



YOUR KINDLE NOTES FOR:

## The Third Industrial Revolution: How Lateral Power Is Transforming Energy, the Economy, and the World

by Jeremy Rifkin

Free Kindle instant preview: <http://amzn.asia/64nmqtQ>

### 49 Highlights

---

Highlight (Yellow) | Location 91

In my explorations, I came to realize that the great economic revolutions in history occur when new communication technologies converge with new energy systems.

---

Highlight (Yellow) | Location 163

As we approach the middle of the century, more and more commerce will be overseen by intelligent technological surrogates, freeing up much of the human race to create social capital in the not-for-profit civil society, making it the dominant sector in the second half of the century.

---

Highlight (Yellow) | Location 272

What occurred in July of 2008 is what I call peak globalization. Although much of the world is still unaware, it is clear that we have reached the outer limits of how far we can extend global economic growth within an economic system deeply dependent on oil and other fossil fuels.

---

Highlight (Yellow) | Location 649

The story line begins with an understanding that the great economic transformations in history occur when new communication technology converges with new energy systems.

---

Highlight (Yellow) | Location 672

The conjoining of Internet communication technology and renewable energies is giving rise to a Third Industrial Revolution (TIR). In the twenty-first century, hundreds of millions of human beings will be generating their own green energy in their homes, offices, and factories and sharing it with one another across intelligent distributed electricity networks—an intergrid—just like people now create their own information and share it on the Internet.

---

Highlight (Yellow) | Location 683

The conventional top-down organization of society that characterized much of the economic, social, and political life of the fossil fuel-based industrial revolutions is giving way to distributed and collaborative

relationships in the emerging green industrial era. We are in the midst of a profound shift in the very way society is structured, away from hierarchical power and toward lateral power. Like every other communication and energy infrastructure in history, the various pillars of a Third Industrial Revolution must be laid down simultaneously or the foundation will not hold. That's because each pillar can only function in relationship to the others. The five pillars of the Third Industrial Revolution are (1) shifting to renewable energy; (2) transforming the building stock of every continent into micro-power plants to collect renewable energies on site; (3) deploying hydrogen and other storage technologies in every building and throughout the infrastructure to store intermittent energies; (4) using Internet technology to transform the power grid of every continent into an energy-sharing intergrid that acts just like the Internet (when millions of buildings are generating a small amount of energy locally, on site, they can sell surplus back to the grid and share electricity with their continental neighbors); and (5) transitioning the transport fleet to electric plug-in and fuel cell vehicles that can buy and sell electricity on a smart, continental, interactive power grid.

---

Highlight (Yellow) | Location 742

Scientists point out that one hour of sunlight provides enough power to run a global economy for a full year.<sup>8</sup> In the European Union alone, 40 percent of the roofs and 15 percent of all the building facades are suitable for photovoltaic applications.

---

Highlight (Yellow) | Location 1488

London became the first modern city with a population of more than one million people in the year 1820. By 1900, there were eleven cities with populations of more than one million people; by 1950, there were seventy-five such cities; and by 1976, 191 urban areas exceeded one million people.

---

Highlight (Yellow) | Location 2067

Nowhere were the new rationalizing principles of the modern business enterprise more welcomed than in the public school system, first in America and Europe and, later, the rest of the world. Turning out productive workers became the central mission of modern education. Schools took on the dual task of creating a literate workforce and preparing them to serve authoritarian and centralized businesses, where they would take orders from the top and optimize their output at the bottom in the most efficient manner possible, while never questioning the authority under which they labored.

---

Highlight (Yellow) | Location 2073

They were given daily work assignments, along with detailed instructions on how to carry them out. Their tests were standardized and their performance was measured by the speed and efficiency of their responses. They were isolated into autonomous units and informed that sharing information with fellow students was cheating and a punishable offense. They were graded on the basis of objective criteria and promoted to the next grade on the basis of merit.

---

Highlight (Yellow) | Location 2240

New collaborative business practices are reaching into every aspect of economic life. Community Supported Agriculture (CSA) is a good example of the impact that new TIR business models are having on how food is grown and distributed. After a century of petrochemical-based agriculture, which led to the near demise of the family farm and gave birth to giant agrifarm businesses like Cargill and ADM, a new generation of farmers is turning the tables by connecting directly with households to sell their produce. Community supported agriculture began in Europe and Japan in the 1960s and spread to America in the mid-1980s.

---

Highlight (Yellow) | Location 2276

It is estimated that each car sharing vehicle takes up to twenty cars off the road. Car sharers report that they typically reduce the miles they drive by about 44 percent. The reduction in CO2 emissions can be dramatic. Communauto, the Canadian car sharing service in Quebec, reports a 13,000-ton reduction in CO2 emissions by its 11,000 members. A study in Europe found that car sharing cut CO2 emissions by as much as 50 percent.<sup>30</sup> Zipcar, the world's largest car-sharing business is a for-profit operation founded in 2000. In just ten years, the company has grown to hundreds of thousands of members. There are several thousand Zipcar locations around the world and more than eight thousand vehicles to choose from. The company, whose revenue topped \$130 million in 2009, is growing at a phenomenal rate of 30 percent a year. In 2010, Zipcar launched a hybrid electric vehicle pilot project in its San Francisco location. The brand has become popular among the environmentally conscious millennium generation who refer to themselves as "zipsters."<sup>31</sup>

---

Highlight (Yellow) | Location 2309

The network has enjoyed surprising success since its inception in 2003. Members report 4.7 million positive experiences, or 99.7 percent of all couch surfing experiences.<sup>33</sup> Even more impressive, members say that their experiences have resulted in more than 2.9 million friendships, of which 120,000 are described as being close.

---

Highlight (Yellow) | Location 2437

Ending the practice of private funding in elections and mandating public financing would go a long way to restoring the democratic process in the United States. Yet, the American public has shown little interest in making the case for the public financing of elections. The issue is never among the major

---

Highlight (Yellow) | Location 2442

What we are left with is a strange paradox. Millions of Americans want government to keep its hands out of the commercial arena, but are unwilling to mobilize sufficient public response to end the practice of private commercial interests buying elections and directing taxpayers' money to their pet commercial projects and industry interests.

---

Highlight (Yellow) | Location 2454

The solution begins with acknowledging that all of the great leaps forward in American economic history have occurred only when government helped finance the critical energy and communications infrastructure and

continued to underwrite its performance so that thousands of new businesses could grow and flourish. Indeed, I cannot conceive of any practical way to advance a new economic era for the country, absent a full and robust partnership between government and business at every level—city, county, state, and federal.

---

Highlight (Yellow) | Location 2488

It was the federal government that conspired with AT&T at the beginning of the twentieth century, transforming it into a quasi-public telecommunication monopoly, which allowed the company to reap billions of dollars of revenue under the regulatory cover of the government, without

---

Highlight (Yellow) | Location 2506

The US Congress amended the IRS code, allowing developers to write off the cost of a new building in seven years, rather than the standard forty-year depreciation schedule. The subsidy, worth billions of dollars, spurred the building of thousands of shopping malls and strip malls off the new interstate highway exits and alongside suburban housing developments.

---

Highlight (Yellow) | Location 2513

For those who doubt the critical role that government has played in America's commercial success, I have included a separate essay on our website that chronicles this unacknowledged relationship, with the hope that it will put to rest, once and for all, the libertarian myth about how the United States became the greatest economy on Earth.

---

Highlight (Yellow) | Location 2539

Today, we are witnessing the convergence of a new communications media and energy regime—a Third Industrial Revolution. Businesses across widely divergent fields—clean energies, green construction, telecommunications, micro-generation, distributed grid IT, plug-in electric and fuel cell transport, sustainable chemistry, nanotechnology, zero-carbon logistics and supply-chain management, and so on—are developing an array of new technologies, products, and services.

---

Highlight (Yellow) | Location 2559

Their politics are less about right versus left and more about centralized and authoritarian versus distributed and collaborative. This makes sense.

---

Highlight (Yellow) | Location 2984

The economic current, he said, is shifting from globalization to continentalization.

---

Highlight (Yellow) | Location 3016

The European Union has recently entered into a partnership with the African Union to begin laying the infrastructure for a Third Industrial Revolution, which will eventually join the two continents. For example,

plans are being developed for a multibillion dollar project, called Desertec, which will bring energy generated from solar and wind technologies from the Sahara desert, via interconnector cables, to Europe—providing more than 15 percent of the European Union’s total energy needs by 2050.

---

Highlight (Yellow) | Location 3247

Still missing is a smart, distributed power grid that will allow stand-alone micro-generators to share electricity with others across entire regions. That is likely to come as millions of families begin generating their own electricity from on-site renewable energies. This process represents the democratization of energy in the world’s poorest communities.

---

Highlight (Yellow) | Location 3297

There is a saying in the Middle East that goes something like this: “My grandfather rode a camel, my father drove a car, I travel on a jet, and my grandchild will ride a camel.”

---

Highlight (Yellow) | Location 3301

Abu Dhabi is investing billions of dollars in the construction of a new city rising from the desert. It’s called Masdar, a post-carbon city that will be run exclusively by the sun, wind, and other forms of renewable energy. It’s

---

Highlight (Yellow) | Location 3538

Anxious to ground their musings in the mathematical certainties of physics, Adam Smith and his contemporaries argued that just as the universe, once set in motion, acts automatically like a well-balanced mechanical clock, so too does the marketplace. While God is the prime mover of the universe, man’s innate competitive self-interest is the prime mover of the marketplace.

---

Highlight (Yellow) | Location 3545

Adam Smith exalted Newton’s systematizing of the physics of the universe as “the greatest discovery that ever was made by man,” and enthusiastically borrowed metaphors from Principia and Newton’s other works to fashion classical economic theory.<sup>2</sup> The problem with using Newton’s mechanics to try to understand the workings of the market is that his physics tells us only about speed and location. The

---

Highlight (Yellow) | Location 3584

Physicists explain that, from a thermodynamic perspective, the Earth functions as a virtually closed system relative to the sun and the universe. Thermodynamic systems can be divided into three types: open systems that exchange both energy and matter; closed systems that exchange energy but not matter; and isolated systems that exchange neither matter nor energy. The Earth, in relation to the solar system, is a relatively closed system. That is, it takes in energy from the sun, but except for an occasional meteorite and cosmic dust, it receives very little matter from the surrounding universe.

---

Highlight (Yellow) | Location 3619

Entropy was one of the first books to examine, in depth, the entropic impacts of the industrial revolution on climate change.

---

Highlight (Yellow) | Location 3659

“about 80 percent to 90 percent of the energy is simply wasted and lost as heat to the environment.”<sup>9</sup> Only 10 to 20 percent of the energy of the prey is absorbed by the predator.

---

Highlight (Yellow) | Location 3663

Miller calculates that “three hundred trout are required to support one man for a year. The trout, in turn, must consume 90,000 frogs, which must consume 27 million grasshoppers, which live off of 1,000 tons of grass.”<sup>10</sup>

---

Highlight (Yellow) | Location 3702

While live-stock—again mostly cattle—produce 9 percent of the carbon dioxide derived from human-related economic activity, they produce a much larger share of more harmful greenhouse gases. Livestock account for 65 percent of human-related nitrous oxide emissions—nitrous oxide has nearly 300 times the global warming effect of carbon dioxide. Most of the nitrous oxide emissions come from manure. Livestock also emit 37 percent of all human-induced methane—a gas that has 23 percent more impact than carbon dioxide in warming the planet.

---

Highlight (Yellow) | Location 3723

Giddy over the prospect of creating a material cornucopia on Earth, the classical economists, with the exception of Thomas Malthus, were united in their belief that human industriousness could create a utopian paradise. The very idea that an acceleration of economic activity might result in a degraded environment and a dark future for unborn generations would have been unfathomable.

---

Highlight (Yellow) | Location 3739

When neoclassical economists talk about productivity and economic growth as a measure of output per unit of input, the inputs they have in mind are capital and labor. Yet, when economists analyze the actual economic growth in the United States and other industrial countries, the amount of capital invested per worker accounts for only about 14 percent of the increase, leaving 86 percent of the growth unaccounted for. Robert Solow, whose theory of economic growth landed him a Nobel prize, says quite candidly that the missing 86 percent is “a measure of our ignorance.”<sup>17</sup>

---

Highlight (Yellow) | Location 3751

“nearly 100% of the Twentieth Century economic growth for each of the four countries.” What the Ayres and Warr growth model clearly shows is that “the increasing thermodynamic efficiency, with which energy and raw

materials are converted into useful work,” accounts for most of the increased productivity gains and growth in industrial societies.

---

Highlight (Yellow) | Location 3790

“Haste makes waste” is an age-old adage that reflects an intuitive understanding of the entropy law at work. In terms of thermodynamic efficiency, then, productivity is as much a measure of entropy produced per unit of output as speed per unit of output.

---

Highlight (Yellow) | Location 3807

The reason most economists just don’t get it is that they fail to understand that all economic activity is borrowing against nature’s energy and material reserves. If that borrowing draws down nature’s bounty faster than the biosphere can recycle the waste and replenish the stock, the accumulation of entropic debt will eventually collapse whatever economic regime is harnessing the resources.

---

Highlight (Yellow) | Location 3848

note that biomimicry—the idea of studying how nature operates and borrowing best practices—is becoming an increasingly fashionable pursuit in product research and development, economic modeling, and urban planning. We’d be well-served by studying how climax ecosystems balance their budgets, and applying the lessons to balancing our own budgets within society and between society and nature.

---

Highlight (Yellow) | Location 3873

Implementing the infrastructure improvements in the nation’s commercial and residential buildings would cost approximately \$4 trillion over a forty-year period, or about \$100 billion a year, but would generate a cumulative energy bill savings of \$6.5 trillion, or approximately \$163 billion per year. Assuming that the infrastructure improvements are financed and paid for out of the energy savings at around a 7 percent discount rate, the benefit cost ratio is a robust 1.80. In other words, for every dollar invested in energy efficiency and/or renewable energy systems, the return on investment would be \$1.80.

---

Highlight (Yellow) | Location 3881

Amazingly, what the United States wastes in energy in the production of electricity, is more than Japan uses to power its entire economy.

---

Highlight (Yellow) | Location 3904

Even with the advent of agriculture, the idea of property was more of a communal concept than an individual possession.

---

Highlight (Yellow) | Location 3909

theologians described as “The Great Chain of Being.” The concept of selling and buying land—real estate—didn’t take hold until the passage of the great Enclosure Acts in Tudor and Elizabethan England, marking the very end of the feudal economy and the dawn of the market era.

---

Highlight (Yellow) | Location 3915

Caught up in the elation, Enlightenment economists began to extol the innate virtues of private property relations in the marketplace, and came to see the acquisition of property as an inherent biological drive, rather than a social proclivity conditioned by a specific communication/energy paradigm.

---

Highlight (Yellow) | Location 3973

The Internet has made the biosphere the new political boundary and, in the process, has made traditional geopolitics appear more like an anachronism.

---

Highlight (Yellow) | Location 4125

The old science views nature as objects; the new science views nature as relationships. The old science is characterized by detachment, expropriation, dissection, and reduction; the new science is characterized by engagement, replenishment, integration, and holism. The old science is committed to making nature productive; the new science to making nature sustainable. The old science seeks power over nature; the new science seeks partnership with nature. The old science puts a premium on autonomy from nature; the new science, on participation with nature.

---

Highlight (Yellow) | Location 4415

our disconnection from the natural world.” Roszak challenged the psychiatric profession, saying it’s time “for an environmentally based definition of mental health.”<sup>9</sup>

---

Highlight (Yellow) | Location 4574

In just the short period between 1997 and 2003, there was a 50 percent drop in the proportion of children nine to twelve who spent time outdoors engaged in hiking, walking, gardening, and beach play. Less than 8 percent of young people now spend time in these traditional outdoors activities.<sup>22</sup>

---

Highlight (Yellow) | Location 4747

If the industrial era emphasized the values of discipline and hard work, the top-down flow of authority, the importance of financial capital, the workings of the marketplace, and private property relations, the collaborative era is more about creative play, peer-to-peer interactivity, social capital, participation in open commons, and access to global networks.

---