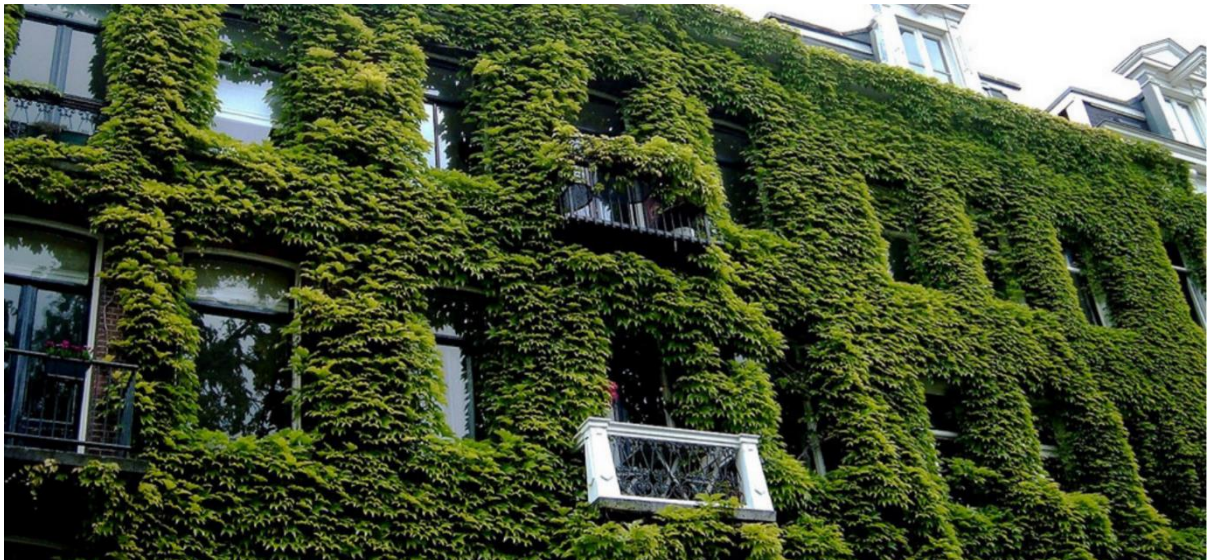**CLC LECTURE**

Circular Cities, Improving Liveability & Economic Climate in Amsterdam: An Example to the World

30 May 2017

Cities and city regions are the hubs for essential flows: of people, information, currency, water, materials, energy, food, and waste. As urban areas constantly change in size, density, and activities, they must find ways to make their resource systems and infrastructures responsive to the opportunities of new technology and to the challenges posed by climate change and resource scarcity. It is thus high time for a new, regenerative approach to resource use in the city. Such an approach implies radical changes in the way we plan, design, and use cities. In this lecture, Dutch and local experts will share about their experiences and challenges in making our cities more sustainable.

Lecture Segment

Tessa 00:00:16	Good afternoon distinguished guests and speakers, my name is Tessa and I am from the Centre for Liveable cities.
	Today, we are honoured to have three speakers who will shed some light on circular cities, as well as a moderator who will conduct the Q&A [question and answer] session.

00:00:53	Our first speaker, Kees Slingerland, he is the Business Director of the Amsterdam Institute for Advance Metropolitan Solutions. He was also the former Director-General of the Environmental Sciences Group [ESG] at Wageningen University and Research. He worked as an Advisor for the Dutch Ministry of Agriculture, Nature and Food Quality as well the Project Manager for Nehem International. He was also the former Managing Director of Arcadis Nederland.
	Our second speaker, Bob Geldermans, he is the Program Manager of the Amsterdam Institute for Advanced Metropolitan Solutions [AMS]. He leads the circular city research program at AMS and is a researcher at the Delft University of Technology. He also does freelance consulting for Except Integrated Sustainability in Rotterdam and Ministry of Economic Affairs.
	Our last speaker, Dr. Lee Hui Mien, she is the Head of Sustainability at IKEA, South East Asia, Ikano Pte Ltd Singapore. She set up the Sustainable Manufacturing Centre as a research scientist with the Singapore institute of Manufacturing Technology at A*Star. She is also trained in circular economy and has been active in the environmental scene Singapore, and is currently a member of the NEA Singapore Packaging Agreement Governing board and the PUB water panel.
	The format for today's lecture will start off with a presentation by each panellist followed by a Q&A session with the audience. The session will be moderated by Ms Jessica Cheam, Managing Editor of Eco-Business and the CLC adjust research associate. So without further ado, I would like to invite Kees.
<u>Kees Slingerland</u> 00:02:40	Ladies and gentlemen, a very good afternoon. Bob [Geldermans] and me and very happy that we are in Singapore—today and tomorrow only—to collect a lot of information on also looking [*sic* look] for future possible collaborations with Singapore for our Amsterdam Institute.

| 00:02:56 | And this is a bit new because the whole institute is quite new, or let me say quite young. It is a top scientific institute that is not even three years old at the moment, that was initiated by the city of Amsterdam because they wanted more scientists in the city, in the field of technology—and not only for science reason, but also because they expect us to initiate a lot of business in the city of Amsterdam. And that is the background [on] why they have invited a group of top universities to set up these institutes, and these universities are: University of Technology in Delft in the Netherlands, the Green University in Wageningen in the Netherlands and MIT [Massachusetts Institute of Technology] from Boston that you probably already know. |

Understanding Cities as they Develop

| 00:03:48 | So, we have to deliver science and we have to deliver business. And it should be about technology, and it is focusing at [*sic* on]metropolitan solutions. And this is not so crazy because all of us know that the world is [*sic* will be] having quite a challenge in the coming decades in the whole urbanization that takes place worldwide. The picture you see here shows the cities having more than five million residents in the year 1950 and this is how it looks now; and it is very easy to conclude that we have more big cities in the world. And we do know that [there] will be even more in the coming decades, knowing that now it is [*sic* there are] three and a half billion people living in cities—and in 20-30 years from now, it will be seven billion. So in that sense, it will keep growing. |

But the other conclusion you can draw from these two sheets is that these cities are developing in the delta regions in the world. And this makes it even more interesting or more exciting, because the deltas in the world are the vulnerable areas in the world—vulnerable for many issues, vulnerable for climate change especially. And in other regions that we have to take care of very precisely, because in the deltas in the world, we produce the total food production for the human population; and the deltas in the world are also the very rich in nature regions where biodiversity is at its richest. So, we have to take care of these regions.

00:05:35	And we have especially chosen these regions for very clear reasons, by the way, to build our very big cities. So we will put even more pressure on these very fragile areas that we have worldwide. Fragile for many reasons and for many causes.

But let me keep it simple: on a day like today, we have some rain in Singapore to look at rainfall as the issue. And I think this picture shows that it is clear to anybody of us that rainfall in the country side area is much more easier [*sic* easily] absorbed that it is in urban areas. So the whole discharge of heavy rainfall in urban areas is much more difficult than taking that in the country side area, in the rural area.

So cities have to take care and to take measurements not only because rainfall is rainfall as it is, but more so because the rainfall will change in the decades to come—and has already changed in the past decades as a result of climate change. I think you experience what we experience in Amsterdam as well, that rainfall is getting much more intense and rain showers are much more heavy [*sic* heavier] and much more local. So rainfall patterns are really changing significantly.

And the big question, by the way, is how this will be in the long run. Because if you look at the several climate models that we have, then it is quite typical to see that it is expected, according these models, that in some regions in the world, rainfall will even get more heavy [*sic* heavier], more intensive—but also in some regions, they will be more dry [*sic* drier]. Especially a country like Bangladesh, which is known as the most wet country in the world, [it] turns out from these models at least, to get problems with drought in a few decades from now—30, 40 years—for several reasons. One of the causes is the melting of the glaciers, that at a certain moment will end and will not result in more river flows through that small country of Bangladesh.

So yes, on a one hand we should count on every year rain, more intensive rain, but in the long run, you never know what will happen.

00:08:13	You only know that there is quite some pressure on deltas, that there is quite some pressure on cities in the world—and that is why we really have to take care in the measurements, in the investments that we take in cities.

Amsterdam has presented itself as a city that has offered itself as a living lab, which is very nice of the city of Amsterdam—the more so because Amsterdam is probably not a very big city, but it is a city that is very compact and that is very well-suited to have experiments about rainfalls, about discharge, but [also] about many other topics about we can study on: which is yes, I mentioned rainfall, which is the whole issue on waste management, which is transport issues, bicycles issues.

On our first day in Singapore, we already had a deep discussion about the desire-ness [*sic* desirability] of having more bikes in Singapore—leave it for now. It is not about sailing, but about crowd management. That is quite an issue in our institute. It is about a new fleet of self-navigating boats that we will introduce in the waterways in Amsterdam. And it is about feeding the city. Big cities in the world need everyday, fresh food, which is not easy to arrange—not in Amsterdam and for sure not in cities with different climates than we have.

So ladies and gentlemen, we know that we will get many more and much bigger cities all over the world. We know that they will suffer from many topics and that we have to try to solve all the challenges we have in air pollution, in traffic jams, in energy supply, in waste management, in micro climate, in heat stress—in whatever kind of topic you would like to think of. And the approach we have kind of chosen in a city, is a metabolism. That a city should not be taking care of a traffic problem being answered by traffic know-how, or an energy problem being answered with energy know-how. No, a city is an integrated part of many aspects that all interfere in one way or another. And we think that this integrated issue in a city should be answered with an integrated approach. And in order to better understand the interferences between

several aspects in the city, we can use big data, at least to understand [a] little of that and try on the basis of conclusions that we draw to make proper decisions on how cities should further develop and what kind of investments we have to take.

That is what Bob and I are doing these days—check and see [and] understand Singapore [as to whether it] could be an option of a twin city that we could further collaborate with, as we have several other twin cities in the world—not too many by the way, because we would like to keep it manageable. And by looking from Amsterdam at least, it looked as if circularity, circular cities, would be the topic that could give very good opportunities to work together with the Singaporean people and the Singaporean institutes and businesses.

And therefore, that is the little bit of the main topic that we have chosen for these days. We hope we can present a little bit of our insights in that sphere, but we hope that more in the discussion, you will also give your views on how Singapore is dealing with circularity and what type of future topics you distinguish that we can probably work together on. Thank you very much for now.

Bob Geldermans
00:12:06

Well, also from my side, it is great to be here. Welcome to you all. Nice to see so many people.

We dived into the Singapore context a little bit today, and it was a great start of only our two-day experience in Singapore. Tomorrow is another packed day and I am looking forward to that.

But first now, I will pick up from where Kees left it, and that is going a little deeper into circular city research program at AMS—which I coordinate. But before I do that, I want to show this picture and go back to Kees' story about water, water stress and water problems—particularly this one. This could either be an image of the Netherlands very long time ago, that is what it looked like or it could be the image of the Netherlands when we lose the battle against water. So, this is

basically the Netherlands relative to the sea level, and there you see is Amsterdam. So you see what is left of Amsterdam: A floating city.

Understanding Circular Cities

Our subtitle was "Improving Liveability and Economic Climate in Amsterdam", and I will go into that a little deeper. It is indeed a combination of the two. The liveability—it has to be vibrant and healthy city for its people—and there has to be a certain economic quality. And these two together bring many challenges and many options [regarding] how to keep them in balance. That is something we will see within the circular city debate as well.

Now, my lecture will be structured around these topics. First, I'll talk a little bit about AMS, which Kees already did. But I want to stress a bit on a couple of other things that kind of bring me to the content of this lecture. And that is about cities' circularity; I want to talk about value and how we have to rethink the concept of value, then I want to take you with me into a couple of projects of AMS. And finally, talk about some opportunities and challengers.

AMS, Amsterdam Institute for Advanced Metropolitan Solutions. It was initiated on instigation of the Amsterdam Municipality a couple of years ago. And what is important about this and what I want to stress, is the position that AMS takes within the quadruple helix as we call it. So, we have the governmental organizations, we have the industry, we have the academia and knowledge institutes, and we have the citizens or the end users, if you wish. And in the middle of that, AMS positions itself. So, that says something about how we want to be and need to be trans- and inter-disciplinary and bridge sectors. And that will come back further within the presentation as well.

Here you see a couple of partners, or potential partners listed. This is an old diagram. There is [sic are] new partners, some partners have left— but it indicates how much it is a collaborative approach that we adhere

to at AMS. We need to do what we do with the industrial partners, with the governments, and [by] the governments I mean not only the Amsterdam city, but also other municipalities in the Amsterdam metropolitan area. And of course, with other knowledge institutes in the area and the citizens, not least—because in the end, we do it for the citizens.

There are three main pillars, if you wish, within AMS. There is an education pillar, there is a data platform, or a value platform [pillar], where all the data that we collect and disclose and process, will be gathered and shared with as many people as possible. That is a dataset that will fill quite substantially over the course of the coming years and it will be informed and it will be fed by both education and research and fellowrisation—that's the third pillar. Research and fellow-lisation is where the three themes takes place, so we have the theme of circular cities, that is my program. Then we have vital city, which is very much about health and food issues. So [these are] very closely related to topics I deal with, within my programme of circular cities, and connected cities. Connected city is very much about mobility, about ICT, big data etc. And also there, you can see the clear connection about the circular city realm. But we will go into that later.

What are we talking about when we talk about cities? From our perspective, we think of cities as concentrated hubs of essential flows. And flows are people, of course, information, currency, water, materials, energy, food, waste, you name it. Many of them were already mentioned in Kees' presentation, in particular the last slide. And offer scale-level potential to close and connect loops—so that is another very important issue in ways to justify associated investments. So there you see the balance that has to be found within the urban context, between the resource systems, between the closed loops and between the investments that are being done because people believe in it. And that is something that we will come back to again in a couple of times within

this presentation because it is all about how can we mobilise people to start, to take part in this exciting challenge and adventure.

Now another thing I want to mention here, is that cities have the capability of providing something for everybody, only because and only when they are created by everybody. So this says something what I earlier stressed: it is the importance of the social fundamentals, that is the city—the famous Jane Jacobs said that.

So here you see the Amsterdam metropolitan area, and in the left corner you see the Netherlands, so that gives you an idea [of] where it takes place and it [*sic* there] is roughly three million people I'd say, that live in that area. We could boil down our task or our objective into this question: How can the living and working quality in the Amsterdam metropolitan area be improved through innovative, renewable and robust resource systems? And I'd like to add there, while bringing innovation to scale. Because what we are doing in Amsterdam, is not only for Amsterdam or done by Amsterdam people. It is mainly done because we are looking at ways to scale it up and to learn lessons that we can bring to other places, other territories—maybe Singapore. And the other way around, [what] lessons from Singapore could lend in a context like Amsterdam.

Now, what is important, I already stated that AMS was initiated by the municipality of Amsterdam. The municipality of Amsterdam is quite proactive when it comes to circular economy. A couple of years ago, they saw the light and they thought, "Okay, if we have to proceed, if we have to go on, and we have to provide, a vibrant thriving city for our population, we need to do something about the other resources that we need. We need to do something about the air pollution, we need to do something about congestion, and all those metropolitan or big cities issues [that] are at stake."

They realised, as Kees already mentioned, that they could do with some extra, let's say, engineering power or scientific power in the city that could help bridge the step from science [that is] often conceptual, often abstract, into implementation, into business.

Here you see two examples, the circular Amsterdam, which was a road map for the municipality of Amsterdam, in which they did a scan, a circular scan to see, "Okay, where do we stand? What are the potential, or high potential flows that we can look at?" And they came up with two high potential flows in particular, I will show them later.

The next one is the circular innovation program, which basically is a spin-off of the circular Amsterdam because they realised that there is so much potential. There is so much potential in terms of returns of investment, in terms of job creation—none of that is sure and the metrics are still a little bit wonky, and that is what we have to work on, that is where research comes in—but they believe in it. So the circular innovation programme was set up into order to bring this a step further in close collaboration with AMS.

Now here you have two maps, this is the circular construction map, this is all about construction demolition ways, which focuses on the flows of Amsterdam at that time. You see how it is nicely located in the Amsterdam region, and that is something I will come back to later as well. But they made very interesting visualisations and graphics of how it could look like: you have different change within the networks of processing flows, processing construction demolition flows.

This is the other one: Foods. Food waste and organic waste in general, but food waste in particular is something that is a high potential and high urgency flow for the city of Amsterdam and the Amsterdam region. Now, the step to re-think value is easily made because [in] 2016, there was a report by Ellen MacArthur Foundation—you probably know the name Ellen MacArthur, the foundation was after "cradle-to-cradle" by

Herr [Michael] Braungart and [William] McDonough, Macdonald Ellen MacArthur came up with significant documents and significant reports and studies in order to put this on track, this whole adventure. And they didn't do that in a flimsy simple way. They wanted to do it **substantially**, so they actually said, we can do this and we are going to help you and we are going to guide you. So that is what happened.

And in 2016, they published a very interesting report which was about unlocking the circular economy potential. It is very interesting and I advise you to have a look at it, it is freely downloadable from the internet. It is so interesting because it really tweaks our perspective on how we think about value. What is value now? This morning, we had very interesting conversations about money flows and about business models and about investment power and risk aversion, and stuff like that. And all these aspects are super important and are the fundamentals behind our current linear economy. Now it is very tricky to start warping them.

Models of Circular Cities: Examples

So how do we go about it? Because we do realise that in a circular model, things change significantly. Now, what they do in this report is give a couple of examples, give a couple of models in which that could work and lead the way and be like a lighthouse in terms of [saying, "Okay], we can go in this direction and not as a norm, but as a way of moving forward and explore and fail, and explore again.

Here is the famous butterfly diagram, I hope that all of you know it so that I am not going to explain it in great detail. But I will do a little bit to help and contribute to my successor. You see on the left-hand side the biological cycle, and on the right-hand side the technological cycle. And these two are distinguished from one another and that is not done for nothing. That is done because there is a very clear reason for it. If you mingle them it is very hard to then retrieve them in a high utility or a high quality.

So, different rules are valid for the biological cycle. You'd sooner speak about cascades than about closing loops. And cascades is [*sic* are] basically bringing it back to the very end into nature again, in order to be a nutrient for the Earth. So that is indeed a closed loop. But, that goes via different cascading, so [that lowers the] grade of the utilities of the same flows.

And the right-hand side is slightly different. You have the technical flows, and these technical flows should not end up in nature. So they have to be dealt with in a technical model, in a technical context. And you can divide that: you can distinguish various steps of let's say complexity, from easy maintenance and repair towards much more difficult remanufacturing for instance, or recycling. And that is then one of the most labour-intensive and complex processes. It also takes the most money and usually takes the most energy in order to bring that about. So there is a certain hierarchy in the model: starting from where we can maintain and keep it as long in its function as possible, then what we can repair et cetera. Clear to understand.

Now re-thinking value is also about what do we have? And this is something we do not realise often enough I think. Singapore, just as the Netherlands, does not have a lot of resources itself. So it is very much dependent on other countries, and these countries are quite often far away; these countries are quite often countries that we don't have a lot of control over; these countries are also a lot of the times politically sensitive. So there's *quite* a lot of risk there. So if we talk about resource scarcity or rather supply security, then you have to do something more radical. You have to think about the future. Where do we find these materials?

Now the good news is they circulate to a large extent within our current economy. But how do we retrieve them? So that is something that requires a lot of research and is something that will take generations. But, we can already make steps, we already take steps. In the

Netherlands, the recycling rates are quite high. There the next question is, is that actually recycling in the highest utility possible, or is it a downgrading type of recycling?

So, these are issues that we deal with. And these are issues that dealt with in the European Union in general, and the Netherlands in particular. Because the Netherlands has one of the highest recycling rates, together with Belgium and Germany [who] follows quite shortly after it—but what does that say? That means other counties look at the Netherlands and say, "Well, the Netherlands has high recycling rates and high energy recovery rates. How do they do that? We have to follow their example." And I would love to say, "Yes! Do it. We can tell you everything we do." But I am not going to do that because a lot of it is down-cycling as we call it—not in the highest utility possible. Or we even burn, we even incinerate valuable resources which we call waste, which is basically a design failure. So that is something we are now looking into: how can we change that? and how can other countries leap frog and make sure that they do not lock themselves into a waste incinerator that will last for 30 years?

Another two examples I would like to show when we think about value and re-thinking about value is the current focus—and then I take about Netherlands, but I see this elsewhere in the world as well. There is a huge focus on energy. Energy transition. We have to move towards renewable energy. And that is great, that is true. Renewable energy technologies, and here you see a nice diagram that kind of shows that indeed, the kilogrammes of CO_2 per kilowatt per hour is much less when we move to the right of the diagram where we see the renewable technology energy. And on the left, you see more the fossil alternatives. Because there should be alternatives in the future.

Now if we take another stance at it and we look at it from another perspective and we look at materials, that paints a totally different picture. Here it is about gramme of metals per kilowatt hour. And here

00:30:33   you see that actually quite a lot of the renewable energy technologies have a much higher material intensity than the fossil counterparts. So that is very interesting. And the moment the energy issues are solved, these material issues become more and more important. And these link to my question earlier: where are these resources?

Now I want to go through a couple of AMS projects to see how we are dealing with that and how we are addressing that. Urban pillars are already mentioned by Kees and I will give a short insight later. 3D printing in a circular city is a lovely but quite small project, that is all about using waste plastic and making that to a filament for additive manufacturing. And that proof of concept was a public bench that they created within this project, and that is something the municipality of Amsterdam really liked and appreciated and they ordered a couple of those benches—so that is a nice kind of symbolic gesture but it is more also to study behind it. So can we actually turn plastic, used plastic into a valuable resource for 3D printing, knowing that 3D printing is a very important future technology? Already now, but it will be even more so in the future.

REPAiR, that stands for REsource management in Peri-urban AReas. I will dedicate one slide to that later. The feeding city was already mentioned by Kees, so I will not go intoo deep otherwise I will go overtime. Smart systems, ethical concerns—yeah, very much smart energy systems and what does that mean for the data that we need and what does that mean for ethical concerns in terms of who knows about those data, who can have access to those data?

Urban retrofitting [is] very important for Amsterdam, I think the same for Singapore but in a different kind of context. Amsterdam, of course, is an old city [where] it has a lot of renovation and transformation challenges.

PUMA and circular economy in built environments. You can read more about those projects on the website. Prospecting the Urban Mines of Amsterdam, that is PUMA. What they did within this project was looking into Amsterdam and basically the Netherlands as a whole because the algorithm that they use is valid for the whole of Netherlands, of the metal content in particular steel and copper, in the built stock, in the built environment. And so, they can give a certain bandwidth of what is in the current built environment in terms of these two metals, and an indication of when it will become available.

Now, this is very rough information because we cannot predict really, when it becomes available and in what quality it becomes available. But it is a start to provide data, to generate data, with which we can then go a step further.

Now urban pillars was already mentioned, I want to show you this diagram which is really nice, simple. But if you see the right-hand side the red oval with the foreign, that is the data that is currently available with regards to energy when we talk about smart grid. So that is on the municipality, on a district, on a neighbourhood level, even on a street level—but always per year. Now what we do what to know? In order to make a really smart grid, we want to know metropolitan region data, we want to know district and neighbourhood data per day, per minute, per second. So there you can see the gap between the data that is currently available and the data level that we need.

Now, resource management in peri-urban area- REPAiR. Here, it says what it is. It is a bit abstract, it is basically a decision-making tool but what it wants to do is take the perspective of waste as a resource. How can we come up with waste issues that [are] currently [in] play and change that into something more innovative either by eliminating the waste flow altogether or finding interesting end of life solutions or changing the design upstream. Now what we realised is that we can start from waste and come up with interesting end of life scenarios. And what

00:35:20   you then do is basically, you optimise the system. That is far from what we want to reach; what we want to reach is look at the whole system because the system in itself does not have a beginning and an end.

What you see here, we wanted to make an activity and spatial based material flow analysis of the whole system. So, in this case it is about glass bottles because we had a lot of data for that [and] we could make a quick example. And it shows where the production and consumption systems around these bottles materialises. And if you want to see the transport lines, this is what it looks like. And you know quite a lot if you know that. You know where the different processes take place within the whole system around the wasting of glass bottles—not only at the household level but also at the manufacturing level for instance, or during transport. Now, this is something that is a work in progress, REPAiR continues for another three years, but this is basically the flow that we follow.

Complex Integrated Systems

00:36:28   We are dealing with complex integrated systems and that is in itself a complex term, but it is very hard to understand what it is because it is not the way in which we usually think. And this goes to show how that kind of manifests itself. We talked about e-waste earlier today. Well, it is quite often out of sight, and we externalise this. We talk about business models for instance, in the circular economy debate. How can we, on a component level, reuse certain materials? Well, it is all very interesting but we have to look at the whole system again. What happens? Where is the leakage? And this is a graph, a diagram of shipment—trans-boundary shipment—of electronic waste over the globe. And you see what activity takes place there. And that's a huge economy! This the reality we are dealing with. And that's not something we have to shy away from, we just have to accept the fact that it is true. But how are we going to include that and internalise that?

Complex integrated systems, here is a small example of Buiksloterham, which was an area in Amsterdam that was studied and scrutinised extensively. Here you see several flows—it's a materials flow analysis—and you see the flows coming in. I am not going into detail. What I want to show you here on the right-hand side is that there is incineration taking place—a lot of incineration of organic waste for instance. And that is an incinerator that provides heat, so that the heat does not go to that particular area, it goes to the rest of Amsterdam more so—but this is a painful point and this is a weak spot if you talk about circularity because resources and potentially high value resources are incinerated here until now. And we doing a lot in the Netherlands in order to post-separate and pre-separate and make sure that behavioural changes take place—but still a lot of the resources end up in the incinerator.

Last slide is about scales. I already mentioned it with regards to the construction of demolition waste map of Amsterdam; how are we going to close loops? Where do we do that? Do we do that on a scale of a building? And if so, do we know what the supply and demand patterns are? Do we need the neighbourhood in order to attune the closing of loops or connecting of loops? Do we have to look even further into the city? Or the whole region? Where can we best close connect loops? Maybe it is Europe. It is quite likely that for some materials, it is Europe. And as we have just seen, it is the world, for some materials. So we have to take really good account of on which scale level and on which temporal scale these loops move. It is complex and dynamic.

Final slide-opportunities are great research potentials. Because opportunities and challenges, yes, but this also means fantastic research potentials. For us at AMS, also for Singapore. And together, we can get much further. We can learn from each other and we can see where we kind of put our own accents. I will not read them aloud. You can read them for yourself—I only want to read out the last one, because that sums it up, really. And it also sums up where I started with. "The need for regenerative value models requires new thinking." Now what does

00:40:23	that entail—new thinking? It means thinking out of the box. It means radical system change. And this is I think that is the main challenge we are facing. Who is going to change what? Who is going to change where? It is going to be a shared effort. We have to drive each other and we have to do that in a shared effort. And that can only be done if we do that radically and not trying to optimise the current linear system. Because then we will not end in the circular model that we try to achieve.

So, I leave you with this one and my e-mail address if you have any further questions. But I am sure we are going to talk about a couple of these issues later. Yeah? Sorry that I took a bit longer. Thank you. |
| <u>Dr Lee Hui Mien</u>
00:41:13 | Good afternoon, ladies and gentlemen. I am happy to be here to be sharing about some of what a retailer like IKEA sees when it comes to circular economies.

I thank you, CLC, for the invitation. Honestly, when I first received the invitation, I had a bit of a struggle to decide how the presentation should be. Because they came and said, "Could you share a bit on circular economies?" And then I looked at the topic: circular cities. IKEA, circular cities? It is a bit difficult to immediately have a connection between the two, but after looking through what AMS is doing, I thought they have set the stage really well for a circular economy. Bob has fantastically explained why we need to move towards a circular economy, and what I can do here is really bring you a concrete example of how a company, a commercial company, like IKEA is convinced that we should move towards a circular economy and at the same time, it is something that we believe will keep our business going. It is not anything we are doing because we need to save the environment **only**. It is really something we believe is the way to go as a responsible business. As we grow our business there is really a need for us to move towards a circular economy, so as to meet the many demands of our customers. |

00:42:36	Hence, today I will share a little about how do retailers like us see what is a circular economy to us? It is essentially about how we meet the demand of the many people. We've just learnt that there are going to be a lot more mega-cities. There are going to be a lot more people living in the cities [with] smaller space. They would have home furnishing needs and that is where as home furnishing businesses, we need to cater to all [of] this. So it's really about reaching the many with smart use of materials. And how do we do that? We need to say and we need to see that it is about prolonging life of the products and materials.

Circularity in Product Design

00:43:19	I know IKEA has a reputation of buy and throw away right? In my position, for many years I have been asked this question many times, but I can tell you for sure that we have relooked the entire business model and the entire resource chain that we have, and we believe that a circular IKEA is definitely the way that we need to go [towards]. But how do we do that?

We are also not doing it just because we think it is the way. We've also gone out to do research, we've gone out to talk to the many people that we served and we realised that people do see values in things, people are concerned about the amount of stuff they throw away—at least I myself feel guilty about throwing many good stuff away, I am sure many of you do, right? And people do have problems at life, at home and they need help with smaller space, you want a good quality of life, everything comes in. So that is essentially why we are very, very convinced.

Again, the very famous butterfly diagram. We are also part of the CE100 of Ellen MacArthur, so we have taken the butterfly diagram and we have adapted it to how we see what IKEA could be looking at, when it comes to repair, second hand refurbishing or remanufacturing, recycle, as other renewable energy [systems] that we have. With that, we know that in order to have a circular IKEA, these are the three big areas which we definitely need to change the way we are doing [these]. Instead of

a linear economy that you see today, it is the circular IKEA that we would like to see in the future. And we are starting to move towards that area.

So first of all, from a product design perspective we really need to look at how do we design for circularity. Today, some of the products, if during the product design we don't really think about what is going to happen at the end of life, then it is also quite difficult to have a solution at the end of life because it does not match when it… but if we from the start, design circularity [and] look at whether the materials are reusable or recyclable or not, [start to do] modular design—IKEA has gone into a lot of modular design where you could just change some parts of the whole furniture and you get new furniture or at least you get refreshed furniture without the need to throw the entire bit away.

And then it comes to the way we interact with our consumer. Today, we are quite a linear economy again: It is a one-way transaction where you come to the store, you buy your stuff and you go out. When you don't want your stuff, either you throw away, [or] you try to sell it on its own. But what if IKEA could think about having things like rent and share? What about if we can really put IKEA furniture onto [*sic* out for] rental, where you only need it for a few days and you [can] bring it back and then we can…again it is a bit of a sharing economy, where you have furniture that is shared by many people. What about taking it back and resell[ing]? I am sure every one of us is guilty about [*sic* of] having a very nice couch, but at the same time we want another couch—whether [it is] because it is a new season, or there is a need for you to upsize or downsize your couch—that is an issue that we all always face. So what if IKEA could actually buy your really good furniture back, and put it [on] resale, resell it back at some of the stores or on the web for some other people [who] might need it? There are some stuff that is really valuable that you really don't want to throw away even though you know that is not working that well—you [might] want to repair [it] or you [would] want it to be working again. So those are the bits where when we look at how we do business today, we have to think about [them].

And then the last bit is, I would say one of the more difficult bits [which] is the resource chain. We talk about…it is easy in forward logistics. It is always: make, manufacture, deliver, distribute. But what about coming back? It's this resource chain that is always giving us the problem. How do we collect back? How do we expect consumers, individual consumers like yourself to bring back a big sofa to IKEA? Or bring back a big table to IKEA? So those are the very bits where we really need to think about how we can affect that. It is not easy, [but] at least we are committed to do it.

So, I just want to give you some examples. We are not entirely into circular IKEA yet, but at the same time we've actually started something. If you look at what we are doing currently, we do have products and spare parts in the store that you can pick up, so that you can do minor repairs to avoid throwing away a product which is only slightly damaged.

Within our own operations, we do repackage some of the products that are broken so that it can be resold, in order to avoid waste. We also have in the existing corner second hand sales, as well as some slightly damaged products, where we sell them at a discounted price. And then in our own store, we definitely handle our waste in a sustainable way and we have a recycling target which is set really high, year on year.

But that is not enough. I think there is a lot more that we really have to bring on. What about after sale, like second hand sale? What about repairing, working with some social enterprise[s] to provide repair services? What about remanufacturing? Remanufacturing some of the products? Because one IKEA product, it might have, it is always self-assemble right? You have different components. Sometimes it just one component that is spoilt. What about disassembling the entire product then re-put[ting these parts] back into a really good product? You have seen that there are a lot of people online out there who try to customise their own IKEA products, [and] we've also seen some of the countries

that have already gone into leasing IKEA products. So those are the bits that we are developing as we go along.

Coming a bit nearer to home, we have not done a big, big project. But within our own operations, what we have tried to do is when we look at our waste flow, when we look at a different kind of waste that we generate from the store, we try to see what [sic how] else can we create a closed loop? What can we do to reuse our waste? So one of the things we tried was with the cooking oil. The cooking oil that we use we worked with Alpha Biodiesel [Alpha Biofuels (S) Pte Ltd] and we converted them into biodiesel which we then pump in back to the delivery trucks that we have. So it is a way of consuming back our own waste.

The other one is really, again, our own façade banner. We have a lot of façade banner every year because we change as [sic with] the season as the campaign goes, so we used to work with Reworks to make them into stuff like little orange bags, which we give out to our co-workers. So again, it is a good way to look at our own waste and creating new products, so that we could avoid using more virgin products.

Moving on, that is of course not enough for us. We really need to look into how much more we can do as a business in Singapore. I am happy to say that in July we are also trying to pilot an activity to really start looking at take-back, furniture take-back. So as a responsible retailer I think it is only right that we provide customer with a good way to handle the products that they've bought from us. So, it is a way of us working towards circular economy. And I also want to share a little bit about...this is more local, what we are doing, but this is what we have managed to do in the last two to three years on a global level. From Bob's last slide you see that it's a different circular scale...you need to look at the scale, and look at where should the circular bit happen. And I think when it comes to some of the products, we realised that it has to happen on a bigger scale, on a regional scale where we collect the

materials back on a regional scale, and pump them back into global product development.

What we have done is we have collected some plastic from the stores in Shanghai and then [we] made them into spray bottles—that is a typo, apologies. And that is one of the product we have done. The other one that we have also done, we have a lot of loading ledgers when we deliver. So, the distribution centre did a project to bring all the ledgers back and recycle them into a desk pad that you can currently find in the store. So it is about a demonstration of the resource chain product that I talked about.

And then recently we have launched a kitchen front which is entirely made from recycled PET [Polyethylene terephthalate] bottles. So those are also our way to demonstrate that recycled products are not inferior; recycled products can be as attractive, as good quality as what you see in the rest of the IKEA products that you can find.

So, having shared many little successes that we have, it is not without challenges and difficulties for sure. And in fact, we are just at the start of the beginning of the long journey towards circular IKEA.

What are some of the challenges and opportunities? As you can see I think the legislative framework is of the number one challenges [that] we have. Today, if you look at many countries when it comes to collecting back waste, different legislation[s] would have different ways of interpreting when collecting post-consumers stuff back. Our colleagues in Japan for example, they tried, [but] before they started collecting [and] doing used furniture sales, they actually ran into problems with authorities. They needed to be classified as a waste management provider in order to do that. So those are the bits where it is challenging.

00:54:29   The second one would be reverse logistic capability and infrastructure. One of the biggest challenges, or one of the issues that we spent a lot of time discussing whether to take back furniture of not, is really about what is the solution, what is the infrastructure, where are we going to store it? How can we know how much the customer is bringing back? How do we look at the reverse logistics? Would customers really go through the hassle, et cetera and et cetera—it is really about the collection.

Thirdly it is the integration in the city planning. I think today, cities where we live in today are planned, again, for linear economies. They have not been looked into, they have not been designed into becoming a circular city where you actually do have infrastructure that plans it well. I mean what about thinking, living in the community where you actually have an area designated for sharing furniture? Would that be perfect? I mean or in shared housing, where not everyone there needs to have garden chairs. The garden chairs can be shared among the entire block, because then different people would need the chairs at different times?

And then the last one is of course coming back. [The reason] why we are doing all these is really back for the consumers. Some consumers need to get into the idea that recycled materials are not inferior—that is one of the points—and that when you buy a second-hand product, if it comes refurbished, comes with good warranties and [sic then] it is still as good as new. So those are the little bits where we need to look into.

But again, with challenges come opportunities for research and areas to work into. I think there is a need to develop regulatory framework, where the circular economy gets a clearer framework to work in. I mean we've seen a framework that has been developed in Singapore for Uber—Uber-sharing economy. It is definitely a part of circular economy where you share, where you reduce the need for resources.

| 00:56:49 | [We should consider] reverse logistics forecasting capability, looking at, in normal production you definitely need a minimum quantity to have production going on. So in a shortfall, where you do not collect enough furniture back, where does the shortfall come from? So those are the various bits where [sic which] we think it is important—scheduling and storage. How does the reverse logistic look like? As good as forward logistics, we hope. |
| | |

Thirdly, it is coming back to planning—planning with circularity in mind for cities and building. If the cities are planned to have certain activities or circular activities, then it will make things a lot easier to run certain schemes and products. And then finally, I think it is really to look at modelling of social and behavioural studies. How do people react, how can…what would really incentivise people to come in, to really bring back your products?

So, I think those are the four big opportunities which can be worked on. And in conclusion, I hope that in the presentation itself, I have managed to share why we are convinced that the circular economy is essential if we really what to continue to realise the dreams and needs of the many people; and at the same time keep within the needs of what the planet can really sustain. With that, thank you very much and I will look forward to your questions.

Panel and Q&A Segment

<u>Jessica Cheam</u>
00:58:33

I am very privileged to be able to ask the first question as the moderator. But immediately after, I'd like to open it to the audience, because I really think the value of such a session really is to exchange ideas. So I encourage all of you to maybe think about what you'd like to ask the panel, or even if you don't have a question, whether you have some responses or some thoughts in your everyday life in the positions that

00:58:58	you do—how is the circular economy applicable to your life and what do you wish to learn today? So, I'd like to pose this question to the panel and really, when we think about the circular economy, we are talking about systems change, we are talking about huge resource loops and huge cycles. So, if you are a policy maker and you are a business owner, or if you are just a citizen, where do you begin to actually apply these principles in your city? Does anybody want to have a first stab?
Bob Geldermans 00:59:34	I could start and I think that Dr. Lee said it quite rightly. She said, "Do you care?" And I think that question was addressed to all of us, right? It is the individuals who in the end, power this system. So, if you don't care within our own household, within your own decision-making in your daily shopping, no matter how difficult it is, no matter how the current system kind of forms obstacles in order to do that, if you don't care about asking these questions to yourself, then it is not going to happen.
Jessica Cheam 01:00:17	Kees, would you like to add?
Kees Slingerland 01:00:19	Well, I always say, "You have to start with yourself," as Bob said as well, and that is what we try to manage in our own family at home. Very few years ago, we were really very keen in saving electricity and at a certain moment, it was even introduced to separate the waste that we have in our household. Then you get [sic become] aware when you separate your waste, on what is it and how much plastic are we, the four of us, using, because you are not aware beforehand—so I think that helps a lot. But I can tell you that me and my wife, we were all the time telling the family we are all doing this becuse we were wanting to have circular economy, and it was very sustainable but our children said, "Well, you only do this because it is saving money." Which was true as well, to be honest. And so that underlines again the statement Dr. Lee made, yes, in one way or another it should be profitable as well. There should be a business case behind it—if it is on family level, on national level, or on company level. Because if it is not a business case, then it is nice to

01:01:32	introduce a system just for your own hobby. But hobbies do not last if there is not a real background behind it. And I think that would be the main lesson to connect nice ideas to practical implementation. And in that sense, that was today, for you, a nice example because probably you think Bob and me already prepared our presentation towards each other—which is not true because I prepared it last week and Bob, last night in the plane, and we had no connection with IKEA on beforehand. It is not a miracle. It is logic, that the three stories, that is a bit more global, a bit more in content, and a bit more company-wise do fit to each other in a great sense. Because circularity is not evidence, it is not gambling—it is logical thinking and I think that, we have presented.
Jessica Cheam 01:02:24	Fantastic. Hui Mien, would you like to add?
Dr Lee Hui Mien 01:02:27	I think first of all it is conviction. I have to say that, if I look at my own journey, when I did my PhD in 2003, that's like about 14 years ago, I think my PhD was the first in closed loop—then the circular economy was not even formed. So I went into research of looking at how closed loop product development should look like, that was where I started my journey. And I think that I am really happy to see that from 14 years ago to today, you don't even have to explain what the circular economy is anymore today. Then, when I was doing it, people were like, "Are you sure? This is really far-fetched, like theoretical. Research is really research." It is just that conviction, and I think that today, you see that sustainability itself has kind of grown more mainstream. It is part of the conviction to believe that it is part of our daily life, and not just about protecting the environment. Of course, protecting the environment is kind of feel good to have, and at the end of the day, it all comes back to the people, ourselves. We protect the environment. But we protect the environment because we want to have a liveable environment—so it is coming back to people ourselves.

So it is about the conviction that you can make a difference, and have the conviction what you are doing is the right thing—I think that is the first step. Then in whatever you do, whether as a private citizen, like |

01:03:54	Kees has mentioned, as a private citizen, you recycle as much as you can, you be mindful of your consumption; and then, in whichever profession you are in, in whatever decision that you make, you keep that as one of the factors, even though the company is paying for it and not you. But think about if you can do that bit as part of your job, you are actually contributing to a greater cause. [It is] not just about your own job or your company—it's really to a greater cause so that is where I think we should start.
Jessica Cheam 01:04:27	Thanks very much, Hui Mien. I'd like to open the discussion to the floor now. Do we have anybody who would like to be the brave soul to offer the first question, first observation?
Eric 01:04:44	My name is Eric Kargen, I am a student at the Lee Kuan Yew School of Public Policy. I wanted to challenge you a bit and ask you to talk about how the circular economy is different from simply good waste management, including recycling,and up-cycling and all that. Thank you.
Dr Lee Hui Mien 01:05:11	Well, probably I can take that question first. I think good waste management simply refers to…it is a bit more reactive. So like today, in the store, what we do is we look at what are the waste that we generate, and then we look, based on the fraction, we go out and look for solutions. We go out and we see, if I have cooking oil, what is the best way to deal with cooking oil? What is the most sustainable and responsible way to do it? So it is very reactive. You don't plan for it. Whereas if you really think about circular economy, you already have it right from the start.

[Take] for example our modular sofa. We already thought that, when we design[ed it], it's modular. And if you really need a three-seater today, [but] tomorrow you buy a bigger house [and] you just want to add another seater, you can add it on. Or when you decide to down-size and you want to remove it again, that sofa itself can be, if it is in good condition, resold on the market to other people. So, it is about the well-thought, proactive effort in trying to manage and estimate how the waste should be managed, versus the reactive one, where you go out |

01:06:18	and look for solutions. And I think that makes a big difference, because you plan in advance.
<u>Bob Geldermans</u> 01:06:30	Well, maybe we want to contradict each other, let's see. I challenge you. I have a very short and simple answer, because it is already in the way you phrase it. You talk about waste management, and what we are talking about is resource system design basically. So, if you talk about waste management, you forget about the whole world that comes first. So that is the difference.
<u>Kees Slingerland</u> 01:07:03	Well, then we are repeating a bit. But you see in all the discussions, as we also have in Europe, that is not specific for Singapore, that we mix two discussions. And that is one, how do we change the linear economy in such a way that it gives less waste or less damage to the environment, which on itself is good of course, but that is still modifying the present system. And we have in the meantime the belief that if we do so, we do not end up in the final solution. So the real discussion that we have to do is how to build circular economy with no output, with no waste? And that is another way of thinking. And I see, in all the discussions, also by myself, that you mix the two of them because it sounds like environment and it sounds like sustainable—but circular economy in its basic thinking, is something else than [*sic* different from] linear economy, changing a little bit in the proper direction.
<u>AUD1</u> 01:08:12	Your title [is] circular cities and when you talk about Amsterdam, your great big city in Holland, are you talking about the circularity within the same city or beyond that city? Because in the context of Singapore—I grew up in Singapore, I am a retired engineer and project manager—I am always fascinated where our good stuff goes after the run out date. Computers for example, my computer supplier always gets this question from me, "Hey can I sell you my old computer?" He says, "No, you are lucky if I don't charge you. You put it in my shop, then you go off with the new computer." Because I cannot exact speed and capacity from my old computer, that is why I leave it in the shop with much regret and I buy a new computer which is more expensive. Now I am very interested to know the last destination, the forwarding destination of my computer.

01:09:24	He says, "I collect 50 of these, I put them in a big crate and we send it to Tuas, Jurong. And then the guy with the boat, he is an Indonesian. He collects and I sell it to him, one dollar per computer." I said, "Yes, but I want to know what happens to the computer." He says, "Well there are some very smart people in Batam, Bintan, they spend two weeks, three weeks, and they make the computer work again! And it doesn't work so fast, but it suits them fine. Because they don't talk so fast, they don't think so fast and it's good enough for them!"
	So when you talk about circular city, I think you have to embrace the surrounding cities around you where transportation is cheap, the traditional way is cheap and good. Our old taxis for instance, they end up in Sri Lanka, maybe 10% of them are stolen, but they end up in Sri Lanka, Batam, Bintan, Johor Bahru—and these people, create another 10 years' life out of our disused products. So what we cast away as dirt, they treat it like gold and they don't have PhDs! They don't have PhDs! They know how to scrape the last remaining value out of that product which Singaporeans condemn because the Ministry of Environment says this is pollutive, this is toxic. We got to keep our waters clean. Then you say, "Sir, sir, it cost you 10 million dollars more, you know? If you throw away these, because these people can derive benefits from this." Yes, but the quality of our water, the quality of our soil, the quality of our air and our total environment the importance of it supersedes the recycling of these products. So…
Jessica Cheam 01:11:30	Thank you very much, sir, I think we need to move on to our second… Yeah, thank you so much for your question. Thanks. Eugene at the back? Over there.
Bob Geldermans 01:11:41	Was there a question in there?
Jessica Cheam 01:11:44	Whether you would take into consideration the surroundings cities. But let's take the second question first.
Bob Geldermans 01:11:47	I want to reply to that because it's a fair point. But I think we've done that. I think I tried to explain that various scale levels that we have to take into account, exactly to address what you are just saying.

Eugene 01:12:05	Hello, my name is Eugene, from Zero Waste SG. It is a non-profit organization. For city planners or for the government to implement circular economy, it needs data right? Data for material analysis, for waste analysis or for…to understand the waste flow. So I am curious to understand three things. One of course is the data collection, how does your institute or the government actually collect the data—the data across ministries, data even from companies, because some of these data can be quite sensitive, so are the companies willing to give it to you? The second is data privacy, so from data about waste, you can actually tell a lot about a company. So that can be quite sensitive as well. And the third is the data quality. So it is not just enough to get the quantity of waste or material, you also need to know how clean is it, is it contaminated, or how often is it being generated. So I would like to share your thoughts. Thank you.
Kees Slingerland 01:13:16	Well, I am happy to respond. I don't know exactly if I give the proper answer, but I hope that I have shown or told that in the world, people talk about big data as if this is the great solution to anything. And yes, we have many, many [*sic* much] more data than we have five years ago, and much more than we have 10 years ago, so that helps us a little bit to understand some of the interactions we have in the total urban system. But no more than that. And collecting all these data is always…I mean, we have far too many [*sic* much] data, so the number of data is not a problem. But the issue is how to combine the, let me say, intellectual data that will give you answers to the questions that you have. And do you have your questions, let me say, sharpened and defined in order to know what data you need to get the proper answers. And do you then really use the data that is okay? Do you take care of the privacy issue in data? And how do you deal with groups in your society that do not deliver data? Because if you would like to invest or if you would like to make a policy for the city of Singapore or whatever city, you are also dealing with older people, dealing with people that have less education, dealing with minorities or

01:14:43	with refugees or whoever kind of group that is not automatically delivering data.

So people like we are here in the room, we all have our iPhones, our cell phones and our whatever. And those are used to collect data about you and me. And we walk in regions where we have cameras, and we are all watched and well, we all know about these systems. But we have groups in our society that are not belonging to the group that directly or indirectly deliver data and who are of very [*sic* high] importance to what kind of policy we have to formulate, and how does new systems, circularity systems, or whatever adapt to them? And therefore, I think it is good in the presentation of Bob to show that we are talking about the golden triangle, or other words, about cooperation between government, know-how institute and companies which is fantastic. But if you do not in one way or another involve also just normal human beings in your systems, then you will roll out top technology that will never connect to human behaviour. So okay, we have data that gives a lot of new insights but that it not the type of miracle that will bring us a new future. We have to deal with them in a very intellectual way. |
| <u>Bob Geldermans</u> 01:16:11 | Yeah, I agree with that. And I just want to add a *little* bit and maybe it also answers part of your question. What you often hear when we talk about the construction sector for instance, the construction of the demolition waste, or construction materials is an instrument like BIM, like Building Information Modelling. And that is really…the success comes from the data quality in it. And I think that is also partly what you mean. And you are absolutely right, we need a lot of data on that level and to some extend the data is not available, like you say. We know may be when something becomes available, but what is the quality of that part of the material? How can we use it? How do we give it a certain value? And how can we then pay that money for it, that price for it? So that is definitely true and these are aspects of, for instance a tool like BIM, or it could also be another tool, is that it's sub-optimal—that there is a lot of data available but it is distributed over many, many different people and different organizations. |

01:17:21	Now how can we reach that, bring it together, and use it? In many cases, it is not possible because there will be gaps in data and there will be asymmetry in the data quality. You know when something becomes available, but we know nothing about in what state it becomes available. So yes, there is a lot of work to do and that is something that is definitely part of the trajectory towards making this mature.
Dr Lee Hui Mien 01:17:59	I think it is no different form another other research project that needs a lot of data—whether it is a health research project or anything else. It is just based on different iterations. I mean in our example, do we really know people really want to bring back old furniture for example? It's about us running an activity and then having the information come back.

And actually, since we are on the topic of data and the circular economy, one of the best things for businesses like us is when we go into the circular economy, you increase your touch points with your consumer. So from a market research analytic perspective, you actually have more touch points—you can get more data from the customer. Today, if it is only a linear economy, you have [only] one transaction data. They come into the store, they buy, they leave. You know what they buy, how much they are willing to spend on certain products, but that is about it. When you have a circular economy where they bring it back to you, whether it is leasing, renting or repairing—that is where you then have data to see what are the products that people love to rent, what are the products people would be willing to repair, and et cetera. So it is actually increasing the data points in order for you to make better decisions, whether is it based on a business or a policy level. Because when you accumulate many different business' data, that is where the government can make use of data to make a fairly more informed policy, and I think that is actually quite important. And of course, you would then reiterate as you get more data, and you would improve the quality of data. |
| AUD2 01:19:38 | I have one remark, observation, and also a question to Hui Mien and to Bob. The observations that I sort of got, after your talk Hui Mien, is an observation about furniture as a service. Would that be a business model |

that IKEA is going to look into? Because it sort of sounds like it. You start to distribute it to them, and then it comes back, you get the data as well of when it comes back—which brings me to the question about scale. You mentioned that it is difficult to predict how much you will get back. Bob touched about the different scales, so I am quite curious if there are some examples of like at what scale, what type of loop would work, if there is already insight into this. And if not, what it takes to get that insight.

Giovanna 01:20:45	My name is Giovanna and I work for a local company that deals in technology commercialization. I'm interested in understanding your point of view of the technology needs to move faster towards a circular economy. Because I was recently reading that actually plastic bottles, not glass bottles but, for example soap or detergents are very difficult to recycle because they are made of three, four different types of plastics. So from the point of view of a circular economy, if we could have one type of plastic that could be used for the whole component, perhaps it would be easier. So from my point of view, as a technology translator, I would like to know from you; what do you see, like a need or new technology that could help speed up the movement towards circular economy in different areas—whether it could be on water, or waste recycling et cetera. Thank you.
Dr Lee Hui Mien 01:21:51	Ok, I shall take the question on whether to provide furniture as a service. I think the idea of going into rent and leasing is where furniture as a service. Whether or not to really change the entire IKEA model into a service model, I cannot answer that for now. But definitely, service is part of the offering, it's what we are looking into and it has to be part of the circular economy. One of the things we try to look at and when we move into circular IKEA is really the options and the offering. I think with every other business, what a commercial entity seeks to look for is to have the widest option to meet the different needs of the many customers. There would be people who like to lease furniture as a service to change year after year; there would also people who would like to own a product—so it is a bit of looking at how do we balance and

how much do we push as a service, and how much do we push as a product and it fits the needs of different people.

Bob Geldermans
01:23:00

Yeah, a short note on the question of the idea. We are doing a small project at AMS that we are doing on circular components in the built environment that is with the University of Delft. And it is with a couple of stakeholders in that supply chain—so it's with a housing corporation and there is AkzoNobel involved, and there is a constructor involved, and there is an engineering company involved that is particularly looking at service installations. And what we want to do is look at the possibility of making circular models on a component level. So we have the housing cooperation, and that is like the launching customer and they provide a kitchen for instance, or a boiler as a service to the renter of the house. And that is just a one-year project that want to try it out, that is a pilot. And then of course, the next question is how do we go and look further downstream and upstream, like we have it on a component level, what does it mean for the material level and the molecular level for instance. But, first thing first, and we start with getting these people together and they are willing to think along, so I think that is a great start. So that is one.

And I want to answer the other lady's question. I think the answer should be that a product, whatever product it is, should be as simple as it can functionally and elegantly be. And that could apply to everything basically. We talked about building products. You have to make a building component or a product that is simple, that is not stuck together with glue for instance—so it is stuck together in a way that you can take it apart again. And the best thing is if it is done with as little as possible in terms of types of materials. And in plastics, especially, in plastic packaging, that is very well possible. It is just not often done because it's not the traditional way, the traditional line of thinking, or part of the line of manufacturing. But some manufacturers already do that. And that is definitely the way to proceed. Because indeed, it really helps the logistics and the separation of plastics. It is also about colour, for instance—not only the type of plastics but also the colours.

Dr Lee Hui Mien
01:25:42

Can I just add on to the question on components as well. I think one of the things where when we talk about moving into circular economy, one thing we have not really touched on a lot is innovation. One of the most important things, when moving into circular economy is design innovation. Not just the service offering innovation, but also product innovation as well. You need to design the product to have a longer life span to last over a few times used, and innovation in terms of the product to look at the properties that different plastics serve. That's where it has to be one important point of it. For example, what we tried to do is to replace some of the metal…in some of the upcoming products, we will be replacing some for the metal joints with just purely wood dowel wedge—so it is a pure wood product. And that will reduce the need of having the need to disassemble the metal when you want to disassemble the product. So those are the different kinds of product innovation that need to come along as we move towards a circular economy. And it's quite an important one I would say.

Ronald
01:26:46

My name is Ronald and I work for an innovation consultancy company here in Singapore. And by my English, you can hear I am originally from Holland. I understand a lot on what has been said on recycling—this question is not about recycling, or reuse of materials. This is more about, very quickly, this is a beautiful nation, a beautiful country, and a beautiful room with a lot of like- minded people. But on the other side, there is reality. And the reality is we are very good at linear thinking and very good at having big themes like smart city. I think smart city, circular city and circular economy have overlaps. But there is a danger that we're going to technology solutions or data solutions only. My question is for this to change and for this to change quickly, we need new infrastructure, we need new policies, we need, especially, a change in human behaviour. So, here it is: **how can this collaboration or this potential collaboration between Singapore and AMS accelerate that transformation?**

Kees Slingerland
01:28:05

You talk about deep psychology and it is quite linked to the question we had earlier. There are several ways to get this change arranged. First of

all, we can organise a very big disaster, because that will bring the need of urgency. And we know that in the world, that only after a big flood, governments are ready to invest in sea defence or those kind of things. So if there could come a big disaster that would help in thinking, but that is of course not the most easy way, because you first have to suffer.

The second way to come [*sic* get] there is, like Bob said, there is if you have a very nice product or if you have a very nice system that automatically fits to who you are and what you are willing to do, that would be the most smooth way—but you have to have very smart people to come to circular type of products, that that well fits to what we like. I mean we were, as human beings, very quick in adapting cell phones. Because that helped us, in two years' time, to come from the world we lived, to a crazy new world with a lot more information because that very well fitted to what we wanted, so that quite a good way.

Then of course if it is a real business case and there is money behind it, there also is quite a quick way of doing this. There are some small examples, and let's hope these examples will grow in the coming years, because then we can accelerate. But if all of that is not there, then you come back to psychology. And then I only have the example in the world of about 10 years ago, when we changed from, "Okay, you are a good guy when you smoke," to smoking, "Well you are an ugly guy when you smoke." And it is very typical how in three to four years' time, in the world this has completely changed. And I am not a psychologist, so I am not going to explain [to] you how we should do that in circular economy. But it is the one example that I know of which something that we didn't like to stop with, we all stopped with, or at least many people [did]; and now you have smoke outside. And in the hotel rooms you are not allowed to smoke and in the office you are not allowed to smoke, that happened in two, three years' time. And that has to deal with how can you influence mass psychology. And if I would have the answer, I wouldn't sit here.

Jessica Cheam 01:30:35	Thank you very much. You are obviously very passionate about the acceleration part of the equation. I would just like to invite the gentleman for the last question and then we will wrap up.
AUD3 01:30:44	Hi, I'm Ming Yi from National Environment Agency. So I have three questions: first two questions relate to the title of the slide. (Laughter in room) I promise it will be short. The title's "Improving liveability and economic climates in Amsterdam." So, there are two keywords. One is liveability and the second is economic climate. So the first question is you mentioned that circular economy must make economic sense. But we all know that resource prices are low right now, and it is difficult to make a business case right now—I am not saying it is impossible, there are some cases where it makes business sense. Let's say for example, recycling of batteries. Recycling of batteries is expensive. We all know that we should recover the metals from batteries, but it is expensive. So for situations where it does not make economic sense, what should we do? The second thing is about liveability. It is interesting to see how you link circular economy to liveability, that is new to me. I would like to hear how you all plan to do it. And that links to the last question on targets and indicators. This question is directed to AMS and to IKEA on what kind of indicators you have for circular economy in the aspect of liveability and economic climate.
Dr Lee Hui Mien 01:32:25	I think it is really looking at how the product should be delivered. I mean if you take an example of batteries, you said that it is difficult to recycle, granted, then we should actually look at rechargeable batteries. That would itself reduce the amount of one-time use of batteries. One rechargeable battery on average lasts about 500 to 1,000 recharges, depending on the grade of the batteries itself—so you bring down 500 to 1,000 times of the [number of] batteries that you look at. And then it's about also different technology innovation, because when we talk about the circular economy, it is only about the process and the business

| 01:33:02 | model. It is not stopping the rest of the other research and the rest of the development and innovation that is going on. It is then about what is the best thing to replace, how can batteries be better made, for example. So there are many ways to solve that, I think. It is coming to a point where it makes economic sense. Everyone strives towards that point. |
| | |

And the other point is that when all else fails and there is a real need for the government to legislate, then it is where you need to have a different, you need to use a different economic mechanism to legislate or look at it. The other thing about indicator, I would like to say, is really about the value that you make from per kilogramme of material, for example. That is the most direct and straightforward indicator that any business can have in order to say your business is moving towards the…you are dematerialising your businesses for its resource usage, then you are increasing your resource efficiency. A kg of metal, can make you bring about X number of value. And that is the best indicator you can have and a straightforward [indicator] that people can understand. Of course, that is one dimension, there are a lot of other different dimensions that you can measure to make it more complete. But I think I will just stop here with one and let other two panellists have their...

Bob Geldermans
01:34:39

I am going to answer one of the questions. I am not sure if it is the right answer, but I forgot two of the three questions—so, I stick to one, I am tired. But the question about resource is a very valid one. We see that the forces in reality are so that resource prices are not going up in some cases, but going down. We see with oil for instances, all the forces behind it we can't control. So sometimes it is even perverse and a big obstacle for a model like a circular economy. And the same goes for other material resources that we need. And we know from the past, that I think that there was once a bet between an economist and an ecologist and the ecologist said, "In 10 years time, we do not have these, these and these resources anymore because they are all going to become scarce." And the economist said, "Well, there is always a solution. There will always be a substitute, or there will be price fluctuations, and that

01:35:45	will always solve itself. The market will always will solve itself." And the economist was right, because that is the life we live, that is the reality we live in. So that means that at the end of the day, we need forces against it, both bottom-up like social drivers, but also top-down too. So we need some financial incentives or some tax measurements, tax interventions in order to make certain resources or materials and give them the price that they deserve. And maybe make certain labour actions cheaper, so that you can put forward the idea of repairing something rather than buying a new product. So that requires intervention on multiple levels.
Kees Slingerland 01:36:42	Well, I will cover question number three. Then we have done all three of them—although the third is not really a question, and I can just underline what you said. The liveability of a city is really an initiative we have to take care of, and the circular economy can be helpful in that sense. But not only that, if we know how big cities will be and how big cities are at the moment; if we know we work there, we live there, we grow up there; our children have to grow up there, have to be excited, have to be able to develop themselves—then it is a bit silly to see that the main driver for city development is the return on investment in financial terms. And if we do that, the type of return on investment in terms of liveability or in terms of possibilities to develop, and to be excited, and to have a pleasant life or a comfortable life, that would be as of importance as just the financial issue. If this is answering your question, I don't know. But it is a true statement. [Transcript ends at 01:37:44]

TITLE
Circular Cities, Improving Liveability & Economic Climate in Amsterdam: An Example to the World

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