Australian FDR-Era Engineer: Let's Resume Great Projects

Civil engineer Prof. Lance Endersbee discusses his personal experience working on great infrastructure projects, and breakthroughs being made at the forefront of Earth science.

This interview was conducted by Marcia Merry Baker, and filmed for "The LaRouche Connection" on Feb. 20, 2002. Professor Endersbee was in the United States to participate in the Presidents Day conference of the International Caucus of Labor Committees (ICLC) and Schiller Institute.

EIR: Hello, my name is Marcia Merry Baker, and I have the pleasure of interviewing today, a guest from Australia, for The LaRouche Connection. With me today is Lance Endersbee, and he's travelling and visiting in the United States. And we have many things to talk about.

He has been an engineer with vast experience, and he's now actively retired, and pursuing some basic science. His specialty has been infrastructure. He's a member of the Order of Australia. He's emeritus professor and was also dean at Monash University in Melbourne. And, he has much experience, beginning after the Second World War, in building projects in Australia, especially the famed Snowy Mountain project.

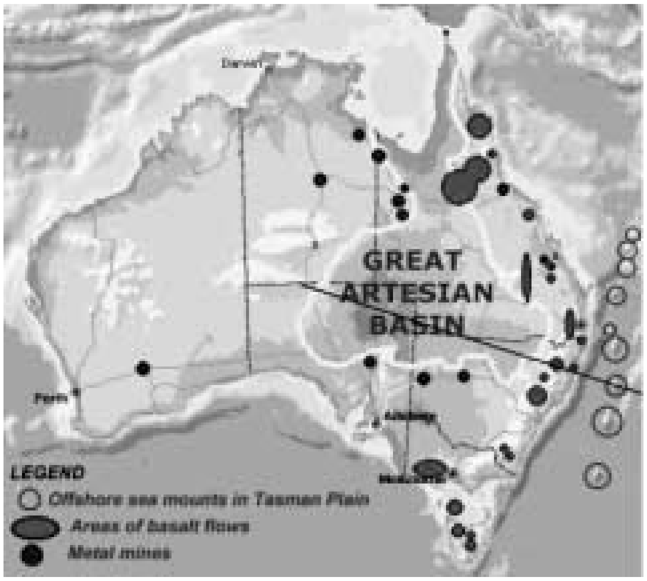
So, it's a pleasure to have you, Lance. And I want to say, what I think we're going to talk about today, could come under three areas: First, what you actually built—tunnels, projects, underground facilities for power, and so forth, in the last 50 years in Australia. Secondly, what you propose for the future: that we haven't built enough; we have a deficit. And, third—and this is where I'd like to begin: With all your experience, literally in the Earth—tunnels, and the rest—you have some very burning views on misconceptions in Earth sciences, and on hydrology, and chemistry, and geochemistry. I'd like to begin there.

With regards to groundwater, do you want to begin with your experience in Australia's Great Artesian Basin?

Endersbee: Well, let's start with the Great Artesian Basin [**Figure 1**]. The Great Artesian Basin is the largest artesian basin in the world. And, for the last hundred years and more, it has been believed that the water that is coming out of the Earth, is surface waters which have travelled to that spot, from

Professor Endersbee came to the U.S. after the war, to learn from the veterans of FDR's great projects, which provided electricity to millions of Americans for the first time.

FIGURE 1
The Great Artesian Basin



Source: Australian Academy of Technological Sciences and Engineering.

rainfall, from points far away—1,000 km away. And, this idea, of recharge of groundwater from surface rainfall is characteristic, not only of the Great Artesian Basin, but of all major artesian basins in the world—

EIR: Yes, we have the Ogalala Basin in the United States.
Endersbee: The Ogalala Basin is an excellent example. And, basins like that are just not being recharged from surface rainfall at all. Yet, the professions involved believe that to be the case.

And, so in the Ogalala Basin, for example, we've had the simple mining—

EIR: Yes, the level's gone way down.
Endersbee: They're just mining the groundwater. The same is happening, not only in the Great Artesian Basin, in Australia, but also right through the Middle East—all of the Muslim countries—and all the way from Morocco, through Algeria, Libya, Egypt, and then into Iraq and Iran: All of those countries are exploiting their available groundwater. And, the important thing to note, is that that groundwater is not rechargeable from surface rainfall.

EIR: So, where does it come from?
Endersbee: Well, it is water that is part of the original constitution of the Earth. And, it's the same as the water that comes up as steam, from volcanoes, and gushes from the deep-ocean vents.

So, we have water, which was part of the original constitution of the Earth, and people have had difficulty in grasping that. But, in recent years, we've had a wonderful lot of information coming to us from exploration in outer space—all these wonderful space vehicles. And, can I just recommend to everybody, and particularly the young people? Everybody should look at something that is readily available on the Internet, and that is: the "astronomy picture of the day" (APOD). Go to APOD on the Internet; have a look at the Astronomy Picture of the Day. Every day, there's a wonderful image, from the Hubble Space Telescope and others, the Anglo-Australian Observatory, the Subaru people in Japan, they are all producing these wonderful images of what's going on in outer space. The flood of information is so great, that it defies interpretation!

EIR: So, you're saying this relates to the water in the universe, or the hydrogen, or characteristics that have been discovered on Mars?
Endersbee: Absolutely. That's right. As in Mars? Yes, well you just showed me that piece of news from Mars: They've had water flooding on Mars.

Well, the work from Hubble and the others has shown us, that the universe has got lots of hydrogen, lots of hydrogen molecules. And, it was these hydrogen molecules, that were part of the original constitution of the Earth. And, now that's easy to believe. Also, these hydrogen molecules include methane. So, we now know that methane may have been part of the original constitution of the Earth. At the moment, there's a space probe going out to look at, I think it's a moon of Saturn, which has a great concentration of water and methane. And, of course, if there's lots of methane on a moon of Saturn, why do we always think that the only methane and petroleum on the Earth comes from biological sources?

EIR: Yes, the theory is, there were plants in ancient times, and then they were compressed, that formed oil. But you're saying—
Endersbee: That's right; I'm saying, the methane was there beforehand. Petroleum is, in effect, floating on water. There's a water-drive underneath the methane and the petroleum. In the case of methane, we have very dense, if you like, solutions of methane and water, sometimes 150 times volume, on a comparative basis.

EIR: Where is this measured? You mean, you encounter it?
Endersbee: We're finding it now, in the probes into the deep sediments in the ocean. They're finding these high concentrations of methane, in the sediments in the ocean. And, of course, as I indicate, they're part of the composition of the Earth itself. When a volcano explodes, it is really the explosion of a water-rich mixture, if you like, deeper than 100 km or so down. And a volcano should be seen as a spontaneous disintegration of what are, in effect, water-rich rocks. And the

Mount St. Helen's volcano in Washington State. Contrary to what "standard" geology teaches, there is compelling evidence that the steam released from the volcano is not due to groundwater that has percolated down through cracks in the Earth, but rather, the water was part of the original composition of the Earth itself.

water is an intrinsic part of the composition of these rocks. An easy way to visualize this, is to think about granites, for example, and a granite will contain white crystals and quartz; and the white quartz, the whiteness is microscopic globules of water. And, that means, that rocks like granite could have only formed in the presence of water. And, so, we have these intensely concentrated, hot, hydro-siliceous solutions. All of the metal sulfides, the metal mines around the world, they can be seen as precipitations from strong water, hydrothermal solutions.

EIR: So, it's fluid transformations. And we can still see it, in eruptions of volcanoes, with the sea up above—

Endersbee: Absolutely. And the deep-ocean vents: We've got people sending vehicles down, with cameras all over them, and they're looking at the water that is gushing out of the floor of the ocean. And, there are animals down there, that are living in these sulfur-rich, acid waters, and they're doing pretty well! And, so, this gives you an idea, that there's not only water deep within the crust, but there could be biological life living on that water, which is interesting. This is where our friend, Thomas Gold, comes in. [*EIR* reviewed *The Deep Hot Biosphere,* by Thomas Gold, on Feb. 11, 2000.]

EIR: Can you describe his ideas for us?

Endersbee: Well, Thomas Gold is a wonderful, elderly British astronomer, who is now at Cornell University. And, he's been saying, for some time, that, not only does methane occur naturally deep within the crust of the Earth, but there's also water there. And, he refers to it as a "deep, hot biosphere." So, he says, not only is there water, deep within the Earth, but there is also methane, and there are organisms living on it. And, of course, he's saying that this is of great importance to the origin and the extent of petroleum resources in the world.

The way petroleum has been developing around the world, it does seem as if some of the resources of petroleum are living longer than people anticipated. And, that suggests that there are sources of the petroleum, away from the place where the wells were originally dug. Now, of course, Thomas Gold has run into a bit of strife with the petroleum community, and they don't necessarily sing his praises—in fact, they do the opposite. But, I suspect that Thomas Gold had a very perceptive view of it.

EIR: So, the prevailing idea in the textbooks—when I studied geology—is that, you're to think, that water crept down near the potential eruption site of a volcano, and got hot; and then came up. It's not that it was part of the deep Earth.

Endersbee: All of the textbooks on volcanoes, and also on the deep-ocean vents, all show a source of water in some other place, percolating down, and then coming up. And, so, in the case of the normal vision of the volcanoes, with all the steam that comes out of the top, over there somewhere, there's a crack in the Earth, down which water percolates, and gets down into the rocks down here, and gets heated up by the rocks, and up comes the steam.

EIR: So, you're saying, and Dr. Gold and other scientists, that, actually, there's a deep composition, and it's still in progress. Let me ask you then, if that's the case: The fact that we have oceans, now, what does this presuppose?

Endersbee: Ah, right. Well, can we just go back on that, get onto the concept of the expanding Earth? About 40-odd years ago, I was a young engineer in Tasmania, and I was measuring rock stresses for an underground power station, we were building.

EIR: I forgot to say that you're a civil engineer, by training.

Endersbee: Yes. Mainly involved in dams and big underground power stations, and things—tunnels.

And, we measured the stress in the rock, and I thought, "Gee whiz! This is much higher than I'd thought it'd be."

So, I went to see a professor of geology at the University of Tasmania—a man by the name of Samuel Warren Kerry. And, he looked at my data, and said, "Well, it's in the right direction. The stress is in the right direction, and they seem to be okay to me"; and then he showed me some of the work he had been doing on continental drift. But, his was a little bit different, in that he was cutting out the continents, on a sphere, and he was cutting them out at the edge of the continental shelf. And he was trying to match them, and they were matching—then, if he put them on a blank globe, they matched very well. It all fitted. But, there were great gaps, in other words, where all the present oceans are. So, they fitted together in part, and the fit wasn't that good.

And then, he was working on a globe of about 80%—a globe 20% smaller. He had cut out the continents on a globe of the present size, as a model; and then, he had another globe, 20% smaller, and lo and behold, all the continents fitted together fairly nicely, and there wasn't space for any oceans at all! It was all land-mass.

And, so, he formulated his concept of the expanding Earth. And I looked at it, and as far I was concerned, it was obvious! The Earth had been expanding. Well, it was obvious to me and Sam Kerry, but it wasn't obvious to most other people in the world, because they asked the question, "What caused the expansion?" And, the fact was, that Sam didn't know! He just said, "This is the evidence."

EIR: You mean it matched: Currently distant land-masses matched?

Endersbee: Oh, indeed! Australia, India, Antarctica, South Africa, and it was all clicking to rather nicely. And, so, he came up with this concept of the expanding Earth. Of course, he was ridiculed a bit. As a result of his various proposals and others, in order to keep the concept of an Earth of the same size, the idea of plate tectonics was evolved. The concept of plate tectonics was essentially devised to be able to explain this phenomenon of the movement of the continents, on an Earth of constant size.

EIR: You do have major shift in the Eurasian land-mass, around India and China.

Endersbee: Well, now, having got to that stage, Sam found that he was essentially blocked, because of this idea of plate tectonics. But, you see, another lot of information started to appear: We started to measure the age of the ocean floors. And, over about the last 20 years, there's been a lot of wonderful work being done, not only looking at the way we have these mid-ocean rifts, where rock comes out and spreads laterally. And they've been able to measure the direction of magnetism in in the rocks, and they have detected the changes in the polarity of the Earth. There have been many changes in the polarity of the Earth. it. And, they've gotten measures that determine the age. And so, not only in the mid-ocean rifts, does the rock come out and spread out, just like that; they've also been able to measure the age of it.

EIR: So, some are new, you're saying?

Endersbee: Oh yes! There are rocks there that are 5 million years old, and 50, 60, 70, 80—and so, the bulk of the floor of the oceans, they've got, now, measurements over a lot of it, and the oldest age is about 200-250 million years, which fits in very nicely with Sam's view that it was all together as one, 200-odd million years ago. And so, all of the data on the age of the ocean floors has enabled us to understand that the Earth has been progressively expanding. So, not only do we have an expansion of the Earth, but we've got an expansion of the oceans, the hydrosphere.

Since I retired, I've been a free scholar. For the first time in my life, I've been totally free, and I can think what I like, do what I like. . . . But, the important thing, is that, when you're as free as all that—all of a sudden, a great world of opportunity opens up, and there's so *much to be done!*

EIR: Of water on the surface, apparently.

Endersbee: Right. So, the next question, then, is: How did all this expansion occur? And, now, intellectually, we're still locked into the concept that the Earth is of a constant diameter, and the atmosphere is a constant amount, and the hydrosphere is a constant amount. And, this brings us—if we can just digress onto the Kyoto treaty on global warming and climate change: In Kyoto, the various people involved were locked into the idea, that the Earth is a constant size, and the atmosphere is a constant size. And so, all of the treaty was based on that.

Now, the actual fact, of course, is that the Earth is under continual bombardment from the Sun and the solar wind, and of all these ions, hurtling towards the Earth. And the idea of a constant Earth, on which Kyoto is based—the idea of a constant Earth means, that the incoming mass and energy from the Sun is exactly balanced by the outgoing radiation of mass and energy by the Earth. Now, there are two huge sums! And it's absolutely ridiculous to say that they're equal! And, I think it's fairly obvious that there is a net gain, and we don't know what it is. But, I think it's obvious that there is a gain, and we have to work out, now, how it is occurring.

One of the things which I've been looking at and trying to puzzle about, is: What is lightning, for example? And, particularly in the tropics, we have lots of sheet lightning, where the whole sky will flash. How does that happen? Well, the incoming solar radiation is, if you like, positive and negative ions, and they are widely dispersed. And so, they can travel independently, without discharging against one another. But as the solar wind comes to the Earth, and it becomes concentrated by the Earth's gravity, these positive and negative ions come together. And eventually there's a sufficient concentration of these positive and negative ions, that they can have, if you like, a spontaneous discharge. So, sheet lightning (and in the tropics, you're seeing it all the time) is the spontaneous creation of water from the solar wind. And so, this helps us a bit: We all know, when there's a great lightning storm, you get lots of water!

And so, this gives us a hint as to the way this increase in mass is occurring.

And, similarly, if you get down to Antarctica, or somewhere like that, and you look at the sky, the incoming meteors—the sky's alive with falling stars!

EIR: So, you're witnessing change.
Endersbee: All the time!

EIR: Back to the idea of geologic history, that we're living history now. You, and your colleagues, also, decades before you, look at the Great Artesian Basin and check out, whether the volcano pattern helps to provide evidence?
Endersbee: I'll have to go back to John Walter Gregory—a Scottish geologist. He went down to London, in about 1885, or something like that, as a young man, and he studied at a mechanics institute. He got a job with the British Museum, and he did so well at the mechanics institute, that the British Museum allowed him to go to the University of London. He did a bachelor of science—he did extraordinarily well, first-class honors; he stayed on for a couple of years, and got a doctor of science, and he was obviously a talented and capable geologist.

The British Museum sent him to America to have a look at the Rocky Mountains, the geysers in Wyoming and so on. And then, he was also involved in the first expedition to cross Spitsbergen. And round about 1895, they sent him down to Africa, to have a look at the Great Rift Valley. So, he had to collect some porters, and off he set. At that time, the people who were trudging through those areas, they had to be fairly intrepid, you know. There weren't an awful lot of friends around. And so, he went to the Great Rift Valley. And he saw these hot lakes, water in the Great Rift Valley: Here it was, high in the middle of Africa, and he immediately knew that the water in those lakes had never been surface rainfall: It was all water that was coming out of the crust of the Earth. And he was pretty good. His book, by the way, on his visit to the Great Rift Valley, is still in print: *The Great Rift Valley of Africa.* He was the first to use the term, "the Great Rift Valley," and one of the rifts in Kenya is still called the Gregory Rift.

And so, he saw and understood this. And he could see that it was a zone of expansion in the Earth's crust—the Great Rift, of course—and there are associated volcanoes nearby, and it put together a picture for him. And it was really remarkably thoughtful, for the time. And a few years later, about 1900, the University of Melbourne was seeking a professor of geology, and he applied for the job, and he was the only one that was interviewed. He just automatically got the job, and he went to Melbourne. On his first, if you like, Summer vacation, he set off with a party of students to central Australia—the dead heart of Australia—to look at the flowing wells.

EIR: And the "flowing wells" meaning?
Endersbee: The artesian bores that were flowing. The wells that farmers had drilled down, and here was the water, gushing out. And he only had to smell the waters, and smell the hydrogen sulfide, and all the rest—and he says, "These are not normal artesian waters, from rainfall. These are waters from deep within the crust of the Earth, and they've always been there."

EIR: Meaning, associated with magma, and similar processes?
Endersbee: He knew, for example, that the whiteness in quartz was due to water, since the water came from the same sort of sources, and it's part of the original constitution of the Earth.

Now, of course, that concept, that there were waters which were part of the original constitution of the Earth, was totally new, at the time. And people, who were running the artesian basin, in the Queensland government, for example, they just couldn't possibly believe it! And, they were saying, "Look, if the water isn't from the rain, well, it must be percolating down from New Guinea, or the Himalaya!" They consulted some American groundwater hydrologists, who were sort of busily exploiting some of groundwater here, and the American groundwater people said, "*All* groundwater comes from surface water." That was enough for those guys, because they didn't have to think any more. That was 100 years ago.

So, Gregory stuck to his guns, but he didn't get anywhere, so he went back to England, and became a professor of geology in Glasgow. But, in New South Wales and in Queensland, the government geologists, in order to appease the politicians and to settle the argument once and for all, they wrote these papers, saying, "These waters came from surface rainfall." And, Gregory caught wind of that a few years later, and wrote a rebuttal of that.

Now, that was 100 years ago. About three years ago, I was visiting Queensland, talking about my railroad proposals, and I heard a presentation by the chairman of the Consultative Council, that the Great Artesian Basin was groundwater. I said, "Mate, you've got it wrong. This is not the way it is, at all!" All he said was, that the wells are drying up, and it just depends on surface rainfall, and this is the way it goes. And I said, "Sir, that's wrong." And, then some amazing things happened. I wrote a small paper on it. I sent it to this particular chairman; he's a farmer, so he took it down to [the federal government in] Canberra, to show it around. And the Queensland government hit the roof, saying that water was a state responsibility. And, I said to this chap that I was going to publish my paper in the Academy, and the Queensland government wrote to the Academy, and said, "Don't publish that paper" (very interesting). And then, the Queensland government enacted legislation, proclaiming the areas [i.e., making it a government preservation], where the water had to enter the ground—where the surface water had to enter the ground, to flow into the Great Artesian Basin, they proclaimed the area, saying the farmers couldn't use the surface water, because that is the area of recharge.

So, the local farmers hit the roof, and the argument is still going on.

EIR: So, the question of science is an *immediate* question of economy.

Endersbee: Well, one of the tragedies is, that we've tended to move away from the capacity to speculate, and to think about issues. And we're always trying to make things black and white, which is never the case. And this means, that we've got ourselves into the crazy situation, where, even in the universities, speculation is not on. And the idea that we can't speculate, is reinforced by this mad system of peer review, and all the rest of it.

I think there's an awful lot of young people in the universities, at the moment, that are being held in a system of thought-control, because all speculation is out of court. Unless you can prove things absolutely, it's not scientific. Well, all of the great scientific discoveries of the world began with speculation.

EIR: Well, let's switch for a minute, to another area of control, where it's said, "It's not economical to build great projects. We do not have the money to develop our resources." First, you were in just the opposite position. After the Second World War, you were building things. If you can tell us something about that—the Snowy Mountain project; then, we'll come to what you propose for today.

Endersbee: Well, let's begin a little bit earlier in America: When [Franklin D.] Roosevelt came to power—and it's worthwhile going to his inaugural, because I think it's fantastic—Roosevelt got on with the job, with the TVA [Tennessee Valley Authority] and Grand Coulee. He had the Bureau of Reclamation already going well, and Hoover Dam. And they were absolutely wonderful projects. The important thing was that every one of them was big and challenging. Hoover Dam

In the case of the Tennessee Valley project, what was absolutely amazing, was that all of the people in the Valley, hundreds of thousands, were all captured by the idea . . . and there was no sense anywhere, of people doing their own thing, or individual purposes: Everybody was united towards a common goal. It was an absolutely fabulous time.

was, by far, the highest dam in the world. It was an arch dam. They had to develop new techniques for analysis, to work out the stresses in the dam. The mere matter of the diversion of the Colorado River, past the dam site, was a fantastic operation. And then, of course, they had the largest turbo generators in the world. There were *huge* steel pipelines. And they have to develop new ways of welding these great pipes, and so on. So, there was a great deal of activity in Hoover, which was exciting and interesting, and it challenged the Bureau.

The same thing was happening in the TVA. And the TVA was an absolutely incredible project, because it covered so much countryside in Kentucky and Tennessee. Hundreds of thousands of people were involved. And, in the case of the Tennessee Valley project, what was absolutely amazing, was that all of the people in the Valley, hundreds of thousands, were all captured by the idea, and they all worked together for a common purpose, and there was no sense anywhere, of people doing their own thing, or individual purposes: Everybody was united towards a common goal. It was an absolutely fabulous time.

Now, I was reading about these sort of things in the technical press, of course. I was watching it all like mad.

EIR: They had music evenings, to give briefings on why they should use electricity!

Endersbee: Yes! Well, it was all a wonderful time.

Now, this was also being monitored, around the world, because everybody was interested in these fantastic steps forward, that Roosevelt was making. And, one of the places where that was noted was, of course, Australia. We'd been thinking about the inland diversion of the Snowy River for some time. And so, after the war, we started getting on, developing plans for the building of the Snowy Mountains project [**Figure 2**].

But, there are other people around the world, also, looking at all sorts of new plans for redevelopment. And we started this project—the Act went through in 1949. We then had an immediate problem, because we really didn't have the strength in depth, within our organization, to get on with the job. We started off with a commissioner, who was a hard-bitten, old hydro-electric construction engineer—he knew exactly what he was doing, and he was a wonderful leader—and a bunch of young engineers, like myself.

FIGURE 2
The Snowy Mountain Scheme

The Snowy Scheme, rated by the American Society of Engineers as "one of the seven engineering wonders" of the modern world, covers an area of 7,780 square kilometers, with 16 dams and 7 power stations.

EIR: Tell us more now, how did the Snowy Mountain training come about, that you could go from one thing to another?

Endersbee: Okay. Well, what happened was, that we just had two or three senior people with background and a bunch of young engineers. And one of the things that we did, was that the Snowy organization entered into a contract with the United States government, whereby we paid—this is Australian money; no aid or anything, right?—we paid the Bureau of Reclamation in Denver, Colorado to help us with the design of the first major tunnels and the first two major dams, and in the process help us, by training some of the young engineers.

And so, in 1952, I was sent to Denver, Colorado, and I was told by the Snowy, that I had to learn to be an expert in tunnels and underground construction.

EIR: In how long?

Endersbee: Oh, as quick as possible!

And so, I was sent to Denver. And the Bureau engineers, they set us down. And I sat down at an empty drawing board, and I started to draw up the first tunnel—the 14-mile-long Eucumbene-Tumut diversion tunnel. And so, I did that, and I was beavering away there for 12 months. And it was wonderful working with these Bureau engineers, because they were all 20 and 30 years older than me—

EIR: And they had all this experience.

Endersbee: Yeah, and they would just saunter up to my desk and say, "Why don't you think about this?" or "Have a go at that." And, every now and again, they'd disappear and they'd come back with a book or a specification, with a few things marked in it for me. And there was this wonderful relationship between these older Bureau of Reclamation engineers and the team of 12 young Australians. And, you can imagine, being Australians, there's lots of banter, and everybody had a good time. But, there was a wonderful human relationship there. And after 12 months, I was going back to Australia, with a bundle of drawings and specifications, so I was hoping I could answer all the questions, when I got home, and the details!

And so, we then got on with calling tenders, and getting on with the construction of the projects.

And then, there was another nice development: The Bu-

The Snowy Mountain Scheme's underground power station Tumut 1, under construction in 1958.

The six pipes of power station Tumut 3 are each 487 meters long, 5.6 meters in diameter, and collectively contain 10,260 tons of steel.

Two of the six generators at Tumut 3 power station can provide enough electricity to power a city the size of Australia's capital, Canberra.

reau of Reclamation had a number of older engineers, in their late 60s-70s, who had been construction engineers, resident engineers, on Glen Canyon, or Grand Coulee—you name it. Some of them had been on the Colorado—Big Thompson. And they had these construction engineers, who'd been there and done it, and so, we arranged for them to come and stay with us for periods of 12 months or so. And they sat down with us, and they helped us with the administration of these *very* large contracts—you know, these were multimillion-dollar contracts; quite huge things, in those days. And once again, the relationships were rather wonderful. Because we'd get into a problem with a contract, and we were worrying about this and that, and they'd say, "Well, this is the way we did it, at Palisades"! And, off they'd go and they'd come back with some data for us. Of course, there were absolutely wonderful relations there. By then, some of us were a bit older; we had children, and they were part of the grandfather circuit in the young Australian community, the relationships were absolutely fantastic.

So, the project was built on time and within the estimate, and it was a great, complex project, and it was this sort of harmonious relationship with the Bureau that helped it along.

EIR: So, the examples of this, which I know have been recently published and available in Australia in the periodical *The New Citizen*, are very appropriate to the Franklin Delano Roosevelt approach today. Because they're *directly* a spin-off, thanks to people like you.

And then, you built more underground power facilities and that kind of thing.

Endersbee: See, when you start off with a rocket behind you, which happened to me—this applied to most of the young Australians who were involved in this, because of the fact that they were expected to become experts, without trying to be experts—within about eight years or so, we were operating at world front. And the interesting thing is, that we had already been working on the design and construction of two large underground power stations, and, at that time, the Bureau of Reclamation had not designed and built an underground power station.

EIR: That was a first?

Endersbee: Yes! And now, the Bureau of Reclamation—they were watching us!

EIR: So, these were underground turbine stations.

Endersbee: Oh yes, absolutely: Large underground power stations. Well, there are two in the Snowy scheme, and I worked on the first one of those. But, by then, as we were completing this first large underground power station, I was then invited to go to Tasmania, where the Hydro-Electric Commission in Tasmania were designing and building *their* first underground power station. So I went to Tasmania, and once again, we had a government instrumentality—a government utility—and we had an interesting charter from the Tasmanian government as a government utility. Tasmania is a hydro-electric island, and, in effect, the orders from the government were, we were to generate the lowest-cost hydropower in the world, so that we would attract industries to Tasmania.

The wonderful thing about Roosevelt, is that he identified, not only problems in America—it helped to inspire a similar approach around the world. And you only have to look at the situation in Africa, in South America, parts of Asia, and so on: There is a need to build new infrastructure.

And so, in other words, as a government department, we were ordered by the government, to operate at the frontiers of technology, design, and construction, to keep the prices as low as possible. And you can only do that by technical excellence. And so, we were encouraged again.

We were the first in the world to use hard-rock tunnelling machines, boring tunnels. And that was an interesting exercise, in that we wanted to drill several miles of tunnels through hard rock, and hard sedimentary sandstones, and things like that. And, we found that, in America, there was a firm that had built a soft-shale cutting machine—

EIR: For cutting, not coal.

Endersbee: No soft shale. This was at the Missouri River diversion—on one of the Missouri projects. And this was [an Army] Corps of Engineers project, and they had used—for a fairly short distance—a soft-shale cutting machine. But we saw that they had the electric motor drive-system, which we wanted. So we got in touch with this firm in Seattle, and there were some [financial] problems there, with the firm. And, in essence, the Hydro-Electric Commission in Tasmania provided funds to re-float this company in Seattle. So here's a government department doing this sort of thing, to help us design and build this hard-rock tunnelling machine, which we were going to ship to Tasmania.

And it worked. We sent our plant engineers over there. They worked with the firm in Seattle, and then, they came back to Australia with the machine. We put it up to the face, and it worked like a charm. We realized, we couldn't get the muck away quick enough, we were doing so well. So, we had to redesign the conveyor belt system, and everything else, to move the muck quickly—and we were breaking world's records.

EIR: Let me ask you, then: This is the positive idea of building infrastructure. But we all know, wherever we live, almost, that the last 20 years, things lagged, there was a pause. And you are now saying, that, not just in power generation, but in railroads, you have a peculiarly dramatic situation in the railroad gauges in Australia. Can you tell us, in your expert opinion: If we were to start tomorrow to have that same spirit and technology commitment, what should we be doing there?

Endersbee: Well, the wonderful thing about Roosevelt, is that he identified, not only problems in America—it helped to inspire a similar approach around the world. And you only have to look at the situation in Africa, in South America, parts of Asia, and so on: There is a need to build new infrastructure. And, the problem is, that the world is divided in various ways: In Africa, the sort of projects that should be built, involve several countries. In the Middle East, the problems of groundwater are sort of heading towards warfare, almost.

And so, it's really a matter of trying to overcome the political problems. If you can put the political structure together, the rest is easy.

EIR: You've developed maps to show Australia, in political-social terms—how it's part of a whole region of 4 billion people (if you count India and China and East Asia and Southeast Asia), so that it could be a positive location, not a strife location.

Endersbee: We have to look at that market. You see, we're just 20 million people, in Australia. And one of our problems today, is that our Constitution, which to a certain extent was based on the U.S. Constitution, preserved sovereign power at the state level.

EIR: Not federal, state.

Endersbee: At state level. That means that the various states of Australia agreed to the Constitution, on the basis that they preserved sovereign power. And the federal government was only granted powers for defense and foreign affairs, and trade, and so on. That meant the states were responsible for water, electricity, and transport, and you name it. And so, that meant that the states—and for the last hundred years—have hung onto, not only the separate ports, but separate rail systems, *and* of different gauges.

EIR: Oh, no!

Endersbee: But, you see, at the time of the Constitution, that was regarded as a plus, because the separate gauges leading

FIGURE 3

Proposed Asian Express

Professor Endersbee's Asian Express, a high-speed train from Melbourne to Darwin, would revolutionize Australia's export potentials to nearby points in Asia.

to each port, meant that the other states wouldn't interfere.

EIR: Oh, wouldn't compete for the hinterland traffic!

Endersbee: No—and, if you like, this idea of separate state sovereignty still remains. I was in the Northern Territory, two or three years ago, and one of the local bureaucrats told me, very proudly, how the Chief Minister of the Northern Territory (which is probably about 200,000 or less people) had recently been in Beijing, and had signed a memorandum of understanding with the Premier of China! You know, I thought, "Ahhh! What madness this is!"

But, okay, if you look at the situation from the Australian point of view, there is still enormous potential in the north and south [**Figure 3**]. And, if you look at the markets to our north: Darwin, for example, the distance from Darwin to Singapore is the same distance as the length of the Mediterranean Sea. So, we can be communicating with all of that part of Asia, and entering into trade with Asia. If you see the map, and you see the distances between Singapore and Japan; at any one time, half of the world's container ships are in the seas between Singapore and Japan. Half of the world's containers are there. So, it's a huge area, based on maritime trade, and that's easy to understand, when you think of all the islands of the Indonesian archipelago—so, we are in a good position to trade with that area, and also to be a source of food.

EIR: So, this would help define infrastructure, to build up ports.

Endersbee: Absolutely. This is what I'm getting at, is that the 4 billion market, and their needs, drives infrastructure development in Australia, because, in effect, we would be designing and building, to sell Australian produce and our goods, into that market.

EIR: Tell us something about the new railroad plans, or new irrigated farming plans—you have a terrific climate in Australia.

Endersbee: Oh yes. Well, I've been working on a new railway system, that goes up through the middle of Murray-Darling Basin—it's a great irrigation area, at the moment. The Murray-Darling Basin—we can double or triple the output, by getting a better access to market.

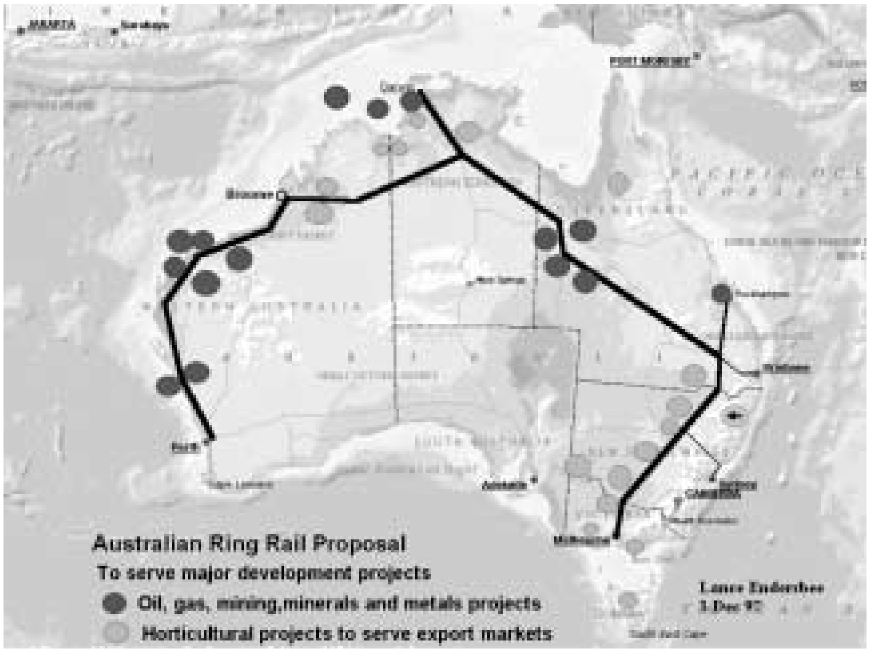
See, in Australia, we have what they call, a "tyranny of distance." And economic development depends on access to markets. If you change the access to markets, you improve the value of crops; you change the sort of crops you grow; it changes the value of water. So, if we have, if you like, rapid transport systems that connect Australian farms effectively to Asian markets, it changes what we grow, it changes the value of land, it changes everything.

And so, I've been looking at transport projects to bring Australian produce to these markets. Now, if we can do that successfully, we can easily support another 20 million people in Australia.

EIR: And also, besides the rail, then, you're thinking of inter-island and rapid marine travel. Have you been involved in that?

Endersbee: Well, down in Tasmania, they've been designing these twin-hull catamarans. And these are fairly rapid, in fact, a twin-hull catamaran, made in Hobart, holds the speed record across the Atlantic. Average speed of about 45 knots, I think. One guy, who was a student at the faculty, when I was dean, he did some wonderful work with them, with the builders of this machine. You can imagine, with a twin-hull catamaran, it's a devilish problem if you're running into a cross-sea. You're going like this, you see: One hull will hit the wave before the other hull. And so, this graduate student (he's 40-odd) was able to devise a sensing mechanism on a computer program, so the flaps at the stern of the catamaran, would go up and down, like this. And so, he had a sensing device to monitor the sea state, determine which hull was going to hit the water at which time, and the whole thing was

FIGURE 4
Australian Ring Proposal



adjusted—and it was just as steady as can be. And they used that on the Atlantic crossing.

Now, these fast catamarans—they're very good—and this chap's got designs for them with 500 or 1,000 containers, which are good for, if you like, inter-island travel, such as in the Indonesian archipelago. A bit of fun!

EIR: So, the technology is there.
Endersbee: Oh! It's the will. You see, with a lot of these things, every one of them requires a leap-frog in thinking. And we've been talking at this meeting [ICLC conference], over the last few days, about the railroad, which could go from China all the way through Kiev, into the heart of Europe; and you'd have Russia and China all connected up, as one common market—a fantastic rail project, which could go ahead. And, the question is: Where is all the money going to come from, and everything else? And, the fact is, that the money is, in many cases, relatively easily found.

EIR: Well, in North America—you may have something to say, about the idea that that railroad should go from Kiev eastward through China, under the Bering Straits and into the Yukon and Canada. Do you have a tunnelling expert's opinion?
Endersbee: There are various technologies which are available, now, these days. You have to look at the costs, but, with a tunnel like that, you'd want to stay away from problems in the rock underneath. And you'd want to stay away from a floating bridge or bridge-tunnel arrangement.

But it is possible to have a tunnel made of pontoons, constructed in the dry. And then, taken out to the site, and in effect floating, submerged—above the seabed. They could be floating submerged, anchored to the seabed. And, so you could have a floating tunnel, and just join it up. So, you're independent of the rock conditions underneath, and you're independent of the sea state, and it's just a matter of paying for the box, and screwing it to the floor. And make sure there's no holes.

You see, that's an easy fix. You'd use longitudinal pre-stressing, all sorts of things to make sure it would work very nicely.

EIR: Is one of those in place, in a significant way?
Endersbee: No, not that I know of. They may be, but the Bering Strait is the sort of place, where that sort of thing could be done.

EIR: This could be the challenge that the projects of Franklin Delano Roosevelt were, in the 1930s.
Endersbee: He had the courage to have a go!

EIR: You said that after you retired—you're a civil engineer, actively retired—you're now in your most exciting thinking period in your life. So, your priority is setting straight the groundwater misconception?
Endersbee: No—primarily in national development: You see, when you're practicing, and, as I was working with the government, or when I was at the university, you are largely constrained by the system telling you what to do. Now, if you're an employee, you have to do what the boss says. If you work in the government, you have to do what the government says. When you're in a university, and particularly these days, with privatization and all sorts of things, you're totally dependent on what money people give you for research. So, your research is totally determined outside, and the idea of free scholarship is totally lost.

So, since I retired, I've been a free scholar. For the first time in my life, I've been totally free, and I can think what I like, do what I like, travel where I want to—if I've got the money to do it. But, the important thing, is that, when you're as free as all that—all of a sudden, a great world of opportunity opens up, and there's *so* much to be done!

And, there are so many blockages: governments all around the world with problems.

EIR: One thing is, you're making available the levers and handles to reconceptualize, to push ahead. You mentioned Professor Gold, Professor Gregory, Professor Kerry, these other people. Do you think, among hydrologists and geochemists, you can force things through in the near future? What's your view?
Endersbee: I am hoping that there are young people out there, I'm hoping that there are young minds, who see these opportunities and grab them and run with them. And the more courage they have to think for themselves, and work things out, the better.

One of the things that worries me, is that our entire generation of young people are being conditioned. And they've lost this capacity to think independently. I could go on, and mention my concern about American teenagers.

EIR: You mean that they're market-composed, instead of mentally composed?
Endersbee: The problem here, is that there's a whole advertising and other industry, preying on the American teenager, because the American teenager's got money to spend. And, the money that American teenagers spend every year, themselves, is about $100 billion. The money that their parents spend on their behalf, is another $50 billion. So, the American teenage market is worth $150 billion every year: You could build an awful lot of things for $150 billion a year. You know, from my point of view, $150 billion on spiky hairdos and bare midriffs, is a total waste of money.

EIR: Whereas if you put it, you mean, in building projects and create natural resources?
Endersbee: Absolutely. But you see, the system is actually preying on these young people, and limiting their ability to think for themselves. They are being driven, so that, in effect, they worship the corporate sponsor. And they don't listen to their parents or their teachers, and that means that they're losing the capacity to work together. You see, all the sports they're encouraged to do, all the things they do—skateboards, you name it—there's not too much group activity, any more. There're not too many orchestras and choirs and bands and things like that. There's not too many group sports for young people.

EIR: Well, I'll tell you: Since the financial system, that's been crazy and that allowed that, is breaking down, I think that now's our opportunity—"now or never," as they say. And I'm so glad you were here today, Prof. Lance Endersbee. And we look forward to having you back to report on your progress.
Endersbee: Okay. Thank you.