https://doi.org/10.51196/srz.26.9

FUMELESS CITIES AND DEATH RAYS: AN ARCHAEOLOGY OF FANTASTIC ENERGY SOURCES IN POLISH SCIENCE FICTION OF THE INTERWAR PERIOD

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On 6 January 1939, the pages of the daily *Dzień Dobry!* carried the following headline: "The car of the future on the streets of Warsaw. *An electric devil* without petrol, oil, gearbox, or clutch" (Wr. L. 1939: 4).[1] While contemplating the Anthropocene, it is worth looking back and wondering what people in the prewar period thought the machines of the future would feed upon? How did they think energy would be consumed in the cities of the future, and, more importantly, are today's various media and pop-culture visions of the future in fact characterised by the unconscious reproduction of modernisation and modernist narratives of a hundred years ago? It should also be remembered that these practices of reproduction seem to have influenced the philosophy of longtermism, a recently popular trend in thinking about the future.

/// An Archaeology of Imaginary Futures, or Reading Science Fiction as a Method?

The issue of energy can be considered in various contexts and using various research approaches. Scholarly and popular-science studies can be consulted, or, as in the quote that begins the article, newspaper sources can be

[1] Unless stated otherwise, all translations are my own.

used to examine the press discourse on energy before 1939. In the following article, I have primarily looked at Polish science fiction.

It is worth noting, as Ruth Levitas does, that H.G. Wells considered the creation of utopias, and perhaps even science fiction, to be a practice belonging more to the social sciences than to fiction (Levitas 2013: xi). In turn, Fredric Jameson noticed that what utopias – and therefore utopian or dystopian science fiction – tell us about the most is the present in which they were created. He called this "shifting the discussion of Utopia from content to representation as such" (Jameson 2007: xiii), and said that science fiction often differs from fantasy simply in that it carefully highlights the economic properties of its past and future (Jameson 2007: 60). It is not surprising that the topic of energy and its new sources is quite frequently discussed in science fiction.

In my reflections on the history of Polish science fiction, I have long proceeded from the assumption that science fiction most often presents imaginary futures (Barbrook 2007). These futures not only mirror social trends and the common notions of a given era, but they take an active part in marking out future realities and imagining where culture (and not solely technical culture) should go. They remain in a constant relationship or tension between the past, the present, and the future.

I have described the exploration of science fiction in search of imaginary futures – in this case concerning energy sources – as an archaeology. I therefore feel obliged to explain that the term is not so much – or not only – a reference to the title of Fredric Jameson's famous book but that it is rather a reference to Siegfried Zielinski's concept of media archaeology (Szydłowski & Zielinski 2014) and to the methods of archaeology as an academic discipline based largely on reconstructing social life from incomplete material remains, and (in my opinion) on speculative thinking. The aim of archaeology is not only to formulate problems and analyse them, but also (or rather) to discover and describe the layers of material remains of the past. Similarly, my goal is to describe what is hidden within the common, collective imagination of the past and the future – elements that may have been forgotten or are overlooked but that are still influential, resonant, and capable of building bridges between present and historical social imaginaries. This approach explains the variety of topics in this paper and the frequently descriptive nature of my argumentation, which seeks to provide a comprehensive cultural context.

For me, Polish science-fiction narratives from before 1939 are a reservoir of overlooked imaginary futures and can tell us a great deal about

both the present and the past. Like many other such futures, these are part of the social imaginary. As Charles Taylor writes, this term refers to the set of ways, practices, and knowledge in which "people imagine their social existence, how they fit together with others, how things go on between them and their fellows" (Taylor 2004: 23). However, as he clearly points out, such an idea of social reality is "often not expressed in theoretical terms, but is carried in images, stories, and legends" (Taylor 2004: 23). Perhaps this is why science fiction can be simultaneously appreciated and disregarded, as some scholars in the social sciences and cultural studies do. For example, Kazimierz Krzysztofek considers science-fiction creators to be the only ones capable of extrapolating trends and somehow predicting the future, because unlike academics, they are "intuitionists," that is, they operate on the outskirts of theory – they practice imagining the future and otherness without being limited by the methodology of their scientific discipline. However, Krzysztofek is at once obliged to emphasise that "there is a problem with science fiction, however, [in] that it often spins too fantastic visions (the proverbial flying cars, the curability of all possible diseases)" (Krzysztofek 2018: 25). For some scholars, science fiction turns out to be too far removed from both theory and real life.

Science-fiction writers, however, may influence the reality of academic disciplines (especially, as Krzysztofek writes, hard science), and they and their works may create the social imaginary of their era, which includes its imaginary future.

Science-fiction writers are an essential component of this imaginary precisely because they are people intensively engaged in the practices of its expression and transformation. Their intuition aligns with what humanists and scholars of cultural studies refer to as "anthropological imagination." This ability allows them to perceive cultural contexts and navigate the social imaginary in a way that, according to Charles Taylor, transcends traditional scientific methods. As John Tresch writes of Poe in his book *The Reason for the Darkness of the Night: Edgar Allan Poe and the Forging of American Science*: "His work embodies its defining tensions: between popular diffusion and elite control, between empathy and detachment, between inspired enthusiasm and icy materialism" (Tresch 2021: 17). I mention this book because it is not just another biography of Poe but is an attempt to define the relationship between the modern, positivist sciences emerging in the USA and the realms of fantasy and science fiction. Tresch emphasises the intricate connections, mutual influences, and often-overlooked aspects of this relationship. For example, many writers and journalists, including

Poe, wrote scientific treatises, and scientists once believed in theories now deemed highly unscientific (Haska & Stachowicz 2019). Interestingly, scientific meetings and lectures often took place in the same venues and at the same time as performances by magicians, spiritualists, and trained animals (Forajter 2014; Tresch 2021: 9–10). In the next century, science in both Europe and the United States appeared to have reached an entirely different stage of development, characterised by institutionalisation and established funding principles. However, this advancement was accompanied by strong echoes of nineteenth-century practices; meta-psychological congresses were convened at the University of Warsaw, university researchers authored science-fiction novels, and science popularisers envisioned the future of science (Haska & Stachowicz 2019). The extensive relations between practising science and creating science fiction remain strong.

It is very easy to illustrate the important role played by science fiction in the social imaginary by referring to English-language literature, but it is much more difficult to answer the questions of whether there were Polish equivalents, whether these works resonated in Poland at the time of their publication, and whether Polish readers could become familiar with certain visions of the future. However, this article does not aim to show the deep mutual entanglements between the science fiction of various countries. I will focus instead on selected visions of the energy sources of the future, and in the above paragraph I have only tried to point out that science fiction is not pure, escapist entertainment, and that contact with it is not "innocent." In turning to selected examples of Polish science fiction, I will try to refer to the broader background of popular science discussions on energy, and to the ideas and works of those times that are not necessarily Polish. We can examine energy sources through various lenses: lighting, transportation, industry, agriculture, and household operations. I will primarily look at literature featuring utopian depictions of future cities. These texts frequently contain lengthy passages dedicated not only to "miraculous inventions," modern gadgets, and the speculative future of science, but they also attempt to describe energy acquisition systems in future societies. Furthermore, it is important to note that the examples discussed below do not encompass the full range of ideas posited in regard to alternative energy sources by Polish science-fiction writers of the interwar period.

/// Coal and "Four Sweaty Horses": Why Were New Sources of Energy Sought?

I will begin my search for imaginary alternative energy sources by outlining a nonfictional urban context. The energy problems of a large interwar city were similar to those of today: high demand, pollution from unbalanced consumption, and the need for lighting. However, it must be clearly stated that these problems occurred in a different context. The "modern city" of that era was not the same as today's "smart city"; it was full of innumerable chimneys and smoke. It is not surprising that discussions about pollution first appeared on such a scale in the context of urban development. It was also then that the search for the energy sources of the future and ways to reduce the emission of harmful smoke began (Crane 2023).

Today, fossil fuels are presented as a source of pollution, to which alternatives should be sought. Combustion engines, coal-fired power plants, and boiler rooms are seen as sources of smog, stench, and other kinds of pollution. They are contrasted with electricity drawn from renewable energy sources, nuclear power, and geothermal heating. Let us imagine, or perhaps recall from historical films and books, that during the interwar period and earlier the problem of "clean" energy sources looked a bit different and was often closer, especially in Poland, to those that plagued the inhabitants of populated and industrialised areas in the nineteenth century (Orłowski 2018: 20–25). Draft animals were still a serious source of both energy and pollution. The large number of horses in cities caused a form of pollution (through their manure and its odour) that has now practically disappeared from imaginings of a "polluted city."

From this perspective, energy sources that seem harmful today were once regarded as innovative, alternative, and, as we might say today, "ecological," in the sense of being less burdensome for nature and humanity. Cars with internal combustion engines (and even steam locomotives) were perceived as machines that were "cleaner" than horses and that freed cities from the ubiquitous stench of horse droppings. Meanwhile, there were not many cars in Poland, and moreover, there was a problem with passable roads (Newman 2021: 47). This is how the scientist, writer, and populariser Bruno Winawer saw Polish backwardness. He wrote a column about the progress of the automobile in the United States in comparison to a trip to the outskirts of Warsaw: "In the meantime, four sweaty horses are pulling us through the woods at a speed of eight kilometres per century" (Winawer 1927: 64).

The energy sources of the future were therefore supposed to solve a problem that had plagued the most industrialised regions of the world for a long time but that was named only at the beginning of the twentieth century – smog. In the British Empire, the famous "London specialty," its "pea soup" – a thick, smelly, and poisonous mixture of smoke and fog – became part of the emerging pop culture in the second half of the nineteenth century. Smog was a serious ecological problem for the capital of the empire, which was at the same time the most populous and most industrialised metropolis of the West. No wonder that descriptions of poison fog and fumes were important elements of those English fantasy stories and novels that today we would describe as post-apocalyptic or catastrophic, including William Delisle Hay's famous book of 1880, *The Doom of the Great City, Being the Narrative of a Survivor, Written A.D. 1942*. The poisonous fog also appeared in other developing cities, although not as spectacularly (due to geographical or other conditions). For example, in 1873, a "fog" that was thick enough to cause carriages to collide was observed in Warsaw. In 1905, Dr Henry Antoine Des Voeux, a member of the London Coal Smoke Association, introduced the term "smog," which was shortly picked up by the press. Smog and smoke were caused not only by industrial plants, power plants, and combined heat and power plants, which were often located close to housing estates in industrial districts (in Warsaw, the Powiśle Power Plant was located just a few hundred metres from a main street, Krakowskie Przedmieście), but also due to the lack of central heating, and due to the lighting of rooms and streets. Additionally, gas was not yet widely used for cooking. During this time, households relied on various kinds of furnaces that burned not only coal but also a range of other available fuels, many of which were more harmful. For this reason, coal could be considered both as a modern energy source and a troublesome one. Properly processed coal was supposed to be a solution to pollution problems. Coking coal in particular, which was popularly known as coke, was thought to be a remedy for the smoke and smog plaguing large cities, and attention was drawn primarily to its "smokelessness." The British authorities recommended switching to coke as part of the fight against pollution after the Great Smog of London in 1952. It is no wonder then that Ritchie Calder, a populariser of science who was also read in Poland in the 1930s, predicted that Great Britain would use domestic coal deposits for the next 500 years (Calder 1936: 91), and if properly processed and obtained in a modern (automated) way, coal could be the fuel of the future. In Poland, even unprocessed coal became a symbol of progress and

a brighter future. During the interwar period, discussions of coal focused less on pollution and more on modernity and the ambition to build a contemporary, industrialised nation. Despite a truly significant civilisational leap and ongoing economic development, Poland was a country whose official (propaganda) image was largely based on envisioned progress and imagined power – I call it an "imaginary Poland" (Haska & Stachowicz 2015). For context, in the interwar years, Germany produced eleven times more electricity than Poland did (Orłowski 2018: 26). The greatness of the port of Gdynia, which has been celebrated in Polish culture, was also built on coal. After the English miners' strike in 1926, "by the second half of the 1930s, Gdynia ranked first among all Baltic ports in terms of the number of goods trans-shipped. However, this achievement was primarily due to the coal trade, which accounted for 82% of all transshipments in 1932" (Szczerski 2010: 209).

/// A City without Smoke

Did Polish science fiction take note of the problem of pollution from fossil fuels before 1939?

The threat of smog was problematised, spread, and became part of the Western social imaginary (among other means, thanks to the extremely popular works of Sir Arthur Conan Doyle, which were also published in Polish). Modernity seemed closely associated with smoke and industrialisation, but in the future, science was to help overcome these difficulties, including through universal electrification and finding alternative energy sources. In Polish science fiction as well, the cities of the future were free from smoke. In the novel *Ludzie elektryczni* [Electric People] by J. Kruk (the pen name of Edmund Krüger), which was first published in 1912 and reprinted several times after 1918, Poles establish a futuristic city called Elektropolis in the Sahara Desert. The city is described as free from air pollution: "In this city, there are also many industrial plants, many factories… But nowhere can you see the towering chimneys that disfigure the landscape and spread smoke and soot around…" (Kruk 1912: 119). However, this was not a city of the kind that dominates visions of the future then and now:

> A huge, powerful city, with hundreds of houses scattered everywhere, with factory buildings, with industrial plants. But this city is also strange. The houses in it do not stand clustered together,

> one next to the other; they are separated by gardens, full of greenery, full of plants. […] And these houses are not huge tenement houses, not those "skyscrapers," rising high into the air, defying all hygiene requirements, serving as breeding grounds for diseases, anthills, swarming with human throngs. (Kruk 1912: 117)

In terms of architecture, it resembles more the colonial idea of an oasis of the future than it does Dubai, which is considered a futuristic city today. A similar city of the future is Warsaw of the twenty-second century in Stefan Barszczewski's novel *Czandu*, which I have written about many times and which I believe is a model example of the interpenetration of science fiction with the modernisation thinking of the Second Polish Republic (Stachowicz 2021). The new Warsaw has been built on the ruins of the old one, which had not been destroyed during a war, but rebuilt like Paris during the Second Empire, in accord with modernist ideas close to those we find, for example, in *Wiadomości Literackie* magazine. "Only the venerable market square of the Old Town, the former Royal Castle, and here and there a historical building that did not interfere with the implementation of the regulatory plan survived" (Barszczewski 1925: 25). This plan has turned Warsaw into a huge garden city without a "system of monstrous skyscrapers of the sky" (Barszczewski 1925: 25). This was not what made the city so unique, though. "What was most striking in the new city, however, was the transparency of the atmosphere, the lack of smoke and soot, and the absence of the chimneys so characteristic of old buildings" (Barszczewski 1925: 26).

/// The Untapped Energy of the Future

The reason of course was the power of electricity, which we find in the title of the novel *Electric People* and the name of the city of the future, Elektropolis – a city to which the journey itself becomes a journey to another era. "Through the streets of the city, running in a straight line, the light cars of the electric tram move quietly, without a murmur… The same line, but used for transporting loads, connects the city with the nearest station of the railway, going to Algiers" (Kruk 1912: 118). The railway is here already a representative of the departing vision of modernity: the age of steam and iron. Lightness, silence, and electricity are the future.

Electricity, although known for years, still belonged (as today) to the imagined future, as can best be seen in the writings of interwar popularisers of science:

> What does the future of electricity look like? We answer: the future and electricity are the same. Progress, especially that made since the beginning of this century – the introduction of telephones, the transmission of energy without the use of wires, X-rays, artificial solar lighting, etc. – make it almost impossible to set any limits to further progress. (Calder 1936: 87)[2]

The fictional inventor Halicz explains his city to newcomers in a similar spirit. "Everything you will see here, gentlemen," he said, "owes its movement, its life, to this mysterious and hitherto insufficiently known and unexploited force that is electricity. This city serves as proof of its power and strength, and, for this reason, it is called Elektropolis – the electric city" (Kruk 1912: 127).

Such cities use electricity, the energy of the future, but in a special way because it is not based on the old sources. Finally, in the future, it will be possible to say with relief that "the age of hard coal and wood as fuel has irrevocably passed. Electricity has taken over omnipotently, providing heat and the driving force in industrial plants, and spreading the exchange of thoughts and images of events throughout the world, and its source was not black, stinking, smoking coal, extracted with hard work from the depths of the earth" (Barszczewski 1925: 26).

Perhaps we should therefore talk about alternative energy sources that involved transforming and evolving existing methods of obtaining energy – for instance, about the development of combustion engines, the exploitation of fossil fuels, and other methods that populated visions of the future and appeared in popular-science publications, scientific and technical experiments, and the pages of science fiction.

There is no smoke in the future city because "clean electric energy" in today's sense has taken over and is produced in ways that at the time seemed futuristic but were not impossible. It was a kind of hard science fiction, where the development of existing technologies was explored and anticipated. In *Czandu*, the source of clean electrical energy is "white coal – water" (Barszczewski 1925: 26). "The practical exploitation of the enormous power of sea and ocean tides, as well as of waterfalls and mountain streams, provided more than enough electric current to heat all the houses and run all the railways and workshops in the world" (Barszczewski 1925: 26). In *Czandu*, the dimension of the energy revolution is, if not global, then at least encompassing the region that is today called the Global North. In

[2] Translated from the Polish translation of the English original.

this novel, the effects of the energy revolution are not environmentally neutral, but the price of progress is supposed to be low:

> Although as a result of the intensive exploitation of this force of nature, the beautiful views of Schaffhausen, Giessbach, Staubach, Tivoli, Feveroera, Imatra, Niagara, Juansectlan, Victoria, Iguassu and so on, which were so enchanting for our romantic ancestors, ceased to exist, what did this immaterial loss mean in comparison with the material benefits, in comparison with the relief of human work, the facilitation of human life, the disappearance of those dirty coal trains circulating day and night on all railway tracks, polluting all countries, and unnecessarily consuming so much space and effort? (Barszczewski 1925: 27)

On the other hand, in Elektropolis, energy is drawn in a way that is more mysterious and less hostile to the surroundings:

> A strange building rises in the middle of the city. It is a tower, a lofty tower, wide at the base, at the top of which countless wires shoot up towards the sky. In this tower, a man, the mighty ruler of the city, has enclosed the tamed power with which he performs these miracles… It is the heart, brain, and strength of the city. […] This tower, as you can see, serves as the main reservoir of electricity… Special devices, with the help of long wires shooting up towards the sky, catch it from the clouds, from the airwaves, bring it down to the ground and bind it in special accumulators. The power I have in this tower is capable of wiping out half of humanity from the face of the earth with a mad hurricane. But it is not for warlike and murderous purposes that I imprison it. On the contrary, its task is to build and to awaken new life. It is from it that the currents spread, moving all the machines of the city's numerous industrial plants; it supplies power for the railways and trams; it heats and lights all the houses in the city. (Kruk 1912: 119–128)

Another idea for the future energy source was the sun. Solar energy is used by mysterious inventions in Mieczysław Smolarski's novel *Miasto światłości* [City of Light; 1924]:

> Within the few pages of this book, only a part of the knowledge that later enchanted even more powerful forces into the Tower of Silence has been revealed. The most eminent and boldest of our scientists proved then that light can do work. In the time of our unaware ancestors, it was only capable of transporting an imperceptible cell. After all, you know the theory that life came to Earth from the Sun in this way. In the time of our fathers, following Nell's instructions, it was not only possible to use light for miraculous, incredible visual phenomena but attempts were also made to move machines with it. (Smolarski 1988: 178)

Solar energy also appears, though very marginally, in Antoni Marczyński's novel *Rok 1947* [Year 1947; 1926]. This book describes the New York of the future as a metropolis where everything has simply become bigger, higher, more automated, and subject to "aviation" (there are various landing pads on the roofs and balconies of skyscrapers, which reminds us of Fritz Lang's *Metropolis* and David Butler's later film *Just Imagine*). In this gigantic city, solar energy has also been harnessed:

> On other roofs, gigantic lenses were placed. These were solar condensers. The problem of utilising the titanic thermal energy of the sun, which had been troubling the minds of inventors for centuries, has finally been solved and the life-giving golden rays have been harnessed for laborious daily work. (Marczyński 1926, no. 200: 3)

The city is the place where the energy of the future is to be used. Even if it is a garden city or a city in the desert, the imagined future does not include any sort of village, which, in the Polish imagination, as in Winawer's feuilletons, is a fantastic symbol of technological backwardness. Although the action in Stefan Wałdyka's very niche novel of 1936, *Tajemnica zamku kurzętnickiego* [The Secret of Kurzętnicki Castle], takes place in the provinces – where the super-modern base of a criminal organisation is hidden in the ruins of a Bond-type castle – the inhabitants of the area are shown as being superstitious and easy to deceive.

/// Rays of the "Radium Age"

The sun rays in science-fiction novels, and the quote from Calder's book in which he mentions X-rays and electricity transmitted without a cable,

bring us to pop-culture ideas of the future that were very characteristic of the first forty years of the twentieth century – rays and wireless communication. Joshua Glenn proposed a new periodisation of science fiction by introducing the term "Radium Age." He recognised that Marie Skłodowska-Curie's discovery of radioactivity had been a crucial milestone in the development of science fiction and the popular scientific imagination. Its influence lasted at least until the mid-1930s (Glenn 2022: 6). The Polish science-fiction works I have cited thus belong to the "Radium Age." It is no wonder that rays, radiation, and wireless transmission as future sources and methods of using energy appear often in Polish science fiction of that period.

Elektropolis has electricity transmitted remotely. In the description of the electric tower in the city centre, we read that

> from it, [are sent] those air currents which stir the surface of the earth and make it fertile… These currents move the ploughs and machines used to cultivate the land, move the pumps which systematically sprinkle all the fields with water from the wells… In Elektropolis, all the functions are performed by electricity, this overwhelming force – the task of people is only to make sure that it performs these functions properly. (Kruk 1912: 128–129)

The tower, the wirelessly transmitted electricity, and the lightning appearing in a later part of the novel evoke one of the most iconic "heroes of electricity" – Nicola Tesla. And indeed, the engineer Halicz leaves no illusions:

> "This is not my achievement," he said when he found himself among the guests, "these powerful electric rays were invented by an American electrical engineer, Tesla… I only perfected them and applied them practically… Allow me, gentlemen, to continue, and I will present to you the practical application of electricity, and the service it can provide to humanity…" (Kruk 1912: 130)

The electrical infrastructure depicted in the novel closely resembles the concept of wireless energy transmission that Tesla attempted to implement, albeit unsuccessfully, at his laboratory in Wardenclyffe (Carlson 2020). In both cases, the central component was a tower designed to transmit electrical energy wirelessly.

After World War I, Nicola Tesla himself was better known for ideas that had no practical application but fired up the imagination (Carlson 2020: 425). Transmitting electricity wirelessly became an obsession for the Croatian-Serbian-American inventor and even led him to have a serious nervous breakdown. The idea also permanently entered twentieth and even twenty-first century imaginings of the future. Although his most famous invention was the high-voltage coil – a visually spectacular device – Tesla also considered himself the true inventor of the radio. At the time, radio was not only a voice and telegraph communication technology. The purpose of his invention was to be something more – it was supposed to transmit energy without the use of cables. He worked on solutions that would make it possible for electricity produced in the United States to be received in Europe or, even better, directly in various types of vehicles. And since he actually also worked on remote-controlled vehicles, he could tempt potential investors and journalists with the vision of total electrification. According to Tesla, the future world would have no room for combustion engines, and this idea continues to have an impact even today.

The concept of wireless energy transfer evolved into the idea of "death rays." Of course, the vision of an energy weapon that was not projectile but based on rays, electricity, or radioactive elements dates back to the nineteenth century (Hecht 2019: 11). Nevertheless, the idea became exceptionally popular after the spread of radio and radioactivity – it seems that tabloid journalists did not fully distinguish one from the other, as the scientist and writer Bruno Winawer pointed out (Winawer 1927: 72). Not only Tesla but also various inventors gained international attention with death rays. For example, in 1913, the Italian engineer Giulio Ulivi announced the discovery of invisible "F-rays" with very destructive capabilities. Later, in 1924, the English engineer and inventor Harry Grindell Matthews claimed to have invented a device that could transmit electrical energy wirelessly over a distance. He asserted that it could destroy entire armies and their machinery. However, both inventions eventually turned out to be frauds. Tesla, though, announced a similar discovery of his own, called "Teloforce," which was also referred to by journalists as "Peace Rays." He presented his version in a series of interviews with New York newspapers and magazines in July 1934 (Hecht 2019: 23–25). The whole world was fascinated by it. As we can read in the August 1934 issue (no. 225) of the Polish newspaper *Nowy Czas*, 77-year-old Dr Nicola Tesla "announced the invention of death rays that would make any war impossible, because the current, raised to 50 million volts, could destroy a fleet of 10,000 aircraft from

a distance of 400 kilometres" (p. 4). After being perfected, the invention was to be presented at the Disarmament Conference in Geneva and used exclusively for peaceful purposes. In reality, it remained in the realm of legend and became fodder for science fiction and sensation-seeking media. Tesla maintained until his death that the invention existed. However, as his biographers report, after his death neither physical traces of the device were found nor technical diagrams among his documents (Hecht 2019: 27).

Death rays settled into the fantastic imagination for good. In Polish science fiction, we can find them, for example, in *Year 1947*. Marczyński used Matthews's idea here.

> Every fortress, every warship was equipped with Wood's apparatus, excellently improved. In 1937, this great American inventor drew the right fruits from the brilliant discoveries of Hertz and Marconi. Wood's apparatus emitted electromagnetic waves capable of disabling every combustion engine from a distance of twelve kilometres. This caused all cars, motorboats, and aeroplanes to stop immediately. As a result, Wood's rays were seen as a great benefit to humanity. (Marczyński 1926, no. 200: 3)

Today, deadly rays in art have become rather like the halos of previous eras. They are simple, universally understandable – some would say kitschy – and primarily visual signifiers of science-fiction aesthetics – signifiers that are probably not even associated with changes in thinking about energy transmission. Think, for instance, of the lightsabre in *Star Wars*, or of laser cannons and phasers in *Star Trek*, and so forth. No one expects science-fiction creators to explain how rays and energy work (frequently without any additional material-mechanical component). On the other hand, in today's "language of science fiction" we can hear an echo of the interwar fashion for rays and the terminological ambiguity that emerged in the move from the exact and technical sciences to the language of everyday life – that is, to popularising narratives and the language of the future. The "rays" might be solar, artificial, radio, or radioactive, but few people considered whether it was possible or necessary to distinguish them.

This notion is well illustrated by Bruno Winawer, a Polish scientist, columnist, and writer who valued science fiction as a literary genre. But he also placed science journalism on the side of cheap fantasy. He wrote in one of his columns that

> There are, unfortunately, other contemporary fantasy writers, much less educated, who believe in the omnipotence of science and technology – journalists. […] They understand that anything can happen in this field. That is why they release printed nonsense that takes flight and sometimes lives for half a year. I have noticed that these reporters have a certain system and are most eager to make discoveries in the field of optics. For a time, rays that ignite gunpowder from a distance and blow up mines and ammunition depots were very fashionable. Another time, light waves that could blind an entire enemy army shot out of the printed page. (Winawer 1927: 72)

Winawer seemed to be perfectly aware of the boundary between scientific fashion, the generating of various fantasies, and scientific speculation, though what was and wasn't fantasy perhaps only seemed so to him, since this boundary was not perceived, for instance, by the legendary inventor Nicola Tesla. Winawer undoubtedly noticed the existence of a pop-culture fashion that he seemed to be opposing but that he simultaneously helped create, as will be explored below.

/// Not Rays but Radiation

Contemporarily, radioactivity is more likely to be thought of as an energy source rather than as deadly rays. Power drawn from radioactive elements still seemed attractive in the interwar period, though even then they were recognised as being dangerous (Moore 2019). However, the so-called "radium madness" had already passed, and nuclear weapons were practically not yet imagined. The weapons of mass destruction were supposed to come from gas and rays; an atomic bomb was not considered. Imagination often failed. Calder saw no practical application in attempts to "split the atom." "What may come of all this, no one knows today" (Calder 1936: 113). The basic repertoire of fantasy and press sensation also did not include the idea of radiation as a source of heat that could replace steam boilers and combustion engines. A certain doubt about the usefulness of radioactive elements, as well as an attempt to sum up the Radium Era, can be found in the novel *Radium* by the Austrian writer Rudolf Brunngraber (1936, published in Poland around 1938). Brunngraber aimed to achieve something similar to Émile Zola's naturalist works. *Radium* was to present a social panorama of the "radium madness": from the discovery of radium

and polonium, through attempts at the practical application of radioactivity, to dashed hopes and the discovery of the harmfulness of radiation.

References to radioactivity and atomic energy also appeared in Polish science fiction of the time. The motif of "taming the atom" appears in *City of Light*, although only in the form of a legend. By narrating his story from the perspective of a fallen civilisation of the distant future, the writer could touch upon themes of futuristic energy without having to explain the details:

> However, it was said that the spirit was the famous inventor Paul Nell, who had once saved the city during the war raging around it and had discovered hitherto untamed forces of nature, either by releasing the energy hidden among atoms or by being able to oppose in experimentation the rotational motion of the Earth, through which, if he wanted, he could provoke a terrible clash capable of destroying the entire globe. (Smolarski 1988: 135)

The motif of radioactivity and the sun as a source of light that could largely solve the energy problems of cities was used very interestingly in Winawer's novel *Doktor Przybram*. The author, who was known for concealing quite interesting analyses of the difficult fates of scientists in his science-fiction works, treated scientific speculation equally seriously. In the narrative, the eponymous character, Dr Przybram, tries to discover a substance that could ignite an energy revolution and provide affordable light for every home and street. This fictional breakthrough references well-established phenomena of luminescence and radioluminescence, the latter of which was a controversial yet hopeful concept at the time of the novel's publication in 1924 (Moore 2019). Dr Przybram successfully searches for a way to create safe "cold light": "If we find something certain – in my manuscripts: 'radiator X' – we will immediately create new particle resonators; we will be able to change any load of useless plaster into a miraculous substance that will absorb and store solar energy during the day, and then ignite spontaneously at night and shine with a bright cold flame" (Winawer 1924: 16). Winawer was more focused on the social consequences of the appearance of "the greatest invention of the century" than on a vision of technological change. He seemed, though, to have no illusions that it would be a solely positive discovery. In the novel, light energy, which is widely available and potentially cheap or even free, quickly becomes the subject of

commercial speculation, media attention, and international conflicts, and even contributes to unemployment among painters. A reader might sense that, in the era of startups and digital capitalism, Winawer's ideas are still extremely relevant, but this is a topic for a completely different paper.

Another Polish interwar writer, Leonard Życki-Małachowski, took up the issue of alternative energy sources in an interesting way in his 1935 story *Władca Grenlandii* [The Ruler of Greenland], in which an unemployed engineer, Antoni Drzewica, goes to the Pieniny Mountains to visit Stefan, an old school friend and currently a forester. The action takes place in an unspecified future, in which "travel was mostly by plane or, to closer places, by monorails, moving at great speed" (Życki-Małachowski 1986: 326). Stefan discovers that the local parish chronicle contains the story of Kacper Mocarny, a companion of the famous Hetman Czarnecki and an adventurer who travelled to Greenland. Towards the end of his life, Kacper had settled in the Pieniny Mountains and engaged in research, for which the local priest had considered him to be a satanic alchemist. According to the chronicle, Kacper disappeared one day, and the locals still thought the valley where he had lived was haunted: "Various lights and flames appear on the mountain, which is true, as I desire eternal salvation" (Życki-Małachowski 1986: 332). Drzewica claims that Kacper was a pioneer of modern research and that the legends told of scientific experiments. He is convinced that apart from his numerous hunting trophies, Kacper must have brought back treasures of value to science from his polar expeditions. Drzewica discovers a cave in which a message from Kacper (encouraging experiments) and his treasure are hidden:

> After a few powerful blows, the lid popped off and inside the box a dark stone and a glass tube filled with whitish powder could be seen. […] Another strange phenomenon caught their attention. Something was shining from inside the cave. They put out their lamps and saw that a strange light was coming from the table.
> "This stone is shining," whispered the forester, as if confiding a great secret to someone.
> The engineer was already approaching the table and taking the stone in his hand.
> "And it's warm…" he added, handing it to his friend.
> "So, is it some kind of radioactive substance?" (Życki-Małachowski 1986: 337)

Drzewica calls the new element "casprolite." It "works" on a similar principle to "nellite." It also produces heat and moves in space – it lifts itself towards the source of light:

> Our accumulator charges itself, lifts itself towards the source of energy, that is, towards the sun, and is again pulled towards the earth by the opposite pole, giving it its power at the same time. You see that this tiny amount moves the machine. If, in the polar regions, this new element is really found in large quantities, and if it were within human power to extract it from there – if it could be chemically shaped like this sample – then we would have an inexhaustible source of energy for the earth. We would only have to expose this new slave of the earth to sunlight and take its energy with our opposite poles. Yes, Mr Japanese! My invention is not suitable for war, but on the other hand – what colossal possibilities would finding deposits of casprolite have for people! There would be no poor, abandoned, exploited people, because our machines would have plenty of energy for free. (Życki-Małachowski 1986: 340)

The engineer therefore goes to Greenland, where he mines casprolite and becomes a kind of ruler of the island:

> Intensive work reigned in Greenland. The unemployed from all over the world, who came here at the call of the engineer Drzewica, applied themselves to it as zealously as if through this zeal they were trying to erase the memory of years of forced inactivity. Two large balls of casprolite – one in the north and the other in the south of the island – provided inexhaustible amounts of energy, which was used by heating machines, melting ice. The earth was already covered with beautiful green grass and young shoots of freshly planted forests. New settlements were emerging rapidly, like mushrooms after rain. Fields were prepared for cultivation, cattle breeding was introduced, and the extraction of immense mineral wealth began. In a word, in all fields there was tireless activity. And on everyone's lips there was only his name, that of the ruler and guardian – the engineer Drzewica. (Życki-Małachowski 1986: 348)

Despite the work's noble slogans and anti-capitalist message at the end – "Let them remember that the machine was created for people, not

people for the machine, and let them act in such a way as to contribute to the happiness of HUMANITY" (Życki-Małachowski 1986: 348) – the story is deeply rooted in colonial discourse, bringing to mind the famous anecdote about Polish diplomats who asked in 1938 at the League of Nations whether they could count on a colonial mandate, even if only in Antarctica.

/// Conclusion: "Disconnecting" Electricity from Its Sources – The Border of Utopia?

The above brief overview of the past's imaginary future energy sources leads in my opinion to several quite important conclusions.

First, the energy futures and alternatives considered today are still rooted in the imagined futures that entered social imaginaries before 1939.

Since the second half of the nineteenth century, the energy of the future has primarily been considered to be electricity, and – in a sense – it is still so today, and alternative methods of producing it are similar (Stasik 2018: 164; Smil 2022: 199). Why? I can only speculate, but electricity gained futuristic significance as it became more independent of fossil fuels and simple mechanisation, which were its origins. Electricity had the potential to be the most "alienated" energy – the most different from everyday life in the age of coal and steam. Vaclav Smil, a researcher and kind of historian of energy, emphasises that electricity was impressive because it required (it still requires) an enormously complicated and extensive infrastructure – a "whole new system" (Smil 2022: 199) – in order to operate. Moreover, the system was based on an "invisible" and dangerous "current," about which not everything was yet known, which could be called "pure science fiction" (Smil 2022: 199), and which was similar to the ghosts of spiritualists and the rays in stories about mad inventors and aliens. Through this elusiveness, electric energy gained a dimension that was finally fulfilled in the silence and "post-electricity" aspect of the digital machine. The noise, heat, and smokiness of the industrial era was finally to give way to the silence and transparency of the new electricity and then to what was called electronics. This division was aptly described several decades later by Alvin Toffler:

> The old symbols of technology are even more misleading today, when the most advanced technological processes are carried out far from assembly lines or open hearths. Indeed, in electronics, in space technology, in most of the new industries, relative silence and clean surroundings are characteristic – even sometimes es-

> sential. And the assembly line – the organization of armies of men to carry out simple repetitive functions – is an anachronism. It is time for our symbols of technology to change – to catch up with the quickening changes in technology, itself. (Toffler 1970: 25)

Electricity was therefore supposed to liberate humanity from the traditional industrialisation of the Industrial Revolution, and thus also from steam, fire, coal, and gears. It was also supposed to involve the liberation of workers from the drudgery of industrial work: an energy revolution that would give everyone a chance by removing hard physical labour and providing electrical energy. We can find such an "energy-based" future in Antoni Lange's *Miranda*, in which perfection is achieved by people transformed through energy into astral bodies: "Each of us is his own aeroplane; he is his own telephone and telegraph; we can communicate with each other at a distance in thought and word; we can even see each other at a distance. We have created a machine of machines that handles all our affairs in a simple and precise way" (Lange 1924: 91). In the twenty-first century as well, the idea can be found that such a state of affairs will exist in the future (Krzysztofek 2018: 34).

In the science-fiction landscape, this division between the filth of industrialisation and the sterility of life for people of the future, as well as its superficiality, was aptly captured by Thea von Harbou and Fritz Lang in their famous novel and film *Metropolis* (1925/1927), which depicted a clean, electric city of the future with dirty, traditionally "machine" undergrounds inhabited by the proletariat. In this case, there was no miraculous future source of clean energy – instead, the filth and hardship of industrial work were just hidden. The remoteness of electricity allowed its dirty sources to be kept out of sight of those who used it. A similar if less legible symbolism can be found in Smolarski's *City of Light*. The post-apocalyptic world is the remains of an industrial civilisation, and the city represents the highest level of post-industrial technology – with electricity and rays (energy) being generated without the participation of the city's inhabitants and out of their sight. Finally, however, it turns out that without a human component – without human work and knowledge – the city will not be able to survive.

The metaphor of separation and concealment is still incredibly relevant today and appeared in an updated form in the mid-1990s in *The Matrix* by the Wachowskis and in "The Californian Ideology," an influential essay by Richard Barbrook and Andy Cameron. The promise of alternative, unlimited, and automated energy sources being available in such a manner that

electricity and electronics could ultimately become new materiality (apparent immateriality) is still being replaced by distancing and neocolonialism. From the global perspective, electricity is still dirty and still old-mechanical. Energy acquisition becomes distant or remote work, performed far away, often beyond the borders of clean, electric civilisation – in mines and nuclear power plants. Let's not forget that these are steam power plants, where the energy of burning coal has been replaced by the energy of radioactivity (Barbrook & Cameron 1995). Researchers and popularisers of changes in the field of energy consumption (Smil 2022), as well as critics of digital capitalism (Zuboff 2019; Zygmuntowski 2020), are still writing in a similar tone today.

Second, Polish science fiction (but not it alone) created visions of a future without nuclear energy, or at least not the kind of nuclear energy that we have today. As I have pointed out, the interwar imagining of the use of energy drawn from radioactive materials, which were considered dangerous at the end of the Radium Age, did not match the reality of the postwar Atomic Age. In interwar science fiction, there are no reactors as a basic source of electrical energy, and there are also no fears about the terrifying energy of a nuclear explosion. There is no atomic apocalypse. Even in *City of Light*, there is only a legend, and the weapons of mass destruction are death rays and poison gases. Today, the darkness of Atomic Age imaginings can be disenchanted by showing that atomic energy is not as terrible as popular culture paints it, and that atomic energy is the only reasonable alternative to a climate catastrophe. The pop-culture history of nuclear energy shows what a significant influence science fiction can have on shaping the social imaginary (Weart 1991). More importantly for the present argument, however, a look at pre-1939 science fiction allows us to see that it is possible to imagine different futures and different energy solutions beyond the nuclear alternative, and that before the Second World War there was a set of possibilities and untapped variants that may still provide inspiration if not the complete answer.

Third, this leads us to questions about today's vision for the future, and to the longtermism mentioned at the beginning of this paper. How should we look towards the future? Is it worth studying the future by reaching back into the past?

Has belief in a future composed of the Internet, the cloud, the virtual reality of digital networks, and the dominance of artificial intelligence covered up the fact that under this digital layer, the old vision of the future from a hundred years ago is still present? This can be seen when we

descend to the sphere of energy and its sources, and at the same time when we consider how unpredictable the distant future is.

Thinking about the future, about alternative energy sources, and about the long-term effects of energy transformations, requires not only looking extremely far into the future but also being aware that this type of practice is the same as that which produces science fiction utopias or dystopias and is nothing new (Bowler 2017). That is why it is so important to look back – not to look for retrotopias there (Bauman 2017) but to discover forgotten imaginary futures in fragments of the past, on the assumption that "the past is not an unchanging set of facts that we are only supposed to recall as written in history books, but an infinite set of possibilities" (Szydłowski & Zielinski 2014: 235).

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/// Abstract

The paper reviews the most important, in the author's opinion, visions of alternative and futuristic ways of producing energy in Polish science-fiction literature before 1939: from electricity generated by hydroelectric turbines through solar rays to radioactivity. The author wonders whether such ideas of energy transformations are still relevant and whether various kinds of pop-cultural visions of the future from the twenty-first century are characterised by unconscious reproduction of modernisation and modernist narratives from a hundred years ago. The theoretical framework of this paper draws upon Richard Barbrook's concepts of imaginary futures and Charles Taylor's social imaginaries, as well as Siegfried Zielinski's concept of media archaeology.

Keywords:
energy sources, Polish science fiction, interwar period, Radium Age, imaginary futures

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