

Webinar Panelists

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Sean Esterly Welcome to today's webinar hosted by the Clean Energy Solutions Center and the International Energy Agency. Today we're very fortunate to have Didier Houssin and Marc LaFrance joining us. Our speakers will focus on IEA's Energy Efficient Building Envelope Technology Roadmap

And, one important note I've mention before we begin our presentation is that the Clean Energy Solutions Center does not endorse or recommend specific products or services. Information provided in this webinar is featured in the Solutions Center's resource library as one of many best practices resources reviewed and selected by technical experts.

And I just want to go over some of the options for audio in today's go to webinar. So the audio you have two option. You may either listen through your computer or over your telephone. And if you choose to listen to your computer, please select the "mic and speakers" option in the audio pane. Doing this will just eliminate any feedback and echo and if you select the telephone option, a box on the right side will display the telephone number and an audio PIN that you should use to dial in. And panelists you just have to please mute your audio device when you're not presenting. And if anyone has a technical difficulty through the webinar, you may contact or go to webinars Help Desk and that phone number is at the bottom of the slide, that is 888-259-3826.

And we encourage all attendees to submit any questions that they might have throughout the webinar. You may do that by submitting the question through the question pane and that is in the go to webinar window and if does anyone have any difficulty viewing the materials through the webinar portal, you will find PDF copies of the presentations at

<http://cleanenergysolutions.org/training> and you can follow along with the speakers present. Also, an audio recording in the presentation will be posted to the Solutions Center training page within a day or two of the webinar.

We have a great agenda prepared for you today that is focussed on the Energy Efficient Building Envelope Technology Roadmap detailed and strategies and actions to transform the way building has constructed by 2050. Now before our speakers begin their presentations, I'll provide a short informative overview of the Clean Energy Solutions Initiative and then following the presentations we will have a question after session where I will present any questions from the audience through the panelist and then we'll wrap with closing in a very brief survey.

Now this slide provides a bit of background in terms of how the Solution Center came to be. Solution Center is an initiative of the Clean Energy Ministerial and then supported to a partnership with UN Energy. It was launched in April of 2011 and is primarily led by Australia, the United States and other CEM partners. So outcome to this unique partnership includes support of developing countries, the enhancement of resources on policies relating to energy access, no cost expert policy assistance and peer-to-peer learning and training tools such as the webinar you are attending today.

So there are four primary goals of the Solution Center: Serve as a clearinghouse of clean energy policy resources. Also serve to share policy best practices, data, and analysis tools specific to clean energy policy and programs and the Solutions Center deliver dynamic services that enabled expert assistance, learning, and peer to peer sharing of experiences and then lastly the center foster dialogue on emerging policy issues and innovation across the globe. So our primary audience is energy policymakers and analysts from governments and technical organisations in all countries. And then we also strive to engage for the private sector, NGOs and civil society.

Now, one of the marking features that the Solution Center provides is its expert policy assistance. This is known as it Ask an Expert and it's a valuable service operative in the Solution Center at zero costs. So we have established a broad team of over 30 experts from around the globe who are available to provide remote policy advice and analysis to all countries. For example in the area of buildings, we're very pleased to have Cesar Treviño, Leader of the Mexico Green Building Council serving as our expert. So if you have a need for policy assistance on building or any other Clean Energy sector, we encourage you to use this useful service.

Again, this assistance is provided free of charge. So to request assistance, you may submit your request by registering through our Ask an Expert

feature at <http://cleanenergysolutions.org/expert>. We also invite you to spread the word about this service to those in your networks and organisations. So, in summary we encourage you to explore and take advantage of the Solutions Center resources and services including the expert policy assistance, subscribed to our newsletter and participate in webinars like this.

And now I'd like to provide a brief introduction for our expert panelists today. Our first speaker is Didier Houssin, the Director of Sustainable Energy Policy and Technology at the International Energy Agency and then following Didier, we will hear from Marc LaFrance of the International Energy Agency also known as Sustainable Policy and Technology Energy Demand Unit and with those introductions, please join me in welcoming Didier to the webinar.

Didier Houssin

Good morning everyone and I'd like welcome everyone to this webinar and also I'd like to thank the Clean Energy Solutions Center and the National Renewable Energy Laboratory for collaborating with us today to launch our new technology roadmap for energy efficient building envelop. Achieving significant energy and due to emission reduction in the building sector is a very ambitious goal. This publication wants to address the fundamental challenges and opportunities to transform the way it was constructs and renovates building. ETP 2012 as you can see on this chart identified the low carbon energy technology that can help achieve the 50% reduction from today while avoiding all of the expected increases. The most important option in both the short and the long term is improving energy efficiency. Improved energy efficiency in the annual sectors accounts for 38% of the total emissions reduction in 2050. Today's publication is focussed on how to construction buildings, which is one of the largest factors impacting heating and cooling loads and for most of the world, heating and cooling loads are the largest end users. Our next upcoming ETP 2014 publication will be released this coming spring and it will focussed an increase use of keen electricity so for the building sector ETP 2014 will analyze greater tool switching from gas boiler to heat pumps, the two regions in particular for China and [inaudible] [00:07:24]Union.

Let me come back to the global challenge. As you can see on this chart, has all end-use sectors, buildings is the largest energy consumer accounting for 35% of total energy used just before the industry and transport sectors. Policies try being to reduce energy and fuel emission must address the growing energy needs of this sector. As you can see on this chart, the breakdown of energy, the consumption in the building sector shows that the share of electricity 28% and renewable including tradition biomass 30%.

Sean Esterly

Sorry Didier. Okay, there you go, it's working, yup.

Didier Houssin

The importance of the building sector it got obvious. It represents 1/3 of carbon emissions and it is strongly correlated to its use of around 50% of the total electricity consumption in the world, much of it from the burning of coal. The building sector plays a vital role in the global economy and for instance in the global economy crisis and stagnation described it has been to a logic sampling to the building sector collapse in many countries such as Spain and Europe. Buildings remain in service for a very long time in where they constructed inefficiently that lost opportunity will cause problems the decade and even centuries to come. So getting construction right the first time its fair amount along with the need to upgrade the existing building stock. The demands for new building will continue to grow for quite sometime with increasing population and wealth at global level and especially in developing market.

Our recent major publication on buildings that we published earlier this year lays out strategy to say 80 joules which is 25% less than in our business as usual case, our 60 week scenario and this amount is equivalent to the combine consumption of India and Russia. These publication provide nine regional analysis including detail recommendations. It also provide comprehensive technical analysis and recommendation for the food compliment of technologies and end users in the building sector including a plan on how to implement energy efficiency alternative at a range from on the to the deployments. Integrated policies such as building codes and deep energy renovation on a major focus along with the efforts needed to transform niche products into mainstream and its practices. That led me now come back to the next please to the—our technology roadmap program. This program was launched for—at the request of the G8 in 2008 and to objective is to accelerate the development and deployment of the major clean technology that are needed to reach the ambitious goal of limiting global temperature increases to 2 degrees Celsius. Our roadmaps aim to address three main question where we are today for a particular technology, how do we move forwards and what are need term action to get us there. This approach is important in the sense that it involves engaging experts from industry, government, academia and research to work together in developing an implementable strategy to accelerate the development and deployment of a particular clean technology. We have issued two previous roadmaps in the building sector, one on heating and cooling equipment and one in solar heating and cooling.

We also have developed in the feel of clean energy policy pathways that assist policymakers in the tuning more effective policies targeting for critical areas within out top 25 energy efficiency recommendations. We have previously issued a pathway on building energy performance certificates and this year we issued a new one on how to modernize building energy coals. So today, a roadmap on building envelop is really complimented its previous work of the IEA dedicated to the building sector. So they keep on hear as if this new IEA roadmap lays out the

strategy to transform how buildings are constructed around the world including the technical, economic and policy analysis to help policymakers focussed on the construction market that can also reenergized their economy. Several regional assessments are provided to assist decision makers on where to focus their efforts and calls for to improve tracking of progress on the adoption of high priority building envelop materials and products. The roadmap also calls the policymakers to conduct self-evaluation on key policies related to initiating more sustainable building practices. It also lays out few recommendations to each stakeholder group that each of these groups should follow to ensure the opportunity it relies while at the same time avoiding construction with inefficient materials to continue. Having said the global objective of this new roadmap, I'd like now to turn over to Marc LaFrance and with the main author of this roadmap and he tell you more about the specific content and recommendation. So please Marc.

Marc LaFrance

Thank you Didier. Welcome participants I appreciate your taking the time to tune in today to learn more about—work on the building energy, a building envelop of roadmap. So here on this chart, this basically lays out the transformation for building and on the left it represents the majority of the building stock that exist in the world today, that is very inefficient and then in places such as Canada, the EU and US we have what we call no advanced construction with a lot of technology such as insulation and low-e windows and proper air ceiling but we really want to move to right which is the future for zero-energy buildings and how can we optimize performance through technology such as highly setting windows, advanced façade, no day lighting, stole and thermal, that sort of thing. So the entire roadmap lays out this process of how do we move forward.

Okay, and so this shows the potential savings from advancing building and we have some globally and we have eight regions lays out here. And, look, the largest savings come from EU, Canada and United States, China and Russia and also with mostly for heating. So, we have the largest consumption of the world right now with heating mostly in the residential sector, that represents the largest opportunity for savings but actually the largest growing sector is the cooling demand and a lot and many developing countries that's going assuming fast so that also have to be addressed. So we have technologies and policies that address both the heating and cooling savings.

So, now I'm going to go through a few technical details then I won't go in too much but just to give you a flavor of what the roadmap has to offer. So here is the chart that shows the performance of the golden rules and the majority of buildings are there, very inefficient with the existing stock that have virtually zero-insulation and then building that have let's say we'll call it minimal insulation from the 60 and 70 and then we have some very advance building codes in the world to show you where we can get to and

so the IEA is laying out recommendations for both cold and hot climates although we know that these deficiencies have to be based at the local and regional level with local and regional data such as pricing and cost materials.

Okay, another key element is to have air sealing and if any building is going to have a mechanical equipment for conditioning either heating or cooling it should be air sealed and contrary to many people believe that air sealing causes poor quality it actually completely the opposite through and by properly sealing the building and controlling for fresh air ventilation you can actually improve air quality not degraded and the savings are pretty dramatic so this is something that needs to be pursued more actively and even with lots of accept in Europe with energy performance certificate the majority of those do not require a validated air leakage task which is something that needs to be pursued.

Okay, in this chart shows you the performance of Windows and on the left that's the majority of the stock of windows that exist in the world today. Lots of single pane glass with inefficient framing even double clear glaze glass is inefficient and so today in lots of places with advanced building codes, people are pursuing window performance that approximately 1.8 watts percent meter squared Kelvin or the technology is double pane with low-e glass and a low conductive frame and then so we're recommending that that becomes the basic requirements for the entire world because these technologies good for both heating and cooling and then for cold climates we're recommending going to a performance that at least 1.1 U-value which is represented as a triple pane with two low-e services and low conductive frame.

Okay, the next slide is it deals with reflective roof opportunity. And reflective roof make the most sense in hot climates but they also can makes densely urban areas what we call a very high urban heat island effect and so a reflective roof will reduce your air conditioning load. If you have a cooler city which is to mitigate their urban heat island, you'll also have a low air conditioning for the entire city. You'll have lower electricity peak demand and believe it or not in places like New York City mandated its policy to reduce the temperature of the city to get people to come out and spend more money in their economy because there'll be more comfortable in the environment and there was also people that are pursuing cool services for roadways and parking lots. And then the last element of it that there's been quite a lot of research that has been done to talk about how can we cool the planet and by objecting the heat backup to space and the report discussed with the and one place, the research has been done in Nigeria.

Okay, so the next big element of the road map was we conducted a technology assessment and we worked with experts on two levels. We

worked with technology experts that address markets around the world and then we worked with regional experts that address their particular situation and we try to catalog the effectiveness of what being implemented on high priority areas in several regions of the world. Now we realized there's significant region variation that makes this type of analysis difficult but this gives you at least a snap shot of where we think things are today and while we have areas such as typical insulation and low-e glass that are doing fairly well, the majority of the world needs to improve on getting much better quality buildings and is like huge opportunity to improve building envelop. So of course when we did an assessment there were some conflict in the IEA that best we could to resolve those but this is the sort of things that we want individual policymakers in countries to track themselves to improve where they're moving forward.

The next slide refers to lifecycle cost analysis and this is more of a theoretical example but it does include real world data but it illustrates why we need to work on integrated policy approach. Why need to look at a 30-year lifecycle analysis rather than just be initial payback period and by doing this we can really get much greater investments into building envelops. So they are the paper does the—I have special mention on why we need to assess level of insulation and types of windows data lifecycle cost.

Okay. And now of course the roadmap address R&D and several high priority areas that we want to work on. The big thing about R&D that some people don't realized is not only will improve the performance of technology but it also can significantly reduce the cost of high performance product and that move was built in a greater return on investment. In essence it's going to make lifecycle cost even more advantageous especially we try to get very high levels, it will reduce the risk associated with investing in advance in most and also in many regions of the world everybody is very coast prohibited to increase initial capital costing investment, lack of financing and whenever you can reduce the cost of advance technology only helps with the market uptake and deployment. A couple of examples include vacuum glazing, vacuum inflated panels and [inaudible] [00:22:03] gel, for example that are discussed in the roadmap.

Okay, we also conducted another assessment which is based on what we call the—actually there's one other point that I was going to discuss, but it's the infrastructure and technical mechanisms but this is a policy assessment where we lays out criteria that distinguished between what we can serve to be a high medium and raw level of policy uptake and these are related to specifically for building envelop and what we done is we conducted what we see as an assessment for each region but we really calling for each region to be with sales assessment to look at the criteria

and they where am I on this policy and how can I move from low to medium or from medium to high or you're the from the high level how can even get better and we try to layout the criteria for people to that assessment and this is something that we see as dynamic. Why would publishing in the roadmap we want to see people doing as our annual basis or every five years how much policy that we make in this particular policy over the last five years and where can we be in 5 or 10 from today.

All right, so it's obviously leading to the next thing, which is tracking. Today, the overall majority of policymakers are not doing a sufficient job of tracking building envelopes. What's the market share for technology such as low-e glass or high performance insulation, air sealing and we also have country that have adopted our zero-energy building policy for 2020. Well, what percentage of buildings are actually meeting the DEB or the zero-energy criteria today and how much more private need to take place of the next seven years so that by 2020, they're successful. So lots of the areas for improving the tracking and then also in a lot of criteria such as we have things that come out what they called that in the EU, we have the thing called near zero- energy criteria. Well, near zero-energy is not really defined. You know is it 70% improvement, is it 80% improvement? So goes with that I think we need more criteria on and then there's also things like renovation rate for public building to renovate 3% per year but we need to have a performance criteria and we would argue that that performance criteria would be better to be a much deeper or a very aggressive energy efficiency retrofit—. it would be better to do one% in a much deeper level than do 3% at the very low level and the roadmap let's drive in deep, the why that make sense. So the other thing is we were also considering the expanding our building activity and working with partners and how can we collaborate on policy assessment. How can we get improved datasets and really how do we work together to affect change. It's one thing about publishing the roadmap today but we wanted people to take this roadmap and implement it where the problems to get implemented, how can we improve that, what additional types of analysis and data of could we doing modeling that would help people implement it and have buildings that are constructed in a much more efficient way.

So, there 's three key elements that we're really talking about on the top level and that is in well developed economies and country, how do we get greater development of existing proven technology? How do we improve market share from 40% to 98% or 100% and another big area is how do we adopt and how can we introduce well-established technology in developed economies to emerging economies. In some cases, it requires infrastructure involves capacity building, rebuilding the performance metrics, lots of various to getting the adoption and it's usually starts with investment, getting manufactures involved and so that's a major area right now with especially with the large group of construction and developing markets on the world and then the last we touch base of course on right

here is the where is the R&D required to get the better return on investment to make these retrofits more cost effective, to make zero-energy buildings more cost effective.

And so it would be through macro strategy we can significantly improve the building of the world. Okay and then I will—I'm just putting my contact information up here. The last link actually includes that actually and will bring you to the page for the roadmap. It is available now. It's free. You can download it. There's also some additional materials on there such as the annexes, along with the news, the web article that was published today and before—I turn you back over to Sean for question, I'd also like to acknowledge two people in the room. We also have to Cecilia Tam and Cecilia she leads our entire roadmap activity for the numerous, our roadmap should be IEAs put out all over the years. She also heads up the Energy Demands Unit within our directorate and also John Dulac and John has been working with me in the building sector. He also is the transportation expert but John was instrumental and putting out the building book this year that Didier talked about and he also assisted with the roadmap and getting everything where we are today. So thank you so much and we look forward to your questions. Thank you Sean.

Sean Esterly

All right thank you Didier and Marc for the presentation and we do have some questions have coming from the audience. Before we get started, I would just like to remind any attendees that if you had any question on the presentation or anything that you'd like to have address by the panelist, you can submit those questions through the question pane and you go to webinar window. I'd like to start off with the question for Didier. Just on, in general could you speak on some target policies for developing countries where growth is likely to happen?

Didier Houssin

I'm sorry Sean, could you repeat the question. I think we had a problem with our speaker here.

Sean Esterly

Yeah, definitely, I was hoping Didier could just speak talk a little bit on a target policies for developing country where growth in the sector is likely to happen

Didier Houssin

Yes. Thanks for the question. I think as we put it out as much just said I mean the one of the key focus the greater deployment of proven technology in developed countries so because a lot I'm not sure a technology that again be used in developing market where bulks of your constructions is the talking place so we have basically two different areas where the policy is for discipline because in industrial country the key issue is renovation because they have making building stock where we need to do a lot in terms of renovation whereby for emerging countries where you have a lot of new construction that have of the increase in population what is important to make sure that the quality of construction

is here and that energy efficiency is taking into account from scratch and not just the objective of low cost construction is not done at the expense of—then the cost of the building in terms of operation cost and energy cost looking forward. So this is really a key issue to expand also to reach out to developing countries for the quality of construction. Other than Marc you want to elaborate and this ...

Marc LaFrance

Yeah, okay, Didier I think you touch base on the microelement. So within the building sector, they thing we're going after the building codes and developing markets at the building policy but when you look back in the slide that and the roadmap when I—we talked about the governing policies. For example we have many reasons of the world that still have pure subsidies in place so how can you implement energy efficiency technology when somebody is applying a quarter or half of the market value of the energy so that's an example of additional policy that needs to occur in developing market to change that. We also have the lack of governance for handling the building sectors so for example a lot of countries have the energy administer or the energy department that's responsible for supply and for, you know, electricity but they don't cover the construction element which is important for the envelops and then the ministry of construction, the ministry of construction, is, you know, a lot of times concerns with safety, you know, they're concerned with fire hazards, they're concerned with occupied concerns or worker concerns. So, if we go back to the slide I know you don't have—we don't have on the screen at the moment but in the roadmap we have a chart that lays out the other policies that are important and many of those are applicable to developing market as well as establishing economies. So, Sean so I'm ready for the next question or we're ready for the next question.

Sean Esterly

Roughly. Thank you the next question is if you ask Department of Energy or any other nation's energy group doing anything to financially support the development and commercialization of very high R value or very low UR key value window components in whole windows.

Marc LaFrance

Yeah, thanks Sean, in the annex we explained in detail on some of the works that occurred for vacuum glazings. Germany had a pretty effort for 10 million Euros. There's been several efforts in the US that were competitive projects under Department of Energy. There's actually some working China on vacuum glazing but we pretty much come to the conclusion that not enough is happening and that more effort needs to happen and we actually suggest that international collaboration on R&D for very low energy windows is kind of key action item especially when we're trying to achieve zero energy buildings and cold climates. It's certainly not need of a hot climate but it would be something that we suggest and we also don't take a position on the technology. Some manufacturers believe that back in glazing is too complicated and too expensive and they believe a more traditional approach through triple or

quadruple pane of glass or thin film layers can achieve the same performances. So we're specifying criteria not the technology pathway but we do describe that the several pathway that get there.

Sean Esterly

Thank you Marc. I have a couple of questions referring to the charts and figures in your presentation so Heather we may want to allow them to or if—Heather if you could put up their presentation that might be helpful. The questions are do the charts account for industrial building energy consumption. They note that several times industry building involved efficiency is ignored and then another question referring to the figures are the figures shown so far worldwide one? Both of these, they don't specify which slide but they were submitted at the beginning at the presentation.

Marc LaFrance

Okay, so the first one is that generally industrial building space conditioning load is not necessarily included but most industrial plants, the thermal load for space conditioning is very low compared to their operation because a lot of these industrial plants have lots of heat and there's a lot of significant effort on the way to harvest that we keep in industrial plant to serve improve deficiency but certainly the services sector which includes all of your manufacturing and all of your hot mentality and schools and public building, so the enormous amount of your service sector is certainly included so we have the residential sector. We call the services sector, many people call the commercials sector were nonresidential sector. I think we definitely have the details in our building technology publication but I think roughly it's something like in the orders of two-thirds, the three quarters of the energy and building that associate with residential and a third or quarter is services and so if you were to look at industrial it would be very, very tiny but certainly if somebody has the industrial building all of the strategy that we discussed in technologies, we discussed in the roadmap with certainly be applicable to that other sector but they're relatively sector. The second question you had about the charts so many of the charts that we present are regional based so in this case we show eight regions. We broke up the world into eight regions so it include the entire world. In our building's publication we had nine regions which in that case didn't include the whole world but we showed global numbers as well nine separate smaller region and then of course when we say, like in some cases, we show you, we're showing the typical window technology that exist in the world today. We don't attempt patient to show the market share of these types of windows around. Quite frankly we would love to have that data but it's very different to obtain and it's almost impossible at this point in time but that something what we need to work so in case in a particular region. Now what is the market share for this, the market share for that? So, I think when they download the roadmap, they'll get a better perspective about what we mean here and of course if anybody has a follow up question I'd be glad to receive those by email to get back with people. So that's about it. Thanks Sean

Sean Esterly Great, thank you Marc. In the next question refers to specific types of window. They note the slide show in window performance refers to aluminum frames but makes no reference to polyamide thermal breaks, which are widely end user in the world. Are you including this type of window in the conductive frame category for the world baseline target?

Marc LaFrance So, well of course. It is very difficult to show all the categories of windows. We do discuss the issue of thermal breaks. We do discuss the issue of high performing aluminum framed windows. We actually discussed the example of one that was very high performance, the buildings book actually provide the thermal graph of that as well which we didn't put in the roadmap but I would actually slightly defer with the question that the majority of the installed windows in service in the world with aluminum framing do not have thermal breaks and that's a problem. They're large energy loss and so of course we can replace the windows, which is probably the best option, or we can put on a storm panel that actually protect that thermal loss of the frame by having an exterior low-e storm panel that actually put in a thermal break from the frame. There's a lot of technologies to improve that so I would just say that I think this issue is pretty well covered in the roadmap and but we can't show every configuration in the charts obviously so.

Sean Esterly Great. Thanks again Marc and our question now about cool roof. If they have the function of reflecting excess of solar energy then aren't they in effect increasing the heat island effect and if that's true can we consider then that cool roof are a sustainable measure for building?

Marc LaFrance Okay, so, if the person that submitted the question want to follow me a bit more than that with a lot of detail but really quickly when you reflect the energy from a cool roof that energy goes—we actually have validated results that it goes to space, okay, so it does not going to absorb. If it's getting absorbed in the roof membrane that actually is heating the building that heating the city. Okay, so the idea is not absorbing the energy to reject the energy to reflect the energy backup into space and the research that was done actually assess the absorption of energy by the water vapor and by particular from the air, from pollution and that's the factor how much it get reflected but it certainly does reduce the urban heat island effect as well as what do you think. Now the one possibly negative side effect is it can increase glare so if you have a roof there at the lower level then our higher building there could be some glare problems and that can be mitigated through a thing we called cool colors which it reflects the near of red rather than the just the bit of the light but in any case, this has been well studied so there's lots of good in this Sean but thanks Sean.

Sean Esterly All right, the next question is are there plans to develop channels to bring existing energy saving products to emerging markets or were current

manufacturers and distributors of these products need to develop this distribution mechanism?

Marc LaFrance Okay, it's a very good question and so what the roadmap is calling for is cooperation among industry, academia, nonprofit, local governments, you know, the organisations like the IEA, organisations like IPEEC and so how could we work collaboratively to introduce the technology and so one of the things we talked about is the capacity building. You know, training, education, setting up the performance metrics and doing that in collaboration with the group of entities will ensure that something is not going to be completely driven by industry alone that could end up, you know, being one sided. We would have an objective so that we don't exaggerate the savings so that they are appropriate. So, you know, we also have an effort in my assisted division which is working on in efforts to do deployment and emerging economies and part of that is of course working on capacity building and so I think there has been that's effort together this consolidated effort that I mentioned but a lot more needs to occur for us to be effective in achieving the goal that we're calling forward to reach to the [inaudible] [00:41:44] for the entire perspective of the roadmap.

Sean Esterly Okay and the next question as of the report covers building material types for building envelop.

Marc LaFrance You're saying that it covered building material types you said?

Sean Esterly Does it cover the type of materials for building envelop?

Marc LaFrance Oh, yes, oh, yes. So we done extensive assessment on different building product and materials. So for example, you know, different types of windows, retrofit attachments to the windows, roofing materials, insulation, so, we have extensive assessments that have been conducted and all of these different types of technologies are discussed and you know this type of project is about between how technical do you get. We might not satisfy some of the people want extreme technical details but at the same time we give a lot more information to policymakers so that it's not just thing this is the right thing to do, this is the right thing to do and why is it the right thing to do and where it has been done before, what savings can you get from it. And we kind of tied that together with the balance m you know, what did I didn't say at the end of my remarks which I should mention is I also want to thank and I'm sure there must be someone on the line today. I think we have over 65 reviewers that commented and provide the extensive input to us and we really appreciate that. There were probably four or five people that provide the extensive information and if it wasn't for that type of peer review, we won't be able to give such a robust explanation of all these technologies. Yeah, definitely is well covered.

Sean Esterly Thank you marc. And the next question notes that the pricing of energy in the state of the economy have direct relationship with energy consumption. Are there any idea on how to integrate this phenomenon with our sure strategies or energy saving?

Cecilia Tam In the IEA's modeling exercises we do take into consideration in our models the energy price relationships. The building sector and particular though given that such a large share is for the residential sector what we have seen in our ETP scenario analysis as well as in our roof efficient world scenario analysis is that in general the price sensitivity for energy prices in this sector is not that high unlike in the case for the industrial sector where higher energy prices does drive more action for energy saving but given that in those part of [inaudible] [00:44:27] countries, the share of household spending on energy costs is relatively low. The price sensitivities are not that high. I think what governments can do is to offset this lack of a link in terms of price sensitivities is to implement tougher energy efficiency policies through implementation monitoring verification of tougher energy efficiency policies as well as Marc already mentioned to remove the extraordinary price effect that are created by fossil fuel subsidies. Thank you.

Sean Esterly And the next question I have asked is the IEA has design tools that can help engineer occupy energy savings that can be incorporated into building such as design phase and if so could you share where those can be found and if not you know, where there such tools are available.

Marc LaFrance Yes, thanks John. Yeah, so in the roadmap we definitely touch based on the need for what we call simulation tools to provide optimized performance and but we didn't not go into detail about those tools. First of all, the IEA does not have that capability where more of a policy organisation we work on macro strategies for the world but there's lots of tools that are available. A lot of the member of governments have these tools. I actually know more about the US tools but that's where I used to work before I came to the IEA. There's, you know, for example there's EnergyPlus and EnergyGauge and DOE-2 but there's many other models around the world and so if somebody will needs more to mention about that. They can send me an email and I can give you a link of few places that we have that but so to some extent we stay on the roadmap that the simulation of the building is beyond the scope of the roadmap but we certainly acknowledge the importance of doing building simulation of for when you try to rather than optimized design. Thanks Sean.

Sean Esterly All right thank you Marc, nest question notes up that there's a populate that triple pane windows with very low U-value are the best solution but the problem is that the DTLT solar factor most of the time varying in opposition with the U-value. The question wouldn't it be better to talk of

optimizing the yearly energy values of our window than targeting the low-e value even if the solar gain suffer.

Marc LaFrance

Okay, so we very clearly discussed in the roadmap this issue about optimizing performance. We want to get total energy benefit more than actually we can have windows that can become net energy plus and they actually contribute more energy to the building than they lose there in a year through high solar heat gain paths of heating. We talked—the chart that I showed that shows the transmission of building talks about, you know, optimized design and orientation, highly setting windows with dynamic solar control. So if we can—but the reason why we do talk about having a very low U-value I because if we look at the consumption of the energy lose from buildings—and from windows in the world, the majority of the lose comes from cold climate and the windows are very inefficient. So having a very low U-value with dynamic solar control you now can get high pack of heating in the winter time and you can significantly reduce the cooling impact in the summer time and we discussed that the extent in the roadmap, I'm sorry that the presentation didn't quite get that but we certainly support that whole effort but at the same time, we do need those fundamental technology so that it allow for this optimized performance of windows which is we need more affordable low U-values and we need more affordable dynamic sort of control. Thanks Sean.

Sean Esterly

All right, and the next questions a little more broad but it's asking if there are three key recommendation that you can make at the city level. If you can make three key recommendations, what would they be? The person submitting this actually targets a city in Southeast Asia but if—you can't get that specific I definitely understand.

Marc LaFrance

Okay, so, okay, okay. Cecilia —Okay.

Cecilia Tam

When I guess if we are looking only at three. One of the top priorities I would say within IEA's work is really to take an integrated systems approach to design and policy implementation and what we mean here is that not look at that individual technology. There are components but really as the whole energy system and in many cases. We do not see sufficient use of efficient district heating and cooling systems with optimal use of high efficiency combined hidden power, technology, often. We see people focusing only on individual and technologies or just one area of the building sectors of the city and we also need to enforce tougher building code and make sure that these are verified in a lot of the city design that's going on and then now I'm going to pass over to Marc for the last one if you want to add.

Marc LaFrance

Yeah, I guess so. Yes, we too touch bases on some of the macro system issues and I think it's probably beyond the scope of this roadmap but John has done a lot on this urban planning for cities and that sort of thing which

definitely comes to mind. But if I was the city planner in a southeast Asian capital and city that has very high cooling loads or very hot climate, the first thing I would do is okay, is of course but new construction all of the things we talked about for building codes, driving forward for building codes cool roofs, for low-e windows with—especially selective low solar heat gain as well as proper insulation but then, you know, probably we have a lot of existing buildings that are low income that can't afford advanced technologies but something as simple as low cost cooling that goes on existing rules, just something as simple as exterior bamboo shade anything that an exterior shade or window film is a lot of low cost technology that are perfect for, you know, low income housing and one of the things that we talked about is that and we know from my experience a lot of the countries as soon as the particular city of a country's wealth increases and people that can afford it go out and buy air conditioning and of course there's work to get more efficient air conditioning which is important but for the building envelope, we can significantly reduce the requirements for cooling and in some cases when people are culturally acceptable to live in a little bit hotter condition we can reduce the temperature of that building to an acceptable level just with passive strategies so they'll never need the air conditioning because let's say the building is 30 degree C and we can bring it down to 25 degree C, you know, the 25 C might be 5, they don't need any air conditioning. So, there's lots of passive technology they'll make sense. Sean.

John Dulac

There's final notes on urban policy it might be adventurous for city planners to look at some of the initiatives that happened globally in an urban level. For example, the Quintin Foundation has its C40 initiative, which the climate acts in Megacity Group. They specifically look at target areas like building and transporting cities and have focus on what mayors are doing in terms of policy implementation to support those actions. And that information can be found online, it might be useful particularly as it's focussed on cities across the globe and not just new developing countries.

Marc LaFrance

Thank you. I think we pretty much add to that. It's that pretty extensively Sean hopefully...

Sean Esterly

I'll take that. All right. Thank you. And the next question is how do you attract private - public partnership in promoting energy efficiency in building retrofit?

John Dulac

I think, sorry just to come forward the—always to do recently we had a workshop on in that attracting private investments or public infrastructure development and one of the key conclusions coming out of this workshop it certainly applies in this case is making sure that you have a policy for marketplace that supports those private investors. Investors want to know that they're working in a sound financial environment which means that

they're investing; they're going to be guaranteed overtime. So certainly, the policy framework is the chief on this.

Marc LaFrance

Yeah, and I think one of the key elements is, is you—one of the charts in the roadmap which is also published in the building's book that described how we implement building policies and the question about public private partnership is most appropriate at the early stages of deployment. So, for example we're trying to do competitive R&D. It's the role for the public sector to put in financing if we're talking about incentives to try to get a niche product to move up[higher in the diffusion curve or the deployment curve, you know, it's an appropriate role and the whole idea there is working together. Let's say you you're looking at a development country and, you know, for them to get commodity based pricing from materials they need to have them manufactured locally. Okay. If you're going to be importing materials from the other side of the world, it's going to be too expensive to be cost effective. So industry need to build factories and plant that are regionally or locally available so that they can come up with commodity based pricing. Well a manufacturer is not going to make that investment unless they know there's going to be some help from the government in driving forward the policies such mandatory building cost. So there need to be collaboration between the industry and the government as they how can they transform the market. That just the couple of examples. Thank you.

Sean Esterly

All right, thanks again Marc. And the next question, what answers the needs to placed on opaque envelop section and develop versus developing countries?

Marc LaFrance

So that's an interesting question. I'm curious what they're been mean by that. I mean the opaque envelop is important. You know, no matter where you are. Obviously most of the energy watts from buildings occurs on opaque envelop because typical window wall ratio is 15% maybe 12 to 18% in residential. We do have—in service sector building, in office building, very high levels of glazing that are inefficient. Although something people say oh, we, you know, we want to remove all the glass, you know, most studies show that something in the order of 30 to 40% window wall area in an office building is actually optimal because you want to get the day lighting. One of the things, we talked about advance the size to get the free natural light to come in and with high performance glazing and the exterior shadings you can keep the heat out but getting back to the question about opaque envelop, I don't see a big difference between develop and developing. You can have a question about heating and cooling so the weather of course—of that question can also follow up with email to get more information what they want, so, I don't think this one is a big driver but I'm sure to listen okay. Thanks.

Sean Esterly

Definitely, and before we go on to the next question. I do just want to remind the audience if we don't happen to address your question today, I will be submitting those questions to the panelist so that they can respond by email. Also in regard to one comment, they do just want to the panelist want to know that the annexes in the report are now live so they are downloadable now. And the next question we have. You might be able to touch on this briefly but they're wondering if there are any specific studies for envelopes of supermarket buildings in particular.

Marc LaFrance

I'm not aware of any for supermarkets. Yeah, usually, you have a very small amount of glaze area but most of the sub mark data that I'm aware of from building is dealing with display cases, refrigeration loops, allows us so I'm not—one of the things that I would say the service sector is to deal with is the would be the sky lights but it won't be particular just to a grocery stores, the supermarkets, it would be applicable to retail and how do you get more natural day lighting coming in through skylight and one of the big problem of course is that people putting those sky light and they don't always adjust what they call the lighting plan is the how they manage the artificial lights but we touch based on that a little bit on the roadmap but not extensively.

Sean Esterly

Great. Thanks again Marc. Next question is this data is improving the thermo and hydro thermo performance of buildings is the paramount important? And they wonder are there any efforts in place to review paradigm shift with the integration of active technology such as feeding and cooling equipment with the building envelop?

Marc LaFrance

So it does seemed to be a two-part question. One of the things with the webinar is we don't have that interaction as clarifying question but the first part of the question about hydrothermal analysis is we certainly touch based about the criticality of managing moisture and buildings so whatever you assemble a building you have to be sure not to cause problems with internal layers that will have the condensation need to avoid thermal short that have condensation so we definitely recommend that high performance buildings with high levels of insulation be properly designed for moisture concerns. Now as far as the integration with heating and cooling certainly there's lots and lots of interaction so for example, if—it's somebody makes the building envelop much more efficient but the keep a very large air conditioner in place then you'll have a short cycle of your air condition equipment and you won't take care of your latent load or you medley in the air and you can cause them problem. So there's lot of interactions there. I think they're might be getting to technical and again I'll be glad to discuss with a more detail if someone would send me an email but I think that's probably good enough for now without having that interaction with the person asking the question. Thanks Sean.

Sean Esterly Yeah, and thank you Marc. And I'll just point out to the audience that your email address is on display in the slide right now on the screen so if anyone had any follow up or you need to clarify something, you could contact Marc there. And the next question, if you have any examples of countries that have existing energy subsidies and has been able to achieve improved energy efficiency? And if not, would you advice the energy subsidy removal should be a critical policy step ahead of achieving improved energy efficiencies?

Marc LaFrance Actually, I don't have the extent of admission is. Some of my colleague in the energy efficiency unit might have more that we could follow up with them on but there is one example that we just highlighted which is in Saudi Arabia that had pretty high due subsidies in place and at a public university, I believe it's an Old Woman's College. They installed the largest solar thermal system and to do that, they had to take into account what the market value of the avoided dealer fuel was that would normally use for a hot water heating and so they were able to do that a justification 'cause that was a public building so the government was able to say we would rather invest in solar that will reduce the use of diesel fuel or fuel oil and we can sell that thing fuel oil on the global market at market value and they could see the benefit. Now that was a pretty good example of solar thermal but that's all I have at this point but, you know, it is a very good question and it's, you know, I'm sure my colleagues are more...

Didier Houssin The general message—as I explained it before that the general message of IEA that certainly the first thing to do is phase out the subsidies because if you don't have energy price reflecting to cost you certainly be incentivized all the players on the market to investing energy efficiency and this is another consequences in terms of energy security, in terms of the economies of these countries, in terms of the pseudo-emissions et cetera from many countries. So the gentle message which is valid, it doesn't mean that some of this countries are not at the same time trying to implement policies and particular in the public sector to boost the energy efficiency renewable et cetera but certainly the objective of phasing out a subsidies particular to custom fuel and having energy prices that reflect that costs is one of best tools to boost the energy efficiency policies on the private sector.

Sean Esterly All right thank you Didier and Marc. And next question, it's from the attendee that will be starting a project in 2014, I'm collecting building market data in the EU and they ask what you would suggest regarding data collection that you mentioned in your presentation on slide 18?

Marc LaFrance Okay, well, if somebody is asking a question about doing this project, the first thing I want to say is this, I want to interact with them and work with them 'cause that's exactly the counter partnership that we want to pursue but with obviously you know the simple things on a building level it's, you

know, okay, how effective of the building codes, what is the performance of the building codes and then on a technology level, okay, you know, what's the current penetration of things like double pane low-e glass, triply pane low-e glass, exterior shading, you know, different types of air sealing validation. All of the things that we talked about and the first thing is just looking up the assessment that we provide is those items in the assessment, you know, do we have performance metrics in place for window film and for attachment then all of the things listed but we definitely would like to work with them to see what they have in mind. We also have a very extensive stats data. I mean the vision here with people that working extensively so maybe the discussion is more on lines of generic stats with buildings along with the expertise in construction.

Cecilia Tam

I just want to add that the IEA has energy efficiency indicators template which helps guide countries on what is the most personate energy and the energy use indicator for the energy use sector and we would be happy to provide this link with the template that are in that link, what country should start collecting in setting up their energy efficiency indicators program. Thank you.

Sean Esterly

Thank you. And I move on to the last questions for this question and answer session. It is a several part question so let me just read it through and I can clarify any part if you need me to. And the question is, in the redrawing of the energy and climate map study that you referred to, energy of building would roughly half of their contributions coming from appliances and lighting and half from heating and cooling. The heating and cooling only referred to heating and cooling devices or is the building envelop included here and also what is the importance of the envelop compared to the 2D devices and what does it make sense to explicitly mention the building envelop in such overarching documents?

John Dulac

Well I guess as the first comment, the redrawing the climate map was the publication by our World Energy Outlook group here at IEA so I can't give specific details on their analysis but we certainly can forward this questions to them however within the roadmap in our building folk we do address that and I would say one of the key points to be said here is that when we're looking at heating and cooling or lighting for that matter, there are really two components to think about. The first is looking underlying demands so if you have access to light you don't need much lighting. If are buildings or providing cooling that means there's a lot of cooling demand and hot climates or conversely and heated for heating and colder climates and we look at the first with regards to intensity so much heat do you need and then we look at it from an efficiency perspective so for the heating that you do need, how efficient is your equipment. So within the savings there is of course two pieces at play. The first is, how can we reduce demands so in other words, the intensity and second, how can we meet those needs through the most efficient equipment and Marc can certainly

talk more about what are now this show laying for the division of efficiency relative to intensity and how displays into the envelop savings.

Marc LaFrance

Thanks John, so it's a great question because right from the premise one of the concerns we have about building envelop is that if you really look at it the building materials don't consume energy right because of the building envelop and that's the energy efficient qualities of the materials that dictate the requirement for what type of equipment you have and of course the—when we start looking at the cost effectiveness, we have to trade off the dividends between more efficient equipment versus more efficient building envelop and whichever you're investing you actually are diminishing the return of investment for the other one so we talk about an integrated and optimized approach of optimizing building envelop and the mechanical equipment but we also talked about things that the mechanical equipment. I mean the building envelop is going to be in place for many, many years and it won't beyond the mechanical equipment. So if you don't get that right so we are pairing the building envelop but that doesn't mean that we fully support excessive amount of insulation that's so high that it cost a lot of money and so we still talk about an integrated approach. And so, a different challenge, but certainly by following all those things in the roadmap is ideal visibility should get better that's why we're doing this and John made a great point about the lighting. So actually, in this particular roadmap we did not directly assess the day lighting savings opportunity. That is actually shown up in our lighting savings under our building technology book but we know for example to advance the size we actually reduce the lighting demand. In the same way so people talks about the lighting for example. If we reduce the lighting demand by 50, 60% and that's what some of the levels that showing in the office space, now your coast effectiveness put in improve lighting device is actually just been diminished because you've done it by the window so is it better to do by advance day lighting or is it better to do by the mechanical to the artificial lighting and those are some of the integration issues that need to be addressed but certainly the very big question and we're doing a very good job of assessing the best as we can but it's always an area form improvement so thank you so much.

Sean Esterly

Yeah and thank you so each of the panelist for addressing all of those question and for the great discussion that we just have. Before we do move on to the brief survey for the audience well, first I'd like to remind the audience if we didn't address your question we will be submitting them to the panelist doing now and now I'd like just to give the panelist an opportunity to make any closing remark before we wrap up this webinar.

Didier Houssin

I just like to thank all the participant for their writing of questions. I think we've covered the number of interesting issues so thanks a lot for your active participation and also thank you and the states to have organised this webinar. Thanks a lot.

Sean Esterly

Great, thank you. And now we just look back to audience to take a quick minute to answer a very brief survey on the webinar that you just see today. So we have three short for you. Heather, if you could go ahead and display that first question. And you can respond to the questions in the go to webinar window and the first question is, is the webinar content provides me with useful information and insight? And the next question, the webinar's presenters were effective? And the final question. Overall, the webinar met my expectations. All right thank you very much participating that survey and on behalf of the Clean Energy Solutions Center, I just like to extend another thank you to our expert panelist today. We had a great presentation, also a great question and answer session and we'd also have a terrific audience and we'd very much appreciate your time. I do invite our attendees to check the Solutions Center website over the next few days. If you would like to view the slide and listen to our recording to our today's presentation as well as any previously held webinars and just where you could find information upcoming webinars and other training events. We would also invite you to inform your colleagues and those in your network about Solutions Centers Resources and Services including the no cost policy support. So I hope everyone has a great rest day and we hope to see you again at future Clean Energy Solutions Center events and this concludes the webinar.