

The Global Renewables Energy Transformation: What is holding us back?

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Webinar Panelists

Rana Adib Renewable Energy Policy Network for the 21st Century (REN21)

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Katie

Hello everyone. I'm Katie Contos and welcome to today's webinar which is hosted by the Clean Energy Solution Center in Partnership with the Renewable Energy Policy Network for the 21st Century. Today's webinar is focused on the global renewable energy transformation. What is holding us back? Before we begin I'll quickly go over some of the webinar features. For audio, you have two options. You may either listen through your computer or over your telephone.

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Today's agenda is centered around the presentation from our guest panelist, Rana Adib who has joined us to discuss an interview of REN21's newly released renewable 2018 global status report. Before we jump into the presentations I'll provide a quick overview of the Clean Energy Solution Center. Then following the panelist presentation we'll have a question and answer session where Rana will suggest questions submitted by the audience. At the end of the webinar you'll be automatically prompted to fill out a brief survey as well. So, thank you in advance for taking a moment to respond.

The Solution Center was launched in 2011 under the Clean Energy Ministerial. The Clean Energy Ministerial is a high level global forum to promote policies and programs that advance clean energy technology to share lessons learned and best practices and to encourage the transition to a global clean energy economy. 24 countries and the European Commission are members contributing to 90 per cent of clean energy investment and responsible for 75 per cent of the global greenhouse gas emissions.

This webinar is provided by the Clean Energy Solution Center which focuses on helping the government policy makers design and adopt policies and programs that support the deployment of clean energy technologies. This is accomplished through support in crafting and implementing policies related to energy access, no cost expert policy assistance and peer to peer learning and training tools such as this webinar. The Clean Energy Solution Center is sponsored by the governments of Australia, Sweden and the United States with in kind support of the government of Chile.

The Solution Center provides several clean energy policy programs and services including a team of over 60 global experts that can provide remote and in person technical assistance to governments and government supported institutions, no cost virtual webinar trainings on a variety of clean energy topics, partnership building with development agencies and regional and global organizations to deliver support and online libraries containing over 5,500 clean energy policy related publications, tools, videos and other resources. Our primary audience is made up of clean energy policymakers and analysts from governments and technical organizations in all countries. But we also strive with to engage with private sector NGOs and civil society.

The Solution Center is an international initiative that works with more than 35 international partners across a suite of different programs. Several of the partners are listed above and include resource organizations like IRENA and IEA and programs like SE4All and regional focused entities such as ECOWAS Center for Renewable Energy and Energy Efficiency.

A marquee feature of the Solution Center provides a no cost expert policy assistance known as ask an expert. The Ask an Expert service matches policy makers with more than 60 global selected experts—excuse me. 60 global experts selected as authoritative leaders on specific clean energy finance and policy topics. For example, in the area of energy access we are very pleased to have Alexander _____, CEO of SD strategies serving as one of our experts. If you need a policy assistance in energy access or any other clean energy sector, we encourage you to use this valuable service. Again, this

assistance is provided free of charge. If you have a question for our experts please submit it through our online, our simple online form at cleanenergysolutions.org/expert. We also invite you to spread the word about the service in your networks and organizations.

Now I'd like to provide a brief introduction for today's speaker. Today's speaker is Rana Adib, the executive secretary of renewable energy policy network for the 21st century which is REN21. Previously Rana was REN21's research coordinator developing the international expert community and leading the REN21 renewable global status report series to become an international reference. She has over 20 years of experience in international sector and we're glad to have her as our expert panelist today. And with that brief introduction, I'd like to welcome Rana to the webinar. Rana? And it looks like your mic is still on mute.

Rana

Oh yes. Excuse me. Thank you very much Katie for the introduction and also for the opportunity to present the renewables global status report. Hello everybody. Good morning. Good day. Good evening. I'm very excited. I hear that you have many people on the other side of the screens and I came here to present you the results of the renewable 2018 global status report which REN21 is producing every year actually to show the advancement. So, we have renewable energy and which we have launched internationally yesterday with different events worldwide.

Now before starting to present what the global sector report tells us about renewable energy I would quickly like to introduce to you what REN21 is so REN21 the Renewable Energy Policy Network for the 21st Century is a global multi stakeholder network which is dedicated to the rapid uptake of renewable energy worldwide. We do speak about ourselves as a coalition of the willing and we bring together different types of organizations so international organizations, national governments, industry associations. NGOs and science academia. And this multi stakeholder approach is really something which is I guess the blood and the heart of REN21 in this respect very much in all our activities.

One activity which is basically our flagship activity is the renewables global status report. And this multi stakeholder approach and this collaborative approach is also affected very much in the way we are producing this report. The objective of the report is to report annually about the status of renewable energy worldwide without doing basically analysis or output which really where do we spend. And obviously where we spend in terms of reaching the energy position of renewable energy. The production is building on a community of international experts. There are more than 900 international experts participating in the global status report. And they can participate as yeah, partly authors which are contributors, reviewers and anybody who would be participating and would want to participate is really invited to contact us. There are many opportunities.

In the report we are looking at all renewable energy technologies and all energy sectors so power, heating, cooling and transport. Considering the fact that renewable energy without energy efficiency will not happen when we are

really talking about the conditions. We also have a chapter on energy efficiency where we are specifically looking at the interfaces between renewable and energy efficiency. And we also have a specific chapter on energy access so distribute renewable energy for energy access so really how do we also reach not only Paris goals but the SDG7. Considering the fact that renewable energy is revolving a lot. So, this year for the second year in a row we have started developing a chapter on energy systems integration and _____ technologies.

Now looking at 2017 the good message is we really have again an expert in every area for renewable energy. In particular in the power sector because there have been record installations in renewable power capacity which are the highest ever. And the total global capacity has what's basically nine per cent compared to 2016 reaching installed capacity of 2,195 gigawatts including launched hydro. Now this is really something which is extremely positive because we see that renewable energy today is cost competitive and this has been the main driver actually for this renewable energy uptake.

It is very clear however that the uptake in renewables has really been mainly by two technologies in particular. Solar PV was accountable for 55 per cent of the newly installed capacity and wind which accounted for 29 per cent. There is however obviously also hydropower which counted for 11 per cent and biopower for 4.6 per cent. We already see these technologies here are all renewable energy or renewable power technologies. So, there is the first indicators.

Now when we're looking into this also in terms of investment there are very good news on renewable uptake in 2017 because global new investment and renewable power and fuels has risen again by two per cent compared to 2016. Reaching \$280 billion US dollars and \$320 billion US dollars including large hydro. So, that's very good news because the investments have increased even though costs have continued to get down. So, this also means that in relation there is more installed capacity.

Now when we are looking here at the bar chart basically we'll see that in this dark red, this is China and China is clearly regionally the driver for the renewable investment very much. When you see the dark orange, this is developing and emerging companies. And again, for the third year in a row developing and emerging companies have been surpassing basically investment in developed economies.

Now what is very interesting to see, and that's really good news that today renewable energy accounted for 68 per cent of total amount of renewable new power generating capacities which means we are reaching the situation that where the power capacity was roughly three times higher than new fossil fuel capacities and more than twice the investment in fossil fuel and nuclear combined. This is a very clear indication that renewable energy power today is cost competitive.

And there are basically two tipping points we typically speak about. The first tipping point is the cost competitiveness when we're comparing renewable

energy power to new installed capacity from fossil fuel and nuclear. And in many regions or in an increasing number of countries we're getting towards the second tipping point which is even more cost competitive to invest in new renewable power capacities than operating existing fossil fuel capacities. And that's really something which will have a major impact during the next couple of years on the development.

When we're looking at the total final energy consumption in 2016 and here we have 2016 data because there is no more recent data available. Its building on IEA world energy statistics. Renewable energy provided 18.2 per cent of the global final energy consumption. A good information or a good development is that modern renewables which we're aiming for has provided 10.4 per cent and was basically a slight increase compared to 2015 of 0.2 per cent. Traditional biomass represents 7.8 per cent and this was a decrease of 2.4 per cent compared to 2015.

Why this is good news? It's good news because when we're talking about traditional biomass we're talking about biomass which is basically burned in an inefficient way or very often in developing countries for heating and cooking in open fires. And these have major health impacts but also environmental impacts. And the objective here is really to increase efficiency of these installations. So, having increased cooking stoves and with this would be the traditional biomass part into the modern biomass category. So, it's very good information that traditional biomass has dropped. The chance obviously is that the overall renewable energy share by this is decreasing but efficiency increased so that's good news.

Let's look at the power sector and this is really the sector where renewable uptake has been the most dominant and visible. In 2017, renewables accounted for 70 per cent of net additions to global power generation capacity. And they provided 26.5 per cent of global electricity demand with hydro power with 16.4 per cent, wind power 5.6, biopower 2.2 per cent, solar PV 1.9 and ocean CSP and geothermal power 0.4 per cent. This progress is a very good indicator. It shows that the transition to renewable energy is possible and we should really build on this positive message because it can be also replicated in other sectors.

When we are looking into the global power capacity you see here the uptake and reaching 2,195 gigawatts of installed capacities in 2017. And here again you see that the main drivers have clearly been wind and especially photovoltaics. Let's have a look at solar PV. So, solar PV was 98 gigawatts of solar PV capacity have been added in 2017. And this was an increase over 2016 of 33 per cent and this is really a major uptake especially as it's following already a couple of years where we have very important growth rates.

It's also important to keep in mind that we're talking here about gigawatts, gigawatt hours, etcetera. This is one parameter. The other parameter is for example that this installed capacity represents 40,000 PV panels every hour. And this means obviously creation of jobs, creation of economics, etcetera which is also very, a very important point to take into account when we're

talking about this renewable energy transition. On solar PV itself we had more installed capacities compared to the next capacity additions of fossil fuel and nuclear power combined. So, that's very indicative.

Obviously, China is really a main driver, has been a main driver in 2017 with 53.1 gigawatt hours. And just to keep in mind or put it in relation, these 53 gigawatts corresponded to more gigawatts to a higher capacity than capacity added worldwide in 2015. As a result, China has reached basically its targets which they had set for 2020 for solar installations already in 2017. The leading countries are the US, Japan, India and the rest of the world plus then the next six countries are Turkey, Germany, Australia, republic of Korea, United Kingdom and Brazil.

Let's move to the other technology which has driven basically the uptake. That's wind power. 52 gigawatts of wind power capacity were added in 2017 increasing global total growth compared to 2015 of 11 per cent, reaching total installed capacity of 539 gigawatts. Again, China has lead position for wind adding nearly almost 20 gigawatts and reaching a total of 188 gigawatts. What is interesting in the wind sector is very clearly the developments we also see in the offshore wind sector. So, onshore winds clearly represent the majority of installed capacity for winds. But in the offshore wind sector, there was an increase of 30 per cent in the capacities compared to 2016. So, we see a very dynamic market.

How does this reflect when you're looking at the power grids? So, this is another good news for the power sector. The electricity grids are able to integrate high shares of variable renewable energy. So, when we say variable renewable energy we're referring to photovoltaic, solar PV and wind power because their projection can vary depending on the sunshine or the _____. Now in Denmark we have reached a share of variable renewable energy which is over 55 per cent. And we have countries which are more around 30 per cent like Uruguay, Germany, Ireland, Portugal and then followed by Spain, United Kingdom, Greece, Honduras and Nicaragua. And that's very, really very good news because even a couple of years ago and still in some countries there are—there is still this myth that it is not possible to integrate high share of variable renewable energy.

That's one aspect. And we see here these countries really show that it is possible, flexible. These solutions do exist. The other good news and I think it's important to be mentioned in Honduras and Nicaragua is that this is also possible in developing countries. It's not only a reality in industrialized countries. It's also important to keep in mind that these countries all have days where they were reaching even higher shares of variable renewables, up to 80 per cent or 90 per cent, etcetera. So, renewable energy transition is possible.

Now we're coming to the section where we have less positive messages but let's keep the good messages of the power sector in mind because we can try to replicate them. Sorry. I went too quickly. Let me go back. Ok. In the heating and cooling sector unfortunately, the renewable energy share is much lower. So, modern renewable energy share represents a 10.3 per cent of the

total final energy consumption. And the climate of renewable technologies in heating and cooling is so slow. Biomass has been the main contributor. So, you see here biomass basically in heat and in buildings. So, when we say buildings we have buildings and residential. Then in heating industry we still have a share of 6.1 per cent. _____ electricity so let's look at the two left bars. What you see here in the heat in the residential area is that traditional biomass represents 21.8 per cent in the heat sector. And this is really something which will for any _____ cooking part. So, it's a reduction but there is still a ways to go.

Now what are the challenges in the heating and cooling sector? In 2017, they have compared quite low fossil fuel prices compared to previous years. And in the sector which is highly dependent on fossil fuels there are obviously low fossil fuel prices are challenging. But this challenge is even increased by the fact that there is a lack of policy support but also a lack of creating a level playing field for renewables in this high fossil fuel sector.

Maybe to mention a part of biomass there have been other renewables, in particular solar thermal and geothermal energy which have been developed. And in solar thermal we see an interesting development which is also the development of solar thermal not only for low temperature and residential applications but more and more also the development for low and medium temperature applications.

The sector in the transport sector is unfortunately even more challenging than in the heating and cooling sector. Renewable energy only represents 3.1 per cent of the global total demand that comes in the transport sector. And the 3.1 per cent has mainly been provided by biofuels. In 2017 global biofuels production increased nearly 2.5 per cent to 143 billion liters. So, that's basically good news. I mean it's getting up but it's not getting up quickly enough. Another aspect is also that biofuel production and use is very concentrated geographically. So, over 80 per cent of the production takes place in the United States and Brazil and the European Union.

In the transport section we do see an interesting trend, and everybody speaks about this. The electrification trend. So, this electrification trend, the segues and in rail and in light rail where we really have the development of electric trains and light metros, etcetera and also a very active intake basically and development of renewable energy, renewable power in these sectors. The other development is clearly the electric vehicles on the road. And so, 2017 has been really impressive with regard to these electric vehicles on the road passed the 3 million mark in 2017 which is growth of 70 per cent. So, very, very dynamic. It is very important to keep in mind we are talking about only one per cent share of the light vehicle market, so we cannot say yet that this electric vehicle development is taking place everywhere.

Even though this is not the case, there is dynamics which really indicate that this capability for many reasons will take place more and more. Electric vehicles are much more cost efficient. They reduce emissions and have a local air pollution significantly and this is a big pressure in particular in cities. Obviously, they also have positive impact on the carbon footprint. From the

energy side, the electric vehicles do allow or do create a new market for renewable energy for power. But they also there are other synergies because they also have the integration of higher service of variable renewable energy. So, you can use the storage, the battery safety and the cost of storage. There are possible to offer services to the grid for balancing the grids. And really interesting innovation is taking place on this also, business models where digitalization obviously is advancing this.

Now you've seen that basically the development of renewable energy in 2017 has been quite different when we're looking in the different sectors and we really need to graph this disconnect. And why is that? When you're looking at the power sector on the right side on the slide you have the blue part which is electricity. So, electricity represents only 20 per cent of the total final energy use, only 20 per cent, whereas heating and cooling and transport represent 80 per cent. So, if we really want to make this position happen, like we want to meet Paris goals and sustainable development goals, we need to transform this electricity, renewable electricity transition into renewable energy transition.

Now I would like to come to the policies because it is very, the uptake of renewable energy in the power sector has been driven by long term policy support. And we see that stable, long term policies which allow for investors in the industry to really develop their market is something which has been fundamental and is still fundamental in the power sector. When we are looking now at the policies in the different sectors, we do see that power sectors who have much more policies basically. Here I will refer to the targets because they are easier to read. So, we had 179 countries with renewable energy targets. 146 countries had power targets. Only 42 countries had transport targets and 48 countries heating and cooling targets. And this really showed that one of the challenges in the heating, cooling and transport sector is a lack of policy, policies to basically for the uptake of renewable energy in the sector.

Interestingly, 2017 has really also—the last couple of years are already better. In 2017, we had 64 jurisdictions worldwide which had carbon pricing policies. And I'm mentioning this because for instance in the heating and cooling sector, carbon pricing is an addition measure which is really supporting the uptake of renewable energy. So, it's also important when you're looking at the other sectors, it's also important to start looking not only at pure renewable energy policies that have a greater approach. So, we see for instance building codes in the heating sector in residential which are technology neutral and which allow for basically energy efficient solutions but also renewable energy development. These are codes which can be a main driver. Carbon pricing policies and that's something where we'll certainly—we can expect a shift also of the policies.

Now I have mentioned sector coupling before and this sector coupling is something which is fundamental in the energy transition. And we see basically policies arising here on the sector coupling. However, I'm taking here the example specifically of the renewable energy and electric vehicles.

What we do see is that only limited examples exist for policies that encourage and mandate the use of the mobile energy and electric vehicles. At the national level we have only identified Austria and Germany even though it's also to mention that this is something which is currently being discussed at the European level. So, what I'm referring to here is for instance subsidy for electric vehicles which are then bound to subscribing to renewable energy power purchase agreement. That's one example.

There is obviously another way to support this uptake. When countries with power electric renewable targets and in parallel also with energy power targets or renewable targets this may encourage the use of renewable energy and deployment and transfer. However, there are certainly ways to really push products more. In these sectors, and I would really like to underline this. We do see that new policy players start playing an increasing role. I mean they've always played a role, but we see an increasing role of subnational government and of cities.

As an example, there are hundreds of jurisdictions committed to 100 per cent renewable energy or electricity by end of 2017 and here I only mention three country examples but really see this as a development worldwide. In Japan municipal leaders released the Nagano Declaration to work together towards hundreds of renewable energy across the country. More than 200 US mayors committed to go goal of 100 per cent renewables by 2035 and in Germany over 150 districts and municipalities, associations and cities for 100 per cent renewables by the end of 2017. Through 100 per cent renewable energy regions network. So, it's new players basically.

There is another form of new players and we have a feature, specific feature in this report, this area which are corporate sourcing which are the corporations. This feature is specifically on corporate sourcing of renewable energy. It has been produced in cooperation with building on IRENA's analysis. And interestingly there were at the end of 2017 corporations had actively sourced 465 terawatt hours of renewable electricity across 75 countries. And when you look at this map here you see that it's not only industrialized countries but that this sort of thing also takes place in developing and emerging countries.

What is important, why is this taking place? A) It's cost reasons but it's not only cost reasons. It's energy security. It's resilience. It's long term visibility on energy crisis so there are many drivers. And we see that basically the drivers are not anymore linked to corporate social responsibility but are really—yes, are a corporate sourcing. The IT sector could take the largest amount of renewable energy through wind power and solar PV, public power purchase agreements. And this context just because I feel it's really important also to see the role these players play so there were 130 corporations which joined the RE100 initiative so corporations working together towards 100 per cent renewable energy.

Now we have heard about this _____ disconnect. What we also observed is that basically the uptake of renewables differs in depending on the regions. So, when you're looking on the upper right part in blue you will see the

situation in Europe. And here we have a decline of the renewable energy investment of approximately 80 per cent. When you go below, and you see China and here we have an increase, a significant increase over 2016. Still an increase over 2015. So, China is the driving force. When we're looking at the rest of Asia, so India has also been done but is still significant. When we are looking at the rest of Asia, Oceania, we do see that investments are going down. So, also, in Asia there is really big differences.

The situation in Africa and the Middle East is more stable compared to 2016. There is a slight uptake. Brazil slight uptake also. In the US and the Americas, in the US there has been a decrease in terms of investment but an increase in terms of installed capacity. And that's really something which I think shows that there are driving markets. But it also shows that things are not going quick enough basically. I'm not sure if that's—or I'm pretty sure that today we cannot afford that investment levels are only slightly increasing in some regions which are still facing energy access challenges or which still have a very, very high share of fossil fuel energy.

While we're looking at the renewable energy champions or looking at the investments. So, we have the leading countries China, United States, Japan, India and Germany. And I really like this slide because I feel that it also shows that sometimes it's very goof to also look at other indicators. So, below in the second line in the second row you have the investment in renewable power and fuels per unit of gross domestic product. And here we have very different leading countries, Marshall Islands, Rwanda, Solomon Islands, Guinea Bissau, and Serbia.

And I feel that it's something which is important to mention because even though these countries would not appear on the top five, top ten countries they are still investing and making major efforts and often even higher efforts than the developing and the top leading countries we have seen before. And it is important to also look at these efforts and showcase as I'm doing here, make them visible and share it so that the message is also being seen and their experiences can be replicated. Also, because there is a general assessment that many elevations will probably not come from the historic leaders. And so, it's really important to also observe what is ongoing with these countries.

Also looking at these countries in particular important because often we also talk about countries which is built facing another challenge which is only the share of renewable energy or the _____. But they are facing the situation that they still have many people living without energy access and without electricity access. So, worldwide there were in 2016 I think 1.06 billion people still without electricity access. This represents 14 per cent of the global population, 14 per cent. When you're looking to the right figure, you will see that we have different developments per region. So, basically, there is a _____ where we see on the left side. There is the electricity access and here from 2010 to 2016 there is a positive trend.

So, the access change was my understanding four per cent so positive. Even if we also take into a population increase where we have a plus 7.4 per cent. When we're looking at Asia, this situation is quite balanced also with regard

to the improvements and energy access compared to population change. There is one region which is extremely challenging, and this is sub-Saharan Africa where basically the electricity change was up only 1 per cent but the population growth is up plus 18 per cent. So, that's just something to keep in mind. We need not only to think about carbon emissions but also single development goals and reaching universal energy access.

Renewable energy already plays a major role here and that's really something to keep in mind. It's not that we do not have the solutions. Renewable energy, 266 gigawatt of connected renewable power capacity exists in these countries. And also, there is distributed renewable energy systems so solar home systems, mini grids, solar lanterns which provide power to 360 million people.

When we're looking at solar lanterns for instance between 2010 and 2017 there was an annual market growth of 60 per cent. So, that's very positive and it's a dynamic market. It's also a market which represents opportunities for technology developments and investments. It is however clear that more investment is needed. When we're looking at different assessments to reach universal energy access from IEA and SE4All and there is an assessment that \$45 to 56 billion US dollars are needed annually to reach that. There's still a long way to go. When you're looking then at the global investment and off grid solar PV companies, we do see that in 2017 that an estimate of \$284 million US dollars when we see compared to 26 that the investment has gone down. And again, we need to ask our self the question can we afford it.

Distributive renewables for energy access is not only electricity access but also energy access for everything which is clean cook stoves. In 2016, only an estimated 29 per cent of the 30.8 million clean cook stoves distributed used renewable fuels. And why is that? There is a) a big focus on improved cook stoves. Sorry. No. Stepping back. So, why this? It's that for health reasons and the peer pressure there is a fuel switch which is taking place to LPG and gas. And that's important because the health effects are major, and LPG and gas allowed _____. However, renewable energy are still 29 per cent and of those opportunities we have on the yellow one that's wood and charcoal. So, here we are really speaking about improved cookstoves using biomass. So, they are much more efficient. Followed then by biogas with 3.5 per cent in particular developed in Asia but also development in Africa. And solar energy 0.4 per cent and electricity 0.1 per cent.

Now it's interesting to look basically at the different trends which have an _____ renewable energy update. So, we did see, and I know this slide is a bit more complicated but this yellow line basically we have the modern renewable energy uptake and we have the growth rate here over the last ten years of plus 5.4 per cent. Traditional biomass was 0.2 per cent and the combined renewables plus 3.3 per cent. Now even though we have an uptake of 5.4 in all the renewables this did not _____ basically other development which is a) the increasing demands of total final energy which was plus 1.7 per cent and this was mainly by economic development in developing countries emerging economies.

Also, as I have mentioned before there's still investment ongoing in fossil fuel and nuclear energy of plus 1.6 per cent. And then there is the part on traditional biomass where we see this move and that's why the total renewable energy share is not increasing at the same pace as the 5.4 per cent. And 2017 was unfortunately a challenging year with regard to energy related CO₂ emissions because for the first time in four years the emissions rose again. And this decoupling of energy demand and energy related CO₂ emissions compared to the economic development did not take place.

I feel that we're talking about the status here. In the status report we're also looking at renewable energy targets. And I think it's something which is interesting also when we're thinking about, a bit about the future because we all have ideas and imagine a future with many, many renewable energies. And when you're looking here at this slide it's a bit complicated again but on the top, we do have the heating and cooling on the right top transferred and on the low part the power targets. So, you see the time span. So, for instance, for heating and cooling you see many countries have targets for 2020 and two countries for 2030.

And here what are the targets? We do have targets which reach from a couple of per cent for 2020 to over 60 per cent. And this is something which is realistic when we're looking for instance to Scandinavia they have renewable energy heating shares which are already exceeding 60 per cent. Looking at the countries and it's interesting looking at the countries for 2030 in heating and cooling. They are both below ten per cent. On transfer the maximum we are reaching is between 20 and 40 per cent. And when we are looking at the lower part, we took the power sector and we see that the projections go people imagine in reality until 2050 so that's really something which is quite different.

We also see that there is a big variability on the targets I think. What we do see clearly that for the power sector, many policy makers can imagine that we are going towards high renewable power share reality in the power sector. And the whole objective I think is to also see hopefully very soon such realities in heating and cooling at the transfer side. But it also means that we need this policy.

Now I'm coming to my concluding slide and we'll then be available obviously for questions. So, I would really like to take this encouraging last slide in the power sector and saying yes, the transition is possible. And this is basically what the power sector shows us. It shows us what's possible because there is advancing record capacity addition and also rapidly falling costs. It's really a reality. The progress is _____ and it's not spreading in all sectors. And we just don't have the time. If we want to reach Paris agreement goals and SDGs, we don't have the time. We need to move now. And that's really something important. And to do this, we need to address basically the other energy sectors and there needs to be policy attached.

But also, development of technological solutions when we're talking about the transport sector for instance and the shipping and aviation or long-haul transportation. In heating and cooling there need to be—yeah. Also, the

industry is needed, cities are needed, behavior change is needed. So, let's work together. It's very clear also on the sector that in view of this energy condition there needs to be a better integrated sector planning and also a better integrated design of policy regulated frameworks. This is fundamental. Where today we're going to a situation where the integration of heating and cooling and transferred into the power sector can offer major opportunities for all sectors and the policies and regulated frameworks need to adapt to it. In the system approach there is clearly a need to link energy efficiency and renewable energy more.

And in particular and this is valid for all renewable energy or for all energy sectors but in particular for heating, cooling and transport which are highly developed, highly dependent on fossil fuels. We need to have a level playing field for renewables. There is still subsidies for fossil fuels and nuclear between three to five times the support which is existing for renewable energy still today. When we are thinking about the energy access we also need a level playing field between decentralized off grid renewables and centralized grid connected solutions because these decentralized off grid renewables offer major opportunities and need to evolve basically in a market space which also takes these seriously I guess and gives them the opportunity to _____.

Another aspect is when we are looking basically at cities, when we are looking at developing countries, when we are looking at all of the innovation which is done in startups, innovation business models, technology innovations and government sector there is many, many things happening but they are not always visible because they are not always consolidated. And this is really an indication to everybody to use global status renewable global status report platform where our objective is to really show what is ongoing in the field to compliment also the official statistics which always capture their realities on the ground.

With this I am closing my presentation for on the global status report and here's the slide with all our different activities. I'm specifically pointing just because I'm sitting in Manilla for the moment I'm pointing to the next international renewable energy conference which will take place from 23rd to 26 October in 2019. And if you want to see the report, download, infographic, etcetera just look at our website. Thank you very much for our attention. And I'm happy to answer any questions.

Katie

Great. Thank you so much for that outstanding presentation. We are going to shift to the Q&A and I'd like to remind our attendees to please submit questions using the question pane at any time. We are going to keep up several links from the screen throughout for a quick reference point to where you'll find information about are there upcoming and previously held webinars and how to take advantage of the Ask an Expert program. We've had some great questions from the audience that we'll use the remaining time to discuss and answer. Our first question today is what do your results show or what about the situation or renewables in Costa Rica? And I think you may be on mute, Rana.

Rana Oh ok. Sorry. I'm on mute again. I didn't see it.

Katie No worries.

Rana Yes. So, you did not hear my answer. So, Costa Rica is a very interesting case study and I think we can really learn from this example and draw lessons from this example. In Costa Rica there is a very high share of renewable energy power. And there has been a support which was really spread also to the population in Costa Rica to see how renewable can really help to become—to reach energy security, self-sufficiency, etcetera and Costa Rica has—I'm not sure whether we are at 100 per cent renewable electricity but close to 100 per cent renewable electricity. Also, because obviously they do have very good resources and hydro power, this plays obviously a role.

But what is very interesting in Costa Rica is that they have really managed, this country has managed to make renewable energy part of the country's culture I guess and identity. And as a result, there's now pushing for the electrification of the transport sector with renewable energy power. And this is something which is _____ but it also shows that basically this renewable energy transition is also an opportunity for building the identities, local identities, local economies, involving communities, creating governance, other governance models in the energy sector. So, definitely a country to look at and learn how they have basically managed this behavior change which is also something that is important especially when you're looking at transport. Normally we're looking at energy efficiency. And the behavior change is very important.

Katie Wonderful. Thank you for answering that. Our next question is how do you assure the credibility or the accuracy of the data you gather and present in these reports?

Rana That's a very interesting question. We do have as mentioned I meant this is building on a community basis we have 800 experts. I'd say these experts can differ very much. So, we have from a student doing master study in their region to the international renewable energy agency or the international energy agency, country contributions from ministries, industry associations like _____, research institutes contributing. So, it's very heterogeneous. Now we also have to validate this. So, how does this work? We are collecting all of this data and comparing it obviously with _____ research who will then produce graphs for the different chapters which we're making available in peer review.

And during this peer review basically we have kind of a validation of the data. And in the peer review I think that for each peer review we probably have something like between 100 and 150 players or experts participating in this review. Then obviously when we're in our fine tuning I think of the data we're also working with other data experts to see what they think about it, the end work and the international energy agency, IRENA, and the different industry associations to really make sure that our data is coherent. When we're looking into some partners have done this, analyzed the status report

data compared to fiscal statistics which have been published and apparently, we are not so much _____ so that's good.

Katie Great. Thank you. Our next question is can you please explain what are modern renewables versus combined?

Rana Yes. This is referring to this last slide, so the combined renewable is basically when we are speaking about renewable energy modern plus traditional biomass. This is the combined renewables. So, we do see an uptake of modern renewable energy of plus 5.4 per cent of traditional biomass plus 0.2 per cent combined of plus 2.3 per cent if I'm not mistaken. So, it's really the all renewable energy so including modern renewables and traditional biomass.

Katie Thank you. Our next question—we have some great questions coming in from the audience so thank you all of the attendees. Our next question is firm level data on renewable investment available for REN21?

Rana If I understand the question correctly so the investment data from the global status report is basically building on the data which is produced in the global trends report on renewable energy investment which is produced together by the UNAB and _____ collaborating center and the global energy finance. This year for the first time we had started integrating additional data because the NEF data is focusing more on the power sector, solely on the power sector and the fuel sector and we feel that there is really a need to increase the investment or the availability of investment data also on the heating sector. This is certainly something which will take some time to build up but is very important also to attract the interest of policymakers but also investors back to these other energy sectors. So, if there's anybody listening here who might have good insights or data please be in touch.

Katie Great. Thank you so much. Our next attendee asks to what degree are relatively mature power markets looking for other technologies such as large capacity batteries and hydrogen for sector coupling to further support integrations of renewable energy. And is renewable energy starting to hit a wall in capacity feeding in Europe.

Rana So, these countries—so basically, we're speaking about markets where we already have comparatively high source or renewable energy where we have like in Europe also an electricity grid which is existing and has been built around centralized solutions. There is very clearly trends in these countries to look basically into the flexibility options in general flexibility options. And, that's also why also a situation we had in China. And China has for instance last year invested less in renewable power capacities but has invested in transmission lines and interconnections because these were also necessary to integrate more renewable energy capacity.

So, this is one part they are looking into. They are clearly looking into storage and yes, I'm sorry if I forget to include the slide on the storage but when we're looking at storage we really see an uptake clearly of storage. The main storage is provided by pump storage and there is _____ storage and then we

have battery storage. When we're looking at the sector coupling for instance for transport or also in the heating sector with high temperature applications in transport in particular all the—so because I talk about the electrification here but there is the other possible to which is the possible _____ renewable energy power to produce synthetic fuels.

So, for instance, in different hydrogen pathways, ammonia, and here there is—we do have different trends but there is a clear—I think it's very clear that for some energy sectors the full electrification is not an option or not an option yet. So, when we're thinking about shipping or aviation, long haul transport, high temperature needs basically in industry, high temperature heat needs in industry and hydrogen is definitely a technology which is one of the solutions.

Katie Thank you. Our next question –

Rana Maybe coupling this because it also allows to provide the sectors with renewable fuels but obviously it's also possible to keep transform renewable power which is being produced into fuel which can be stored more easily.

Katie Great. Thank you. Our next question is what are the financial incentives available in investing in renewable energy?

Rana Oh this, it depends very much on the countries basically, on the countries' policies. There are different support schemes which do exist in the power sector. We see for instance a very—for a long time we had Paris goals which were our main driver. Last year there have been two countries which have adopted the _____. I think it was Vietnam and if I'm not mistaken Zambia. But in the power sector for instance we see since a couple of years of development that there is more and more options. Just because renewable energy power today is cost competitive and options allow to develop large capacities on the one side but also reach low energy prices. It basically depends on the bid which is provided by the entities.

So, that's really a big trend we can see. As I mentioned carbon pricing for instance relevant. There's subsidies today, detaxation. When you look at the report, there is a policy table and also reference tables which we'll give you that the policy situations in every country. And sorry. I don't have all of them in mind.

Katie No worries. Thank you for answering that. We have time for a couple of more. Our next question is, what is the current role of solar thermal—sorry. I lost the question. What is the current role of solar thermal energy compared with other alternatives? And what is the forecast evolution in this sector?

Rana So, solar thermal has been in the last years a bit under pressure because of the low photovoltaic. So, in general, the thermal applications of thermal renewable energy have been a bit under pressure because of the low photovoltaic enterprises in particular. And this has slowed down the solar panel market. However, as I mentioned we do see an innovation here which is taking place, and this is really the development of larger solar thermal

plants and also the application for industries in medium temperature applications. When it comes to the predictions I'm really sorry. I could not tell you what the projections are for the solar thermal market. But please don't hesitate to drop me an email and I'll put you in touch with our experts.

Katie

Ok. Thank you. We've had several attendees ask questions about the transportation sector specifically in the maritime and air transportation sector. What other alternatives are being seen and what are policy steps that are taking regarding these two sectors in transportation?

Rana

So, shipping and aviation are certainly two quite challenging sectors when it comes to decarbonization and development of renewable energy. There are different reasons for this. One reason is these sectors are highly dependent on fossil fuels but not only these sectors because they are also internationally coordinated by the international marine, maritime organization and the international council, I'm sorry _____ sea and air organization. There needs to be an international consensus. And in many countries basically these sectors have an additional detaxation of the fossil fuels. So, we have a challenge the institutional _____.

There is also a challenging situation when it comes to the technology solutions because these are sectors which are difficult to electrify. So, the main solutions we can see here is clearly biofuels is an option and it's being developed so advanced biofuels. And they are primarily being used as drop in fuels which means that there are parts, fuels are being, a share of biofuels is being added to the normal fossil fuels. Another aspect is particularly in aviation there is also a very—is a need for stable, a stable fuel actually. And this is where we see really the development or what are the technology solutions which do exist. It's very clearly the development of advanced synthetic fuels so where renewable energy power is being transformed into for instance hydrogen, ammonia, into synthetic fuels which can then be used in the normal combustion engines.

So, these are probably the most promising parts. There is also hydrogen itself being developed primarily. And what we did see is in shipping that—I'm sorry, in the maritime sector. Actually, have a doubt whether in English it's maritime or marine but yeah, you understand what I'm talking about. Sorry for that. But here we also see that there have been the first electric fairies existing. So, when we're talking more about domestic load sector. There's the other possibility to also integrate solar PV obviously and wind in the shipping sector.

Katie

Thank you very much. Our next question is about auctions. What are the different auction models and what is the current trend for that area?

Rana

Ok. For the auctions it would be great if you could tell me the email of the person who has asked this because I would prefer to get back with details. In principle what we see is that there is very clearly the _____ auctions because they allow to as I mentioned before to increase or to build basically large capacities and reach lower prices for a bit. What is interesting here is I mean one of the markets or the impacts we see on auctions is that—and there

has also been _____ in particular of project developers who are developing more community-based projects and small-scale projects. So, auctions, the result of auctions is that you, the bids often come from larger players. We're looking at larger capacities.

And for instance for Latin America REN21 has produced last year a report on the tendering system so the auction system and community empowerment and our recommendation or the recommendations that we report which is building on interviews and research for Latin America was to have one part of the auction system which is reserved basically for community based and lower scale or smaller projects because these ones cannot compete with larger projects but are fundamental as for instance the example of Costa Rica shows are fundamental for the energy transition. But please send me the contacts and I'll put you in touch with the experts on that topic.

Katie

Absolutely we will. For any questions that we do not get to today we will definitely connect with those attendees offline after the webinar. Our next question is a two-part question. What are examples of national policies in developing countries that have unlocked corporate renewable energy procurement? And what is needed in developed countries to advance the transition?

Rana

So, one fundamental thing when we're looking for _ is very clearly often the possibility to allow for legally allow or make the independent power production legal. So, it's a liberation of the energy markets which is fundamental and access to the grids. And the authorization to be allowed to sell electricity. So, this is some basic needs in the regulative framework. Unless you have corporations who would directly invest in their own production capacities and will only consume them their selves which is also existing very often when you're looking into the mining sector, the development of mini grids, pulp and water with water treatment plants, etcetera and breweries. And many of these sectors already have their own renewable energy capacities.

Now what is needed in developing countries? Really the markets, the regulatory framework for the energy market. That's one aspect. In developing countries, we see very often high subsidization of fossil fuels and this is the situation which is challenging. And also, still taxes which are not in favor of renewable energy development. What is also needed in developing countries is the investment in capacity building. It's fundamental to develop sustainable markets. There is a need for institutional capacity. There is a need for transitions, etcetera. So, that's another part which is important.

Katie

Great. Thank you so much. Our final question is what does your findings show or what does REN21 show, find as the biggest barrier that is faced as we move forward in renewable energy?

Rana

I would say, yeah, probably the level playing field still because we're talking about renewable energy technologies which our actors to be cost competitive but which are not operating, still not operating in the environment which allows them to really be cost competitive. That's one thing. The other one

I feel is change of perception. And there are still many myths out there. Myths on renewable energy is too expensive, it's only for a list of countries. We're making the grids—it's not possible to have high share of variable renewable energy in the grid without having a negative impact on grid stabilities. And this is something which is important to address by information, knowledge creation, education, capacity building in the countries but also in the different organizations, in the banks and the finance sector.

It's fundamental because all of these players are needed to really make this transition happen. And to do this and I think renewable energy power sector has really shown it. It is important to develop good and stable and long-term policy and framework. That's fundamental. The good news is that there are many good examples. And I attended the conference a couple of weeks ago and Arnold Schwarzenegger said like when they have developed the California framework for instance they did not try to invent all of the things themselves. They looked what was working in other countries and tried to analyze it and transpose it to the Californian context.

And I feel that this is something which is very good news. I mean we do have a solution so it's not about making good entry points but it's more about really getting these information to decision makers, getting these information in good energy planning tools, in good investment analysis, etcetera and really take into account the significant _____ we have, the tech that, the technology was much older than they are probably still assessed by some countries, sorry, by investors or commercial banks. And all this comes down to information and capacity building. Yes.

Katie

Thank you again for that informative question and answer session. Like I said for any questions we didn't have time to get to we'll connect with those attendees offline after the webinar. Now I'd like to provide Rana with an opportunity to have some additional or closing remarks before we close the webinar.

Rana

Yes.

Katie

Rana, go ahead.

Rana

Yeah. Thank you. Yes, I'm very happy that I had this opportunity and thank you for this. I'm really inviting anybody who might be on the other screen. I guess that's always a challenge on the webinars. But the great advantage is we can reach out to people we might not meet at some conferences. But really don't hesitate to get engaged in this process. This is a collaborative process. There is an expert community. We're keen on illustrating good examples which might be more local and not always seen globally. So, don't hesitate to participate and share your insights and knowledge to make this transition happen. Thank you very much.

Katie

Great. Thank you again. And on behalf of the Clean Energy Solution Center I'd like to extend a thanks, a thank you to our wonderful expert speaker and to all of our attendees for participating in today's webinar. We very much appreciate your time and hope in return that there are some valuable insights

that you can take back to your ministries, departments or organizations. We also invite you to inform your colleagues and those in your networks about the Solution Center resources and services including our no cost policy support through the Ask an Expert service. I invite you to check the Solution Center website if you'd like to view the slides and listen to the recording of today's presentation as well as previously held webinars.

Additionally, you'll find information on upcoming webinars and other training events. We're now posting webinar recordings to the [Clean Energy Solution Center YouTube channel](#). Please allow about a week for the posting to occur. Finally, I'd like to kindly ask you to take a moment to complete a short survey that will appear when we conclude the webinar. Please enjoy the rest of your day and we hope to see you again at future Clean Energy Solution Center events. This concludes our webinar.

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