CLEAN ENERGY SOLUTIONS CENTER
ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

Energy Efficiency Measures to Boost Building Renovation

—Transcript of a webinar offered by the Clean Energy Solutions Center on 13 January 2015—
For more information, see the clean energy policy trainings offered by the Solutions Center.

Webinar Panelists	Bruno Lapillonne, Vice President and Co-founder, Enerdata Carine Sebi, Project Manager, Energy Efficiency Specialist, Enerdata
This Transcript	Because this transcript was created using transcription software, the content it contains might not represent precisely the audio content of the webinar. If you have questions about the content of the transcript, please contact us or refer to the actual webinar recording.

Sean

Hello everyone. I'm Sean Esterly with the National Renewable Energy Laboratory, and welcome to today's webinar, which is being hosted by the Clean Energy Solutions Center in partnership with Enerdata. Today's webinar is focused on energy efficiency measures to boost building renovation.

One important note of mention before we begin the webinar 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.

Before we begin I just want to go over some of the webinar features; you do have two options for audio. You may either listen through your computer or over your telephone. If you choose to listen through your computer, please go to the speakers option in the audio pane. Doing so will eliminate the possibility of any feedback and echo. If you choose to dial in by phone please select the telephone option and the box on the right side will display the telephone number and audio PIN that you should use to dial in. If anyone is having technical difficulties with the webinar, you may contact the GoToWebinar's Help Desk at the number displayed at the bottom of the slide. That number is 888.259.3826.

We encourage people from the audience to ask questions at any point during the webinar. To ask a question simply type it into the question pane and submit it there. I will receive those questions and present them to the

panelists during the question and answer session following the presentations. If anyone is having difficulty viewing the materials through the webinar portal, we will be posting PDF copies of the presentations to cleanenergysolutions.org/training so that you may follow along as the speakers present. Also, we'll be posting an audio recording of the presentations to that page within about a week of today's broadcast. Just to note, we are also be adding recordings to the Solutions Center YouTube channel where you will find other informative webinars, as well as video interviews with thought leaders on clean energy policy topics.

Today's webinar agenda is centered around the presentations from our guest panelists Dr. Bruno Lapillonne and Carine Sebi. These panelists have been kind enough to join us to explore potential existing savings in building stock and present some innovative financial schemes.

Before our speakers begin their presentations I just want to provide a short informative overview of the Clean Energy Solutions Center Initiative. Then, following the presentations, we will have the Question and Answer session and then a brief survey.

This slide provides a bit of background in terms of how the Solutions Center was formed. 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 include support of developing countries and emerging economies through 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 now attending today.

There are four primary goals for the Solutions Center. The first goal is to serve as a clearinghouse of clean energy policy resources. Second goal is to share policy best practices, data, and analysis tools specific to clean energy policies and programs. The third is to deliver dynamic services that enable expert assistance, learning, and peer to peer sharing of experiences. Then lastly, the Center fosters dialogue on emerging policy issues and innovation around the globe.

Our primary audience is energy policy makers and analysts from governments and technical organizations in all countries, but we also strive to engage with the private sector, NGOs, and civil society.

This slide shows one of the marquee features that the Solutions Center provides is the no-cost expert policy assistance known as "Ask-an-Expert." The Ask an Expert program has established a broad team of over 30 experts from around the globe who are each available to provide remote policy advice and analysis to all countries at no cost to you. For example, in the area of Energy Efficiency Policy we are very pleased to have Jeff Deason, the Senior Analyst with the Climate Policy Initiative,

serving as one of our experts. If you have a need for policy assistance in Energy Efficiency Policy or any other clean energy sector, we do encourage you to use this valuable service. Again, it's provided to you free of charge. To find out if the Ask-an-Expert service can benefit your work please contact me directly at sean.esterly@nrel.gov or at 303-384-7436. We also invite you to spread the word about this service to those in your networks and organizations.

Now, I'd like to provide brief introductions for today's panelists. Our first speaker today is Bruno Lapillonne. Bruno is a Vice President and Co-founder of Enerdata. Then following Bruno we will hear from Carine Sebi. Carine is a Project Manager in Energy Efficiency at Enerdata. So now with those brief introductions I would like to welcome Bruno to the webinar.

Bruno Thank you very much for the introduction. Before we start the presentation I will say a few words about the Enerdata. Enerdata is an independent company that was created in 1991...

Maybe you can change the slide please? Thank you.

Which specializes in the global energy market analysis and modeling and also specializes in energy efficiency and demand analysis. Our work relies a lot on detailed database and all kinds of aspect on energy environment, and so on, and several forecasting models.

We are based in Grenoble and we have offices in Paris and Singapore to cover Asia. Our expertise on energy efficiency deals with energy efficiency indicators and databases. We have been involved in a lot of projects worldwide in Europe. We are working a lot in Latin America with UN CEPAL. We are working also with Adam on several regional projects. We work also, and maybe this is what we present today—we are working on the evaluation of energy efficiency policies and measures with a specific focus on buildings. You have a list of different projects in which we are involved and this presentation today will mainly rely on the Entranze project. All references I will give at the end of the presentation.

Our presentation will be made of three parts. Two main parts—one I will cover, which gives A-EU background and the second one that will be presented by my colleague Carine, will deal with some interesting experience of financing energy efficiency in buildings.

About the EU background, first of all the building sector that covers residential and service sector represents 40% of the final energy consumption. So it's a significant share of the energy consumption in the EU. For electricity it is even 55% of the total consumption. Building the residential buildings represents 2/3 of the total, so we mainly often focus about dwellings because it's an important target. The trend now is that the energy consumption has been decreasing since 2008 and the decrease is

not fully linked to the economy crisis we were suffering in Europe. It's also mainly driven by the impact of energy efficiency. So in that case energy savings is stronger than the effect of economic growth. We expect that this trend, even if the economy grows, is coming back, will go on. This is a constant trend and will decrease in absolute values because of the effect of existing policies that have been implemented. We have implemented policies in buildings to cover the heating, mainly thermal uses, but also in appliances. This presentation will focus mainly on thermal uses, space heating, which is about 70% of the consumption of dwellings.

I said the consumption will decrease even in a baseline scenario, but we expect that in an ambitious policy scenario a decrease could, the potential of the reduction of consumption could, be as much as 26%. Therefore, this is the kind of potential that we could try to tap with appropriate policy measures. It is cost effective for the consumers but, and this is shown on the right slide, the red line shows what we could expect with a baseline but the baseline includes a lot of policy measures, all the policy measures that have already been implemented, and the ambitious one is potential that could come from additional measures. In that case we could expect consumption to decrease by 1.8% per year. The decreasing CO2 emissions would be much higher because of a shift to less CO2 emission fuels.

Most of the potential would have to come from existing buildings because new construction in Europe represents roughly, in a good period, 1% of the existing stock but since the crisis it is even less—down to .07, .08%, as you can see from the graph on the left.

What we have to take into account is that in this existing stock half of the dwellings were built before 1970 that is to say before there existed the first regulations. So the target is clearly on the refurbishment of existing building stock, which is not easy.

What is the new legislation in that area? Countries separately in Europe have been implementing building codes, mainly targeted to space heating rules that were regularly tightened for some of them across time, but have been no common rule and approach. In 2002 the European Commission, that is a kind of governing board of all European countries, adopted a law and actually it went through the European Parliament, which adopted the law known as Energy Performance of Buildings Directive, in short we say EPBD. It was the first attempt to harmonize building code in the EU. It required all EU countries to set up building codes based on the "whole building" approach, so called the performance-based approach—not looking at element by element but fixing target as to the consumption of the building. It also required, this is very important, because by experience we have seen many countries having one standard but not improving it or making it tightened. So it required a regular update of standards every 5 years and also what was innovative was to look at renovation. It was the first real item because there were no real countries with such measures. To

create standards in the case of renovation of large existing buildings, in that case it was above 1,000 square meters. You had to follow standards based on the new buildings. The additional interesting aspect of this legislation was the introduction of the monitoring and recertification of buildings, like what exists for appliances. It is well known to be able to characterize what is efficiency of the buildings. In most countries [inaudible 13:19] as to the absolute value of consumption of the building per square meter. This is monitored for all buildings that are sold or rented.

Then, the importance of the building sectors importance of looking at renovation lead to what they call the recast of the directive. So it's kind of an update and is often referred to as a second directive or EPBD 2, which was a bit more precise on different aspects. One aspect was to say that the standards that had to be set by the country should be in accordance with what is cost optimal, and I will come back to that. Not just having standards, but trying to have standards that correspond to what is cost optimal for consumers. It was required for new buildings that, by around 2020, all new buildings should be nearly zero energy buildings. That is a bit vague definition but the idea is to have buildings that do not consume much and not only for space heating but for a certain number of venues. For example, it might be the case in France, our country; the standards apply to five venues. So it is space heating, for air cooling, for water heating, for ventilation, and for lighting. So this is very severe treatment of buildings that have to cover these issues with almost no energy consumption.

For existing buildings, that is the target of this presentation, there were also some change that eliminated the threshold for large buildings and set the minimum energy requirements where necessary in case of the renovation, major renovation, of existing buildings. Major renovation is characterized by 25% of the building surface being renovated. It also required regulation on building elements for renovation. That is to say if also I want to renovate a dwelling, they have to use elements that meet certain standards.

Then there was a third law, which was adopted in 2012 that was broader than just buildings or just picked what was related to buildings. It said, and it was known as EED—the Energy Efficiency Directive. It said that to enhance the target to reach near zero energy building renovation or just near zero new buildings it requires new countries to develop long term plans to support renovation and development of such buildings. It is clearly a signal to go towards low energy existing and not only at new buildings.

This directive also set up the requirements for the public sector to play a leading role, which was to increase, and in some case it was to start, a renovation rate for buildings that are owned and occupied by the Central Government at 3% per year, which is quite significant.

Now going back to this cost optimal concept that was included in the second EPBD directive. The objective was to assure that the minimum energy performance requirements, that are part of the regulation in each country, are set in a view to achieve what is cost optimal—what is cost effective for the consumer, and not just set up the level without looking at the cost. Cost optimal level means, of course, higher in initial investment costs but these higher costs are repaid later on by a lower energy savings. The cost optimality look at the global costs that is to say that it will take into account the capital costs but also the energy expenditure and all other expenditures over a certain period. It was agreed to take 30 years for the calculation. The global costs are discounted over a 30 year period.

The European Commission established a reference methodological framework that is public and that can be of use for any country in the EU to calculate this cost optimal level for the minimum energy performance requirements for new building, existing building, or for elements.

We'll see on the next slide we go into more detail to explain this cost optimality and I will take the example of the Entranze project where we have made great use of this methodology to define for each country that were looked at in the project, there were 9 countries in the investigation, of what are the package of solutions that were cost optimal. The solutions for renovation can be solutions that can be looked at improving the quality of the building share but also using it as a better, more efficient, heating appliance or cooling appliance.

So the calculation was done for 12 climatic zones because of course the climate is important for both in terms of use but also in terms of solar energy that would be available for a solar water heater or solar PV. The objective of the Entranze project was not just to look at cost optimality but also to find what is the best package of policy measure to be implemented in the country to accelerate deep renovation of existing building and, if possible, to go as much as possible toward deep renovation. Deep renovation means that you don't only get 5% savings but more significant savings when you implement energy efficiency solutions.

What we've done is that for each building type and we considered four building types. That is on the next slide. It's single family houses, a multi-family dwelling, office, and school and we took as the reference for these building types badly insulated dwellings. This would be the target for the first approach for renovation, so buildings built in the 50s or 60s when there were no regulations. We set up in the project a cost energy cloud that represents global costs versus net primary energy demand for a large variety of renovation options. We considered, for the building envelope, 34 options for heating/cooling equipment, 34 also possibility alternatives, and if you combine all the options it can go up to 30,000 combinations. It meant a lot of calculations that were carried out by our colleague in Milan at technical university. This is shown in this cost cloud. We have an example on the next slide where each point corresponds to a solution. You

have in red with the arrow what is the present situation for the building and then you can see down the zone that is called A, which represents the solution where the cost is the lowest. The cost is not the investment cost but it is the total discounted cost over 30 years. B, on the left, corresponds to the solution that corresponds to the worst consumption. If we look at low energy building, what we call nZEB, B represents the nZEB zone.

What we are interested in here is zone corresponding to the minimum global cost. In the directive it is even specified that countries have the margin to fix their regulation in the range of 15% around these minimum costs but that was possible to see from the graph. This was an example of the Paris area. This was done for a 15 climatic zone. Very often the zone of the lowest cost was not just a few points but it was really a zone quite broad. In case it is one single point the regulations say that we can choose between + or - 15% to take into account the uncertainty.

After that there are two very technical slides just to show you how we have worked but I will not present all the detail. The idea was to show what was the best solution and the distribution among all the possibilities of the points that were displayed. The graph showed, the first graph showed, the building envelope—what was the distribution of the most interesting solution and the circle one where the two best solutions, but there were also others that were interesting. Each code, that could be too long to explain, corresponds to e for the envelope, w for window for different options characterized at the end of the graph and oddly readable like this but the purpose is just to show you what we have been doing. You can find a lot of information that is freely available on the Entranze website.

The second slide relates to the distribution of heating optimal solutions and different aspects of building to heating. In the case of barriers to [inaudible 24:28] to now in 80% of the cases to be the best solution followed by ground heat pump, GSHP or air heat pump.

For other areas, like Milan, Madrid, or others, the distribution of costs is very different because it all depends on the availability of resources and the heat and cooling load. Now, in summary, you can see that there is a lot of effort to boost renovation to push towards costly renovation package, deep renovation. And this means high investment costs, of course, that would payback over the lifetime of the building but the difficulty is that the investor, especially when they also have difficulty to think about cost effectiveness over a 30 year period. The question now is how to get the household to invest in deep renovation and for that we have to look for innovative financing. Several countries have tried to develop innovative financing packages or other measures and carrying would go on showing some example and lessons we can draw from these measures. Carine?

Carine Thank you Bruno. So now I think that we have a clear understanding of the European legislation and recommendations that are sent to the European member states to boost renovation in existing stock. So in this second part I will first briefly present you two innovative schemes—the UK Green Deal and in Germany the KfW program, refurbishment program. Of course there are many other incentives and financial schemes implemented in Europe like in France, for instance, the soft loan in entitled [inaudible 26:49]. But we wanted to focus on the most criticized and popular schemes within Europe. Then, in the second part, we will look at the scenario of results of the Entranze project of renewable energy presented in the first part.

So Bruno, you just said that energy incentive measures should incentivize households to implement renovation solutions and that it should help households to overcome the problem of high initial renovation costs.

The purpose of the Green Deal implemented in 2013 is exactly to have households to get access to energy efficiency improvements with little or no upfront costs. So, how did it work? On that side I briefly present you the Green Deal process in eight points. First of all, a household interested in the Green Deal pay a Green Deal Adviser for the initial assessments. Second, the adviser provides the household with recommendations on which measure can be installed and that are compliant with the golden rule. It means that [inaudible 28:14] recommend appropriate improvement for the house and should indicated whether they are expected to pay for themselves through their reduced energy bill. Third, they take this recommendation assessment. Households are supposed to shop around and find the Green Deal provider with the best offer. Fourth, once the contract is signed with the Green Deal provider, the Green Deal provider will then order the Green Deal installer to carry out the agreed measure.

How is this part of this financial scheme? Well, part of the cost of the measures is financed through a loan from the Green Deal provider and the Green Deal support schemes. The loan that is going up to 25 years and the rate is ranging from 6-8% is repaid by way of a surcharge on the electricity bill collected by the electricity supplier and it's paid back to the Green Deal provider. I remind you that that value of the monetary savings triggered by the measure installed should be greater than this surcharge. This is the Green Deal golden rule.

Last, but not the least, the Green Deal is paid on an innovative idea of not attaching the loan to the owner but to the property itself technically through the electricity meter in the property.

Households can co-finance measures easily by providing some other required investment itself or they can use the UK policy instruments that are proposed. So, the first one is the Energy Company Obligation. This partial financing means that when customers choose measures that are unlikely to pay for themselves in their lifetime they can still get money

towards the installation costs up to the value of the estimated savings. The Energy Company Obligation, the preceding scheme, was known as the carbon emission reduction target. So they picked Energy Company Obligation in places where legal obligation of the larger supplier, energy supplier, to deliver energy efficiency measures for domestic customers with a focus on fuel poverty for low income customers.

Besides and to promote the Green Deal plan, UK developments launched a two sets of incentive schemes. The first one was implemented from January 2013 to June 2014. It's the Green Deal Cashback scheme. It's a subsidy that depends on the type of measure and household cash back for implemented measure. For instance, it was like $6,000 for implementing new solid wall insulation or $400 for installing a new efficient boiler.

Then the second scheme implemented in June 2014 was the Green Deal Home Improvement Fund. Here it proposed a subsidy up to $9,000 US dollars for implementing a solid wall insulation, so the amount has increased. It's proposed a new cash back for implementing at least two solutions. Fortunately this last scheme collapsed immediately because there were too many applications.

The Green Deal has been criticized by a broad range of groups but let's see on that slide what are the impacts of assistance. What type of measures were implemented? So look on the graph on the left part. You can see the Green Deal financing attracted a very limited number of households. I put in brackets the number since the implementation, since January 2013. Only 3,200 households signed the Green Deal finance. That is to say the loan is repaid by the electricity bill. In addition, we can see that the Green Deal finance did not favor deep retrofitting, such as solid wall insulation for instance. We see on that slide that for the Green Deal finance a lot of households decided to implement micro generation or the replacement of the boiler. The number of solutions implemented per household is quite low, like 2.2 measures implemented per household. As a result the Green Deal finance has very little impact on the thermal insulation markets today and is well below initial government projections.

The ECO, as I explained previously, is supposed to fund measures that do not meet the golden rule and we can see that 35% of measures come in cavity wall but compared to the previous scheme, the Carbon Emission Reduction Targets, insulation activity has decreased over time. Then the subsidy scheme, the Green Deal House Improvement Fund, targeted mainly solid wall insulation. Indeed we've seen that the Cash Back was higher than the Cash Back scheme and as I told you previously it collapsed immediately and still a number of applications is quite low as 8,800 households have asked for that grant.

So briefly and as a conclusion, the Green Deal was made to smooth upfront costs thanks to this loan. However, we've seen that it attracted fewer household and they implemented mainly PV installation or boiler

replacements. So as a conclusion we can determine that the golden rule limits impact on thermal insulation markets. We've seen also that the Green Deal is very sensitive to subsidies, like the Cashback and GDHIF program that collapsed immediately. There is a need to fix long-term drivers and oriented incentive measures towards deep retrofit to avoid this continual cycle boom and busts. We've seen as well that the scheme does not give enough incentives to implement a package of solutions as Bruno presented profusely. If you want to catch the cost optimality this is very important for, to implement this package of renovation solution. As an answer, the UK government decided to offer a second release of the Green Deal Home Improvement Fund in December 2014. Now they said that households had to implement at least two measures to benefit from the grants.

So the last point is the transition to the second scheme I want to present to you. The Green Deal, the general preference insulation measures should be promoted and should be a negotiable condition for benefiting from the loan or the grants.

So now let's turn to the German case. What's going on in Germany, the KfW, is well known in Europe and is one of the leading programs on building retrofitting measures. KfW is a German state owned promotional bank and is managed by loan to carry out promotional activities. KfW acts in close cooperation with the Federal Ministry of Building, Transport, and Urban Development. Incentives are offered by the public investment bank with a strong financial backing from the government. The government injects funds through the KfW and dedicated credit lines are open with commercial banks to offer grants or loans to customers. The objective of the program entitled Energy Retrofitting and Refurbishment is to provide financing by way of loans or grants for energy efficient construction and renovation in the residential sector. The rule is simple—the higher the energy efficiency, the higher the incentives. This is clearly what is presented up on that slide. In order to benefit from the advantages of promotional financing condition, it's a precondition that the pay efficiency standards achieved are better than the requirements as set out in the German Energy Saving Ordinance for new buildings. The program reduces the compliance ordinance requirements to two values. The first one is the annual primary energy demand compared the energy of a new building, the so called reference building. The second is the structural heat insulation still compared to the reference building, that is to say the specific transmission heat loss.

The basis for measuring the level of energy efficiency is a so called KfW Efficiency House Standard. For energy efficiency refurbishment and activity you can see on the slide that there is, in total, six promotional levels starting with the most efficient one—the Efficiency House 55 as the most ambitious level. So on that slide you can see that the KfW refurbishment program includes either a loan or a grant. Let's concentrate on the loan.

The loan is at an annual rate of 1% can cover up to an investment of $90,000 per household for energy efficient refurbishments. Plus, it proposes a repayment bonus subsidy that is calculated on the loan performance and the repayment bonus depends on the level of energy efficiency of the refurbishments. For the customers that do not target deep retrofits, KfW offers promotional loans for single measures. Single measures, for instance, can be a window or changing heating systems or improving insulation.

Second, if customers don't want to apply for a loan there is a second option to apply for, a grant, for investment. Again, the loans available are based on the same energy efficiency levels and is calculated as for the loan, the maximum loan, amounts applicable. It varies between 10% and 25% of the maximum loan amounts.

On that slide, as with Green Deal, we look at KfW impact assessments. KfW approved around $12 billion of commitments in 2012. This figure includes the construction amount of the program, among which $1.8 billion came from the Federal Government, which in turn mobilized a total of around $32 billion investments. So, there is a good leverage effect; the ratio between the private and public investment is pretty good.

Since 2006 $1.8 billion—this is a cumulative number, around 250,000 house units were refurbished thanks to that program. It's around roughly 250,000 households per year, which represents around 5% of the total stock. The average savings per house is 26% of energy reduction consumption prior to our refurbishments.

What is the type of measures implemented? Is it single measures? Is it loan or grants as well? So the statistics given indicate by the KfW program told us that 82% households applied for single measures. However, households can apply to several single measures. That is to say they can apply for a grant concerning a window, plus insulation, plus heating, and on average it is said that between 4 and 5 measures are implemented per household. There is a good chance that households implemented a package of measures at the end of that program.

As a result there is a large majority, like 70% of households, that received the grants that rather than a loan. Deep thermal solutions are largely implemented in case of package of measures. That is to say that they reached the energy efficiency house targets but still the results show us that insulation solutions are implemented as well and in the majority of the cases they were single measures.

Briefly again as a conclusion, we can say that KfW bank gave simpler access to capital and makes loans attractive to borrowers. The financial scheme is based on energy efficiency conditions. Besides if the customers don't target deep retrofit, there is still an opportunity to apply for a soft loan for single measures. We've seen that grants are strictly preferred than

loans. With that as well, there is a good energy savings as to that energy program. However, we can ask, we can wonder, if this program is sustained because, sustainable—sorry, because it depends highly on preferred projects to which extent and until when. But, it seems that the government sends good signals because generally—like one week ago, they announced that there is a 5% increase in the repayment bonuses of KfW efficiency house standards. I think it's to make the promotion of the soft loan program rather than grants.

On that slide I hope that I will have more time during the question or at the end of the presentation to present you in detail with this benchmark analysis, which is not the purpose of the presentation. It's just to make the summary of each scheme. In green you have the main advantage or strength and in red the weaknesses. As a conclusion I would like to say that to make a transition with what Bruno presented about the cost optimality. The value is better than the Green Deal because it results in higher savings at lower costs. The package of measures on average is higher than in the Green Deal program.

Now in this last part of the presentation we'll go take advantage of the results presented in the frame of the Entranze project. Bruno already introduced you to the project just to say quickly that a different set of national policy packages on refurbishments have been developed in close cooperation with national stakeholders and policy makers in each country. The scenario of being assimilated, within that model that takes into account the cost of the values renovation option and decision criteria of different groups of investors.

The scenarios are country specific and cannot be compared; however, energy savings highlight the most powerful and ambitious policy packages. So, on this graph the blue bars show the savings potentials, that is to say the different levels of energy consumption in 2030 against the business as usual scenario and the most ambitious scenario.

The red dots represent annual savings obtained over the proud 2008 up to 2013, 30—sorry, in the ambitious scenario. The potential of energy savings shows the impact of the most ambitious policy set compared to business as usual in 2030, while the other shows the amount of energy consumption reduction since 2008. On that slide we see that Spain and France have the biggest energy savings potential, ranging from between 60% and 80%. Germany has the highest energy reduction over time.

So we will present you briefly in the next slide with the three packages, policy packages, that have been displayed and simulated in Entranze. So first, first thing, the policy packages include the current regulatory requirements, the current building code, and plus an increase in the financial instruments. To promote the renovation activity they expect that the VAT reduction from 22% to 10% to booster renovation activity. They took into account the energy efficiency obligation, like set in the energy

efficiency directive. One innovative measure is that there is an energy efficiency refurbishment obligation in Spain today. The buildings older than 15 years must have a building assessment report and following two assessment reports, obligation refurbishments to the building are enforced.

In France it follows roughly the same idea. We keep the current building code and the current financial and fiscal measures. There is an increase of awareness and coaching program, plus mandatory renovation enforced at the occasion of real estate transaction for the least performing buildings thanks to the DSS platform provided by the Energy Performance Certificate that Bruno presented in the first part and of course it has to be economical feasible.

Third, in Germany, again there is a current policy design with of course a continuation of the financial supports offered by KfW that I presented you previously. There is a tightening of current energy efficiency requirements for new and existing buildings, plus an introduction of renewable use obligation for all existing buildings in case of heating system change.

Finally, as in France there is an increase in compliance rate in energy efficiency requirements and increase in information awareness of subsidy programs, for instance. As a conclusion, so Bruno showed that there is a very high potential energy savings in the building sector and more particularly in the existing stock that is the key target. As a response, the EU legislation is tightening, as indicated, and implementing norms on new and existing building and the objective is to tend toward nearly zero energy buildings in 2020 with cost optimality conditions as a priority for refurbishment.

Then in the second part I presented you two initiatives launched recently. The first one was the UK Green Deal that offers an innovative mechanism but unfortunately within that it has a poor impact on retrofit activity. In Germany since 2009 the KfW refurbishment program that offers financial support that depends on expected savings and benefits from government funds. Within that both show a preference to grants, compared to loans. Finally, the teaching from the Entranze projections highlight that efficient package of measures includes obligation of renovation, financial schemes—like the KfW program, and an increase of information awareness.

On that last slide we have put the references that helped us to make that presentation. Thank you very much.

Sean Great, thank you and thank you Bruno for the presentations and now we will move on to questions from the audience. Before we do I just want to remind the audience that if you have any questions for the panelists you can submit those through the question pane in the GoToWebinar tool.

So, the first question just goes back to Bruno's presentation. Bruno, you presented in the first part on the EU legislation regulation on hard renovation solutions, such as thermal insulation of heating systems. Are there any other drivers that could help to decrease the energy consumption of existing buildings and what are their potentials?

Bruno

Yes, as usual people tend to focus on technical solutions but in building, behavior is very important. You can lose a lot through behaviors in the sense that you can implement...you can have a very well insulated building, you can implement interesting packages to refurbish a dwelling, but if you don't have RES behavior then you lose part of the savings through the so called rebound effect. A fact that will increasingly come forward and at the end you lose part of the expected savings. So what is important as far as behavior? Behavior can be now addressed through a lot of EPBD devices, which can [inaudible 54:36] to control heating to plan the heating shut-off when you know that in three days weather will warm up and so on, with lighting, with air conditioning, in your area.

About the legislation, what has been done—actually I did not mention it—so thank you for the question, is that in the energy efficiency directive it is made mandatory to address this issue through the installation of a smart meter for electricity and gas that will become mandatory in all EU countries. We can expect that by 2020 most also will have so called smart meters. It is a fact that the country should promote smart building. It means building that is informative for the consumer. There are a lot of aspects that look at this aspect of behaviors. I would say that soft solutions for energy efficiency are complimentary and as important as the technical solution. I don't know if you want to add something. So that was my answer to this first question.

Sean

Great, thank you Bruno. I will move now to our next question from the audience. This question comes from one of our attendees who actually works for a housing agency in Albania and is working on introducing new building standards for houses, specifically low cost, low income houses. They say that these families usually try to save money just by not using it, not by energy efficiency measures necessarily, but by simply not using energy. Therefore, calculating the cost of efficiency of standards is very difficult. Are there any recommendations on how to address cases like this?

Bruno

Well, the issue you raise is a very burning issue in all European countries. It is also called shoe poverty and there are a lot of studies about how many hours sold are in so called shoe poverty, meaning they can't have the comfort that they should have and because they have to save on their bills so they have to not to eat or to lower their heating temperature. The number of households in shoe poverty increased a lot with the economic crisis. So, a lot of countries have designed specific programs for low income households, which include mainly financial packages where organizations take charge of investments and where most of the cost is subsidized actually through public funding because you cannot expect these households to invest themselves in saving energy. In addition to that, these low income households are usually the ones that live in the less insulated buildings with the poorest quality so the potential in these households is very high—the potential of energy savings. But, the capability of these households to make the necessary investment is limited. You need to go through third parties to invest and without expecting to earn money from that. One program is public funding and there are a lot of programs in the EU countries, especially in the new member countries where the quality of the household is good compared to the old member countries. Parties finance through special funds from the European Commission. They are structural funds that are given to the country that can set up the fund to, a national fund to, subsidize to eye level the percentage of total costs.

In addition they are interesting approaches and the UK was the first one to do it with one measure that Carine mentioned and maybe we should insist on that. That is the Energy Saving Obligation that has been introduced maybe 20 years ago and has changed several times [in] name and now is called ECO. That makes mandatory to electricity and gas utility to get savings from their customers. In the UK they have...now I don't remember if it is now the same percentage, it's 50% of their total savings they have to make, because they cut down savings that they have to prove, should be made with low income households. It forces utilities to pay for these investments. In France we also have some kind of policy, but it is less quantified, saying it should be 50%. Your question was also addressed to the regulation and how to calculate this cost of regulation. Actually, you don't make regulation for just low income households. You make regulations for all households and they are calculated for normal standard of living. In short, I would say this issue of shoe poverty is not only an energy efficiency issue. It's a social issue. It is to improve the living standard, the quality of life, of low income households.

I would like to come back to what was said about the Green Deal and it's called the road. The idea was very great to arrange a package that at the end the household would have a better insulated dwelling without paying more on their energy bill than before. It did not work well and it was this idea of the golden rule. I don't think we should cancel the golden rule. It is an interesting example that was very successful, which was dealing with

less important investment, which has been done in Indonesia—which is called the Parcel Program for the diffusion of solar wattage. It was really a success and it was exactly the same setting as was explained by Carine for the UK for the Green Deal. Thank you.

Sean Great, thank you Bruno. Thank you very much. We had another question come in. It asked, on the KfW, do we know how the federal public support breaks down between the straight cash grant and the payment bonus and interest rate subsidy?

Carine Well, you're asking what's the...what is the difference between the payment bonus and the grant?

Sean Yeah, I believe they're asking how the public support was spent...was broken down between the straight cash grant and repayment bonus and then the interest rate subsidy. We can come back to that.

Bruno I can try to answer. We don't have the number right now but I'm sure we can easily find it. What she has shown is the distribution of the measure or the number of households that get subsidy and the houses that get the loan. In terms of what it costs for the public budget, of course, we have to find the allocation, which would be different from what was given. What we have to conclude about KfW is that the cost for the public budget is very low compared to the benefit at time of investment and the impact on the economy because we said it's a factor of 20. For one Euro of public money given through grants or through subsidized loans, you'll get 20 Euro of investment, which means more jobs and more materials to be sold and so on. So it has a positive, a very positive, impact on the economy. And probably, and I think I've seen this study on that, the federal, state government get more money through taxes on labor and on the sale of the materials. So it's 100% benefit. It is a win-win strategy for the federal government. For one Euro spent, it gets more money back through taxes.

Sean Great, thank you Bruno. So this next question is in regards to the KfW program. It asks, does it provide some type of technical assistance to owners on how to select the energy efficiency measures?

Carine Yes, of course, it's at the Green Deal before benefiting from the KfW grant alone. A KfW assessment has to be done. It's our precondition as well. Thank you.

Sean Great, thank you Carine. Another question that came in, it states that public support is justified if social returns exceed financial returns. What is the best scheme in this regard?

Carine Are you asking the best scheme in terms of public support and social aspects, both?

Sean Yeah, so they're stating that public support is justified when social returns exceed financial returns and they're wondering the best way to...the best scheme in this regard. I'm guessing that they are asking how you get those social returns to exceed financial returns.

Carine Well, I would like to say that the Green Deal, the Green Deal scheme, the loan in terms of social aspects is not working because the amount of households cannot reach the golden rule. So finally, the household, they can't benefit from the ECO program, as Bruno said. It's in terms of mixed support it asks for grants, so for subsidy schemes. The KfW is asking as well for public purchase but just as Bruno said, the leverage effect is very good. That is to say for one dollar invested or given by the government, it's like a 20 dollars investment in insulation, installation activity, in the country. So, the best scheme for me is the KfW in terms of social because it gives access to everybody with a very very good interest loan at 1% plus this repayment bonus or this grant that is depending on the energy efficiency standards.

Sean Thank you Carine. Moving on now to another question. They ask, how do you deal with the case of insulation applied deteriorating faster than the loan recovery? This could probably be spread out to other technologies—something that deteriorates quicker than the loan recovery.

Bruno This is a good question and doesn't only apply to insulation but also to other materials. First of all, one way is to put quality standards and quality certification on the materials, which is what is being done in a lot of countries especially it is a condition to get access to public funding, public subsidies, and other programs Carine mentioned. To have it you have to go to certified installers and to certified materials to avoid low quality material and equipment. In addition, in the cost calculation—cost optimal calculation, this is still going to count even if the calculation is not [inaudible 1:08:28] it is for certain types of insulation materials. If we know we have to replace it after 15 years, it can be taken into account. We said it takes into account all costs that occur over the 30 years, including some kind of maintenance. Maybe I did not insist enough but if people go to the publication Entranze website there is a lot of detail about what is taken into account in this cost optimality calculation. Thank you.

Sean Thanks again Bruno. Another attendee asked—this question has a couple parts in it so let me read the whole thing and I'll repeat it if needed. What are the actors anticipated in the different schemes? Were they institutional investors or households and is there anything in the schemes to tackle the issue of the landowner or tenants incentives mismatch? The first part of that question is who are the actors that participated in the different schemes—institutional investors or households or other?

Carine Well, in the case of the Green Deal, as I explained on the slide there are several actors. For the Green Deal Finance there is the household, of course, that asks for an assessment. Then you have the audits that are made by an assessor that are certified by the UK government. Then you have the provider that is as well certified by the government as he's making the contract with the household. Then there is the Green Deal installer that is certified by the household and is implementing the measures. Besides the basic installers within the contract, the proposed loans and so on and everything is certified by the UK government based on the golden rule. However, I would like to mention that this golden rule is not guaranteed and that's why the Green Deal has been highly criticized because the assessment, the assessor, recommends the measures that meet the golden rule but in reality it's not guaranteed that the savings will be higher than the loan repayment. Anyway, that was just a comment.

Then concerning the UK Green Deal that is highly dependent and linked to the Energy Company Obligation, here you have—as Bruno repeated—the energy suppliers that are involved in that scheme. And Bruno wants to add something?

Bruno I believe the question was more with investing in the installation, for instance, and I think most of these schemes they address also, no more investors. The only way where investors may come in, but it is not the case in these countries but something that was considered in France, when you have an energy saving application scheme with energy utilities it means they have to make savings and they get a certificate to show that they have obtained this savings. They can trade the certificate on the market, especially for companies that did not manage to reach that target. One way to put investors in this trading is to allow them to invest in energy saving and then sell certificates to the utility that they have the obligation. This is an interesting move for energy saving obligations. This energy saving obligation that, like ECO in the UK, exists in about 8 countries. So, more countries should be included because there is some indication in one article, called article 7, of the energy efficiency directives that give incentives to countries to implement an energy saving obligation. An energy saving obligation is related to a trading of certificates or saving for the common certificate and so on.

Sean Thank you and there was a second part of the question.

Carine Sean, sorry, can I add something?

Sean Yes, go.

Carine Okay. Sorry if I misunderstood the question and I just wanted to say something about the KfW program that I presented mainly the program that targets mainly households but they have the same type of program incentive targeting the service sector. Then the second part of the question was to know the signals for owners why they chose this scheme for homeowner incentives, no? So in the Green Deal...

Sean The second part was...

Carine Go ahead Sean.

Sean Carine I was just going to repeat. The second part of the question was asking if there was anything in the schemes to tackle the issue of mismatch between landowner and tenant incentives.

Carine No, these two schemes focus on the landowner, however, the Green Deal says that if you sell or if the property changes tenants then the energy bill—the one that is repaid by the energy bill, will pass through a tenant on a rental.

Sean Great, thank you Carine. I'll move on now to the next question. Go ahead Bruno.

Bruno Probably this does not really address or target the owner but in some countries they are introducing legislation, the possibility, for a renter to implement energy savings solutions or owners to implement savings to increase the rent in both ways. There are some legal texts addressing this issue where either the renter can implement saving and lower his rent or the other way around increase the rent in case it is the owner that is implementing the solutions because you are right. This is a key issue and owner incentive mismatch.

Sean Great, thank you. And how is the public made aware of these schemes?

Bruno I can't answer in the case of the UK. Because of this Energy Saving Obligation, the energy companies have any way to do some saving. So for them it is like marketing. They are doing marketing to sell electricity and gas to get new customers but they have also to market energy savings solutions. The same way that installers know about these programs, you get probably a lot of advertisements by the different companies that Carine mentioned that are part of the...because for them it is new business. They go to the customer and they offer the service. In France we see that because we also have an Energy Saving Obligation like in the UK and the companies manage to provide use of loan and subsidies if you change your boiler or if you buy a very efficient refrigerator. It's like marketing of product and to address this issue of information, which is key, and maybe not stressed enough in one of the last slides that compares the policies that were used and tested in Entranze. The information of the public is very important and all countries recognize that. You can have schemes and people don't know it exists. They don't know or they find it too complicated just when you see the different type of scheme. The Green Deal scheme may look very complicated for an educated also. So, what is the approach is to disseminate the information office everywhere in the cities where people can go in the office of companies to inform the consumers about what are the solutions. No France has taken a very strong decision in that area and created what is called "the one stop shop" where you...I don't know how many we have in France but they are in all cities, maybe several hundred. There may be more than 1,000 shops where people can also come in but also small companies or anybody can receive information on technical solutions, on the fact that they can get a list of companies that can come to their home to do all this and tell you how much it would cost to do all this, and also about all the complex packages to get funding because in many countries there exist a lot of programs. What we quoted for UK is probably not exhaustive. They have local programs, regional programs, and so on. The consumers, they are lost with all these possibilities so if they go to these shops the advisor will tell them what they can do and how they can finance it. Before we used to have information centers but this link with the financial possibilities was a bit missing so this was the idea of what we call the one stop shop. Thank you.

Sean Thank you Bruno. Yep, and we have a few more questions to get to but we are starting to run a little low on time. So maybe we'll just keep these remaining questions brief if we can.

One of the attendees was wondering if you can discuss some of the scopes and barriers to public and private partnerships in implementing other energy efficiency schemes and learning lessons for developing countries. So, what are the barriers to public and private partnerships in implementing energy efficiency schemes and what are some lessons for developing countries?

Bruno This is a whole conference. It is difficult to answer in a few words. Just public/private partnerships works mainly for the public sectors. It is more dealing with the service sector, which is building still but less in the household sector. There are a lot of experiences. Germany, again, is one country with a lot of experience in that area. You may ask why Germany? Germany because they were confronted with the building of all the eastern part of the country when there was reunification where the quality of building was not as good as in the western parts and so it is likely that KfW started to develop its program. In addition to that they developed a lot of public partnerships to renovate public buildings. I did not mention it but it is on one of the first slides, we are involved in a project on an energy concept for some time reviewing the interesting policy experiences of the world. I think the address for the website is given at the end and people can go there and they will find information about different policy case studies we have done and one of them was addressing this issue of ESCOs and public/private partnership. Yeah, it's true also this energy saving obligation too, a kind of public/private partnership where the private partner is a utility and the public is a consumer. We don't have much experience. There are two countries in the world where to my knowledge are not OECD countries where they have not developed energy obligation for companies. It's Uruguay and Brazil where electric utility has to spend money on energy efficiency for the consumer but usually it's mainly targeted to the household sector. It could be. This approach is interesting. I would recommend to look at the experience of Uruguay and Brazil and especially Uruguay. They have a very comprehensive approach to energy saving. Thank you.

Sean Thank you again Bruno. I received two questions from attendees that are somewhat related. They are asking your opinion of other mechanisms used for energy efficiency. So I'll loop these out...group these two together. The first one asks what your opinion is of white certificate schemes for the energy efficiency retrofit of residential buildings. The second one asks what your opinion was regarding housing in building sector under the carbon market credit schemes to benefit customers.

So again that first one asks what your opinion or outlook or experience was with white certificate schemes for the energy efficiency retrofit of residential buildings. The second one asks regarding your opinion on the housing and building sector under carbon market credit schemes.

Carine Okay, concerning the first part at least, and I'm sure that Bruno will comment, concerning the white certificates we are seeing in the case of the Green Deal finance that is linked to the energy, the ECO, or the Energy Company Obligation is a white certificate. The figures, on the slide, I showed you that there is a high number of applications and it works well. However, as I told you, since implementation of the ECO—the white schemes in the UK—did not target deep retrofit and the cavity and loft insulation decreased compared to the previous mechanism—the government energy and reduction targets. In France the white certificate schemes target mainly residential and consider mainly the replacement of boilers so that's true again in terms of deep retrofit it's not really efficient but in a sense it's a good way to at least implement one measure, a single measure.

Bruno There is a reason for that. There is a company that does that, they start with easy solutions.

Sean No, go ahead Bruno.

Bruno Yeah, the company starts with easy solutions so deep retrofitting or addressing the building shell is more expensive, but as you increase the obligation and in France we have a cert program. The first one was obligatory. The second target was a bit more ambitious. The third program is a bit more ambitious. So it means the companies will have to go through taking into account part of the refurbishment on installation, on windows, and so on. As to the question, the link, on the housing with...the housing with market, the problem we have to address here is to avoid the instrument—the conflict between them. So for instance, industry is a sector where wide certification is not eligible because in Europe big industries are in the energy, the carbon, trading scheme. Building, they are with more wide certificates. I don't think you can have both because it would be a bit confusing. There would be double counting. Most of the measures now really differentiate the sector where it would be mainly carbon market mechanism and the sectors where it would be other mechanisms would include these wide certificates. Clearly building has been put with wide certificates. Thank you.

Sean

Thank you again to both Carine and Bruno for that. We are running out of time so we'll have to move along now to wrap up the webinar and before we do I do ask that the attendees take a brief moment to answer a survey that we have. It's just three very short questions that help us evaluate how we do. So the first question, which can be answered right in the GoToWebinar window, is The Webinar content provided me with useful information and insight. The next question is the webinar's presenter [lost sound]. And then the last question—the overall webinar met my expectations. Great, thank you for answering our survey and on behalf of the Clean Energy Solutions Center I would just like to extend a thank you to all of our expert panelists and our attendees for participating in today's webinar. We very much appreciate everyone's time and I do invite the attendees to check the Solutions Center website if you would like to view the slides and listen to a recording of today's presentations, as well as previously held webinars. Additionally you will find information on upcoming webinars and other training events and we are also no posting webinar recordings to the Clean Energy Solutions Center YouTube channel. Please do allow for about one week for the recordings to be posted. We invite you to inform your colleagues and those in your networks about the Solutions Center resources and services including the no cost Ask-an-Expert policy support. With that I hope that everyone has a great rest of your day and we hope to see you again at future Clean Energy Solution Center events. This concludes our webinar.