

Beyond Energy Savings: Accounting Multiple Benefits of Local Building Renovation

—Transcript of a webinar offered by the Clean Energy Solutions Center on 19 April 2018—
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Webinar Panelists

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Audrey Nugent
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Katie Contos

Welcome to today's webinar, which is hosted by the Clean Energy Solutions Center, in partnership with EmBuild Project. Today's webinar is focused on Beyond Energy Savings: Accounting Multiple Benefits of Local Building Renovation.

Before we begin, I'll quickly go over some of the webinar features. For audio, you have two options. You may either listen through your computer or over the telephone. If you choose to listen through your computer, please select the mic and speakers option in the audio pane. Doing so will eliminate the possibility of feedback and echo. If you choose to dial in by phone, please select the telephone option, and a box on the right side will display the telephone number and audio PIN you should use to dial in. If anyone's having any technical difficulties with the webinar, you may contact the GoToWebinar's help desk at 888-2593826 for assistance.

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

Today's webinar agenda is centered around the presentations from our guest panelists, Sebastian Botzler, Audrey Nugent, and Niko Natek, who have joined us to discuss accounting for the multiple benefits of local building renovation. Before we jump into the presentations, I'll provide a quick overview of the Clean Energy Solutions Center, and Mariangiola Fabbri from Buildings Performance Institute Europe will provide a quick welcome and introduction for the project.

Then following the panelists' presentations, we'll have a question and answer session, where the panelists will address questions submitted by the audience. At the end of the webinar, you'll be automatically prompted to fill out a brief survey as well, so thank you in advance for taking a moment to respond.

The Solutions Center was launched in 2011 under the Clean Energy Ministerial. The Clean Energy Ministerial is a high level global forum to promote policies and programs that advance clean energy technology, to share lessons learned, and best practices, and to encourage the transition to a global clean energy economy. Twenty-four countries and the European Commission are members, contributing 90 per cent of clean energy investment, and responsible for 75 per cent of global greenhouse gas emissions.

This webinar is provided by the Clean Energy Solutions Center, which focuses on helping government policy makers design and adopt policies and programs that support the deployment of clean energy technologies. This is accomplished through the support in crafting and implementing policies relating to energy access, no cost expert policy assistance, and peer to peer learning and training tools, such as this webinar.

The Clean Energy Solutions Center is cosponsored by the governments of Australia, Sweden, the United States, with in kind support from the government of Chile.

The Solutions Center provides several clean energy policy programs and several services, including a team of over 60 global experts that can provide remote and in person technical assistance to government and government-supported institutions, no cost virtual webinar trainings on a variety of clean energy topics, partnership building with development agencies and regional and global organizations to deliver support, and an online library containing over 5,500 clean energy policy-related publications, tools, videos, and other resources.

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

The Solutions Center is an international initiative that works with more than 35 international partners across its suite of different programs. Several of the partners are listed above, and include such research organizations, like IRENA and IEA and programs like SEforALL, and regional focus entities such as ECOWAS, Center for Renewable Energy and Energy Efficiency.

A marquis feature the Solutions Center provides is a no cost expert policy known as Ask an Expert. The Ask an Expert service matches policy makers with more than 60 global experts selected as authoritative leaders on specific clean energy finance and policy topics. For example, in the area of buildings, we are very pleased to have David McKuen, principal at McKuen Associates, serving as one of our experts.

If you are in need of policy assistance in buildings or any other clean energy sector, we encourage you to use this valuable service. Again, this assistance is provided free of charge. If you have a question for our experts, please submit it through our simple online form at cleanenergysolutions.org/expert. We also invite you to spread the word about this service to those in your networks and organizations.

Today's webinar will have a welcome and introduction of Buildings Performance Institute Europe by Mariangiola Fabbri, who is a senior project manager at BPIE.

Now I'd like to provide a brief introduction for today's panelists. First up is Sebastian Botzler, who is a PhD candidate at the Institute of Energy Efficient and Sustainable Design and Building at Technical University of Munich. Following Sebastian, we'll hear from Audrey Nugent. Audrey is a senior policy advisor at World Green Building Council. And our final speaker today is Niko Natek, who is an energy consultant at KSSENA Energy Agency.

And with those brief introductions, I'd like to welcome Mariangiola to the webinar.

Mariangiola Fabbri Thank you very much, Katie, and thank you all for participating. I hope you can see my screen. Please let me know if you don't.

I would just want to thank everyone for attending, on behalf of the EmBuild Project, and I will just take five minutes of your time to give you an overview of the EmBuild Project and what is its relationship with the topic of multiple benefits. So, the project started a couple of years ago, and started, and while we were developing it, and when we started it, we looked at a number of—at this picture, I would say. That's the effort and an overview of how member states, European member states, had developed their renovation strategies, and how compliant they were in respect to the obligations that the European Directive, the European Energy Efficiency Directive, put onto them to develop the renovation strategy.

So, as we can see, the picture is not very cheerful. It's actually pretty—it was actually pretty worrying. So, the EmBuild Project really decided to focus on how we could improve the level of compliance of—for member states, and

how we could help them deliver better renovation strategies, but with a specific focus.

The challenge for this project is that the obligation that the European legislation puts, it's on national governments, but the implementation is actually delivered at different levels, including regional and local level. And the local level is where EmBuild is actually putting its attention.

The objective of the project is really supporting public authorities, and in particular, local public authorities, in six European countries: Romania, Bulgaria, Slovenia, Croatia, Serbia, and Germany, to prepare long term renovation strategies and mobilize investment in the energy efficiency renovation of the building stock.

We do work directly with public authorities in different towns and regions in order to generate a higher capacity in local governments to design ambitious but realistic renovation strategies, and we focus in particular on public buildings. The local renovation strategies and the structure that we suggest the local authorities to follow actually reflects the structure of the national renovation strategies, but we highlight three specific points that are absolutely relevant in order to achieve the level of quality _____ of these renovations.

First of all, we really support local authorities in achieving deep renovations, and avoiding lock-in effects, so making sure that it will not prevent further solutions to be implemented. The second point, and this is the link with the webinar for this afternoon, is really valorizing the multiple benefits of these renovations. There are other benefits beyond the energy savings, and this is a point where a lot—many are struggling, and in particular in local municipalities and local authorities. And that's where Sebastian's presentation will really focus on how can we support them in doing this, and how to use sustainable financing.

The project has a distinct bottom up approach, and we're really targeting and supporting 100 municipalities in developing the renovation strategies. The project, as I mentioned, mobilized and focuses on mobilizing investment in energy efficiency renovation. We really focus on the local levels, on public buildings in particular, and we're really aware of the fact that these renovation strategies have to be implementable on the ground. So, they have to be ambitious, but realistic in their delivery.

In the meantime, while we were developing this project, the European legislation has changed, and I wanted just to highlight the novelty that was just introduced in the Energy Performance of Buildings Directive, that actually is now hosting the obligation for member states to develop national renovation strategies. And so, what—the legislation that we had when we developed this project was actually—the obligation of developing a national renovation strategy was in another piece of legislation, which has now been moved to the Energy Performance of Buildings Directive, which has just yesterday, just two days ago, on Tuesday, was voted in plenary by the European Parliament, and will come into force before the summer.

The goal of these national renovation strategies is really to have a 2050 long term goal and achieving highly energy efficiency in our decarbonized building stock, and really with a focus of transforming existing buildings, and renovating them to a point to become nearly zero energy buildings.

The directive, and this—the national renovation strategies will have to give special attention to worst performing buildings, to split-incentive dilemmas and market failures, to energy poverty, they will have to focus on all buildings and all public buildings, and they have to take into account wider benefits, so health, safety, air quality, productivity, and many other benefits.

So, when developing the national renovation strategies, member states will have to think about also how to take into account and how to include wider benefit of renovations into their strategy. And the last point that I wanted to highlight is the fact that member states are now required to set up public consultations during the development of the renovation strategies, and during the implementation of these renovation strategies, and these will open an opportunity for many stakeholders, but in particular for local authorities that in many countries are not involved into this decision process, this decision making process.

And this is where we see a project like EmBuild will really provide the right tools in the future to public authorities to take it—to participate into this process. And with that, I conclude. I leave the work to Sebastian, and I hope you enjoy the webinar.

Sebastian Botzler

Okay. Good afternoon from Munich. Thank you all for attending this webinar, and thank you, Mariangiola, for the introduction, and Katie, for the introduction of the whole webinar. In the next slides, in the next 15 minutes, I would like to introduce some insights into what are the benefits and what we consider are the benefits and how we want to measure and assess them. But before that, I would like to go in the same direction as Mariangiola and show the current situation in Germany.

At the moment, we first face quite stable, even decreasing situation, when we look at renovation activities. You see it on the upper part, the red columns, that the public buildings or non-residential buildings are like renovated in a quite stable pace, but residential buildings, renovation activities are decreasing. Especially when we look at the energy efficient renovation activities, we have a strong decrease in the last years. And this is something we need to overcome.

And I think one of the main aspects or main tasks when overcoming this situation is implementing and including the benefits. Here is one sign I like to show a lot. Europe must go deep. We need to have deeper innovation. We have to have comprehensive and energy efficient renovation, just any way costs or any way renovation maintenance is not enough.

To go straight into the topic of wider benefits, I would like to show you an overview of the variety of topics we can include into renovation assessment. Deep renovation has a lot of impacts on the society and on our environment, and these are just a selection of topics we selected, and we have categorized

into the three pillars of sustainability to make it understandable. And I would say economic effects are the most interesting one, for most of the audience, so we have a particular focus on that, especially macroeconomic growth, supporting local small enterprises, companies, producers, but also focusing on economic productivity, competition, markets, research and development, public finances. These are all sections which are affected by renovation of buildings, especially when we come to like properties values, asset values, real estate markets.

On the other side, we have the environmental topics, which are clear, I think, for the most, to understand. If we reduce energy consumption, if we reduce—then we reduce the emission of CO₂, we reduce the emission of particulate matter, we have less ecosystem impact, we have reduced emissions indoors, we have better indoor quality, and related to that, we have a better productivity.

On the social side, and this is something which is mostly forgotten, we have strong impacts on health when we have underheated homes or we have bad indoor air quality. Also, the architectural side, aesthetics, noise impact, energy security, these are all factors which are—which should be taken into account when thinking about renovation. I don't say we need to calculate them all, but I think it's nice to see how broad the spectrum is.

One phrase I like to quote a lot is that some impacts of energy efficiency can deliver 2.5 more times the value of energy demand reduction. So, we talk about the big number, big values. Of course, this is extrapolated, and of course, this is not applicable for a small project for small municipalities, but I think this is a number we can take into our minds and think about it, and especially when we come to the next topics in this presentation. It will be clearer how it could work in municipalities, and how we can assess that.

In the beginning of EmBuild , we made some survey within our stakeholders and public offices and asked them what they could think of what their experiences have—regarding the impacts of energy efficiency or building renovation, and whether they could actually observe impacts and effects on the society. And of course, the biggest, not surprisingly, the biggest section is the economy. So, we had the reduced cost of operation, higher productivity, the energy costs could be invested, reinvested in new projects, especially in public household—in public budgets.

Then the second biggest was environment, which is also quite clear, I think, lower CO₂ emissions, less air pollution, less particulate matter. But—and then for me, it was a nice insight that—a nice finding that sociology was already the third biggest part, and especially focusing on reduced health issues, better working quality in schools and hospitals. I think this is a big issue and should not be underestimated.

To get it hands on, and I think I will try to keep it hands on the next few minutes, I want to show you an example of a renovated administration building. I got this example from Jan Bleyl. They did it for the Institut Wohnen and Umwelt, IWU, institute in Germany. And I just want to show you shortly what they did and what they calculated, because I think it's a quite interesting

example how you could actually incorporate where are the benefits in the project. This is a science and research project, but I think it's also applicable for public buildings everywhere around.

So, you see here—it's German, but it doesn't matter. You see here the usual cost balance, cost planning. You see that we have 36 per cent extra costs for energy efficient measures, and 12 per cent anyway maintenance costs. So, 36 per cent are extra to the usual, common renovation practices. But on the other side, they could achieve 85 per cent savings in heating energy demand and 50 per cent savings in electricity. So, these—this actually, the numbers and the basis, we can calculate our effects and where the benefits are.

What they had, of course, they had a quite long payback period, I would say 25 years, 26 years, up to 30 sometimes, 20 years. It's the numbers we all know, and it's the numbers which are—which _____ barriers and reflects barriers in the whole renovation process, because this 36 per cent energy efficiency extra costs, they are a huge barrier for most municipalities and public offices. So, this is where we need to implement and incorporate the wider benefits, and there are actually financial benefits of energy efficiency renovation.

This is how they calculated multiple project benefits, for example, the work productivity increase, about 1 per cent, and rental income increase, also asset value, CO2 savings, if you think about emission trading, and other—yeah, balancing and costs, shadow costs, for example. We can calculate financial and monetize these effects quite well in some aspects. In others, we're still working on it.

This is something I made up, it's not from the study, which I want to just show that the payback period could be reduced, and our own calculations in another project show that we can reduce it, when we are conservative, up to five, ten per cent, the payback years. But this is something we are still working on, and there will be reports coming up this year showing deeper and detailed calculations in other projects.

Now to the main core of this presentation, the main part. It's the methodology we are applying now in EmBuild, and which we are working on in the next month with municipalities and regions, mainly from Southeastern Europe. And I just wanted to briefly introduce this methodology, and I ask kindly for feedback and also your opinion about it. It will be a very broad methodology and approach, incorporating as much benefits as possible, and topics, just selecting them, and ranking them for specific uses in specific locations. So not everyone is happy to have, I don't know, if you don't have local business related to construction, you might not have these effects and economical effects, macroeconomic effects in your municipality, when you have enough deep renovation, but you might have it in other fields. So, this is what we want to accomplish with this methodology.

Firstly, I want to show you the structure. So, we worked with actually two kinds of data inputs. One input is the municipal data we're collecting from municipalities and public offices. This will be a comprehensive questionnaire, and also interviews, data analysis, statistical data from the national

governments, and we're collecting them and compiling them into some database to analyze the current situation of the municipalities related to building renovation and energy, and making some first—yeah, analysis.

The second data input is the statistical and experimental data we have from science, we have from other projects, we have from experiential reports, from European and worldwide assessments of the benefits, and we try in this methodology to combine these both data inputs into some ranking and some local values that are usable for every mayor, every municipality public officer, because they don't want to handle numbers from the UK or Germany specifically in other countries. It doesn't work, and I think it's not in the interest of everyone.

First, and this is what we do now, is we have the indicators and parameter study. We want to identify what actually is important to measure when it comes to what are the benefits of building renovation. And of course, we have, again, the socioeconomic and environmental topics and categories. Most of the data has to be measurable. It has to have—it has to be monetized. It has to have financial impact, of course. And we are now making a set of these indicators, which we will publish soon, and these indicators, we need to gather data for. And we have, like I mentioned, data from the local authorities, and also the data from other experimental and worldwide projects, which are sorted into these indicators.

As an example for what is existing and what data we're using, for example, this is an example of various reports, and we have, for example, these 22 jobs per 1 million euros spent, which is a quite average number, I think, for Europe, for deep renovation _____. And what we now want to do is we want to adjust these numbers to local necessities, to local situation, and not everywhere in Europe, 22 jobs are created when you spend 1 million euros in building renovation.

But this is our task, and therefore, we collect local data, which will be an online survey with preselected and predefined answers. And these answers help us to sort and adjust these numbers that are out there.

You see here an overview of the back end, like we have all these different kinds of answers, like how many inhabitants, numbers of buildings, numbers of public buildings, numbers of educational buildings in different countries. And based on these numbers, we can estimate the potential for renovation, and from there ongoing, we can estimate how much jobs there might be created in the future, how much social impacts, how much health issues we can solve.

And when combining it, like here, for example, when I look at the jobs issues, we measure how many jobs are created. Then we measure how complex is it to install this assessments, how complex it is to perform an assessment for a municipality, independent from any research facility or energy agency. How good is it or how easy is it for them to implement that in the local situation?

And also, we want—we measure now how much impact we can have with some benefits. Like if we have a deep renovation done on a public building,

how much is actually the impact in the next 10, 20 years, in different sections, in the job creation, also in health? How much health issues do we reduce? How much days of absence, like for example, for pupils in public schools, or employees in the public sector? How much we can reduce the absent days for them due to health issues with indoor climate or a bad building quality?

And also, we have these specific regional challenges. For some countries, some regions, they have a specific need for—or an especially high unemployment rate, so for them, the argument of job creation is much more valuable than for other regions. Like for example, in Germany, we have quite a less—a low unemployment rate. And also, this works for different things, like in some regions, we have a high amount of asthmatic and pulmonary diseases, just because of bad indoor climate. And in some other regions, you have underheated homes, like in Bulgaria. And these are the specific local challenges, and they are kind of up-voting and up-ranking our benefits.

And also, something we assess is the indirect benefits growing out of the assessed direct benefits, and this together brings us to an over-rating for—of—for what are the benefits or impacts of building renovation.

The ranking will look like this in the end. So, we have—we don't provide numbers, specific numbers, because I think we think that these detailed numbers sound not very precise and are really hard to match and hard to verify for every region and every municipality.

So, first step is to show a ranking and to explain what's going on there, explain how easy it is to quantify, how easy it is to monetize the impacts. And based on these rankings, we can produce reports for single municipalities, for single regions.

The supports could look like this as well, like here, an example for Romania, the whole country, but in the future, it will be a single municipality. And we have the advantages and positive effects or positive situation, like if they have their own renewable sources, or they have a lot of local—yeah, companies working, consortia, and also the challenges, what they want to achieve, what is their biggest issues. And this combined with our benefit assessment will produce a nice report, and we will feed these reports with detailed numbers and values, and also financial aspects for the different, wider benefits.

Coming to the end of my short presentation, I would like to invite everyone here to participate in these surveys, especially if you work for a municipality or a local government or a region. Please take your time. Look at the survey, fill it out as much as you can. For every survey, we will produce reports in the end, and these reports will be sent out to you. You will have your specific local wider benefit assessment, which will be ongoingly improved, but for the first moment, you will get this overview I showed to you.

And I think in the future, this topic will be increased, will raise awareness. It will have to be implemented in renovation actions and in renovation plans. So, a first overview of the possibilities and potentials you have in your municipality regarding all social aspects and environmental aspects of energy

efficiency and deep renovation could be I think a nice political argument for the future.

Yes. And I just can encourage you to incorporate and think about wider benefits when planning or designing building renovation, and now I hand it over to Audrey, who will tell us more about the bigger picture of wider benefits. Thank you.

Audrey Nugent

Hopefully everyone can see my screen. Yeah. So, my name is Audrey Nugent. I'm the senior policy advisor at the World Green Building Council, and I'm just going to walk you through some of the work that we have done and we have seen, and World GBC has been a part of on the multiple benefits of renovation.

And so just a little bit about the World Green Building Council. We are a global network of 74 green building councils in five regions across the world. And what each of our green building councils do is they aim to advance the green building movement in their country by focusing on specific areas. So, some people—so some companies or green building councils will focus on awareness raising activities. Others will focus on policy. Others will focus on certification. But they all have one core aim, and that's to advance the green building movement.

So, at World GBC, the work that we do is really focused on projects at a regional and global level that could scale the impact of our GBCs. And so, in terms of the multiple benefits of renovation, there's two specific projects I think of interest for this webinar that I can go into a little bit more detail on, and that is our Better Places for People campaign, which is focused on healthy buildings, and then deep renovation, which is a European project that we've been working on called Build Upon, to promote better designed national renovation strategies.

So, our Better Places for People campaign came about a couple of years ago when a report was published on the business case for green buildings, and really, what that looked at was not just the energy efficiency benefits that a green building can have, but what are the other benefits in terms of health, wellbeing, and productivity?

And so, since the first report, we've really launched a whole campaign around this, so I invite you to look at our website to look at some of the key statistics. And we've done a lot of reports on building the business case for green buildings in terms of its impact on offices, and how it can increase productivity, and looking at schools, and in some cases, looking at homes.

So, what I'm going to do right now is just some of the key statistics on the benefits of green building, because I think they can then be translated into benefits in terms of the renovation of buildings, and then they can be used as drivers and incentives to actually drive renovation activities.

So, in terms of daylight and lighting, what we have found is if office workers are working near windows, then they receive 46 minutes more sleep per night

on average. There is a 6.5 per cent reduction in sick leave if employees are exposed to good views and good daylighting. And in schools, we see an increase of 36 per cent—this is specifically in the States—in oral reading fluency, when exposed to high intensity light. So here we can see just benefits that designing or renovating a building that incorporates these aspects can have, and then this speaks to productivity gains, to health and wellbeing, and mental health. So, we see all of these things kind of coming together.

And in terms of noise and acoustics, in our offices report, we saw, not surprisingly, that 99 per cent of people surveyed said that they had impaired concentration where they're exposed to background speech or noise, and 66 per cent drop in performance when exposed to distracting noise. And then in school, in a study done in France, it found that for every 10 decibel increase in noise, then the language and math scores of students decreased by 5.5 points. So again, some really compelling cases to design and renovate these buildings so that these aspects are considered, because it leads to all of these other things.

Thermal comfort. An interesting finding from one of our reports that if employees are given access to the temperature controls within their offices, then it led to three per cent increase in local thinking performance, seven per cent increase in typing performance, and a three per cent increase in overall productivity. And then in schools, students who said that they felt comfortable with the thermal comfort in their classrooms were able to achieve four per cent more correct answers in a math test compared to those who were not.

And then lastly, I'll just give some brief stats on indoor air quality. So, there's quite a bit study done called the Cog Effect Study with Harvard University that we were a part of, and what that found was the impact of the indoor air quality would have on your cognitive scores. So, what we've seen is 101 per cent on average doubling of cognitive scores in green buildings over conventional buildings, and 30 per cent of participants reported fewer sick building syndrome. And then we have some other stats on schools.

So, what we've seen from the body of research we have done is that there's a very compelling case to promote and use the multiple benefits of renovation as an incentive to—as an incentive.

Now those are just four aspects that I've addressed, but there's a whole host of other ones that we could talk about, so I would encourage you to look at the Better Places for People website, and a new report on a business case for green building will be coming out next Tuesday. So, there'll be more kind of case studies and statistics in that, which I find really, really compelling.

And once we started kind of compiling all of this research, we've seen more and more that people are beginning to talk about it. And this was particularly evident during the Build Upon project that I spoke about briefly.

So, Build Upon is the world's largest building project and building renovation, and Mariangiola briefly mentioned the requirements for national renovation strategies within Europe, and how a lot of those are designed quite badly. So, the aim of the Build Upon project was to bring in all of the different key

stakeholders together to design renovation strategies that are actually meaningful and impactful, and to co-create those _____ governments.

And what we saw through that process, with a very large stakeholder dialogue across 13 countries, was that we saw other entities coming to the table that previously had not been involved. So, for example, in Ireland, they have a local charity. They wanted to address fuel poverty. Employees' groups in other countries. So really kind of bringing together kind of a diverse set of stakeholders.

And the output of the Build Upon project was a series of recommendations from each participating country on what could be done to drive renovation and to make renovation strategies a lot more meaningful. And what we saw consistently again and again was that national renovation strategies must promote the multiple benefits of renovation.

So, I've just put a few of the kind of key quotes from those recommendations from some of the countries, but again, I encourage you to go on the Build Upon website to see more. But in almost every case, the recommendation is totally about promoting the multiple benefits of renovation, whether that was addressing socioeconomic problems, health and wellbeing, reduced dependence on fossil fuels, the message is very consistent that this is a good way and a good driver to incentivize renovation activities, and it must be communicated better.

So as part of the Build Upon project, we also collected about 800 initiatives related to renovation, and in a database that we call the Renowiki. And within this database, and even since then, we've come across a number of interesting case studies that kind of show how other aspects can drive renovation activities. So, I'll just very quickly go through those. Unfortunately, we don't have time to go into much more detail, but hopefully, they encourage you to do some further reading.

So, in Norway—I'm just going to briefly talk about a concept known as Powerhouse. There's a very interesting scheme in Ireland called Warmth and Wellbeing. And the UK Green Building Council are doing some very interesting stuff on a concept called Retrofit Led Regeneration. And then in Poland, there's a very interesting campaign called Efficient Poland.

So, I'll just briefly go through these. So, the Powerhouse is a consortium of organizations in Norway, and what they're aiming to do is demonstrate that it's possible to create energy plus buildings in colder climates like Norway, and to demonstrate that building these buildings makes commercial and environmental sense to all of those who are involved. So really, to show kind of _____ showcases.

And it's not just limited to new builds. The first project they actually did was a renovation project, I think it was about 2014, and it's a renovation of two office buildings from the 1980s. And like I said, the incentive is to promote the multiple benefits, not just the energy efficiency benefits. And they were able to do that, and the results of the project really demonstrate this.

So, they found that they've been able to save money through reduced energy and water consumption and lower long term operation and maintenance costs, and they're able to see increased productivity because when they redesigned the building, they made sure that there was good natural daylighting, and workspaces were located around the perimeter of the building with access to external views. The renovation was done with materials that are low-emitting VOCs, and openable windows promote a healthy indoor air quality. And then actually they were able to integrate some wider aspects of sustainable urban development by including bike sheds and showers and having priority parking for those employees who drove electric vehicles.

So, I think this is a very compelling case that shows it's not just about the energy efficiency, but there's other benefits that need to be considered as well. So, I would encourage you to look at some more of the case studies on their website as well, because it's quite an interesting piece of work that they're doing.

And in Ireland, a very interesting scheme that's currently being piloted by the Health Service Executive and Sustainable Energy Authority of Ireland. It's something called the Warmth and Wellbeing scheme. And the—what this scheme does, it provides energy efficiency upgrades to homes of those who are living in energy poverty, but also have chronic respiratory conditions.

And the aim of this is to make homes warmer and healthier to live in, but also to reduce the attendance of these citizens in hospitals, particularly during the winter months, when hospitals would be pretty stretched.

So, what would happen is that the patient would go to a doctor or visit a Health Service Executive employee, and they would be referred to the agency responsible for doing this work, and then they would come and assess their house and determine whether or not it is suitable. And if it is, then they would do—kind of pick from a suite of work. So, it could be standard attic insulation, wall insulation, boiler replacement, draft proofing, or other energy efficiency related upgrades where recommended.

So, this is still in its pilot, so we don't have any of the impact data yet, but I think it's a real kind of exciting example of governments actually working across departments to act in a more systemic way, and understand, you know, how one thing in the Department of Energy could actually have a positive benefit for the Department of Health. So, I think it's well worth keeping an eye on the outcomes of this particular one.

And this isn't a case study, per se, but it's a very kind of exciting piece of research that's being done by the UK Green Building Council on retrofit led regeneration. And they've just released a report at the end of last year which aimed to clarify how high quality whole home retrofit or renovation can be used as a catalyst to actually regenerate low income communities.

So, the reasoning behind this was that regeneration often focuses on large scale redevelopment, but in many areas, this isn't viable or practical. And they're

hoping that retrofit led regeneration program can provide a solution to ensure that these communities aren't left behind when these works are taking place.

So, this, I think, this graph here is very compelling, so I would encourage you to look at it in more detail, because unfortunately, I can't go through it all. But really, what it does, it explores the wide-ranging social, economic, and environmental benefits of whole home retrofits for households, communities, and cities.

So just as a brief example, if you retrofit an individual property, then this could leave to improvements in the physical and mental health of those residents who are involved in the retrofitting. From a community level, retrofitting a number of properties at scale, what we see is there can be a decrease in the number of void days for rental and mortgage defaults for owners-occupiers. So, you have properties _____ longer. And then at a city and a national level, by retrofitting to a certain level, you actually—and doing that at scale, you'd be reducing the demand on the grid, so you're actually promoting energy security. So, it's a really interesting case, sort of making the link between the action at the household level, and by scaling that to the community level, how you can have an impact.

And again, it's not just talking about the energy efficiency benefits, but actually, it goes beyond that, and look at how scaling energy efficiency or scaling the retrofit can actually have impacts on the whole community. So then—we won't go through this, but just some examples, if you generate renewable energy into the project, then you could potentially be creating opportunities for community-owned projects to provide an ongoing income stream, and then that can be funneled back into the community. And again, by scaling retrofit activities, there's an opportunity to install electric vehicle charging points, and so you're promoting that. You're bringing together different community groups. And you're enhancing the appearance of the state and improving accessibility.

So again, it's a very, very compelling case. And the UK GBC are now looking at how they might pilot this with certain cities and local authorities in the UK. So again, another interesting example I think to keep an eye on over the next couple of months and years.

And just lastly, I'm going to talk a little bit about a campaign in Poland, which is not specifically a case study, but I think a very interesting idea, which is that in Poland, a lot of interventions in terms of renovation activity are based on multi-family buildings, and there's a lot of single-family buildings in Poland with low stack chimneys, and that's leading to a lot of problems related to the air quality.

So, this campaign is really aimed at renovating these single family homes, and by doing that, addressing the problem of low air pollution. So, their tagline is warm house, clean air. And that is still kind of in motion, this particular project, but I thought it was a really kind of good example of kind of more systemic thinking about energy efficiency benefits.

So that's kind of briefly the examples I wanted to go through, but happy to take any questions at the end, and feel free to contact me for any more information or resources that I've spoken to. Thank you for listening.

Katie Contos

Wonderful. Thank you so much, Audrey. Now we'd like to welcome Niko to the webinar. Wonderful, Niko. We can see your screen perfect. Thank you so much.

Niko Natek

Thank you. So, ladies and gentlemen, it's an honor to be with you here at today's webinar. _____ welcome also on my behalf. My name is Niko Natek, and I'm here on behalf of my employer, the Energy Agency of Savinjska, Šaleška and Koroška Region, one of the partners of the EmBuild Project.

I was devoted a very short time slot, so I would like to get straight to it. I'll be saying just a few words about some practical experience in defining and quantifying additional benefits of energy renovation and how this can be supported by organizational and awareness-raising activities, or so-called soft measures, if you will.

So, as you already learned from my fellow presenters, the positive impacts of energy renovation are numerous and can be manifested in several ways, either take into account higher GDP, increased tax revenues, the creation of jobs, or even—perhaps in my mind this is the most important aspect—improved living conditions, increased comfort, productivity, and better health. After all, this is why we construct buildings in the first place.

And in this respect, I thought to myself that the perfect example of displaying the latter sort of micro-cosmos that allows us to view energy renovation from a humanistic perspective instead of a strictly monetary one, are schools. Why schools, you ask? Well, because of many things, but namely because schools are public spaces in which the overall energy efficiency depends very much on user behavior. Generally, the energy performance indicators, such as energy numbers expressed in used energy per square meter of heated surface per year, are high. So, implemented measures are commonly economically feasible.

The aspect of wider benefits is also very easy to argument, because parents generally act in the best interests of their kids. Money, if available, is not a persuasive counterargument. Children are also very susceptible to ideas and concepts that they can relate to. They learn fast and are unburdened by bad habits from the past. And I could go on, but I think you understand my point.

Take, for example, the 50/50 methodology that was implemented through the Euronet 50/50, also a follow-up project of Euronet 50/50 Max, carried out through the cofinancing from the Intelligent Energy Europe Program. We're talking about a methodology that aims to bring about energy and financial savings in a building by actively involving building users in the process of energy management, and teaches them environmental friendly behavior through I guess practical actions.

It's comprised from nine steps that finally result in some worthwhile energy savings—at least, they should—that can be reinvested into additional measures

and activities, creating this sort of perpetual mobile of positive advancements. The approach is a bit similar to the EPC Lights model, if you're familiar with energy performance contracting, also a term coined by German experts. We could conclude that this is a sort of bottom up approach to energy renovation, because it's user centric. It starts with behavior change of users, which is then followed by concrete investment. This approach allows us to maximize the impact of the investment, because if a building and all its systems aren't fully automatized, then users have a big impact on the final energy consumption.

So, the 50/50 methodology is successful because it addresses and rewards all of the key stakeholders, so they are motivated to engage in such activities over the long term. In essence, 50 per cent of the financial savings achieved is returned to the school through a financial payout, while the other half of the financial savings is a net saving for the local authority that actually pays for the energy bills. So, in that way, everybody is happy, and the benefits to all parties are essential. Even for pupils that form the energy teams, speaking quite proudly, acquire additional knowledge, learn about teamwork, are directly rewarded for doing the right thing. And following this line of thought, I guess, are also very excellent ambassadors for promoting energy efficiency within their family circles and amongst peers.

So, it's clear that this approach is very successful within the Euronet 50/50 project, which was implemented in over 50 schools from 9 European countries. There was 6,900 pupils, teachers, other key stakeholders involved. Forty of the 50 schools achieved some kind of notable energy and financial savings, which was about 1,100 megawatt hours of energy, translating to CO₂ that requires about 340 tons of mitigated CO₂ or greenhouse gas equivalents that weren't emitted into the atmosphere. So, each school saved on average more than 2,000 euros.

One more interesting project that I wanted to include in this discussion about wider benefits is the Energy@School project, which basically aims to increase the capacity of the public sector for implementing so-called energy smart schools.

The project should achieve this by applying an integrated approach that educates and trains school staff and pupils to become so-called senior and junior energy guardians, so a very similar concept to the one we learned about in Euronet 50/50 or 50/50 Max.

So, the projects will provide a transferable and customized strategy and management plan for smart schools, also providing various tools that will support _____ behaviors, such as smartphone apps for energy guardians, which will be demonstrated in I think seven pilots throughout Europe. The Slovenian pilot includes eight elementary schools in which we set up some form of an energy management system that is displayed here. So, what's important to note, that besides the display of common micro-climate parameters, we also acquire subjective feedback from building users, because as you are probably aware of, thermal comfort is very subjective. We always have people that are either always cold or always hot, and it's—sometimes, it's almost impossible to provide an environment that is good for everybody. But the purpose of this

application is that we're trying to get all that different subjective feedback and try to benchmark on what we have to do to make at least the majority of users happy.

And this is just a few graphs charting the energy use in a certain building. This is cumulative. That's why it increases in April. This is the power consumption, not energy, but power, the power load. This displays the display for the fourth elementary school _____. They also introduced a way of either turning on or turning off lighting systems remotely, and believe it or not, this is really popular by students, and I don't mean pranks, either. So—okay.

Maybe I would like to turn the story now a bit and focus on the other side of energy renovation and how to mitigate also its negative impacts, or more importantly, how this should be considered in investment preparation and tendering procedures.

Especially when renovating or upgrading the thermal envelope of a building, there are several things that we should consider, some of which are that generally, insulation on the buildings outer envelope reduces the air exchange rate between the outer and the internal air. This means that the concentrations of undesirable gases tends to increase, such as formaldehyde or other forms of volatile organic compounds. The perceived indoor air quality is actually better before renovation was carried out, albeit thermal comfort is much lower. And that energy renovation efforts must always include measures to also improve ventilation. Very important.

We addressed this within a national pilot carried out in THE4BEES project, which is the Transnational Holistic Ecosystem for Better Energy Efficiency through Social Innovation. We started to implement this project in late 2015. It's based on three main objectives, which are to influence behavior of building users, to achieve energy savings, and to introduce experience and lessons learned into an amendment of relevant policy on the national level.

The general idea was to acquire concrete data about actual energy consumption, as well as other relevant parameters, such as indoor air quality. And of course, this is a two-edged sword, because oftentimes, energy renovation measures have wider negative impacts on certain important factors, such as health. In our particular case, for which you can see a schematic of the sensor network, the school center of Velenje carried out extensive energy renovation of its five old buildings. Otherwise, the buildings were constructed from I think 1959 and up to 1984, which was followed by extensive investment into energy renovation. I think the last one was concluded in 2008.

So special focus was attributed to measuring indoor air quality, which is in our example defined as a prerequisite and a benchmark for monitoring and optimizing energy use, with reference to existing health and safety standards. To this end, the developed sensing network measures indoor levels of carbon dioxide, formaldehyde, and radon gases. CO₂ was chosen due to its negative effects on concentration and overall learning ability, although it's quite impossible to create a situation where the gas would actually be toxic.

On the other hand, formaldehyde and radon are highly hazardous gases that were assumed as being problematic in the context of energy renovation, which generally reduces the air exchange rates, as I said, between the interior and exterior, causing in many cases the increase of such compounds in the internal air. Furthermore, radon is formed from radium in the decomposition series of uranium within the earth's crust, and rises to the surface, where it's released into the atmosphere, or in our case, accumulate in enclosed spaces, meaning like caves, mines, or even buildings.

Since Velenje has a very long tradition of lignite mining, and also been very active in energy renovation in the past decades, a combination of these two factors kind of pointed us into the direction that these two potentially hazardous gases, or their build-up, should be present on the ground or lower stories, which is also confirmed.

So, I think it's time to sum up, because it's already past 4:00. So, let me just make some conclusions. Energy renovation should always be considered with the bigger picture in mind. *Per partes* or partial renovation will not nearly achieve as much savings, and can cause significant negative side effects, as you can see from my presentation.

I also invite you to look at a study done by ECOWAS, the renovation tracks for Europe up to 2015, which look at different levels of renovation, and basically concludes that the most effective, the cheapest option, is to go for comprehensive deep renovation. So please, have a look at the study. It's really worthwhile.

So also, for countries, it's really, really important that wider benefits can be considered within public tendering procedures. We can only claim what are benefits if they are quantifiable and/or measurable. So, IT support, like, for example, advanced energy monitoring information systems, are and will also remain crucial in the future.

Unfortunately, we also must be aware of the fact that the world is also viewed through a prism of currency, and until that changes, wider benefits are considered as an addition to an otherwise feasible business case. Otherwise, they are common disregarded. This is why they should be quantified and expressed in monetary value, so we're able not only to analyze their actual impact, but to also make the decision makers understand that it's in their best economic and general interest. And this is all for my part. Thank you very much. Happy to take your questions.

Katie Contos

Wonderful. Thank you, Niko, and thank you to each of the panelists for those outstanding presentations. As we shift to the Q&A, I just would like to remind our attendees to please submit the questions using the question pane at any time during this time. We also keep several links up on the screen throughout for quick reference, to point where you'll find information about upcoming and previously held webinars, and how to take advantage of the Ask an Expert program.

As we shift into the questions for the panel, I'll ask that anyone can answer the question, but I'll direct it to one person. To start, I'd like to start with Mariangiola. Do you think wider benefits will become a main factor in EU regulations in next editions of the EED and EPBD?

Mariangiola Fabbri Well, I certainly hope so, because as all these presentations have shown, that there is an increased interest in this topic, but an increased questioning of how can all these different wider benefits be identified, and most importantly, be quantified and monetized, in order to be part of the renovation planning of both local and central authorities.

For the future of the legislation, the EPBD has just—the revision has just been concluded, and we've seen that there is a clear reference to wider benefits, and its inclusion—their inclusion in international renovation strategies. So, we are going into the right direction, but freedom is entirely left to the different governments across Europe to decide how to do it and how to quantify it. So, that's where I think a project like EmBuild can help, because if we—if we can support this process with some tools that would get close to that quantifiable aspect, I think we will make progress.

As far as the EED, the negotiations are already—are still ongoing, so I cannot predict the future, but I think that the indication that we got under the Energy Performance of Buildings Directive is clearly one of an increased interest and understanding, I think, both from policy makers in Brussels, but also policy makers across Europe, and the different stakeholders, of the importance of this topic.

If we don't learn how to deal with it and how to plan for it and quantify it, I think everyone is realizing that we're losing big opportunities for saving, big opportunities for what energy _____, but also an extremely high opportunity to actually increase the quality and comfort of everyone that lives and works in a building.

Katie Contos Wonderful. Thank you so much. Would any other panelists like to comment to that? All right, we will continue on with the questions. My next question is directed at Niko. Niko, what is the current state of policy on including wider benefits into tendering procedures on the national level?

Niko Natek Yes, thank you for the question. Well, speaking for Slovenia, unfortunately, we can't really say that we made substantial advancements in the past decade. There was some improvement achieved with the renewed Act on Public Procurements, which is ZJN3, adopted last year. This act allows the introduction of additional criteria within the public tender for energy renovation. For example, some metrics on the quality and comprehensiveness of proposed measures that aren't necessarily identified as a priority.

However, this is still a very long way from what we would like to see, namely, that the tendering process would allow the consideration of a wide scope of impacts, provided that they are, again, quantifiable or measurable, and that are based on concrete analytical or methodological approaches. Perhaps other

panelists would like to share their thoughts on the situation from their countries as well.

Audrey Nugent

Hi. Audrey here. I think that it's probably worth mentioning, it's not really in relation to energy efficiency, but there is a new framework of—it's called Levels. It's being released by the European Commission. And what that does is it aims to encourage reporting on sustainability of buildings beyond just energy efficiency. Although it's not mandatory, it is part of the Circular Economy Action Plan. And _____ series of meetings [audio glitch] different _____, and some of those incorporate the wider benefits. So, for example, Macro Objective Four _____ health and wellbeing, so there's a focus on indoor air quality and things like noise and acoustics.

So, although it's not mandatory, it is an indication that the commission are beginning to look at these things, and kind of align—we're looking at World GBC very much at Levels, as to how our GBCs can help implement this, and one of those things will be looking at how you would align the indicators within Levels with green public procurement criteria. So perhaps that's one kind of pathway to achieving this as well. So just something for _____ consider, and I would encourage you to look that up as well if you haven't heard of it yet.

Katie Contos

Wonderful. Thank you so much. Sebastian, the next question is for you. Are there any other countries you're planning on having participating in the surveys? And who are you targeting in those surveys? What's the audience?

Sebastian Botzler

Thank you for the question. First, I just wanted to add to the other question before, because in Germany, I would say the official or regulations are not really focusing on wider benefits, but however, for example, we have the KfW. It's a development bank, and they are having a lot of projects regarding renovations, and they actually care in their reports and their assessments of impact of their funding. They focus a lot on wider benefits, and they produce numbers and quite interesting insights.

So, I think it's in the government cycles, but—circus, but not so far in regulations. So just to the first question.

And now to the survey, since EmBuild is focusing on Southeastern Europe, we adopted _____ this survey mostly for these countries in the region, but in the future, it will be extended definitely. And we have an English version as well, and German version. So, these countries, like European countries, they are definitely in focus, and following up projects will hopefully include Spain and English, UK as well. But we'll see how it works and how the feedback is, how we can improve the survey during this project, and it will definitely be improved and updated. So, I hope it will last longer, and also the reporting process after that will develop and provide nice reports in the end.

Katie Contos

Thank you, Sebastian. Audrey, do you plan to continue the Build Upon project?

Audrey Nugent

Yes. That's our intention. So, the first stage of Build Upon was really looking at the—at a national level, the—how renovation can be driven, and like Mariangiola was saying at the start of the session, the revised Energy Performance of Buildings Directive really gives it a renewed kind of enthusiasm for those strategies, and that they should be developed with 2050 goals in mind, and they'll need to contain milestones and indicators to track progress towards these goals.

So, what we're seeing now is an opportunity to look at the local level how you develop those indicators, so there's actually I think a lot of parallels between what we're _____ to do _____ some of the things that the EmBuild Project has done. So interesting to explore those synergies further. But yeah, we're scoping that at the moment.

Katie Contos

Thank you so much, Audrey. The next question is for Niko or any of the panel. Niko, would you agree that it's about time to change existing investment schemes as a public authority, and incorporate much more effects of energy efficiency measures into long term investment planning when renovating public buildings?

Niko Natek

Yes, thank you for the question. Yeah, my answer would be definitely. The only problem is that at least in our case, that municipalities are financed directly from state budgets, so they don't actually have that much autonomy on deciding on how much money they will spend and where. I think it's definitely required that local authorities are also equipped with the capacity that they can actually carry out the renovation investment for which the state government has set the goals to.

So, the situation currently in Slovenia is that local authorities are very much dependent on the national tender for co-financing energy renovation, but at the same time, the local authorities were left on their own to actually acquire, for example, project development assistance and so forth. And of course, their budgets were not increased at all.

So, I think—I know we're—in Slovenia, it's a very unique situation, I guess, because we have no regional authority level, only the national decision makers, which pass down their legislation to about 220 small or a bit larger municipalities. And I think this is the essence of the problem. So basically, to streamline the commitments on the state level with the budget that is actually available for local authorities to carry out these investments, in my opinion.

Katie Contos

Wonderful. Thank you so much. Would anyone else like to comment on that question?

Mariangiola Fabbri

Yes. Mariangiola here. Just one thing to add to what Niko said. It is definitely an issue, and it's an issue that has been looked into much more in detail, as it was before. A few months ago, Eurostat published new guidelines on accounting rules and how municipalities can actually calculate and consider energy efficiency investment and renovation investment in their budgets, rather than including it as a debt, but as an _____, and put them outside of their books.

So, there is, slowly, I think, but steadily, a movement towards understanding what the barriers to renovations are, and what are the barriers to including and integrating wider benefits into these calculations. It's certainly not going with the speed that we would all like to see, and I think all of the projects that we've seen today give clear indications that there is an increased interest from all stakeholders and also society collectively into looking at that. But that is definitely—the moment we understand how to solve this issue, I think that will open up many opportunities, and there will be plenty of investors and plenty of companies ready to invest in renovation at the municipal level.

Katie Contos

Thank you so much. For Audrey, you mentioned the Renowiki project. Can you explain more about this resource?

Audrey Nugent

Yeah. So as part of the Build Upon project, one of the aims was to map and kind of compile all of the existing initiatives related to renovation activities. So, the 13 countries that participated in the project, they _____ the Renowiki, and it's a really quick summary of what a specific project in energy renovation could look like, and they're categorized according to the different barriers that we identified to renovation activities.

So, for example, in the finance and economics section you will see some of the kind of financial incentives to drive renovation programs _____. In awareness raising, you'll see some of the campaigns that have been successful in different countries to raise the awareness of renovation, and often, that's where some of the activities of the multiple benefit _____. And yeah, and then there's finance, organizational, economic, and awareness-raising, and policy, some of the policy drivers in different countries as well.

So, it's a very good resource for those people who are looking for inspiration on renovation initiatives, because there's a lot out there, but what we found was that there was no kind of one central place that was tracking where they were. So that's what the Renowiki aims to do, and it's an open source database, so you can add your own initiatives as well. And it's _____, so—

Katie Contos

Great. Thank you so much, and thank you to everyone for that informative Q&A session. Now I'd just like to ask that Mariangiola give us some closing remarks to today's webinar.

Mariangiola Fabbri

Sure. First of all, let me thank you, everyone who has presented, the organizers, and the participants, to stick with us until 20 past 4:00. I think what we can clearly see from the presentations that we heard today is that there is an increased interest in this topic, and also, a clear understanding of why it is important to consider wider benefit and valorize wider benefit, both from an energy perspective, both from a policy perspective. We talked about 2050 objective of decarbonizing the building stock, or achieving a highly efficient and decarbonized building stock, and bringing existing buildings to nearly zero energy levels.

But there is also another element that I think gives hope, in the fact that this process will continue and will actually achieve the result. It's that there is a societal component to it. We've seen an increased involvement of stakeholders,

also community and local levels, from schools to the small construction companies to other—all sorts of local interests that are showing they're willing, and their interest in the topic. There is an increased interest in the quality of the building where we live and where we work, which until a few years ago, you wouldn't hear so much about this. So, this idea of increasing the wellbeing, increasing the health, the comfort of the buildings.

And obviously, there is this drive towards improving the quality of our building stock. We have a big barrier to overcome, which is how to make the wider benefit quantifiable, measurable, financeable, as we've heard earlier, because if we do it—it can also be done wrongly, and when it's done wrongly, the consequences can be—can be negative for those that actually have to live and work in a building that is badly renovated.

But I think that there is a clear direction to which we are going, and there is a large community of industry and stakeholders and policy makers and local authorities that are willing to invest and investigate more. And I'm pretty sure that the next round of 2020 projects that will be presented and financed by the European Commission in the next two, three years, we'll see more and more proposals covering the aspect and—of including and integrating the wider benefits into the renovation strategies.

Katie Contos

Great. Thank you again. And on behalf of the Clean Energy Solutions Center, I'd like to extend a thank you to all of our expert panelists and to our attendees for participating in today's webinar. We very much appreciate your time, and hope in return that you—there were some valuable insights that you can take away back to your ministries, your departments, or organizations.

We also invite you to inform your colleagues and those in your networks about the Solutions Center resources and services, including the no cost policy support through our Ask an Expert service. I invite you to check the Solutions Center website if you'd like to view the slides and listen to the recording of today's presentation, as well as previously held webinars. Additionally, you'll find information on upcoming webinars and other training events. We're now posting webinar recordings through the [Clean Energy Solutions Center YouTube channel](#). Please allow about a week for these audio recordings to be posted.

Finally, I'd like to kindly ask you to take a moment to complete the short survey that will appear when we conclude the webinar. Please enjoy the rest of your day, and we hope to see you again at future Clean Energy Solutions Center events. This concludes our webinar.