



COMMONWEALTH OF AUSTRALIA

Proof Committee Hansard

SENATE

ELECTRIC VEHICLES

Use and manufacture of electric vehicles in Australia

(Public)

FRIDAY, 31 AUGUST 2018

MELBOURNE

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SENATE

ELECTRIC VEHICLES

Friday, 31 August 2018

Members in attendance: Senators Bushby, Kim Carr, Patrick, Rice, David Smith, Dean Smith, Storer.

Terms of Reference for the Inquiry:

To inquire into and report on:

The following matters:

- a. the potential economic, environmental and social benefits of widespread electric vehicle uptake in Australia;
- b. opportunities for electric vehicle manufacturing and electric vehicle supply and value chain services in Australia, and related economic benefits;
- c. measures to support the acceleration of electric vehicle uptake;
- d. measures to attract electric vehicle manufacturing and electric vehicle supply and value chain manufacturing to Australia;
- e. how federal, state and territory Governments could work together to support electric vehicle uptake and manufacturing, supply, and value chain activities; and
- f. any other related matters.

DILLON, Mr Andrew, Chief Executive Officer, Energy Networks Australia

JOHNSTON, Mr Stuart, General Manager Network Transformation, Energy Networks Australia

NELSON, Associate Professor Tim, Chief Economist, AGL Energy Ltd

[16:24]

Evidence from Associate Professor Nelson was taken via teleconference—

CHAIR: I now welcome representatives from Energy Networks Australia and, via teleconference, AGL Energy. For your benefit, I am the chair, Senator Tim Storer, and I'm joined by the deputy chair, Senator Kim Carr; Senator Janet Rice; and Senator David Smith. Information on parliamentary privilege and the protection of witnesses in giving evidence to Senate committees has been provided to you. AGL have lodged submission No. 55 with the committee. Would you like to make any amendments or additions to this submission?

Prof. Nelson: No.

CHAIR: Energy Networks Australia have lodged submission No. 60 with the committee. Would you like to make any amendments or additions to this submission.

Mr Dillon: No.

CHAIR: I now invite you to make short opening statements, and at the conclusion of your remarks I will invite members of the committee to ask questions. I'll ask Associate Professor Timothy Nelson to speak first.

Prof. Nelson: Thank you, committee members, for the opportunity to present to the inquiry today. AGL considers that innovative technologies such as electric vehicles will play a crucial role in improving the efficient use of infrastructure, placing downward pressure on prices and bills, reducing greenhouse gas emissions and delivering value for Australian homes and businesses. EVs have the potential to deliver on these objectives based on their use of cost-efficient and low-emissions electricity, and will play a pivotal role in Australia's transportation and energy future.

Accordingly, AGL wants to help improve uptake of EVs in the Australian market by removing the obstacles to ownership and enhancing the ownership experience. AGL has invested in the development of the Australian EV market through our AGL Electric Car Plan, which allows customers to charge their electric car whenever they like, and as often as they like, for \$1 per day. As part of our electric car plan, we also offset emissions associated with the customers' EVs at home through our Future Forests program. In addition, we as a business have transitioned to 10 per cent of our vehicle fleet being EVs. We're currently trialling remote EV-charging management during peak events for a number of privately owned EVs in New South Wales through our Managed for You program.

We've given careful consideration to the inquiry's terms of reference, as we elaborated in our submission. We recognise the wide range of economic, environmental and social benefits that vehicle electrification can deliver to the Australian economy. They include savings for consumers, investment in job creation, environmental benefits and national fuel security. Recent analysis that was commissioned by the Electric Vehicle Council, the NRMA and the St Baker Energy Innovation Fund elaborate some key economic benefits of a high EV uptake scenario. In terms of customer savings, while the purchase price of EVs is relatively higher than the price of vehicles with internal combustion engines, EVs are less costly to maintain and run. Over a 10-year ownership period, UBS estimate the total cost of ownership to be \$5,000 less for EVs relative to internal combustion engine vehicles by 2021, and \$11,000 less by 2025 as battery prices fall. This translates to projected savings of \$1,700 per annum by 2030. Total consumer savings over the entire period are estimated to reach \$14 billion.

In terms of the relationship between EVs and the reliability of the electricity system, EVs are a flexible resource that has the potential to deliver benefits that will increase with scale. The increased penetration of EVs could play an important role in improving the reliability of the grid. AGL is trialling remote EV charging management during peak events for this purpose. Supporting the shift towards vehicle electrification will increase demand for electricity, greatly enhanced employment opportunities for Australians. In terms of environmental benefits, when coupled with the decarbonisation of the electricity grid over time, it presents a substantial opportunity to deliver emission reductions consistent with Australia's international commitments.

AGL would urge the Commonwealth and state governments to consider the following public policy measures. A national EV target would provide a powerful platform to drive coordinated, whole-of-government policy initiatives. A government fleet EV target, not too dissimilar to AGL's business-specific target, would provide scale and could potentially create a second-hand market for depreciated EVs that would provide an additional avenue for private ownership. Further analysis should be undertaken on network tariff regulatory reform to enable

intelligent management of EV charging. Strong vehicle fuel efficiency standards will play an important role in accelerating the uptake of EVs. Charging infrastructure planning and support will also play a fundamental role in the context of planning and deployment of EV-charging infrastructure.

In short, we would welcome coordinated cross-government leadership through the COAG Energy Council to develop a robust EV road map that establishes a nationally agreed target and supporting policy initiatives. In our view, this would provide the optimal policy platform to support businesses operating across the Australian economy.

Mr Dillon: On behalf of Energy Networks Australia, I'd like to thank the committee for inviting us to participate today. We represent the Australian electricity networks and gas distribution businesses. These are the poles, wires and pipelines to which electric vehicles will connect around the country. Supporting the commercial rollout of electric vehicles is a major opportunity for our sector but it requires careful planning to ensure we can continue to deliver reliable, safe and secure energy to all of our customers.

Going onto that schematic, the changes in the current landscape, this slide shows the changes in our grid from a one-way energy system to a two-way power flow. These are already happening in Australia. Electric vehicles are starting to become a significant part of it and that's why we're collaborating with the Australian Energy Market Operator, AEMO, who appeared earlier, in developing our coordinated approach to improve the electricity distribution system as it needs to transform to meet the changing demands from our customers. We're looking at how to best integrate household solar and storage as well as electric vehicles into the grid. We are also considering the role of hydrogen production as a means to balance the grid and, overall, we think that we need to have a systems approach linking electricity, gas and hydrogen fuels to deliver the best outcome for customers.

Slide 4—that chart there—is from a trial in South Australia. It shows traditional demand, demand with solar and demand with solar and batteries, which is this red line. I'd like to draw your attention to the two spikes each way and this is what networks will start to see once we get storage devices rolled out at scale and, obviously from our end, electric vehicles are storage devices. The spike there was when the South Australian network operator, SA Power Networks, sent out a signal to the batteries in its own trial to charge up because there was a storm coming. They knew this and they did this and it almost breached thermal limits on the load and that was just a trial. So what we absolutely need to figure out are smart ways to manage this system going forward.

The next slide is a graph of usage from a UK trial of electric vehicles. As you can see, with the green line being the normal load if you like blue plus the red EV line added together, the electric vehicle load more than doubled the peak amount at about 8 pm. This doubling of demand has significant implications for the design and management of the grid. In simple terms, if it's not done well, major investment in infrastructure will be required to meet this peak demand but it would only be used for a short amount of time. For us, it's very similar to the air conditioning challenge we face today; it's just making it worse. However, if done well, electric vehicles present an opportunity. If their rollout is managed with proper network industry consultation and consideration, a number of risks and challenges can be worked through, network utilisation can increase significantly making the overall supply much cheaper per unit for everyone.

Without proper intervention, we are going to see things like localised outages from too much storage in the local space, significant investments from networks to deal with that capacity or we're going to see networks simply blocking storage devices from getting on because they'll be breaching various operational limits. None of these are good outcomes. We want to avoid them. Therefore, we recommend the committee considers, as Tim Nelson mentioned, variations of time-of-use type electricity billing by: time-of-day pricing, a form of demand pricing to encourage people to charge their electric vehicles at off-peak times to maximise network use rather than adding to use at peak times and requiring more network; adopting a technology-neutral approach to electric vehicles to allow both battery and fuel cell electric vehicles to compete on their commercial merit; develop nationally consistent guidelines on how to connect fast-charging electric and hydrogen refuelling infrastructure in conjunction with work we're already doing on upgrading connection guidelines; and monitoring systems for networks to allow us, systems operators and other aggregators, to know where vehicles and other storage devices—as we do now with solar—are so we can better manage the grid. If these issues are properly considered, we think the rollout of electric vehicles could reduce customer bills, support the cleaner energy transition by increasing the use of renewable generation, and increase overall power supply reliability. Thank you for your time today. We're happy to answer any questions.

CHAIR: We might start with AGL. You utilised the PwC report in terms of benefits, and I think one point that you may have touched upon was fuel security. It's interesting for an energy company to see that as a benefit because of some of the extra demands that may come. I thought that was interesting to note. You noted your pricing projections—\$5,000 more in 2021 and then \$11,000 less by 2025. Is that correct, Professor Nelson?

Prof. Nelson: It's actually \$5,000 less by 2021 and then \$11,000 less by 2025. Those estimates were produced by UBS.

CHAIR: So that's a global figure rather than Australia focused?

Prof. Nelson: Yes, but it's in Australian dollars.

CHAIR: The issue of load and tariff adjustments in terms of network tariff reform and changes to pricing for consumers—could you expand a little bit more on that, and then I'll ask Energy Networks to speak on it. With that pricing, you would therefore be an exponent of quite significant take up in the 2020s. Do you think that, without significant change, there will be a need to have different pricing for EV recharging during certain times of the day?

Prof. Nelson: It's a very good question, and I think it goes to the heart of the broader question of needing to see tariff reform that reflects the cost of providing the energy at various times of the day. There's a broader discussion around what cost-reflective tariffs mean—whether that's a time-of-use tariff or a demand tariff that's reflected in kilowatts rather than kilowatt hours. What's really important about that is that as we're seeing more consumers installing their own energy generation infrastructure, largely distributed solar PV, you've also got more variable renewable generation coming into the market. As we see new loads come into the market, such as EVs, it's really important to align the optimal peak charging times with the times where there is surplus energy available, rather than at times where you've already hit peak demand.

The reason those network tariffs are so important is that they then provide incentives not just to electricity retailers but to anyone who's installing energy-consuming or energy-producing equipment, to make sure that they're minimising any additional cost to the network, which is having to meet their individual customer demand. If you look at the way in which most people drive their vehicle, having EVs plugged into a home connection in the middle of the day, where there is solar on the rooftop, is ideal because that excess solar production in the middle of the day, particularly if it's a household where there's not a lot of other consumption going on, that solar unit can effectively power the EV. Likewise, when people get home of an evening you wouldn't want to see widespread EV charging in those peak times of, say, six to 8 pm; you would want to leave it until later in the evening.

Those pricing signals then allow the installers of those EV connections to make sure that the charging is done in an automated way that minimises any of those additional loads on the grid, so to speak. In some states you've got high variable renewable penetration at night. Again, that's an ideal time for EVs to be charging. Getting these pricing signals right is a really important way of ensuring that, when there is surplus energy, it can be fed into EVs, and EVs aren't drawing extra energy through already congested networks at those times of peak demand.

CHAIR: Mr Dillon, would you like to add something?

Mr Dillon: Yes, briefly. From our end, it is a similar perspective. What really matters in terms of driving network cost isn't just how much energy you use; it's when you use it. Unfortunately, most households in Australia today are simply charged a flat rate regardless of the time of day. This has been one of the big drivers behind the challenges we have on hot, sunny days in most of Australia when everyone comes home and turns their air conditioner on. We are not saying that people shouldn't do that, but the problem is that we are not giving them an incentive to then not do cooking or ironing or have 16 TVs on at the same time.

As it currently sits, under that flat pricing, there is no incentive for an EV owner to do anything other than come home and plug in their EV as part of that process at the moment. If that happens, this will make the peaks that we see at the moment worse. However, if we can move to changing the pricing on different times of the day, lining up with network peaks and, as Tim has just outlined, when there is significant generation in the system, we can link that into smart-charging devices to make the system better for everyone. This is not about making people get up at 11 o'clock at night to go out and start charging their EV; it is about having the smarts in the plug already that know what signals they get and charge at not only the best rate for the user but also the cheapest rate for the system and for everyone else.

Senator KIM CARR: All the evidence we have had—and, Professor Nelson, you've reinforced this—is that there is an expectation that there will be significant growth in demand for electricity as a result of the uptake of electric vehicles, and, on your analysis, sooner than just about anyone else has put to us. Most of the industry is saying mid-20s rather than five years hence from here, which is a little earlier. Whatever we do on demand management in terms of the tariff question—and I will come back to that—there is a requirement for additional generation capacity. Would you agree?

Mr Dillon: Correct.

Senator KIM CARR: Who is going to pay for that?

Prof. Nelson: It's a question that really goes to what the utilisation rate of the infrastructure is, and I think that is where tariff reform is so important. More supply at the right time of the day improves the utilisation rate of all of the infrastructure and therefore decreases the unit costs to serve. To your point around 'it's not just capacity; it's also the right amount of energy as well', the end result here is that those consumers who are consuming extra energy would pay for that energy through their electricity rates that they have with their supplier.

Senator KIM CARR: I got that point. You made that point well. But you've agreed that we need additional capacity. My question to you is: who is going to pay for that? Are you saying that consumers are going to pay for that? Would I be bold enough to suggest that the energy companies should pay for it?

Prof. Nelson: Energy companies are already investing in new energy infrastructure and capacity. AGL has a 200-megawatt reciprocating engine project, a 200-megawatt windfarm and a 450-megawatt windfarm through the Powering Australian Renewables Fund.

Senator KIM CARR: You've talked about a 50 per cent increase in demand. We've heard other estimates of a 30 per cent increase in demand. So a 30 per cent or a 50 per cent increase in demand on the system. Who is going to pay for that?

Prof. Nelson: Just to clarify: I didn't use a figure of 50 per cent. I am not sure where that came from. The demand profile that EVs would bring into the system would be incremental. We're talking 20, 30 terawatt hours over a decade or two: we're not talking the number you just mentioned. If I had mentioned that, I apologise, because it's not a number that's right.

Senator KIM CARR: I'll put another question to you. Yesterday's *Financial Review* had a headline: '... power companies as bad as banks.' How do you respond to that? I'll ask the people here in the room and you, Professor Nelson.

Mr Dillon: I'm happy to say, from the network sector, we've been working for at least the last five years on improving customer service, working towards better consumer outcomes and doing the sorts of things I was talking about in my opening statement such as increasing utilisation. Network charges across the country, over the last three years, according to data from the AMC, have reduced from 51 per cent of an average bill to 43 per cent of an average bill. That's a reduction over those three years on an average bill of 80 bucks a year. So, we are doing our part to increase energy affordability and will continue to do so.

Senator KIM CARR: Professor Nelson, what do you say to that proposition?

Prof. Nelson: The industry and companies like AGL always have more to do to service our customers. In the past 12 months, approximately two million customer accounts in AGL have shifted deals. I think Prime Minister focused last year on ensuring that customers make contact with their retailer, and retailers make contact with their customers, to ensure that they're on the best deal for their particular circumstances. I think that is absolutely appropriate.

The other critical thing that the industry is doing to alleviate bill pressure on consumers is investing in new supply. I keep coming back to that fundamental point that, in the generation market or the wholesale market, the way to alleviate pricing pressure in that market is new supply. I can only speak on behalf of the business that I work for, but the business that I work for is spending in excess of a billion dollars, through its investment partners, on new supply. That new supply is aimed at providing that downward pressure on prices that I was talking about.

Senator KIM CARR: The new energy minister has:

... equated power companies to the banks, saying they have forfeited their social licence and should brace for heavy handed intervention to force down electricity prices.

If you can't convince a conservative government that there is goodness on your side, how do you expect to convince the community at large?

Prof. Nelson: I think that's where—to your point—we absolutely have more work to do and that's where we are focused on the core principles of simplicity, fairness and transparency and the new AGL's essential product that delivers just that. It's a very clear, easy to understand product not related to the issue that we've had in the market, which is the discounts-of-what issue. In addition to that, we're focused on getting on with the job of providing more supply to the market, which again puts that downward pressure on prices.

Senator KIM CARR: Thank you.

Senator RICE: I'll continue with you, Professor Nelson. I'm interested in the focus of both you and Energy Networks, which seems sensible, that we need to have time-of-use tariffs so that we don't have electric vehicles being charged up at peak times. I'm interested in AGL's experience. You've got your Peak Energy Rewards

Managed for You program that sounds like it's aiming to do that. I'd like a bit more reflection on how that's going versus your dollar-a-day offer, which seems like it hasn't got that signal incorporated into it.

Prof. Nelson: Yes, at the moment, I think it would be fair to say that the uptake of EVs has been relatively modest and therefore we're not in that dilemma that both Energy Networks and AGL have highlighted. I think that's why it's so important to address that before we see significant EV uptake. If we get it right before lots of mums and dads are buying EVs, then we'll be able to improve the utilisation rate of the infrastructure and lower the unit cost for consumers. In terms of the outcomes of the Peak Energy Rewards Managed for You program, as we start processing some of the learnings from that I'd be happy to take that as a question on notice that we can feed back to the committee, if that is helpful?

Senator RICE: That would be terrific. This committee is going to be going for probably only another month or so. Will you have something that you could feed back to us before then?

Prof. Nelson: I think we'll have some very high-level information but probably nothing that would be material to the committee, if that makes sense?

Senator RICE: Thank you. It would be very beneficial if you could get to us whatever you can within our timeframe. We're talking about time-of-use tariffs and the potential for electric vehicle batteries to be feeding into the grid as well as being charged from the grid, and whether you would see that time-of-use tariff would be reciprocated, in terms of higher prices for people who are feeding power back into the grid at that time, when it's required.

Mr Dillon: The short answer is absolutely yes. The open energy networks program I spoke about earlier has been driven by significant uptake in solar. Some of the early adopters there are starting to get storage and indeed we're starting to see electric vehicles, which are mobile storage from our point of view. It is interesting to note that we've aligned closely with some work done in the UK. They have a project called the Open Networks Project. Over there, it's not driven by solar. They simply don't have the levels of household solar we have. It is driven by the starting take-up already of electric vehicles and how they manage those impacts on the grid. From our end, the whole assumption, almost, around that model is that there have to be ways to charge for what customers use at different times of the day—time-of-use pricing, as you mentioned—but also that we can reward customers for injecting back into the grid, not just as the network operator, but, as we already see through the likes of Reposit Power and others, being able to inject into the wholesale market as well. What we absolutely have to get is the coordination and the optimisation of that process, because, as that chart I showed earlier demonstrates, if things get too localised you suddenly get a signal to an area and they all start injecting into the grid to try to bid into the wholesale market and you will cause local blackouts. So, we have to get the coordination of those signals working.

Senator RICE: That sounds very valuable to me with solar panels—and getting the same price for my energy that I'm putting into the grid, knowing that when everyone else has their air conditioners going and it's 42 degrees it is worth an awful lot to you!

Mr Dillon: Correct.

Senator RICE: I think AGL mentioned that you're looking at hydrogen production to balance the grid. Was that AGL or Energy Networks?

Mr Dillon: We also represent the gas distribution networks right around the country. One of the things that's starting to really come through as a significant opportunity in that space is the use of hydrogen. There's a project here in Victoria to get hydrogen from brown coal—traditionally, hydrogen has effectively been cracked from gas. Another opportunity that is being looked at, particularly in South Australia but in other places and not just in our country but around the world, is the use of electricity electrolysis to split water into hydrogen and oxygen. From the network's point of view you can take that hydrogen and, as we're starting to see now, blend it in with the existing methane based gas in the gas distribution networks. Up to certain levels you can simply start to blend it in without needing to change burners on hot water services and on heating systems. Over time this has the potential to decarbonise our gas distribution system, as well as being a potentially very beneficial balancing item on the electricity system as it is able to use excess electricity generation. On windy, sunny days, when electricity is cheap, turn it into hydrogen and store it in the gas networks.

Senator RICE: Do you actually see the ability to completely transform from natural gas to having a hydrogen supply rather than a natural gas supply?

Mr Dillon: Most certainly. In other parts of the world, particularly northern Europe and northern America, where there are huge gas loads for heating. The idea that you could electrify that heating load simply doesn't make any sense at all. That's why in places like Leeds in the UK they are already ahead of us in trying to transform part

of their gas network to 100 per cent hydrogen and figure out what that means for appliances, for safety and for all those sorts of things. It's also important to note that town gas here in Australia—which we had in most of what are now gas distribution networks a few decades ago—was half hydrogen. Engineers who have been around the industry for decades describe this as a bit of back to the future. There are some technical challenges, but it absolutely can be done and lots of work is going on to make it happen. Indeed, today as we sit here in Melbourne there's been a conference in Perth, led by the government over there, on the hydrogen opportunities for that state. A road map came out from the CSIRO last week, ARENA put out a report on hydrogen opportunities, as well, last week and Alan Finkel led a hydrogen strategy group presentation to the COAG Energy Council a couple of weeks ago, so this is a significant opportunity both here and around the world.

Senator RICE: I think it ties into electric vehicles in that if you've got a hydrogen economy developing the likelihood of then having hydrogen distribution and hydrogen refuelling stations means that the uptake of hydrogen fuel cells is encouraged.

Mr Dillon: Absolutely. We could send you a chart of hydrogen refuelling stations in Central Europe. There are a lot of them there already and a lot more planned. There are parts of the world that are well and truly further down this path than us.

Senator RICE: You mentioned, as did AEMO, knowing where the electric vehicle batteries were. How granular would you be seeing that knowledge? Would you want to know the location of every single vehicle that has a battery that is potentially going to feed into the grid?

Mr Johnston: It's not the vehicle; it's the charging station. We need to know exactly where the charging station is and what capacity those charging stations have, because they are where you will get the draw on the system, and that will change the load. It would be down to the street level, virtually, that we would need that.

Mr Dillon: Historically, networks have been built to satisfy demand. If networks have to be built to satisfy a demand which can vary hugely, because you have a significant fast-charging station or something like that, then it's not going to be the least-cost way to do it. We need to know what's going on and we need to agree with certain users around when they may and may not have access to certain demand, and that will be the cheapest way forward on this for everyone.

Senator RICE: In terms of what we were talking about before, about car batteries being able to feed back into the grid, obviously you would need to identify that they were there, so you would get down to the individual car level.

Mr Dillon: Yes, and have pre-existing arrangements for network support on how that might work.

Senator RICE: Thanks.

CHAIR: Professor Nelson, you speak about state jurisdictions versus federal in relation to charging infrastructure. Do you see it as a necessary aspect for state governments to provide the EV charging roadmap so that you could best plan in your business?

Prof. Nelson: As with all infrastructure projects, having a high level plan is very beneficial for participants' understanding of how the evolution of the infrastructure is likely to look. If you look at, say, the evolution of the infrastructure in Europe, you tend to have quite a lot of slow charging within city limits for commuting type vehicles—vehicles that tend to be smaller and have less range—then you tend to have the very fast charging, high-load facilities that tend to provide fast charging for bigger vehicles that are on longer trips. If you put it into the Australian context, there are going to be a lot of people who may have a small vehicle that they use to commute about their town or their city, but occasionally they are going to want to travel a longer distance. They might want to travel from, say, Sydney to Melbourne or Sydney to Brisbane. Having some adequate planning of where those faster charge, higher load stations might be—from a network planning perspective I'd defer to Andrew's expertise on this—I think that having that understanding and that high-level plan would be very beneficial for how that would be rolled out in the most efficient way that minimises any risks and costs to participants and consumers.

CHAIR: Mr Dillon, slide 5, shows the impact of charging infrastructure on peak demand. Is it from a study you did?

Mr Dillon: No. It's from a trial in the UK.

Mr Johnston: The trial was called My Electric Avenue. It was a significant study that was done for the UK which has now led to the work they're now doing with the open networks program in the UK with OfGem.

CHAIR: Of course, they are more progressed in the EV space, so they're able to pool that. I imagine that in a country like Norway the EV level would be higher, if there's more presence, and their graph would be more accentuated in this.

Mr Dillon: Absolutely. I'm not an absolute expert on the Norway system, but they certainly have high levels of EV, and I'm sure they're managing—through timing, pricing and other signals, they are balancing that load. Our key challenge with the network sector is mainly due to air conditioning in most of the country. We have times of the year when we are going to extreme on the network load, but most of the year we are nowhere near it. If we take things like electric vehicles and use them as an opportunity we can increase not the peak but the average usage, which will make the network part of your bill cheaper on average.

CHAIR: We have no further questions. Thank you very much for your presence here today and by teleconference. I would like to thank the witnesses who gave evidence to the committee today.

Committee adjourned at 17:01