CLEAN ENERGY SOLUTIONS CENTER
ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

The Role of Energy Saving Targets and Regulatory Measures in Renovation Policy Packages: Key Lessons from Global Best Practices

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For more information, see the clean energy policy trainings offered by the Solutions Center.

Webinar Panelists

Sophie Shnapp	Global Buildings Performance Network
Dr. Yamina Saheb	DG Joint Research Centre, European Commission
Peter Bach	Danish Energy Authority
Ann Edminster	Trilateral Green Building Green Building Construction Task Force, Commission for Environmental Cooperation
Jens Lausten	Global Buildings Performance Network
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Sean Hello, everyone. I'm Sean Esterly with the National Renewable Energy Laboratory. And welcome to today's webinar, which is hosted by the Clean Energy Solutions Center in partnership with the Global Buildings Performance Network. And today's webinar is focused on The Role of Energy Saving Targets and Regulatory Measures in Renovation Policy Packages, Key Lessons from Global Best Practices. One important note of mention, before we begin our presentations, 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 Solution Center's Resource Library as one of many best practices resources reviewed and selected by technical experts.

And, just want to go over some of the webinar features. You have two options for audio today. You can either listen over your computer or over the telephone. And if you do choose to listen through your computer, please go to the audio pane and select mic and speakers. This will eliminate any possibility of echo and feedback. And if you choose to dial in by phone,

select the telephone option in the audio pane, and it will provide you with a number, access code and pin number that you should use to dial in. And panelists, we do just, uh, ask that you please mute your audio device at any point that you are not presenting. And if anyone is having technical difficulties with the webinar, you can contact the help desk number at the bottom of the slide, that number is 888-259-3826.

And we encourage anyone from the audience to ask questions at any point during the webinar. To ask a question, simply type it into the question pane in the GoToWebinar window, and submit it there. And if you're having difficulty viewing the materials through the webinar portal, we will be posting PDF copies of the presentation to cleanenergysolutions.org/training. And you may follow along as our speakers present. Also, an audio recording of the presentations will be posted to the Solutions Center training page within about a week of today's broadcast. And then, sometime in the next month, we'll be adding the webinar to the Solutions Center YouTube channel, where you can also find other informative we-webinars, as well as video interviews with thought leaders on clean energy policy topics. And in addition, the Global Bui-Buildings Performance Network will also be providing a live Tweet, today, of the webinar. Attendees can use #globalbuilding to follow the live Tweet and participate.

Now, today's webinar agenda is set around the presentations from our guest panelists; Sophie Shnapp, Yamina Saheb, Jens Lausten, Peter Bach and Ann Edminster. These panelists have been kind enough to join us to discuss the importance of energy-saving targets and how they drive energy renovation. In addition, panelists will discuss examples from countries that set ambitious targets and will provide insight into how these targets have been implemented, and what role they play in policy development, so that other jurisdictions can learn from their experiences. Before speakers begin their presentations, I'll provide a short, informative overview of the Clean Energy Solutions Center initiative. And then, following the presentations is when we'll have the question and the answer session, uh, where we'll address questions from the audience and where Peter Graham will be joining us to help address questions, um, from you. And following that, we'll have some brief closing remarks, and then a quick survey for the audience.

Now, this slide provides a bit of background in terms of how the Solutions Center was formed. And the Solutions Center is one of 13 initiatives, of the Clean Energy Ministerial, that was launched in April of 2011 and is primarily led by Australia, the United States and other CEM partners. Some outcomes of this unique initiative includes support of developing countries and emerging economies to 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. And the four primary goals for the Solutions Center. The first goal is to serve as a clearinghouse of clean energy policy resources. Uh, second goal is to share policy best practices data and analysis tools specific to clean energy policies and programs. And third is to deliver dynamic services that enable expert assistance, learning and peer-to-peer sharing of experiences. And then, lastly,

the center fosters dialogue on emerging policy issues and innovation around the globe.

Now, our primary audience is energy policymakers and analysts from governments and technical organizations in all countries. We also strive to engage the private sector, NGOs and civil society. And one of the services that the Solutions Center provides is the no-cost expert policy assistance known as Ask an Expert. And the Ask an Expert program has 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 at no cost. So for example, in the area of buildings, we are very pleased to have Cesar Trevino, leader of the Mexico Green Building Council, serving as one of our experts. So if you ever have a need for policy assistance in buildings or any other clean energy sector, we encourage you to use this valuable service. And again, it is provided to you free of charge. So to request assistance, uh, you may submit your request by registering through our Ask an Expert feature at cleanenergysolutions.org/expert.

We also invite you to spread the word about this service to those in your networks and organizations. So in summary, we encourage you to explore and take advantage of the Solutions Center resources and services, including the expert policy assistance, the database of clean energy policy resources, subscribe to the newsletter and participate in more webinars like this.

Now I'd like to provide brief introductions for today's panelists. We'll be hearing, first, from Sophie Shnapp, and Sophie is a policy analyst with the global research team at the Global Buildings Performance Network. And then, following Sophie, we will hear from Yamina Saheb, and Yamina is a scientific and technical project officer at the DG-Joint Research Centre European Commission. Yamina is also the head of the Sustainable Building Center with the International Energy Agency. And Yamina has 13 years of experience in buildings and appliance energy efficiency. And then, after, uh, Yamina, we will hear from Peter Bach, and Peter is chief advisor on energy efficiency at the Danish Energy Agency and with the Ministry of Climate Energy and Building. He's worked with energy issues and policies for more than 30 years, with special focus on energy efficiency over the last 20 years. And after Peter, we will hear from Ann Edminster, and Ann is the chair of the Trilateral Green Building Construction Task Force with the Commission for Environmental Cooperation. Ann is leading experts on green homes, focusing on assisting design and building professionals, and developing their capacity, to create the... better buildings. And our final speaker today is Jens Lausten, and Jens is a senior policy expert and advisor at the Global Buildings Performance Network. Yens will be presenting on behalf of Andreas Shuring, who had some technical difficulties and, unfortunately, could not be on the line with us today. And then I'd also like to introduce Peter Graham, who is the executive director of the Global Buildings Network. And Peter will be joining us after the presentation, for the question and answer session of the webinar, to assist with addressing questions from the attendees. And so, now, with those introductions, I'd like to welcome Sophie to today's webinar.

Sophie

Hello there. I'd like to say a big thanks for everybody, for being here today, especially people from California who woke up very early to be here and other (unclear) who are staying on very late to, to listen in. My name is Sophie Shnapps. As Sean said, I'm a policy analyst from the Global Building Performance Network, and I'm in charge in the development of the existing building projects. So today's webinar title is The Role of Energy Saving Targets and Renovation, um, relating to policy packages. Next slide, please.

This is a little introduction to the GBPN. We are a global network with original presence. We have, um, hubs, uh, and offices in China, Europe, India, America, and, uh, are now working more in Southeast Asia. As a network, we develop recommendations and, and share information on state-of-the-art policies for efficient buildings. Next slide, please.

In 2012, we looked at three different policy scenarios for future building energy use around the world. You can see these three different scenarios on the graph, uh, on your screen, just at the bottom right. The research showed that there's only one real path to follow that will allow us to reduce the energy consumption from the building sector. This is the "deep path," and this is what we follow as a company. You can see that this the green area, um, on the graph, and it's the only real path that we can follow that will allow us to reduce global energy consumption of buildings by 2015. And in fact, we can reduce it by 30%. Can I have the next slide, please?

So following the deep scenario means that state-of-the-art policies and buildings will be upscaled, and upscaled fast, being fully implemented, around the world, within the next 10 years. And by "state of the art" we mean deep renovation practices and net-zero energy, but new buildings. Next slide, please.

So in order to reach this deep path, we need... In order to reach the deep path, um, holistic policy should be in place that support this confirmation of the market towards energy efficient buildings. And again, you can see the red line here. We need to speed this up and make sure that this is in the next 10 years. Next slide, please.

So being in sight of the GBPN's existing building projects, um, means that we have one real fundamental goal, and it's to upscale deep renovations. So in order to achieve this, we-we're really undertaking lots of projects that will help us to allow this to happen. So last year, we published a report called *What is a Deep Renovation*? Um, we-we've noticed that "deep renovation" is, is really a popular buzzword, but, um, was really in need of harmonizing and defining. So using a consensus-seeking process, with a group of experts in the field of renovation, we came up with a finalized definition for what a deep renovation is. And you can find this, um, report online, on our website. We've also moved on, now, to define a set of state-of-the-art criteria, for a policy package, that targets energy renovations. This criteria presented a new policy towards renovation that we have just published in March, and it compares and analyzes 12 best practice policy packages, using the defined state-of-the-art criteria. Um, and the regions that we've invited here, to present their, their

stories today, are, are regions that we deem to be best practice, from the criteria that we defined. Can I have the next slide, please?

So with the findings of this tool, we would like to present to you a webinar series, this webinar series on how to save energy using renovation policy measures. The series is meant to really take a deeper dive into how to set up a best practice policy package and, more specifically, individual elements of the best practice package, um, using insight from best practice jurisdictions. Can I have the next slide, please?

The webinar that we're hosting today is the second of a series, and we're going to discuss the importance of energy-saving targets, how these are regulated, implemented, and how they drive energy renovations. We've invited three jurisdictions of ambitious type (inaudible) um, to join us today and tell us a bit more about their story and how they were implemented and, and how important it is. Next slide, please.

So I'd like to say thank you and, say that I'm very pleased to invite Yamina to talk next. She's going to give us an overview as to why these targets are key and part of being a success, for a renovation strategy. So thank you, very much.

Yamina

Thank you, Sophie. Good morning and good afternoon, everyone. Thanks to GBPN for the opportunity to, contribute to this international webinar on innovation policy packages, eh, for buildings. In fact, the building sector and renovation of the existing building stock is one of the hot topics in Europe because two third of our, eh, current, existing building stock will still be standing here by 2050. And unfortunately, because we had regulations quite late, after the oil crisis in the '70s, and we have been strengthened, eh, over time, eh, so our building stock is basically leaking. And it has an impact on our, eh, energy dependency on, on our, eh, economy, itself. Can you please go to the next slide?

And when we talk about energy innovation, I think what we need to keep in mind is, what is it about? From economic perspective, it is about investing in low-carbon and climate-resilient infrastructure. And buildings sort of present, in Europe and in most of OECD countries, an important part of our instructor infrastructure that we have to make low carbon and climate resilient. I selected this graph from OECD, on how to make the investment, in low-carbon and climate-resilient infrastructure happening, what is the policy package that is needed. And you see here that the first step or the first element in this policy package is to set strategic, goals or targets. And then, this is the first policy instrument that the OECD recommends, to the OECD countries, based on intensive research on how to speed up and how to make the investment or (unclear) investment happening.

Why, the OECD comes with this conclusion? Can you go to the next slide, please? Because it is about investment, and investors and financial institutions need to have (unclear) and consistency. And this is something that the targets could provide to investors. We had, in Europe, a very interesting experience between October and March of this year. We (unclear) energy, at the EU

level, working with financial institutions on how to drive, finance for energy, e-energy efficiency investments. Particularly, the first part of this work was the investment in energy innovation of the building sector. And the pics that you see here is from the financial institution's working group. And for them the long term because of the long term, the long-term period, payback period of the energy innovation, it is very important for investors to have confidence. And to have this confidence they need to have a stable and robust (unclear) And from the information that we know from different, other projects that I'm not related to—for example, I'm not related to green investment—this is possible.

This ability and this consistency is possible only if we have targets. Then when we said the way to set targets—I think of this because we've come back that could buy from one country to another. And we could, for example. And this is the case in Europe, currently. We could start with, specific targets for the building sector... uh, for the public sector. Sorry. Because the public sector, eh, should be leading, eh, by example. We already have this in Europe and, have this in some other states. The ideal situation is to have targets, for the overall building s-sector, between now and 2050. In some EU countries, we already have these targets, and others, because we go through that. And we could also do it per building segment; public sector first or commercial buildings first or we need to have a time line. But most important is that the driver for the finance institutions is to have this ability and to have this consistency in the, in the framework that we have. We don't know any other policy estimate that provide that at this time, apart from the targets. Thank you for your attention.

Peter

And thank you, Yamina. And now it's Peter Bach from Denmark. And welcome to all of the people here who have attended this webinar. I will speak a bit about the Danish case and about how we have had used political commitment and targets as a way to drive energy efficiency and the change of the whole energy system to a more sustainable way. Next slide, please?

We have had a very strong energy efficiency improvement, in Denmark, over the last, 40 years. We have for... since '75, (unclear) energy consumption and economic growth very dramatically. And we also are doing this today, and have been doing that over the last five years, when we have a had an economic crisis. This has been done by a very strong political commitment since the first oil crisis in '73, energy policy has been very high on the agenda in Denmark. And we have used a combination of policies and measures in all sectors, including energy taxation, regulation and information awareness. Next slide, please.

And we have now, a long-term goal or target, you could call it that we in Denmark, onto... in 2050, would have an energy system with, 100% based on renewable energy sources. We will not use any fossil fuels anymore, in Denmark, in 2050. That's an (unclear) target. And it's quite clear that the way we can reach this long-term target is we have a strong improvement (unclear) efficiency in all sectors. That includes electrification. And we have of course,

developed more renewable energy, get rid of gas and coal and oil. And so we need new measures and new targets to deliver that. Next slide, please.

We have already re-reduced energy consumption in our building stock quite dramatically. The consumption per square meter today is 45% lower than it was in, eh, '75. We had a very, very dramatic improvement from '79 on to '84, after the second oil crisis, where energy prices went up. That was also a combination of a huge information and awareness campaign and a huge (unclear). So all these worked together. So that it was a combination of measures was delivered. And that has continued afterwards. Next slide, please.

For new buildings, we have developed our building codes, eh, as a very, very important tool, to deliver energy savings and reduce energy consumption in buildings. We have had a regularly update of building codes. We have had, over the last years, a very early announcement of next step. We have a building code 2010. We are already, five years back, announced the 2015 step, and we have also set the 2020 step, a step which will fill the (unclear) energy target. These early announcement of next steps of building codes give the industry and the whole construction sector time to adapt, time to learn, have time to develop the solutions. And that reduce costs and make, uh, uh, (unclear) building (unclear) cost effective. Of course, enforcements are a very important element of building codes, which we all have to work with. Next slide, please.

In our existing buildings, we've got the main, uh, uh, target and the main, uh, challenge for all of us, in Europe at least. Most of the buildings which we have today, uh, will be there in 2050. We have to secure that. The whole building stock has been... almost been renovated over the next 35 years. This means that we have still a very big potential. We have to see energy renovation as a part of the normal renovation cycle. That's a way to do it in a cost-effective way. That's also a way to have the house owners the building owners involved. And we have to have renovation as a, when we, as a part of integration of all elements. And we have to look at both on a holistic and components. And we have to secure the renovations. And we see that that will have a good economy, both for society and for house owners, and especially if it includes all the other benefits that, are linked to energy renovation.

We have just developed a new renovation strategy, and the strategy shows that, uh, we can reduce our, uh, energy consumption in, eh, existing buildings, that will at least 35%, will if we strengthen our building codes for existing buildings if we develop them even further at and have new technologies involved, we could maybe reduce 45 or 50%. Eh, we need a lot of combination of measures to deliver that. We have quite high taxes on energy for heating, in Denmark. We have strong regulation, and we also have a lot of information and (unclear). We have obligation for energy utilities and so on. And all these measures, together, can deliver. Next slide, please.

What have we learned about these things? I think, first, we have learned that political commitments are needed. We are also seeing that a target, it could be a national target and it could first (unclear) be a target at UPN level, for

energy efficiency or energy consumption, with a very, very strong commitment. We have also seen that target works. It's very easy to, monitor in progress and see how we align, or take new actions if we are not aligned to meet the target. So a target is a very strong, pretty big commitment which can deliver. And we need a combination of measures. There is no single (unclear) who can deliver these things. Thank you for your attention.

Ann

Good morning and afternoon, everyone. This is Ann Edminster. I'm in California, and give you a little bit of perspective of what has been happening here and what the picture looks like with regard to, um, retrofitting existing buildings. Next slide.

So, probably many of you are aware that California has their reputation of being an energy leader. And this means, in particular, we've had energy legislation going back to 1978. However, more than half of our housing stock is older than that. And, as a consequence, um, we have more recently begun looking at that housing stock as a potential area for tackling greenhouse gas emissions. In fact, it is the largest single opportunity remaining that we haven't, yet, made significant progress with. Back in 2007, the California Energy Commission identified this and said we should really be tackling 100% of all cost-effective energy efficiency opportunities. So all of this is the backdrop for our target setting. Next slide.

So in terms of targets, our largest one was established in 2006 with assembly bill 32, The Global Warming Solutions Act, which calls for a reduction of greenhouse gas emissions to 1990 levels by the year 2020. And, of course, we're coming up on that very quickly. Seems more quickly every day when we look at the magnitude of this challenge. Three years later, assembly bill 758 was established as the enabling legislation for AB32. And, um, AB758 identifies a whole range of opportunities, you see listed here, as means of tackling this very ambitious target; so energy assessments, benchmarking ratings, uh, public and private sector financing, public outreach, education and green workforce training. So I think the key message for the, the question asked by this webinar, are targets important in driving implementation? Absolutely. They are because the targets set the stage for what really has to happen on the ground, in order to make the improvements. Next slide.

Outcomes, to date, from the two assembly bills. The key ones are we've had a, an energy retrofit program, called Energy Upgrade California, targeting existing housing stock. And more recently, Energy Upgrade California has been directed to refocus from what was referred to as a "widget-based approach," i.e., tackling, individual items of equipment and so forth, to a whole-house approach. In addition, we have had efforts to develop a, a whole-house energy rating called HERS 2 Home Energy Rating System Version 2. That was intended both to provide a point-of-sale energy disclosure and also to assist in the identification of cost-effective energy retrofit measures. I'll say a little bit more about HERS 2 in a couple of minutes. But, next item on the implementation, roster is a $20 million workforce development program, also Property Assessed Clean Energy financing pilots, often referred to as PACE. We've had a number of those.

And then, um, this last one, which sounds quite inconsequential. But, nevertheless, it is a measure that is going into effect in just a couple of weeks, with the latest version of our energy code. This one re-requires that any residential retrofit must replace older plumbing fixtures with the newer water-conserving fixtures. One of the kind of interesting and perhaps odd, paradoxical things about our energy codes is the codes primarily address new construction and major remodels that is... they are, they are large enough to be subject to the new building codes. And although I think our codes are, in many ways, a much more powerful mechanism, they don't tend to really touch the existing buildings very much. So, that's one reason I wanted to definitely address this last bullet here. Because it is a very, very small measure addressed within our largest policy framework piece. So, and yet, our other elements of this solution set aren't code measures, but they are more specifically on the existing building stock. So kind of an interesting two-for approach. Next slide, please.

One example in the workforce training, that I've been very directly involved with was the development of a class series which is directed at existing home owners, designers, builders, trades and so forth. And in this one, we spend four days, typically presented over a, say a one-month period where we walk through the whole suite of strategies necessary to achieve deep energy reductions or a possible equivalent of zero-net energy, with the inclusion of renewable energy strategies, on a building or within a development. And this class series, we've developed to, oh, some number of hundreds of attendees now, in service territories throughout California. We offer these through our major utilities in the state. Most of them, investor-owned utilities, um, but, also, a couple of the municipal utilities. Next slide, please.

So another question we were asked to address for you all, in this webinar, was who should be involved in setting targets and developing the enabling mechanisms? In California's case, we have a specific directive, within our legislation, that tells who the state agencies actually need to consult in the development of our strategies. And as you can see, it's a very, very comprehensive list. And I think that the question of who should be involved is pretty effectively answered by this mandated list. In other words, it's very comprehensive and appropriate. It represents a bra-... broad spectrum, across our social fabric, which I, personally, think is very appropriate now. How effective we are at actually reaching all these stakeholder groups is another question. And I think, at a state level, we do a better job at reaching some of these stakeholder groups than others, not surprisingly. Next slide, please.

Building sector impacts. In the short term, the measures that I've e-enumerated have produced some new market opportunities for players in the building sector. However, that also represents the necessity of training, in order to take advantage of those opportunities because I would say relatively few of the players in the building sector were previously capable of undertaking these new opportunities because of the scope of ambition. We're really looking for building performance pretty significantly above the average state of practice within our building professions. What this means, longer term, is we still do need to be fostering the capability of the individuals and

professional firms in accomplishing much, much higher levels of energy performance. One of the kind of unfortunate, unintended consequences of our relatively progressive regulatory stance regarding energy efficiency is something I refer to as the "compliance mindset," where, uh, there's a tendency, within out building professions, to think that, "Ah, we're in California. We're ahead of the curve on energy, so really, all we need to do in order to, um, achieve appropriate levels of energy efficiency is to meet the code." And what this means is that, in practice, our building professionals tend to get quickly familiar and comfortable with what it takes to meet each iteration of the code.

And then they're practice becomes rather stable or stagnant at that level, without a continual striving for levels of performance above code. And so, our codes to ratchet up, but, um, A, I don't think that really drives the level of improvement that we need. And, B, because, as I mentioned earlier, the codes tend not to be so much, um, affecting existing buildings, we don't really see that effect the existing building segment of the market nearly as much as I think we need to. So in the longer term, we really are going to have figure out ways to get our building community much more up to speed on energy efficiency, must faster.

Another aspect of this, in California, we have this mechanism called Time-Dependent Valuation, which essentially says that energy provided by the grid has different values and different costs, different social and environmental costs, at different times of day and different seasons. And our compliance mechanisms, uh, particularly our energy simulation models, reference this Time-Dependent Valuation. And very few people understand this, or understand it in any level of depth, and I believe that we are going to have to become much more familiar, across our, our professions, with the construct of Time-Dependent Valuation in order to get more effective at addressing, um, the energy needs within our state. This means we're going to need to learn some new tools and, also, reexamine the tool kit. And what I mean by that is there are aspects of building design that we tend to overlook because they're not typically addressed by our regulatory mechanisms; in particular building form, building basic geometry and orientation, which we, of course, can manipulate less in existing buildings. The new ones, nevertheless, we need to be looking at them as well. Next slide, please.

So lessons learned. Energy Upgrade California, as I mentioned earlier, is, is currently being retooled. It's being retooled because the earliest stages of the program showed rather poor uptake. In fact, the result from that—I suppose you could call the first few years a "pilot"—demonstrated that the efficiency gains were only about one third of what were actually forecast. So very, very poor correspondence between the predictions and actual performance.

Secondly, that program was largely driven by utility-based incentives. And what we also found was that the amount of incentives were really not sufficient to induce the, uh, sort of scale of remodeling that we had hoped to see across the landscape. So what we need to do is really figure out a way to reach people when they have other motivations for remodeling and find ways

to support the energy efficiency upgrades at the time that remodeling occurs for these other reasons. Because relatively few people will undertake those remodels purely for their own sake. So we need to get a lot more sophisticated about how to do that. Second lesson, important one that $20 million dollars for workforce development was a huge injection, um, for the economy in California, briefly. A lot of people were retrained and introduced into new occupations. Unfortunately, there was not a commensurate effort to improve demand at that same time. So as a consequence, we had a lot of people who did acquire some new skills and knowledge, and then went out into the workforce and found not enough work to support them in these new jobs. And a lot of those folks are, yet again, looking for new work. So, uh, we did not really do a very good job of matching supply and demand.

Now, as regards PACE, um, PACE has had notable success in a number of jurisdictions. And we have a couple of different flavors of PACE that are... some of which are still in pilot. So I think there's very good promise for that, as a mechanism for funding retrofits. HERS 2, uh, again, I would say this is a program that... it, it was very closely tied to Energy Upgrade California and was used as the primary tool for the sort of audit portion, identifying viable energy upgrades. Not seen as tremendously successful, so it has not seen a lot of uptake. And whether that will actually find its way into its second role, that is, identifying energy performance at time of sale, remains to be seen. So a little early days to comment on those. And I believe that is all my comment for now. Thanks, so much.

Jens

Thank you. Um, this is Jens Lausten. I hope you will hear me. I represent the (unclear) because, uh, Andreas, uh, Shuring, from the Federal Ministry of Economic Affairs on Energy, uh, couldn't make it for technical and practical, uh, reasons. So I will give you some briefs, uh, based on the, uh, PowerPoint presentation that he sent us. Next slide, please.

As it was the case with the two previous presentations, the German policy is strongly based on, long-term targets. They are targets that, for 2020, it is a 40% reduction of greenhouse gas emissions, compared to 1990 levels. And there are also targets for a 20% reduction of the energy demand, compared to 2, um, 2008levels. Therefore, the targets' on a long term, setting targets for 2050, where the targets are 80% cut in the greenhouse gases and 50% cut in the primary energy demand. These were set in the energy strategy back in 2010 and is the basis for the German policies today. Next slide, please.

But it's not enough to have, (unclear) targets, so there are also specific targets for the, the building sector. And this is requiring that, in 2020, there will be a 20% reduction in the demand, so this is another 20, 2020, uh, target. And in 2050, this should go all the way up to 80%. This means that the whole building stocks must be almost climate neutral, compared to today. And of course, it means that new buildings must reach this point much earlier. The interesting thing is that these kind of buildings are being built already. We know the technology. We know how to do it, but we (unclear) to upscale this very massively. One of the key points in the German policy for existing buildings, but also for new buildings, is the (unclear) Rehabilitation Program

or the KfW Program, as they are called. And it is strengthening of energy consulting, which means that, uh, we would try to improve the knowledge that everybody has on what they can do and how to do it. Next slide, please.

Some of the primary demands is the energy-saving ordinance. That's where rules are set for minimum requirements. But at the same time, these standards are also defining higher standards that you can go for, uh, than the absolute minimum. So this is a kind of stretch codes, I think they would call it in U.S. The programs are all very holistic, so they focus both on energy efficiency and reusable, renewable energy. There is a big freedom in the choice of technology, but it's, in some way limited. It needs to be cost efficient because, otherwise, it's difficult to get the right uptake of these kind of policies. The KfW have developed efficiency houses branding, which they call KfW 55 or 40, which means that this is 55% of the consumption that you would have according to the regulation or 40%, in the higher case. Next slide, please.

This next slide is showing the development in Germany where building codes have become more and more stringent. And the latest one came in place. I think it was the 1st May, uh, this year, which is the 2014 building regulation, which is the current, uh, requirement in Germany. And at the same time, we have seen that best-practice buildings have gone deeper and the usual market standards have been decreasing faster than the building codes. Next slide, please.

This slide is giving a few details on the previous building code EnEV2009 and the current building code 2014. Both of them are looking on the building envelope. The previous one was concerning heating, cooling and air conditioning techniques and warm water. And it depends on the calculation (unclear) et cetera. The new building codes also sets requirements for standards toward solar energy and solar energy programs, and it gives different requirements for renewable energy and for primary indicators for the buildings. Next slide, please.

The building codes have two sorts of requirements. There is one, as mentioned, on the primary energy use, giving the freedom to choose between renewable energy and buildings. But to ensure that the buildings, themselves, are not built too bad condition, there is also a transmission heat loss which is requiring that buildings are well insulated, there are good windows in all of these building physics. Next slide, please.

The KfW program, which is supporting these, have two sides. One is for the new building stock, and another part is for the existing building stock. And here are some of the details on how bank loans and loans that can be given. There are different repayment bonuses and they are all in the end, target the home owners. There is a requirement, in both of them there is a (unclear) assessment by an expert, so that they ensure that it is the right measures that are done. Next slide, please.

This one has a very important and interesting topic, and that shows the different grades of renovation. Because now we're going to the refurbishment programs we'll give different kinds of subsidy. We are looking at, uh, energy

house, efficiency house 100 would be the same as the current, uh, building code. And then we have better and better classes, going up to, uh, 55%, and it is shown here. And the loans and the support and the interest rates that you get on your loans will actually depend on how deep you go. So this is a general encouragement not to do a general renovation, but to go deep. And this is very important for-We expect that there is only one chance for refurbishing a building. So if we don't go deep enough the first time, we might like some of the potential. You can see the percentages here. Next slide, please.

This is as slide which is showing how the KfW is working. It's subsidized by the German government, out from the left. It's, uh, rated in the capital market. It has its own capital and, and rating, for further loans. And then, it is, uh, having a mandate, which is set up by the government. And this requires what the types of loans will be given and what types of buildings would be supported. On the right side, you can see that it's usually done through, uh, the bank. So this is using your own bank, which would then get the loan in the KfW. This way it ensures that the bank can add additional loans to the clients. Next slide, please.

The impact on this is shown in this slide which is showing that, given the red curve, which is, a subsidy from the German government which is giving to keep the capital, intact, even if the loans are given on very, very good rates. That gives an additional loan capacity, which is five to six times higher, uh, today than what the government is putting in, itself. So it's a very important accumulation of the capital. Next slide, please.

These slides are giving a few of the details which is coming of the, uh, programs. And as you can see, there have been very significant, over the last eight, nine years, where more than 3.5 million housing units have been supported through this. Today, it's nearly 50% of all new buildings which goes for these loans. This mean they go farther than the building code. And it's 33% of the refurbishment. It also shows that 1. … 11.1 billion federal funds accumulated, 160 billion in investments, so that the funding gave 12 times as much investment. And this is very important for the success. I would show a couple of the outputs of this on the next slide, please.

This means that it created up to 300,000 jobs, and maybe the last year, it was nearly half million new jobs that were created because of these kind of loans. This, of course, gave an income for the government, in terms of taxes and cost of Social Security and also less cost for, uh, unemployment. The studies have shown that each one Euro spent by the German government comes back four to five times from these programs. So it's a good business for the government, actually, to run these programs. It also showed the need for intensive training of people. And this is all the (unclear) from architects, engineers. It's energy consultants. It's skilled employees in the construction industry. Next slide.

I think this is just the lessons learned. And some of the lessons which we heard from, from Germany is that the more transparent and the more simple the schemes are, the easier it is to understand, the easier it is to distribute and

the more people will use this scheme. It's very important to have mandatory experts involved, so that we ensure that it's the right things that get support that there is a high quality that the public funds are used correctly. And it shows that these programs have had a very, very big impact in Germany. Thank you. This was what I was presenting.

Sean Great. Thank you to each of the panelists for the, the excellent presentations. And we will move on, now, to the question and answer session. Before we do, I just want to remind all attendees that if you have any questions for today's panelists, uh, please feel free to submit those through the question pane in the GoToWebinar window. And with that, I'll, move on to the first question that I have for the panelists. And panelists, if you'd like to answer any of the questions, just go ahead and make sure your unmuted and then, chime in. And so, the first question I have is—when politicians change every four years, how can you then ensure targets of 20 or even 40 years ahead? And this is mainly for Peter or Ann.

Peter Peter, here. It's a very good question. I think it relate very much to some of the success we have had in Denmark because all major, uh, political decisions taken on the energy side, in Denmark, since '79, has been taken in the broad condition between the social democrats and the liberal conservatives which has been included in all political decisions. So we have (unclear) from a social democratic (unclear) to a liberal conservative (unclear). The energy policy has been very stable because all agreement has been through... with both sides. So policy has not changed every four years in Denmark, or every 10 years. It has been a long-term tradition or a s-stable policy, and that's given high security for investors, for companies to develop. And so, it's very, very important. Thank you.

Ann Yeah, this is Ann. I would have to, to agree with Peter that here, in California, too, the strong pro-efficiency sentiment has really transcended party politics. And so, while we've certainly seen ebbs and flows of interest in energy efficiency policies the overall trajectory has been pretty solid, and we've had good stability in our public agencies, as well. So, we've been very fortunate in that regard.

Sean Great. Thank you, both. And the next question that I've received asks, many of the interesting case studies presented today deal with more developed countries. So how, if at all, would these recommendations differ for rapidly developing countries, like China and India, whose share of greenhouse gas emissions are growing?

Peter Peter Bach, here. I'm not an... at all an expert in China and India. But I think there's one big difference between Europe and U.S., on the one side, and the developing countries, on the other side. Is in Europe and U.S. the major challenge is the existing building stocks. In China and India, the major challenge is the new buildings because they have built so much in the new buildings. So strong building codes, strong enforcements, uh, uh, uh, related to new buildings are very, very important. And so, the long-term targets for how the building codes should be developed over the next, 15 to 20 years will (unclear) strengthen the codes. That would... I think that what we could learn

from Denmark. That could be a wise way to go, also, in these countries. Thank you.

Jens And this is Jens Lausten now talking, from GBPN side. And I can agree with Peter that in in fast emerging economies, the, uh, the new construction industry is, uh, the very important thing to get under control. Well, it is, for two reasons. The first one is if you don't have the, the new buildings under control and have allowed energy consumption, it seems a bit strange to, to renovate buildings and needing to renovate a new building because it's not good enough, uh, compared to the standards for existing buildings. But we see that, in, in countries like China, is that looking more into renovation policies because (unclear) building stock, and maybe some of it is built for five, ten years ago and will not fulfill any kind of standards which they, they have today. So this is also coming up in emerging economies. And I think the lessons that is learned from, from more emerged economies is that, uh, it's very important to do things right in the first place, and not do too much skimming and take the very easy solutions first. But try to really do an energy renovation when you, when you start improving because otherwise, the potentials would be locked in for a very long time.

Yamina This, this is—

Jens – this same kind of request –

Yamina This is Yamina. I tend to agree with Peter and Yens about the difference between, eh, emerging economies and OECD, countries. And I would distinguish in emerging, in fast-developing countries two categories. China, for example, is in the in the first category, and Russia, where we have at the same time the challenge of building a new construction. And in this case it is clear that if we do it right, from the start, energy—which is the case in all these economies then we will avoid to be in the situation that we today face in OECD countries, where we have to renovate, eh, to low energy consumption in the existing building stock. (Unclear) to that, in China and in Russia, we have, eh, the issue of, um, um, renovating part of the, the existing... the current existing stock. And in this case, these countries face similar, um, challenge. Its challenge is, uh, um, uh, similar, like in OECD countries. So in other fast-growing economies, um, uh, like India and, uh, now we see it also in Africa and other southeastern Asian countries, I think the main message is to make sure the they have building codes that are not as weak as the ones that we had in our countries in the '70s, but they're building codes are as good as the best building codes that we have today in our countries. Thank you.

Ann This is Ann. I agree with all of the foregoing comments. And the one thing I would add is what I see is we have, uh, a lot of emphasis on the building, itself. And yet, a couple of folks have mentioned the importance of enforcement. I would go a-a little bit underneath that idea, that the reason enforcement is important is because compliance with codes, you know, based on the California experience, is not what we would hope it would be. And the reason for that is our building occupations really are not on-board the way we need them to be. So I would offer that in rapidly developing areas of the world. We need all of those things. We need strong codes, but we also need

very deep and broad education across all segments of society that affect our building quality. And that should begin with young school children and extend to, um, young people who are entering building occupations, as well as building professionals who are presently practicing. We've spent a lot of time looking at this issue in, uh, some ad-hoc task forces for the California Public Utilities Commission, over the last couple of years. And we began by looking at four segments—design professionals emerging and practicing, and building, um, tradespeople, emerging and practicing—and rapidly realized we needed to expand that list to people in real estate, finance, building operations and maintenance, the public sector and, um, almost anything you can imagine. It's a very long list, and this is all about building our capacity, at the most basic level of the social fabric, to produce better buildings, so that the regulations are met. And enforcement, ultimately, would... we would hope would become less of an issue because we've calibrate the mindset of everyone who touches the building, from the outset.

Sean Great. Thank you, everyone, for that great discussion. Moving on to the next question now. This one is directed towards Yen, Peter and Ann. And the question is, how would you go about setting the level of ambition of the energy targets for a country and ensure that it is suited to the needs of the jurisdiction?

Ann Tough question. This is Ann. I would say that, (unclear) I was chatting with a colleague about this yesterday. I believe that this goes back to the stakeholder question, and we need the most comprehensive possible stakeholder group. How does the saying go? You want to keep your friends closer and your... or your friends close and your enemies closer. And so, there will always be elements in a society, who resist progress, resist regulation, the climate-deniers and so forth. And yet, it's really important that, again, everyone who affects the progress towards climate-neutral building be involved in the discussion. And we really work as hard as possible towards consensus. It's slow, and it's messy. But it is faster when we have consensus than it is to try to, again, enforce in an environment where we have not really achieved the mindset necessary to make the progress we're looking for.

Jens Yeah. And, and I would like to say, then, I agree with these comments on involving the stakeholders. I also feel it, it feeds back to today's question about having targets. Because I think it's easier to discuss this if it's happening in three, four, five years from now, where most people would say “Yes, we can do it,” then if we suddenly come and say “Can we change this from, uh, tomorrow.” So I think having a, a longer-term policy which is showing that they're going this direction, eh, then it's easier for the industry, for finance people to prepare for it, to have the right products, eh, in place and to take the right training. And also taking into account that new construction, but also renovation takes quite a time from when you start thinking about it until you have the building or improved building there. So the long-term targets and maybe, also, mid-term or short-term targets.

Peter I would agree with both Ann and Jens. I would only add that I think it can be wise to go from maybe a bad building codes to where you want to be in 10

years by... in some steps. You cannot... The construction sector, the workers has to be trained and learned. The new products has to be developed. They have to learn how to use them, how to build up a building with, airtight with huge, good ventilation, a good insulation. So, so do it step-wise and when, and (unclear) set a target where you want to be in 10 or 15 years, and, and then go there. I think that can work. Thank you.

Ann One more thought along those lines, too. I think that one of the challenges that we face is that we, perhaps, put excessive emphasis on design and insufficient emphasis on construction. And this is sort of part and parcel of a larger cultural phenomenon that we face here, in the United States, which is the de-professionalization of the building trades. We don't have a very good formal education process for the trades, as well. And so, much of the progress that could be made, in building efficiency, comes from a very well-known but, in some ways, unglamorous, not terribly interesting aspects of building performance. As Peter alluded to, it's airtightness and good quality insulation. And yet, we have been looking for workers to do the fastest, cheapest possible work instead of the best quality work. And we, we don't have a consumer base that is really... has any sensibility to distinguish between the two, and they don't see it because it's hidden. So we have some really systemic challenges here.

Sean Great. Thank you, everyone. And the next question is in regards the rehab program, and it asks, um, if you have... if you know what Germans participation rates were in the rehab program.

Jens I think there were some figures, in the slides, saying that, uh, should they... It's, it's quite significant. It's something like a third of all renovation projects which are, uh, getting support from the program. It was in, in one of the slides. And for new buildings, it was even higher. I think one of the interesting questions that I would ask, but, (unclear) can, respond is how many went for the deep end of it. And how many went for the, the smaller subsidies and, uh, the small amount of loans. And I think that's where the program still target, um, relatively small... a small fraction of the market and where there is a need to further upscale. But I can't (unclear) But we can ask the German ministry and, and send the response to this question.

Sean Great. Thank you, Yen. Next question asks, what is the… if you could discuss what the most important role is, or what the roles are, in the valuation and appraisal profession? And what can they play in driving deep-energy greenhouse gas improvements?

Ann This is Ann. I think they can play a really important role and, in fact, need to play a very important role. And in our market, here, that is a significant challenge. We hear, over and over again, that efficiency improvements are... failed to be valued. On the other hand, we do have a couple of studies, in different parts of the country, that show somewhere between an eight and a fifteen percent increase in valuation for retrofitted housing. That incorporates energy improvements. So there's some good evidence, and yet, this knowledge has not been well-dispersed in the appraisal and real estate fields. And so, there is still a very pervasive lack of understanding of these features,

in those professions, and this, this is a significant barrier we need to overcome.

Peter Peter Bach, here. In Denmark, we have a –

Sean Take the... Yes.

Peter – We, we have seen all of the last years that the energy (unclear) of buildings with our mandatory European Union that... when the building is sold, uh, has huge impact on the price. A new study, which we had done last year, shows that moving up one class, from D to F and further up through H, from (unclear) one class in the bottom of the scale, the price of a building would increase around 100 Euro per square meter. And that's really (unclear) a quite huge impact on, uh, the value of your building, if you improve your, your energy quality and then get a higher rate on the, uh, uh scale. So we can see that in the market today, really quite clear.

Peter Peter Graham, here. I wanted to just add that, um, some of the work that U.S. hubs have been doing has been looking at the impact on jobs, for examples, from rating disclosure. And from there a closer look at the effected policies, like the... seeing a potential job crash in the 59,000 (unclear) jobs by 2030, just from that particular policy. Um, but there needs to be better, uh, better regulation of, of rating... the rating process, better trust of the data, uh, and the data isn't really being presented in, in (unclear) friendly format. (Unclear) with the Economist Intelligence Unit and real estate investors shows that. So part of the challenge is to, is to be able to, to reach decision maker... investment decision makers with, with respect to public finances and how (unclear) jobs. And the other is also looking at how you can get more trusted performance data to, uh, the finance industry, as well. And providing a bit more, a bit more trust, that would incentivize a greater investment in energy efficiency or innovations.

Sean Thank you, everyone. Next question asks about Germany, but it could also be applied to other EU states. Is it more important that Germany sets its on EE targets or that the entire EU sets common EE targets for all member states?

Jens And that-that's a good question, and I'm not sure I can answer on the behalf of, uh, of Germany, on this one. But I definitely feel that something happened in the European scene when, uh, uh, EU took a common agreement on saving energy according to cultural, uh, agreement. That was when they started to design directives like the EPPD directive and, currently, the Energy Efficiency Directive and when this became a common European policy field of setting policies. And, and this can help developing standardized products which can be used in, in multiple countries. And it also started, maybe, a trend where, uh, some of the countries said, "If, if we have a common target on 80%, we go for 16," and somebody else went for 20. So I think we should probably have both. And, I hope this also answers on behalf of the German thinking.

Peter I would, agree with Jens. I think, uh, also, in the actual discussion now going on in Europe, about the 2030 climate or energy framework, we... as, as part of

that, we need a target for energy efficiency at European levels. If, if we have that, then we could... should discuss (unclear) that the distribution... the target for different countries should be (unclear) instructive. Our member states should report their, their own indicative targets and then the commission should see if that will be in line to fulfill the European target. But we need targets at the European level and at member states level. So, so that's quite clear, in the European context, today.

Sean Thank you, Yens and Peter. Moving on to the next question. I'll read through it, and then, if you need any clarification, I can always read through it again. So the question is, the difficulty we have with incentivizing deep-energy reductions in the U.S. is that our typical incentive programs treat every kilowatt hour saved equally or actually value the initial kilowatt hour saved higher than the last. How does the German government justify, to financial markets, the progressive incentive rates for deeper renovations where, apparently, the last kilowatt hour saved is being incentivized at a higher level than the first kilowatt hour saved?

Jens That's a good question, again, which is, um... I can't answer this on behalf of, uh, the, the German government, but I can give you a, a perspective from, from my side. And that is, um, if you go for high targets. Studies which we have done, for instance, here in GBPN, which were presented on by Sophie, in the beginning of this—is showing that if we go for a shallow renovation first and not go deep, then we would lock in a potential which it would be very expensive to come back and pick up fast again. We might need to wait another 30 or 40 years before those buildings are ready, uh, for a new renovation. So I think it can be justified in the way that we... If we really want these deep potentials, then we need to encourage people to go as deep as possible. And the way that Germany had done this is to use, uh, the KfW funding, uh, to make an incentive scheme which is incentivizing people to go as deep as possible because that's the way you get the most support from the bank. And, and it also has shown that in—often, when you do an energy renovation, this has a big impact on the people who live in the building or who work in the building because you have (unclear) outside. You have pollution from machines. You have... maybe, in some cases, you need to move people out of the apartment and move them in again. Again, you can say, if you do everything in one goal, you only have to move people one time and you only have to make these kind of troubles. So I think there is a lot of reasons for, uh, going deep, and maybe it is exactly the government's role, uh, to ensure that, uh, the conditions become so that people think "Let's go deep" in the first place. So that would be my interpretation of why this is done.

Yamina This is Yamina. I agree with what Yens said. And, uh, if you look at it from a governmental perspective, the only way to decarbonize, uh, our building stock is to go as deep as possible each time we (unclear)—and the incentives are provided by governments. So it is the most rational thing to do, is to provide incentives for deep renovation instead of providing incentives to a correctional renovation. And I think more and more government are starting getting this because especially in energy-dependent countries because there is an economic impact, immediate economic impact importing energy outside

the country, energy that we waste. And it's like double or three times wasted, in, in money, because then we incentivize, something that doesn't reduce this energy dependency. At the time I was at the IA, we had done this exercise for at least two countries, France and Netherlands. And from what I remember, even Netherlands, who is not in similar energy important situation like France, it didn't make sense, at all, for a country like Netherlands to provide incentives, to incentivize shallow renovation that locks (unclear) potential. Because what we need to keep in mind is that the renovation cycle... And it's not the energy renovation cycle. We are not, yet, there. The renovation cycle, the average renovation... time for that, in the OECD countries, is 30 years for residential sector and 20 years for non-residential sector. So basically, if, today, we incentivized shallow renovation, we lock ourselves, eh, for at least 30 years, or 20 years in non-residential sector, with, taxpayers' money. I think probably more analytical work needs to be done for each for each country, individually. But overall, what we need to keep in mind is that the message to the market actors is we don't have we don't have any more of the time and the money to waste by locking ourselves and we have to avoid that. That's why deep renovation is the only option possible. Thank you.

Jens And if I may add, uh, one comment from the German case it is shown that, uh, if you do something very shallow, you might not create new jobs because you are only supporting what already would happen. And the KfW schemes have shown to create 300 to 400,000 jobs. And they have created a, a revenue for the government which is higher than the cost for the government of running this scheme. So I think it's relatively easy to argue for... that this is a good goal and this is well-invested public money. So that was just to add extra note from the slides.

Sean Thank you, Yens and Yamina, for the, responses. Moving on, now, to the next question. That's, How feasible do you think it will be to implement embodied energy greenhouse/greenhouse gas metrics alongside policies that also address operating improvements in your community or country?

Jens I'm happy –

Ann This is Ann. Go ahead. Go ahead.

Jens No, II was just saying I was... I'm happy to, to add on this and say that the closer we come to zero, uh, the more important embodied energy will become. And when we reach the zero, everything we do is embodied energy. So the more advanced we get our building codes, and the closer we come to this magic zero, the more important it becomes to look at the embedded energy. And if you're far away from the energy... I remember some of these studies. It showed that you need to go very dramatic before you should ask this question. But now, when some countries start approaching zero energy, I think they have to start going into these kind of what does, does it cost. And especially, what does the energy efficiency measures cost in, in embedded, uh, energy?

Yamina Yeah, I, I full agree with Yen. The, the embedded energy is question for, uh, zero-energy buildings. It's not really question for the renovation of the

existing building stock because we are far away from zero-energy buildings. And when even when we renovate deep, deeply only few buildings could go to zero energy consumption. And the current (unclear) what the market is delivering is far away from zero-energy buildings. So it's bit premature question for zero... for existing buildings. But it's a real question for zero-energy buildings, for new buildings at least.

Ann Um, I, I would –

Peter Yes, I also agree. I also agree... Sorry.

Ann Oh, go, go ahead.

Peter I also agree with this, for renovation of existing buildings, it's not really an issue today. I would just add, when we look about the new buildings, lower-energy, solar-energy buildings, we should not only look on the embedded energy. We should look at sustainability. It includes, also water, chemicals, sustainability in a broader sense of the, the building materials and the whole cycle of the building. So it's a broader perspective than just embedded energy. Thank you.

Yamina Yeah, just o-one last point, after what Peter said. So maybe, for zero-energy buildings, we really have to work on new metrics that takes into account the resource efficiency, and not just the energy efficiency part, in the operation phase.

Ann Couple of things I want to add on this. I think that, while it's true that the embodied energy becomes a larger factor with a zero-energy building, or as we move towards zero energy, something that, uh, a number of folks here, in the U.S., have been really thinking a lot about lately is the fact that all of the new materials put into both new buildings and renovations, um, even though they may represent a relatively small fraction of the overall lifetime energy of the building, that-that's a carbon load that it... it's a... it's front-end loaded, in terms of the building's life cycle. And because we have this critical 20-year or 25-year window to address global (unclear) we need to be very, very cognizant of that front-end load. And I think, among other things, what this means is we need to be looking more and more at regulatory mechanisms that incentivized renovation of existing building stock over the creation of new building stock. So we need to, in a sense, step back a ways and look at the overall means by which people create new buildings or renovate old ones. And we should be favoring renovation with our policies.

Sean Okay. Thank you, everyone. And the next question from the audience asks what participation rates, in voluntary deep-retrofit programs, are needed to adopt a mandatory deep retrofit requirement?

Yamina This is Yamina. I think this will depend on the, we cannot have, we cannot have one single answer for each country. I think what matters is that, each time the renovation is taking place, it has to be as deep as technically possible, eh, to avoid the lock-in effect and to avoid, uh, wasting time and money. And then, eh, for each country, eh, we need to look at the overall

building stock and... We need to look at the overall building stock and then set the targets based on what is achievable. Because there, there is another point that we didn't really discuss here is we need targets, but we need realistic... ambitious target and realistic, at the same time. What is really achievable? Market actors are not currently eh, ready to shift from, I consider that, in all OECD countries, we don't really have deep renovation happening. With the exception of the KfW example we don't know about really deep renovation projects happening. So we need to prepare market actors to shift from shallow emerging innovation, with low innovation rates, to, first, to deep renovation that is learning-face and, uh, then increase the, increase the renovation rate over time. One point that I think Peter mentioned before was that the renovation should happen with a—the energy renovation should happen with the renovation cycle of the building because the energy renovation cycle is great opportunity to have energy renovation included. And unfortunately, in the current situation, uh, it's not the case. All the energy requirements are so low that we (unclear). So to answer this question, we need to have to know for which country and then the IA (unclear) methodology, to make these calculations. And I will be happy to provide more input about the methodology to the person who answered this question. And then you can make the calculations for your own country. Thank you.

Sean Great. And I'm actually going to jump in there.

Jens I would like to—

Sean Oh, go ahead, Yens.

Jens Yes. This is Jens. I would like to, to jump in and say we have seen two ways to get to the magic zero that we are going for. We saw the building codes in Germany and, uh, Denmark, both going, uh, down and it's (unclear) out of the energy consumption until we reach the first... the zero, and then the cost of energy. We could do the same with existing buildings. So first we, uh, require energy renovations, maybe 30%. Then we go to 50%. Then we go to 80%. And, then we go to 90%. So we could slowly increase the requirement for each building. Or the other way to get there is maybe a slowly upscaling of deep renovation. And I think the question is pointing at how fast could we go to make deep renovation mandatory. And I think we cannot go from a situation where this existing less than 1% or 2% of the market. We need to have a significant market, so that we don't get bottlenecks, so that people know how to do it right, that the industry can deliver the right products to, to this. So I would say, before you can start thinking about making something mandatory, you should probably be sure that you can... you have a supply of maybe 30% of the market already. Because otherwise, you get too many implementation issues.

Sean Great. Thank you. And we are out of time, so I'd like to move on, now, to the, um, quick survey that we have for our attendees. And this survey just helps us, uh, evaluate how we're doing and improve for future webinars. So Heather, if you could display that first question. And the question is the webinar content provided me with useful information and insight. Great. And the next question, please, Heather, The webinar's presenters were effective.

And the final question is, overall, the webinar met my expectations. Great, and thank you for answering our survey.

And on behalf of the Clean Energy Solutions Center, I'd just like to extend a thank you to each of the panelists for joining us today. Great discussion and great presentations that we had. And I'd also like to thank our attendees for participating in today's webinar. We very much appreciate your time. And I invite everyone to check the Solutions Center website, over the next couple days, if you'd like to view the slides and listen to a recording of today's presentation, as well as any of the previously held webinars. Additionally, you will find information on other upcoming webinars and training events hosted by the Solutions Center.

We are also now posting webinar recordings to the Clean Energy Solutions Center YouTube channel. Please allow for about a week for the audio recording to go up on the Solutions Center website, and a little bit longer for it to make its way onto the YouTube page. We also invite you to inform your colleagues, and those in your network, about Solutions Center resources and services, including the no-cost policy Ask an Expert support. And with that, I hope everyone has a great rest of your day, and we hope to see you, again, at future Clean Energy Solutions events. This concludes our webinar.