

# REN21 Renewables 2015 Global Status Report: Transport

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## Webinar Panelists

**Christine Lins** Executive Secretary, Renewable Energy Policy Network of the 21st Century (Ren21)

**Heather Allen** Independent Consultant, PPMC and SLoCaT

**This Transcript** Because this transcript was created using transcription software, the content it contains might not represent precisely the audio content of the webinar. If you have questions about the content of the transcript, please [contact us](#) or refer to the actual webinar recording.

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**Sean Easterly** Hello, everyone. I'm Sean Easterly with the National Renewable Energy Laboratory, and welcome to today's webinar, which is hosted by the Clean Energy Solutions Center in partnership with the Renewable Energy Policy Network for the 21st Century, also known as REN21, and the Partnership on Sustainable Low Carbon Transport. Today's webinar is focused on the REN21 Renewables 2105 Global Status Report with a special focus on transport.

And, before I begin the presentation, I just want to mention that the Clean Energy Solutions Center does not endorse or recommend specific products or services. Information provided in this webinar is featured in the Solution Center's resource library as one of many best practices resources reviewed and selected by technical experts.

And apologies—I'll get my slides advancing in a second. They have momentarily frozen but I'll get those moving in just a moment. And before we begin, I just want to go over some of the webinar features that you have. So, you do have two options today for audio: You may either listen through your computer or over your telephone. So, if you do choose to listen through your computer, please select the "Mic and speakers" option in the audio pane. Doing so will help 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 audio PIN that you should use to dial in. If anyone's having technical difficulties with the

webinar, you may contact the GoToWebinar's help desk at 888-259-3826, and they can help you out there.

And sorry... One moment as I just try to get my slides unfrozen for you so you can follow along with those. Great. I think I have them working for you now.

And so, we do have an exciting agenda prepared for you today. And as we move through that, I'd just like to remind all attendees that if you have any questions for our panelists, please go ahead and submit those questions into the question pane, where we will use those during the question and answer session and they will address those. And if anyone is having difficulty viewing the materials through the webinar portal, you will find PDF copies of the presentations at [CleanEnergySolutions.org/training](http://CleanEnergySolutions.org/training) and you may follow along as the speakers present. Also, just reminding—a reminder that a full recording of the webinar and the presentations are also now being posted to the Solutions Center YouTube center, where you will find other informative webinars as well as video interviews with thought leaders on clean energy policy topics. It does take a few days for the webinar recording to be posted, so please keep in mind that slight delay.

And today's agenda is centered around the presentations from our expert panelists, Christine Lins and Heather Allen. These panelists have been kind enough to join us to discuss REN21's flagship report, the Renewables 2015 Global Status Report, focusing on its findings related to transport. Before our speakers begin their presentations, I'll provide a short overview of the Clean Energy Solutions Center initiative. And then, following the presentations, we will have a question and answer session where the panelists will address questions submitted by the audience, followed by some closing remarks and a very brief survey for the attendees today.

And this slide provides a bit of background in terms of how the Solutions Center came to be formed. And the Solutions Center is one of 13 initiatives of the Clean Energy Ministerial that was launched in April of 2011 and is primarily led by Australia, the United States, and other CEM partners. Some outcomes of this unique initiative include support of developing countries and emerging economies through enhancement of resources and policies related to energy access, no-cost expert policy assistance, and peer-to-peer learning and training tools such as the webinar that you are now attending.

And there's four primary to the Solutions Center. The first goal is to serve as a clearinghouse of clean energy policy resources. The second is to share policy best practices, data, and analysis tools specific to clean energy policies and procedures. Third, the Solution Center strives to deliver dynamic services that enable expert assistance learning and peer-to-peer sharing of experiences. And then, the fourth and final goal is to foster dialogue on emerging policy issues and innovation from around the globe. And the typical primary audience for the Solutions Center is energy policymakers and analysts from governments and technical organizations in all countries. But then, they also strive to engage with the private sector, NGOs, and also civil society.

And this slide gives a brief overview of one of the marquee features that the Solutions Center provides, which is its "Ask an Expert" technical assistance program—the no-cost expert policy assistance. The "Ask an Expert" program—through the "Ask an Expert" program, the Solutions Center has established a broad team of over 40 experts from around the globe who are each available to provide remote policy advice and analysis to all countries at no cost. So, for example, if you had a policy question in the area of clean transport, we're very pleased to have Jane Wilkinson, an associate director with the Climate Policy Initiative, serving as one of our experts who could address that question. And so, if you have a need for policy assistance in clean transport or any other clean energy sector, we do encourage you to take advantage of this service. And again, it would be provided to you free of charge. So, if you have a question for our experts, please go ahead and submit it through our simple online form at [cleanenergysolutions.org/expert](http://cleanenergysolutions.org/expert). Or, to find out how the "Ask an Expert" service may be able to benefit your work, please also feel free to contact me directly: Sean Easterly at [sean.easterly@NREL.gov](mailto:sean.easterly@NREL.gov). And we also invite you to spread the word about this service to those in your networks and also your organizations if they'd like to take advantage of it.

So, with that, I'd like to provide some brief introductions for today's panelists. Our first speaker that we'll be hearing from is Christine Lins, the Executive Secretary of REN21. And with over 18 years of experience working in the field of renewable energy, Ms. Lins helps convenes international organizations, governments, industry associations, and academic and NGO representatives active in the field of renewable energy.

And then, following Christine we will hear from Heather Allen. And Heather was the lead reviewer for REN21's Renewables 2015 Global Status Report and an international expert on urban public transport, climate change, and sustainable development. Heather's career spans both the public and private sector as an independent consultant to the Paris Process on Mobility and Climate Change, with the non-sustainable low carbon transport partnership.

And so, with those introductions, I would now like to go ahead and welcome Christine to the webinar for her presentation.

### **Christine Lins**

Thank you very much, Sean, and good morning, ladies and gentlemen. I look forward to—or, good afternoon, depending on where you are. It's my pleasure to welcome you also on behalf of REN21 to the first webinar on global renewable energy development with a focus on transport. This is indeed unique, and I think it really reflects the need for also highlighting how renewed energy cannot only make a difference in the electricity sector but also provides services in the future including the sustainability of transport.

A word about REN21: We are a multi-stakeholder network dedicated to the rapid uplink of renewed energy worldwide. I am happy to announce that we just got SLoCaT as a new member of REN21. And as you can see, we have really a coalition of the willing from both the private and the public sector who work towards renewable energy.

What I'm going to present to you today are the findings of our annual \_\_\_\_\_ publication, the Renewable Global Status Report, which is the report that is based on a network of over 500 contributors, researchers, and reviewers worldwide providing an overview on industry market [audio dropout], investment trends in the field of renewable energy, with a focus on distributed renewable energy on developing countries. And last year, at COP21, a focus on how renewables can be used to change adaptation, so that we can not only contribute to mitigating climate change but also help countries that—in case of damage.

The report covers all renewable technologies. And as I mentioned, not only the power but also the heating and cooling and transport sectors. We also have some information on energy efficiency there because we do believe that the energy that is not consumed is effectively the cleanest one. And when we talk about reaching high shares of renewables, it goes without saying that we also need to look at the demand side. We collected a lot of data about the global status of renewable energy, which can be accessed at the Renewable Interactive Map on our website. And that provides just sort of basic information.

So, in a nutshell, the last decade saw really substantial growth in renewable energy that surpassed expectations. We see global installed capacity and production from all renewable technologies increase substantially. When you, for example, look at my last two lines in the transport sector, production of ethanol from—increased from 28.5 billion liters in 2004 to 94 billion liters in 2014. Biodiesel, an even bigger increase from 2.4 to 29.7 billion liters.

We saw in most technological areas significant cost reductions. And with these —support policies were written around those so that we have now over 400 different countries in the world with renewed energy policies and targets in place. We have many countries that are not only subscribing to some renewable energy targets but that are really focusing on a transition of the energy system, especially after the outcome of COP21, where it is clear that renewables are an essential part of the solution. Many countries are already are—and will learn more who's on \_\_\_\_\_ deployment. And the fact that in 2014 renewables continue to grow against a backdrop of increasing global energy consumption and also against the backdrop of declining oil prices is clearly one of the signals why they were so prominent also in the discussion also at COP21.

You should know that despite rising energy use, for the first time in four decades, global carbon emissions associated with energy consumption remained stable in 2014 while the global economy continued to go. And this stabilization was attributed to increased penetration of renewable energy and to the appropriateness of energy efficiency. So, we have as listed here many countries in the world embarking on an energy mission with renewables. Industrialized countries such as Germany, Denmark, but also emerging economies such as China, India, South Africa, Brazil, and also smaller countries such as Costa Rica, Chile, Mexico, Morocco. And I think one of the

reasons why this happens is we believe that the costs for many technologies have come down.

Where do we stand today? About 20% of final energy consumption provided by renewable energy. So, you see that we still have a long way to go when we talk about fully decarbonizing the energy sector, what was effectively agreed in—by over 195 countries at COP21. So, there is still a long way to go. And the UN secretary general's sustainable energy for all \_\_\_\_\_ will see a doubling of the share of renewables by 2030 as an interim objective.

In terms of champions, when you look at the world, the champions in terms of total investment in renewable power and fuels are China, the United States, Japan, UK, Germany. However, when you look at investment relative to GDP, you see that this list reads different. You have Burundi, Kenya, Honduras, Jordan, and Uruguay there. And you see the emerging economies and underdeveloped countries making an effort in \_\_\_\_\_ energy from others.

In the power sector—so, as I mentioned initially, the development of renewable energy in the power sector was really—or, the development of renewables was mainly happening in the last decade in the power sector. We have now about 28% of global power generation of electricity as renewables, and about 23% global electricity demand provided by renewables. That is an average. However, we have situations where much more—in Denmark, we've got—40% of total electricity demand was covered by renewables. We had a day—the 23rd of August last year in Germany—where over 80% of Germany, Germans' electricity demands was provided by renewable energy. And you see that about 60% of all newly built power plants that are in the renewable space, with a good and rapid increase in power capacity. So, we see that there are bigger shares of the \_\_\_\_\_ renewables in the system. And of course, one of the solutions to deal with variability this is [audio dropout]. And so, we see already in some parts of the world happening the quick spreading of vehicles, and this is definitely something that [audio dropout].

When it comes to heating and cooling, just for the sake of being complete, the share of renewables is growing, but it's still relatively modest with about 8%. And when we see that the energy use for heat accounted for about half of total world final energy consumption in 2014, it is clear that we still need to go a long way in this sector.

As far as transport is concerned, renewable energy accounts for an estimated 3.5% of global energy demand for road transport. That is an increase compared to previous years. However, we also see that the potential there is still big. We see that trends—there are trends in the development of gaseous fuels and electricity, and we continue to create pathways for the integration of renewables into the transport system. In as early as 2015, China was home to 97% of the world's electric two-wheelers and about 79% of the world's electric buses.

At the end of 2015, there were about one million electric vehicles in the world. And the forecast from Bloomberg—actually, in order to reach these one million, it took us roughly 20 years. The latest forecast from Bloomberg

New Energy Finance is that the next million will be reached in about 18 months. So, you see a big acceleration of the trend, of the promotion of those electric vehicles. And that goes hand in hand with an increase in \_\_\_\_\_ renewable energy technology, as I mentioned. So, here you just see the development of [audio dropout]. And you see that there were—that the graph is quite exponential. In 2015, about 51 to 55 or 57 gigawatts of solar PV were added to the system. You see so that the exponential curve continues in the same trend. And we see that more than 60% of all the PV capacity in operation was added over the past three years, with massive increase in Asia.

Similar trends in wind—also, they are quite a substantial increase. And we have similar data for all the different renewable energy technologies. I'm not going to go take a lot of time to go through the details on them, just a word on the \_\_\_\_\_. Of course, renewables are a job promoter: There are about 7.7 million people directly or indirectly employed in this industry. A large chunk in China; lots of jobs \_\_\_\_\_. And in terms of investment, we also see that the development of investment, we have a new record in 2015 with \$329 billion US dollars that were reported by Bloomberg New Energy Finance. And what is interesting: For the first time, in 2015, developing countries surpassed the developed economies. So, as you see in the date of 2014 where the developed country share was a bit better, now for the first time [audio dropout].

**Sean Easterly**

Hi, Christine. I don't know if—I'm not sure what happened, but your audio seems to be—we seem to be losing you now.

**Christine Lins**

Can you hear me now? Better?

**Sean Easterly**

Yes. That's better. Thank you.

**Christine Lins**

Okay. Good. Excellent. So, new trend: more investment in developing countries, emerging companies, than in the [audio dropout]. And again, there is major investment in solar and wind.

I mentioned at the beginning all of the—the renewables landscape is quite populated. We have over 164 countries with renewable energy policy targets in place. The majority of the policy instruments are existing in the power sector. However, we have [audio dropout] also in the field of transport flatlined. Here, you see that the states and provinces and countries with biofuel mandates have increased from 10 in 2004 to 62 in 2014.

What we think is going to happen in the year to come is that we are going to see more and more integration of policy instruments, not only promoting electricity, renewables that are in the electricity sector, but also in transport and in heating and cooling as we move to higher shares of \_\_\_\_\_.

Of course, renewables are also promoted because we must not forget that still 15% of the global population lack access to electricity. And there are distributed renewable energy systems that are in many cases more cost-competitive and—for example, the off-grid solar PV market in 2014 attracted \$64 billion US of investment. So, that already shows that this is an interesting and growing market.

However, what we must not forget is that the balance between renewable support in the [audio dropout] \$82 billion US compared to fossil fuel subsidies, \$444—\$544 billion in not even—especially in times when oil prices are low. It should be [audio dropout]. So, I think—I tried to demonstrate to you that we've seen that the past five decades have really set the wheel in motion for a global transition to renewables. However, there's still a long way to go. We need long-term and stable policy frameworks. We need in the future greater attention to the heating and cooling sector and transport. That's why I'm really excited about today's webinar. And we need to make sure that we really reach the goal within \_\_\_\_\_ of renewable [audio dropout] by focusing on distributed renewable energy markets in developing countries and also look at the financing.

With this, I'd like to thank you for your attention and hand over to \_\_\_\_\_.

**Sean Easterly**

Okay. Thank you, Christine. And we'll go ahead now to Heather for her presentation.

**Heather Allen**

Hi, yes. Good morning. I don't know if you can see my presentation? I –

**Sean Easterly**

Yes. We can, but you just want to go to slide screen—or slide show mode.

**Heather Allen**

Okay. Okay.

**Sean Easterly**

Yep, so we see your screen in there. And then, you just want to enlarge the PowerPoint.

**Heather Allen**

Okay. I don't actually see my screen at all. Whoops. Okay. Now I've got it. Okay, that's great, yeah.

So, yes, good morning, good afternoon, everyone, wherever you are in the world. And thank you very much, Sean and Christine, for setting up this webinar so that SLoCaT could be part of it.

As mentioned, I am a consultant with SLoCaT, this slightly weird name for the Partnership on Sustainable Low Carbon Transport. And I have been working very closely with SLoCaT in terms of COP21 and the climate change activities on transport as part of a public-partner partnership called the PPMC—the Paris Process on Mobility and Climate. So, just to clarify a few of these abbreviations and acronyms that we've heard.

And you might be curious a little bit to see why I chose this picture as my opening slide—because I wanted to just underline that we have a very narrow view on how transport and renewable energy can be used for transport. And of course, this is in Bogota, and there they have a ropeway to go from downtown to uptown, as it were. And of course, the capacity of something like a ropeway doesn't compare with a metro, but nonetheless it is a very feasible option for many cities that are either with rivers or with mountains. And you can see that this actually works extremely well and is much, much cheaper in the end than building a lot of roads—so, increasing the capacity of roads. And of course, it can be powered by electricity. So, I just wanted to

share that with you so that we could—oops—so that we could just kind of open our minds a little bit on what transport and renewable energies might look like.

So, this is a little quick overview on what the SLoCaT partnership is. It is really an international partnership that has more than 90 members from all the different aspects of transport and those that can influence transport, including—as mentioned here, the—many of the UN organizations and agencies, governments, development banks, NGOs, academia, and others. And we really are trying to federate all these different actors so that there is more of a one voice for sustainable transport and to help change global policies, particularly in the realms of sustainable development and climate change. And so, here you can see just a few of our supporters. Of course, we thank them very much because without them we can't function. [Laughter].

So, the title was "Present Trends in Transport." And really, in transport, for the last 150 years people and goods have been travelling further and further, and speed has been the main driver of this need to travel, this need to be mobile. However, we as passengers spend roughly the same time every day on our commute, which is between 40 and 90 minutes, depending on average where you are. Of course, in some places it's a lot worse than that. And as consumers, we are demanding more and more in this area. Our orders, whether they're made by Internet or otherwise, have to be delivered as quickly as possible. And as business has always said, "Time is money." So, this speed issue has really driven the trend in transport to deliver more and more transport and for us to go further and further.

But we know that this is actually not quite the reality. The reality looks more like this, where you have congestion, you have pollution, you have people that are really suffering because of the use of fossil fuels in transport.

So, yes, the use of fossil fuels. Pretty much 95 and more percent of transport relies on fossil fuel for its traction. And this slide shows that the transport emissions are growing at the moment, and if we continue on the present trends, this is going to just get worse and worse. Transport is just one of the sectors where emissions are actually growing the most and the fastest. And as we need to decarbonize globally, this obviously will offset any efforts made in other sectors. And the power sector is making, as Christine said, some very good inroads into the reduction of their emissions, particularly in the developed world. But in the developing world, they still have a few challenges.

But transport really has to somehow embrace this decarbonization aspect if we are actually going to achieve anything like a two-degree scenario. This are the scenarios that are set out by the International Energy Agency, and this just shows you the bad news for what would be a six degree scenario, which we all know is certainly not what the planet needs. So, we need to look at—in some way or another address this issue of an increase of around 60% of transport emissions from today, which is already pretty high, to 2050.

But the landscape is actually, I think, extremely promising. The COP21 for the transport sector was actually a very encouraging agreement. Obviously, I think it was very well managed by the French, and this has set the scene for quite a lot of governments to be able to start this process of change, yeah? We know that it is going to be very difficult and challenging, but if we don't have the international framework to start making these changes, then nothing is going to happen.

What was really important between Kyoto and COP21 was that transport was part of—or, is seen as very much part of the energy sector. So, there was nothing really in Kyoto that identified transport as being an area, a sector that needed special attention. And it was felt very strongly that if you dealt with transport, then you—sorry, if you dealt with energy, then you would de facto deal with transport, and the transport emissions would therefore come down. And there is some logic in that, There's nothing wrong with that—except that in reality it absolutely did not happen.

So, we were extremely encouraged to find that the work that SLoCaT and others bridging the gap started in about 2009 were beginning to bear some fruit. And by COP21, this Paris Process on Mobility and Climate was created precisely as a private-public partnership to create a stronger visibility around, first of all, what can be done with transport—and I'll share some of the outputs of that with you later—and also that transport was not such a fragmented sector and that it could come together under the common objective of addressing climate change. And we could put all the different aspects to one side and really show that the transport sector itself was ready for change and that we were actually ready to help and partner with governments to make this change.

So, 2015 set out a very promising landscape from an international landscape, and I think 2016 is going to be just as interesting. We have a major summit coming up in Washington, which has only, I think, four sectors that will be addressed, and transport will be one of them. And this will be held in May. We have the New Urban Agenda being set out later on this year in October in Quito with Habitat III. We have G20 meetings, and we have at the end of the year, of course, COP21. [Note: Slide indicates COP22]

As Christine said, the current share of renewable energy use in transport is extremely small. So, we need to really work out how we are going to increase this, and that's obviously going to help with the emissions. There's some obvious strategies for the short and medium term. There are some long-term strategies, of course, but the ones that most people kind of can quickly understand and quickly embrace is a shift towards using electricity in all its forms—ropeways included, if you remember the picture that I had at the beginning in my first slide. Typically, for passenger cars. More coming onboard for freight, but that's obviously more difficult, to get heavy-duty vehicle switching over to electricity. We've heard that there are only 46,000 electric buses in the world. There will be a lot of hybrid vehicles. And there will also be a lot of new types of vehicles, that we don't know exactly what they will be. Of course, there's a lot of talk now of things like the Google car

and fully automatic driving, and these will come onboard and are appropriate in some countries.

Christine mentioned the number of companies that have biofuel mandates and are mixing with fossil fuel for—with biofuel for vehicles actually works extremely well, with ethanol being in the lead there. And the production of biofuels is getting better and better. It's moving away from obviously having any conflict with food, and there are a couple of examples I'll share with you at the end.

So, there are a lot of opportunities now, and we have this challenge to somehow decarbonize by nearly 50% by 2030, if we're actually going to get to the 2050 goals. And so, there are several—obviously, several ways that we need to be—we need to do this. We need to also accelerate the shift away from fossil fuels for transport.

So, there are three things that really need to happen. The first is that we need to have a willingness and an intention to do so. And we saw at COP21 that we had 15 climate initiatives, of which two were particularly focused on urban and electric mobility. So, that's just two out of 15, and these 15 came from across all the different sectors of transport, including aviation and maritime. So, there is definitely a willingness and intention to make change.

We need the international policy framework, which we've just mentioned a few of the aspects—the sustainable development goals that were agreed in September, and of course transport as a cross-cutting issue has a lot of impact on those being delivered. And obviously, the climate change agreement from Paris. National policies, of course, are absolutely key to accelerating this change in transport. Fuel economy standard, the biofuel mix. The use of alternative fuels, their standards as well is a key thing that needs to be put in place, because in some places you can't actually use some of the alternative fuels because of the lack of harmonization standards. And these nationally appropriate mitigation actions, many of which have transport at the heart of them, and the NDCs—the national determined contributions, which were asked for prior to COP, where countries would set out even in a skeletal form their plans for shifting to a low-carbon economy across all sectors.

And then, we have very interesting options that countries themselves can take which might not be linked to the international frameworks, such as national climate action plans and very ambitious plans possibly at city level. You know, there are several countries that we know want to go carbon-neutral by 2030 or 2050, and cities that have very strong commitments. Now, they're not going to be able to do that—it's quite clear—if they haven't got a low-carbon transport system. Paris, I mentioned, and the link of maybe the mayors' declaration in Paris, which shows a very strong commitment at the city level, where some 450 mayors signed a declaration to push their cities towards low carbon, is also a great opportunity for transport. And we see a lot more progressive policies being put into place at city level: low-emission zones and ultra-low-emission zones will drive people, their consumers, to make sure that their vehicles are as clean as possible. And on the upside, of course, there are incentives for that to happen.

And then, there is actually a lot of activity in technology-based partnerships. These are either public-private or private-private, and I'll give you a few examples.

So, in terms of fuel decarbonization measures, SLoCaT did a very interesting analysis of these intended or now national determined contributions and picked out those countries that had chosen transport for some focus. You can find these reports on the SLoCaT website, and the website will be on my last slide, and obviously you can come back to it.

So, this just gives you a variety of the kinds of plan measures that were put forward, and the diversity of the countries. So really, whether you are a highly developed rich country such as Canada or New Zealand, a medium or emerging country—you know, we have Korea that's a very strong emerging country in Asia, and you have Barbados or Mongolia, the Marshall Islands—these are all looking at what they can do with transports. So, it's really very important that the transport sector also can share with them what the options are. So, I think that this is very, very encouraging.

So, we're talking about spreading the news. One of the big problems when you might have a policy framework that looks at decarbonizing transport and you really start driving deeper into that, what are you going to do? So, you know, what can we do? The first thing is: What can we do? And you need to be inspired as to find out really what is going on in the world.

So, I was personally involved in the 80 Days Campaign, which was led in the 80 days prior to COP21, where we worked with the Dutch Ministry of Environment and Infrastructure. And looking across all the different aspects and focusing on—particularly on technology, on partnerships, on policy, freight, and inland waterways, which are all areas that are maybe not so well-documented, we created a list of more than 110, I think, snapshot case studies from all over the world that are accessible via the PPMC website on examples of what is going on. And this is being built on for the next year, the next 12 months, to have 365 examples on transport and climate change, which will include all the 80 Days example and more, including the INDCs and the NAMAs that look at transport. And here, you can—it's more of a database. So, you have case studies in the 80 days, and the 365 is more of a research database where you can actually search for some of the aspects that you might like.

I have to say: We didn't actually think of putting a tab on renewables, but maybe we'll change that, Christine, and put a search feature around renewables. But on—in the 365 you can search by region. You can search by focus. So, if you want to know what's going on in passenger aspects or in freight or in a particular mode of transport—rail—whether it's in an urban area or rural area or into country as well as all the different policy areas—technology, partnerships, as I mentioned, and electric mobility.

So, here are just—luckily, there is just absolutely too many to mention. There is no limit to our creativity that the human being has. This just gives you one or two examples. So, we have the wind-powered railway system in the

Netherlands. They are actually in the short term accessing green credits for buying wind-generated electricity for their railway system, but in the long term they have the vision to actually shift all their electric provision to renewables. We have examples of second and third generation biofuels made from municipal waste, which again is obviously a win-win situation where the municipal waste can be turned into biofuel for use in local transport.

The picture on the right is a very interesting example where this company has managed to develop a technology where they capture carbon rich gases from steel production and regenerate them into ethanol and methanol. We have an example which is just one example, but it's a casebook of more than 50 examples of e-mobility all over the world. Hytruck is a freight delivery program using heavy-duty vehicles that have been specially designed for urban or semi-urban freight deliveries, and that's something from the Netherlands. We have obviously many city examples such as Rotterdam. What's interesting in Rotterdam, I think, is not just the electric vehicle focus that they've got, but that they have the ambition to shift 50% of their own municipal fleet—so, this is all their municipal cars as well as their waste trucks—by 2018 to electric vehicles. A lot of different times of testing of biofuels in marine and aviation.

So, that—I can only encourage you to have a look at these two aspects—the 80 Days and the 365—because it really can inspire you. And I was actually really amazed about what's going on in the world.

So, in conclusion, yes, technology and innovation: We need to scale up, obviously, technology transfer, in particular to the developing world. There is just so much going on in this area that it could be adapted for their needs. There is, I think, this political landscape which is very encouraging. Just in Davos last week, the African Development Bank launched this Power Up Africa program where they want to really scale up the access to electricity for Africans, because that's holding back African development. And it's led by the African Development Bank, people like Kofi Annan, and they really are looking at not only main grid delivery but mini grid and off-grid delivery. So, there is a lot of technology that's going to be needed. And it's all out there, but we need to transfer it to the right places.

Obviously, battery research and storage capacity is absolutely key, especially for the transport sector. We need to, as I mention, expand developments in biofuels. There are now, you know, many good examples of how we can use things that we pretty well just throw out at the moment and convert them into biofuel. And why biofuel is really important, I think, is for transport the best fuel is a liquid fuel. It's the one that's the easiest to deal with. So, this connection with biofuels and transport. Of course, there's a biogas, and that will remain; CNG is used for transport as well. But the majority of transport is connected to a liqueous fuel. Obviously, scale up the use of renewable electricity.

And then, there are the policy instruments. We need to have this predictable policy landscape. And we need to have the mandates for the shift of incentives or disincentives, whichever one you want to call it. As Christine

mentioned, the subsidies towards fossil fuels need to be shifted towards promoting renewable energies. And there was a lot of talk as well of this phase-out of fossil fuel subsidies at the COP21, so there's a political willingness there. And there was also a political willingness to put in the—a carbon price, and that will obviously impact transport considerably.

Increase of focuses obviously on electric vehicles, and deliver electric vehicles, also, that are appropriate for the developing world is a key area. And then, the finance piece is obviously very important: to create these dedicated fundings and positive mechanisms to incentivize—and I'm afraid—sorry—there's several spelling mistakes in this slide which I'll fix before it's put on the Web. And then, we need to implement, obviously, these possibilities for local carbon pricing policies, of which there are a variety, so it's not just having one carbon price, but in—you know, to finalize. And we need to capture these co-benefits of decarbonizing. We absolutely have to decarbonize the transport sector.

So, thank you for attending and thank you for listening. These are the—it's my own contact details if you want to contact me afterwards, and the contact details for the PPMC and the 365 as well as obviously for SLoCaT, where you'll find some very useful analysis. There's a briefing paper on renewables, as I mentioned—the INDC analysis, as well as our analysis of COP21 around transport and what needs to be done on transport. So, thank you for your attention.

**Sean Easterly**

Great. Thank you very much, Heather and also Christine, for the presentations. We'll move ahead now to our question and answer session of the webinar. So, just a reminder to our attendees: If you do have any questions for our panelists today, please go ahead and submit those through the question pane and I can ask those to them right now.

And so, we did—the first question that came in from one of our listeners in Zambia, they noted that with several issues they have a real need for renewable energy sources. However, they have a real capacity problem. They have a need for—to develop more renewable energy technology skill sets. Are there any recommendations for how they can build capacity in the renewable—so, skill capacity in their renewable energy sector?

**Christine Lins**

Can you remind us again where the person who asked the question comes from?

**Sean Easterly**

From Zambia.

**Christine Lins**

From Zambia. Okay. Yes, indeed. I mean, when we talk about renewable energy, we talk also about increasing the skills that—to really build a workforce and... So, what is actually happening is that there are a number of training programs out there. IRENA has a platform that is called IRELP: Integration Renewable Energy Learning Platform, a \_\_\_\_\_ of different training programs. There is also a situation that \_\_\_\_\_ is in the process of setting up \_\_\_\_\_ for renewable energy. [Audio distortion] in Western Africa.

The \_\_\_\_\_ Center in Southern Africa is about \_\_\_\_\_ as well as the one in \_\_\_\_\_.

We have been working in REN21 with these centers to develop a baseline. So, original renewable energy and energy sufficiency data reports, which—okay, the development of these \_\_\_\_\_ centers will also serve as \_\_\_\_\_. But I agree with the person who asked the question; there is a need in embracing skills and creating skills locally so that also a local industry is created around the new skills.

**Heather Allen**

Yeah, good. Could I just also just remind people that there is the CTCN, the Climate Technology Network that's based in Denmark? This is a UNFCCC mechanism that actually countries can request technical aid. So, it is to do with the transfer of technology. So, if there is a real capacity problem, countries themselves can actually request aid on that. But they in general haven't got anything much on transport. In other words, the countries themselves don't make that request. So, there are mechanisms that if you ask in the right places you can actually get opportunities for technical assistance to increase the skill sets and to also increase the understanding of what technologies are appropriate for your particular country and needs.

**Sean Easterly**

Great. Thank you, Heather. That actually touched right on our next question, which did ask how technology transfer could work through the UNFCCC. So, that was the Climate Technology Center Network, and they do have a website that you can go out and visit if you'd like to take advantage of some of their services that Heather just mentioned.

So, we'll move ahead to the next question. Could you speak a little bit about any solar technologies that are available for vehicles?

**Heather Allen**

There's actually quite a lot going on in solar for vehicles. Obviously, you may have heard of the Solar Impulse, which is a plane that's flying around the world based uniquely on solar power. So, there is absolutely no other kind of power for this. I think that it's a fantastic project to show the potential of solar, because as we've seen with all that the slides of the takeup of renewables and the takeup of technology, once we get it, we get it really pretty quickly. And that hockey stick of a graph, you know, it goes very, very slow, slow, slow, slow, slow-burning, a kind of lead-in to technology transfer and takeup. And then, once it works and we get it and we're sure about it, whoosh, then it can really take off.

Now, at the moment there are a lot of solar-based support opportunities. I mean, you see them all along the motorway in a way that you'd never saw 10 years ago, where they will provide small off-grid opportunities for either connections—you know, powering, parking meter places where you put the money in. There are some other small off-grid opportunities. But where I see really—oh, and there's also a lot of work going on in buses where there's sort of solar panels that can be used on the roofs. On trains, there's been several tests so far. Not yet quite found the right options in that.

But where I see, really, the huge opportunities, is that if we can develop more robust two-, three-, and four-wheeler electric vehicles, particularly for the rural communities, that there can be this virtuous circle that we can create through mini grids and off-grid solar panels where you can link the mobility with the lighting and power needs of small communities and bring that mobility part in. At the moment we're not yet doing that. But that's where I see really some interesting developments and a huge potential for helping the rural community to themselves come out of poverty a little bit, and also stay to in the rural areas. It's really important that we somehow curb the exodus from rural communities to the urban areas. As a growing population in the world, we're going to need food, and we need farmers to make that food, and we need transport for the farmers to transport their goods to market. So, you know, we've got to work out this transport piece of that whole rural economy.

**Sean Easterly**

Great. Thank you very much, Heather. And you actually touched on a couple of the other questions that we had. Looking at developing countries and emerging markets, what do you see as kind of the next steps for renewable energy transport transition—or, the low-hanging fruits for renewable energy transport transition? And again, that's focusing in developing countries and emerging markets.

**Heather Allen**

Well, maybe Christine would like to answer that first, and then I'll step in?

**Christine Lins**

Yeah, sure. Transfer solutions in emerging markets—was that the question?

**Sean Easterly**

Yeah. And mostly the low-hanging fruits, so I guess kind of the first steps, the easier steps in the transition.

**Christine Lins**

Sure. Well, I think it's actually—it is really—when we look in the trends in the sector, it's a mix of all different options that are needed. There is the need, of course, of city planning. We know that we will—we already have over 70% of the global population living in cities. So, a big need for planning cities in a way, building public transport solutions that are often not existing. There is of course a—there will be a big need for increasing public transport, because if we only opt on individual transport, then it's going to be very, very difficult. But then, also, we have—as I said in my presentation, we have the two-wheelers, where there is a continual trend towards electrifying them.

We also have, of course, the biofuels option. There is some research also going on of second and third generation biofuels. But clearly, what we need to take is we will—the way to will—greenhouse gas emissions of different technologies, and there we just see that biomethane from manure or also electric mobility powered with renewables is coming up there on the top. I think also we need to rethink our current system of—or, our current technology is probably not really needed to have the big cars, with the two tons driving near individual vehicles, because very often our cars are just used by one or two people. So, what we are going to see is electric taxis and more public transport vehicles emerge more and more. Heavy [audio distortion] as being more adapted to congestion cities. Heather also referred to, in her presentation, of the cable cars that we see in some of the—in some of the emerging countries.

So, I think it's really a mix of the two. But I think in the emerging economies a big focus should be on the public transport sector in order really to make a difference on the large scale.

**Heather Allen**

I can just add to that as well. I think that the first step really has to be the vision, either at the national level or at the city level. This is where we've seen the most action and the best examples and the speediest examples. And so, you know, at the national level there are some—really, some key things that can be done. Christine mentioned the kind of limiting the big cars—you know, importing secondhand cars that are only of a low emission standard, a low performance standard, just is a no-brainer because these can be adapted. You know, they can be retrofitted to have a higher performance, but that costs money. But if the national governments actually really put those policies in place, that will immediately clean up the fleet because you have to start cleaning up the fleet, and that's the first thing. Fuel economy standards, again, helps cleaning up the fleet.

And so, there's sort of push-and-pull mechanisms and policies, and the pull policies are to use where you would be subsidizing fossil fuel use. Use those kinds of—phase those out and use that money for pulling in new types of vehicle configurations that use renewables in a better way. And obviously, build capacity and the technical capacity and put in the infrastructure. If you build the infrastructure around a fossil fuel future, then that's the future that you're building yourself into for the next 30 years. And as Christine mentioned—I mean, obviously, I'm a great fan of public transport, but it's also about the city development and the land use planning and the urban development. It's not entirely about the transport piece. Because if you create these more compact cities which allow people to walk, use cycles, and use small two- and three-wheelers that are, you know, for short distances already very affordable and very low emission, and if you have high level renewables in your grid, then you're onto a win-win situation.

And many, many developing world countries don't realize that actually they have a fantastic opportunity to leapfrog in their transport situation. Because they say, "Oh, our transport system is so poor and it's fragmented and this and that," but actually, they have a great opportunity. And they really should be encouraged to take it.

**Sean Easterly**

Great. Thank you both again. We have a pretty specific question on data needs that I'd like to ask you, Heather, and then I'll turn to Christine if you have anything to add on it. So, I'll read through it and let me know if you need to repeat it—need me to repeat anything. So, it asks: "How do you overcome challenges to move from data established in country national communications such as national defaults—" and they note the IPCC tier one—"to identifying data needs for a more thorough analysis at a detailed level in developing countries and where such information can be found?" And that is specifically for the transport subsector that they're asking that.

**Heather Allen**

Okay. So, if I understand it correctly, they're questioning, really, how do you use what might be internationally relevant frameworks for data collection and putting it into what might be more appropriate for the national use?

Well, I mean, if you are using default information, then there is something wrong with the fact that the data is not there. So, there has to be at a national level an investment in data collection. And I have to say that for transport this is a real bugbear. The problem with us really knowing what's going on in transport is that the level of the data and the quality of the data is very, very fragmented. Just to give you one example which the—I don't if—the—if it's appropriate to mention, but in many countries you will have a vehicle registration system but you will not have a vehicle end-of-life system. So basically, the fleet just gets bigger and bigger and bigger because you never see any vehicles exiting the fleet. So, it's really difficult to understand what the fleet looks like because there may be many vehicles actually off the road.

So, you know, there are a lot of—there's a lot of work that needs to be done at a national level to collect the data. It is a big challenge. I think that the only thing—to give a very short answer to this very precise question—is that every country really needs to engage in collecting accurate and appropriate transport-related data, because there are many frameworks and ways of collecting it, but using an international framework, whether it's the IPCC or—which is not necessarily destined for transport data collection—but, you know, there are OECD guidelines for many of the transport data collection. But you need to have something that you can compare with other countries. And then, to go down in the granularity of your data collection, then you do need to actually go into quite some detail.

But the good news is, I think, that there is quite a lot of development in terms of how you collect data. In order to plan a public transport system you have to have origin and destination data to know what the demand is. Well, the ways that we used to do that would be somebody standing on a corner counting vehicles, interviewing people. These days, technology can jump in and produce something that is much more precise. And there is a lot of, as I said, development in using technology to understand, really, what the transport situation is. And in terms of the real world emissions, you know, nobody will not be aware of what VW has experienced in the last three or four months. And the difference between the real world emission data on transport-related emissions and actually the type approval standards and numbers are quite different, and we do see much more interest in the real world emission data collection. And even just to know the delta: How wrong are we on this? That is enough.

So, we are moving towards real world emission and transport emission collection. And I see that coming up fairly—yeah, in the very near future. It's already there, but it's not there everywhere.

### **Christine Lins**

Yeah, I mean, and just to add on to Heather's comment: This is a situation about data availability that I think many sectors face. It's the same story in the renewable energy sector. Without good data it is very difficult for policy makers to make the right decisions. So, it's something that—to be worked on. It's something that is time-consuming and costs money, but there are ways of objectively collecting data in our experience. Also, when developing the Renewable Global Status Reports, we just—to take the approach of relying

on data from both the public and the private sector really helps to draw up the picture. And we have over the last decade developed this. And so, that's why we are also working now, having a partnership with SLoCaT to probably also increasing the strength protection that we have in \_\_\_\_\_. By no means am I saying that we are the only ones providing the data, but I think it's really important to connect the dots and put all the different sources of data out there together in order to be a [audio distortion] very often needed to portray all the different solutions and put people who [audio distortion] in touch with each other so that they can learn from already made experiences.

**Sean Easterly**

Great. Thanks to you both again. Another question that came in; it's asking: "Why don't we see more policies that limit countries from exporting secondhand used cars?" They note that developing countries are becoming dumping grounds for secondhand cars.

**Heather Allen**

I mean, I think it's quite difficult to limit exports. But it's quite—it's much easier for countries to limit imports. And if—I know Kenya put something in—put a policy in place to limit the imports of poor quality vehicles. And once that market is no longer there, you know, then the export side of it is already changed. So, if they can only export to countries that will accept a certain level of emission factors from their vehicles, then those vehicles very likely will be retrofitted in the countries where they're exported from, if you follow what I'm trying to say.

So, I think that this is where the developing world has to have a vision and they need to want to make this change in transport. They are beginning to understand, I think, that just transport at any cost and as quickly as possible is not going to actually drive the economic development that they want. You know, how many cities in the developed world—developing world—has just the most terrible congestion you can imagine, built up in a very, very short time from a very small percentage of the population that can actually afford motorized vehicles?

So, they know that they have to address it in some way. And it's a bit of a vicious circle in a way. The quality of fuel, particularly the quality of diesel, is very low in many developing world countries, with high amounts of sulfur in them. And these work on, you know, Euro I, II, and III level vehicles. You get to Euro IV vehicles and they can't take the fuel. So, it's—you've got to do something about your fuel quality in order to limit your exports—your imports. So, it's again one of these kind of conundrums where you really have to have the political will to—and understanding that this is a real key issue for the future.

And as fleets around the world—if we achieve the levels of penetration of electric vehicles that we need to be able to do in order to decarbonize by 2050, then, you know, this in a way is going to impact all those import and export corridors. If there aren't any old vehicles to export from these developed world countries to developing countries—and let's face it, an electric car without a decent battery is not going to be much of a prize to anybody—I think that this is quite an interesting kind of thought which nobody has really gone in to study very much.

**Sean Easterly**

Thank you. And we did have one quick follow-up to the question on the data collection that was just discussed: "Are you—do you happen to be aware of any NAMAs or INDC examples that have already performed this transformation to real world data collection?"

**Heather Allen**

There's a NAMA in preparation, and I believe it's in Ghana... I think it is in Ghana. I can look that up and put it in—send it to you, Sean, maybe, and you can send it on or... But yes, I mean, this is really the way to go, and I can continue a bilateral discussion with that question or—if you want. But as far as I know, Ghana is the only one that's looking at real world emissions. There will be, I think, more. The nice thing about real world emission data is that actually you can build it very quickly into a policy program.

So, just to give you an example: There is technology out there that can identify particular vehicles that are polluting—in general, local pollutants. But obviously, that will have—that's that whole combustion cycle. So, they can—you can identify particular vehicles that are polluting beyond the vehicle class. And you then can identify, obviously, through the registration the owner of that vehicle. That owner may get a letter to say, "Clean up your vehicle. Go to the inspection of maintenance people and get it brought up to at least the standard that your class of vehicle is supposed to be at." And then, that can be linked—if that doesn't happen—to obviously fines and whatever. But that whole process can be at least revenue neutral, if not revenue positive. And it can really help to clean up the fleet and give a better understanding of how many vehicles in the fleet are just not maintained, so their emissions are not even at the—are well, well away from any default emission factors that you might be using.

And this is where real world emission standards, I think, and real world emission data collection is really going to pull the punches. At the local level, it's going to help clean up local air pollution, and therefore it will also help clean up the CO2 emissions as well.

**Sean Easterly**

Thank you, Heather. And I did go ahead and put your e-mail back up so that that attendee can reach out to you to continue the conversation on that question if they'd like to. So, I'll leave that up for a minute there and he can take that down and contact you.

And so, with that, we are running low on time. We had a number of great questions, and we thank our attendees for that and the panelists for addressing those. We do have a brief survey that I'd like to ask our attendees to participate in. We have five questions that can be answered directly in the GoToWebinar, so I'm going to go ahead and put those up now, and we'd just ask you to kindly respond. It just helps us evaluate and improve for future webinars.

And the first question is "The webinar content provided me with useful information and insight." And the second one is "The webinar's presenters were effective." The third question is "Overall, the webinar met my expectations." And then, a couple of "yes or no" questions for you. So, "Do you anticipate using the information presented in this webinar directly in your

work and/or organization?" And the final question for you: "Do you anticipate applying the information presented to develop or revise any policies or programs in your country of focus?"

Great. Thank you very much for responding to the survey. And so, on behalf of the Clean Energy Solutions Center, I would just like to once again thank Christine and Heather for the presentations and taking the time today to join the webinar. And also, to our attendees for their time—we very much appreciate your attendance.

Just a reminder to everyone: If you would like to download a PDF version of the slides from today's presentations or listen to the recording of the webinar, we will be posting them to the Clean Energy Solutions Center training page. That's the first link on the slide that you're seeing. Please give us about a day or two for those to go up there. There's a—it will take us a couple days to get that posted. Additionally, webinar recordings are now being posted on the Clean Energy Solutions Center YouTube page. That link is also provided, or you can get there through the Clean Energy Solutions Center page.

We do hold a number of annual webinars with REN21 on a variety of topics. We split those webinars up this year based on topics. So, if you go out to the previously held webinars and look for the recordings, you will find other REN21 webinars as well. You can also go out to the REN21 site for more information on those.

And then, finally, I'd just like to remind everyone about the Solutions Center "Ask an Expert" technical assistance program—the free policy support that we offer. If you have any questions on that, you can e-mail me directly. My information is at the bottom of the slide. Or, feel free to go right out to the website and submit any requests that you might have through that simple online form. And again, please feel free to share any of this information with those in your networks and organizations.

And so, with that, I hope everyone enjoys the rest of your day. And we hope to see you again at future Clean Energy Solutions Center events. And this concludes our webinar.