versus best practices of a utility and facilitating actually what in standard industry would be normal innovation adoption. So where to start, which strategies, where to invest, what are the right steps, the technologies to enable that and how do you measure success, those things need to be defined so that one can cage actually where you focus your time, effort and invest in dollars. We have chosen here for today's webinar to highlight a couple of examples. One is directly in support of the Ontario initiative in the Canadian context. The initiative of the Ontario government was through the ministry of energy to put together a special fund, the smart grid fund. For that we in fact worked very, very closely with the government, with the university community, with three utilities in this case and various industry partners to put together a demonstration project which really focuses around understanding again and aligning the business objectives between in fact government, the regulatory mechanisms, the utility business objectives and aligning all of that to a strategy conversation that Siemens facilitates through something we call the Siemens smart grid campus and what we're able to do by

finding that alignment is make sure that everyone is pulling together to unlock actually and innovate and we're able to put forward a proposal for a multi utility, multi vendor collaboration. So it includes a really reflecting the real world environment that the utility works in. Also respecting and understanding its legacy investments. Every utility is different and then the next step therefore will be a little different. So the utility of today is then able to innovate, adopt in technologies and prepare itself to be the utility of the future. Using the idea of bringing together the government, university utilities and industry I think is important and this is going to be a team now which I carry on in some quick references. Similarly another project that we're engaged with in Canada is in the province of New Brunswick and this is certainly not a technical slide and I think that's the point. Bringing together all of the key stakeholders. If you are successful at doing that you actually have a success story and I think that's important. In New Brunswick for instance when the project was announced this year on July 25<sup>th</sup> it was so well positioned, so well aligned that in fact even the political commentary through the media was positive in the reflection of the project in this for instance as shown here New Brunswick power and things to bring smart grid to the province's energy system. And the comment is if only the parliament would have a smart grid program and indeed what was missed is that the parliament does have a smart grid program that facilitated the entire initiative. So strong alignment of key stakeholders is what I am messaging right now and then similarly just trying to get outside of Canada for a second. There are other great examples London in the UK for instance the project that Siemens has been working on a multi year infrastructure enhancement partnership again with government, university, utility and industry and the theme behind this is establishing the alignment is never a quick job. So this initiative began in 2007 so before actually there were smart grid was even on anyone's list and I think today, you know, we are talking about smart grid. I am thinking five years smart grid will be probably acquired or turned in the market again will become standard business. A little bit like E business was in the late '90s and then we have the dotcom buzz. The reality is utilities will continue to innovate and prepare themselves for the future and they probably need the time to look in five and ten and 20 year increments minimally to understand their vision or strategy, their objectives, their current capabilities, where they move in the future capability and which innovations and technologies they will need to adapt to accomplish that. That's it McKay.

Speaker (Male):

Well thank you Richard. That's a great segway. We are a bit over but I would like to include a couple of questions from the audience and one of the questions for you from the audience picks up on that thread. It's a bit of a provocative question so I hope you will give us a provocative answer. From the Siemens perspective do you consider "utility innovation" to be an [indiscernible] [01:30:45] or contradiction in terms given to regulatory environment they live in and a related question there is if it is hard to

innovate under regulatory environments how can governments and regulators grant some sort of prudent cost recovery for innovation? One of the challenges here around innovation in regulated environments Richard.

Speaker (Male): Well another really comprehensive question that if you would deal with all of the neons we could have a half an hour conversation. So from a perspective I think it's, you know, the biggest challenge that utilities have today is that everyone is asking them "What are you doing to address smart grid?" and depending on the utility where it is, what its capabilities are, the defensive position or response of the utility saying "Actually our grid is pretty smart." You know it depends of course jurisdictionally but a lot of utilities that are innovating and applying smart grid concepts already have very robust grid. They already have established communication technologies in place, automation monitoring systems in place, robust control rooms in place. So the actual moron is in fact you know depending on which side of the fence you sit on it's happening in both directions. It's a misunderstood concept I think. Where is the current utility capability? So you have to look deeply into the real legacy landscape and understand the direction that it's going to go into and there is the challenge right because the policy is something that is driven on very short cycles normally potentially related to, you know, political, pure political influence. The policy then comes to regulate which is running more stable, steady mechanisms and addressing in, you know, being concerned about the constituency. So sometimes there is a gap there and one of the things that we're doing specifically globally is to address that gap and help everyone understand how to build the bridges and not to make a strong commercial out of it but the smart grid campus framework specifically is designed to facilitate and build a bridge between the policy, the regulator and the utility landscape so that actually there is a real structured understanding around the investment requirements of business cases and the means to say "Okay we have accomplished what our intention was. So that... building that threat is I think a key to success. It's often times missed as different opportunistic influences enter into decision-making processes and somehow I think I would encourage all utilities to find a way to manage those opportunistic influences and keep true to the longer terms strategists.

Speaker (Male): McKay, if I can just chime in here just for a sec. Totally agree with Richard's comment. I would also say that utilities are innovating today so I don't think it's auxi moron. I think the technology landscape is just changing even faster so I think rubbed at each other it may look like utilities are not innovating but then they actually they are. And the other aspect of it is that, you know, this is a bit of a... this is the benefit to being a leader because it is everyone trying to innovate and you've already done it. You can go and teach people and find commercial opportunities around that so to the expense I do they are innovating already I think we just need to accelerate that in various jurisdictions and I would pause about it to

some collaboration, cooperation that we could align various strengths and make a better go at it.

Speaker (Male): Very interesting and I wonder if on this utility question we might ask Ritchie to give us the last word here. What is the utility innovation and distribution company innovation challenge in India and I know we are a bit overtime so this will be our final word. Ritchie, any thoughts? Perhaps we lost Ritchie. In any case I think it has brought us full circle to this question of, you know, the rapidly changing technology landscape underneath the utility speed and the sort of challenge in planning. Ah, there you are.

Speaker (Male): Yeah, I was muted so I just... we have some private on utilities who embarked on this last month last four five years ago like Delhi. One of the private utilities on Tata power and Delhi government to invest called the NTPL. Now they changed the name to Tata Power Delhi Distribution so they were one of the pioneers in smart grid incentives in India. They joined IBM's UN coalition, global coalition and that time when the smart grid maturity model in 2009 when they were also they were one the best of five utilities and many things which NTPL had done that time for reducing the losses. See our challenges are different initially and Delhi when it was privatized in 2002 the TNT losses were above 50% and they have brought it down over the last eight years, eight-nine years through technology intervention primarily to 14%. I am told it was 57. It could be 58. It could be 60. Nobody knew because the numbers have no meaning but that was the range. From there they have brought it down so there are lot of initiatives done by many... even state government owned utilities. The state of Gujarat their total losses are below 15%. It has crossed 10% that's even lesser than the NTPL in Delhi. Some of the similar stories are there in our states also who have done systematically. Our challenges are different. It's not just one solution being implemented there... no. Problems are multi various and we have to innovate the problems picked by the smaller problems which are not being challenged in the advanced nations. So our road map is entirely different than other world map. But the advanced solutions who are being implemented and it's not the same which is being done in Canada or United States or in Germany.

Speaker (Male): And on that note I think the diversity of solutions around the world is going to be one of the most interesting topics to watch over the next five years. I would like to on behalf of the solution center and on behalf of his camp give a hearty thank you to our panelists this morning and to all of our attendees. I thank you for hanging on with us. I know we have gone a bit over. This [indiscernible] [01:37:54] to our webinar for today. Again as we mentioned the presentations will be available at the solution centre website and within a couple of weeks the audio of this webinar will also be available. Please stay tuned. Sign up for the solution center newsletters so you can receive notification of upcoming webinars and this again itself

will be presenting smart grid relevant webinars on a regular basis all throughout 2013. We very much thank our panelists and wish you all a good day. This concludes our webinar.