

Energy Transition: The Future Is Not What It Used To Be



Prepare to have your assumptions about energy turned upside down, were the words used by Pier Paolo Raimondi, MBA'97D, event organizer and Managing Director Finadvice Group, to introduce the keynote speaker at *Energy Transition: The Future Is Not What It Used To Be* in Zurich in May 2017.

The speaker was Gianni Operto, the President of the Swiss Alternative Energy Association (AEE Suisse), a board member of several cleantech startups, with an energy career trajectory that highly qualifies him to challenge assumptions. He is an ETH-educated engineer who worked for ABB Power Generation, then headed the Zurich municipal utility (EWZ), with a pioneering role in solar and clean energy projects, followed by stints at two global champions in cleantech venture capital.

This experiences gives him insights into the whole energy ecosystem, enabling him to describe the challenges, trends, opportunities, the latest technologies and business models, putting it all neatly into the context of the past, present and future of energy generation and supply.

Read on to find out more....



Speaker Bio

Besides serving the AEE Suisse, **Gianni Operto** is Chairman of greenTEG AG and on the supervisory board of Nexwafe GmbH, Caterva GmbH and ProCom GmbH, all three in Germany. He is also chairing the Scientific Advisory Board of the Werner Siemens-Foundation and serves on both the Steering Board of the Swiss Competence Center for Energy Research in Storage and the Partnership Council of the ETHZ Energy Science Center. He also served at venture capital firms, Emerald Technology Ventures (formerly SAM Private Equity) and Good Energies. Before that he was President and CEO of the Zurich Municipal Electric Utility (EWZ), where he was awarded both the European and the Swiss Solar Prize for pioneering the marketing of green products. He began his career at ABB Power Generation. He has a Master's in Mechanical Engineering from the ETH and completed the Executive Training Program at London Business School.

A Distributed, De-carbonized, Data-rich Future

The title of the event, *The Future of Energy Is Not What It Used to Be* is a one-liner that Operto chose from a speech Steve Jobs made back in 1983 at CES, which at that time was a small consumer electronics exhibition. Jobs told the audience that computing is going to become more distributed, miniaturized with more processing power in the distributed CPUs than in the big ones. People laughed back then but that didn't change the accuracy of Jobs' vision, nor did it prevent it from coming true.

Operto says that energy is at a similar point in its evolution. Just as computing underwent a fundamental shift from a centralized and one-way paradigm to multi-directional and distributed, with localized processing and storage, so it will be with energy. It is a mega-trend that creates opportunities for innovation, new jobs, investments and economic growth. The shift drives an almost urgent need for entrepreneurial engineers and creative MBAs.

Today we still think of power generation and supply as a centralized, unidirectional, CO₂ generating business. However, the future is a distributed, de-carbonized, data-rich and flexible power industry.

The energy industry is in the early days of a secular transformation like computing was in the mid-80's, before the advent of the PC. Localized storage and processing power was enabled by personal computing which eventually replaced the legacy domination of centralized mainframes with their limited functionality and features. But energy is a much more challenging sector that computing was, with a much longer and much more entrenched legacy. Monopolistic and highly regulated, energy is conservative. It has more of the "hallmarks of a religion than it has of technology", says Operto.

Renewables Are Now the Low-Cost Competitor The grid-parity milestone has been reached in many geographies by a number of different technologies. In places like India and Africa solar power plants are being built as they are more economical than long established alternatives.

In addition, Operto referred to a note by Bloomberg New Energy Finance earlier this year that predicted that flexibility in capacity will be more important in the future, making the term baseload obsolete. The new model will be increasingly based on the so-called “base-cost” renewables. The grid-parity milestone has been reached in many geographies by a number of different technologies. In places like India and Africa solar power plants are being built as they are more economical than long established alternatives.

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Reducing Environmental Impact

How long does it take to generate the energy used to create a renewable power plant? It is a complex topic, worthy of a deeper discussion, according to Operto, but he touched on a few key ideas. One aspect is the environmental payback time, which is rapidly shrinking for all renewables.

Even solar, which was once criticized due to the massive amount of energy required to purify the polysilicon used to make wafers for photovoltaic modules, is shrinking. The wafers are also getting thinner, thinner than 30 microns, if they are grown on a substrate instead of being sliced from ingots.

But renewables can be loaded with carbon, depending where it is manufactured. For example, if solar panels are made in a Chinese plant plugged into a coal-powered electricity network, then it is loaded with carbon. If they are made in a Swiss fab fed by hydro-electric power, then there would be almost zero carbon-loading. Contrasting renewables with today’s dominant technologies, Operto pointed out that the payback for fossil fuel energy (due to emissions which permanently change the atmosphere) is infinite.

Monopolistic to Customer-Centred Electricity Supply Utilities have yet to understand that selling plain vanilla electricity, or just kilowatt hours, will ensure their demise. They must listen to customers and develop new business models, new services, and new technologies. It is up to the energy producers to find out what applications they can offer customers. Italy’s Enel is an example of the new forward-thinking utility.

A multi-utility and energy contracting approach is a way forward, offering a selection of contracts for hydro, solar, woodchip, CHP for gas, geothermal, and hydro, depending on the resources and infrastructure. Operto gave the example of an Italian company that is selling flat-rate subscriptions for unlimited Europe-wide recharging of electric car batteries. Some utilities could offer storage as a service in order to retain customers over the long term.

Storage and Methanol: the Next Big Thing? Operto was asked where are the best bets for venture investing. Storage is one. Germany is installing between 2000 and 3000 personal storage units a year, as end users understand that generating power for their own use delivers a quicker return than the old solar feed-in tariffs. This model requires storage, creating a high demand for solutions.

Battery-based storage systems are favored at the moment. There is a multitude of battery technologies but financing them is the biggest inhibitor of innovation, according to Operto. Lithium-Ion systems have a strong tailwind thanks to ten year warranties and lifetime guarantees. The financing for such systems is fairly easy to come by today. There are also some emerging storage service models with good ROI.

Other storage systems with high potential are power to gas or power to liquid. Methane and methanol are two candidates. Methane has replaced hydrogen as the preferred gas as it is less explosive. Methane can be produced using CO₂ and fed into gas utility networks.

Optimizing Renewables for Swiss Energy Needs One of the old arguments against solar was that less power would be produced when it was really needed, i.e. in winter (due to fewer hours of sunshine). Opponents said that solar power was not optimized to meet the seasonal demand for heating and lighting. But that assessment is no longer correct for Switzerland.



Caption: Fresh insights and inspiration sparked curiosity and inspired conversations amongst attendees.

Photo Credit: INSEAD Alumni Association Switzerland

Operto said that the Swiss demand for power actually shifted to peak needs in the summer several years ago. The advent of air conditioning and the exit of electricity-based heating systems drove the shift. Today a Swiss photovoltaic plant can position its modules to produce energy at exactly the right times for the local demand, e.g. vertical panels for noontime and mid-day peaks, rather than traditional panel positioning.

To replace nuclear, a combination of technologies are required including biomass and wind. Being able to optimize and manage excess power (beyond current load) using innovative storage solutions is very important. Switzerland's hydro infrastructure (which includes pumped storage power plants with hydraulic coupling to the Swiss river and water stream system) has a high value in such future networks.

Electricity is Emotional On the one hand, utilities still think that they know what is best for customers rather than focusing on what consumers want and what they will pay for. On the other hand, customers are not exactly realistic. What customers want is no interruption of power supply, no transformers or wind-generators on the horizon line, no transformers in their neighbourhood and while they might not know exactly how much they are paying they think that it is too expensive. In other words, even with electricity, emotion plays a role in opinion formation and decision-making.

Political Will is Going Clean Sensitive to the opinion of the general public, many politicians are warming up to clean energies. There are politicians that understand that going green has a positive effect on the economy. It is financeable. It creates jobs and new wealth.

The Problem With Nuclear Once upon a time nuclear power was the answer. Now it is the problem, according to Operto. Recent accidents have caused long-term and unforeseen damage. The fallout from both Fukushima and Chernobyl accidents is there to stay. The environmental impact cost is infinite.

The Problem with Carbon Climate impacts of the use of coal and oil may be denied in certain circles but there are measurable changes underway. Yet even before climate discussion became critical, the general public was open to renewable energy. The lack of sensitivity to public opinion and tastes, which Operto describes as a recurring oversight, affected the utilities' assumptions, contributing to bad decisions.

Summary

The once staid and highly-regulated energy industry is changing; it is being reformed by outside forces: innovation, cost decreases for renewables, economies of scale, policy-making, public sentiment, consumer tastes, economic incentives, environmental disasters, as well as hope that the human causes of climate change can be mitigated.

This was a premier knowledge event in the spirit of INSEAD alumni lifelong learning, held at the traditional Haus zum Rüden on the Limmat.