

“Renewables can best reduce the economic risks”

Economic expert **Shimon Awerbuch** on how renewable energy can make electricity cheaper.

Interviewed by Peter Ahmels and Hanne May, Photographed by Axel Schmidt

new energy: Energy and energy prices have been on the top agenda for politicians worldwide recently – particularly in relation to gas price hikes and the conflict with Russia and Ukraine. You have been looking at energy price developments for many years. How does it feel to suddenly see these issues rise to the forefront?

Shimon Awerbuch: For the last 15 years I have felt like a lone voice. My measurements have always shown that fossil prices, especially gas, are very volatile and my estimates of gas-based generating costs have always shown that it costs 50%, 60% or even 100% more than what the traditional engineering analyses suggested. So when everybody thought gas generation cost three cents per kilowatt-hour, my estimates showed that it was six to eight cents per kilowatt-hour. And even now my estimates are much higher than those of most energy agencies such as the International Energy Agency, or the UK's DTI because I include fossil price risk in my estimates. So I'm not surprised by the recent developments. I have been expecting this for 15 years.

ne: There is considerable talk nowadays about the issue. Do you see a new focus in the energy cost debate?

Awerbuch: Yes, I think the debate in general is new. The Gazprom confrontation earlier this year opened the eyes of European policy makers. They realized that supply changes can cause prices to spike virtually overnight. You can see the effect in the gas futures prices, which are still extremely

high. That means a lot of investors think high gas prices are here to stay for a while. But unfortunately the procedures for estimating electricity-generating costs haven't changed to reflect this. Some people still don't understand the problem of risk.

ne: What is the real problem in your point of view?

Awerbuch: Many people think about “geopolitical” price risk. They worry that their pipeline supply will be cut off. I do not think it makes sense to focus just on the source because when supply in one pipeline stops, it immediately affects market prices everywhere. You can see what happened in the Gulf of Mexico after Hurricane Katrina. Oil production stopped and that affected world prices very, very quickly. So, I think that exposure to oil and gas price volatility is an excellent measure of energy security – or its absence.

ne: Do you think we are prepared to mitigate these risk effects?

Awerbuch: Not as much as we think. Individual investors can hedge fossil prices. They can buy futures and various derivatives. But society as a whole can't hedge oil or gas prices. We can shift price risk to entities that can better handle it, but we cannot eliminate it. Unfortunately policy makers don't seem to understand that.

ne: But somehow the risk has to be minimised. You suggest that renewable energies are one key to the solution. How would that work?

Awerbuch: There are two aspects to this in-

volving micro-economic and macro-economic risks. Let's take the micro-economic effects first. In a power generating portfolio, renewables – even if you believe they cost more – will reduce generating cost and risk because their costs do not move with fossil cost. The basic idea is not complicated.

Everyone understands that a diversified investment portfolio behaves better.... gives a better return. The same happens here. Diversifying the generating portfolio with renewables reduces expected generating cost and risk.

The second set of impacts, the macro impacts, have to do with the so-called Oil-GDP Effect. This relationship has been recognized for forty years. It is statistically significant: when oil prices go up, economies generally go down. It varies by economy and by time. Germany, for instance, has the second highest measured Oil-GDP Effect in Europe, France the highest. Measured Oil-GDP elasticity in Germany is close to 10%. That means if oil prices double, GDP falls ten per cent. It's a big number.

And the problem is you cannot hedge the Oil-GDP Effect. There simply are not enough shares of Exxon-Mobil and other oil companies to go around. The best answer I see is to invest in non-fossil technologies, in renewables, although some people argue that nuclear should play that same role....

ne: ...most recently especially in the UK. Some of your colleagues from the University of Sussex issued their comments on the government plans for a nuclear renaissance...

Awerbuch: Yes, and I agree. Anyone can



build a nuclear plant now. But it is likely not economic. It needs significant help as regards liability insurance and nobody knows what to do with the nuclear waste. Renewables can probably best help reduce the macro-economic risks and get us away from the fossil price risk. Just a ten percentage point increase of the worldwide share of renewables-based generation is worth \$200 billion in avoided GDP losses. We converted that to a per-kilowatt effect and found that about a quarter of the investment cost of every kilowatt of new wind, geothermal or solar would be offset by avoided GDP losses. When you invest \$1000 per kilowatt in a wind turbine, one quarter of that – \$250 – is potentially offset by avoided GDP losses. It is a powerful number and it's a powerful driver for renewables at a macro-economic level.

ne.: Nonetheless many people still argue that wind energy costs more and that coal, for instance, is cheaper.

Shimon Awerbuch

- ▶ A financial economist, Shimon Awerbuch has been working in the energy sector for more than 30 years as an analyst, consultant and academic.
- ▶ Among other things, he worked as Senior Advisor for Energy Industry, Finances and Technology at the International Energy Agency. He has also worked for the consulting company Ernst & Young.
- ▶ Since 2003 he has been researching as a Senior Fellow at the University of Sussex at the centre for Science and Technology Policy Research (SPRU).

Awerbuch: Right, I am aware of that, but I believe that wind costs less than coal. I can show you what I mean in a simple example. Suppose I plan to retire and want to make an investment that gives me an income

stream of \$100 per year. I can buy a risky junk bond that promises to pay 10% – I give them \$1000 and they promise to pay me \$100 in interest every year. Or I can buy a safe government bond, say a US treasury or a British gilt. Those pay only 3% or 4%. So in order to get a yearly income of \$100 I would have to invest \$2,500 or more in government bonds. In other words, to get the same income I have to spend over two times as much as on the junk bond. But does that make the junk bond a better investment? If you use the logic people use for valuing how much coal costs versus wind or solar you would buy only junk bonds. They might seem cheaper. But they are just riskier. In the case of financial investments people easily understand the risk. But when it comes to coal and wind people somehow forget that costs can change in the future. They forget the risk. We need to apply these ideas when we compare wind, gas and coal. It's basic finance theory; we teach students how to do this. ▶



ne: Many future energy scenarios are based mainly on fossil technologies. Why do you think the positive economic effects of renewables are underestimated?

Awerbuch: Because people use outmoded cost models that ignore these benefits. Also, gas was cheap for a long time; people couldn't think about anything else. They invested in gas plants and there is a lot of gas infrastructure in place. I don't think corporations necessarily do a vastly superior job of investment analysis. I think they mainly want to make sure they do no worse than their competitors. They follow each other – like lemmings.

ne: But in the US there is now movement towards renewable energy. And new wind turbines are often compared to the generating costs of new gas power plants. In Germany the price discussion is different. Here you very often see comparisons between the recent or expected average electricity production tariffs and renewables...

Awerbuch: ...Oh no, you can't do it like that. You can't compare today's fossil production costs to the cost of generating with renewables. Today's production costs are based on today's fossil prices. It's a serious mistake – people compare actual costs today to the estimated future "levelised" costs that

come out of a computer model. As you know, I don't really believe in these models. The costs of generating with gas are volatile – they go up and down. But the computer models produce costs that are levelised over time.

Very few people understand what this means. The "levelised" cost-of-electricity produced by computer cost models is not a price that anyone will actually pay. It is just an imaginary concept – a kind of time-weighted average of future prices. We must be very careful how we use such estimated levelised costs.

People also do not realize that by rearranging the levelised costs over time we can further reduce wind generation costs today and compensate with higher costs ten or twenty years from now. This can be done without affecting a firm's risk or market value. I have been arguing that society should consider changing the compact – the implicit agreement – we have made with future generations. Right now, it seems, we plan to saddle future generations with higher costs of environmental mitigation and cleanup. Instead we can install a lot more wind and solar, and rearrange the capital recovery so prices are lower now, but rise over time. I don't think future generations will be any angrier if we leave them with higher prices on wind turbines installed today instead of high environmental costs. I've been arguing that for years.

ne: At the beginning of our conversation you said that for many years you felt like a lone voice...

Awerbuch: ... in the woods ...

ne: Has the situation changed? Do you see more willingness for a new strategy, a more honest debate on cost and risks?

Awerbuch: I have been hopeful for fifteen or twenty years, and I do see a lot more momentum now. I see a lot of interest in, for example, the portfolio-based planning work we are doing. People are starting to realize that the old approaches really aren't working and they want new tools, some new ways of thinking about the economics of our energy future. But I would also say I am realistic – I have been through this before – fossil prices come back down and the interest in renewables disappears. This time, however, I am really hopeful that we have had enough experience to realise we must make a change! ◀

Costs and risks at a glance

Financial economist Shimon Awerbuch has researched and published at length about the price risks of fossil energy sources and ways to minimise them.

The general impact that oil and gas price fluctuations have on economies translates to what is called the Oil-GDP Effect. Research into this dates back to the 1940s. Alice Rivlin, for example, calculated that the 1973 oil crisis generated some \$350 billion in costs to the US economy.

In a 2005 study based on a series of previous analyses, Shimon Awerbuch and Raphael Sauter demonstrate that the development of renewable energy sources has two positive effects: The direct delivery costs of oil and gas drop. Macroeco-

nomical losses incurred by the Oil-GDP Effect are massively reduced. The authors estimate that for the European Union, developing renewables to provide 20% of European energy demand would be compensated about by a third by way of avoided Oil-GDP losses.

Another central point made by Awerbuch is the so-called portfolio approach. Using model calculations the economist proves that a significantly higher proportion of renewables in the energy mix does not drive up electricity prices. On the contrary, steady prices reduce the danger of price fluctuations.

More information and studies on this topic can be found at: www.awerbuch.com