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Energy Information in the Caribbean: What's expected, what's needed, what's available?

Webinar Panelists

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Vicki Healey	Hello everyone. I'm Vicki Healey, a project manager at the National Renewable Energy Laboratory. I welcome you to today's webinar, which is hosted by the Clean Energy Solutions Center, in partnership with the CARICOM Secretariat and the Renewable Energy and Energy Efficiency Partnership. Today's webinar is focused on energy information in the Caribbean, reviewing what's expected, what's needed, and what's available.

Okay. Real quickly before we begin, I'll go over some of the webinar features. For audio, you have two options. You may either listen through your computer or over your telephone. And if you choose to listen through your computer, please select the mic and speakers option on the audio pane. If you choose to dial in by phone, please select the telephone option, and a box on the right side of your screen will display the telephone number and audio pin you should use to dial in.

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Today's agenda is focused on the framework and development of the Caribbean Energy Knowledge Hub, which is being designed and structured to ensure that those working on the sustainable energy transition in the Caribbean have access to information and the knowledge that they require. After I wrap up these introductions, we will hear presentations from James Smith, of Monkey Mosaic. We'll also hear from Sigmund Kluckner from REEEP and Martyn Forde from the Rocky Mountain Institute and CAREC. And after the presentations, we will also hear from Dr. Devon Gardner from the CARICOM Secretariat energy unit, who will be providing some closing remarks following the presentations.

Also following the panelist presentations, we will have a question-and-answer session where our presenters will be available to address questions submitted by the audience. And, finally, following the webinar, you will be automatically prompted to fill out a brief survey. And we thank you in advance for taking the time to respond to that survey.

So, now I'm just gonna provide brief introductions for today's panelists. First up today we will hear from James Smith, who is a social and environmental leadership consultant. His work focuses on learning strategy and innovation. James is supporting this project through his company, Monkey Mosaic. Following James we will hear from Sigmund Kluckner, also known as Sigi, who is a senior project manager in the field of knowledge information, data systems, and processes at REEEP. And, last but not least, we will hear from Martyn Forde, who is an energy and knowledge management consultant working on the Rocky Mountain Institute's Islands Energy Program as well as the community leader for the CARILEC Renewable Energy Community.

And so, with that, I would like to turn the presentation over to James Smith. And, with that, James, the floor is yours.

James Smith   Thank you, Vicki. A few months ago, I was hired to conduct a stakeholder consultation process to scope out an information knowledge needs that users have for energy in the Caribbean. Now, that's consultant speak. This is actually a great project for me to be working on. Because what it really means is that I get to talk to lots and lots of lovely people in the Caribbean who are working towards a cleaner and more sustainable energy system. And I have to say, "Wow. What an amazing part of the planet you have. You really truly deserve a clean and sustainable energy system." I'm going to talk about the information and knowledge needs that I've uncovered during this.

So, some time ago, CARICOM Energy realized that decision-makers trying to pursue the regional sustainable energy strategy—that's called the C-SERMS—face a number of significant factors, two of which are lack of information and a lack of knowledge. And I say two deliberately because lack of information and lack of knowledge are related but they are not the same thing. And I will come back to that in a couple of minutes. So, CARICOM

Energy is setting up a new knowledge hub which will operate as part of the also-new CCREEE, the Caribbean Centre for Renewable Energy and Energy Efficiency, which formally came into being in May.

It's really important I think to stress that the knowledge hub is about applied knowledge, not knowledge for its own sake. Its purpose is to support the decision-making of the actors in the sustainable energy transition. And the hub is as much about the relationships with and between those actors as it is about information. It needs strong connections to ensure it's sustainable moving forward, connections to ensure it has an ongoing supply of information from the people who have that, up-to-date, but also it needs to support the people who are using that information and developing their knowledge.

And you see here the key stakeholder groups that the knowledge hub will aim to serve. These actors all have different roles and responsibilities. And so their knowledge requirements are different. Just as this inkblot that you see here suggests different things to all of us, a sustainable energy issue looks very different if you look at that from the perspective of a government official in a ministry of energy or a government official in a ministry of finance. That's already one difference. But it's also very different if you're working for a utility or a regulator or if you're a private-sector renewable energy developer looking for business opportunities. So, these different actors need differentiated support. And the hub has to work out how to deliver that effectively, get people what they need.

And one of the initial answers of course will be to work in partnership with existing organizations. So, we'll be looking to work closely with other organizations such as CARILEC, OOCUR, BREA, and other associations, as well as information services such as OLADE and universities.

Now, I said I'd come back to how the lack of information and lack of knowledge are related but different. If I'm presented with more information, it doesn't necessarily mean I have new knowledge that I can then apply in my job. In fact, these days, more people—most people are drowning in information. It's thrown at us from our TV screens, through our computers, through our phones, in the thousands of research reports that're published every year. And the trouble is that a lot of it isn't actually directly relevant or immediately relevant to what it is that we're trying to do, and so we don't use it. And it won't help if the knowledge hub collects lots of information but people don't use the hub. And it won't help if people don't end up with better knowledge.

So, the title of this slide is "Focus on people learning." And both those words are really important. It's a focus on people learning. Gaining new knowledge is learning. And, for that, you have to integration this new information that comes in into our overall existing knowledge of the matter in hand. We have to understand how it interacts with what we already know and with all of the external pressures and other externalities that we're considering, with the whole reality of a decision or a plan or an opportunity that we're trying to pursue.

So, with the considerations of the different needs for different people and with this focus on learning in mind, I've characterized the information and knowledge needs that I heard from the stakeholders that I've spoken with into seven areas, as you can see here. First two are very important so I'll be talking about those in a bit more detail: energy planning and development and the information and knowledge needs to support that; secondly, knowledge to support specific decisions or specific tasks on a variety of current and upcoming topics, for which there'll be a continual supply.

Thirdly, knowledge-brokering opportunities to spread understanding of specific developments. So, this is perhaps a top-down need in that there's been a new development such as, for instance, CROSSQ has developed new minimum energy performance standards for appliances and standards for energy efficiency in buildings. And there's a whole range of different people that need to be sensitized to those standards if they're going to actually be operationalized, used in practice. On the building side you've got architects and builders, just as an example. Or on the appliance side, you've got customs officials; you've got retailers; you've got all sorts of people need to know about these new standards.

Financing. Obviously everyone is very interested in how you can get financing for the development of sustainable energy. And I heard that some countries are very good at this. They developed good skills, good relationships, and good networks to the funders. And therefore they hear about opportunities and they know how to develop a bankable project. But others know that they're lagging behind and they want a piece of the action too, understandably. So, they need to develop that knowledge.

Information on the market: what's going on? Who's out there? What can they do? What opportunities are being put out to tender? People need timely information on this so that they're able to prepare their response to tender effectively. And I heard that sometimes people find out very late about those opportunities.

Similarly with capacity-building activities, not everyone necessarily finds out about training opportunities, about events and conferences that take place. And so we need to spread that information, make access to that easier.

And, seven, we all need solid information to support us in tracking and communicating impact of clean energy projects if this is going to be sustainable moving forward.

And I want to add an eighth of my own, which is not something that people particularly pointed out to me as a need themselves, but it's rather an observation. Modern energy systems are an ecosystem. And the different stakeholder groups all play different but interdependent roles in that ecosystem. So, people need a decent understanding of the big picture, of how it all works and how they fit into that, who does what, and how a particular decision or action on their part impacts on those others and on that system.

So, back to those first couple of points in a bit more detail. Energy planning and development. Lots of people told me there's a need for better-quality information to support energy-planning processes. So, a number of countries, for instance, are developing integrated resource plans or national energy plans or something similar. Or planning new developments for new renewable generation capacity or energy efficiency programs. And there's a whole range of information that's potentially useful here. So, for instance, current energy generation, consumption by different sectors, the projected increase in the demand, energy balances—there's quite a range. And the availability of this information varies greatly across the different countries in the Caribbean. Some countries have detailed energy information systems either which they've developed themselves or some are supported by OLADE with the National Energy Information System. But others lack this level of support. And I think we need to try and support them to be able to have better statistics to do their planning.

Benchmarking data is also highly relevant. Lots of people want to know: "How does my country fit in with the others? How do we rank?" Tariffs, to consumers, on electricity are a particular issue here where work has been done, data has been collected, but access has been limited to that data. And people want information on different technology options. There are lots of different possibilities with renewable energy or with energy efficiency measures. So, many options to consider. But information to help people judge what's most suitable for their situation, their context, and what's gonna be commercially viable and therefore sustainable in their context—that's not always easily available or accessible.

And people want support and advice in those planning processes. So, here I'm talking about support for improved analysis of the information that is available, energy modeling, and, moving forward, looking at sophisticated big-data analytics. From the smart meters which are being developed in many countries—Barbados I heard will have smart meters rolled out the entire country to all consumers by end of 2019, and many other countries are going to be doing more on that moving forward—you end up with enormous data sets about electricity consumption. So, help to analyze that in order to make improvements is required.

Knowledge to support specific decisions. So, here we're talking about stakeholders learning in order to improve their knowledge to help them take a specific decision or carry out a specific task. And, as I said earlier, there's going to be a constant stream, through the energy transition, of upcoming topics that people need to deal with that they haven't had to deal with before.

So, just a couple of examples that I heard about from people in the Caribbean. Again, in Barbados, Barbados Light & Power drafted a power purchase agreement. And earlier this year, the Fair Trading Commission—for those of you who don't know, that's the regulator in Barbados—put that out for consultation. Anyone could respond to that. But a PPA is a highly technical document on both legal and engineering fronts. And it has serious financial

implications for the utility and also for the independent power producer entering it. I've got a law degree.

My dad was an electrical engineer before he retired. So, between us we might have some chance of understanding a PPA. But do all of the interested parties have access to all of that knowledge that they require to comment meaningfully to ensure the PPA is fair to both parties? 'Cause it's only if it's fair to both parties it's gonna be sustainable. And if it's not sustainable, this has knock-on implications for stability of the grid. PPAs are an example where there are people in the Caribbean and elsewhere around the world who have considerable expertise and experience, because they've been around for some time and used widely for some time. So, knowledge does exist. And it's a question of spreading that knowledge to the people who need it now.

Another example of a live issue that I heard about is grid-connected batteries. This is the technological development which a lot of people expect is going to fundamentally change electricity systems around the world in the next 15 to 20 years. People obviously argue about how long that's gonna take depending on how quickly the price falls. But it's certainly gonna be a big issue. But it's not an issue that at the moment there are many people who have real experience of at all because they haven't had the opportunity to work through the cycles. How long do these batteries last in practice when they're connected to the grid? What's it really like to have a high percentage of battery use on a grid? Some people have some experience.

So, you've got—in the Dominican Republic, for instance, I understand that the grid-connected batteries that they have there were useful for frequency regulation after last year's hurricanes, that helped to keep the grid operating at least in part. And I understand that in Barbados there are large-scale batteries either coming on stream now or they will be coming on stream this year. And if others aren't thinking about this yet, then they will be soon. And what we're talking here is development of new knowledge. So, the role for the hub will be to help people capture, consider, reflect on what it is that they're learning through their experience, and then to capture that information, that knowledge, and to make that available to others if they're thinking about this for next year or the year after or the year after.

Now, we don't have time to go into all of these information and knowledge needs in detail. I need to pass over to Sigi in a minute. So, there will be a written report available that gives more detail on all of these knowledge needs. Thanks for listening. And I will pass you over now to Sigi, who's going to talk about existing information services and how well they match up to these needs.

Sigmund Kluckner   All right. Thank you, James. Hi, everybody. Good morning. Good afternoon. Depending on where you are. I was just thinking, listening to James: I am coming from the completely opposite side of the spectrum. I am not a lawyer. I am a computer scientist with a good standing in the understanding of needs and knowledge portals, I wanna say, but by far not as well as James does now after visiting a lot of you guys. I am coming and I was looking at this project from that perspective: what is out there and what do we need to do in terms of

technical IT systems, knowledge systems, and a little bit of organizational efforts, to get the Caribbean Energy Knowledge Hub also up and running for a distributed network of stakeholders like all of you are?

And what I did as my first task, I guess, is that I looked into: what is actually already out there? What's available in terms of platforms? And with the amount that I spent on it, which were a few days of good desk research, I think I only or we only scratched the surface of what is actually out there. I have found a lot of good information, some of the surprising information. But I have also found that a lot of it is well-hidden or just unknown to the broader public or even the broader stakeholders that they would be trying to reach. So, thinks like maps on potentials for solar and wind might be known to a few of the stakeholders. Private entities developing solar power plants hopefully have that assessments to make their business viable. There are a lot of country comparisons and scorecards on selected topics in terms of renewable energy, energy efficiency. There are news aggregations, financing instruments, or an overview of those at least.

One of the surprising things is there is a worldwide map of power plants available that is hosted by WRI. Of course you have all the history data on all the different flavors of infrastructure investment, on tariffs, on electricity generation and what James just mentioned. We have the events and workshops—several platforms have that. Barely any have the same events listed. So, it's like a mix-and-match kinda situation when you find out where you should and could go for getting your capacity-building needs done. Then you have policy information out there. And of course we have some community features on some of these platforms. For example, Martyn will tell us later about CAREC.

Some considerations that came to my mind when I was doing that research is that a lot of platforms: there is either a one-purpose or a multi-purpose platform. So, they fulfilled one or more information needs. Sometimes really hard to figure out which information need they actually were targeting primarily. So, some of them are just like: "We dump all the information on there and hope that somebody finds it." Some of them actually have—you can feel that they have put in some thought about why they are doing this, what they wanna publish, and for whom. So, there is a whole bunch of different thought processes going on. Another thing that I found is that not everything is available for all CARICOM countries. So, some countries—James mentioned this already: some are advanced in energy statistics; others are more advanced in collecting their knowledge and reports. So, there is a whole bunch of different levels on that side as well.

We have historic information but that is not always complete for all the years. So, some go back to the 2000s. Some go back further. Some stop at 2015. So: hard to do comparison if you don't have that complete set of data. But it can still be very useful if you happen to find the right time frames. The language issue that we have found prior also in other projects is that language dominantly is in English. From a computer science perspective, that is great because then we can all talk to each other. But of course from a stakeholder

perspective, not everybody might be completely fluent in English, and have a preference on their local or their native language. Spanish being the second-most-used language. And even only a few of the platforms I found are primarily in Spanish with the choice to then switch over to English. Very few French. And I don't think I've seen any other language. Maybe Portuguese on platforms that are also targeting Latin America and especially Brazil in that case.

Many of the portals and also regional portals I have found are run from organizations that are outside of the Caribbean. Examples are like the World Bank. Through ESMAP, we have IRENA that runs a lot of portals. That brings me also to the next point that not many of them have a specific focus on the Caribbean. So, a lot of them focus on the world but include the Caribbean as a subset. Meaning that it's great that we have the information about the world, but given resource constraints in satellite imagery, we would say the resolution is probably not high enough to actually deal with very localized problems, for example, of an Island or a city on an island.

Additionally—I think I hinted at this—the quality between platforms, what I have seen, is variable. So, there is a lot of good information out there, and some of it is lower-quality. I would also account that for resource constraints and also the processes of data and information-gathering. So, depending on the process that you have, you will get better or not-as-good resolution.

We have data and information update schedules that we don't know. So, some of them I mentioned have last been updated 2015. There might be a schedule that says every five years, so we can expect the next one in 2020. Some have update schedules of six months or three months or whenever something new happens. But we don't know that necessarily. And it's hard to account for that variable if you're trying to learn something new from the data and information that's out there.

At that point, a lot of information is outdated. So, if you're looking for history data, that might be great, but if you're from data for 2017, it might not be published yet or not available online at least. It might be available in your governments. It might be available in certain organizations but not publicly available that I could have found.

One thing that I will also touch later on again is that machine-readable data sets are only available on a few portals, meaning that you can pull the information right away from one portal into another portal. Or you all know Excel really well I assume—that you just put this information into Excel and that's it. This I would count as machine-readable. A lot of the data sets and information is put into PDFs and Word documents so it's basically a report that if you don't put it back into an Excel spreadsheet you can't really do any calculations with.

And the last point for those considerations is the licensing of data and information so it's not always clear what the usage license of that data is. So, the question is: can the data actually be used? Can I as a government official, as a regulator—the information that I find online: am I allowed to use that in

my report that I am then publishing again? And, if so, if I am actually allowed to and I know that I have the approval from the copyright owner, how do I give credit? Do I have to giver credit? And all of these kinda things that basically tell the focus around the licensing and the right to use of data and copyrights.

The quick check—these were some of the portals that I visited, that I looked into, that I tried to make sense of. You might know some or many of them. I probably knew about 80 percent or so, which is also why I found them originally. Then Google helped me out and I found the rest. And I wanna go a little bit into detail about how some of those examples fit into the knowledge needs that James just mentioned. So, I tried to match those needs to those platforms. As I said, this is a first assessment. So, this can change with time. So, either the platforms change and are updated, and of course increase understanding of myself and others who are using the platforms so then leads to a better match, when you can say, "Okay, I know now how to use that platform or how to get to that data; now I know how I can actually also use it for my knowledge needs, for my requirements that I have."

I also created a living document that everyone can add to. So, I didn't wanna keep that to myself, but I wanna open this up. I have a link in the presentation. And I will show that to you in a second. Some examples that I found in terms of platforms and how they relate to the knowledge needs I will show you. And I tried this to do in a very visual way. So, the first example, the first knowledge need that James mentioned, energy planning, is the Global Wind Atlas, published by DTU and others, supported by ESMAP. So, you see this is a global project but it has information about the Caribbean. It has power density of wind potentials. It has the wind speed for—I wanna say very granular data actually already. That project developers can then use for creating projects in that area if all the other frameworks allow for that. So, here an example of good loop. And surprising that you can see the potentials of the mountains in there.

We have another knowledge need that was the support of specific decisions on current and upcoming topics. A very clear contender was there: the Clean Energy Solutions Center, who has a lot of information, also focused on a more global level, but does have a whole bunch of information that applies and can be applied to the challenges that decision-makers, government officials face in terms of policies, in terms of new technologies, upcoming topics.

James mentioned financing information. So, where do I get potential finance for my project? IRENA's Project Navigator I found has quite a good list, for example, in terms of who is supporting projects and in which region, which might be very interesting. One caveat is that you have to log in—or you have to register for this website. Once you're in, you can do a lot of things, and the finance information is one of them.

Lastly, also with a shout-out to the CARICOM Energy. They are currently creating or have created the events page trying to collect information that are

related to this field. So, there it would be a first stop, if you will, to actually go there and see which energy-related events are happening in the future.

So, these are a few examples. Now, obviously there is a little bit more. But I'm sure we missed something, as I mentioned in the beginning. And I would like you all to check out the Google spreadsheet that I have created. It's at tiny.cc/caricomenergyportals. I know there are some people that like longer links. I'm not gonna read that for you. But you will be able to click on this one in the presentation and I'm also gonna put it into the chat afterwards. And this is the spreadsheet that I created. It's fairly easy and understandable I think. And we would appreciate if you could, if you want to, spend a minute or two and look at this and see if there is anything that you wanna add or change. And I will continue in about a minute.

Of course you're also more than welcome to do this afterwards as well. And you're also more than welcome to use this from now on in your work, in your day to day, and change as we come up with it.

All right. I realize that two minutes of silence is a really long time if you're eager to keep going and discussing things. The question now for me in terms of the hub is: how do we go forward? And I think an IT and an online system is one part that is very necessary in terms of keeping the communication going, keeping the conversation going, and actually provide a system that—or an online—I think Devon calls it the first-stop shop—where information is actually available for your knowledge needs. And the question always that comes up then is developing a new platform—do we really want to create a new platform? Something that, out of my previous jobs or my previous tasks here at REEEP was always: this is the first question we're gonna ask if somebody wants to create a new platform: "Do you really?" And if we do, how do we go at it? What are we doing?

And I'm gonna switch back to my PowerPoint. And you guys are more than welcome to keep listening, and at the same time type. If you can. I personally cannot [laughs]. So, my point about "Do we really want a new platform?"—and this is something that decision-makers need to sit down, decide, and follow through. And my caveats or my points to this are basically—and you could hear that from what I said before already: there's already lots of information out there. So, can we use technology to reuse that data? So, can we link to that data? Is there a way to copy data? Can we create new insights on the existing data without having to put in a lot of effort of first having to create that data again even though it's already out there? And how can we create those insights based on user needs?

We have lots of non-technical unknowns when we build a new platform. And, mind you, this all comes from an IT person. We have funding questions. We have governance questions: so who's responsible for which part? Who is taking the final decision? And we have of course functional requirements, we have non-functional requirements, and we have organizational requirements. So, also not only "Who is responsible?" but: who is hosting this? Where does it live? Who is administering this?

As a side note, also from that task, from one of my other tasks here at REEEP, I was the project lead for the CKB, the Climate Knowledge Brokers Coordination Hub. And as one of our deliverables for this project, we had a video where we tried to put together a nine-point checklist on how to build up or set up a successful platform. So, there is a video there. I will also post it right away after my talk. I will post this URL as well. And, for those interested, go ahead and look at it. It's very entertaining and interesting as well. Kudos to our great supporter, Geoff Barnard.

Another point that you might not think that you hear from an IT person is that technology is by far not the most important thing. My theory or a thesis that I have heard before and I have to subscribe, or I'm very fond of as well, is that only ten percent of an actual platform on the internet is technology. Because technology in a sense is only setting up the service, installing the software, and set the parameters and options according to the defined ways of the overall project. Programming of specifications is another part. So, the actual coding.

The other 90 percent, though, are—and especially in the knowledge hub as we are thinking here, is the stakeholder network, the engagement of others, and some sort of a help desk on topical issues. So, it must not be only about help desk "How do I do something on the platform?" But also some sort of a help desk or a helping hand in terms of like: "I'm really interested in this topic. How can I find out more on this? How can I learn more? Where is my best chance to actually get knowledgeable about this topic or the other?" Given James' topic about battery storage, somebody might be there that can help.

Of course, the content creation and curation is something that a human person needs to be doing. There is translated—as I mentioned languages—annotation, taxonomy development—so the definition of the content and how all of these different topics are related and linked. There is of course the project management and human resources side to it. You need people and effort to do verification and testing and to do documentation of the platform. And then of course you also have things about the broader outreach to show: "Hey, we are actually here. We have a brand. We are doing communications." And all of these kinda things that you might not think as a technology platform project.

And one last point that I wanna mention on that is: the other 90 percent is specification of the integration with other systems. And that comes in especially when we are thinking about linking data. And that is my last point that I wanna make is: linked open data has proven very successful in the past, especially with data that is close to governments and public good. So, linked open data basically means nothing else than you make yourself available on the web and you make it available in a way, as you can see in the five star, that people can use your things and you can link to other people's data to provide more context. So, in a sense, you put your information and you can put your information in context with others, and thereby create new knowledge by putting those things together. You have less repetition and

duplication so you're offering the same data sets in different places. And you keep the data maintenance costs low. Because one person or one organization is responsible for that data and others are using it. While you are responsible for something else and another organization might be using that. So, basically you would support each other with the most up-to-date data.

Of course, if the data is available, especially openly and linkable, there is a big encouragement to reuse existing data sets instead of going out and do yet another survey of how many people are using solar home systems. So, there is a way to do this encouragement of reusing. More innovation can happen because the data sets can be put into ever new contexts. Some contexts that you might not have thought of because you were thinking in your world and another one is thinking in that world, and then you put those things together and you get something completely new. And, again, you create new knowledge by doing that.

And one thing, relating back to the language issue, is that if you set it up right, you can also link content from different languages. So, the very simple example is that you have energy data from a country in two different language: you have the Dominican Republic and you have República Dominicana. You would have maybe those two data sets never combined because you wouldn't find them searching for English or Spanish. But if they are linked together, you can say "I wanna see Dominican Republic information" and you find both of them.

Linking data of course has its pros and cons. I have tried to bring up the most important ones for me. So, linking data, you have always included the last updates automatically. So, if the World Bank publishes a data set, they will automatically be in yours, while when you copying data, you always have to do downloading and re-importing. You have efforts on linked data in the beginning that are higher because you need to define and find the data that's out there and link to it. On the contrary, when you're copying data, you have to do data-cleaning over and over again and normalization so that it actually fits into your system again, which you have done in the linking—in the initialization phase.

The linking data remote data—so _____ data from others—has to be accessible on demand, while copying data is available locally on your own server. So, you are also responsible for it. And that's the next point: if it's stored remote server, the responsibility is with somebody else; if the data is stored on your local server, you are responsible for also hosting this and keeping it up to date.

An example that uses linked energy data is OpenEI. So, open energy information. What they're doing is that they're pulling in information that, as you can see here on the right: different energy resource information from winds to solar to coal reserves. From different information. Not everything might always be available, but that's something for discussion between the data provider and yours to say, "Hey, do you have this information? How can we get to it? Do we need to set up a project to actually create that data and publish it? Or how we can get to it?" Really helpful in terms of also putting

this into context so you can see: how does the GDP relate to solar potentials in different—it's probably a stupid example, but to, for example, energy created in different countries.

And my last point about linking. This was more about linking data. Now also linking information is basically the next step. I mentioned data and information in the sense of: data is having singular data sets, so numbers, to a certain extent, or other smaller text fragments. Information can be more about—you can think about more as reports. And the Climate Tagger, as a side note, a software solution that REEEP has developed with a few partners through funding from CDKN and their innovation fund, is a tool that basically increases the consistency through standardized vocabulary. So, meaning that it looks into the documents, extracts tags or keywords, and by doing so, basically the user can search easier for these kinda tags and keywords.

And that's my last point for today. I think Martyn is going to showcase us quickly how CAREC works as an example for the community-enabled platforms online. Thank you.

Martyn Forde   Sorry. I was on mute. Good morning everyone, and thank you for having me. For those of you who do not know, the CARILEC Renewable Energy Community is a online learning community that launched June 29th 2016. And it came together through a partnership between CARILEC, which is the Caribbean Electric Utility Services Corporation, and the Islands Energy Program of the Rocky Mountain Institute and the Clinton Climate Initiative, and also with support from IRENA, the International Renewable Energy Agency.

And funding for the initiative came from the GEF via the United Nations Development Program, as well as through the Dutch Postal Code Lottery as well as Norad. And CAREC, as an online community, serves CARILEC's members, which consist of all the electric utilities in the region and any interested energy professionals from the Caribbean and from other regions. And CARILEC has also partnered with WIRE, the Women In Renewable Energy Network, to promote leadership and professional development opportunities for women working in the energy space.

So, just moving forward—one second. So, the vision when we were doing our initial assessment of the region—similar exercise to what Sigi described: looking to see what resources were out there. How could we add value to the region? And the ultimate vision is that the Caribbean becomes a region of indigenous energy experts in low-carbon technology and powered through collective learning and collaboration. So, our slogan at CAREC is to connect, collaborate, and innovate. And, as such, CARILEC and CARICOM have an MOU for sharing of information. So, we work very closely with entities like CARICOM and other different entities in the region to gather information. But, as James and both Sigi have said, there are various gaps.

So, when we decided to create the platform, our mission was to make sure that we could create a vibrant community, a forum where the energy

professionals could share via a peer-to-peer network. So, you can access this from any device and at any time and reach out to others in the region.

So, this year—initially when we started, we looked very broadly at what the energy topics were. But coming out of last year's hurricane, we found that we needed to be very pointed in adding direct value to the Caribbean utilities. Where were the hiccups? And so we focused our learning agenda strictly in grid resilience and creating energy independence for these islands. So, some topics include: what are the best practices with regards to procurement and system operation? Energy storage being a new technology. Smart grid. Grid modernization in general. And is the dialog happening between the technical experts, those being utilities, with years of the technical acumen and electricity generation distribution transmission, and policymakers or different entities working within the region.

So, for this year, our goal is to make sure that all CARILEC utilities are registered and engaged on the platform and to continue to build a portfolio of contextual Caribbean content. But by extracting the best practices, these can be applied to other regions, island regions like the Pacific region. And I'm very careful there to say "Island regions." Because it's not just about if you are from an island. There are a lot of mainland countries within the Caribbean and also remote communities that can benefit from the sharing of this knowledge. But we have to make sure that we are exploring knowledge from all aspects, not just the technical characteristics of the technologies that're emerging, whether they're commercial or new innovations; we need to understand the financial aspects, the regulatory, the environmental considerations in transitioning to low-carbon economies.

So, how does CAREC help energy professionals? When you're developing a peer-to-peer network, in this instance what we term a community of practice, we have to look at increasing the efficiency for the users of that network, and by increasing the users' efficiency, reducing project timelines with the sharing of information. Creating an ecosystem for open sharing, we thus can save utilities' cost. So, for example, ConocoPhillips created—I think it was in 2003, I believe—ConocoPhillips made a move to create communities of practice within their business organization. This saved over $900 million per year I believe. And sometimes finding the direct-add value of the community of practice is hard to articulate but it comes through the continuous sharing: as the network builds, it becomes more robust.

So, what does CAREC also do for energy professionals? We make sure that technical solutions and experts can be accessible via every device. So, since starting, we've been actively mapping who has what type of knowledge within the region. And, thus, being able to create groups or targeted sharing of information. We also, through CARILEC, offer employee training professional development opportunities, the in-person exchange of information at conferences. CARILEC has four conferences during the year which usually have workshops that are CAREC-sponsored. And then what we did was we were sure to create a technical document library. But we made sure that this was publicly-accessible information or information that utilities,

given any security risks, were willing to share. So, thus we also have templates that, if you wanted to, for instance, go and have an interconnection license, you wouldn't have to go and start that from scratch and spend money on consultants; you would have examples that have worked in contexts similar to yours.

And we've made sure to drive our content from a utility perspective. So, looking at making sure that it always was framed from the viewpoint of helping utilities scale projects and day-to-day utility issues. And what this [audio begins to break up and cut out] –

Vicki Healey   Martyn, we're having a hard time hearing you. Your audio is—

Martyn Forde   [Audio continues inaudibly].

Vicki Healey   Martyn?

Martyn, we've lost your audio.

Martyn Forde   [Audio continues inaudibly].

Vicki Healey   I'm just checking to see if he's been able to send a message. So, with that, I think—this is unfortunate obviously, but I think I will take back control since we're no longer able to hear Martyn. Can anyone else hear me? Can any of the other presenters…?

Hello? Hello? Devon?

Devon Gardner   _____.

Vicki Healey   Is that Devon?

Devon Gardner   Yeah.

Vicki Healey   Okay. Devon, I'm actually having a hard time hearing you as well. I can –

Devon Gardner   _____ I can hear.

Vicki Healey   Oh, you can hear? Okay. So, Devon, since we –

Devon Gardner   Can you hear me?

Vicki Healey   Yes. And I am going to take back the control since we have lost Martyn's audio and turn the floor over to you, Devon, here in just a quick moment.

Okay. Very quickly—and apologies to everyone with the audio difficulties with Martyn. But at this point, I do want to say a very quick thank-you to James, Sigi, and Martyn for their presentations. And just to let you know that, before we begin our question-and-answer session, we will hear some remarks from someone who really needs no introduction, Dr. Devon Gardner, who was the Programme Manager for Energy and Head of the Energy Unit at the

CARICOM Secretariat. And, with that, Devon, we're eager to hear your remarks and the floor is yours.

Devon, are you able to hear me?

Okay. Let's see if I can troubleshoot this real quickly. James, are you able to hear me?

It looks like we've also lost Sigi's audio. We have lost Martyn's audio. James, you're on mute. If you can hear me, can you unmute and let me know if you're able to hear me?

James Smith   I can hear you in [audio breaks up].

Vicki Healey   Okay. Even you sound a little broken up. And, again, Devon, one more chance. Are you able to hear me or able—we're not able to hear you right now. Though it does show your _____ _____.

[Crosstalk]

Devon Gardner   _____ _____ _____ hear me?

Vicki Healey   Yes. I can hear you now. Yes. Thank you. Okay.

Devon Gardner   Sorry. It's coming in and out. It looks very overcast. I don't know if it's a storm out here _____ _____ _____.

[Crosstalk]

Vicki Healey   Ah. Okay. Yes. We can hear you clearly now. And Devon, thank you so much for attending. I will turn the floor over to you for your comments.

Devon Gardner   Okay?

Vicki Healey   Yes.

Martyn Forde   I had issues during the –

Vicki Healey   That's okay, Martyn—is that Martyn? Okay.

Martyn Forde   Yes.

Vicki Healey   Okay. Yeah. We are having some audio difficulties suddenly. So, we did not hear the last part of your presentation. But I have now turned—thank you for providing the information that you did and we were able to hear. At this time, I'm turning the floor over to Devon for his remarks.

Devon Gardner   Yeah. Thank you very much. And I will firstly start thanking the [audio begins to break up, and goes in and out throughout his presentation and the Q&A] _____ _____ _____ _____ in this important session. I want to also express my thanks _____ _____, who has worked tremendously hard over the last few months to get us to this state. And to the World Bank, who is

supporting near and dear to me, and the engagement, and Monkey Mosaic, _____ what we call the C-SERMS platform, which is an indication of multiple cooperation on regional energy matters as we _____ _____. The C-SERMS platform is not an ICT platform. So, in a sense it's keeping to what was said by Sigi, that _____ really more _____ _____ the technologies themselves.

So, _____ _____ an interaction of _____ who are deeply engaged in sustainability development within the Caribbean, in the CARICOM context. And what we have been doing in a number of key areas. And it is within the context of the C-SERMS platform grid to develop the CARICOM Energy _____ _____ _____ _____ _____ _____ critical aspect of anything that we want to do in the region.

Point is that we _____ _____ be able to improve the way in which we plan. And _____ _____ _____ _____, you know, medium-range, long-range for our electricity systems, _____ _____ _____ _____ _____ _____ variability factor within our planning: being able to predict things like _____, things like wind speed variation _____ _____ _____ _____ cost-effectively ramp up our _____ generation from a more _____ _____ _____ sources to fill in where gaps are _____ _____ so that we are really saving fuel and _____ _____ _____ _____, being able to _____ _____, the way in which we _____ _____ _____. We are talking about being able _____ _____ _____ and improving it with climate and _____ and manage all of the _____ _____ the same. About being able to build it _____ _____ capacities for people within the region, or people even operating and serving the regional energy sector even if they are not within the region.

We thought about being able to support _____ in particular and _____ developers where necessary, in respect to transaction support, in respect to transactions _____ _____ projects and programs. So, there are a multitude of things. And we haven't started yet to talk about: how do we support the general knowledge and awareness requirements of citizens and civil society within the region? _____ research through _____ _____ I'm studying, such as through those who simply want to know more.

And so the issue of the CARICOM Energy knowledge job is one, which is _____ _____ _____ _____ time it is open. And it's one in which we are _____ committed _____. And it's one through which there's a lot work that have started. The intention is not to reveal the _____ _____ _____ _____ _____ serving as a gateway to help folks to be guided to _____ _____ _____ in respect to using the information and the knowledge that _____ _____ _____ that much outreach without _____ _____ _____ so that local communities, national situations, and regional situations can be accessed in respect to the level of information and knowledge that is out there. And we are talking about developing and already have started work on the R-three-E-A-D, what we call the "Reed," the R-E-and-E-E activities _____ _____ _____ _____ _____ _____ _____ _____ activities from _____ _____ happening within the region, which we hope will become part and parcel of the energy hub.

We're talking about the integrated area class of the Caribbean, which we are looking at with IRENA, so that we build some of the global atlas that are going to be _____ details _____ wind resources, solar resources, and other types of RE potentials that are within the Caribbean. _____ _____ about pieces that are relevant to _____ planning, such as those _____ _____ _____ _____ national energy _____ _____ systems _____ _____ as maybe looking at potential opportunities for home-grown _____ _____ _____. And how all of that can be effectively functioning in each country _____ _____ _____ _____ and regional information systems. So, it's really a lot.

And as Sigi pointed out, ten percent of it is probably IT. The _____ is going to be _____ _____ _____ people; what are going to be the protocols for data sharing and the movement of data and the creation of information and knowledge from the data that we have? What are going to be the protocols for managing and supporting? And where are the resources going to come from? And how are we going to effectively partner, especially among _____ _____ resources to pay for _____ _____ kind of people and the kind of skills and the kind of actions that are going to be necessary? Because data is not going to simplify in itself in a hub. And _____ _____ information and knowledge _____ _____ _____ information _____ _____ _____ effort _____ _____ that.

And so we are here as the Secretariat to ensure pieces fall into place and to ensure that the region will be able to benefit from an effective mechanism that allows _____ _____ patchworks of _____ _____ as Sigi has pointed out, and create a seamless web through which we can generate the kind of consistency and reliability and accuracy and interoperability that would _____ _____ _____ confident in the _____ _____ of the energy, information, knowledge that is here and that we can regularly access and use that towards our _____ _____ as energy expects. And _____ _____ _____ energy experts towards the understanding of what's going on in the region.

So, at this juncture, I know that it will be _____ _____ _____. I'm not going to say anymore. And so I'll turn over back to Vicki and say to you all, as participants, I would like to thank you for join the study, and I look forward to hearing your feedback, now that the experts have presented their perspective.

Vicki Healey

Super. Great. Devon, thank you so much for both taking your time and sharing your knowledge. It's really always very good to learn from you and hear your vision. So, with that, I would like to begin our question-and-answer session, which we have had some really good questions come in. I've been sort of monitoring them as they have arrived in. So, all panelists, if you could unmute yourself or be available to unmute yourself once the question's presented to you, that will be fantastic.

Okay. So, first of all, I will start with—a couple of people actually have sent in questions asking if we would be able to provide the links that Sigi had in his presentation. And the answer to that is yes. We'll be e-mailing out copies of the presentations and also putting them up on our Clean Energy Solutions Center website and [YouTube channel](#) so that they will be accessible through a multitude of means.

So, then a question for everyone. I think probably all of the panelists could contribute to this. The question is: how easy would it be to have a regional repository of what is out there and what it covers? For example, the list of platforms that Sigi showed—to have all of those platforms in one place so that you can have a single option when you are searching without having to go to Google to find a lot of this individually and with long searches that might be involved. So, I'm not sure: does that question make sense? Or if I need to repeat that. But that is a question that came in: looking for a consolidated way to access the information.

Sigi, I think I'll turn this question to you.

Sigmund Kluckner Yes. It's really not that easy as it sounds. Because most of the problem I think we will have doing that _____ resource constraint. Because—and that's what I mention in my presentation about the curation, right? So, you need to curate this. And whenever somebody else brings up a new platform or a new report comes out, it has to be included in this. Of course, as I also mentioned, there are tools that can help us automate this—so I'm just thinking about the Climate Tagger again now—that can help doing that. But of course there's always that human factor in there that we need to consider. It is possible.

It is also possible to basically use Google and just restrict the search, from a technical perspective, to give me only results from this page or from these list of pages. _____ _____ we also have done before. So, it's not like trickery or rocket science. _____ then it's always a matter of how much resources we can put in and how much resources we can create there into this.

Creating the single access point itself would be—for example, the list that I created is the simplest of the first-stop place where you say, "Okay, at least I can find the portals and then see what URLs—where their website is," and then go from there. Already with a categorization. So, this might actually already help. But of course also Devon's vision is a little bit bigger of including this and a lot of others where we can say, "Okay, this is your—you are the stakeholder for governments. Here is the information that we think is most important for you or that you have told us is most important for you." So, going from there.

I'm not sure I answered this question, but that's pretty much how I understood the _____ [laughs].

Vicki Healey Great, Sigi. I think you hit it really well. And actually there's a follow-up question on that regarding guidelines and if there will be guidelines offered that the users can use for the information for such things as: what can you use this information for? How you can give credits to the sources of the information that's collected. Things like that. So, I don't know if there'll be some sorta guideline or tutorial on that sort of need.

And that could go to maybe Sigi and/or James I think. If the question didn't make sense, let me know and I'll repeat.

James Smith	Vicki, I don't think it's that the question didn't make sense. It's just that you broke up. I think we're having _____ _____.
	[Crosstalk]
Vicki Healey	I'm sorry. Again the audio issues. Basically the person asking the question is asking about guidelines. On: will guidelines be provided to help people understand what information is available, how that information could be used? And such things as: how will you be giving credits to the information that you collect to the people who actually developed the information? Things like that. So, they're looking basically for a guideline framework on best practices perhaps on how this information that's available can be utilized for different needs.
James Smith	I'll take that, Vicki. I will leave Sigi to answer in terms of I think some of maybe those technical _____ _____ linking and how you credit data with _____, things like that. But _____ _____ that _____ _____ _____ last few months was that the best information resource they had ever used in their life was a library with a good librarian. And I think that that's a key thing to mention here: that, as both _____ and Devon have said, we're not thinking of the knowledge hub simply as a online web platform. We are thinking that this is going to be staffed in some way. Obviously there will be resource questions to be worked out in terms of how much staffing there will be.

But I think that, in terms of helping people to find the information that they need and then understanding how they can use that information, _____ _____ kind of thing that we would hope we can answer for some people. We're not thinking of the knowledge hub as a support to the general public. This is thought of as support to professionals within a list of stakeholders that I gave. Starts with the governments. This _____ initiative. Includes regulators. Includes utilities and includes developers and potentially universities. But we're not talking about an enormous, enormous number of people. We're not trying to serve the information needs relating to energy of every single person in all CARICOM countries. It's going to be focused on providing priority needs—meeting priority needs for the people who are most important in the transition to clean energy systems. |
| **Vicki Healey** | Great. Thank you. |
| **Sigmund Kluckner** | Yeah. And in terms of licensing and crediting, I think the biggest difference of a lot of these things is that many of the data _____ _____ under different licenses or published under different licenses. So, thee is no one-fits-all answer to this. Because it depends a lot on the license. You can have a lot of creative commons licenses where you actually don't have to credit the author. There are _____ _____ creative commons licenses where you only have to credit the author and you can do whatever you want with it. Or there's another one that: you can do whatever you want but you need to inform the author.

And there's a whole bunch of different mix-and-match kinda licenses also that are not possibly creative commons. So, there might be other copyright licenses that have _____ on how—or that tell you how to cite and how to give |

	credit, very similar to scientific publications and stuff as well. So, there is not a one-fits-all answer. But normally licenses, if they give you a license, it also _____ _____ credit.
Vicki Healey	Okay. Super. Good answers. Thank you both. Next question is regarding case studies. Interested in knowing: will the hub provide good case studies of countries that use the data for decision-making and are successful in its application?
James Smith	Yes, potentially, would _____ _____ to that. Case studies can be very useful. As I said, if you're talking about passing on existing knowledge and you're talking about creating new knowledge, capturing people's experience, then case studies are one way of doing that which some people find useful. Not everyone though. I think there are some people who are more used to that, that sort of perhaps academic way of learning, and that's very useful for them. But for other people, there's a very very important social aspect to learning, that it's something that happens best for them in relationship and in discussion with other people. And I think this is why the CAREC community and the opportunities that provides for interaction are particularly important. I think that's why face-to-face training _____ _____ and conferences are incredibly important: because it allows people to interact with people who might have more experience on a particular topic than they do. We haven't yet decided exactly what the knowledge hub is going to do because we've just finished this process of understanding what the knowledge needs are. We'll now move into more of a solutions focus and start to think about: how do we meet those knowledge needs? And we will be organizing _____ _____ _____ workshop in the autumn, the northern-hemisphere autumn, in September, to discuss these various different knowledge and information needs and to do some prioritization of those. Because, like I said, there's gonna be resource questions. We're not necessarily going to be able to meet everyone's needs immediately. And what we do want is to hit some very important _____ _____ quickly and get some traction with the hub and demonstrate to people that this is useful.
Vicki Healey	Okay. Great. I was just looking at the time and it looks like we've not only used our time but have exceeded it. So, there are a few questions remaining. So, for any of the questions that we did not have time to answer, we will connect with those attendees who asked the questions offline after the webinar. So, with that, I'd like to now provide our speakers and Devon with an opportunity to provide any additional or closing remarks you'd like to make before we end the webinar. And I guess in order – [Crosstalk with inaudible speaker] Go ahead. Sorry.
Martyn Forde	Sorry. I had connectivity issues with the audio. If there are any additional questions? I couldn't hear you.

James Smith	Martyn, Vicki was saying: do you have any last comments you would like to make? It's time for this webinar to end.
Martyn Forde	Not at this time. Other than we plan to work together with other partners like yourselves to make sure that information _____ _____ is pointed and adds value to the region.
Vicki Healey	Great. Thanks, Martyn.
	[Crosstalk]
Sigmund Kluckner	Glad to hear that. Well, from my side, thank you everybody for joining and for your interest. And I am looking forward to seeing the outcome of the spreadsheet that I shared. _____ _____ looked at it since I shared it. So, I'm gonna be _____ what the outcome was. And thanks for everybody for their inputs and questions. And have a good day.
Vicki Healey	Thanks, Sigi. James?
James Smith	I would like to say thank you for everyone who _____ through the various technical difficulties that we've had. I believe that a lot of that has actually been a platform issue. _____ _____ webinars that's had some issues that has _____ the audio. So: apologies and thanks very much for those of you who stuck with us. _____ _____.

As Martyn and Sigi have said, we're gonna be looking to work together with all _____ _____ _____ _____. The knowledge hub is, as I said, very much about partnerships, and it's about the relationships that develop. Should anyone wish to get in touch with me, in particular if there are any information-and-knowledge need I haven't mentioned in my slide set and things that you feel are important for you from you position—perhaps I haven't had the chance to talk with you in the last few months—do get in touch. Just because we've come to a pause in that process, it doesn't mean it's stopped. And there will be, through the knowledge hub, an ongoing _____ _____ _____ and better those information and knowledge needs are, and trying to refine the services to better meet those needs.

This is only the start. I think it's a very exciting project. And I think that the potential for sustainable energy is clearly enormous. You could very clearly meet all the energy _____ in relation to electricity from sources such as solar, wind, without even thinking about tidal. There's a lot of _____ _____ resources that're currently untapped in countries. There's geothermal, which some countries are starting to investigate at the moment. Or some countries have small-scale schemes. And there's lots more potential for that.

So, I think that this transition to clean energy will happen. This will happen throughout the world. And I think that _____ in the Caribbean is _____ _____ to be a leader in this. And I think that's very exciting and I hope that you are able to take it.

Vicki Healey	James, thank you. And last but certainly not least, Devon, any final thoughts or remarks that you would like to make?
	I believe actually we've lost Devon. So, with that, first of all, I just definitely sincerely apologize for the audio difficulties we've experienced midway through this webinar. We were doing really great and then audio seemed not to want to participate anymore with us. But, as we all know, technology is great when it works and it's very frustrating when it doesn't. But, with that, okay, gentlemen, once again, thank you so much for your time and sharing this information.
	And, on behalf of the Clean Energy Solutions Center, I'd like to extend a very hearty thank-you to all of the attendees that participated in today's webinar. We just very much appreciate your time. And also we hope that, in return, you gain some valuable insights into this project, have some thoughts about it that you might like to share later with the team. And also I'd like to invite you to check the Clean Energy Solutions Center website if you would like to view the slides and hopefully be able to listen to a recording of today's presentations, as well as review previously-held webinars that you may find value in and like to review.
	Additionally, you will find information on our upcoming webinars and our valuable resources and services offered through the Clean Energy Solutions Center. We will also post this webinar recording to our YouTube channel. And please allow about a week for that to occur. All of this information with the links will be sent out to you subsequent to the webinar ending. And, finally, just a reminder: I would like to request that you take a moment to complete the short survey that will appear right after we close the webinar.
	So, with that, please enjoy the rest of your day, and we hope to see you again at future Clean Energy Solutions Center events. This concludes the webinar.