

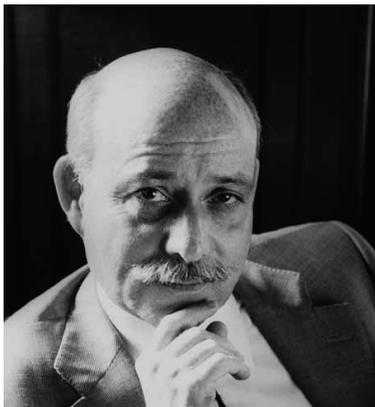
# DIGITAL LEADERSHIP

An interview with

**Jeremy Rifkin**

President of the Foundation on Economic Trends





## Jeremy Rifkin

President of the Foundation on Economic Trends

**Capgemini Consulting:** Can you explain the concept of the third industrial revolution?

**Jeremy Rifkin:** We're in the first stage of a paradigm shift that is reshaping not only the economy, but also society at large, and even how we think and perceive our world. The great economic and social revolutions in history occur when two things happen. The first is the emergence of a new energy regime that opens the path to a more complex civilization: the new energy flows can bring more people together, integrate bigger commercial and social units, etc. To emerge successfully, this new paradigm requires a communications revolution powerful enough to manage the new energy regime. The first and second industrial revolutions help us to understand this phenomenon.

In the 19th century, print technology became cheap with the move from manual presses to steam powered presses. Large print runs became possible thanks to low transaction costs. Editors published school books in America and Europe creating a print literate workforce. This print literacy was necessary for managing the complexity of the steam-powered first industrial revolution.

In the 20th century, there was another convergence of communications and energy. Centralized electricity - the telephone, and later radio and television - became the communication media to manage the complexity of the oil powered automotive culture, a suburban infrastructure and a mass consumer society.

The energies used - coal, oil, natural gas, other fossil fuels, uranium - are now mature and their prices keep increasing. The infrastructure and the technologies based on those energies, such as the internal combustion engine, have exhausted their productive potential. Today, the second industrial revolution is clearly on life support, so a new economic narrative is needed that will bring us to a post-carbon era and create hundreds of millions of jobs and thousands of new businesses. That new paradigm is emerging just now in Europe, especially in Germany which is leading the way. A new convergence of communication technology and energy is giving rise to a Third Industrial Revolution (TIR).

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## A New Communication and Energy Matrix

What's interesting about the IT revolution, especially the personal computer and the Internet, is that it communicates in a very different fashion from the 20th century centralized media that were top-down (such as radio and television). With the Internet, communication is distributed and collaborative. It scales laterally. Today, 2.3 billion people are able to send their video and audio documents to the other 2.3 billion people at the speed of light. This distributed and collaborative internet communications technology, which is far more expansive than all the centralized television and radio networks of the 20th century, is now merging with the new renewable energies, which are also distributive in nature and organized collaboratively.

To understand the new energy regime, you have to think about today's leading energies. Fossil energies and uranium are only found in a few places on Earth. They require huge geopolitical investments to manage them, extensive military investments to keep them secure, and massive capital to finance the infrastructure that goes with them. These elite energies have given us the most centralized, top-down economic structure in history.

By comparison, what we call distributed energies are found literally everywhere: the sun shines all over the world every day, the wind blows across the planet, there is geothermal heat below the ground and ocean waves and tides everywhere. We produce garbage that can be converted back to biomass. In rural areas, agricultural waste can be transformed back into energy. These renewable energies are found everywhere in some frequency or proportion. This new energy regime is

just beginning to merge with the new internet communications technology.

## Five pillars for the third industrial revolution

The European Union has formally committed itself to a five-pillar infrastructure for the third industrial revolution based on this communication-energy matrix of the Internet and distributed energy. It was endorsed by the European Parliament in 2007. The plan is now working its way through the European Commission and the European member states.

**Pillar one is the shift to distributive energy.** The EU has committed to 20% renewable energy by 2020. That means a third of the electricity in Europe has to be green. It's mandatory.

How do we collect these energies? Our first approach seemed quite logical. Italy, Spain and Greece enjoy a lot of Sun. We could build large solar plants and ship the electricity out to the rest of Europe. The Irish have wind: centralize it and ship it. No one opposes this model, but it won't be enough. Then we asked ourselves: if renewable energies are distributed and found everywhere, why

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are we only thinking about collecting them in just a few places? We're using 20th century thinking around centralized energy and centralized communications.

**Pillar two is buildings.** The EU is home to 191 million buildings: houses, offices, factories, farms, etc. The number one users of energy in our economy and the single greatest cause of climate change are buildings. The goal is to convert every single possible building in the European Union to a personal green micro-power plant over the next 40 years to capture the sun on the roofs, the wind on the building walls, geothermal heat underneath the building, biomass with the garbage, etc. Some of the new buildings in Europe are already positive power. They provide for all of their own needs and send the excess power back to the grid. Germany is leading in pillars one and two; it has reached the goal of 20% green electricity and is heading toward 35% within nine years. Germany has also converted one million buildings over the past four years to micro power plants that are now producing energy on site. The process has created hundreds of thousands of jobs.

The Internet has democratized information. Now, energy is being democratized. Several million buildings in Europe are currently collecting their own green electricity on site. Within ten years, it's going to be tens of millions, and within 30 years, virtually every building will be a green micro-power plant.

**Pillar three is storage.** Storage is essential because the sun isn't always shining when you need the electricity. The wind doesn't always blow when you most need it. These are intermittent energies. We're going to have to store them so they're reliable. Many different technologies are possible: batteries, capacitors, flywheels, water pumping,

etc. We like them all, but in the EU, we put much of the focus on hydrogen as the storage carrier for intermittent energies just like digital is the storage carrier for information. Let's say you have a solar roof on the top of your home and you're collecting energy. If you have an electricity surplus, you can put it in a water tank and let the hydrogen percolate out of the tank into a second tank. So when the sun isn't shining, you can convert that hydrogen back to green electricity with only a very small thermodynamic loss.

**Pillar four is where the renewable energy converges with the Internet.** We take off-the-shelf Internet technology and transform the power grid in Europe to an energy Internet. Now you have millions and millions of buildings collecting their own green energy on-site and storing it in hydrogen. If they have a surplus at any given moment, their software technology will direct them to sell that surplus electricity across the energy Internet from Ireland to Russia.

Here again, Germany is leading the way by testing this energy Internet in six major regions. Every appliance is connected with software to the grid so that we know in that region what every washing machine, every toaster is doing. If there's too much demand for electricity and not enough supply, the energy Internet can direct your washing machine to forget the extra rinse cycle! If you sign up for the electricity savings program you get a credit on your bill from the power and utility company at the end of the month. It means everyone becomes an entrepreneur. Everyone is his own producer of energy just like today everyone is his own producer of information.

**Pillar five is transport and logistics.** Electric vehicles are out this year in mass production. With the third industrial revolution, we'll be able to plug in our vehicles anywhere there's a green building: offices, factories, homes... and get green electricity on-site. You can power up from the grid or, if the electricity price is high, your software can direct your car to sell its green electricity back to the grid. If 25 percent of all cars at any given time are selling back to the grid, you eliminate all of a country's centralized power plants.

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*With the third industrial revolution, we'll be able to plug in our vehicles anywhere there's a green building.*”

## The Five Pillars are all Linked

These pillars alone are only components. It's when we start connecting them that we create the synergies that allow for a new technology mega platform. If one pillar gets ahead of the others, it all collapses. Here are some lessons we learned in the EU.

European states have encouraged early adopters to convert their buildings to power plants. In return, they receive a premium for selling their electricity back

to the grid. This has been so successful that thousands of outlets are now trying to get their green electricity back to the grid. The problem is the grid can't take it because it's 60 years old, not digitalized and unidirectional. So Europe understood it had to upgrade the grid, and make it multidirectional to be able to accept green electricity from thousands of micro-power plants.

Moreover, the premium was so successful that some regions in Europe are at 20, 30, 50, 70% green electricity. The two Spanish regions, Navarre and Aragon, are at 70% green electricity. But we're losing 75% of the kilowatts because there's no storage!

There was also a problem with pillar two, the buildings. Big companies were getting all the premiums because they could invest in the technology. But how does a home owner or a small business invest €30,000 to build a micro power plant? In Germany and Italy, the banks have now realized there's money to be made in handing out green loans so that millions of players can invest in these technologies. The banks look at your electricity bill and they know exactly how much money you're going to save once you start producing your own green electricity. They know that they can't lose.

And finally, we realized that pillar five – transport - is in trouble. Daimler and General Motors are in my Third Industrial Revolution Global CEO Business Roundtable group and they're worried. They launched electric vehicles very recently. But if the other four pillars don't phase in, they're not going to sell their cars. The whole plan requires that each city and region establishes the five pillars so they make the transition to the third industrial revolution infrastructure.

Making the shift creates new businesses and jobs from day one.

**Capgemini Consulting:** What sort of governance do we need to implement the five pillars?

**Jeremy Rifkin:** My global CEO group did the plan for Rome, Utrecht, Monaco and some other places. What we have found is this: as soon as a city or region starts to create its Third Industrial Revolution node, it automatically wants to connect to the next node, and then the next node, just like WiFi. Let's say Rome has a surplus of electricity, they then want to sell it to Florence or Venice. And when they have a deficit of green electricity, they want to buy from one of the other nodes. In this way, it goes city to city, region to region. There are no borders.

This means that we need political governance at the local, state, and continental levels to lead the revolution. At the local and state level, the government authority sets the regulations, the codes, standards, incentives, etc. The local business community comes in with the technology and leverages the infrastructure. Finally, civil society has to buy in because the paradigm shift affects everybody's life.

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*As long as we're in the dying economic paradigm of the second industrial revolution, there's no growth potential.*”



Then there's the continental level. The first and second industrial revolutions came with an economic model that relied on national governments. The third industrial revolution scales laterally. It likes to run across land and borders until it reaches the ocean. You try to be self-sufficient locally but you have to collaborate and share green electricity across continents. It's only when you have the entire continent connected that you can manage the energy surges and deficits.

## Europe's Growth Project

The European Union is ideally suited if it can move to the next stage of integration. Currently everyone is talking about austerity. But even if the EU makes spending cuts and creates new banking mechanisms and reforms, that won't be enough to grow Europe! As long as we're in the dying economic paradigm of the second industrial revolution, there's no growth potential.

So Europe's plan is the third industrial revolution. The continent has 500 million inhabitants and there are another 500 million people in its partner regions: the Mediterranean North Africa, and beyond. This is by far the richest potential market in the world. Now we need to integrate it into a seamless market space. This means we have to move The Third Industrial Revolution infrastructure across all those regions. Then we establish a single continental energy internet and a seamless communications and transport network so that a billion people can engage in commerce and trade in the largest internal market in the world. This represents the next stage of European integration.

## Continental Governance

Other continents are moving the same way. The Association of South-East Asian Nations is forming very quickly and is starting to deploy the third industrial revolution infrastructure to create a continental market. The African Union was stumbling until the EU put in almost one billion euros for new energy infrastructure. Now they're talking about establishing regional groupings of nations in Africa to start creating a continental market. The South American Union was created 24 months ago. These continental political unions can't be governed top-down. They're too big. You have to govern them like a network. That requires a common set of formulas for regulations to make sure the energy internet is universally accessible and that the communication and transport networks are seamless.

## Our Crisis is an Energy Crisis

When an industrial revolution occurs, you create businesses and jobs during the first 40 years to deploy the infrastructure. Then you live off that infrastructure for the next 40 years. That's what happened with the first industrial revolution. The infrastructure in Europe and America was laid down between 1830 and 1890. And we lived off it for another 30 years. The same thing happened with the second industrial revolution. The infrastructure was built up between 1900 and 1929. Between 1929 and 1945 everything went on hold and took off again after the War. We lived under this paradigm until the early 1990s.

Today, the economy in Europe and the US is collapsing. The second industrial revolution is embroiled in a long torturous endgame with rising energy prices. Make no mistake: the real collapse of the global economy occurred in July 2008 when oil hit \$147 a barrel on the world market. The whole economy stopped. That was the economic earthquake. The collapse of the financial markets, 60 days later, was the aftershock. In 2009, oil went back down to \$30 a barrel and the economy started growing again. Recently, oil has shot up to \$115 a barrel forcing a rise in prices across the supply chain, precipitating another slowdown of the economy. This means that every time we try to restart the economy, with China, India, and much of the developed world, in the game, there's just too much demand for crude oil and not enough supply. We're experiencing restart-collapse episodes one after another.

**Capgemini Consulting:** What does the third industrial revolution mean for companies?

**Jeremy Rifkin:** The first and second industrial revolutions scaled top-down. Because of the capital needs, we had to create huge centralized factories, centralized supply chains, centralized logistics and transport. That's why three out of the five largest companies in the world today are energy companies. About 500 huge companies depend on materials made out of carbon energies. Those 500 companies create nearly a third of global GDP! Communications

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*The third industrial revolution favors lateral power.*  
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are centralized and so is the energy regime. This is our society. It's the way we think, the way we understand economic activity.

Today, companies are undergoing a fundamental shift. Some sectors are far advanced into the new paradigm. For example, the music industry did not understand file-sharing technologies when millions and millions of kids began to create software to share music with each other. Then they contracted or went out of business. Newspapers didn't understand the distributed, collaborative power of bloggers. People are blogging, creating their own news and sharing it freely. So now newspapers are trying to create blogs. And many of them won't make it.

The third industrial revolution favors lateral power. It sounds like an oxymoron because we think of power as vertical. Lateral power is when millions of small players come together in vast networks to pool their risks and their resources. They create lateral scaling that is much more powerful than vertical power. It requires a shift in business mentality that the business schools don't teach yet.

**Capgemini Consulting:** So this means many business models are going to change?

**Jeremy Rifkin:** Yes. Let's take the power and utility companies which are huge centralized institutions. They like to control power supply and the transmission of electricity and sell as many electrons as they can. When we introduced this third industrial revolution model in Europe, obviously some energy companies weren't very happy. But one by one, the power and utility companies started to come to our side because we introduced a new business model. We explained that there are a few million people creating their own green electricity today. Within ten years, there will be tens of millions, within 25 years,

hundreds of millions. The cost curve is moving exactly like the cost curve when we moved from centralized computers to personal computers and cell phones. Over a period of 25 years, desktop computers and cell phones became cheaper and cheaper. Now we nearly give them away just to sell the service. It's the same thing with the technologies that harvest renewable energies. Within 20 years, they're going to be so cheap, that virtually everyone will be able to afford the technology.

Just like the democratization of information has reduced its transaction costs, now the same process is happening when Internet technology starts to manage the new energies. The energy becomes nearly free. This is "power to the people" - the democratization of energy - and its going to force a fundamental reshaping of the business model in the decades ahead.

**Capgemini Consulting:** So how do the utility companies make money?

**Jeremy Rifkin:** They'll make money not just by managing the energy Internet, but by selling as few electrons as they can! That's counter-intuitive. Remember when IBM went through a crisis in the 1990s. They were selling computers with very little margins. The Chinese, the Koreans, the Japanese were all making cheaper computers. So IBM went into a deep retreat in search of what the company has that the world needs. They decided that the company's real expertise lay not in making a physical product, but in managing information.

It's the same with power and utility companies. Their expertise is managing energy and electricity. Their job as a utility company is to set up thousands of partnerships with small, medium and large size companies. They help them manage their energy flow, so that they can reduce their energy costs

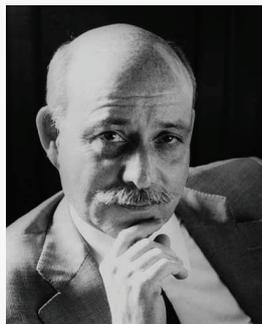
and increase their efficiencies and productivity. These partners will share their savings back with the utility. This new business model is called a "shared savings agreement".

## Energy Cost over Labor Cost

This will work because the survival of every company in the next 30 years, whether it is big or small, will depend on their energy costs, as much as or even more than their labor costs. Many power and utility companies will not make this shift. Already start-up companies are emerging that are beginning to bring together IT, energy, and information experts. They're aggregating all the new components of the Third Industrial Revolution game plan into clusters. They manage the energy flows and help clients direct their electricity on and off the grid. So the role of the utility companies may be narrowly circumscribed to manage the energy Internet.

## New Opportunities Ahead

Big companies will become more like consultants. They have the technical expertise that will allow them to facilitate the development of The Third Industrial Revolution business networks. But there is no way that centralized companies can control these distributed networks across the globe. It's too big a proposition. They can, however, be strategically placed to help manage the Third Industrial revolution infrastructure and hone its synergies. Their mission will be to help new businesses develop and mature. This means they must learn to think systemically, not in an isolated way, if they are to effectively connect the potential business opportunities that lie along the 5 pillar Third Industrial Revolution infrastructure.



## Jeremy Rifkin

President of the Foundation on Economic Trends

Jeremy Rifkin is president of the Foundation on Economic Trends and the bestselling author of 19 books on the impact of scientific and technological changes on the global economy, workforce and society. He has been an advisor to the European Union (EU) for the past decade and is the principal architect of the EU's Third Industrial Revolution – which is also the title of his latest book – a long-term economic sustainability plan to address the triple challenge of the global economic crisis, energy security, and climate change. The plan was formally endorsed by the European Parliament in 2007. Mr. Rifkin is also the founder and chairperson of the Third Industrial Revolution Global CEO Business Roundtable, comprising 100 of the world's leading companies.

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