

This is a raw transcript of the Flagship Urban Solutions session on Resilient Cities of the World Cities Summit, held at Marina Bay Sands, Singapore, on 3 July 2012. The panel comprised:

- **Usha RAO-MONARI** – MODERATOR
Global Head Water & Waste, Infrastructure & Natural Resources, International Finance Corporation
- **Asit BITSWAS**
Visiting Professor, Lee Kuan Yew School of Public Policy, National University of Singapore
- **Jane HENLEY**
CEO, World Green Building Council
- **Bart PARMET**
Acting Delta Commissioner, The Netherlands
- **Andreas RECHKEMMER**
Chief Science and Policy Advisor, Global Risk Forum GRF Davos
- **Paul REITER**
Executive Director, International Water Association
- **TAN Yong Soon**
Permanent Secretary (National Climate Change), National Climate Change Secretariat

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Ms Rao-Monari: “Good afternoon, ladies and gentlemen. This is a very difficult session to moderate because it’s right in the middle of lunch. So thank you all for having a very short lunch and joining us. We have a brilliant panel. My job is an easy one because of the brilliance of the panel but I would like to make some opening remarks, introduce the speakers and then have them make their opening statements. The idea is to have as much discussion as possible to make this as interactive as possible not only within the panellist but also with all of you in the audience. So to the issue at hand, resilient cities. We were talking about it earlier as to why it was such an important thing, right, who cares? From where I sit, I think the world in general is going into a perfect storm and that perfect storm is the storm caused by a number of external events. What are they? Climate change, population growth, the emergence of mega cities, rural people moving into cities, geopolitics about land and water and other natural resources, and that perfect storm is going to hit us fairly soon and our future has therefore be one that is resilient to that storm. I also know from where I’m sitting that at the centre of the solutions somehow, there’s going to be cities.

Why? Because most people think and there’s an emerging realisation that cities are going to be the centres of economic growth in the future. Policymakers are looking at cities not just a place where they have to build a whole bunch of houses for a whole bunch of people and so on and so forth but it really centres of growth, employment, jobs and prosperity. But in order to have cities be that, they must be resilient and sustainable going into the future. The subject of the panel here is really, and they all come from a wonderful

experience in everything that they've done so far to tell us a little bit from where they sit what the issue around resilience that is are. So let me without further ado start with our panellist. I'd like to introduce our first panellist, Mr Tan Yong Soon who is the Permanent Secretary, National Climate Change Secretariat of Singapore. Mr Tan has years of experience in public policy with a very strong focus on climate change and its impact on growth.

May I ask you, Mr Tan, to make your opening remark and perhaps think about the following points – why is climate change important to cities? What is Singapore's approach to dealing with climate change in cities? And what are you actually doing to address the issue that is climate change? Please, Mr Tan, thank you."

Mr Tan: "Thank you, Usha. A number of you were present at the early session this morning and we heard Kishore asking the panellist what kept them awake at night and most of them talked about the sustainable future, climate change, global warming, their children's, grandchildren's future and so on. So I think it's quite clear why climate change is an important subject. I'll briefly explain in Singapore how we are organised to address the issue and what's our approach. Two years ago almost to the day, July 1, the Singapore Government formed a National Climate Change Secretariat within the Prime Minister's Office and I was appointed as the Permanent Secretary. Before that for a number of years I was Permanent Secretary in the Environment and Water Resources Ministry. And this was done because the Prime Minister view it important that because climate change covers so many different areas of government that we need to have a central body placed directly under him so that there is that authority. Now I don't report directly to the Prime Minister but I report to the Deputy Prime Minister who was guest of honour last night and he chairs an inter-ministerial committee comprising the Minister for Finance, for Trade and Industry, for National Development, Transport, Environment and so on and they are all together and within the civil service, we work across different agencies and come up with plans and strategies.

Now what do we do? We address climate change in four areas. We look at how we mitigate against the greater carbon emissions. We look at adapting, what's our vulnerability and how do we check against those. We look at harnessing green growth because it's very important that the economy continues to do well as we address climate change and we look at the collaboration with the public because the government alone cannot do this, the companies alone cannot do this. It's a whole society, the people who have to address this issue. And we also, part of the collaboration is to look at international collaboration because climate change is a global issue. Any country or city on its own cannot address the issue. Within the country, the cities have to collaborate and within the global community countries have to collaborate. So these are the things we do. I should say that what guide us as we think through these issues generally we need long-term planning, we need constant innovation and we need very effective implementation. In the current situation as we plan towards 2020, we understand that because Singapore is a very fairly developed country, we have done certain things, taken green measures and so on. There's a limit to which we can address at this point in time but we are beginning to put in place a group that look into our long-term strategy in the 2040 and so on, and what must we do and we hope we can come up with good solutions. Thank you."

Ms Rao-Monari: “Thank you very much, Yong Soon. That was very helpful. I’m not going to ask you a question now. We’ll go through all the speakers. Our next speaker is Dr Andreas Rechkemmer, who is from, I’m just trying to find my notes, who an ex-UN diplomat, an internationally experienced, well-known scholar and today is the Chief Science and Policy Advisor at Global Risk Forum in Davos. And Dr Rechkemmer if you could just address your points around obviously the issue of urban risk and the need to be resilient, what are the risks? I kind of gave some silly suggestions at the beginning of my talk. Perhaps those are not the risks and you have a better answer for us, thank you.”

Dr Rechkemmer: “Thank you very much. We’re all talking resilience by now and resilience is almost the buzzword of the day. So let’s try to agree on a common understanding and approach to resilience, what it means and how we have to address it. We should be aware that the term was originally taken from the biological sciences. It comes from ecology and it means the capacity to buffer external disturbances while leaving the vital functions of the systems intact. Now we are transferring this notion of resilience now to cities and we have to address cities as urban systems, very highly complex urban systems. So resilience of urban systems means, requires a complex understanding or an understanding of complexity. And so, we must address the issue of resilience cities in a truly holistic and integrated way. Not just talk about resilience of infrastructures, physical environment, transportation or of the economic and finance sector but rather look at it as the resilience of social ecological systems, economic systems and physical systems. So let’s recall that it’s about the capacity to buffer disturbances and it means we have built these capacities simultaneously across all these areas from social to physical. And we call this capacity the adaptive capacity so resilience then for a city means to be able to steer a dynamic change process and not just maintain the status quo, to be able to buffer disturbances from the outside and those risks are really multi-faceted. A resilient city is a city with a high level of adaptive capacity and the other flip of the coin is of course vulnerability. So we also need to look at key vulnerabilities that have to be part of the equation. Likewise, vulnerability is very complex thing and defined by exposure and sensitivity of buildings, physical environment, infrastructure, financial, economic asset and of course, the population. So we must look at the vulnerabilities first. Whenever we plan towards resilient cities, we plan to enhance our adaptive capacity in the face of climate of change and/or the other risks that we face simultaneously, the so-called cascading risks. We first should carry out state of the art smart vulnerability assessment, urban vulnerability or risk assessments and that’s really an art in itself because we need to address all these complexities simultaneously and in an integrated way. So these assessments, they are the cornerstone for risk mitigation and risk adaptation at the city level. Sometimes we look at the hazard side. We use climate models, high-resolution climate models and GIS data but that’s really not the end of the story.

So we ought to combine hazard scenarios with vulnerability, integrated vulnerability assessments and then of course assessing the adaptive capacity. Looking at vulnerability, the aspect of social population born vulnerability is absolutely critical and ought not to be neglected. It’s about poverty, housing conditions, about mobility patterns, education and health situations, about situations and so forth. Only after having assessed those vulnerabilities at the city level, we can then really move towards building adaptive capacity for our urban systems. And this capacity to counter those disturbances that we called risks, risks being an equation of hazard times, vulnerability times, capacity to adapt. We need to

look at our governance systems. We need to look at the quality and the adaptability of our governance systems. We need to look at inclusive empowerment, inclusion and empowerment of stakeholders and people, education, social learning and the potential for behavioural changes and of course we need to adapt our local economies and markets. And I'd like to address also some of the aspects, what makes a resilient governance system in a city and I'll keep this for a few minutes later. Thank you very much."

Ms Rao-Monari: "Thank you very much. I appreciated your comments because I think this is a huge subject and then I would like to put that into the discussion. I'd like to introduce our next panellist and speaker, Mr Bart Parmet who is the Acting Delta Commissioner from the Netherlands. Mr Parmet is a hydrologist by training, an expert in water resource management and I look forward to your comments, Bart, on really the legal institutional planning processes around urban resilience, what needs to be done, what's your experience, what have you done in the Netherlands?"

Mr Parmet: "Well, thank you. I'd like to start a little bit with how the institutional framework related to climate resilience is organised in the Netherlands. And I take the liberty of defining the Netherlands as one big city. It's not fully true but this Netherlands, most of you will know it, I think is a typical delta with a large part of the area below sea level, would be flooded if not protected and due to some serious disasters in our past 500 years, we work hard and we can say now it is the best protected delta in the world. Of course, we are proud on that but we also know that we have two people working and we say work on our delta is never finished. And what is important is that also the government has realised that something institutionally is necessary to keep this on the agenda and therefore a long-term programme has been started, the Delta Programme, which is anchored in law and which has a specific Commissioner to bind all institutions and governments that play an important role. And this Commission should also take into account all stakeholders, including let's say disabled stakeholders.

I think important also institutionally, mostly you do something, let's put it other way, it's easy to do something after disaster. You said we are in a perfect storm and if there is a real storm, people are let's say, relatively easy to motivate to act. But if not everybody realises there is a storm or there is no storm, then it's quite difficult. And therefore you have to be aware that without a disaster, staying ahead of a disaster is the right way to do but a very difficult one and I think that it's nice to talk about it further on in the panel. Maybe some examples in the Netherlands is, well first, we really try to look for multifunctional solutions, solution that are integrated, where a lot of let's say as many as possible challenges can be combined and we're also, there's a lot of win-win to be gained. And what we try to do in the Netherlands is that, a lot of ground are already developed, so new developments are scarce and sometimes people say why on Earth have you ever start building at minus-five, below sea level but we did and there is now a huge investment, so you can't say well, let's more to Germany; it's throwing money into the water.

So therefore we stick to the Netherlands and we can protect and stay there but then we do not do new buildings or new building developments but we restructure and while restructuring and doing that in a sensible way we try to combine the possibility, let's say the driver of restructuring urban area whether a possibility to make it climate resilient. And the in that sense, in that way, you can do it very cost effective so a little additional cost and a lot of additional benefit for the resilience. And for those who want to look at it in a real time, you can come to Rotterdam which has a climate-proof programme and which

means that all restructuring in Rotterdam is done taking in mind, having in mind to climate resilience. So there is a parking garage that is also used for water storage, not at the same time or same level so you can park your car without being afraid to get your car wet. But also let's say, water squares, combination of let's say urban farming on top of houses to keep water. All these kinds of initiatives, sometimes small, sometimes bigger but really meant to get a climate resilient situation. Well, I think for this moment, that's sufficient."

Ms Rao-Monari: "Thank you very much, Bart. I'd like to introduce our next speaker and panellist, Mr Paul Reiter, who is the Executive Director of International Water Association. Mr Reiter has over 30 years of experience in the field of water, waste water and water management in general and I would like for you to speak about roughly the same thing but perhaps comment on the importance, an urban design and water management design in building city's resilience. Thank you."

Mr Reiter: "Thank you, Usha. Well, I have about 30 years of experience in water, energy and solid waste working at the city level and for me resilience is really about capacity to absorb things that we can plan or not plan for like population, urbanisation, resource shortages and economic impacts and it's about flexibility. It's about flexibility to respond and adapt. So if we kind of summarise those two, to me they mean doing more with less at the urban level and to create a design that allow for flexibility to do that in the long run because our foresight isn't as good as we wish it was. I mean, under flexible design side, for example, Rotterdam as was just mentioned is really sterling example. We can think about this at the city level only and that means for example in my area, utility systems, we can think about it at the building use level, which is going to be the next speaker and we can think about it at the industry level. But I would plead that we think about it this problem in the context, the city and the context of larger picture which agriculture, energy and environment. Most of the gains to trade, they are going to come from that. I think you've asked about legal institutional planning barriers. I think the biggest barrier is the lack of integration and it's a thinking problem more than anything. We've subdivided the world to make it simpler. That subdivision may be made it simpler in some ways but it's the biggest enemy in terms of thinking about how to overcome things because integrated solutions provide the capacity we are talking about and provide the flexibility. So I'd like to talk about my time in IWA. We've been working on a programme called Cities to the Future and that is really to think about how we will build the city if we started from scratch as opposed to the city we inherited which is on the water size, extremely inefficient and where there's no connection between urban planning the water system, the subway systems and the like. We have a water and energy programme that I want to talk about specifically about, an example, and then working on the water-food nexus because that's going to be in my opinion the biggest issue coming up. Now on the issue of, let's just take one example of where you can do some really interesting things, most cities in the developed countries have sewage and waste water treatment plans. Remarkably few number of those actually generate energy even to cover their own electricity use let alone to produce energy. You might ask why that's possible because of lack of integration and lack of care really. So if I told you that if you could combine the footways from the subway with the waste water plants and its digester in the city probably down the street from each other, virtually 80 per cent of the waste waster treatment plants in the world could be energy neutral if not energy positive. A very simple idea ,right? Get food waste which is now largely goes to landfills or put it in incinerators with no resource recovery to speak of

and put in the ... waste plant. Why doesn't that happen? In many community, amazingly enough, it's illegal. It's illegal not for a rational reason, it's just illegal because of tradition. So what could we do worldwide? We could actually have, we're trying to launch a programme for Europe, US and China where we basically try to make every waste water treatment at least energy neutral. It reduces the carbon footprint of utilities by 70 to 80 per cent at which is not small to begin with. What other things would happen? We get transportation and noise pollution reduced, we create an alternative fuel sources. If you look at Sweden for example, we're looking at plans that re producing 130 to 150 per cent of their own energy. They're creating transportation systems, fuelling transportation systems, heating and other uses. And we're, big picture most importantly we're increasing resilience, right? All the way around and we're also in financial sense increasing resilience to energy price shocks which I think will be another feature of cities as a whole. So I hope that was a reasonable example of the real world."

Ms Rao-Monari: "Thank you very much. It was and I have a question immediately but I will ask that later to introduce our next speaker and panellist, Ms Jane Henley, who is the Chief Executive Officer of the World Green Building Council in the United States. Jane has huge experience in the subject of sustainability and sustainability strategy and she's done so many things, I can't read them all out now but Jane, if I could ask you, you've been a passionate proponent of the issue of public/private sort of collaboration in issues around sustainability. So how does, how do we do this? How do we do this in a real actionable way at the city level?"

Ms Henley: "Well, I think it's about ways of collaborating if you just think about my organisation, the Green Building Council movement around the world is made up of people within our sector that want to do a better job with the resources that we use and want to do a bit of job through the life cycle of the buildings that we create and we want to make sure that our buildings are actually adding to the social and economic fabric of the communities and cities that we put them in. So there are now actually 90 countries that have these organisations called Green Building Council that are bringing industry people together. There are about 700 staffs that work in these non-profits and there are about 30,000 volunteers from industry that drive these movements. About 25,000 companies that are paying for this work so we're really forming this collaborative base. The industry has defined green building through what you might know as voluntary rating systems or voluntary best practise benchmarks. And the idea is that by having some sort of target above building code that they can act as the pool and the building codes can then come as the sort of push and mechanism at the bottom to bring up the bottom end. And through this kind of pull-push mechanism we can improve our buildings stocks, overall and the quality of performance.

So really the main thing is with rating tools they don't just create a technical target but they create a platform for communication so that's quite segmented as you see, value chain can speak to each other and there are many, many different companies involved in delivering and building and it creates a platform us to educate so that we're all speaking the same language. These rating systems such as you've probably heard of Lead or Greenmark here in Singapore, they encourage mitigating actions. So we talk about mitigation or adaptation. In the terms of mitigation in these rating systems, we see actions like energy efficiencies, storm water reduction, connection to public transport thing like that. And within a system

like Lead, about 25 per cent of these credits can be attributed towards mitigating actions. But really only over the last couple of years have we as a community started looking at adaptation, how do we need to be actually focusing on creating much more resilient buildings. So it is quite a new conversation thrust.

Our biggest challenge really is the design isn't formed from the past. We get our information through feedback loop, from building successes and potential, not-so-successful buildings but we learn from those. We set our air-conditioning targets and systems and spectrum according to data from the past. So really what we need to be doing in our biggest challenge now is we need to start to looking forward and including some sort of future scenario planning and somehow predicting data into these energy models and technical solutions that looks forward. That's one of our big challenges and this is really vital, I mean the building stock that we have today all around the world is going to be built again over the next 50 years in the developing nations. So we've learnt some things over the past few hundred years that we've been some capacity green buildings but we really got to get it right now and we got to be designing much better, much more resilient buildings into the future. Because of this, our one building at a time approach that we've taking, as industry movement is not enough. We've been pretty good at that, we built some capacity around green building but it's addressing these issues that are community increasing and city level that is our challenge of today. This means much closer relationship with cities, with governments between developers and industry and in general much more better collaborative working styles and methods and frameworks. There are things that you may have heard of (inaudible) development, green star framework for communities, Estidama on the Middle East. These kind of give a guide to help create a vision for that conversation to occur for cities to speak with industry and to create some sort of targets and as you know, are helpful for some larger projects and they're helping kind of create an idea or figure out an idea of what sort of policy could then be implemented at a much more city-wide level rather than just project-by-project.

So these collaborative frameworks, one of the hard things about them is that they take time but in the long run, they can actually save a lot of money. I just think of one example. A developer I know in Canada who talked about the community engagement process but he was basically forced to do by the city, how he got design nuggets out of that that was critical to the success of the actual project and also along the way, he didn't spend any of his legal budget fighting the community. So from a development perspective, there's real opportunity to be, to be had. And then there are existing buildings. I don't have time to go into that now but hopefully we can discuss some of the challenges that we've already created and the legacy we've created, with the stock that we have today. So there are some interesting innovative financing mechanisms being seen in New York, energy efficiency cooperation, the re-fit programme in the UK. We're seeing a lot of energy performance contract in the East Co. models coming out of the city level. So I think there's real opportunity starting to emerge there. So from us from the World Green Building Council's perspective, we're quite committed to ramping our focus on cities and the large numbers of people that are involved and now network and we got some exciting partnerships both C40 and Italy starting to happen. We're excited to work with Italy on creating a building focus at their event called Resilient Cities in Bonn, that happens every June and so really we are starting to figure out how we work with you to address these issues. Our new motto is that

we want to adopt a no-regrets policy for what we build and for the legacy that live for our children and we need each other to realise that. Thank you.”

Ms Rao-Monari: “Thank you, Jane and we’d like to move to our final speaker and panellist, Professor Asit Bitswas, who’s a distinguished Visiting Professor of the Lee Kuan Yew School of Public Policy. But Professor Bitswas has also has many, many other accomplishments including being the founder of a Third World centre for Water Management in Mexico among many other things. Professor Bitswas, I’d like you to tell us from your perspective have we got the definition of resilience right? What’s resilience? We’ve all spoken about resilience. Do we really know what it is and if we know what it is, how do create a system-wide response to urban risk and create that system-wide resilience framework? Thank you.”

Prof Bitswas: “If I could answer your question, Usha, I should get 10 Nobel Prizes not one. When I was a kid, one thing that impressed me very much was James Bond. How could James Bond go into an enemy’s territory and he knew exactly which button to press. When you talk about the resilience, I haven’t a clue which button to press. Forget which button to press; I’m not sure if the buttons are even in the board. So let me go back to the definition of resilience because my view is little bit contradicting, little bit different, perhaps a little bit controversial. Oxford dictionary, I looked up when I was asked to join this panel, what is resilience? Dictionary, Oxford dictionary defines resilience – ability of people or things to feel better quickly after something unpleasant such as shock or injury.

I would like to submit to you that smart city is not a resilient city, efficient city is not a resilient city. You have to build in a lot of flexibility. Equally what is resilience for Singapore will not be resilience for Mumbai. People’s expectations are different, their thinking are different, their education level are different so the concept of resilience you cannot transfer from one place to another. And looking at all the sessions that are happening here, I ask myself one fundamental question and that question is what is the city for? And I was fortunate to sit beside lunch, a very quick lunch, with the Mayor of Christchurch as she’s sitting there. She told me a Maori proverb and I’m not going to try to say it in Maori but I haven’t a clue but the English translation says what is the most important thing in the world? It is the people, it is the people, it is the people. If you’re going to do a resilient city, it is for the people, for the gadgets, it’s not for anything else. So that is my first comment.

The second is cities, each city is extremely diverse and I’m speaking from a developing country’s perspective. No matter which city you go to in a developing world and our cities are growing like mushroom, they are rife with contradictions. Mixture of old and new, sacred and the profane, very rich, we have Arnie Lambanias of the world who build \$1 billion house and we have next to his house a shack. We have extremely rich people and people who don’t even have regularly half a dollar a day. So when you talk about the resilience, we need to think about whom are you talking for and how are you going to use it. I see all the Asian mega cities sleek, modern, soaring skyscrapers. In many places, I see air-conditioned trains that take you point A to point B. But next door to these air-conditioned trains, you have streets congested with traffic, sidewalk filled with vendors so that you can’t even walk, beggars, touts, dubious massage parlours, even more dodgier

nightclubs. So we're talking of a very diverse system and we cannot talk about resilience of the city as a whole. So let just try to answer a few of the questions that were raised.

Are we looking at the right questions? If I ask you in the Third World, what is the most important issue right now, I bet not one person here will have the right answer. Not water, it's not energy, it's not climate change, it's not food or anything else. The most serious problem we're facing in the Third World countries is indoor air pollution. In most of the Third World countries, now indoor air pollution is about 10 times the outdoor air pollution although outdoor air pollution leaves much to be desired. The depth from indoor air pollution in our urban centres in Third World cities now reaches two million each year, mainly women and children and this indoor air pollution is because people cook with cow dung, with agricultural waste, with whatever they can do the cooking and yet neither in Rio nor any of the places indoor air pollution is even mentioned. Altogether we estimate seven per cent of the death in the developing world is due to indoor and outdoor water pollution. It's mammoth issue but we don't look at this. But these are some of the issues we need to look at.

Another issue I would like to just mention briefly, because my time is coming to an end, is more than 150 cities with more than 150 cities with more than million population are located in the world on the fault lines. On an average each year according to US geological survey, 160 earthquakes of more than six Richter scale happens each year. So if you have an earthquake, how do you handle, how do you have resiliency? Just one issue I'm raising in your case. In Japan, which is supposed to be a very advanced country, last Kobe earthquake most people do not know, more people died because the lack of water than from the earthquake itself. And if you ask how people die from lack of water in earthquake, very simple, in Kobe when the earthquake happened, the fire tracks could not access water to douse the fires so people got burnt alive because of lack of earthquake.

So we have monumental so I don't know where to start. In the area of water, we have problems. The UN tells us that we have reached millennium development goals only 780 million people. Ban Ki Moon told us that 780 million people don't have access to clean water. My answer to this is very simple. Mr Ban Ki Moon, which planet do you live? The number of people who do not have access to clean water in South Asia alone, whose population is 165 billion, twice the figure the UN gives. I challenge any one of your to tell me one city, one urban centre, one rural centre anywhere that has clean water. We are underestimating all these issues. Waste water treatment, we talk of sanitation. We dump our waste into the river and we call this sanitation. Is this what we want? Thank you."

Ms Rao-Monari: "Thank you very much, Asit. So we've now heard various perspectives on this issue of urban resilience or cities resilience and I'd like to do a couple of things. I'd like to open this out first to all of you to ask questions. There's two ways of asking questions, one is to just email or whatever electronically the question. I have some of them here. The other is simply to raise your hand and say I have a question, I don't know what you are talking about. I want to start with that. I have some difficult questions to ask each of you which I'm going to save depending on the audience so let me, the most question, the one question that received the most votes from the audience so far is the following, I'll open it to the panel, what do you think is the role cities in mitigating or adapting to climate change and how does this compare to the role of nations. Paul you talked about cutting things onto

little pieces to make it more efficient but have that become more of an issue for us? I'd like all of you or any of you to answer but perhaps we can start with you, Yong Soon."

Mr Tan: "In Singapore, we have no problem. The city is the country, the country is the city."

Ms Rao-Monari: "Touché."

Mr Tan: "I think in many aspects a city can move much faster because it's less complicated than a country, because it comprised mainly the buildings and transportation, areas where you can improve on mitigation and adaptation more so than in heavy industries, which is spread over the whole of countries. In certain cases, it's because the country is obligated internationally under the UNSCCC so therefore doesn't want to be seen to do certain things. So in countries like India and China, the countries maintain a certain position internationally BUT domestically they encourage a lot of innovations, new practises across different parts of the country not just cities but in regions as well. So this may be some of the reasons."

Ms Rao-Monari: "Thank you. I encourage the panellist to jump in if they views. Otherwise, I'll go to other question and you can interrupt if you want. Otherwise I'll go to other questions."

Mr Parmet: "And I'd to also go the cities and the nations question. In a few years, 70 per cent of the world's population is living in cities so that could be the answer to the question. But on the other hand, let's say cities are the place where things have to be done, where things have to be implemented. But it helps very much if there are long-term perspectives and if these perspectives area inspiring that's even better. And I think to my opinion, but everybody may correct me if I'm wrong, it is relatively easier to do that on a nation basis to make these long term perspectives than on the city level where you have a lot of shorter problems that have to be taken care of. So I would definitely go for the end, knowing that the real thing has to be done on the cities."

Ms Rao-Monari: "Thank you. Madam."

Ms Henley: "Can I just add to, sorry, that's very loud. One of my other panel members here mentioned before about the challenge around the motivation to act. I think at the city level there's the responsibility to get people engaged to act is where it sits. I think for the national governments, they are too far removed and at city level, they are much more connected to the people so that's one role I'll say at the city level."

Ms Rao-Monari: "Thank you and then, Paul?"

Mr Rechkemmer: "Two short points. One if of course cities have always been the drivers of innovation, research, development so they are the drivers of mitigation naturally but they also have to become the drivers of adaptation policies right now. We look at adaptation policies as sometimes a local phenomenon more on the rural areas. Cities have to adapt, have to drive the art of adaptation, to use the word again and of course, it is in

cities where mitigation and adaptation efforts in the face of climate change have to come together and can come together. Second point is something I would like to actually repeat what Mr Conhart (?) (47:59) Secretary-General of (48:00) said this morning that in the absence is that in the absence of effective national governance on climate change, we seem failing all over whether Copenhagen or Durban or Rio. The story will continue. I'm afraid that our governments whether democratic or not democratic doesn't seem to make a big a difference, just failed to act on climate change impacts now. So cities are becoming centres of hope in terms of political collective and vis-a-vis climate change. So what we see perhaps is also a transfer of power legitimacy and accountability and creative energy away from national government towards city governments."

Ms Rao-Monari: "Thank you Paul."

Mr Reiter: "Usha, I just like to kind to recast your question a different way because I think the answer is compelling. Can you imagine a meaningful response to climate change without the cities? Can you just conceive of that world where cities are not engaged actively in managing climate change? It's an inconceivable world. So I think the cities, I agree with everything that's been said, cities are vital. They are a big part of the problem and they are vital to the solution of this problem."

Ms Rao-Monari: "Madam, would you like to ask your question? Can we have a mic or should I just walk down the stage?"

Question: "Thank you very much. At the beginning, Mr Tan Yong Soon explained very well the problems, not problems, the challenges of Singapore regarding climate change and whether it's been an institution and then we lost all thoughts with reality. We have, please all of you correct me if I'm wrong, lots of innovation, lots of affiliations, integration, all stakeholders, adapted capacity that things have to be done. And then all of a sudden we were involving a lot of presentations involving and these are actual problems. So could we just go back? All of you have so much experience. Can we hear something which is the actually solution to an actual challenge because this was nothing but random warnings. Things have to done day and night. We are living this day and night, they are not. We're missing everything, so many things, we have so many challenges so things have to be the way we want. How are things, how do we go from where the world is not all (development, developing cities are not that different. So how do we go from there? Let's forget all these warnings. As one of our speakers correctly said it's buzzword so could we learn with so many real problems what could be the actual solutions? Thank you."

Ms Rao-Monari: "Thank you. So basically she's asked all of us to stop talking and start acting, which I think is a very worthwhile request. Would anyone like to respond to that by way of solutions? It's really easy to frame questions constantly and infinitely. Solutions are more difficult."

Mr Reiter: "I'd like to suggest that if you look around the world there is a phenomenal number of solutions that are being developed, that are at hand. I mean if you went to the Prize speeches, there's a set of solutions being generated in the New York. I mean, that's a huge problem and it's huge but very creative solutions and the other speaker was talking about solutions to ordinary problems that create energy and recovering. Yeah, so I think

there is, I'm sorry I'm not, I don't share the idea that the entirety of this discussion is all around political platitudes. I'm sure there is a lot but if you look on the ground there is, I mean, look at Shanghai for example. It's a very inspiring city so I would say that maybe we can have a mix of things. But on the ground and back to cities, here is just a rich set of solutions that are being developed and the Netherlands sitting next to me, there are some very inspiring examples there."

Ms Rao-Monari: "Thank you. Asit, you look like you're about to jump out with a sort of solutions, what might that be?"

Prof Bitswas: "I think the problem, the question is very pertinent. I go from meeting to meeting and hear the same things and in fact I made a lot of people very mad at the Stockholm Water Symposium in 2006 when I said all I'm hearing SOS, same old stuff, a lot of platitudes, a lot of the same statements. I have to be honest and tell you, I've listened for two days here, I haven't learnt anything new. There are solutions but we are not thinking about the solutions. I heard this morning a lot of platitudes. Don't do what the developed cities have done. You should learn from their experience. I'll (inaudible) to you many of the cities in the developing countries now have solved it, at least some of the problem much better than London, New York or Washington.

I give you one example because you take Phnom Penh. Phnom Penh water supply authority is now as good a good water supply system as Singapore. Accounted for losses for Phnom Penh is about five per cent, very close to Singapore. The profit of this completely public corporation, semi-autonomous corporation is going up each year as a result of which, and the municipality does not subsidise it, as a result of which they paying more and more taxes because the autonomous cooperation to the government each year. Phnom Penh corporation doesn't give them any money. So we have examples, we have solutions but the biggest problems in the cities, including US and Canada and Europe and everywhere and the developing world. We know these solutions, we have the technology but public is not aware of what can be done, politicians are quite okay with the status quo and the bureaucrats recently in India, I talked to some of the bureaucrats, they said we don't want water pricing. I said why, they said if we price water we have to provide a good service delivery so they will hold us to account. So solutions are there. in places they are happening and happening better than the West but how do we transform the Phnom Penh experience to other places. That's the part we need now."

Ms Rao-Monari: "Thank you, yes, you may because I want to go to next point or related question, please."

Mr Tan: "I just want to say that all of us either in the government, companies or universities can come up with solutions. Just give a small example. In 2003, Singapore, we started desalination and in 2007, we, the National Water Agency came out with a technology challenge to water companies or researchers to come out with a solution to reduce the energy needed for desalination by at least 50 per cent. It was very small price money and the winner of the challenge was Siemens Water Technology. Siemens is a very big company. It has a lot of money but we think the research set-up, they couldn't get the funding for that particular research. It wasn't immediately within their workplan. So together with the money that the Singapore Government gave, Siemens have produced

years later and test bedding the technology with PUB a solution that reduce the water, the energy needed for desalination from 3.5 kilowatt per meter cube to about 1.7 and that's a big, big achievement. So I'm saying that is one small part that the PUB to achieve. University researchers, companies, communities, all can come up with solutions and if we gather this collectively we can share them."

Ms Rao-Monari: "Thank you. I'm going to come to you in a second sir but the issue around solutions though if I may pour a glass of cold water on all these excitement around solutions is an assessment of the problem. Do we really know what the problem is to provide solutions? There are two questions on my screen here. You spoke about vulnerability assessments so just an assessment of the issue at hand. Has that been done? I mean are there examples you can give of such assessment because from where I sit and from where some of these members sit, it's only when you know the problem that you can go out and find the right solutions. Otherwise, you end up doing what bureaucrats like me do which is to throw solution at the country against a problem that doesn't exist. So that's part of the problem. So maybe you mention the vulnerability assessment. Andreas, what do you think?"

Dr Rechkemmer: "First generation of vulnerability assessments were carried out years ago in the context of disaster risk reduction and the Indian Ocean tsunami seven years ago created so-called this so-called a framework for action and another wave of assessments. And now we are moving towards a third generation of vulnerability assessment, especially looking at climate change impact and that's likely different from so-called natural disasters. So yes we have learnt a great deal from going through various cycles of assessment. Of course, there are places so these are all case studies in various cities and such vulnerability assessment for instance have been carried in mega cities, like Sao Paolo, Rio de Janeiro, Jakarta, many other places, Johannesburg, et cetera, and they have also been carried out in second tier and smaller cities. And now there is a community, the risk community, if you will, which is not only research is inside but also policymakers and practitioners that are trying to agree on a new platform or new approach to smarter more integrated vulnerability assessment. That's what I try to mention before. Not only looking at the vulnerability of physical infrastructure and economic assets but really look at the key vulnerability of people of population, of the sectors and of course the ecosystems, things like biodiversity, urban biodiversity, food supply et cetera. All these have to be part of the equation. So there are good examples and there are less shiny examples on vulnerability assessment and it is a very exciting time right now because the community is preparing for as I said the next generation of assessment to be carried out in the next few years in this more integrated way."

Ms Rao-Monari: "Thank you. Sir, you question. I'll come back to you, Bart, with question."

Question: "Thank you. My name is Emiel Wegelin, I'm the programme coordinator of the Cities Development Initiative for Asia, a venture supported by the ADB, the German Government and several other to help medium sized cities to better job in planning and programming urban infrastructure. My question is the following. We have to be cognizant, I'm sure some of you are, actually all of you are. Jane began to address my issue a little bit. The built environment of tomorrow is already 90 per cent here. We're talking about existing assets. We may augment perhaps over the next 10 years 10 per cent more but the

delta system in the Netherlands started in the late 50s, it's basically there. Our built environment, our housing, our units, our flood protection, our drainage, 90 per cent of it is there. So it raises the question how do we deal with existing assets rather worry about new assets to be developed and I'd like to ask the panellist all to respond to that question."

Ms Rao-Monari: "Thank you, sir. Who would like to start, Jane and Cart?"

Ms Henley: "Should have gone to buildings first then."

Ms Rao-Monari: "Well, you can fight over it."

Ms Henley: "Well developments say two things or, sorry I should say owners, asset owners said two things. They say the first problem is access to the building so to see someone (inaudible) in the building that they want to keep to get their income or someone who is in the property as a house owner. So basically to get access to the building is going to in some way disrupt the business model and the income model. So when should they do that? When is the renovation cycle? So just decision on how to win the access and intervention should occur is their first challenge. And to get a large 50-story building, should they do it section by section, what sort of technical problems does that present. So and then the second problem for them and probably the biggest problem that's stopping action is finance. So they have an existing mortgage of some sort on the building. They don't want to take out or generally can't take out a second mortgage under the existing business model that they have and so they need some sort of secondary financial structure and that's where we're seeing the programmes where this pay-as-you-earn in the UK or the PACE scheme in the US where they're basically enabling a building owner to access a financial stream which doesn't put their existing mortgage at risk, guaranteed by the government generally. All the cities, settling at the city level as well so it not an issue with the bank and the money in that building. So I think if we want to bring forward that investment into the existing stock, which really has to happen, it's one of our biggest priorities, we need to leverage these financial mechanisms and needs to be a focus to really scale those up. Some of the situation in some of the case studies which is quite a few in this little booklet that we've highlighted some successful policies that are doing this right now, I've got a few of these if you want to have a look at it. Some of these examples, they're not costing the governments either at city level or national level anything in capital outlay. The actual money is coming from the private sector but it's being guaranteed by governments. So I think there's lots of opportunities in this base that we're still yet untapped."

Ms Rao-Monari: "Thank you. Could I ask Bart what do you think? I think he mentioned that you have an existing stock of assets that's all you've got, is that true?"

Mr Parmet: "Well, I think it's more an opportunity than a threat so to say because for example in the Netherlands, a simple question was will we stay here or will we go away. Because of the existing stock, of course we want to stay here if we manage to deal with it and we can. Then the next person if you look existing stock, for example if you look from the water perspective, then water alone is not a well enough drive to do something in they city and I think that's probably with all separate drivers. But there's one interesting driver in urban areas and that sometimes you have to restructure, which is the Singapore about

30-35 years and the Netherlands maybe 60 years but that's a little bit the cycle and if you use this cycle in a wise way and if you have let's say a good perspective that when it is an issue they should do it this time to do it. Climate resilient, you can do it not a lot of cost and at the same way you have a lot of extra benefits. So use the restructuring an engine I think is a powerful force. Then I come back to what I mentioned earlier, if there is not a storm or not a disaster, you can take the time and you can use the force of the effected time and I think that's important to get things done. Don't be too impatient but use the opportunities and then in 50 years, you're around."

Ms Rao-Monari: "Paul, did you want comment?"

Mr Reiter: "Yeah if I use the pun it's a tale of two cities. I mean if you look at the Asian Development Bank report for 2050, only 30 per cent of Asia's assets are built at the moment, right so we're talking about a huge opportunity to do something right or better in constructing Asia between now and 2050. If you look at the development countries, you're right. I mean, it's one billion people that are living in developed world right now and there's very, very little population and I think Japan is a example that population is falling. And so cities like Tokyo have to look at their future not in terms of doing things differently in the constructing the future. It's remodelling what you have today and having a long-term vision as my Japanese friend say. So a very different situation and I think it's hard to generalise. I think you have to be precise in what you're thinking about."

Ms Rao-Monari: "Did you want to comment as well?"

Mr Parmet: "Yeah, briefly just to add a word so that we don't only talk about adaptation now in this context of resilience that are important. Ten years ago, it was all about mitigation and when we are moved, we have to talk adaptation now. Now it's almost shifting back and that is very dangerous. So we have to really integrate mitigation with adaptation. This has to be a balance if we only adapt then without mitigating, effectively in the long run we'll be lost. How high can you build your dykes in the Netherlands? Without mitigation in the long run, you might have all move to Germany, which is fine. Please you are most welcome and we will merge our football teams and then be successful."

Ms Rao-Monari: "Thank you very much, Madam?"

(Question inaudible)

Ms Rao-Monari: "Asit, would you like to attempt a response?"

Prof Bitswas: "That's a very serious question but I'll go even further. Forget 2050, in any profession now, including water for cities, we don't know very much how the world would look like even 2020, let alone 2050. As I see now the paradigm of research is now shifting. Before it was in the universities and research institutions and they put out the results promptly in a written form. Now much of the research, real serious research cut in the university budget is happening in the private sector and we haven't had a clue what they're doing and some of the large corporations are spending more money than Oxford or Harvard, just one corporation whole university put together. So we're seeing a completely new paradigm and as an advisor to at least three Fortune 50 CEOs, I think know thing that

are radically going to change water requirement, food requirement. I cannot speak because I have a confidential agreement with them. But they are spending billions of dollars to do and nobody knows what's going on. And this is the most positive thing, what the world look like You raised a very good question but the same question for Japan, Spain, et cetera right now. Their population are already declining. How do you handle that? So we don't have to wait till 2050 to do that."

Ms Rao-Monari: "Thank you and you actually created a wonderful segue into two questions which are connected, which I've received rather a lot of votes here. The question is the following. Resilience is about self-sufficiency, it's a proposition. If that is so, is it possible for cities to be self-sufficient in food, energy and other important inputs? If not, should cities limit their growth to allow areas around them such as hinterland agriculture and so on to give them the food security that they cannot establish themselves. I mean, how self-sufficient independent should cities be and what are the impact of such set of actions, Paul?"

Mr Reiter: "I just totally disagree with resilience being equate with self-sufficiency. Resilience for cities or agriculture or for energy or for the environment are going to come from jointly optimising across all those spaces. Self-sufficiency means local optimisation which means hugely sub-optimal solutions."

Ms Rao-Monari: "Anyone, there's one more question that I'd like to take."

Prof Bitswas: "Just very quickly I completely agree with Paul. That concept of self-sufficiency in food in the city is out of the question. The concept of self sufficient, it can't be scaled in foods and energy. The world is becoming globalised. For example if Singapore has to be self-sufficient in food, you have to rethink your catchment concept, et cetera. So it's not, it's globalised world, you can't talk of individual self-sufficiency of individual unit be it city or be a country."

Ms Rao-Monari: "Thank you, that's clear. Bart, did you want to say something?"

Mr Parmet: "Maybe a little bit. If you look at the black and white picture I of course agree but in the self-sufficiency you can also get some interesting perspectives that could be, for example, I'm a fan of urban farming on top of roofs or flats. Of course, it's not for self-sufficiency but it's the kind using the space in an optimal way. We have in Rotterdam the first garden and I think in New York there's a lot. So let's wait for the first restaurant with rooftop vegetables. It could be a new marketing instrument. So I'm joking a little bit but I think this is important. This could be an aspect which is not self-sufficiency but an idea that comes forward wit it."

Ms Rao-Monari: "Right, I agree. So did you have a question and we need to wrap up soon so any quick questions so I can take it. Please, sir, go ahead."

Question: "Thank you. My name is Habibie from Indonesia. My question is maybe a stupid question. From the beginning, we agreed that urbanisation is unstoppable. But look at the challenge and look at the problems, massive challenge and massive problems that we will face. So should it be stopped or let it be a trend like that? Because in the perspective of

environment, we know that one day there will one day that the environment-caring capacity or Earth-caring capacity cannot carry us, when we are in top of the caring capacity or Earth-caring capacity. That's the first question and second question may be more stupid. Because I am from the rural area, is it not fair if you just look at the solution on the city because in the rural area, there is no opportunity, no equal opportunity in the rural areas. That's why the rural people like me goes to the city to find the opportunity like human well-being opportunity like education, public health and else. So in my point of view if you want to have an integrated solution, you will have a solution in the city and solution in the rural. Is it not fair, it's not fair when the rural areas, rural people have to support your food in the city, with irrigation and farming system? In the city, you just eat and have more carbon dioxide for climate change and something like that. Thank you."

Ms Rao-Monari: "Who would like to attempt that? I'm looking at Jane here."

Ms Henley: "I've just recently been in Norway and I'm thinking of a political structure that can support actually keeping people in rural areas who have to be something very socialist like that because I don't think private sector financing would keep infrastructure open like they do in remote parts of Norway. They make sure everything is equal across the country to make sure that people want to stay in those rural areas. So I think it's very political. It can't just be market driven to encourage that shift away from hyper urbanisation."

Ms Rao-Monari: "Thank you. Anybody else would like to respond to that? I think I agree, look, I think the issue around cities versus something else is something we should not go towards. I think as Paul said it has to be a system-wide solution. I think everybody should share the benefits of resilience and I don't think it should be one part versus another. It was actually going to be my question to the panel which is whenever you focus on any centre of growth or centre of human settlement or whatever it is, does that mean you exclude somebody else? Where is the concept of inclusiveness in resilience? We may have to end there and, or I might ask somebody from the audience to answer this question but the whole point of inclusiveness is something we cannot move away from when it comes to sustainability or resilience or climate adaptation and so on and so forth. I invite any or all of the panellist to make very, very quick intervention if you like and then I would like to sum up. Paul, you would like to start?"

Mr Reiter: "Well, I come back to water as an example of how by taking and I'll be quick, but if you think about a war between rural areas and agriculture in cities, it's a stupid war. I mean, in fact cities can produce reused water and they can basically make that water available to rural areas and agriculture. They can buy conservation and more efficient systems and the agriculture areas, the farmers are better off, the cities are better off than any solutions that could be crafted in individually. So I think that if, I come back to this idea that we have to change our scope from the cells that we're trying to optimise in the whole system."

Ms Rao-Monari: "Thank you. Anybody else with some closing comments?"\

Ms Henley: "I think that everything that we've talked about you mentioned before it comes down to people and our ability to speak to people outside of this room and to people who read the newspaper and watch the TV and for them to understand these issues is probably

our biggest challenge, so that's the public. I think the way that we've been trying to speak to the public is by telling stories, by telling good stories and not telling the kind of downside or the negative or the scary or the risk part of it. So I guess my challenge to all of you and it's to tell good stories outside of this room to other people who are not necessarily at this conference. And I think it's the small steps that we make bit by bit and the changes you make as political leaders in the way that you know you can is how we're going to make change. I don't think it's going to happen radically. I don't think any solution is a silver bullet but it's really about us all being positive, doing what we can with the now and sphere of influence and acting everyday"

Ms Rao-Monari: "Thank you. Asit?"

Prof Bitswas: "I think we're on the wrong track if we're going to say we're going to build the smartest cities, most resilient city, us the technocrat or the academics or the bureaucrats. I think we have to go to the individual cities and the people ask a very simple question, does the city have a soul and let the people of that city decide what the soul means. How do we meet the expectation, aspirations, their needs? And let me just quote, finish by a quote from Walt Whitman. "The great city is that which has the greatest man or woman. If it be a few ragged hearts, it is still the greatest city in the world.""

Ms Rao-Monari: "Anybody else? If not, I would like to thank the panel in one second and just leave with you my vision around this, which is one-liner vision. I would like to see an inclusive, sustainable, resilient world where all of us work together in achieving that rather than against each other. On that note, I'd like you to join me in thanking our brilliant panel. Thank you so much for all your insights. You've been most helpful. Thank you."

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