

Education and Skills Needs in the Renewable Energy Sector

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Webinar Panelists

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Sean Esterly Today’s webinar, which is hosted by the Clean Energy Solutions Center and the International Renewable Energy Agency. Today’s webinar is focused on Education and Skills on the Renewable Energy Sector. One important note to mention before we begin our presentation is that the Clean Energy Solutions Center does not endorse or recommend specific products or services. Information provided in this webinar is featured in the Solutions Center’s resource library as one of many best practices resources reviewed and collected by technical experts.

Before we begin, I’ll go over some of the webinar features. For audio, you have two options: you may either listen to your computer or over your telephone. If you choose to listen to your computer, please select the “mic and speakers” option in the audio pane and doing this will eliminate the possibility of feedback and echo. And, 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 the audio PIN that you should use to dial in. And panelists, we just ask that you please mute your audio device while you are not presenting. And anyone having any technical difficulties with the webinar, you may contact the GoToWebinars Help Desk, text the number at the bottom of this slide, which is 888-259-3826.

And we encourage everyone from the audience to ask any questions that they might have at any point throughout the webinar. To ask your question, simply enter your questions into the question pane in the GoToWebinar window. And if you are having difficulty viewing the material through the webinar portal, you can find PDF copies of the presentation at cleanenergysolutions.org/training and you may follow along as our speakers present. Also on the audio recording of the presentations will be posted to the Solutions Center training page within a week—about a week of today’s broadcast.

Now today’s webinar agenda is centered around the presentations from our guest panelists, Stephanie Pinnington and Nicolas Fichaux. And these expert panelists have been kind enough to join us to discuss one of the greatest areas to the adoption of renewable energy technology, the critical shortage of skilled personnel to develop design, finance, build, operate, and maintain renewable energy projects. Before our speakers begin their presentation, I’ll provide a short informative overview of the Clean Energy Solutions Center Initiative. Then following the presentation, we’ll have a question and answer session where the panelist will address questions submitted by the audience, and then closing remarks, and a brief survey.

In this part, I provide a bit of background in terms of how the Solutions Center came to be. The Solutions Center is an initiative of the Clean Energy Ministerial and is supported to our partnership with UN-Energy. It was launch in April of 2011 and primarily led by Australia, the United States, and other CEN partners. Outcomes of its unique partnership includes support of developing countries to enhancement of resources on policies relating to energy access, no-cost expert policy assistance, and peer-to-peer learning and training tools such as the webinar you are attending today.

The Solutions Center has four primary goals that serves as clearinghouse of clean energy policy resources; it serves to share policy best practices, data, and analysis tools specific to clean energy policies and programs. The Solutions Center delivers dynamic services that enable expert assistance, learning, and peer-to-peer sharing of experiences. And then lastly, the Center fosters dialogue on emerging policy issues and innovation around the globe. And the primary audience is energy policy makers and analysts from governments to technical organizations in all countries. And then we also strive to engage with the private sector, NGOs, and civil society.

In this slideshow is that one of the marquee features that the Solutions Center provides which is the expert policy assistance, this program is called the Ask-an-Expert. And it’s a valuable service offered through the Solutions Center and we have established a broad team of over 30 experts from around the globe who are available to provide remote policy advice and analysis to all countries at no cost. For example in the area of

renewable electricity policy, we are very pleased to have Paul Komor the Energy Education Director at the Renewable and Sustainable Energy Institute serving as our expert. So if you have a need for policy assistance on renewable electricity or any other clean energy sector, we encourage you to use this useful service. Again, this assistance is provided free of charge. To request assistance, you may submit your request by registering to our Ask -an-Expert feature at cleanenergysolutions.org/expert. And we also invite you to spread the word about this service to those in your networks and organizations.

In summary, we encourage you to explore and take advantage of the Solutions Center resources and services including the expert policy assistance, the database of clean energy policy resources, subscribe to our newsletter, and participate in webinars like this.

And now I'd like provide brief introductions for our distinguished panelists. Our first speaker today will be Stephanie Pinnington a Junior Professional Associate at the International Renewable Energy Agency where she is leading the work of the IRENA Renewable Energy Learning Partnership, a project which aims to increase awareness of, and broadens access to renewable energy, educational resources, and opportunities. And then following Stephanie, we will from Nicolas Fichaux a Program Officer for Resource Assessment at the International Renewable Energy Agency where he coordinated the development of the Global Atlas for Renewable Energy.

And so with those brief introductions, please join me in welcome Stephanie into the webinar. Stephanie, we can see your slide but I think you still have to unmute your mic. Stephanie, I think you're still muted; you'll need to unmute the mic on your computer.

Stephanie P. Sorry, I didn't know if that's on.

Sean Esterly That's all right.

Stephanie P. Can you hear me now?

Sean Esterly Yeah.

Stephanie P. Okay. Great. Sorry about that. I think you're [inaudible] [00:06:59] introduction. My name's Stephanie Pinnington and I'm a Junior Professional Associate working for IRENA, the International Renewable Energy Agency. IRENA is an intergovernmental organization that is mandated by countries around the world to promote the widespread and sustainable use of renewable energy technologies and we currently have a 130 number of states. I work on the project called the IRENA Renewable Energy Learning Partnership, we call it IRELP, which is just one part— one projects of IRENA, which is focusing on education and skills.

IRELP was developed just under two years ago with the goal to increase awareness of, and access to renewable energy, education, and training. With the ultimate goal of creating a strong and skillful workforce to drive the renewable energy sector forward. I'll just quickly tell you a little bit about IREL and then I'll go through some of the resources that we offer through our website. Currently, IREL offers free access to a global database of approximately 2,000 courses, 600 webinars, 200 in training guides and manuals, and about 200 internships. These are offered all around the world and in many different languages and can all be found in our website. Specifically our courses include everything from short-term courses in professional development to vocational training; we also have certificate programs, associate degrees, bachelors, masters, and PhDs.

We do have some limitations to our database with this information, those being that we are generally limited to the languages of our partners. We work with 22 partner organizations that really help us in gathering this information about what education and training exists globally. Our partners do provide us with content in many languages including French, Spanish, English, German, Japanese, and Arabic, and more recently Chinese but of course, we have to work within those languages for the most part. We also do not include generic engineering programs which may teach skills that are relevant to the renewable energy sector but which are not renewable energy specific. We also don't have any in-house renewable energy training that may be offered by some renewable energy companies.

We have users all around the world, we have about 7,000 users per month and we see that about 1/3 of these people are returning to the site, and mostly looking for webinars and internship opportunities. We also have a very strong social media following with more than a 145,000 people and this has been a really way for us to reach out and particularly reach out to young audience and those who are interested in studying renewable energy and starting careers in this sector.

Another way that we gather a lot of this information is through our IREL Global Network, which is a group of very dedicated individuals who volunteer their time to help us collect information on education and training, specifically within their regions. And they also help us address this issue of language, and to an addition of the languages of our partners, our Global Network work members also speak Korean, Turkish, and Portuguese. We have about 20 people in our network and about 10 who are actively engaged with us right now, and they take on a variety of different tasks depending on their interests and sector.

I'll just run through briefly what is included on our website. Here you can see our Education Centre, which offers our course database, our resources for educator centre, training guides and manuals, webinars database, and also information on the IRENA Scholarship Programme. Within our course database, you can filter through the courses to find different

programs that maybe of interest to you. For example, you can search by sector, also by topic, you can search by closer deliveries, or if it's online, or a case-to-case program, you can search by country and language of the program is offered in, and also by the date of the course that you're looking for a certain time span.

I just highlighted a few courses that maybe of interest. These are all programs that are free and online and they're only just a few that are offered through IRELP. These are interesting to look at because they're available to anyone. If you're interested in renewable energy education, you're looking for something free and easy to access, these may be some to look at. We also have a webinars database, unlike the clean energy research center, we are not doing many intern—sorry many webinars directly but what we do is collect webinars that are being offered all over the world on a wide variety of topics. And you can find at least one webinar happening every day of the week of not more, and they really do cover a wide span of topics. I would say that 99% of these webinars are offered free of charge, so it's a great way to not only to get some information about renewable energy but really to follow trends in the sector.

We also offer training guides and manuals, we have a library. It's not just a broad renewable energy library; it's not generic reports but really focused on hands-on training guides and manuals. We're looking at, for example, a how to install a biogas duster on your own, what—how to do a site inspection to install solar PV, and we have a wide variety of these as well. We've also—we recently added some resources for educators, for teachers looking to integrate renewable energy into their curriculum. Right now, we have about 20 resources but are in the process of creating a new database which will have approximately 150 of these resources. And again, these are all offered in a multitude of language, and includes everything from tool kits for activities and lesson plans.

We also provide information on the IRENA Scholarship Programme. The scholarship programme accepts 20 students annually into the Master Institute of Science and Technology in Abu Dhabi, and the students of this programme receive access to IRENA events that they are able to attend our assembly and even work [inaudible] [00:14:13] energy summit as well as our council meetings. They also partake in an IRENA lecture series offered by experts in renewable energy sector. The scholarship provides full tuition coverage and as well as housing—sorry, as well the accommodation. If you want to find out more information about IRENA Scholarship Programme, you find it on the website as well. We also recently added a career centre.

Sean Esterly

Stephanie, sorry to interrupt. We can only see its—for some reason, cutting off to the very right side and the very bottom of your slide. It's just off center instead of—the slide's not centered on the GoToWebinar page. I'm not sure...

Stephanie P. Can you see?

Sean Esterly Yeah, try—it moved over then. Try going back to the slideshow and we’ll see if fixes itself. I’m not sure what’s doing that.

Stephanie P. It’s appearing completely on my screen.

Sean Esterly Because right now it’s showing up like it should but when you go to the sideshow, for some reason it’s moving over and down a little bit. Another option we could Heather run it and that could eliminate the problem.

Nicolas Fichaux Hit the screen and you can start to...

Stephanie P. Okay. Maybe I can just restart my screen here.

Nicolas Fichaux And start and then [inaudible] [00:15:44].

Stephanie P. Okay. Sean, I’m sorry. I can’t seem to figure out what the issue is.

Sean Esterly Okay. Why don’t we have Heather run it and we’ll if that fixes it.

Stephanie P. Okay. Sure.

Sean Esterly And that does seem better. Yeah, it was cutting off a significant portion of your slide; we definitely want to be sure people can see those.

Stephanie P. Okay, great. Sorry about that.

Sean Esterly Oh, that’s all right.

Stephanie P. So—okay. Should I go ahead?

Sean Esterly Yes, go ahead.

Stephanie P. Okay, great. Sorry. We recently added a Career Centre to the IRELP website and this includes several different career resources. We have our Renewable Energy Internship Database, we have some career guidance on where to start a renewable energy job search when you apply for a job, we have some jobs and skills reports as well as career profiles, and interesting career testimony, most of some leading people working in the renewable energy sector.

For the internship database, you can narrow down your search to sector again similar to the courses database. You can search by location and we really offer a wide variety of internships for everything from working in renewable energy marketing to doing renewable energy research.

We also offer jobs and skills reports which are forecasting where renewable energy jobs are going to be in the future. And what sort of trends are—what sort of skills are really being demanded by the sector.

And these are interesting if you're really looking into getting into the sector, you might want to know where those jobs prospects are. While we don't actually list renewable energy jobs on the IRELP site, what we do offer a collection of renewable energy jobs sites where you can go and then start your job search. We have over 40 websites and now they've been identified and they are categorized by region, so this is a great place to just start your job search.

If you're interested in some of the resources that IRELP offers, you can register for our weekly newsletter. You can do this on home page; you'll see a box that says, "subscribe to IRELP newsletter". And this newsletter will show up coming course as well as webinars and recently added internship opportunities.

We are also working on another project which will be launched at the end of this month but it—the idea came about because we were seeing some interesting trends in the data that we have on IRELP about where course in renewable energy are located. We can see from these two maps that we have a huge number of course in Europe compared to a very few in Africa, we have 5% courses in Africa and 36% in Europe. We're also seeing this trend; we were receiving lots of queries from people interested in developing renewable energy education and looking for assistance in curriculum development. In the world that—we really saw that IRELP and IRENA could play—was in helping to facilitate discussions between these people seeking guidance in curriculum development with those that to have experience in this field.

So we thought to create a public space for this exchange of best practices and experiences. And as we started to do this, we realized that we could have an open space for dialogue such as this and peer-to-peer engagement that could be something much broader than just curriculum development. We planned to launch an IRELP Community and it will allow for discussion on a broad range of topics and—Heather, maybe you can go to the next slide. You can see that the community will look something like this and we'll have space for discussion on everything from policy, and finance, and entrepreneurship to education, capacity building, technology, innovation, and sustainability. We hope that you will stay connected with IRELP and that we can see you on our community and engage. So that's all from my side and I will hand it over to Nicolas. Heather, would you be able to upload the presentation for Nicolas that has been sent?

Heather

It just arrived. So if you could—Sean, if you could take a question or two for Stephanie. I'll get Nicolas' presentation up and ready.

Sean Esterly

Sure, definitely. Stephanie, how can one join the IRELP Global Network?

Stephanie P.

That's a good question. You can send either an email to me, which is on the last slide here or you can email info@irelp.org. What we request is that those interested in joining send their CV as well as a statement of interest,

which could be between 300 and 500 words, just saying why they're interested in participating with us.

Sean Esterly Okay. Great. And what sort of internship opportunities are available through IRELP?

Stephanie P. We offer a wide range of internships. As I was mentioning, we have everything from internships in communication, in marketing, journalism related to renewable energy, all of which—those really technology focused off some more in research for our project design and development.

Sean Esterly Great. And I do have a few more questions but Heather just signaled that she's ready. Why don't we go back to Nicolas?

Stephanie P. Okay.

Sean Esterly Nicolas, go ahead whenever you're ready.

Nicolas Fichaux I'm ready. Hello. Thanks to everyone that is connected to the webinar to listen to us and to participate to this session. I'm Nicolas Fichaux; I work for IRENA management group. I work as a program officer and I will make a presentation on the Educational and Skill Needs in this sector. And in particular, what I would like to address in this presentation not only what we know but what we don't know about this skills need. I think that's an interesting topic for this time. Could you go to the next slide?

As you may know, already the renewable energy sector is—it's really dynamic and it is a sector that is expanding very rapidly. For a long time it was difficult to get an estimate of the number of jobs that are in the sector and there have been several studies, ongoing, in order to capture this socioeconomic effect of renewable energy. Renewable energy is what we're known for because it provides clean energy to the energy needs and for decarbonization. It has been pushed a lot for the climate discussion, but also more and more the governance on clean side effects and side benefits. If they out one [inaudible] [00:25:08] or \$1 into investing renewable energy what happens for the citizens and for their [inaudible] [00:25:17].

Today from the estimates of IRENA which we have already 5.7 million people that are working in renewable energy and it's a figure that is growing every day. Of course, since the growth of renewable energy is very strong, in order to go for it we find a new sector and in some location are between 20% per year, 30% per year and in the solar heating and cooling sector in some countries we noticed and we witnessed go for 100% a year or doubling of the capacity in one year. It's a sector that is very intense and moving very fast and in many places in the world, having no technology from any resources we noticed and we witnessed a gap in the supply of worker for the sector. This is something that is has been advertised, of course, in particular the wind energy organization in New

York is providing member in a regular basis and they are providing the forecast not only for the capacity and the market growth but also for the shortage of workers that they should notice in the sector. In their case, it's the people who are both in off shore and on shore energy. It's noticeable that in this sector there are shortages of workers.

They're having some attempts in order to quantify and to understand which parts of the supply chain or in which part of the sector; we would notice these kind of gaps now and in the future. We have found an analysis by the International Labor Organization program. You can see there is that most of the jobs we are talking about are qualified jobs that require some time in order to train the persons, for this person have the necessary skills to work under the sector. What we notice also is that the skills that we are talking about are sometimes transferred. Also, what is happening is that in case many renewable energy domains, we have the people—we find—we have people coming from elsewhere. In the past, in the last ten years we have to say that there has not been a lot of renewable energy [inaudible] [00:28:02] dedicated to learning about renewable energy so most of the people working in the sector today are coming from excellent [inaudible] [00:28:09].

Sean Esterly

Apologies. We seem to be having some technical difficulties with our presenter's audio. Let's see if we can get them back on the line. All right. Stephanie and Nicolas, if you can hear us, you cut out there for a second. Hi attendees, I apologize for the technical difficulties. We will be silent for just a second but I'm going to try to work out the audio issues that we're having with our panelists.

Nicolas Fichaux

Am I—hello?

Sean Esterly

Nicholas? Hi. Yes.

Nicolas Fichaux

I think they're [inaudible] [00:29:16].

Sean Esterly

We can hear you again. It cut out for a moment there but we can hear fine again.

Nicolas Fichaux

Very good. Can I go to the next slide, Heather? Okay. We've—we are trying to track a little bit the dynamics of the training capacities worldwide. As Stephanie has shown you, I work as its communication so we may not capture everything about the training sectors is—or the education sector is providing in renewable energy, what I have is sort of snapshot of the situation. What we see is that the education capabilities are very reactive and they are following the market. What we see is that there is always a gap on the education sector as always, a little bit lagging behind to the rest of the sector. Now it is a problem for renewable energy in particular because it's very dynamic market and you can't have a shift in global market from we continue to another [inaudible] [00:30:24] depending on what policy is in place. There is really a need for the sector

itself just to [inaudible] [00:30:33] of course and what we must to look forward into the future stock capacity, and to look forward between the consequences and dedication in the system.

Here you can see—it's a small illustration of what I was saying. It's the frame that the market is reacting. Here it is about geothermal energy, so it's—as you can see on this map the geothermal energy education and training that are best located where geothermal energy has happened in the past and that's where they expect and competencies. And the problem is we have now is that we are looking forward; we are looking at 2020 and 2030. And we are looking at a very strong growth of all the renewable energy sectors and also geothermal energy. And we know that there are resources of geothermal energy in East Africa, and there are many programs focusing on geothermal energy in East Africa with [inaudible] [00:31:38] we are looking into that. We are looking also at geothermal energy in the [inaudible] [00:31:44] region and what we see is that apparently there is a lack of training in education geothermal energy in the sector. The consequence of that is that when the sector will grow and when the policies will be in place, and [inaudible] [00:31:58] will be in place, one of the major bottlenecks will be to find people to actually [inaudible] [00:32:04] the plants.

I was one—I was mentioning a little bit before this education sector on the renewable energy sector is very reactive and very policy driven. This is an example that is a bit [inaudible] [00:32:26], it is the example of the PTC. The exemption tax credit for renewable energy in the United States. In the United States, very often you have, [inaudible] [00:32:39] which is provided [inaudible] [00:32:41] under the form of tax exemptions. This—at stake in one of the policies and the support scheme are usually stable and they provide some kind of baseline for supporting renewable energy. And the PTC is something that is really committed after a number of years. What we need per year every year, the PTC has recommitted and it's a discussion that is involving many politicians. What happens each time the PTCs discuss and what's supposed to be discuss is what the energy sector if there is any uncertainty on the collection of the PTC you'll find that all individual person are rushing in order to collect the projects to the US group as quickly as possible in order to benefit from the support team in case it would be suppressed.

And then what happens when the uncertainty continues is that there is no more development foreseen or [inaudible] [00:33:44] for renewable energy anymore. And then you have really a gap into the orders that the manufactures get for only two months. And what happens the consequence is on the next slide. Is that in the case of the US and for renewable energy, what happened in 2012 is that there were many companies that shutdown their facilities. It is not—the country's not will to go renewable energy or is pushing for renewable energy at all, it's not that the industry has yet to respond, it's not the capital or the policy, it's not the [inaudible] [00:34:24] but there is uncertainty in the policy and

therefore the owners [inaudible] [00:34:28] are not coming to the factories and the works are qualified and they are, and they're in the factories but the owner are not coming in so they get—it was major problem in 2012 in the US in particular for the wind sector in their case.

This policy drive is extremely important and basically what happens—what we see is that if it's a combination of many things. So when a country wants to go renewable energy market a number of elements need to be done. One of this is the vision, the long-term commitment of the country for growing renewable energy [inaudible] [00:35:09]. So they can move from plans, targets, and things in place and it leaves a very strong signal for the industry to respond to these future market and on the [inaudible] [00:35:22] work will be maintaining to invest in a specific country that has very clear and very ambitious talent. What we see also is that as soon as the policies have not been in place there will be immediately a program—the question of the workforce. Where all people that should work in the sector come from, should they come from another industry? Are they able to supply the skills that are fit and should we put in the place the necessary training skills? That's why couple of years ago IRENA came up with a goal that is providing an analysis from [inaudible] [00:36:00] a country that beginning to move towards renewable—country would be able to make the assessment of the skills and skills gap that are present in the country in order to plan ahead and to plan in advance.

So building renewable energy is not only planning in term of capacity and energy needs green integration but also it's also planning in terms of people, in terms of skills, and in terms of education. And that's what this [inaudible] [00:36:28] technology is providing for a country to make this kind of processing.

Now in the contract we look a little bit into the future and we are already talking about the skill gaps today in a very dynamic sector. And we try to focus and foresee what will happen into the future. In IRENA now we are collecting an exercise that is to provide scenarios for renewable energy growth until 2030. It is something that is coming from the initiative launched by the United Nations secretary general that is sustainable renewable energy for all. And in this sustainable energy for all initiative, there is one [inaudible] [00:37:18] that is doing the share of renewable energy in 2030. So what IRENA is doing it is looking at scenarios for 2030, looking at the baseline in 2010 that was 63 [inaudible] [00:37:35] of renewable energy that was produced globally. As you can see 2010 we are talking mostly about traditional biomass for 50% of the capacity of the energy produced already. We can see that heat is 3/4 of the energy that is consumed and only 1/4 is power and transport.

Now if we look at 2030 on the next slide. We are talking about a completely different split of renewable energy. We are talking about the doubling of the energy that is produced on renewable energy. We can see that heat is only half of its energy that is produced. Power is very

important so it's 1/3 of the energy electricity that is used. Overall, any power include a part of the transport sector and they should be a large [inaudible] [00:38:36] of the transport sector. And then you can that the split on the needs of renewable energy is completely different from what it is today. This scenarios if it takes shape has consequences not only in terms of policy—on investment of course, and that's what we are looking on now is breaking down the scenario and working with the consequences of the scenario. But it will have also an impact in terms of complement and jobs.

The question will be all these people that are supposed to work in biofuel transport, in biomass heat industry will move on biomass to replace traditional biomass, the question is where will all these people come from. As we saw is that we're expecting—you can go to the next slide. Yes. The consequence we see in terms of employment from this scenario, we foresee that we could have 17 million persons working in the renewable energy sector in 2030 from the baseline of only 6 million people. It will be I think half a million people to one million people every year working into the sector in addition. And the question is where will these people come from? Most of the jobs that we see today in the renewable energy sector, as I was saying before, are mostly skilled workers and a lot of this complement would come from technical proficiency.

We should basically look into where these technical person would come from. Then, we could go to the next slide. We are already talking about a gap into the number of technical persons that I were able to do in renewable energy sector. Part of this graph can be explained from the numbers we get. Basically, the lowest interest into technical professions that we can notice is in many of the OECD countries, which is not the case in other countries like India and China where we see that a lot of these of these degrees are in the technical professions. Probably, part of the graph we see today is a consequence of the lack of vocations into technical work. Can we go to the next slide?

We can see that basically what can happen in the future is that the technical professions of the person could reduce further into what is called here developed economies. In this sample from Accenture, they take on the US, UK and Japan. It is more or less what is happening at the developed OECD countries in general. We could forecast a lower number of what is called STEM person, technical persons working in OECD countries. What we can see however is that there could be in emerging economies a growing number of these technical persons that would probably work in the technical field. It may mean that part of the workforce that we would need in the future in the sector could come actually from these emerging economies. What we can see in the scenario is that Brazil, China and India, anyways places where we need more energy, would grow tremendously in the future. We expect that the training and the education system would follow in this emerging economies and we expect that a part of this talented technical persons

maybe trained in India, Brazil and China. Then, the question would be, could these persons be exported to all the markets where renewable energy would be growing and where the education system may not be following the trend? Then, it immediately becomes the question of the transfer of skills. If you have a diploma or degree that is very basic India, you are about to go and work in Africa. For the time being there is no harmonized curricula, no equivalent for education specific to the renewable energy sector. There are two questions, it's basically, where can the work force come for renewable energy to follow the very ambitious targets that we can have for this sector, and also if these person are coming from different place where the market is not—can this person be transferred to a new location.

For the time being there is no answer, no solutions. Also, I have been mentioning technical skills but what we see is that you need not only technicians but also all of the support person and the support skills in order to push all the sectors. Not only the technical person but also the person that are able to finance the project, that are able to understand a renewable energy project and understand the specifics of renewable energy project in terms of financing. Also, the persons that I are able to work on policy, that are able to work in education and in trainings. Thank you very much. As you see in this presentation, we are not bringing solutions but we will teach and highlight a few of the characteristics that we see in the educational sector relative to renewable energy. We see that there's a gap in what we know today about the educational system, but also a gap to what we could foresee in the future developing for the educational system. Thank you very much.

Sean

Thank you Nicolas and Stephanie for the presentation. Just a reminder to the audience, I had a few people ask if they can have access to the presentation. We do have copies of those posted at cleanenergysolutions.com/expert. I will send out a link for that again. Also, if anyone from the audience has any question, please submit those to the question pane of the GoToWebinar window. I did receive several questions from the audience so I'll go ahead and start with those. The first one is referring to IRELP, it asks, "What is the procedure of application to a PhD program?"

Stephanie P.

Yes, that's a good question. It really varies between programs. We don't actually offer that information on our website of the specific application processes of the different PhD programs. We do provide contact information so if you find a PhD program that you are interested in, you would need to contact that institution directly to find out what their application procedures are.

Sean Esterly

Thanks, Stephanie. The next question of one of the attendees, "We'd like to know more about IRENA's efforts and training and education in Egypt and if there's any representative there or any work going on there?"

Stephanie P. We do have a partner in the Middle East which is ECREEE and they do have their headquarters in Egypt so they do organize quite a bit of training and all of that is represented on the IREL P webpage in our database. But if you are interested specifically in training in the Middle East, ECREEE would be the place to go I would say.

Sean Esterly Thank you Stephanie. The next question asks if there's any requirement to be part of an internship, or maybe you could just talk about main requirements for those?

Stephanie P. For internships on IREL P or specifically with IRENA?

Sean Esterly They didn't specify. May we talk about both or in general?

Stephanie P. Sure. In general, for an internship program, most of the ones that we have on IREL P would require that you have a high school diploma but not that you've finished university. Some of the requests stipulate that it can only be students so you must be enrolled in an undergraduate or master's program. But it really again varies from internship to internship, but that information is provided on IREL P. If you find something, an internship that you're interested in, that would all be provided there. For an internship in renewable energy, definitely you don't have to have a lot of experience. Internships are a great opportunity to get your foot in the door to start your career in this sector so don't feel that you necessarily need to have a lot on your CV related to renewable energy. It's expected that when you start an internship that you would be new to the sector and maybe not have a lot of experience.

Sean Esterly Great. Stephanie, this next question goes right along with what you're just saying about internships being a great way to get your foot in the door. It notes that IREL P jobs often have a minimum of seven years' work experience requirement so it becomes difficult for people fresh out of a master's program to apply. Do you have any suggestions for other ways to gain that experience?

Stephanie P. Definitely when a job says that you need to have seven years' experience that would be working experience. It is difficult coming out of the master's definitely trying to get a job right away. A great way again, is to go for an internship. It's not only a good way to test out the career, maybe you're not so sure which area you want to work in, which sector you want to work in, so that's a good way to test out a job without having to make a huge time commitment. Also, it's a really good way to show a company what you can do, that you're capable of moving up and internship may turn into a full time position. Another way to gain experience if you don't have a degree necessarily related to renewable energy, you might consider talking a short course that would then give you some sort of edge when applying for a job to show that you really are interested in this sector and that you do have some correct knowledge. That would be what I would recommend.

- Sean Esterly** Thank you Stephanie. The next question right here asks how much of the cost could do in MSc in Renewable Energy and is that accredited under the UK specifically?
- Stephanie P.** We have a lot of different MSc programs on IRELP. Again, it varies a lot in terms of cost. We do provide that information where it's available. If this person is interested specifically in Europe, you'll find many, many schools that offer scholarships and grants particularly to these programs. In certain cases they will be fully funded particularly at the master's level. Others can be slightly more expensive if you're coming from outside of Europe and you're interested in studying in Europe. Again, it really varies between programs.
- Sean Esterly** Great. The next question is little more general so maybe we could just talk briefly on it. It asks, "how can IRENA have more of an effect or impact on developed countries?" That might be...
- Stephanie P.** The question was how can IRENA have more of an impact on developed countries?
- Sean Esterly** Yeah. They didn't specify but you might want to talk about that in regards to the education sector for that.
- Nicolas Fichaux** It depends on what you mean by impact honestly. In terms of membership, IRENA has 130 countries that are members of the organization which is in concrete terms that everything we'll do in IRENA is developed through our work program. This work program is basically discussed, negotiated and shared with each of these countries. The only task and only activity we have are basically coming from our membership. What we do is that we reported every year to all of these 130 countries in what we have done. What is one of the specific of this organization is that in most of the programs that we have, we work directly with the countries. We do have programs where we would have both developed and developing countries that would come together for a specific topic. In my case on resource mapping we have 67 countries that come together and that have a joint interest in working on mapping the renewable energy resources. That's how we interact with the countries. It's a long project, there's long activities and the reach of this project or activities becomes a platform where the countries can share their experience and go in developing renewable energy.
- Sean Esterly** Great. Thank you, Nicolas. In the next question from the audience asks, "If you have a question are or any other tools or method to evaluate the actual scale of an individual, in what lacks that needs to be acquired for additional learning skills?"
- Stephanie P.** That's a very good question, but currently we don't have anything for someone to try and assess their skills. But that's a good point.

- Nicolas Fichaux** It's a very difficult question. For offshore wind energy, you have this initiative in Europe called the Windskill and they try to do that so that the purpose of the exercise was to have a workforce that could be transferable within the sector. They are looking at having in particular installation and environmentalist people on offshore wind energy that they could transfer from country to country and from company to company also. Only for that, it has been un-thought for two or three years in order to develop this kind of question. It is correct to say that in the renewable energy sector, this, in short, to assess which skills are needed for each renewable energy technology at which stage is very embryonic for the moment. It's one of the gap of the sector to know exactly what other skills they need for specific tasks.
- Sean Esterly** Thank you, Nicolas. The next question is similar to the one about Egypt it asks, "Does IRENA has been in training with their partners in Africa to scale up skills specifically Western Africa?"
- Stephanie P.** Yes, IRELP specifically does work with one organization in West Africa, the ECOWAS Centre for Renewable Energy and Energy Efficiency called ECREEE. IRENA does also have another ongoing program or project in West Africa called ProSPER, which aims to enable entrepreneurs interested in developing renewable energy projects specifically for PV.
- Sean Esterly** Great. Thank you, Stephanie. Does IRENA have a specific program dedicated to a training center and program accreditation and certification?
- Stephanie P.** No, we don't currently.
- Sean Esterly** One of our attendees note that they want to acquire a better knowledge on renewable energy in United Arab Emirates, especially in desert areas and they need to learn how to tassel energy in those areas. Do you have any recommendations or suggestions on how IRENA can help them learn more?
- Stephanie P.** Are they looking specifically for a course, or they are looking for some reports or information on renewable energy in this region?
- Sean Esterly** I think in relevance to our topic, if there's any courses that you'd recommend like on our database or a source of—to apply for.
- Stephanie P.** Sure. Within the UAE, there isn't too much, to be honest. There are some university level course but you won't find too much that's just specific to solar but there are several engineering programs offered here. The best way to find those would be to go to our course's database and you can search by country so you can see what's existing here but I can tell you off hand that there isn't a lot in terms of short-term education.
- Nicolas Fichaux** As far as for education course, but in terms of knowledge center, if you're question is about evaluating the resource or developing the technology

there are a few knowledge center because the—in England, GCC and in UAE in particular, there is a very strong development and very strong forecast for solar concentrator and PV. You will find these knowledge centers; in UAE you have the Masdar Institute for Science and Technology. Those are more of our neighbors so we know what they are doing. Also in Dubai, they are developing computer center on solar. You will find, if you're looking at the GCC region very surprisingly for those that are not familiar with this region, you will find a lot of enthusiasm for renewable energy and quite a lot of research centers are working on solar. You may not find a course formally, that's correct. However, you may find a PhD or you might find that there are many assistance or they may have already done quite a lot of work on either the technology or the resource in particular in desert environment which at least to be a bit specific.

Sean Esterly

Great, thank you both. What type of engineering is most needed to enter this sector?

Stephanie P.

That's a good question. All types of engineers are needed really across the board. Everything from mechanical engineers, civil engineers, electrical engineers, computer engineers. There's certainly a demand for all of these. I can't say for sure which would be the most in demand, but those are definitely the four areas that I can think of that we will see a strong demand for. There are also many—there are sub-types of engineering that are in demand as well like aeronautical engineering for designing wind turbines, and so there are lots of these really specialized engineering fields that will also be in demand.

Sean Esterly

Thank you, Stephanie. In the next question, let me read through it and I can repeat any parts if you need me to. Note that the ECOWAS center for renewable energy and energy efficiency based in Cape Verde. It's supporting a national training center for renewable energy and energy efficiency to become a regional training center for the ECOWAS region. Nicolas mentioned in his presentation that there is a need for uniform curricula for RE training, how can I IRENA support a center like the center for renewable energy and energy efficiency in developing that uniform curricula?

Nicolas Fichaux

That's a really good question. ECREEE is one of the regional centers, partner with IRENA. We have very strong ties with [inaudible] [01:01:54]. We are working on such curricula on PV in the [inaudible] [01:02:09] in the ECOWAS region. I believe that over time, we will build the necessary ties to do this kind of thing. Already on the ECOWAS region there are a number of competent center that grew overtime and you have quite a lot of teams that are on the ground and looking into renewable. The role of ECREEE there is indeed from the notary it is very clear they are building on the existing capacity and they are networking everything that is happening in the region. A lot has been done in the past and a lot is still happening there and this is basically a big task for ECREEE to do.

Sean Esterly

Thank you, Nicolas. The next question asks how country can join IRENA and within that have you thought about the inclusion of developing oil-exporting countries or petrol is so cheap as application of green energy technologies almost seemed impossible? They raised Venezuela as an example for that.

Nicolas Fichaux

That's good one. To join IRENA, a country has to directly notify IRENA that they would like to join the organization. Then they would be signatories of our statute, the statute of IRENA is very good instrument that you need to deposit. Then you need to notify this statute at the legislative level so it can be the assembly of the congress. You need to have that voted. Then, the country can become a member of the organization. It takes a little time. We do have in the membership of IRENA quite a lot of oil-exporting countries already which is indeed extending interest in the dynamics of—so these countries are, most of them, are interested and committed already to grow renewable energy. They do have long-term plans, and some of them, very massive plan for growing renewable energy. But the dynamics are a bit different from the traditional or original countries that's got to do with the process. What you can see in countries like Saudi Arabia for example has come up with a very ambitious plan for solar, but also geothermal and a little bit of wind. They are working very seriously on investing to this technology for similar reason. One reason is that their internal energy demand is growing inside the country and they are using oil for generating the energy they need, not only for electricity but also, in this case, for water desalination which is energy intensive. They looked at the economics and basically what they see is that either the demand continues to grow, Saudi Arabia could have problems in continuing to export energy because then the energy demand would be so big that it would consume significant part of what is extracted from the ground. In reality, when you see the price of oil in the international market, then you have directly a benefit in lowering your internal demand in one way or in another way, in order to continue exporting and using a cheaper energy source that will—in particular for solar, when we saw that the cost have decreased so much. Now, solar can be so competitive depending on your energy needs. Basically, what happens, that Saudi Arabia made the match and they came up with the plan where they said we will integrate, I think it's 50, to go at solar which is at 70 if they can. Not only that, but there are looking into creating a supply chain, because they are not looking at benefiting from lower energy price and it's profiting lowering their internal consumption of oil. But also, creating employment for their own citizens. The dynamics of the growing renewable energy or the reason why it is happening are different from Europe for example but the result is the same and the commitment. If you look at the GCC countries which are thinking of the traditional on all countries, you look at the GCC counties and you see that most of them have renewable energy target of some kind or on look out. There's the energy demand and there is also the winds to create a supply challenge to

create employment. That's the factors we can find, depending on the country, the specific countries.

Sean Esterly

Thank you for that answer, Nicolas. The next question from the audience is from someone who knows that they have multiple years, seven years' experience in utility and they want to make a switch to clean energy but they don't have any experience in the renewable energy sector. What career pathway or what options would you suggest and is there any way that IRENA could help with that switch?

Stephanie P.

Yeah. I think definitely when someone's looking into a career change, a good way to enter the sector should be to take some short courses to refresh their skills, this is called the upskilling. It doesn't necessarily mean that you have to go back and do an undergraduate or a master's degree, but it could be some short term course that would really give you a broad introduction to the sector and give you sort of more insight to what it happening currently. Then it also enable you to see how you could transfer the skills that you've developed over these seven years effectively into the renewable energy sector. You will find jobs though in renewable energy that may not require that you have previous experience in this sector so depending on what job this person does specifically and you may be able to find a job without doing some of this upskilling.

Sean Esterly

Great, thank you Stephanie. Sort of along the same line, one of our attendees is wondering how IRENA could help them get more experience in that specific sector. They mentioned liquid biofuels, but how could IRENA help someone get experience in any very specific sector for renewable energy?

Stephanie P.

Yeah, for sure if one's interested in biofuels, that's something that you could use IRELP for to search what courses are available, wherever they are located. As I mentioned earlier, webinars are also a great way, it's just more of a general interest if you want to know more about it. You can find, I know, for a fact we have lots on biofuels in our database, so that's also a great way to get some information. Yet, if they're really looking to be trained in this area then they can search within our database.

Sean Esterly

Great. The next question notes that one of our attendees can't find any renewable energy job sites specifically for India. Is there any suggestions for that or any way that IRENA helps with the actual job search?

Stephanie P.

That's a good question. We do have some job sites on our website as I mentioned earlier, we have about more than 40. Some of these are global renewable energy job sites, so you can look all over the world and then some are divided by region. We don't have, I think, one that's just specific to India but we are posting internships definitely that are in India so probably the best route would either be definitely look at IRELP and see what's there, then also to use maybe one of these more global job sites like

indeed.com or the idealist either to good job sites that are global and definitely have lots of renewable energy jobs.

Sean Esterly

Great. Thanks again and that was the last question that I have received from the audience. I appreciate taking the time to address those questions and at this point, before we move onto the survey to audience, I just like to give Stephanie and Nicolas, both of you the chance for any closing remarks or final statements that you'd like to make. Stephanie, why don't we start with you if you have anything you'd like to add?

Stephanie P.

No, I don't think I had anything to add but just thank you very much to you Sean and Heather and to the Clean Energy Solutions Center for organizing this webinar and it's been very good.

Nicolas Fichaux

Yeah, maybe what came to my mind when we—that the best one from the utility was asking for how to switch to renewable energy in his career. I must say that the more we work on renewable energy and the more I find that this sector is primarily an energy sector. Indeed there are specifics to renewable energy and maybe that's what the person could concentrate on. But when we are talking to the coordinators that are working in their sector, there are similarities into what we are doing. The way to approach things is a bit different because we are talking about renewable energy reserves that never stop and we are talking about all the reserves that are finite of course. But in the way to approach the energy production and energy consumption, that there are similarities. It's not completely different at all. We are still looking on a lot of renewable energy and since the renewable energy sector is doing so much, what we expect is that there might be a need for skills from the traditional and changes to work in these sector that is like becoming a semi-professional compared to what it was 15 years ago. Semi-professional, and we are now talking about an energy sector. That's the main difference from what it was a decade ago.

Sean Esterly

All right. Thank you, Nicolas. Thank you, Stephanie. Thank you both of you again for the presentation and great question and answer sessions. Now, we would like to just ask our audience to take a minute to answer a quick survey on the webinar of you today. We have three short questions for you to answer that you can answer right there on your computer. Your feedback is very important to us and allows us to know what we're doing well and where we can improve. Heather, you can display the first question. That is, the webinar content provided me with useful information and insight. The next question, please. The webinar's presenters were effective. And then the final question for you to answer. Overall, the Webinar met my expectations. Great. Thank you for answering our survey. On behalf of the Clean Energy Solutions Center, I'd like to extend our thank you to our expert panelists and to our attendees for participating in today's webinar. We very appreciate your time and I invite our attendees to check the Solutions Center website over the next few weeks. If you'd like to listen to a recording of today's presentation as well as any previously held webinars. PDF versions of the presentations are available

at the website currently. Additionally, you will find information on any upcoming webinars and other trainings and events offered to on the Clean Energy Solutions Center. Please, we invite you to inform your colleagues and those in your networks about Solutions Center Resources and Services including the no-cost policy support. We hope everyone has a great rest of the day and we hope to see you again at future Clean Energy Solutions Center event, and this concludes our webinar.

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