Policies for Large Scale Adoption of Renewable Energy Technologies
The Design of adapted Feed-in Tariffs for Developing Countries

SERN side-event World Forum on Energy Regulation
16 May Quebec 2012

Event organized in association with the African Forum for Utility Regulators

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Introduction

The Renewable Energy and Energy Efficiency Partnership (REEEP) promotes the wider use of renewable energy and energy efficiency as a means to greater energy security, economic development, social equity and environmental protection. REEEP is an active global coalition that structures policy initiatives for clean energy markets and facilitates financing for energy projects. REEEP is uniquely placed among global initiatives to drive the integration of renewable and energy efficient systems into national and global energy policy. REEEP is supported by funding from the governments of Austria, Ireland, Italy, the Netherlands, Spain, the United Kingdom and the United States and the European Commission.

A priority area for REEEP is therefore the promotion of policies and regulatory mechanisms that support renewable energy and energy efficiency (sustainable energy). REEEP has organised via its Sustainable Energy Regulation Network – SERN a side-event on "Policies for Large Scale Adoption of Renewable Energy Technologies. The Design of adapted Feed-in tariffs for Developing Countries" at the World Forum on Energy Regulation, in Quebec the 16thMay 2012.

This event has been coordinated by Dr Xavier Lemaire and Dr Gill Owen, Energy Institute, University College London and transcriptions have been done by Daniel Kerr and revised by Gill Owen and Xavier Lemaire.

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Program

12.45	*Arrival and registration*
13.00	Introduction by the Chair Dr Gill Owen, SERN/REEEP **Mr Martin Hiller, Director General of REEEP** **Mr Haruna Masebu, Chairman AFUR**
13.30	**How (not) to design a feed-in tariff: lessons learned** Tariff calculation methodology – tariff duration - tariff and time differentiation - tariff revision – tariff degression – location and size specific tariffs **Speaker: Mr Chad Laurent, Meister Consulting Group**
14.00	Q&A
14.15	**Specific features of a feed- in tariff to support RET in developing countries** Examples of a feed-in tariff in developing countries: how to keep control of cost in developing countries – capacity cap; local content requirement; FIT financing **Speaker: Mr Chad Laurent, Meister Consulting Group**
14.45	Q&A
15.00	Discussion/Roundtable on feed-in tariff and RET strategies **Chair: Dr Xavier Lemaire, SERN/REEEP** **Speaker: Mr Thembani Bukula, NERSA**
15.50	Conclusions and closing remarks by the Chair
16.00	*End of the seminar*

List of speakers

Thembani Bukula

Thembani Bukula is the Regulator Member primarily responsible for electricity regulation at the National Energy Regulator of South Africa (NERSA). He obtained his B.Sc. Engineering from the University of Natal and a post graduate diploma in Engineering Business Management from Warwick University. He started his career at Yelland Engineering, then joined M&E Design and thereafter joined Eskom in 1994 as an engineer responsible for the commissioning of the extra High Voltage substations in the KwaZulu-Natal region. Between 1995 and 1997 he was a test engineer at KEMA-The Netherlands. He has been the Managing Director of various companies including the NETFA, SABS – Testing and Conformity Services and National Data Systems between 2001 and 2006.

Martin Hiller

Martin Hiller has over 20 years of experience in policy and environmental campaigning, and in-depth knowledge of climate change and energy issues, with a focus on policy and business engagement. He has developed and implemented numerous campaign strategies in the international policy arena, communicating complex environmental and development issues and co-ordinating and managing cross-cultural teams and projects.

He finished a long career at the environmental NGO WWF-World Wildlife Fund where for eight years he had led campaigns and communications of the global climate and energy programme. Before that, he established the first communications operation for any environmental NGO in Brussels, developed WWF's regional communications operations, and created the first EU-specific policy campaigns. He is also the founding President of the Board of the Gold Standard Foundation. Martin Hiller's credo is to use the power of communications to create momentum for making solutions happen.

Chad Laurent

Chad Laurent is a Senior Consultant and Meister Consulting Group's General Counsel specializing in renewable energy law and policy, sustainable business strategies, and renewable energy project development. He currently manages Meister Consulting Group's work with the U.S. Dept. of Energy providing technical assistance and training for the SunShot Solar Outreach Partnership on solar energy opportunities within local communities.

Mr. Laurent has provided legal analysis of Indonesia's Geothermal feed-in tariff policy contributed to the drafting of a renewable energy law drafter's guide for the United Nations Environment Programme, and to a study on the legal ability of U.S. states to set feed-in tariff rates for the National Renewable Energy Laboratory. In addition, Mr. Laurent has consulted for the World Bank, DB Climate Change Advisors, the Mass. Dept. of Energy Resources, and the SEMI PV Group among other clients. Chad's professional experience also includes work with the Environmental Defense Fund and the Rocky Mountain Institute.

Xavier Lemaire

Dr Xavier Lemaire is research associate at the UCL Energy Institute. Previously he was research fellow at Warwick Business School. Since 2005, he works for the Sustainable Energy Regulation Network (SERN), an initiative funded by the Renewable Energy and Energy Efficiency Partnership (REEEP). For this network, he coordinates an annual energy policy review and he conducts research on energy policies and regulation in developing countries.

Xavier was previously Marie Curie Research Fellow at the University of Warwick (2003-2004) and lecturer in Universities of Paris in Socio-Economics, Management and Sociology of Organizations (1998-2002). He also worked as project officer on rural electrification with solar photovoltaic systems and energy efficiency programmes in French Guiana and as an independent consultant (1992-1997).

Haruna Masebu

Mr. Haruna Said Masebu, is currently serving as Director General of the Energy and Water Utility Regulatory Authority. Following the expiry of the first term (2006-2009), he was reappointed for his second and final term (2010-2013). Prior to his current appointment he worked for the Presidential Parastatal Sector Reform Commission (PSRC) as a Regulatory Coordinator (2001-2005); Regional Manager for the Nairobi-based African Housing Fund ([1997-1999) and Director General of the National Housing Corporation (1994-997). He started his career in academia, where he rose through the ranks to become Senior Lecturer and Vice Principal of the Dar es Salaam Ardhi Institute (now Ardhi University) (1979-1994).

Mr Masebu has served as a member of the Board of Directors of several institutions, including major banks and academic institutions. He is the current Chairman of the African Forum for Utility Regulators (AFUR) and of the Independent Regulatory Board (IRB), established in relation to the East African Power Pool (EAPP).

Gill Owen

Dr Gill Owen is a Senior Research Associate at the Energy Institute, University College London and Director of the REEEP Sustainable Energy Regulation Network (SERN) project. She is also Vice Chair of the UK Government's Fuel Poverty Advisory Group, a Non-Executive Director of the England and Wales water regulator Ofwat and a member of the UK Government's Smart Meters Consumer Advisory Group.

Gill was a Commissioner of the UK's Competition Commission for ten years until 2002 and has also been a non-executive board member of the Great Britain energy regulator, Ofgem. She has continued involvement with Ofgem as a member of its Consumer Challenge Group for the Distribution and Transmission Price Reviews. She has undertaken extensive research and published widely on energy efficiency, smart meters and demand side response.

Transcription[1]

Dr Gill Owen, SERN: Welcome everyone to this SERN side event on feed-in tariffs. We have simultaneous translation in French and English with head sets available at the back. I am Gill Owen and together with my colleague Dr Xavier Lemaire, we run the SERN project, based at University College London. SERN is a REEEP initiative and REEEP's Director General will say a bit about REEEP in a few moments. But first I would like to introduce Mr Haruna Masebu of the African Forum for Utility Regulators, who are very kindly co-hosting this event with us today.

Mr Haruna Masebu, African Forum for Utility Regulators: Good afternoon. Yes, I'm Haruna Masebu and I'm representing AFUR. Ideally, our Executive Secretary, Miss Debbie Roets, is the one who would have come here to present AFUR. She couldn't make it through, she had problems with the visa in the United States and therefore I have had to stand in instead. AFUR is a member organisation which has membership from about 22 African countries, and most of these countries are developing countries. To most of these countries, issues of renewable energy are very relevant. Most of these countries have got single buyer models, and therefore, the development of renewable energies and how these would be integrated with the main transmission lines and grid systems are very relevant. Therefore, whenever we get fora like this, to discuss these matters and compare notes, it is both relevant and ideal for ourselves. We already have got best practices from many other countries in Africa, so Africans will be talking about what they've been doing in this regard. We've also got models from Tanzania about standardised power purchase agreements, but it is my pleasure to participate in this event, and see how all of us benefit from the network that we have, the relationship that we have between our forum and REEEP. Thank you very much.

Dr Gill Owen: Thank you very much for that. I would like now to introduce Martin Hiller from REEEP. Martin is our Director-General, he's going to say a few words about REEEP.

Mr Martin Hiller, REEEP: I will continue in English since we speak it usually and it's a bit easier for me. Welcome to this workshop on feed-in tariffs for developing countries, and thank you for your interest and being here. I might ask just to very briefly introduce REEEP and SERN. I describe REEEP when I have to be brief with the three F's. It was founded in 2002 at the World Summit for Sustainable Development in Johannesburg by a group of OECD governments led by the United Kingdom, and then including countries like Norway, Germany, Switzerland, Australia, Canada, the U.S. and a few others. It is funded through contributions from those OECD governments, and others, and it is focused on energy efficiency and renewable energy. And in that sense, it's a rather rare organisation, because most organisations are focused on either renewable energies or energy efficiency, but we have combined that. And specifically, we focus on policy and regulation, we focus on financial frameworks for market development, for clean energy, and we focus on information provision through our portal, REEGLE.info.

The overall theme for REEEP is to create market conditions for clean energy, and one of our initiatives is SERN, the Sustainable Energy Regulation Network, that has organised this event today, and Gill Owen who is leading it together with Xavier Lemaire. SERN is a network set up to provide information and advice to regulatory agencies, governments and others, on clean energy regulation. The focus is on developing countries, as is the focus on REEEP, and what unites REEEP and SERN very much is our strong conviction that clean energy is the future, and I think here, today in this room, that's one of the opportunities where we actually start to set the course to reach that future. Thank you.

[1] The power point slides of the presentation of Chad Laurent can be found at: http://www.reeep.org/830/sern.htm

Gill Owen: Thank you very much, Martin. I also wanted to say that we are recording this afternoon and we will be producing a report of the session today, which will be produced in French and English and be available after today. And there's quite a bit of information around in the room about REEEP and SERN, which you're very welcome to take away with you; you'll see there are links to the website, where we have information on our policy reviews of policies for regulation for renewable energy and energy efficiency in a very large number of countries around the world, so please feel free to take any of that information. So without further ado I'm going to introduce our keynote speaker, Chad Laurent. Chad is a senior consultant specialising in renewable energy and policy, with Meister Consultants Group, and he's got a very wide-ranging experience, which is detailed on the biographies, which I think are around the room. He has advised the U.S. Department of Energy, and he's done work in a number of developing countries, including Indonesia. So we're very pleased that Chad is able to join us this afternoon, and I'll hand over to Chad now.

Chad Laurent, Meister Consultants Group All right, thank you very much. Welcome everyone, and thank you for taking the time this afternoon, and thank you for having me, it's a real honour and pleasure to be here to speak more about feed-in tariffs, and the implications of feed-in tariffs, in particular to developing countries. (…) We will introduce some of the more interesting and more relevant types of feed-in tariff and policy questions that need to be asked, and some of the lessons learned or mistakes that have happened along the way and sort of what can be learned from those examples. So we're going onto a few different examples of tariff methodology, duration, differentiation, revising tariffs, and then finally tariff degression.

So first just a bit of background. The majority of countries around the world now have some form of renewable energy target, and a feed-in tariff is basically one of the mechanisms used to meet those targets, and to actually develop renewable energies within a country's environment. The important thing to remember is that one country's perfect design for a feed-in tariff may be the worst possible design for another country, so for example whilst Indonesia is focusing on geothermal, if geothermal resources were not relevant, or were not the most economically feasible renewable energy source, then another country would be ill-advised to seek the best practices from a geothermal feed-in tariff. Similarly, an uncapped feed-in tariff, like for some resources in Germany, may be economically undesirable and infeasible in many developing countries.

In general, feed-in tariffs involve being guaranteed to interconnect to the grid, guaranteeing purchasing the energy from the renewable energy generator, guaranteeing some form of transmission standardised contracting, and then, what is spoken about the most, is the price, and what that price is, a fixed price for a certain amount of time. However, given that feed-in tariffs have been one of the most successful renewable energy policies in the world, with the majority of all installed, something like 80% of all installed photovoltaics in the world are due to feed-in tariff policies, 75% of all wind power and so on all across the world is due to feed-in tariff policies. That said, given that they are successful, there are many cautionary tales and lessons to learn going forward.

So first, tariff calculation methodology, there's basically two different options, there's a cost-based approach, this is not different from traditional cost-based price setting, which has been done for fossil fuels throughout the world; most of the monopoly utilities are guaranteed a certain return on their investment when they build a power plant, whether it's coal or natural gas, the cost plus a certain reasonable return is built into that price, in that sense a cost-based feed-in tariff is in fact not different from traditional rates-setting for traditional fossil fuel resources. The other approach is a value-based approach, this approach can value the electricity given the time that it's delivered, or the avoided pollution or the environmental benefits, somehow calculating the added value of renewable energy resources, and setting the price based on those values. However, given that a developer needs to make a certain level of return on their investment, if you're using a value-based

approach you're sort of hoping the value equals the return necessary to build the project, and in a sense if you're using a value-based approach, you might get lucky and get projects built, but with a cost-based approach, you're certain of building that into the tariff (…).

So what comes up in the debate about price setting is that it's some form of government price fixing, and many times there is a detailed cost model produced, and everyone debates what those inputs should be. And the North American experience at least is that we like to argue about every single input in that spreadsheet. But what we've learned is that you may spend days discussing items such as inflation, which is what happened when Vermont were discussing their feed-in tariff rates, and at the end of the day, the inflation rate picked didn't actually affect the end tariff. So arguing over 2,000 different variables that go into setting the price, may not be the most effective time-wise. Similarly, you can get the price wrong; the original 2006 rate in Ontario was quite low for photovoltaics, therefore only a couple of very large projects got built, that had the lowest cost-per-kilowatt-hour to construct. Similarly, Spain set relatively high rates for solar, not anticipating a steep decline in solar energy prices, and therefore the market grew at a rate they could not quite handle.

In the 1990s, in the first stages of the German feed-in tariff, the payment amount was pegged to 8% of the retail electricity rate, however when retail electricity rates fell, the tariff amount was no longer high enough. So they went back in and changed those rates, but it's something to keep in mind when you're setting those rates. Similarly in California, there was a feed-in tariff for small-scale renewables, but actually no projects got built because the rate wasn't quite high enough. That especially can happen when you're basing the rate on avoided cost, or some sort of value-based cost, rather than the actual cost of generation: there can be unintended outcomes. In Sacramento, California for example when they were setting a feed-in tariff rate, it was a value-based rate for 20 years, they were hoping to get wind and solar projects, geothermal and maybe some biomass, but instead the queue filled with only PV projects in two days, which demonstrated that solar is a rapidly-dispatchable renewable energy resource, and if the goal is to encourage multiple types of technology development, you should probably have rates that are differentiated as such.

The next is tariff duration or payment length. This is essentially the length of the power purchase agreement that is signed between the purchasing entity, usually the utility or some form of government entity, and the power provider. Feed-in tariff payments usually are categorised as short-term, medium-term and long-term, and international best practice is long-term rates for most types of renewable energy, and that's in a 15-20 year range. This is because renewable energy sources are capital-intensive up front, and then the fuel source is free, and therefore you need a longer payment term to get reasonable financing terms, for building such projects. Similarly, cost-based rates, longer contracts, increase the potential for price stabilisation, you know what rate you're going to be paying for those sources for 20 years, and you can design where you're getting your other energy sources accordingly. Long-term contracts provide a greater period of time, you can levelise (sic) that cost, reducing the rate required for debt-based projects. Short-term contracts however do cost less from a rate-payers perspective because you're on the hook for a smaller amount of time, but often, with the exception of biomass projects, it's not enough to drive the type of renewable energy development that is often desired.

Some lessons learned. There haven't been too many big mistakes due to tariff duration, the only mistakes have been when projects weren't built. So in the 1980s in California, wind turbine projects got a large up-front payment, and then very little payment in later years, and once the projects got built, and got the short-term rate, then they didn't have any incentive to operate afterwards, and essentially stopped working, which is no policy-makers desired outcome. Similarly with rebates, if the payment term is too short, you can see what happened in Long Island off of New York, where they had a large up front rebate program, and there are anecdotal stories of solar panels being

installed on the wrong side of the roof, on the North side, where is isn't sunny, simply to get the rebate, due to inexperienced installers rushing in to take advantage of the incentive, whereas the real desire is to have these projects contributing renewable energy to the grid for a long time. Similarly, in Hawaii, there were 20 years contracts below the cost of generation and that can have real impacts for oil-dependent countries that have huge fluctuations in the price of their electricity which is often coming from oil or imported diesel.

I mentioned earlier, there have been traditions with feed-in tariffs with biomass or biogas, because of the fuel source implications, sometimes a short-term payment may be desired, because they have a fuel cost and fuel cost risks, and so they may not be able to get a 20 years contract for the fuel, and they don't want to be exposed to long-term risk. So the duration of payments for biogas or biomass may be on a short-term and then revisited, which I'll get into in a minute. The Germans have developed lots of biogas, but they have a very, relatively high feed-in tariff rate, and there are some examples where folks over there are growing resources, simply to be put into the bio-digesters to create biogas. The counter-example is in Spain, where the rate for biomass projects is very low, the exposure to fuel risk is quite high, and they essentially don't really have a biomass market to speak of. So biomass is really critical, and it's one of the areas of energy where there may be different payment durations and considerations that you want to take.

Next, a bit about tariff differentiation. So feed-in tariffs are commonly differentiated by a number of different ways: the project size, the installed capacity of the system, the resource quality - so you're paying more for projects that are in less windy areas or less sunny areas and less for projects that have more wind or more sun. Also technology, or the application, so obviously differentiating between solar and wind and biomass, but then also between say ground-mounted solar, which tend to be large projects, versus rooftop solar, which tend to be projects on residential or small commercial buildings, and then building-integrated PV. Also you can differentiate the payment amounts by ownership type, so whether it's publicly-owned or privately-owned, so if you wanted to encourage independent power producers that weren't part of the utility or part of a monopoly-type infrastructure, then you may want higher payment for independent power producers than for projects owned by a utility. Similarly in geography, you may want to encourage development either on-land or off-shore, if that's an option, and finally, local content requirements, which I'll get into in the second half of the presentation, where you may want to add a bonus payment or some form of requirement for projects that have some sort of local manufacturing or local installation component. So location and size-specific tariffs, that's usually what we say when we talk about differentiation other than the technology, the pertinent decision besides eligibility is whether to restrict size, and then if you're restricting the size, applying a cap, or maybe a floor on project sizes. So in this sense, larger projects are likely to be more cost-effective, they're likely to cost less, so you may want them to have a different rate, so often a lower tariff payment rate.

Similarly, projects that are in an ideal location for wind and so forth, may not be where transmission lines are or where load centres reside, for example in the United States we have huge wind resource throughout the middle of the country, but the major population centres tend to be on the coasts, and so each state should accordingly plan, or look to locate renewable energy resources near where load is provided, otherwise there may be the need for increased transmission and distribution capacity, which would be an additional cost, to get transmission lines to where the resource might be.

So, some of the lesson that we've learned. Spain has differentiated between large and small projects, but they've also failed to close a loophole where a large project could be split up into smaller projects to take advantage of the larger tariff rate for smaller projects, so you must be very careful to consider how you're defining a large project, is it one interconnection point for the project, because someone will find a loophole, or a way to get the higher tariff payment rate, and so if the goal was to encourage small projects, but you simply get large projects that are split up into smaller ones, you

haven't really achieved what you are going for, so it's an important consideration. Also location, so in Germany the majority of the PV is in the sunniest part of the country, in Bavaria, if the desire was to have PV in other locations, the tariff may have needed to be differentiated in a different way. The other example is in France, where they're differentiated by irradiance levels, and the tariff payment is higher for areas with less sun, and lower comparatively in areas with more sun - basically each project is getting the same return on investment, which is sometimes to consider in how you differentiate, and what those ultimate tariff levels might be.

A couple of other examples, there are relatively high tariff rates in Uganda, but it's unclear if the PV rates are so high that customers would be willing to support potential rate increases. There may be a boon to developing areas, but that may result in costly upgrades to the grid, or it may not be possible to accommodate large projects, and so it may be important to focus on developing projects that are sized to the existing grid infrastructure and the capacity constraints of transmission lines. One other outcome in France that was sort of unintended was that they wanted to focus on integrating PV and doing a building-integrated, photovoltaic installations, (architectural shingles for roofs), however there was a loophole that allowed free-standing structures with solar to be considered building-integrated: the result was a large amount of free-standing structures built just to hold photovoltaics. This probably wasn't what they had in mind in terms of building-integrated, so again it's important to make sure that you're developing a policy that's targeted to the results that you want to see.

Next we'll move onto tariff revision and degression, which are very important topics, given that renewable technologies are very dynamic and prices can fluctuate significantly, especially with PV, we've seen prices drop in the 40 to 60% range in a short amount of time, which can really affect an uncapped feed-in tariff, or feed-in tariffs that are set at a certain rate, so it's important to have those reviews built in. There are three different general mechanisms, either triggers, adjustments or reviews. Triggers are where, after either a certain amount of time, or a certain amount of capacity is built (e.g. megawatt target), or you have an amount of generation, you review the tariff levels. You can have automatic adjustments that are pre-set, so once you reach a certain trigger, after one year the price drops X%, or you could just stop the program entirely, which would be sort of a hard stop, or it would initiate a policy review. So you can either set up the rates that will decrease at a certain time, you can say we're going to do a pilot project, and once a certain amount of it's available we'll stop and re-evaluate, or you can say, we're going to re-evaluate the price, through some sort of regulatory or policy procedure. So those reviews are either formal, or they can be hard-wired in. It's important to review where the market stands, where development has occurred, and adjust the tariffs accordingly. Say, if, you know, we're only getting big projects, and they're not where we wanted them to be, then we need to make adjustments to move them to the desired locations and desired sites.

So there are a number of examples where triggers have been initiated and have been remade into different policies. In Australia, they review the different feed-in tariff rates every 3 years, California in the U.S. here is reviewing annually, Italy every 3 years, Malaysia every 3 years, Taiwan has an annual review of the tariff, Ontario, next door is only 2 years. In Germany it was an annual degression reviewed every 4 years, however the big issue is PV and that moved from a volume-based review, now to monthly degression rates. This was because the market expanded, and prices have come down so rapidly, that they're now using a monthly review and decrease in prices going forward.

So again, the big question around feed-in tariffs is how you control the amount of PV that gets developed. Prices have been dynamic, and it's a very easily-dispatchable resource. So, there are generally very many rooftops that could support solar, and there's many areas of land that could support solar, and unlike wind, which usually needs to be developed in areas with high wind speed,

solar can go almost anywhere, as long as it's not on the North side of the roof, and so as a result, you can see a large increase of PV being developed in a relatively short amount of time. So for example, the Czech Republic, there was no trigger, and there was no automatic degression, and the rule was that the regulator could adjust every year, but they couldn't adjust the price by more that 5%. So they saw a huge explosion in PV development, the regulator tried to respond, but they couldn't get regulations passed for two years, and in the meantime the market basically tanked for solar, or stopped as a result. So if there's no adjustments, no degression rule, and if you're sort of tied to a certain percentage deduction that may not match the actual drop in prices, you could run into trouble.

The opposite can happen, where as in Germany early on, wind turbine prices were actually going up, while the automatic degression rate for wind, for wind turbine feed-in tariff was going down, and so effectively the market froze until they were able to re-adjust that tariff. So it can go both ways. Finally the triggers in Spain had a long delay, there was a one-year window in which the tariff level was good, it was based on the amount of time it takes to develop wind turbine projects, obviously you can build solar PV projects in a much shorter amount of time, and as a result, that was the huge boom in Spain which has essentially since frozen PV development in Spain.

So that's all I have for the first section, I'd like to welcome questions.

Gill Owen: Thank you very much Chad, very interesting, I think it raises [applause] some quite interesting points following on from the theme of the Forum in general, about striking a balance. This very much highlights some of the difficulties of striking a balance between, obviously the interests of consumers, who don't want to be landed with over-high charges, but the need to keep investment going, and not have stop-start, and catastrophic problems in the market, so quite a challenge for regulators and policy-makers here, and indeed for everyone else. So I'd like to open up now to questions...

Mr Zia Miam, OUR (Jamaica). We actually started the tariffs with the avoided cost of electricity, but there was a lot of noise by the electricity board, so what we have done is we have adopted the short-term market cost, we give only two-year contracts, and because this is what we are going to use as a pilot project, and we'll see how it will develop, and short-term market costs, just based on the price of fuel, and there is a lot of people who want to develop the systems, but we don't want to get caught into a situation where our prices are already too high, and we can't just start loading this thing to the consumers. Plus they wanted feed-in tariff, they wanted the net billing, and as far as I'm concerned the only thing we can allow is the net billing based on the short-term market cost. We haven't recommended this model, it's a working model, it's not really final, we'll see after a few years what happens, but there you have it of course.

Gill Owen: Okay, thanks. Do you want to reply to that?

Chad Laurent: Sure, of course. So I guess it wouldn't be surprising if the photovoltaic developers would be complaining, however if the avoided cost rate is high enough, which it could be for an island which is reliant on diesel fuel, it may be enough to build a project and get a project financed, so, for example feed-in tariff rates in Germany and some places are below 20 cents a kilowatt-hour, and they're able to get a project financed. The issue there would just be educating the financing community, in terms of the sort, the other types of guarantees their going to need, because given the high up-front cost of a system, if oil prices were to dramatically go down within, after two years, they could be left sort of stranded with a system that wasn't paying for itself. See, you know given

the likelihood of that, who knows, but you may need to have a strong educational program, not only for developers but also for investors, to try and make them comfortable lending for those types of projects, given the high up-front cost.

Gill Owen: Okay, the next question, the gentleman there, thank you.

Mr X, Autorité de Réglementation du Secteur de l'Electricité (ARSE), Togo: My question is about degressivity and periodical adjustment of tariff. In the presentation, it is said that this can be done every year or every 3 years. My question is when it comes to fix the tariff, the mechanisms of adjustment are the rules clearly established or not, because if they are not clearly fixed then it can discourage investors. Could you explain us how this degressivity works?

Chad Laurent: Thank you, that's an excellent question, because you want to have the rates established, the degression period established ahead of time, because you're exactly right in that if it's just arbitrary, then the developers aren't going to be comfortable that they're going to get the rate, and if the rate can change every month, or every six months, a developer is not going to know what they're getting in to, you often can't develop a project in that short amount of time. So for wind projects, for example, it can take a year to get them permitted and constructed, and so if you were, you know, started in 2012, but your project didn't come online until 2014, and in the meantime the price changed, because of some automatic degression or something people weren't expecting, then you won't get investors moving into those markets. So it's very important I think to have it set up ahead of time, and I think the amount of time depends on the technology, so with most of the other renewable energy technologies other than solar, I think a review period of two or three years make a lot of sense. For solar, one year is probably necessary, and maybe after six months, if you were to have a pilot program, given that the rates can decrease so dramatically. That said, you want to make sure that, whatever the procedure is for getting a project approved, and a contract approved, you want to make sure that they've guaranteed that rate, even if it takes them longer to get the project built. There needs to be some sort of process there, and I'll talk a little bit about that in the next session on queue management, or how do you manage people that are in line, so if you have those automatic degressions, it's good to have them set up ahead of time, I think you should probably have them for different technologies, and then make sure that folks aren't left with projects that they can't finance, so you're not changing rates on people, because then you'll lose your market.

Gill Owen: Thank you. Any other questions at this stage that people want to ask?

Commission de Regulation de l'Electricite et du Gaz, CREG, regulatory commission of Algeria representative: We are preparing a text to promote renewables. We have a great ambition for renewables. Is it better to have decentralised or centralised systems? Big plants or people who connect their system to the network? We have also the possibility to have hybrid plant gas and solar for instance. There is also cogeneration. Do you have indication so from the start we can avoid difficulties?

Chad Laurent: That's a very good point and a very important question, and it's always, you know, better to do things right the first time, than to do them many times thereafter, as the saying goes, you know "measure twice and cut once", when you're building something. Hopefully next week, the United Nations Environment Program will be releasing a report[2] that I contributed to the drafting of, which is a law-drafters guide for feed-in tariffs for developing countries, so that provides a good sort of, walking through what the various issues are, with each of the different sort of tariff, and then gives examples from different countries. And, it isn't a document that tells you what the right thing to do is, but merely gives you various options on what others have done. Many places have

[2] This report has been now published. See references at the end of this document.

hired consultants to come in and help them review draft language, I know there has been support from the UNDP and others to bring in outside experts to help review draft language, and help to look for potential loopholes and where things may go wrong, so definitely, that would be an approach to use.

As far as the hybrid systems, the CHP, and the biogas, I definitely think there should be different rates, or maybe a different program for those technologies that may be more well-established. Similarly, if you're trying to encourage independent power producers, you're going to have to have different mechanisms other than price, guaranteed interconnection, you know, a guaranteed contract signed by someone who's credit-worthy. If you're not familiar with independent power producers, or what the inter-connection procedures are or the permitting procedures are, all of that should be considered, and they need to be different than the well-established utility, or whoever is generally purchasing the power. Their well-established protocol may not match those of small projects or independent power producers, so it would be very important to differentiate between the two, and maybe you have different eligibility requirements for some generators even if they are considered renewable - if they're already doing well, then maybe they don't qualify for the feed-in tariff, or maybe a feed-in tariff just for solar, or wind, or another resource that you're looking to promote.

Gill Owen: Thank you. Any other questions at this stage? I suggest what we do is just have a short break, before Chad does his next presentation.

Gill Owen: welcome back everyone and we will now hear the second half of Chad's presentation.

Chad Laurent: Thanks for coming back, I know how hard it can be to come back and sit down after you've been wandering around for a bit. I wanted to clarify one thing, when I was talking about tariff degression, or revising tariff rates, I want it to be clear that that should only apply to new projects. So you can't go back and start changing the rates for systems that have already been installed, who already have their contract in place, you can't go back and retroactively affect those prices. So if that was unclear, I just wanted to make sure that we were talking about degression and tariff revision. It's that after that review period, any new projects from that time on get the new rate. So you're still exposed to the rates that were in effect before you made changes, but you can't go retroactively cancelling contracts, or changing the rates that folks have signed up for, or you really won't develop a market, so I just wanted to make sure that's clear.

Now, most of these issues are relevant for both developing countries and countries that have already implemented feed-in tariffs. That said, there are some specific features of feed-in tariffs that are particularly relevant to supporting renewable energy technologies in developing countries, I'm going to talk about three of them but there are many others that apply. The three large ones are capacity caps, local content requirements because you're really trying to develop a new industry, and a new market, and also financing. Obviously feed-in tariff financing is relevant for everyone, but it can be particularly challenging in developing countries.

So, capacity caps. There are a few reasons why you want to consider capacity caps. The first is grid stability. Some renewable energy grids can't support large amounts of renewable energy development, either because of their size or their instability, and by restricting project sizes you can control the development of renewable energy by placing it where you can connect in the near-term, and then have a plan to develop additional grid infrastructure, going forward. In addition, there is a trade-off between economic development but also the cost of the policy, and so limiting project size, while it may decrease the opportunity for large-scale or utility-scale solar developments, may help

you make sure that you are allowing many individuals to participate in the program, not just large developers. Another reason is so you make sure that you're not exposing yourself to a large amount of economic risk that may put your entire renewable energy program in jeopardy, like, “well that feed-in tariff didn't work so we should just scrap the whole business of renewable energy”. You want to avoid that, and by controlling the amount of renewable energy that you get online, and managing your tariff and your policy appropriately, you can control for that risk.

So there are a number of examples of capacity caps. In California, there is up to 1.5 MW in size for large, investor-run utilities, 1 MW for smaller utilities, and the total program cap is only 500 MW. So it's really a small program because California, didn't really want to take on too much risk with their feed-in tariff program. In Italy, only power plants below 1 megawatt can participate, 200 kW for wind, so again there's a size restriction, they don't want large projects necessarily being incentivised through the feed-in tariff, however there's no overall cap on the program. Malaysia has an annual capacity cap, divided into quarterly shares, to manage what comes online. In Ontario, there's no program cap, however hydro plants have to be smaller than 50 MW, and ground-mounted solar has to be larger than 10 kW. So they are making sure they can see what types of projects are coming online and when and evaluating the program accordingly. In Spain, there's specific capacity caps, for each technology, which is probably appropriate, given that the performance characteristics of a wind turbine project are different from those of a PV project.

So, as I was mentioning earlier, if you have a cap, then you're going to get a queue, and so it becomes important that you figure out how to manage that process, and that it's transparent and fair, and so you don't stop development, or everyone gets upset and decides not participate. And the main key is to try and avoid speculative queuing, this is an issue that we've seen happen many times, where for example in California, 100 MW of projects got in line, and about 40% of them dropped out. Similarly, when we've seen auctions taking place, this is separate from a feed-in tariff, when you're auctioning at a certain price, the contract failure rates can be as high as 50 or 60%. So one thing to consider if you're going to have a queue is to put in some form of barrier to entry – i.e. criteria, that you have to meet certain milestones before certain dates, otherwise you're out of line, or you have to pay a certain amount. In this way the administrative costs of managing that line, or that queue, is handled, and the developers are paying in, because you really want to avoid phantom or ghost projects, holding a space in line and then selling their space in line to another developer, because that's not really the point of the program.

So in 2006 in Ontario, the majority of the PV pipeline was speculative, and a lot of those were developers that didn't develop PV projects, but had land and were selling their space in line to an actual PV developer, and that can just delay the process, and isn't the most effective way of managing those queuing processes. And again, you want the queue to be transparent, so investors know if it's full, and they're not trying to move into a market that is saturated. Similarly, the regulator should have all of the appropriate information from anyone who's in the queue, so they can keep track of those milestones, and kick people out of line if they need to, and in order to really get projects built, rather than having projects sit there, that don't really have a realistic future.

The next topic is local content rules. There are four general types of local content rules: local equipment content requirement; local tax benefit; local government grants available to domestically-owned projects; or local ownership. A local content bonus payment is a sort of adder, to the tariff, a sort of lower interest rate. In terms of tax benefits, they could be relieved of sales tax or property tax or other types of taxes. A local ownership requirement would mean that in order to get the feed-in tariff rate, a certain percentage of the project has to be locally owned, as opposed to just having local equipment, or locally manufactured equipment.

So in India, they have generous tax incentives available for local projects, as a way to transition over to a feed-in tariff, in order to share the burden of cost, not just with the electricity rate-payers, but also with taxpayers. In addition, modules themselves for PV systems have to be manufactured in India, to qualify for those incentives, so that's one way that you can try and promote local industry, and local development, local expertise, and a local business base, in addition to just getting renewable energy projects built, and putting electricity into the grid.

Ontario has domestic content rules, a 50% domestic content requirement for wind, 60% for solar, however one thing to consider was that there was a WTO, North American free trade agreement challenge to those rates that's still on-going, so if you are trying to be too protectionist, or offer incentives that are specifically tailored to in-state or in-country resources, you could open yourselves up to trade agreement challenges. In the United States, there's a constitutional clause called the Dormant Commerce Clause, where an individual state can't isolate itself from commerce of other states, and so if you had a local content requirement that was pretty strict, that would run foul of those constitutional provisions, so again that's something to consider when you're providing local content rules, that they aren't so lucrative as to potentially get you in trouble with other agreements, or constitutional provision, or other laws that may be in place.

Nova-Scotia in Canada has a community-based feed-in tariff, the project must be locally, community-owned in order to qualify for the feed-in tariff, and there is also an adder for indigenous populations, first-nation populations, so native Canadian tribes, if they own a project they're eligible for a higher feed-in tariff rate, so it's another potential way to encourage either traditionally disadvantaged groups, or specific populations within a country or state or province, to participate in a particular program, and develop expertise in ownership of projects. So Nova-Scotia is another potential model that can be used, in terms of a community-based and local ownership requirements.

Another example is in China, they had a 70% wind local content requirement, and as of 2009 that changed due to pressure from the U.S, so maybe 70% was too high. They also have tax investment support for the local PV manufacturing industry, those significant incentives for local manufacturing have recently been challenged before the U.S Treaty Commission in alleging dumping, or artificially low prices of PV panels in the global market. There was a small U.S. tariff instituted on Chinese solar panels, last month, and there are other proceedings on-going, so to be careful, it's good to provide incentives for local production, but if you go too far in the wrong way that may result in some sort of, you know, filed complaints. That said, definitely a certain level of local requirement, or local incentives is allowed, you just can't go too far.

So, this sort of brings us to one of the cornerstone issues, which is how do you pay for the feed-in tariff, and again, this isn't just an issue for developing countries, this is an issue for every country, but also think of it as an issue with, paying for any type of energy, because there are incentives that exist for fossil fuel and traditional energy, those energy sources are not subsidy-free, no matter where you are, so reallocating those incentives to renewables, it may be new, but it isn't new to the energy industry. Show me a type of energy source and I can show you a subsidy available to it. That said, reallocating to what are currently relatively expensive renewables has its costs. So the key is to have a credit-worthy funding source for the feed-in tariff, in order to get participation, and there are generally a few options, as I sort of mentioned earlier. You can pass the cost through the rate-payers, you can pay for the cost using the national budget, that's essentially taxpayers footing the bill, you could do hybrid approaches like India, where rate-payers and taxpayers participate, you can try and use external funding mechanisms, or potentially international development funds to support the tariff - we haven't seen that yet but I think it's an innovative model that could be used in future. You could tax other fuel sources or other activities to pay for the feed-in tariffs, so you could attempt to eliminate subsidies from some of the current energy sources that are subsidised, and move those over to renewables, of course those energy, those plants, and those energy sources that are taking

advantage of the existing subsidies will likely be very upset if you are trying to remove their subsidies, it may not be a challenge that you can undertake, but it's definitely an option.

So a couple of examples, Tajikistan, Sri Lanka. Tajikistan created a fund to gather money, for their feed-in tariff, this is a relatively new development, however, they have listed various source, but it seems ultimately that rate-payers will be on the hook. However, given the current financial structure of the country, it may be too much of a burden for rate-payers to pay the anticipated amount of that feed-in tariff, and the government may be reluctant to raise taxes to cover it, so you may end up with an unfunded mandate, and you want to avoid, that. You can draft the perfect renewable energy law, or the perfect feed-in tariff, law, but if you ultimately don't have a plan for financing it, you may not get anywhere, so it's important to be realistic about where the funding for renewables will come from. Similarly, a colleague of mine was telling me that Sri Lanka was seeking to rely on donations from wealthy individuals in the country and other countries to support their feed-in tariff. I hope that's a model that works, but it may be a bit risky, in terms of hoping that those donations keep up with the amount of funding that will be necessary for the feed-in tariff levels. So it's important again to be realistic, and know that's it is going to cost a certain amount and be up front about what those costs are.

Other examples from Malaysia and Taiwan, Malaysia's feed-in tariff's fund is capped on a 1% annual increase in retail rates. Their renewable energy goals will likely cause more than a 1% increase in retail rates, so it's unclear if they'd be willing to go back and change the law to remove that cap. There's an additional 1% increase to high energy users, while the lowest energy users are exempt from the program, and I think this is an important model, and one that other countries have used, where the lowest income rate-payers don't face the burden of the cost of the feed-in tariff, maybe you apply the burden to higher rate-payers, or those rate-payers who aren't spending a significant amount of their overall income on energy use. But even countries like Germany have a different exemption for industrial users, so it's all something to consider if you're worried about impacting a particular industry. It may or may not be appropriate, depending on the circumstances. Similarly Taiwan instituted a tax on nuclear and fossil fuels, but from the look of it, the tax amount that they are proposing may not be sufficient revenue, but the way the law is structured, the utility is still on the hook for payment, so it may then ultimately go back to rate-payers to pay the bill. So again, where the money comes from and how much you're willing to subject either rate-payers or taxpayers to those feed-in tariff costs is an important consideration.

Something to talk a little bit about is potentials for international funds to pay for feed-in tariffs. So again, there's no example yet on a program or programmatic basis being funded by international agencies, so no-one to date has said “we're going to fund your feed-in tariff”. Most of the work has been project by project, and the sort of general sense from the international funds is that the fund should be used for lowering risk and not necessarily increasing returns, I think those things sort of go hand in hand, so it may be a distinction without much of a difference, but what it's resulted in is that more individual projects are being funded rather than programs, that said maybe we should be trying to move towards more programmatic funding, I think it will vary depending on the context.

Already there are funds such as the Global Environment Facility, that have supported the development of renewable energy projects in developing countries, and there's a [wind] project, La Venta, in Mexico that was essentially funding a feed-in tariff rate for that project. So while it didn't fund a feed-in tariff program, they essentially helped fund a higher tariff rate for that project, so that's a potential example that could be used. The UNDP, the World Bank Climate Finance Options web platform is a place to look, there's thirty-six different funds that can support individual energy projects, it's something that could be used potentially for a feed-in tariff pilot program, could develop a pilot program where you build a number of projects and then based on what you learn in terms of pricing, that can help guide feed-in tariff regulation moving forward.

There are some additional emerging financing trends around renewable energy projects. There's the certified emissions reduction credits that can be sold through the Clean Development Mechanism, with a value of 4 to 7 dollars a tonne as the projection going forward, it may not be enough to be that helpful, but it's something that could be an additional bonus that may lower the rate you would otherwise be paying in a small way, so something to consider and definitely not overlook. Also from the UN Framework Convention on Climate Change, the Bali conference, there may be funding for programmatic or technical assistance in terms of creating feed-in tariffs. There's millions of dollars set aside for the Green Climate Fund, but it remains to be seen how that money is going to be allocated or spent, but something to consider is that it could be applied to a feed-in tariff, or a technical assistance evaluation of feed-in tariff programs, or reducing the risk of implementing a feed-in tariff.

One integrated finance model that we worked with, the Deutsche Bank Climate Change Adviser's Get FIT and Get FIT Plus: these were potential funding structures under which public sector resources could be used to sort of de-risk renewable energy investments, so investment banks could put money into a fund either to pay the utility or the government, as a back-stop of the feed-in tariff rate, to secure financing from the project developers, if the utility or the local government didn't have the credit-worthiness or were seen as too risky. Currently tried to do one project in Uganda, to try and de-risk the local environment for investing there, it started with a multi-stakeholder conversation about how to coordinate resources, and also involving technical assistance, grant funding and private capital, to help get some projects off the ground, but more importantly figure out what the costs of the program are, what resources are available, getting all those stakeholders in the room to determine the best path forward.

Another finance model we worked on in Indonesia is the Indonesia Feed-in Tariff Fund, developed by FMO and NL Agency, which are two Dutch funding organisations, for geothermal development in Indonesia. Indonesia has one of the world's largest geothermal resources, and it's largely untapped, and so it's a real potential renewable energy resource for the islands. The fund seeks to invest private equity in the form of a dollar per kilowatt-hour of payment to geothermal developers, the payments are structured between what they need in terms of a power purchase agreement contract, and what they would otherwise be getting in terms of the avoided cost or wholesale electricity price. And the generators are awarded those rates, and they need to meet certain return expectations, and the rates are also pegged to fossil fuel costs, and so if a developer is getting any sort of windfall, they pay back the difference between that guaranteed payment and the windfall amount into the feed-in tariff fund. The CDM funds that are associated with the project are put back into the fund as a way to keep the fund financed and stable, so that's another potential innovative financing mechanism that may be applicable if you're looking at doing a feed-in tariff, but need some additional financing support to do so.

So in fact, that's all I have, and I look forward to having a more detailed discussion, and answering any more questions you may have, thank you.

[applause]

Gill Owen: Thank you very much Chad, very interesting second half of the presentation, with some interesting points about local content and about some of the financing issues, which I'm sure people will want to explore in more detail, so any questions now, or points that people want to raise?

Chad Laurent: It would also be great to hear any other personal experiences, either with your own renewable energy regulations, or if you've tried a feed-in tariff, or any additional lessons you've learned, I'd love to learn from you all, as much as anything.

I'm a member of the regulator in Tanzania. In Tanzania, we are having a program for encouraging renewable energy, we used the avoided cost method, and the result is first of all, we have low installed capacity, although we have abundant renewable energy sources, but we have not tapped those resources. We thought we should use the avoided cost because we don't have experience, and we don't have much information on developed technologies that would be applicable to all countries, so we opted to go for avoided cost. So, the utility should not have any reason to reject connecting a new project, unless it is technically not feasible. So we tried going through that route, but unfortunately it happened that many developers were asking us to go for a feed-in tariff, because of better assurance. But then, if you consider our country, which has a very low installed capacity, just over 1,000 MW, and the potentials that are available, calls for people to invest in, putting up wind projects, talking about 50 to 100 MW projects and even someone is now talking about going 310 MW of solar. So here, I feel that the various ways of capping comes in handy, because we really need to also look on the capacity of the utility to absorb this.

So every generation that comes into the utility if the utility feels that they're going to sell it at much lower costs, and renewable energy, being initially capital-intensive, then there's no incentive for the regulator or for the utility to go for these program unless there is a fund. Now here, in Tanzania, we don't have a renewable energy policy, and the various sources that you have mentioned, very few developers in the country are aware of, except those coming from outside. So we are really trying to promote, but we are getting a lot of challenges because of the lack of renewable energy policy, lack of funds to support renewable energy, but also because of the low capacity, and solar capacity of the utility. So here we are in a position, we are now reviewing after 5 years, so maybe we can select for a few technologies to have feed-in tariffs, but we cannot have feed-in tariffs for every source. We have used this avoided cost so that we can screen those expensive technologies, to count gains so that we can see how we can promote those expensive technologies, otherwise they can wait. We did hold a route open for capacity that are over 10 megawatts, they can come and negotiate, so that we can help them in, because of the advantages of first, clean energy, and also because we can have those projects located in different areas where the consumers are.

Now, the other issue is regarding the contracts, I saw in your presentation you proposed the short-term contracts. Really, many of those who are proposing projects in Tanzania, they don't want to hear anything less than 10 years. So we have reached a point, we said okay, since these are projects that are coming in, we compromised in having PPA of 15 years, because now they are all thinking about at least 10 years. So maybe if you have any advice from what you have explained or from other participants?

Gill Owen: Do you want to say something on that Chad, and then we'll see if anyone else wants to?

Chad Laurent: Sure, certainly, there's a classic sort of case of what can happen. There are often subsidies for the traditional generators built into the avoided cost, and so the avoided cost may be artificially low, and doesn't take into account environmental and pollution and other costs, and so when you have an avoided cost-based feed-in tariff it isn't high enough for developers to develop PV projects or other renewable projects. That said, if you have a relatively small grid capacity, and if you only have 1,000 MW of generation, you don't want to be putting 50 and 100 MW PV projects onto that system. So I think this is where you could really try and promote small-scale PV systems, you know, rooftop systems only, or systems that are connected only to the distribution grid, you could do projects that are only 10 kW or smaller, the other advantage there is that, if everyone can participate in a program, it isn't just a couple of large international renewable energy developers, then you also gain local support for the policy. One of the reasons that Germany's program has been so successful, is that something like 80% of all the solar is rooftop, and so it's businesses and individuals who, like the feed-in tariff because they can put solar on their roofs, similarly with wind projects, if a community is allowed to build a wind turbine project and take the benefits of the

project, then they're less likely to fight the project coming into their community and say, oh, the turbine is too ugly or put it somewhere else. In this way you can build support for your renewable energy policies, and for the feed-in tariff.

As far as the contract length, this gentleman was saying the short-term contracts really weren't feasible, and that's true, you know for wind and solar, 15 to 20 years is really a standard. I apologise if I wasn't clear, the only time that really the shorter-term contracts make sense is with some of the biomass projects, that don't want to be exposed to fuel costs risk, because unlike the other types of renewables they have a fuel source that they have to pay for, that has some sort of cost associated with it. So we're generally talking 15 to 20 year contracts, and so, one idea would be to potentially target an additional feed-in tariff rate, and put a small capacity cap on it, to develop projects that are locally-owned, or on local businesses, rather than the large-scale projects that might not be able to be handled by the current grid infrastructure. That's one initial thought, without having seen the specific regulations, but that could be a way to revise that, at least get some experience, and get started, and then you can scale up, you know, from there, after a couple of years, you could review.

Gill Owen : Any other thoughts? Yes, you wanted...

I'm from the regulator in Nigeria, and we are in the process of a revision of our feed-in tariff, from the first week of June 2012. Chad, you were talking about degressions, and review. I couldn't quite separate the two. I know that the solar degression is very necessary and much more common, but I don't understand is how it is applied across other technologies, like wind, biomass, and probably small-hydro. Now my question points to the fact that is it popular to have the fixed percentage of degression for all the technologies, how would I then pass on the projects, you know, payback period. And secondly, when talking about review, you said something, that it is forward-looking, and that you don't have to take it back, once somebody has handed in contracts, you don't need to go back to the contractor and review that contract. How about digression, I mean degression, will you have it in the system.

Now in terms of trying to take control of the queuing system, we have had cases where people have come and signed contracts and the projects don't come to materiality. Now you talked about using milestones to control that queue, what kind of milestones can be applicable in a country like ours, and to what extent that can help us in making sure that these projects are materialising at the end of the day. Now the type of transmission contract, and connection costs, I'd like to ask, because you have a relatively unstable and unreliable transmission network, the cost imposed on the project in terms of connecting to the network, is quite huge, and we are of the opinion that if we allow the cost of the project to make it very, very high, then the huge projects will cost too much. Now we propose to have these projects connected through the distribution network, especially where we have the load centres, to reduce the cost of connection, I don't know how appropriate that policy is.

Chad Laurent: Right, making sure I've got all of your points, I'll try and address them. So the first was to sort of differentiate between degression and review. So there's a few different ways that degression can work, it can either be that the payment term is for 20 years, maybe for the first 5 years the prices is this, and the next 5 years the price is different etc and it's the lowest price for the final 5 years, but the key is to know what those prices are, when you're entering into the agreement, and that you know that the agreement won't change. So that's one way of building in tariff degression rates. Or you could say that the policy has an automatic degression written into the law, that the current price of solar would be, say, 30 cents, and then in 5 years it will be 20 cents, and then, so it's known what the price will be for a certain number of years going forward. And the way that's different from review is that then the alternative would be to write in to the law that the current price is 30 cents, and then we'll review that price after a certain amount of time, but we're not telling you what that price is yet. And then it goes to some sort of regulatory proceeding, or you

amend the law to make a new rate, after a certain number of years.

And so that's the difference, that you can automatically write in a certain rate of decrease, or you can write into the law a certain amount of time that passes before you review the prices. It's probably more risky to write in a certain percentage review at a certain time, and have to stick to that, because the technology or the prices could change more rapidly than you were predicting, and it's very difficult to predict what prices are going to be in the future.

Gill Owen: I can see from a regulator's and policy-maker's perspective, it's probably desirable to say we will review it at these times, rather than saying up front, it's going to be this price in 5 years, another in 10 years, because it's very difficult to predict how much the technology will come down in price. But obviously from the investor's point of view, they'd prefer you said up front, you know these are the prices for a long time ahead, and that's the difficult balance, I think that you end up having to make, isn't it.

Chad Laurent: Yeah, because there's an important balance there between giving the market, a certain number of years that they know what the price is so they have time to get projects built, and get familiar, but then allow yourselves the ability to try and control the overall impact of the policy, so that's where the various triggers come into play. Is it a trigger every so many years, or is it based on the amount of capacity that's come online? So you say after 500 MW are built, or after 50 MW are built, then we're going to review everything, and then maybe we might introduce different rates, and there's, you know that would look risky to certain developers, but it's a way for you to control, and sort of know what you're getting into.

I think the next question was if those should be different for different technologies, and you know, initially, with feed-in tariffs, we've seen that it's been the same across the board, but what we've learned especially with solar is that you may need to differentiate by technology. We haven't at least historically seen the costs of hydro or wind turbines fluctuate or drop as dramatically as solar did, however there is in that example from Germany that I gave, where the price for wind was set to decrease automatically, but wind turbine costs went up, and so that was a problem for the policy. So, you know, that can happen too, but that said, I think there may be some breakthrough in wind or some other technological breakthrough, but for now, solar seems the one that's always talked about, that's on everyone's mind. It is important that you don't go back on those contractual agreements, even if you're changing the policy significantly moving forward. That just causes the market to just totally fall apart and freeze and can result in lawsuits and legal appeals, and puts the stability of contract law within a location at risk, and so developers would be shy from moving in again, if that was to take place.

Next question was about milestone payments, and the queuing procedures. So if you would say you have to have the contract signed by a certain date, you'd have to have your interconnection paperwork and interconnection proceedings, everything in place by a certain date, the project needs to be permitted by a certain date, you have to have all the agreements with the utility in place by a certain date, you have to have a certain amount of the equipment purchased, and show receipts for purchase of a certain amount of equipment by a certain date, and then a project has to be online producing electricity by a certain date. Those are some of the milestones that we've seen and if you don't meet that date, then you'd either automatically be kicked out of line, or you could appeal, and say we need an extra 30 days, or there's some sort of back and forth between the regulator and the project developer, as to what we do, because we're not going to meet that deadline, you may not want to kick that project out of line, but it's important to keep projects real, and stick them to a certain schedule. And similarly, you could have a certain amount of money that they pay up front to get in line, and maybe get certain amounts of that back as they meet certain milestones, as a way to keep them honest.

Definitely true that long term contracts are good for solar and wind, as you were mentioning, but for biomass it all depends on, you know the rate, if you pay them enough, they can make the fuel risk work out, but that may be more expensive as a policy than you'd like, so biomass can be tricky in maybe trying to peg the rate that you're paying for biomass to the cost of diesel fuel.

On interconnection, I think the important part is to develop a utility transmission plan, that is aligned, or considers the feed-in tariff at the same time, or says these are strategic locations that we have renewable resources that we want to take advantage of, so we should prioritise, grid upgrades in these areas, that may be something to consider.

Gill Owen: Thank you. Well we've got some tea and coffee outside, so if people would like to help themselves to those, and come back in reasonably quickly, and then we're going to have our other speaker this afternoon, Mr Thembani Bukula from the National Energy Regulator of South Africa, and my colleague Xavier Lemaire and Chad will stay up here as well. We will go on to further questions after that speaker and we'll take questions to all of them.

Xavier Lemaire: So, we're going to start again, and I'm pleased to introduce Mr Thembani Bukula who will introduce what happened in South Africa, then you can ask questions, then we aim to have a short discussion about feed-in tariff policies in developing countries. So Mr Thembani Bukula is a regulator member, responsible for electricity regulation at the National Energy Regulator of South Africa, NERSA. He obtained his BSc in Engineering from the University of Natal, and a postgraduate diploma in engineering business management from Warwick University, which happens to be a University we know well. He formerly worked for ESKOM, the South African electricity utility.

Mr Thembani Bukula: Thank you, Xavier, and good afternoon colleagues, I first must admire your tenacity and your ability to stay awake and I think my reward to you would be to do this in a very short space of time, without compromising what I'm going to say. My colleague has already indicated that I am standing between him and his cold beer that is waiting for him [laughter], so I'll ensure that it does not get any warmer. As indicated, I'm the regulatory member responsible for electricity regulation at NERSA, I'm going to give you a run-down, really of what happened in South Africa with the feed-in tariffs, and the procurement of renewable energy, and electricity from renewable energy technologies. But just a bit of background, South Africa started in 2003 with the White Paper on Energy, that indicated that by the year 2013, at least 10,000 GWh would be generated from renewable energy sources, and 10,000 GWh from renewable energy sources is equivalent to about 3,500, 3,700 MW of installed capacity of renewable energies.

The next step is that the policy that mandated the National Energy Regulator must be the one that determines or investigates a method that would be suitable for the implementation of these renewable energy technologies. It was then, in 2006 that the NERSA went back to our Department of Energy of the government and said that for now, the best possible method that seems to be appropriate for the implementation of these technologies is the use of the feed-in tariffs. And then our ones will not be the FITs but by REFITs, renewable energy feed-in tariffs. The Department of Energy then mandated the energy regulator in 2009 with a couple of tasks. The first task is that the energy regulator must develop now, and determine these feed-in tariffs, or the REFITs, and the technologies that will be selected, as well as come up with a standardised power purchase agreement that will be used for the different technologies. It also required us to come up with the criteria that would be used for selecting these renewable energy technologies, but specifically around the job creation, economic development, including the part about the local ownership.

We also have defined some criteria that will ensure the localisation of all part of the manufacturing processes, and we are well aware that you cannot require or demand localisation of manufacturing. But we wanted a significant amount of whatever it was that we built, in solar, wind, to have a content that's localised. And the other criteria that we were going to develop were around the decentralisation of these generation plants, so as to aid and enhance our rural electrification. So those were the tasks that we were given by the Department of Energy. And all the energy that was going to be generated by renewable energy power producers was then going to be sold to our utility, ESKOM, which is the main utility that does the generation and transmission and part of the distribution. And these are what have to a large extent shaped what ended up happening in South Africa in 2012.

We then looked around the different countries that had started with feed-in tariffs, and Germany and Spain were the countries that we looked at, and we evaluated the systems that they were using. We also went through various public consultation processes, where we interviewed and consulted the main stakeholders, the government, or the National Treasury and our Public Enterprises Department, but I want to stress that in the early consultation that we did, we also did a consultation with the developers, project developers, and both the debt and equity investors, the manufacturers, the engineering, procurement and construction companies, or EPC companies, as well as, you know, your general electric consumers. But I must stress that when you talk to these different investors, all of them, yes it is true, they would like to get profit out of this. But the terms of the durations, of when they want their profits, shapes what the renewable energy feed-in tariffs would be.

For an example, developers are interested in the development of the project, and they want to get all of their money within the first 3-5 years of the project. Debt and equity investors, yes, are talking the long haul, 8 to 10 years. EPC is only interested during the construction period, and they must get all of their money. Your manufacturers are also interested in getting their money once the projects have gone, but when you structure the feed-in tariffs, when you go into the feed-in tariffs, these costs and these capital outlays do shape what your feed-in tariffs would be. In our case it was a clear and transparent process, and we had all of the numbers that showed that for a developer who has put in 100 million Rand, the return that the developer would get would be close to the internal rate of return around 17% in South African Rand, but if you use the dollar terms it goes to around 13%, but it was still an amount that was acceptable for developers, your debt and equity investors, for your manufacturers what they wanted was the money that they had to get.

But aside from this, you also need a power purchase agreement, which amongst other things, we must talk about how the price must escalate, if you're talking escalations or in some cases you would have a constant price, but embedded in that is 80% of the costs are capital costs which are really up front, the other 20% is mainly operation costs, so there's sometimes an issue around the feed-in tariff, which part must escalate, the first part, the 80% is paid for, so why must that escalate, so you may have to escalate only the 20%.

But the way these feed-in tariffs were designed the first time, it was not with all of those nuances in mind, but it was there to encourage people to build their plants, and I think we've fed into that process in the first round of these. But having said that, one of the things that we did, we assured that in tariff determination for the company that was designated as the buyer, we then are going to draw in the amounts that are required, set aside an amount of, about 12.3 million in South African Rand, but it's just over, a U.S million dollars. We set it aside to pay for these renewable energies that must come in by 2013. We also had the standardised power purchase agreement, take or pay agreement, wind blows when it blows so you must take when it is blowing, sun shines when it shines, and night when it's not there, storing it was not part of the deal, so most of these entities were going to be non-dispatchable generators.

But I'm mentioning this because in the later development of our process, even the fact that they were non-dispatchable became an issue, and we had a company that is also a generator willing to buy from other generators, now there was an issue about the conflict of interest, that you can't have the player and the referee in this process, as for me the generator, the generators are going to compete, ESKOM decided not to scale it in our plans, and only scaled it in there, so there was a lot of argy-barging around, but the part that to us, the regulator, was critical was that wind was non-dispatchable, so it's a take or pay to do it. But at the time we agreed this, our own utility ESKOM was not the strongest financially, and it was at the time that ESKOM had to also build two coal-fired power stations, their balance sheet would not support this. So we got to a stage that although we had allocated the funds, when it came to really nailing down the power purchase agreement, we then had to have other considerations around our own company.

So the tariffs that we set out in 2009, which were, if you look at the average costs of our electricity is around 60 South African cents, to convert it to Rand you divide by seven, or divide by eight. The lowest cost feed-in tariff that we had was that of wind, which was still twice the price of our average cost of that, at the low end, solar was sitting at 4 Rand, which was something close to seven or eight times our average price of electricity. With those delays, and the discussions around who should be the off-taker of this power purchase agreement, considering that our own ESKOM was not having the strongest of balance sheets, the prices of solar panels dropped by a good 40%. We then had manufacturers as well, who were saying that if you want us to localise in the way that you are putting in your selection criteria, we will want to see a little bit more than the 3,200 MW that you are wanting us to commit on. We then had other project developers saying that in view of the fact that your feed-in tariffs are sitting at amounts or rates that were set in 2009 for implementation in 2010, we can provide you with similar projects at a price, less than your feed-in tariffs, so our view is the feed-in tariffs are too generous. You then had, also the debt equity, debt and equity investors, starting to be uncomfortable with the state of ESKOM's finances, and they said that we would want to do this, but we would want the government to then back-stop all the power purchase agreements that we are going to pay.

Now all of those delays are happening at a time when many were thinking it's a time to really start and go ahead with the feed-in tariffs. As the regulator, we took half of these inputs and said let's revise the tariff, so the wind tariff was reduced by less than 10%, but the solar tariff was reduced by around 40-50%. South African banks, most of the major banks at the time also had problems with our National Treasury, said that we want to fund some of these projects, but we want to show that you as a government are going to back-stop these power purchase agreements. I mean by that time, consumers were also aware of these big increases so even if we wanted to go ahead with the feed-in tariffs because we did not want to disappoint investors, we did not want to lower them, the truth and the fact of the matter is we would have made South African consumers to pay a little bit more than they should have paid for this technology.

So the view then was to say that, competition is also required. We then had to agree, that the best way to do this was a hybrid between our feed-in tariffs and a bidding process. So when we announced our procurement program last year, in August 2011, we had bidders who were going to bid for the 3,725 MW, we received bids of more than 3,000 MW for the first round, and we selected about 1,400 MW, so at this stage, we have just licensed 28 of the independent power producers, who will be doing, who will be building 632 MW as wind, 640 MW as well as solar, and 150 MW is concentrated solar power. The second round of bidding closed on the 5th of March, and what was different in the second round of bidding was that we still had the ceiling prices, but we also took into observation the changes of course in your solar value, we had prices that were lower than those in the first bidding round. And we have not been disappointed by the amount, or the response, because we have received for this 1,400 MW, or the just over 2,000 MW that was left out from the

first bidding round, there's been more than 3,200 MW of bids that have come through, and I think, if it is not this week then certainly the next week, we will have decided, or selected the feed-in tariff that will then build the rest of the plans.

Our view, having licensed and having assessed all of these, is that all of these 28 bidders will build, there will be no queuing, it would cost them way too much to do anything else, other than to build. And there are penalties for not delivering your price at the dates that you have given as your date of completion. And that, in a nutshell, is our experience, that yes, we started with the feed-in tariff process, and most of the developers came because they were aware of our feed-in tariff process, but when we got to understand the issues around feed-in tariffs, and some, why some were designed in a certain way, we had to find a hybrid of feed-in tariffs. But in our view, it is still working, going forward, you'd think the prices would normalise, and maybe, using feed-in tariffs, at a later stage, would still be an option that we have, because of the simplicity that we have. Thank you very much.

[applause]

Xavier Lemaire: Thank you, Mr Bukula. I know a bit of the situation in South Africa, so I have a few questions, but maybe as we are limited in time, I will see if anybody else wants to ask a question, as of a technical or more political one.

The regulator from Nigeria: My question is, this hybrid you have adopted which is the REFIT, how did it address the concerns of the different stakeholders? In other words, if you show it as a successful addition to the feed-in tariff, how does the REFIT program takes care of those issues? Now in the finance side, which you also talked about, I mean the impact of those tariffs for consumers. How did you take care of that as a political comment, because I still didn't hear you say that, the REFIT made the rate come down? In other words, it's still at the same high rate, so how has the impact on customers been managed? Thank you.

Thembani Bukula: Let me start with the easier one, I left it out because I wanted to check if someone would ask about the tariffs. The first grouping of the tariff, we had wind that was at 1.25 Rand South African, the price, the ceiling price that we set was 1.15 Rand, so we took away ten cents out of that, so we reduced the price of the feed-in tariff by 10 cents. Those who were encouraged to bid, 90% of them came in at close to the ceiling price of 1.15 Rand, others came in at 1.4, 1.9, but came close to that, but, there was not a lot of reductions that happened in the cost of them, but on the solar side, even though we had set in the price of the 2.85 Rand for solar, there were bids that came in at 2.75 Rand, 10 cents less than what we said, so for the consumer, consumers did score in that, because it means left with the 2.85 Rand, others would have felt there's no need to try and compete on the price so as to be able to get it. So we did get, I mean 10 cents over a 20 year period to any country is a lot of money, so there were savings that we achieved by that bidding process. But as I have said, that half of this whole thing was still based on your feed-in tariff structure, so the hybrid helped in the reduction of the price, but also the feed-in tariff process helped in the structuring of how these payments were formed, and how we would contract with them.

Now in the one about the bidding and the developers, I think what you find in all of these different investors, like your banks are looking for a certain return, your developers are looking for the highest return that they can get, your EPC contractors are looking for reasonable returns that cover all of the other risks that go with building with contractual manufacturers, yes are looking to outbid and outpace their competitors. But with this bidding process, because they were now required to be competitive, even your developers had to understand that it is not as it was in the feed-in tariffs, where they would get returns of, you know above 40%, everyone had to cut their spending to fit into this program, and that's the benefit that we got from it.

Xavier Lemaire: Thank you, any other questions? Yes, please.

Person from Japan: Thank you for this exciting presentation. You mentioned about the off-taker being ESKOM. And these projects tend to be in the lower chain, that is, something like in the distribution side of connection. Now can you describe those areas where you have distribution companies, instead of ESKOM: was the same response accepted by the other distribution companies in the provinces, other than ESKOM?

Thembani Bukula: The reason why the off-taker was ESKOM, there's something that debt and equity providers look at, and they don't compromise on that one, and that is their guarantee to get their revenues back. And in most municipalities and some districts, their balance sheet and their revenue, or the liquidity metrics, will not interest any investor to go in there. So you would never even get developers or even equity and debt providers that would want to contract with them in the very first place. But about the technical side where you would be looking at integrating at a distribution level, ESKOM does have a distribution network, but in areas where the site is closer to the municipality, it will still be integrated via ESKOM. But most of these power plants, I mean the smallest is 10 MW, in solar, the highest is about 75 MW also that are integrating at transmission level.

Xavier Lemaire: Thank you. Any other questions? Yes, again?

Person from Nigeria – question not recorded.

Thembani Bukula: As regards ESKOM, there are two things; one is more on the political side, to remove the part of ESKOM that does the system operation, so there's a Bill that's going to be promulgated in the not so far future, where the system operator of ESKOM will be ring-fenced. But IPPs would probably feel that ESKOM is a player and the referee and this may be a conflict of interest, if they don't have any power purchase agreement that protects them. Solar, you can also to a large extent schedule, but it is not firm power, when the sun starts shining in the morning, the power output is somewhere in between this and that, so it's not dispatchable power, wind blows when it wants to blow, and so most of the contracts that take up their agreements, so there is no way that ESKOM would have discriminated against them anyway. It was these perceptions that you would have, when it's dispatchable power, yes there is a possibility of you doing that, but if your power purchase agreement is wired such that, if they don't take the power when you were generating it they are going to pay, even ESKOM would have no reason to not take the power that they are going to pay for if they don't take it. But the solution has been provided, to even remove that perception forever, let's have a ring-fenced system operator that is outside of ESKOM's control.

Xavier Lemaire: Thank you. Any other questions? I could ask one. What were the targets in terms of job creation?

Thembani Bukula: When we started looking at the job creation targets, I think Germany was the one example, when they started in Germany, with their 17,000 MW, you know, that it's 300,000 jobs. The figure that we had was that in the whole process, both your direct and indirect jobs that at least every MW must bring about 15 jobs. What we currently have with the 1,300 MW that has been put into the system, is that you have close to about 9,000 jobs, in total, direct and indirect, but 80% of those jobs are the ones that are coming during the construction period, and some are going to that, but the ones that are direct, for wind it's really your operators who are, out of the 633 MW, there's about 28 people what would be employed, but for solar, because it's going to be, most of the plants are going to be in the desert-like area, where the solar panels will need to be cleaned, and where there will need to be extra security, the job numbers are quite high, for the 640 MW, we have

got about 70 people who'll be permanently employed. But the off-stream, and the fact that the steel manufacturers, the steel, which is one of the things that South Africa has it uses, and the manufacturing of the steel structures is an indirect job, which caters for the other 5,000 jobs that I mentioned.

Xavier Lemaire: One interesting feature of it is you plan to have a lot of CSP, which is quite particular, so that is one industry you want to develop, actually, locally?

Thembani Bukula: I think that it is fair to assume that when it comes to solar PV, China is probably not going to be overtaken soon, but when it comes to CSP, although if you look at our integrated resources plan, I think it's about 1,400 MW over our 30 year period, and yet on solar, or PV, it's a good 8,100 MW. But what we are also going to be doing, is that when it comes to the one about CSP, concentrated solar power and the mirrors that are being used, that's the technology that we expect that we are going to be leaders or a force to be reckoned with in that way. But also in the manufacturing, I think in solar PV what you do have is that you have your cells, ingots, that's the part that maybe is very difficult and complex to do, but assembling the cells, and also putting them in is not a very complex thing, and if you look at our perspective, and our location, and the fact that more than 40% of the electricity consumed by the SARDC, or Southern African part, is consumed by ESKOM, so we are probably best positioned as well to provide the other requirements that our neighbours would require, in as far as the solar technologies, whether it is only to assemble, or whether it's only to produce the glass that is required.

Xavier Lemaire: It is now 3.50 pm, so we need to conclude, except if anyone has any last question? Also Gill, do you want to give a word of conclusion? I'd like to thank you. Ah, one question.

Person from Nigeria - Sorry, what did you put in the bidding document, regarding hurdles?

Thembani Bukula: It will cost you 15,000 South African Rand to get that, because it's in those bidding documents you must buy, but I'm going to give it to you for free. [laughter]. There's a lot of hurdles that have been put into the bidding documentation, for starters, to just buy the bidding document you would pay 15,000 Rand, second, to put in your bid you have to pay a million Rand per MW, and the other part is that you also have to accept certain conditions and terms of the...the list is a little bit too long, but I can give you pointers; one of the requirements for interest in the bidding documentation is that in the community that you are going to build, you will have a community development project that will ensure that people around that area benefit from the fact that you are coming to put up some solar panels, and they are not going to see the power going into the grid, and not coming to the area, so there's a lot of those requirements. 5% of the proceeds or revenue from these different plants must go back to be ploughed back into the community, so there are a lot of hurdles that have been put, and in a way I think we'll achieve most of the things that we have targeted to be achieved by these technologies.

Gill Owen: Okay, well thank you very much, I'd just like to say a few words in conclusion. First of all I want to thank our speakers. I want to thank Mr Haruna Masebu from AFUR, and for their support in organising this, I want to thank Chad Laurent, for coming along and talking to us today, and also Mr Thembani Bukula, for your very interesting example of South Africa and what's been done there. I also want to thank everyone here for coming along today and contributing your thoughts and experiences, and asking all the questions (…). We will email people a link to the UNEP report that Chad mentioned earlier, as I think that will be quite a useful report, focusing on a number of these big issues that we've talked about today. It does seem that it's not easy setting up feed-in tariffs, or setting up support for renewables, there's a lot of very detailed, technical questions to answer and hopefully this has explored some of those issues. These are very much the sort of

issues that we try to cover through our work with SERN and REEEP, trying to signpost people to the information and examples of good practice. I think we've heard today about some examples of poor practice but some also some examples of good practice, and I think we can learn from both of those.

So, we're very happy to continue sharing information with people, and hopefully we may see some of you again at future events, so thank you very much to everyone, and hopefully we'll all have a safe journey home. Thank you.

[applause]

References on the design of feed-in tariff[3]

The Spread of Renewable Energy Feed-in Tariffs (REFITs) in the EU-25, *Mischa Bechberger, Danyel Reiche.*

This paper analyses the factors which contribute the wider use of REFITs in EU countries. It employs a multi-levels framework, taking wide spectrum of factors into consideration, from geographical, political, economic and cognitive disciplines. This paper emphasis more on how these factors influence the distribution of REFITs, by looking at some issues: (1) the principal driving forces and obstacles from an increased RES use in the EU-25; (2) favourable design of RES promotion instruments.

This paper also looks at how continental contingencies influence the success of such diffusion, from four distinctive perspectives: (1) political condition; (2) natural reserve; (3) Technical condition; (4) cognitive condition. It suggests the long term security provided by REFITs for potential investors are particular efficient if they are designed according to national contingencies. At meanwhile, other factors, such as natural energy resource availability, technical competence, political environment, and mentality and cognitive ability also play their roles in diffusion.

http://www.wind-works.org/FeedLaws/bechberger_reiche_fTheSpread%20of%20Feed%20Laws%20in%20the%20EU.pdf

GET FIT Program - Global Energy Transfer Feed-in Tariffs for Developing countries, *Deutsche Bank Climate Change Advisors, New York, 2010.*

Over the past years, developing world governments and international organizations have proposed national and international funds to finance the large scale deployment of renewable energy and the access to modern energy services in a clean and environmentally friendly manner. A 'FIT Fund' combined with risk-mitigation instruments and capacity building efforts, to be financed from sources such as international sponsors, emissions auctioning or climate finance could help to address these needs and overcome barriers such as the lack of financial and infrastructural capacity. The GET FIT Programme (Global Energy Transfer Feed-in Tariff for Developing Countries) is a green paper covering issues around FIT schemes in developing countries. It combines the existing proposals on funding and provides an example for a FIT programme that supports both renewable energy scale-up and energy access in the developing world through the creation of new international Public-private Partnerships.

The paper begins with a project level perspective into the challenge of renewable energy in the developing world. The characteristics and the outlining of the potential architecture of a GET FIT Programme are then provided. The paper goes on to present the risks and barriers faced by investors and financers to attract capital and how GET FIT would mitigate these risks, followed by a discussion on the GET FIT role at providing technical assistance to address non-financial barriers. Also questions on the programme impact, capitalization and timeline are explored. Finally, summary tables with developing countries FIT designs are provided.

https://www.dbadvisors.com/content/_media/GET_FIT_-_042610_FINAL.pdf

[3] This section has been extracted from Xavier Lemaire, SERN Literature Review 2012, An Annotated Bibliography and Reference Guide on Regulation and Sustainable Energy. Available at http://www.reeep.org/830/sern.htm All the documents are available on the web via usual research engines on top of web links indicated.

Evaluation of Different Feed-in Tariff Design Options - Best Practice Paper for the International Feed-in Cooperation, *Arne Klein, Anne Held, Mario Ragwitz, Gustav Resch and Thomas Faber - Fraunhofer ISI and Energy Economics Group, 2006*

The European Union has the objective to increase the share of electricity generated from renewable energy sources (RES-E) to 21 % of the total electricity consumption in the 25 EU Member States by 2010. This is the core element of Directive 2001/77/EC, which requires each Member State to apply appropriate instruments in order to achieve the national target for RES-E. In the past years several instruments to support the electricity generation from renewable energy sources have been implemented in the EU countries, being the *feed-in tariff design* the most popular one. Among others, Spain and Germany have been applying feed-in tariff systems very successfully, which led to a large increase of RES-E plants in both countries. In the year 2004 Spain and Germany initiated the *International Feed-in Cooperation* to promote the exchange of experiences and to improve the feed-in system design in EU and other countries.

This report is written in the framework of the *International Feed-in Cooperation* with the goal to describe and analyse the feed-in tariff designs applied in the European Union States. Innovative design options to reduce the electricity generation costs as well as the costs for society are investigated. Furthermore the questions of distributing the costs of RES-E support and how to improve the integration of RES-E into the electricity grid are covered. Best practice examples are analysed and their consequences for RES-E generators and electricity consumers are described. Before the different feed-in tariff designs are illustrated, *renewable energy sources* are defined and the development of RES-E generation in Europe is outlined. Furthermore the *International Feed-in Cooperation* is described. This paper is not exhaustive, but it intends to show the wide range of different feed-in tariff designs applied in the European Union. Changes in the legislation of Member States until the end of September 2006 are taken into account in this report.

http://www.feed-in-cooperation.org/wDefault_7/wDefault_7/download-files/research/best_practice_paper_2nd_edition_final.pdf

A Policymaker's Guide to Feed-in Tariff Policy Design, *Toby D. Couture, Karlynn Cory, Claire Kreycik, Emily Williams - National Renewable Energy Laboratory, United States Department of State, E3 Analytics – July 2010*

Feed-in tariffs (FITs) are the most widely used policy in the world for accelerating renewable energy (RE) deployment, accounting for a greater share of RE development than either tax incentives or renewable portfolio standard (RPS) policies. In the European Union (EU), FIT policies have led to the deployment of more than 15,000 MW of solar photovoltaic (PV) power and more than 55,000 MW of wind power between 2000 and the end of 2009. In total, FITs are responsible for approximately 75% of global PV and 45% of global wind deployment. This report provides a detailed analysis of FIT policy design and implementation and identifies a set of best practices to quickly stimulate the deployment of large amounts of RE generation.

This report begins by building on previous analyses of FIT design. It provides a detailed evaluation of a number of policy design options and considers both their relative advantages and disadvantages. The report also explores experience with feed-in tariff policies from the European Union, where the policy has been used for approximately two decades, as well as recent examples of FIT policies in Canada and the United States. Furthermore, the report offers a comprehensive overview of FIT payment design options, FIT implementation options and various approaches to funding the policy. Finally, the report concludes with future directions on FIT policies and implementation options.

http://www.nrel.gov/docs/fy10osti/44849.pdf

FITness Testing: Exploring the Myths and Misconceptions about Feed-In Policies, *World Future Council and Meister Consulting Group, Inc. – Washington DC, 2009*

Although North America has been slow to adopt feed-in tariff policies, this is beginning to change. In 2009, the Canadian province of Ontario (home to 1/3 Canada's population) enacted a feed-in tariff similar in design to Germany's. In the United States, California, Hawaii, Oregon, and Vermont each established limited feed-in tariffs in 2009, while Gainesville, Florida, and San Antonio, Texas, announced citywide feed-in tariffs for solar power. Feed-in tariffs have also been proposed in more than ten other US states, and a federal feed-in tariff bill was introduced in Congress.

This short report reviews a series of criticisms of feed-in tariff policies drawn from recent published reports, academic literature, and the press. It also argues that in spite of the recent surge in renewable electricity markets, the United States will need to dramatically increase the amount of installed renewable energy in order to improve energy security, create new jobs, and address the growing risks of climate change. The report includes an accompanying survey of counter argument derived from published literature and interviews with governmental representatives and industry experts.

http://www.worldfuturecouncil.org/fileadmin/user_upload/PDF/FITness_Testing_Myths.pdf

Feed-in tariffs and a policy instrument for promoting renewable energies and green economies in developing countries, *UNEP, 2012*

This report is intended as a resource for policy makers in developing countries to make informed policy decisions about, when and how of FITs and to support nationally appropriate policy measures to scale up renewable energy. The report is also intended to improve the understanding of the potential benefits and challenges for developing countries to design FITs as well as the factors influencing their success, more in depth from the policy and legal foci, whilst also analysing the funding and capacity implications. Throughout the report, FITs are construed as interacting with national energy and non-energy policies in a dynamic manner.

Through a general overview of FIT policies and design elements, the report draws broad and qualitative comparisons between FITs and other policy instruments available for scaling up renewables. It then reviews FIT design issues and options, relevant policy considerations, and text from existing laws as references in the form of a Law Drafters‘ Guide. The report also discusses strategies for funding a FIT policy, utilizing both domestic and international resources. In addition, the report examines the human, technological, regulatory and institutional capacity that must be in place in order to successfully implement a FIT. The report adopts a flexible toolkit approach to the design of policies and law drafting for feed-in tariffs in developing countries, and uses systematic links to broader development objectives.

http://www.unep.org/publications/contents/pub_details_search.asp?ID=6269

Qualitative Issues in the Design of the GB Feed-in Tariffs, *Poyry and Element Energy, Oxford, 2009.*

Since 2002 the UK’s principal form of support for renewable electricity generation has been the Renewables Obligation (RO). The RO has been relatively successful in increasing the deployment of large scale renewables, but the exploitation of small scale renewable electricity projects has remained limited. As a result, the UK’s electricity system currently has a very low penetration of small scale renewables, relative to many other European countries. The burden sharing arrangement agreed as part of the EU 2020 targets for RE commits the UK to increase its share of RE from an estimated 1.3% in 2005 to 15% by 2020. So the UK faces a significant and urgent need to increase the deployment of small scale renewable electricity generation. The Government plans to retain a revised RO as the main support mechanism for bulk electricity and has stated its intent to institute a system of feed-in tariffs (FIT) to address small scale renewables below 5 MW.

This report provides a comprehensive review of how such a FIT scheme would work and explores the implications of different design options for a FIT scheme in the UK. It seeks to identify the appropriate FIT design, given the UK Government objectives, which would deliver effectively on the take up of small scale electricity producing renewables, while maximising cost efficiency and minimising distortions to the existing RO support system. A detailed literature review is undertaken to offer insights into the development of a FIT scheme. Finally, the report discusses selected EU FIT schemes, in the form of case studies and review of their performance against policy objectives and best practices.

http://www.fitariffs.co.uk/library/regulation/090715QualitativeIssues.pdf