**REPORT ON PROCEEDINGS BEFORE**

# PORTFOLIO COMMITTEE NO. 5 – INDUSTRY AND TRANSPORT

## INQUIRY INTO THE AUGMENTATION OF WATER SUPPLY FOR RURAL AND REGIONAL NEW SOUTH WALES

**At McKell Room, Sydney on Monday 6 November 2017**

**The committee met at 10:00 am**

**Published by resolution of the committee on 6 March 2018**

**PRESENT**

The Hon. R. Brown(Chair)

The Hon. D. Clarke
The Hon. J. Graham

**The CHAIR:** Welcome to Portfolio Committee No. 5. Neither of the witnesses will be sworn today, because they are not Australian citizens and are outside our jurisdiction but we would like to record the presentation. We will get a copy of it and circulate it to the rest of the Committee members who are not here today.

This hearing is an inquiry into the augmentation of water supply for rural and regional New South Wales. We welcome the witnesses to Australia and to the Parliament of New South Wales. Your presence before this Committee is a unique and exciting opportunity, which we greatly appreciate. We thank you for appearing before the Committee today, and for helping us with this inquiry. The inquiry is examining water demand and supply, the suitability of existing storages, flood history and technologies to mitigate flood damage, and water management practices, including that of environmental water, which is water that is let go down the rivers for environmental purposes.

Before I commence I would like to make some brief comments about the procedures for today's briefing. The evidence you give us today will be transcribed by our Hansard staff. The Committee usually publishes these transcripts on our Committee's website and uses this information in its report. A copy of the transcript of the witnesses' evidence will be provided to them to review in case there is anything that they do not want published.

**MOTI SHIRI**, Vice President, Planning and Development, Mekorot, before the Committee

**MICHAEL ELISHA**, Chief Project Manager, Mekorot, before the Committee

**NITZA LOWENSTEIN**, Interpreter

**The CHAIR:** I now welcome our guests from Mekorot, Israel's national water company. The interpreter has just arrived. Both the witnesses speak English but if the evidence gets technical we may need her assistance. I thank her very much for agreeing to help us today.

I believe that the witnesses have a presentation to make to us today. We might proceed with that, and if the Committee members have questions they will put those to the witnesses after the presentation. Before you proceed I will describe what we are doing. The upper House of the Parliament—we have two Houses of Parliament—has a committee system. The committees consider different portfolios. The committee that is sitting here today considers the Industry and Transport portfolio, which includes agriculture, water, fisheries and forestry and things like that. There are other committees that consider legal issues, the Government—Premier and Cabinet—and energy. There are six different committees. Today, this committee, which has been running for about a year and a half, is considering all of the impacts, demands and requirements for water—not for Sydney, but for agriculture everywhere outside of Sydney.

As you are probably aware, we have a range of mountains—they are really hills, I suppose—running close to the coast. They are called the Blue Mountains. The range runs down most of the eastern seaboard of Australia. Most of our broadscale agriculture—large farms—is to the west of that range. A lot of our water falls on that mountain range and flows eastward into the sea. Some of it falls on the western slopes, and that is what is called our inland river system. In the south of the State the border between New South Wales and Victoria is the Murray River. The Murray River has a number of tributaries, of course, and is fed from the alps—the Snowy Mountains—in the south. The snow melt from those mountains generally speaking runs into the Murray system and the Murrumbidgee River. Those rivers hook up, and are joined by a third river—the Darling River. There is not much water in that river. All the water from those three rivers goes through to South Australia and out to sea in the Southern Ocean.

Those are our major inland rivers. The Darling system, which runs from the north, is fed from rivers in Queensland. In Queensland, as in New South Wales, everything that falls on the eastern side of the mountains runs away out to sea. In the north of New South Wales and further north—in Queensland and Far North Queensland—rainfall events quite often create large floods. So we have floods on the east coast, occasional floods in the west and, generally speaking, large areas without much water at all. Those areas are probably good for grazing sheep or something like that but not good for intensive agriculture because there is no water there.

On the southern rivers—the Murray and the Murrumbidgee—where the water comes from the alps, there are large irrigation schemes where the water is channelled across the land. That is called the southern basin. Most of our irrigated production is on the Murray and the Murrumbidgee—the southern part of the State. In the north of the State is the northern basin—the Darling River and the rivers that run from Queensland. There is a bit of irrigation there but that is used mostly to grow cotton. In Western Australia, on the north-west part of the continent, there is another large scheme on a couple of large rivers. In the north of our continent we have monsoonal weather. The middle of the continent is temperate, and then there is the southern part of the continent.

In New South Wales this Committee is looking at the water situation largely—the water balance—and what the options are going forward to the middle of this century or beyond, where we can get more water into the dry lands. Hence our interest in Israel and the water systems that you have developed there, because your country is also largely a dry land type of climate, a southern Mediterranean climate. We are deeply interested in what you have done over there.

**Mr SHIRI:** Thank you very much, gentlemen and ladies. I start with the presentation of Mekorot. If you have questions after that about regulation in Israel, I can answer any of your questions. I think it is very important, because the regulation in Israel is very different, I think, from here. The water belongs to the Government, not to the citizens, so if there is rainfall in my home it does not belong to me, it belongs to the Government. I cannot collect it. Every bit of water belongs to the Government—that is the situation in Israel.

I start with the Mekorot company. The Mekorot company was established in 1937, so it has existed for 80 years. There are two companies: Mekorot Israel National Water Company and EMS Mekorot Projects. They make 70 per cent of the projects of Mekorot, especially pump stations, pump lines, pipes. We started a new company 10 years ago that makes all the business action abroad, separately from the Mekorot company. They

build some projects abroad. We supply 40 per cent of the water in Cyprus—we make desalinated water in Cyprus. We work in Argentina, South Africa—everywhere in the world. It is not so easy to make the business, but we have the knowledge so we try to do it. This is why we created this company.

**The CHAIR:** Mekorot Development and Enterprise is the company that does that work internationally.

**Mr SHIRI:** Yes. Some facts and figures about Mekorot are that we re-use 60 per cent of water, we supply 85 per cent of the drinking water and 70 per cent of the total water in Israel. We have a lot of wells in Israel—more than 1,000. I will describe this later. We have 12,000 kilometres of pipe and 3,000 facilities. We invest a lot in water per year: $US350 million per year. The revenue is $1.3 billion per annum. We are rated triple A, which is very important for us. We collect stocks and then we invest in projects.

**The CHAIR:** With your revenue of $US1.3 billion per annum, is that from all of the business including your overseas consulting work?

**Mr SHIRI:** Everything.

**The CHAIR:** Everything comes in to the $1.3 billion.

**Mr SHIRI:** Yes. There are not many water companies with all this knowledge. Some of them have some of the knowledge, but we use all of the knowledge. In Israel, we need to do everything, because we do not have water. After many years, we are doing everything. I will explain what we do in this presentation. In Israel, we supply five different types of water. There is desalinated water, which is huge in Israel today—it is 600 million cubic metres per year. It is a lot. Groundwater is coming from the wells and provides 27 per cent. Surface water is from the Sea of Galilee. Today it is a little less as we have a problem there. Effluent water is 16 per cent—it is a lot. And we supply a lot of brackish water with the wells in the Arava. A lot of that goes to agriculture.

**The CHAIR:** How saline is the brackish water? Can you use it for livestock?

**Mr SHIRI:** Yes—some of them yes, some of them no. We make a difference between the pipes. If you go to Arava, you will see a lot of pipes.

**The CHAIR:** Where is that?

**Mr ELISHA:** It is Arava, in the south of Israel. It is mostly desert.

**Mr SHIRI:** It is mostly desert. You do not see any water there.

**The CHAIR:** But there is water underground.

**Mr SHIRI:** There is water underground—water that for millions of years has been underground.

**The CHAIR:** Is it very deep?

**Mr SHIRI:** Yes.

**The CHAIR:** How far down is it?

**Mr SHIRI:** It is 200 metres or 300 metres, which is not so deep, but the wells are deep—600 metres to 700 metres. A few years ago we made some changes. A few years ago all the water was from the Sea of Galilee in the north. From there we would take the water to the south. Until 2005 that was what we used in Israel. We would take all the water from the north to the desert in the south. But with the understanding that the population would grow and we would need more water, we started to make five desalination projects to supply 600 million cubic metres per year. And now the water goes in the opposite direction—we now supply water to the north.

Today most people in Israel are drinking desalinated water. In the past we supplied water from the Sea of Galilee and it would take seven days to supply the water. Today we need to supply water within three hours, so we changed our position. Desalinated water is created by a private company and they want to sell water, so we need to take the water until it is raining and nobody needs the water. We need to take the water, so we completely changed the operation of Mekorot systems. We have more than 1,000 wells. One of the deepest is 1.5 kilometres.

**The CHAIR:** That is deep.

**Mr SHIRI:** It is very deep—yes. It is like an oil well. It is not like a water well.

**The CHAIR:** So you manufacture your own pumps?

**Mr SHIRI:** Yes. Water treatment and quality. We have 800 plants of treatment. We have a lot of testing every year of the water. We make a lot of testing in our laboratories. This is one of the largest. We built it in 2005 in the Sea of Galilee. It has a filtration capacity of 1.7 million cubic metres per day. It is one of the biggest in the world. It makes very, very good water—0.1 NTU is very good water.

Today we do not use it a lot because we do not have water from the Sea of Galilee. We have a problem. We do not have rainfall in four year's in the north and today—10 per cent for water you need to operate.

**The CHAIR:** Is the Sea of Galilee a tidal or inland sea?

**Mr SHIRI:** It is a freshwater sea.

**The CHAIR:** How big?

**Mr SHIRI:** I think millions cubic, something like that.

**The CHAIR:** You had to virtually decommission that pump because you had no rainfall.

**Mr SHIRI:** If we are going very low it will be more salty. So that is why we don't really shift the line. The red line is minus 2013. When it is below we do not pump from there. We stop the pump. We do a lot with biological cleaners of our reservoirs. It is simple with a lot of fish. Some of the fishes clean this, some clean that. You need to clean the reservoir but you do not need to make a cleaning by the reservoir. It is very smart and it works very well.

**The CHAIR:** In the inland rivers of New South Wales carp are not a benefit; they are a problem. They breed to such huge biomass that they keep the water turbid and take out a lot of small native fish, and because of their feeding habits they undercut the banks and drop the stream banks in. They are bad here.

**Mr SHIRI:** That is why we have fish that clean the bed. This is what we do. All our reservoirs we put like that.

**The CHAIR:** Do you try and control the amount of fish?

**Mr ELISHA:** We control the fish and we put some fishes because every species knows exactly—

**INTERPRETER:** They cannot multiply. They put fish—

**Mr ELISHA:** To keep the amount of the fish we put unfertilised fish.

**INTERPRETER:** They have total control of the number of fish. Here with the carps they just multiply, but they put fish that cannot multiply.

**The CHAIR:** Sterilised fish.

**INTERPRETER:** They sterilise the fish before they put them in the water and they use the particular fish that will eat that particular algae. They know which fish to put in the water as well.

**Mr ELISHA:** There is a fish that takes all the algae.

**The CHAIR:** The Australian authorities want to introduce a herpes virus specific to the carp into the whole population, hoping that the virus will not mutate and jump across to other species.

**INTERPRETER:** Carp in Israel is very different to the carp here. They eat the carp in Israel. They are very good fish to eat. Here you do not eat carp.

**The CHAIR:** Different types of carp. Excuse me for interrupting.

**Mr SHIRI:** Mekorot makes a lot of research and development. We catch all the technology. Every year we spend on monitoring systems. We make a lot of models of water quality. In Israel we protect water research and development because we do not have a lot of water. This is the world record in Israel for the Mekorot company. The water loses 3 per cent—I do not what it is here in Australia.

**The CHAIR:** That is the loss—

**Mr SHIRI:** Yes.

**The CHAIR:** —through evaporation?

**Mr ELISHA:** Leakage.

**Mr SHIRI:** Including evaporation, including everything, 3 per cent.

**The CHAIR:** The irrigation systems in Australia that I mentioned have 3,000 gigalitres a year flow through them and they are all open channels. They flow down to lakes in South Australia from the west of New South Wales and the evaporation rate out there is—just imagine if you had freshwater lakes in the southern part of your country, how would they last? Gone.

**Mr SHIRI:** All our reservation is covered.

**The CHAIR:** They are all covered?

**Mr SHIRI:** Yes. The reservoir for drinking water, all covered. WaTech. We take a high-tech company of major water research and we do it with them in a joint venture, starting R and D centres and maybe do some technology of the water. That is why we do it in Israel.

**The CHAIR:** Are the R and D centres of different disciplines or are they all the same? Do they all do the same thing?

**Mr SHIRI:** No, they are different.

**The CHAIR:** Different fields?

**Mr SHIRI:** Yes. Water security. This is what we are very strong about. What you see here is a fish. We put the camera on the fish and when the fish changes we know what happened to the water. This is what we do a lot. We do monitoring of the water. We do everything about the water because security of the water is very important in Israel. That is why we do it a lot. We are very protective of the electrical system of our pump station and everything as well.

**The CHAIR:** Do you have backup power for them?

**Mr SHIRI:** Yes.

**Mr ELISHA:** We secure all our facilities.

**The CHAIR:** Everything is done with security?

**Mr SHIRI:** If someone gets in all the valves are closed automatically, you cannot open it.

**The CHAIR:** It automatically closes?

**Mr SHIRI:** Yes. Everything is automatic.

**The CHAIR:** For example, if you have a burst pipeline the valves close?

**Mr SHIRI:** Close. You need to go to that opening. We have early warning systems about everything. You can know everything what happens there. This is online sensor of our water. With our sensor we know everything about our water. We know what happened to the water every time. This will go to our command and we see everything.

**Mr ELISHA:** We are monitoring. We have a few pourings. We are monitoring the water system all day and we take samples automatically and check all the parameters of water quality. If there is any deviation they send a warning to the control panel and we know how to proceed.

**The CHAIR:** Do all your desalination plants and your major facility come back to one monitoring centre?

**Mr SHIRI:** Every desalination plant has a monitor. At every connection we have a monitor. We see everything.

**The CHAIR:** Do all the signals come from one central monitoring station or do you have many monitoring stations?

**Mr SHIRI:** We have many. I will show you in just a minute. We have some warning systems. Some of them are very specialised but this is what we use in Mekorot today. It is high-technology attention to water. This is what we suffer and you suffer, and in all the world it is the same problem—a shortage of drinking water. We have a rise in the world population, climate change we saw in Israel in a few years; it is everything changing in all the world. We have a change in the water, everything is—

**The CHAIR:** Going the wrong way.

**Mr SHIRI:** Yes, everything in all the world, the same thing. We make optimal management of the facilities. We have a lot of facilities. This is what we do and this is what they speak about our command control

system. We have something like 10 model systems. Everything is automatic. This is the model that everything will be automatic, and this model is low energy and is the most optimal system about the water.

**The CHAIR:** There are 10 there. Are they connected to one place so that one government department understands what is going on all over the country?

**Mr SHIRI:** We have one centre of command but it is not working. It is working only when we have a problem. Each one is working alone because each one is in another area, each one can show in another region, so he knows how to work in his region. But we are one command. If you have a problem with something happening in the system we are the one command. Usually they are not using it. This is the thing that we do a lot in Israel—it can give us 15 per cent more rainfall. We use it only in the winter. Every situation that we can use it and use it a lot, but it is working from 1960.

**The CHAIR:** What is a ground generator?

**Mr ELISHA:** It is like an oven. We put some chemicals, and they evaporate the chemicals and it goes to the clouds and the clouds then become more heavy and raining.

**INTERPRETER:** It increases the moisture.

**The CHAIR:** Crystallisation in the clouds. Out here, I think generally, any seeding that is done is done in the southern alps where the snow is, and that is done with aeroplanes.

**Mr ELISHA:** We use also aeroplanes.

**Mr SHIRI:** Most of the things we use aeroplanes. This is the most efficiency.

**The CHAIR:** Is it successful, the technology?

**Mr SHIRI:** Yes, very successful.

**Mr ELISHA:** It increase 15 per cent of the rainfall.

**Mr SHIRI:** In the north—especially in the north.

**Mr ELISHA:** We invest in the north because we have the Sea of Galilee. We would like all the rainfall to go to the Sea of Galilee because this is an immense source of water in the north.

**The CHAIR:** What was that expression?

**INTERPRETER:** For example, if we had one over Warragamba Dam you would increase the rainfall over there to increase the water. So in Israel they increase the water—they use the planes and over the Sea of Galilee, for the catchment area there—

**The CHAIR:** To try and concentrate it.

**INTERPRETER:** Yes, because they do not want the Sea of Galilee to go below the red line. They do not like to take water out of the Sea of Galilee if it is below the red line, so the one way of doing it is increasing the waterfall over it. They are using it very successfully and we do not do it in Australia, I know that. I am a journalist as well so I am very interested in the area. I work for SBS.

**The CHAIR:** We should get you as a witness.

**INTERPRETER:** If we take Warragamba Dam, when we have like cloudy weather, it will increase the waterfall over the catchment area, and that is what they do over the Sea of Galilee, very successfully.

**The CHAIR:** I understand now, thank you.

**Mr SHIRI:** I speak about the command and control. We have an AMR system—automatic meter reading. All the meters is now automatic reading—it belong to the command control. It measures every five minutes.

**The CHAIR:** Are all the signals wireless or are they hardwired?

**Mr SHIRI:** Wireless, everything wireless. Energy saving, we improve it a lot. We need to make a saving of energy of 1.5 per cent each year. So we do it a lot; we are pumping all our water in the night to save energy.

**The CHAIR:** The lower demand.

**Mr SHIRI:** Yes, it is the lower amount. We make a lot of optimal planning, we make everything. We change all the pumping efficiency, we do a lot of this, and we do it very good so the consumption of energy is very low.

**The CHAIR:** What is the main source of power in Israel?

**Mr SHIRI:** The main source of power in Israel is two things: one is electrical from the company with electrical, but today we are buying from the private company. The electrical is less than 10 per cent, the government company, and we have electrical from wind but it is very small, it is not a lot. When the pressure is put on the system and we need to reduce it, we put hydraulic turbines in the system.

**The CHAIR:** Sorry?

**Mr SHIRI:** When we have the high pressure, we put hydraulic turbines at this point and transfer it to electrical to our system.

**INTERPRETER:** They actually produce their own electricity because when they are trying to reduce the pressure—when the pressure is high and they are trying to reduce the pressure, they use the turbines and the turbines produce electricity. What they do, they do not just use electricity, they produce their own electricity when they can.

**The CHAIR:** How is electricity produced in Israel? Do you have solar, wind, nuclear, coal?

**Mr ELISHA:** We have coal and gas. Now we have a resource from a lot of gas in the sea. Now they produce the gas and they try to change all the power plants to gas.

**INTERPRETER:** They discovered gas in the sea in Israel offshore—very recent; Israel never had natural resources and suddenly they discovered gas offshore, so they are trying to utilise it and use it. So now they are trying to move even production of electricity to use this natural gas that is now plentiful.

**The CHAIR:** So in your plants what type of power do you use for backup? Do you use diesel generators or—

**Mr SHIRI:** We have a diesel generator. In every backup you have a diesel generator. Wastewater I think in Israel is very unique. Shafdan is one of the biggest ones in Israel. Mekorot do it. We do something very unique because we make all the treatment in Gush Dan, which has Tel Aviv in the area, in one place. They remove all the nitrification in the wastewater and everything.

**The CHAIR:** What is the population that that services?

**Mr SHIRI:** It is something like 2½ million.

**The CHAIR:** And that all comes to one treatment facility?

**Mr SHIRI:** Yes. We have a lot of very small treatment in every well, but this is what they were doing in the 1980s and it is very smart. In Israel we use 85 per cent of the sewage after treatment for irrigation, and they say in Australia it is 15 per cent.

**The CHAIR:** That is probably right.

**Mr SHIRI:** We use all the water for irrigation; we do not throw it away to the sea. We use it because it is water.

**The CHAIR:** We take out the solids and then pump it out to sea.

**Mr SHIRI:** I know. What we do in Shafdan is take the water after the treatment plant and put it in the ground and pull it outside by the wells.

**The CHAIR:** Aquifers.

**Mr SHIRI:** Yes, it is closed aquifers. We take the water after a second treatment and put it in the ground, to a closed aquifer, and then we pump it again. This aquifer is a closed aquifer, and it is a 100 million cubic aquifer. In the winter nobody wants water, which is a problem in most of the world. We store it in the winter and supply it in the summer.

**The CHAIR:** How deep is that aquifer?

**Mr SHIRI:** It is something like 200 metres.

**The CHAIR:** Is it high permeability so the water moves well within the aquifer?

**Mr ELISHA:** This is a basin that we build. We take the water there and all the water filters through the ground.

**The CHAIR:** It is not pumped, just gravity?

**Mr SHIRI:** Just gravity. When we pump this water it is very clean; you can drink it. You get very clean water that everybody can use. We supply to the Negev, the desert.

**The CHAIR:** How clean is the water you put into the holding basin?

**Mr SHIRI:** It is second treatment.

**The CHAIR:** Secondary treatment, so you are virtually using the aquifer as tertiary treatment. Is that right?

**Mr SHIRI:** Sure. It takes 90 days, something like that.

**The CHAIR:** To get in and filter it?

**Mr SHIRI:** Yes. We make a lot of pipes, because this area is in the centre of Israel, so there is a big pipe to the south, to the Negev. Today, if you go to the Negev, you see everything is green. It was a desert, but everything is green today. We take 180 million cubic per year from that, which is a lot.

**The CHAIR:** Is most of that distributed in the summer and collected in the winter?

**Mr SHIRI:** Yes. We make a big reservoir in the south so that if there is a problem in the summer, because they need a lot of water, we need a lot of pipes. We make a lot of reservoirs in the south.

**The CHAIR:** Open reservoirs or covered?

**Mr SHIRI:** It is open reservoir but covered today by plastic, because we do not want it to evaporate.

**The CHAIR:** How big are the reservoirs?

**Mr SHIRI:** It is something like 3 or 4 million cubic metres covered with plastic.

**The Hon. JOHN GRAHAM:** Are they permanently covered, or do you have to replace the plastic quite often?

**Mr SHIRI:** It is drinking water so it is closed plastic and we need to change it every 15 years. It is small plastic, and we throw away a lot of small plastic. They cover it like that. It is not closed hermetically.

**The Hon. DAVID CLARKE:** By what percentage does it reduce evaporation?

**Mr SHIRI:** I think it is 80 per cent, or something like that. What we do in the water system, it is 100 per cent. Israel grows good vegetables.

**The CHAIR:** Next time I go to Israel I will have a look.

**Mr ELISHA:** There are a lot of greenhouses growing peppers and tomatoes in good quality.

**The CHAIR:** Are they all high-efficiency irrigation systems like drip-line irrigation? You do not spray water everywhere, do you?

**Mr ELISHA:** No, you do not see sprinklers.

**Mr SHIRI:** Mekorot does not supply water to the client or the citizen, only to the city and to agriculture.

**The CHAIR:** You are virtually a wholesaler.

**Mr SHIRI:** Yes, we are in the top. For each area we have a corporation that sends water to the city and handles the sewage and water in the cities.

**The CHAIR:** How much does drinking water cost the households?

**Mr SHIRI:** Something like $3 per cubic metre, excluding treatment water. It is a lot.

**The CHAIR:** Do you sell agricultural water to an agricultural water corporation that then sells it to the irrigators?

**Mr SHIRI:** I think some of them just supply for irrigation, but we sell to everybody. For irrigation water, the price is very low. The tariff is very low because it is subsidised. For agricultural water, sewage after treatment, it is between 30¢ and 60¢ a cubic metre. Fresh water sells at something like $1 a cubic metre.

**The Hon. DAVID CLARKE:** Does Israel have many dams?

**Mr SHIRI:** We do not have any dams; it is a desert.

**The Hon. DAVID CLARKE:** Because there is no water run-off.

**Mr ELISHA:** No, but we capture flows for irrigation in some places that we know it is raining and all the water, especially in the desert, flows to the sea.

**The CHAIR:** They are temporary storages, only when it rains?

**Mr ELISHA:** Yes.

**Mr SHIRI:** But it is like a general mix. We see it today but it is not the general mix. We did something before and we have stopped today to do it.

**The CHAIR:** What is the average rainfall of Israel?

**Mr SHIRI:** Something like 500 millimetres per year.

**The CHAIR:** Of course, that varies because in the desert it would be nothing.

**Mr SHIRI:** Yes, and in the north it would be 700 or 800.

**The Hon. JOHN GRAHAM:** I want to ask about your new investment. You have built a lot of infrastructure over a long period. What is the most cost-effective technology that you are using now?

**Mr SHIRI:** It is difficult to answer that because with each type we use a lot of technology. I think the best that we do today is that we use desalinated water. We do it a lot in Israel and we now use it mainly for the agriculture. We take sewage water and make agriculture by treatment using membranes. Another thing is the security of the water. We suffer from water security. Today it is very open. Everything is open.

**The Hon. DAVID CLARKE:** We have desalination plants but a number of them throughout Australia are not being used because there is no necessity for that. These plants are still expensive to maintain, even when they are not being used. Is there a way to minimise that expense?

**Mr SHIRI:** In Israel it is not very expensive. I have heard that it is expensive here. I do not know why. In Israel the amount of cubic water, after desalination, is at a cost of something like 70¢.

**The CHAIR:** The cost is 70¢? I think ours costs us a lot more than that.

**Mr SHIRI:** When it is not for that it is 50¢. That is why, if we do not need the plants, they only use 50 per cent. They do not stop.

**The CHAIR:** They run all the time?

**Mr SHIRI:** They run all the time—50 per cent minimum.

**The CHAIR:** When were they built? How old are they?

**Mr SHIRI:** They started in 2005 and the new one was started in 2015. Between 2005 and 2015 they built five.

**The CHAIR:** Does the new one use different types of technology, or is it the same technology as the ones that were built in 2005?

**Mr SHIRI:** The Government pay less money. It is not the same technology because the filtration has changed; they use the UF filtration—not sand filtration. I think the technology of the membrane has changed so it uses less energy, because the energy costs a lot for the desalination. That is why the prices have changed. The prices start from $1 and $10 and now it is going to 60¢ or 70¢.

**The CHAIR:** So it is cheaper to produce and there is lower power usage.

**Mr SHIRI:** Yes.

**The CHAIR:** There may be different membranes. Do they use ultraviolet technology?

**Mr SHIRI:** Yes. I think the price of the energy is lower because they use some heat gas—power plant gas—in our system, which lowers the cost. It is not private, but it is private—

**The CHAIR:** I know what you mean. They use cogeneration. They use the heat from the plants to help. Can we get a copy of your presentation?

**Mr ELISHA:** We will leave it.

**The CHAIR:** Thank you very much. We will send the transcript to you at your company. I ask that you have a look at it. If you are happy with what you have said here today to become public we would like to put it up on our website. We will have a teleconference on 20 November with some other Israeli experts. That will probably be a bit more difficult, because it is great having people in the room whom we can look at and talk to.

With respect to the amount of water that you produce and the amount of agriculture that you produce, what do you see will be the greatest demand in 20 years time in Israel? Will the demand be for more agriculture, or are you at peak now, and unable to do any more?

**Mr SHIRI:** I think the agriculture will now grow from what it is now. They will stay like that. We have a lot of land but agriculture is not growing because people in Israel go for high technology, not agriculture. They want to put a lot of money in high tech industries.

**The Hon. DAVID CLARKE:** But you are exporting a lot of agricultural product, are you not?

**Mr SHIRI:** Yes.

**The Hon. DAVID CLARKE:** So it must be worthwhile. It must be good use of land that may not be good for anything else. You are producing—

**The Hon. JOHN GRAHAM:** You are exporting.

**Mr SHIRI:** A lot of export, but it is not growing. It is staying like that.

**The CHAIR:** Realistically, the sort of work that your company would do for the next 20 years might be related to efficiency and keeping it running?

**Mr ELISHA:** No.

**Mr SHIRI:** No, we have another problem—the growth of the population. It is 1.8 per cent.

**The CHAIR:** Per annum?

**Mr SHIRI:** Per annum. We have another thing. We supply water for our neighbours. We supply water for Jordan—60 million cubic per year. We supply for the Palestinians something like 60 million cubic per year, and they want more and more. So it is difficult because we need to supply more water to our neighbours.

**The CHAIR:** How do you think that will be achieved? Will it be achieved through more desalination? Is that probably the way to go?

**Mr SHIRI:** Yes, it will be. Now in Israel they are talking about making another one, which will make 200 million cubic more desalinate.

**The CHAIR:** Per annum?

**Mr SHIRI:** Yes, because we do not have enough water.

**The Hon. JOHN GRAHAM:** Is that new plant for salt water or brackish water desalination?

**Mr SHIRI:** We do it for brackish water but only a small amount of drinking water. It is not a lot. Mostly it comes from the sea.

**The CHAIR:** Is the hyper saline product just pumped back out into the sea? Do you take that off shore to discharge? When you make the water you end up with hyper saline product—very, very salty water.

**Mr ELISHA:** Yes.

**The CHAIR:** How do you get rid of that? Do you put it back out to sea?

**Mr ELISHA:** Back to the sea.

**Mr SHIRI:** It goes to the sea. We take from the sea and send it back into the sea.

**The Hon. DAVID CLARKE:** My question is off topic to some extent. Some years ago, when Gaddafi was in Libya, he had an enormous project underway to get water from the desert in Libya. Was that just hype and spin, or was there substance to that? What was the result of all that?

**Mr SHIRI:** Like you, I heard that, but I heard that they are finding that it is salty water.

**The CHAIR:** Brackish.

**Mr SHIRI:** It is not brackish. It is a little salty, yes. You could use this water for agriculture. That is what they do. It is not for drinking.

**The CHAIR:** Can you use it without treatment for agriculture?

**Mr SHIRI:** You can use it without treatment. We use quite frequently because this water contains iron and $SO_4$. We get it out, but after that you can supply it.

**The CHAIR:** So you take out the iron and the hydrogen sulphide—

**Mr SHIRI:** Yes.

**The CHAIR:** —and the water can go.

**Mr SHIRI:** And the water can be supplied. It is used to supply for agriculture.

**The Hon. DAVID CLARKE:** It is a lot cheaper to get the salt out than to put ocean water through a desalination plant?

**Mr SHIRI:** Yes, sure, because it is less salty. The salt of the ocean is something like 32,000 or 35,000 chloride and this salty water is something like between 800 to 2,000. So it is most efficient, because the energy you need to remove the salt is very low.

**The CHAIR:** What was the word that was used, after the number?

**Mr ELISHA:** It is the Mediterranean Sea, not the ocean.

**The CHAIR:** Yes, the Mediterranean Sea.

**Mr SHIRI:** In the sea it is 35,000 chloride.

**INTERPRETER:** Chlorine—the density of the salt.

**Mr SHIRI:** Yes, something like that.

**INTERPRETER:** The percentage of the salt in the water of the sea is 35 per cent. Thirty-five thousand, did you say?

**Mr SHIRI:** Thirty-five thousand parts per million [PPM].

**The CHAIR:** Thirty thousand unit—whatever the units are. Okay.

**Mr SHIRI:** It is PPM.

**INTERPRETER:** It is a measurement.

**Mr SHIRI:** Yes, of the saltiness of the water.

**INTERPRETER:** And with the other water it is only up to 800.

**Mr SHIRI:** It is 800 to 2,000, or something.

**The Hon. DAVID CLARKE:** As opposed to 35,000.

**The CHAIR:** Yes.

**INTERPRETER:** It is much more.

**Mr SHIRI:** I do not know—you do not have any wells, do you? You do not use wells at all.

**The CHAIR:** Yes, we do. We use a lot of wells.

**Mr SHIRI:** But not for water.

**The CHAIR:** But only for agricultural water, and mostly for crops. We do use water for stockfeed and stock water, but only shallow aquifers with not a lot of salt in it. Some of the deep wells we use—we call them bores—are down to 200 metres or 300 metres. The water that comes out of them is very high in salt and in alkalines. When these bores were first sunk 80 years ago, where the water came out of the ground they cut a channel and let the water run down. It might go 30 or 40 miles open channel and it is hot and salty—not much use for anybody. In the last 30 years the Government has been subsidising farmers to cap all the wells and put pipelines in.

Under the south-eastern part of Australia, which includes part of Queensland, part of New South Wales, a little bit of South Australia and a little bit of Victoria, is what is called the Great Artesian Basin. It is a

huge series of aquifers of varying depths. The water quality is dependent upon what the aquitards above and below are—for example, if it is coal seams, the water is not much good. If it is just straight sandstone or if it is shallow and alluvial—sand, rocks or clay—the water is very good. We have had that in Australia for a long time, but 30 years ago two things were happening. Firstly, the Government realised that all the long, open channels were just evaporating and that that was no good. Only 10 per cent or 15 per cent of the water was able to be used—the rest was just evaporating. The second thing was that all of these bores were starting to draw down the aquifers, so they were having to be taken from deeper and deeper. The deeper they go, the worse the water quality gets.

The Government has been encouraging people to only take a certain amount under a licence—they are only allowed so many gigalitres per year out of the bore. They had to cap them and were no longer allowed any open drains. They all have to be piped. If you cannot pipe it, you do not pump it. Even so, in Australia, if we could find a cost-effective way of utilising those aquifers like you are using in Israel, where you recharge the aquifer then draw out of the aquifer, our aquifer area—the basin—would be 100 times the size of Israel. It is huge.

A third of New South Wales, a quarter of Queensland and maybe a tenth or a quarter of South Australia—all that huge area. It is not just one system—it is thousands of systems all over the place. But we do not know the interconnectivity through that system. Over the years we have learnt what the varying qualities are in varying locations, but there is not a lot of coordination because Australia, unlike Israel, has not had to worry too much about water security except when we have a 10-year drought and our agriculture is failing—all of a sudden, people start to worry. The other time Australians start to worry is when there is a lack of rainfall in the cities and the city dams start to go down: "Better build a desal plant." So we build a desal plant, then it rains, everything fills up again and we turn the desal plant off.

What this Committee is attempting to do is to try to put all of that into context and try to find the baseline: What is the data that should inform what we should be doing in 50 years time? Like pretty much every other democracy in the world, our parliamentary system lasts three to four years and it changes repeatedly. The last major infrastructure project we did pertaining to water was the Snowy Hydro scheme in the 1950s and 1960s—a long time ago. These days environmental policy has changed so it is a lot harder to dig a hole, put a tunnel through or build a dam than it was 60 years ago.

New South Wales and probably the whole of eastern Australia will need to think about what it does in the next 50 years, towards the middle of this century and beyond. Like Israel, our population is growing. The world population is exploding. Maybe in 50 or 60 years time, wars will not be over oil; they might be over water or productive land. The reason we wanted to speak to representatives from Israel is that you are dealing with those problems now and have been for the last 30 years to 50 years, and you have largely dealt with them. We have not even started yet. Hence looking at what you have is very valuable to us. The difficulty is that governments are very slow to do things.

**Mr SHIRI:** What we do now in Israel is we connect areas that are not connected to the main pipes. In Arava, until today, they have lone wells—salty wells and some wells for drinking. They are not connected for most of the area. Now in Israel we connect them to the desalinated water. Then we noticed that there was less and less water from the wells because the aquifers are down.

**The CHAIR:** They have been drawn down.

**Mr SHIRI:** Yes. We have this problem, and the salt in the water is getting higher. So we made a big project to connect this area and make a mixture of salty water and desalinated water to bring to the farmer.

**The CHAIR:** By recharging those salty aquifers, are you diluting the salt?

**Mr SHIRI:** Yes.

**The CHAIR:** And you are increasing the volume. Then you allow the farmers to bring that back out again and put fresh water back in.

**Mr SHIRI:** We do not do it like that. We take two pipes and connect them together in a matrix. We do not put it in the aquifer.

**The CHAIR:** Sorry—you are not doing recharge of those salty aquifers.

**Mr SHIRI:** No. You lose energy. You do not need to do that.

**The CHAIR:** Too much energy—okay. You are mixing the water after the salty water comes out of the ground.

**Mr SHIRI:** Yes.

**The CHAIR:** And I guess because you are mixing, say, 50 per cent of this and 50 per cent of that—the salty water they are dragging out—they do not need as much, so that means a longer life for those aquifers.

**Mr SHIRI:** It is a longer life for the aquifer and it is better for the agriculture. If you give more salty water, you need more water—this is what happened. They now need less water, and that is why it is good for everyone.

**The CHAIR:** Is it only for agricultural purposes?

**Mr SHIRI:** Yes.

**The CHAIR:** Are there any other areas in Israel that you are going to need to start to look at in future, other than connecting those?

**Mr SHIRI:** We connected the north. The north is the only good wells. Unfortunately the aquifers in the north have a problem because there is very low rainfall. We now start to connect the north to the desalinated water. We connect all of the areas, but the north is not connected yet. In the last five years we connected the areas, one to the other. Now we need to connect the desalinated water. We need everything to connect so people can use any of the water from every area. That is what we do.

**The CHAIR:** Will you be building more desalination plants in the future?

**Mr SHIRI:** Yes, it will be in five or seven years from now they will build between 200 million cubic per year.

**The CHAIR:** Per year?

**Mr SHIRI:** Yes.

**The CHAIR:** Over the next five to seven years?

**Mr SHIRI:** Yes. They need to do it in the north.

**The CHAIR:** Will those desalination units be built in the north or will they built in the middle of the country where the rest of them are?

**Mr SHIRI:** I do not know. If we do not find a place in the north, because to find a place is very difficult, they will maybe find a place in the middle of Israel like they are doing now. They take the water to the north. It does not matter.

**The CHAIR:** Excuse my ignorance of the geography of your country. Is it more mountainous in the north?

**Mr SHIRI:** Yes, the mountains are in the north.

**The CHAIR:** Gentlemen, do you have any questions for our guests?

**The Hon. DAVID CLARKE:** No.

**The Hon. JOHN GRAHAM:** It has been really useful to see the potential of what you are doing. It is obviously very applicable but, as the Chair has indicated, we have a long way to go to be anywhere near the level at which you are working.

**The CHAIR:** I assure everyone that after 2019 we will be going to Israel. Thank you for agreeing to come and see us today. I hope that you have enjoyed your stay in New South Wales, and in Sydney. I was pleased to hear that you enjoyed the conference on tunnelling. A couple of the proposals received by the Committee relate to putting in tunnels and dams, so down the track we may very well be coming to your company to ask for assistance. How do we bore a water tunnel? Did you say 30 kilometres is the one you have just done?

**Mr SHIRI:** It is 13—13.5.

**The CHAIR:** How big?

**Mr SHIRI:** It is 3.9.

**The CHAIR:** Just for water?

**Mr SHIRI:** Just for water.

**The CHAIR:** Lined?

**Mr ELISHA:** We lined with a pipe.

**Mr SHIRI:** Steel pipe.

**The CHAIR:** Thank you for assisting the Committee.

**Mr SHIRI:** We want to give you a book on Israel as well as Mekorot. It is a small pleasure from us.

**The CHAIR:** Thank you.

**(The witnesses withdrew)**

**The Committee adjourned at 11:12.**