

## **The Politics of Maintenance: Electricity, Socialism, and John McClane's Tireless Fight Against Evil**

Essay for "The Maintainers: A Conference," 7<sup>th</sup> to 9<sup>th</sup> April 2016, Stevens Institute of Technology, Hoboken (NJ), Adelheid Voskuhl, March 2016 (draft: please don't cite or circulate)

I propose to revisit the engineering and politics of electricity to trace aspects of the cultures of maintenance at our conference: electricity as the quintessential power source of industrial and post-industrial economies, an emblematic public utility, an engineering field in its own right, and the electricity grid as a material base and ideological superstructure of state-building and government.

Charles Steinmetz was chief electrical engineer at General Electric and socialist councilman in Schenectady during the US's "Second Industrial Revolution." We owe much of what we know about him to Ron Kline's ground-breaking biography.<sup>1</sup> Steinmetz came to the US as an immigrant as a young man from Prussia via Zurich in 1893, escaping political conflicts with the Prussian regime due to his activities in socialist student organizations. He rose to fame, and to the top of his profession, in the US within a short period of time, stopped suddenly by his premature death in 1923.<sup>2</sup>

For the purpose of this short essay, I emphasize the convergence of two projects in Steinmetz's life: he was the leading electrical engineer of his generation and also a political theorist. At the intersection of these two activities in the immigrant Steinmetz's life, we find nuances and details about networks, grids, and material built-environments for the upkeep of small and large political and economic institutions. Next to the chemical industry, steel-and-concrete civil engineering, and the internal combustion engine, electricity is typically counted as a key pillar of industrial and political modernization. This holds certainly for key phases of industrialization and state-building of the United States (and, to some degree, Germany) around the year 1900. Steinmetz contributed a range of ideas, artefacts, and insights to this, which grew not least out of his identity as a trans-Atlantic immigrant.

Steinmetz's chief contribution to electrification were mathematical theories of alternating current. His rigorous mathematical training in both Breslau and Zurich in his youth allowed him to translate the complicated (and fairly recent) mathematics of electrodynamics into a language that could be used by engineers in the US. The latter usually did not have, at the time, the mathematical training necessary to plan and design the equipment for transporting electrical power over large distances in the form of alternating currents. Because of the massive occurrence of electro-magnetic induction in long-distance transmission lines, and accompanying significant loss in power, late nineteenth-century transmission lines were switched from direct to

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<sup>1</sup> Kline, *Steinmetz: Engineer and Socialist*.

<sup>2</sup> Kline, *Steinmetz: Engineer and Socialist*, 34.

alternating current, which experiences less induction but is much more complicated to calculate mathematically.<sup>3</sup>

The many textbooks that Steinmetz wrote on the theory and mathematics of alternating current had tremendous influence on generations of electrical engineers across the United States.<sup>4</sup> Next to those, he wrote a handful of books on history and philosophy, whose material came out of his work as a politician and teacher of political economy at Union College. Kline emphasizes how Steinmetz's work on committees for standardizing electrical tools was a breeding ground for his later theory of technocratic socialism, of which he proposed outlines in 1916 in *America and the New Epoch* (see my reading below).<sup>5</sup> A group of engineers from competing companies (Westinghouse Electric and General Electric) met on a committee on standardizing-electrical-tools at the AIEE in 1912 and 1913, and there was reportedly an unprecedented spirit of cooperation. On the committee with Steinmetz was, among others, Benjamin Lamme, the Chief Engineer of Westinghouse Electric.<sup>6</sup> Lamme wrote in a letter to Steinmetz about the growing friendship between rival engineering organizations, and how it was a great step forward, and Steinmetz wrote to Lamme that "engineers of the corporation should impress upon the world, and upon the men in the organization, the solidarity of the engineering interests, even if the commercial interests are competitors."<sup>7</sup> Out of experiences like this – of *engineering*, rather than *worker*, solidarity, as Ron Kline says – grew Steinmetz's theory of technocratic, corporate socialism.<sup>8</sup>

### **Steinmetz's *America and the New Epoch* (1916)**

Steinmetz's work *America and the New Epoch* was published in the middle of the First World War, in 1916. In it, he first engages in American history, explaining that it was in the early colonial communities in North America that the current government system originated, with its fundamental democratic principles and fundamental inefficiency, as he says, the "rotation in office." In the simple colonial society, he says, it was natural that any intelligent citizen was considered eligible to any office, and that the office-holder changed at every term. But, Steinmetz says, this has become a serious handicap in our present highly complex civilization. He says: "When in rapid succession a theater-director, a physician, a minister, and a lawyer are placed in administrative charge, then the absence of knowledge and experience must lead to the incompetence and inefficiency that we see now in all our political life."<sup>9</sup>

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<sup>3</sup> Kline, *Steinmetz: Engineer and Socialist*, 20, 37-38 and 40.

<sup>4</sup> Among his works are *Theory and Calculation of Alternating Current Phenomena* from 1897 (with a second edition in 1898 and a third edition in 1900); *Theoretical Elements of Electrical Engineering* from 1901 (with a third edition in 1909 and a fourth edition in 1915); *General Lectures on Electrical Engineering* from 1908 (with a fifth edition from 1918), and *Engineering Mathematics; a Series of Lectures delivered at Union College*, 1911 (with a third edition in 1917).

<sup>5</sup> Kline, *Steinmetz: Engineer and Socialist*, 179-80.

<sup>6</sup> Kline, *Steinmetz: Engineer and Socialist*, 182-183.

<sup>7</sup> Kline, *Steinmetz: Engineer and Socialist*, 182.

<sup>8</sup> Kline, *Steinmetz: Engineer and Socialist*, 182-183.

<sup>9</sup> Steinmetz, *America and the New Epoch*, 110.

When elaborating on the history of industrialization in the US, he points to the beginnings of industrial development in the early 19th century in New England and then laments that in the current early 20th century, the corporate development of industry has been arrested by the interference of the Government. He blames this increasing interference, the unjustified public demand for it, and the resulting inefficiency and waste, on the uneven industrial development in the US: in other nations industrial development was fairly uniform throughout the nation, he explains in a historical manner, but in the US the development in the Eastern States was about a generation ahead of that in the mid-West and the West. In the East there emerged corporate organizations while there was still a large class of small, individual producers in the West, who were ready to fight the corporation and its higher efficiency of production.<sup>10</sup>

An equally serious enemy to progress toward co-operation, according to Steinmetz, is the strong individualistic temperament of a large part of the American citizens. His solution to that is a better understanding between industrial corporations and the general public. He sees an obligation on the part of corporations to establish harmonious social relations and “industrial and social peace,” as he says, but he states that corporations still fail to realize this.<sup>11</sup> Looking once more back to Europe, Steinmetz observes, that the old world has gone to pieces (he writes this in 1916), and a new one begins to rise from its ruins, in an era of cooperation. Germany, he says, already has organized its industries cooperatively, has encouraged and enforced by government acts corporations, which we have out-lawed, he says. And he sees an industrial efficiency resulting in Europe that he calls a “menace” to the individualistic nations. Our government as now constituted, he says, is not adapted for efficient constructive work.<sup>12</sup>

It is in this context that he formulates his political and economic visions: we have to find new ways and means, he says, to accomplish a thing which has never been accomplished before – “co-operative organization of a democratic nation.”<sup>13</sup> He presents two more major lines of argument here: an idea of a strong civil service (coinciding with technocratic structures) and some elements of a utopia that he presents to his reader as resulting from his previous ideas. He says that constructive work in the American political system is accomplished where the office is held more continuously, namely either under civil-service rules or because the office is not sufficiently important to be included in the rotation principle (he calls that principle the “distribution of spoils”).<sup>14</sup> And he insists that there can be no efficiency without continuity of the administration. Strangely, he says, when we consider political offices, we disregard the principle of expertise and competency and place a man who has failed in every business he undertook in administrative charge of the community.<sup>15</sup>

Steinmetz outlines a utopia by asking: “What, then, are the structural elements in our American nation from which a continuous, competent, and responsible government could develop – a government such as is required for the efficient industrial co-operation of all citizens in the

<sup>10</sup> Steinmetz, *America and the New Epoch*, 119-122.

<sup>11</sup> Steinmetz, *America and the New Epoch*, 129.

<sup>12</sup> Steinmetz, *America and the New Epoch*, 130.

<sup>13</sup> Steinmetz, *America and the New Epoch*, 149.

<sup>14</sup> Steinmetz, *America and the New Epoch*, 140.

<sup>15</sup> Steinmetz, *America and the New Epoch*, 153.

interest of all, under democratic principles?”<sup>16</sup> The elements that he lists are those normally considered elements of socialist economies and societies: there would be no industrial competition, for example, because in the co-operation of all producers duplication of work and waste would be eliminated; the production would be controlled to correspond with the legitimate demands for the product, and all production for mere profit, without regard to the demand for the product, would cease; because competition between industries also would cease, the country's transportation infrastructure (waterways and railroads) would be used to the fullest extent, and no interest would deflect to one mode of transportation what could more economically be carried by the other; there will be competition between the kinds of energy sources and plants to be used (gas-engine, electric motor, local steam-turbine, or long-distance transmission system), and the decision would be made on the basis of the relative economy of the various propositions, uninfluenced by commercial or financial considerations; and there would have to be an active co-operation between all producers, from the unskilled laborer to the master mind who directs a huge industrial organization.

### **Popular culture and maintenance: John McClane’s fight against innovative information technologies**

I would like to use the material from Steinmetz’s book on the history of nineteenth and early-twentieth century industrialization and government in the United States and ask one more question about the imaginative powers of, on the one hand, “old-school” electricity grids, networks, and artefacts and, on the other, recent “innovative” computing and information technologies, in particular the expertise of the “hacker.” And I would like to use an example from popular culture in which we find an explicit account of how electricity encounters recent information technologies and their experts, to explore tensions between the virtues of maintenance and those of other engineering and political activities such as innovation, creativity, and hacking.

In the fourth sequel (from 2007) of the *Die Hard* franchise (*Live Free or Die Hard*), Detective John McClane is paired up with a young, white, male sidekick, who is a computer hacker. Together, they try to prevent a villain (a former FBI employee) and his crew from hacking and taking down the US’s vulnerable infrastructure (transportation, the stock market, and the power grid). I selected passages from the film (about nine minutes), which we will watch, to bring out the use of recent information technologies by both the “good” and the “bad” guys/institutions (hackers, the FBI, and a well-organized paramilitary gang of villains), and how the film brings this together with the old-school public utility system of electricity: the villain’s main target for both remote digital and local manual hacking is a utility superstation in West Virginia. Among the questions the passages raise are: What is the old-school appeal of John McClane in this film (and perhaps others), and how does he get away with not being an innovator? What is the division of labor between him and his sidekick, the generational tensions, and the tensions in different models of masculinity? What is the relevance of the other obvious gender and racial dynamics? Where and how could we situate the electricity grid in all its economic, political, and engineering relevance within recent ideas and imagination of innovative and disruptive digital information technology?

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<sup>16</sup> Steinmetz, *America and the New Epoch*, 153.