

# Relational Geographies of Planetary Urbanization and the Question of Alter-Urbanization

Urban Theory Lab Research Practicum

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## RELATIONAL GEOGRAPHY

### IS SIBERIA THE TRANSNATIONAL CORPORATION?

A series of industrialization waves, driven by sociopolitical concerns and State policies—from prison camps, to Soviet socialism, to mass privatization—created a framework for the present-day Siberian urbanization process. The case of Norilsk Nickel, operator of a copper, nickel and platinum-based mining megacomplex in northern Siberia, is representative of the monoindustrial corporate strategy within the post-Soviet backdrop of oligarchic monopoly, corruption and political unrest. The company's territorial scale mobilization through logistics networks, energy development, and corporate alliances exemplify strategies sought to reduce corporate exposure while creating unchecked ecological and social risks.

### NICKEL | Ni | ATOMIC NUMBER 28

Siberia is a heartland of nickel extraction, producing 11.5% of the world's nickel, second to only the Philippines for global production in 2012. Nickel is found around the world, typically as one of two ore types—sulfide or laterite deposits, corresponding to 40% and 60% of world reserves respectively (USGS 2016). Laterite resources are primarily formed in tropical climates following extreme weathering, whereas most sulfide deposits are typically derived from volcanic and hydrothermal processes (Mudd 2009). Major sulfide deposits are in Norilsk-Talnakh (Russia) and Sudbury (Canada). Once extracted from the ore, nickel is primarily sold as a refined metal (cathode, powder, briquette, etc.) or ferronickel product. Lauded for its versatility, nickel will alloy with most metals. Complete solid solubility exists between nickel and copper and wide solubility ranges with iron and chromium make possible many alloy combinations with nickel.

China is a predominant importer of raw nickel exports, followed by the United States, Malaysia, the Netherlands and Germany (MIT-OEC 2013). This correlates to the rise of the steel industry in China and nickel's direct relationship with stainless steel production. These interrelated primary commodity networks link operational landscapes of nickel and iron extraction, sites of stainless steel production and manufacturing industries, such as automotive and petrochemical. Nickel is ultimately integral to the production of highly technical manufactured goods. This chain, however, exposes the nickel industry to repercussions in the global steel industry and vice versa. China, as the leading steel producer, has directly affected steel costs, causing down and upstream consequences. Additionally, the complexity of this commodity chain requires large amounts of energy and extensive logistical operations. It is clear that nickel is not only a base commodity of extraction but part of a greater system.

About 65% of the nickel consumed in the Western Hemisphere is used to make austenitic stainless steel. Another 12% goes into superalloys (e.g., Inconel 600) or non ferrous alloys (e.g., cupronickel). Both families of alloys are widely used because of their corrosion resistance (USGS 2016b). Leading consumers

of nickel alloys are petrochemical, automotive and aerospace industries (Norilsk 2013 Annual Report). For example, alloyed steels are vital to mission-critical jet engines components, airframe structures, and other applications where common stainless steels may not provide adequate performance (ATI 2016).

The major corporate players in the nickel industry are Norilsk Nickel and Vale. Norilsk Nickel, the primary case study of this exploration of Siberian territorial urbanization, is an open-stock mining company principally concerned and leading global production of nickel and palladium, plus interests in platinum, cobalt, copper and rhodium extraction and processing. In 2005 Norilsk Nickel accounted for 90% of nickel and platinum metal group metals in Russia, a monopolistic situation not atypical to Russian commodity development (Levine and Wallace 2005). Vale operates in Brazil, Canada, Indonesia and New Caledonia, and the remaining top five operators include Chinese, Swiss and Australian corporations.

The global scale of this commodity industry has recently been characterized by an overall devaluation across most commodity sectors, nickel included. Specific to Russia, the country's overall economic crisis is disconcerting. Declining economic output and a 15% increase in inflation in 2015 are sending repercussions throughout the state. Under the Soviet system, the output of Norilsk operations were primarily consumed within Russia. With the collapse of the Soviet economy, Norilsk Nickel began a trade relationship with Europe that still stands today, in spite of the conflict in the Crimean Peninsula and the potential resultant limitations to Russian economic mobility and markets. There is already a turn to China, as a primary steel manufacturing center, and given the political climate the future may continue in this trend. In spite of this market uncertainty, nickel production has made small gains, partially attributable to the devastating weakness of the Russian ruble (Levine and Wallace 2005).

## **NORILSK NICKEL**

Nickel was first extracted in Russia in the Ural Mountain range, and many of those sources are now exhausted. While large nickel reserves were known to exist in the northern reaches of Siberia for some time, the mobilization of nickel extraction in the Polar region did not occur until the last century. Norilsk Nickel operates out of these northern reaches of Siberia—Murmansk Oblast on the Kola Peninsula and Krasnoyarsk Krai on the Taymyr Peninsula.

The company history springs from the gulag camp 'Norillag' of the 1930s through 1950s; however, the general form of the present corporation developed in the waning years of the USSR. On November 4, 1989, the USSR passed a resolution on the 'State Concern for Non-Ferrous Metals Production Norinickel,' beginning the first level of consolidation of the nickel and non-ferrous metals industry within Siberia and along the Arctic coast. This legislation connected the geographically disparate Norilsk Mining and Metallurgical Plant and Krasnoyarsk Non-Ferrous Metal Processing Plant both in Krasnoyarsk Krai; the Mining and Metallurgical Plant Pechenganikel, Severonickel Plant, Olengorsk Mechanical Works, all in Murmansk Oblast; and the Gipronickel Institute in St. Petersburg. Significantly, these interests previously existed as fully operationalized entities in their respective industries, with well over 100,000 people in their employ (Glazunov 2013, 116).

The state consolidation of these operational landscapes connected seemingly remote places, albeit heavily developed for the extraction economy, by industry. The creation of the Norilsk Mining and Metallurgical Plant agglomeration is a quintessential example of a localized development strategy deployed on the Siberian territory. By 1989 Norilsk was the site of five mines, two ore concentrate plants and three metallurgical plants, directly attributable to the work of persons in the forced labor camp of Norillag. These

previous rounds of state directed industrialization ultimately become the inherited riches of today's transnational corporations.

With the fall of the Soviet Union in 1991, the historic industrialization of the Siberian territory saw government owned assets claimed as the cornerstone to newly created private corporate interests. Arguably, this could be interpreted as a transfer of mineral extraction industries from government held regimes to similar institutions, except now helmed by powerful, overwhelmingly wealthy, oligarchs. This corrupted, private takeover of the physical Soviet legacy, constituted the base infrastructure which the corporation would use to re-envision the territory in service of its own economic goals.

The formal privatization of this 'State Concern' occurred over the span of 4 years. By 1997, Norilsk Nickel went from state control to private corporation. The mechanism for this maneuver came as a result of the suspect "loans for shares" programs of the early Russian Federation. The July 1993 Presidential Decree 'On Special Features of the Sale of Shares and Privatization of the Russian State Nonferrous and Precious Metal Concern Norilsk Nickel,' laid the terms for the privatization of today's present Norilsk Nickel corporation. The following April, RAO Norilsk Nickel officially became an 'open joint-stock company.' Assets were split among employees and investors, but 48% were retained by the state (Glazunov 2013, 117). The 'loans for shares' system operated through the loaning of these state-held shares; a phenomenon that went beyond the case of Norilsk Nickel and contributed to the extreme wealth and power of many of the oligarchs today. Essentially, a consortium of Russian banks received government owned assets as collateral for loans issued to the state. Vladimir Potanin, then President of United Export and Import Bank of Russia, hereafter Uneximbank, became a primary facilitator to the management of the loans and eventual appropriation of the loaned assets (one being Norilsk Nickel) into a privately held corporation, controlled by himself and Mikhail Prokhorov. (Glazunov 2013, 117-8).

In 2001, RAO Norilsk Nickel became OJSC MMC Norilsk Nickel, a change affecting the operation's legal status and shareholder distribution, in the favor of higher stock prices and fewer shares in the hands of individuals and employees (Glazunov 2013, 123). By 2012, Norilsk Nickel assets were divided among the interests of Interros (Potanin), RUSAL (Deripaska), Metalloinvest (Usmanov), and Crispian Investments (Abramovich) (Norilsk Nickel 2015). Glazunov, drawing on Boldyrev, underlines this not trivial point; the Russian state received US\$170 million for a corporation whose net profits were totaling roughly half a billion (Glazunov 2013, 118).

As evidenced, over the past two decades Norilsk Nickel has undergone corporate restructuring, consolidation and reinvention. Following the 1997 takeover of Norilsk Nickel by Potanin and Prokhorov, the company focused on "increasing the production of metals from the company's own ores, involvement of stale raw materials into the conversion processes, development of production of metals from waste products in production facilities of the Kola Peninsula, increasing direct sales to foreign producers-processors and implementation of new technologies in the mining and metallurgical areas... the strategy [also] included elimination of inefficient production units, acquisition of licenses for new ore deposits and essential vital energy and transport companies, and creating international alliances with companies processing non-ferrous and precious metals" (Glazunov 2013, 122).

Similar to the state reorganization of Norilsk Nickel across multiple related assets, Norilsk Nickel sought internal diversification as a means to continue what can be described as the territorialization of the corporation. The company needed to overcome the disadvantages of fixed resource extraction economies. The Norilsk agglomeration lacks overland connections, relying on water and air transport for both commodity distribution and sustenance. Thus aspirations resulted in a turn to developing energy and

logistics capacities. By gaining control over its main providers and contractors, Norilsk Nickel would have the flexibility to move through the landscape uninhibited by outside controls. Their self-serving corporate project manifests in independence through development of necessary operational goods.

Considering first logistics, the company now owns an airline carrier, interoceanic icebreaker fleet and port assets, and Yenisei River shipping company. The Northern Sea Route through the Arctic is critical for nickel exports. Without it, Norilsk would have been at a serious development disadvantage, as nearly all assets (railcars, supplies, people) originally arrived by boat. While the Northern Sea Route is a vital shortcut for commerce between Europe and the Asia-Pacific region, its maintenance is non-negotiable for supporting Norilsk.

Therefore, the substantial investments in water infrastructure are unsurprising. Given that the aforementioned Northern Sea Route is only ice-free two months of the year, in 2009 Norilsk Nickel began purchasing specialized container cargo ships (diesel-electric powered), today operating a fleet of five vessels. These ships are capable of breaking through 1.5 meters of ice without assistance from ice-breaker ships. This process is achieved through an innovative design that rotates the main propeller 180 degrees, essentially maneuvering the ship in reverse configuration. Over the course of a year, the fleet runs between Dudinka, Murmansk, Arkhangelsk, Rotterdam, Hamburg and Shanghai; transporting a total annual freight of 1.3 million metric tons, of which 0.45 million metric tons are directly attributable to metal products mined by Norilsk Nickel (Telegraph / Rossiyskaya Gazeta [article](#)).

As Norilsk Nickel expands into the Trans-Baikal region with their Bystrinsky project, they are continuing to develop new logistics capacities and infrastructure. In two joint ventures, Norilsk Nickel is developing air and rail connections near Chita. Norilsk Nickel and the regional government of Zabaikalsky Krai, purchased L-410 UVP-E20 aircraft to service air routes between Chita and the Gazimursky/Nerchinsky plants, and intend to construct 227 kilometers of railway lines in the Trans-Baikal region and an ore mining/processing complex. This is part of a larger social and industrial development agenda for the region. "Norilsk Nickel COO Sergey Dyachenko said, 'Chita project is one of the Company's top priorities and development of transport infrastructure connecting Bystrinsky polymetallic ore mining and processing complex to the regional center is clearly of paramount importance. That's why the Company decided to back regional government's plans on buying an aircraft to service crucial routes' ([Norilsk Nickel](#))."

In regards to energy, the company holds key gas fields and hydroelectric dams. Norilsk Nickel owns its own fuel and energy complex west of Dudinka seaport, consisting of one gas and three gas condensate fields, operated by the Norilsk-Taimyr Energy Company. This subsidiary is responsible for the generation, transmission and supply of electric and thermal power to consumers. In addition to supplying the company's own production needs, excess gas is sold by Norilsk Nickel and the Norilsk-Taimyr Energy Company for thermal and electric power generation across their operations and beyond. Gas is shipped by sea to other Norilsk Nickel operations along the Arctic sea route, plus ports in Europe.

Through these corporate diversification strategies, the reach of Norilsk Nickel extends beyond its primary sector of mineral commodities. Their monopoly of Norilsk and the Taimyr Peninsula, dominates all aspects of life. They maintain their workforce by offering competitive salaries and their corporate territorial reach includes the subsidization of worker housing in Russia's largest cities. Beyond that structure, Norilsk Nickel also retains interests that support its operations through ownership connections. These alliances with other private industrial conglomerates reinforce the corporate machinery. Holding shared interests in logistics, trade, banking, plus complementary production ventures such as steel, and even media, they can work in tandem to achieve a resource utilization and development scheme for their benefit.

Operating on a global market, Norilsk Nickel has taken advantage of various forms of economic exchange within and beyond the territory, capitalizing on fiscal advantages in the international resource trade and labor costs within its borders. Their worldwide view connects nickel as not only a base commodity of extraction, but part of a larger network, dominated by transnational corporate power.

## CRITIQUE

Grab a 5-cent piece, *nickel*, from your pocket and you hold a coin that is 25% nickel and 75% copper. Open the door of your *stainless steel* refrigerator and consider that it is in part made possible by the steel alloyed with nickel. So nickel, in itself, may seem relatively harmless. However nickel extraction and the associated land use transformations have come at great cost. Operations as they currently exist, destroy health, opportunity and the environment, inscribing the land and atmosphere surrounding these sites with their devastation. Therefore the critique of the corporate urbanization project is its drive for unabated development stemming from the corporation's own need for self-preservation through capital accumulation, without regard for degradation of the environment, health and societal well-being.

## ENVIRONMENT AND HEALTH

Norilsk tops the chart for emissions pollution in Russia, such that it is a significant concern for the entire global community (Rosstat 2011 and University of Kansas 2016). As a result of smelting and refinement, heavy metals are literally falling from the sky. The primary pollutants are airborne emissions derived from copper, nickel, cobalt, iron, manganese and sulfur (Yakovlev 2008). As exemplified in the New York Times piece, Mr. Vladimir Stratyev, described himself as "in effect, a miner of air pollution" working for contractor Poligon ([New York Times](#)). In an ultimate understatement of the processes that cause these conditions, they are extracting "technogenic sources of ore."

Additionally sulfur returns to earth in the form of acid rain, destroying 1.2 million acres of forestland around the Norilsk megacomplex ([New York Times](#)). There are not any living trees within 50-kilometers of the smelter, mainly due to acid rain (Glazunov 2013, 121). Some sources cite 1% of global sulfur dioxide emissions are directly attributable to activities in Norilsk. Soils have elevated levels of copper and nickel concentrations within a 60-kilometer radius of the city (Dolgov 2013). In Norilsk the soils within a 4km radius are so fully devastated they are deemed in "a catastrophic state," meaning environmental loss exceeds 40% and the transformations are essentially irreversible (Yakovlev 2008).

If minerals are essentially vaporized into the air, then they are also causing physical human harm. Cases of lung cancer, allergies and skin lesions "nickel eczema" are directly attributable to these conditions. High rates of respiratory disease and cancer are attributed to the 500 metric tons each of copper and nickel oxides and 2 million metric tons of sulfur dioxide spewed into the air from mining and smelting operations. Life expectancy for factory workers is 10 years below the national average. In spite of these risks, the potential financial gains for corporations operating in resource extraction are sufficient to provide incentives to work in the mines. But meanwhile, the mining activity is plagued by the aforementioned environmental hazards.

Across the polar regions of the world, climate change is a pressing concern. Nickel extraction and its associated downstream industries, such as steel and manufacturing, are direct contributors. And while climate change is affecting permafrost stability on a national scale, locally the concentration of minerals in the soil already represents what the future might hold. Building foundations are shifting due to the increased

presence of minerals which lower the freezing temperature of the groundwater. Localized incidents of land subsidence persist, due to accelerated permafrost thaw. Seven percent of buildings have been abandoned because they are no longer safe to occupy due to uneven settlement ([New York Times](#)). Similar but larger scale effects will result because of climate change, increasing the burden on existing infrastructure and buildings. An added concern is the potential to accelerate these effects, as organic carbon sequestered in permafrost soils will be released as greenhouse gases once the soil thaws ([Nature 2015](#)).

While Norilsk Nickel has acknowledged these issues in its Corporate Social Responsibility Strategy, the immediate and long-term impact of their four top-priority environmental protection goals is less clear. Their lofty goals consist of reducing atmospheric emissions (mainly sulfur dioxide and solid matter), minimizing water pollution; avoiding maritime spills during transit, and developing waste disposal areas for the byproducts of production processes. In 2014, Norilsk Nickel's environmental expenditures totalled more than US\$80 million, of which approximately 25% were due to enforced violations. More than US\$210 million were allocated to environmental protection measures (Norilsk Nickel 2014b, 58-60). But these issues still need to be addressed with greater immediacy and regulation.

## **SOCIAL**

Norilsk is the most northern city in the world with a population greater than 200,000 (Glazunov 2013, 121). It is a place isolated by distance, lack of terrestrial transport, the Siberian cold, and closed in 2001 to nearly all foreigners, for undisclosed and only speculative reasons. This seems to be a return to Soviet policies that restricted access to strategic military and scientific sites, such as Kaliningrad and Vladivostok (now open). Approximately 10 cities remain closed in the post-Soviet era, as they hold nuclear research centers (The Associated Press 2001).

The entire operation struggles to maintain a population that can meet the demand of the extraction industry. Russia has seen declining populations across the nation since the early 1990s. In addition to the difficulties of the Siberian climate and remoteness, Gaddy and Ickes (2013, 95) note potential fallacies to promoting population growth as economic policy. They also point out a ramification of improved health and greater longevity—an increase in dependent populations. Alternatively, they suggest populating warmer, less remote areas and improving education for a greater positive effect. However, in the case of primary resource extractions the former policy may not be possible. And a better educational policy will likely allow for greater labor mobility, decreasing the workforce in less desirable regions of the country, causing them to 'lose out'. Considering this, the education system has seen little reform under the oligarchs' management, and uneducated workers are funnelled into lower end jobs (Gaddy and Ickes, 95).

Norilsk Nickel has 71% of its labor force stationed in Norilsk—out of its 80,000 employees, roughly 56,000 are accounted for in the Polar Division alone. This coincides with the company's most critical assets being based in Norilsk. Until the 2001 closure of the city to foreigners, about 10% of Norilsk's total population were non-Russian, many of them attracted to—like Russian workers—the wages. On average, a Norilsk Nickel employee earns US\$2,000 a month (Norilsk Nickel 2014a, 90). In part deriving from former traditional Soviet policies, Norilsk Nickel also provides a series of wellness, sports, social, safety, educational, training, environmental, health and holiday programs and assets for its employees (Norilsk Nickel 2014a, 92).

An example of the company's programming includes their pension and homeownership programs. Directed in an effort to attract personnel to their Far North assets, a 50% subsidy is provided by the company towards the purchase of housing in more preferential locations in Russia, such as Moscow. This program,

run since 2012, guarantees support for approximately 550 units per year (Norilsk Nickel 2014b, 87). In April of 2007, Norilsk Nickel established its own corporate university by consolidating in Norilsk other centers previously based in Moscow and Kola, creating the Norilsk Nickel Corporate University, a non-governmental educational institution, responsible for all internal corporate procedures related to personnel education and training (Metal Supply and Sales Magazine 2007 ). They enroll more than 20,000 a year; all financed by the company (Norilsk Nickel 2014b, 81).

Given its primacy in the territory, all aspects of life—education, work, amenities—are dependent on the corporation. Glazunov suggests that this dependency has created an atmosphere where citizens are “afraid of speaking out and providing truthful information” (2013: 121). In a way, Norilsk Nickel has created a monopoly not only of industrial might, but to life itself. Its economic impact is clear and the resultant social ramifications spur directly from Norilsk being the principal employer in the Taimyr Peninsula.

Local politics are also firmly entrenched in corporate interests. In 2001, former general director of Norilsk Nickel, Aleksandr Khloponin, won the election for governor of the Taimyr Region, where Norilsk is located. During his one-year tenure, prior to subsequently gaining the governorship of Krasnoyarsk Krai—a larger regional division of Russia which includes the Taimyr Region—Khloponin changed the taxation structures for the benefit of Norilsk Nickel (Glazunov 2013: 121). The ambiguities of ‘Norilsk,’ the agglomeration, and ‘Norilsk Nickel,’ the company, are also apparent in these regional politics, as at the time the former was regulated by Krasnoyarsk Krai and the latter registered to Dudinka, the Taimyr Region’s capital. As a result 80% of the region’s operating budget was directly attributable to Norilsk Nickel’s activities. Disconcertingly, *The Moscow Times* quoted a Russian political analyst applauding the move. Alexei Titkov of the Moscow Carnegie Center suggested, “In Russia there are just a few institutions that unite it—the army, maybe political parties or central television...It’s important to have big companies in whose interest it is to have a unified, functional Russia” (Uzelac 2001).

## **ALTER-URBANIZATION**

There needs to be a challenge both to true corporate accountability and the monopolization of industry and development. The market needs to be critically examined for inputs and outputs to determine over the longue durée the impact of production today. The productivity of Norilsk Nickel should not continue unabated without reflection on global commerce demand and price. We need to begin assessing the potential opportunities in the various realms that Norilsk Nickel is firmly entrenched.

From an economic standpoint, there are opportunities for Norilsk Nickel to continue consolidating and innovating within the existing process of production. Forward progress could be framed under the development of cleaner technology for mineral extraction and responses to the environmental crisis in the Norilsk region. Possibilities to be explored are the diversification of metallurgical services, such as recycling or reprocessing of products currently considered waste.

Similarly, what role could the state and politics play in altering the corporate built landscape? Businesses need greater resilience to economic change instead of building bigger. The state should leverage taxation as a means to fuel economic development, encourage low impact development and incentivize environmental responsibility. With the responsibility of distributing mining rights, the state can further manage the resources at its disposal in a responsible way. Consideration should be made to open the territory to the world through mechanisms in addition to trade..

Finally, the social aspect of corporate driven urbanization is the most alarming. More investment needs to be made into the labor sustainability and the creation of workforce practices prioritizing health, safety and welfare. The power of the press is also a key aspect that is not able to be mobilized under current conditions in Russia. Oppressive legislation and the ownership of media outlets favors the powerful and the homogenization of a society. But if successfully overcome, the media can be a means to demand corporate transparency and a method to promote the mobilization of both corporate and social interests, in the appeal to greater inclusionary practices.

The monoindustrial corporate complexes in Siberia exemplify the simplification of urbanization to meet the needs of corporate values. We propose a shift in this territorial imaginary—an alter-urbanization process of three interrelated and dependent scales—starting from the global and ending at the local, working towards a long term plan of social mobilization and de-intensification, as markets permit.

On the international scale, we hope to harness the growing desire, of consumers and clients vital to corporate markets, for fair and clean production chains. Nickel commodities should be ecologically accountable at the site of extraction and through processing and shipment. Socially, the production needs to occur in environments that reflect worker's rights, health and safety. Nickel extraction needs to be held to a higher standard through consumer demand. Conceived similarly to conflict-free mining, this initiative could result in urbanization strategies that tackle existing pollution issues and inform sustainable strategies for replacement or rehabilitation of the aging and inefficient built environment.

Simultaneously, we see the potential for state or non-governmental incentivization of economic diversification and the concurrent de-intensification of the operational landscape. New developments could center on scientific research and entrepreneurship, given the territory's unique position relative to issues of climate change and permafrost thaw, and incorporate conservation as a focus. Forays into studying the unique ecological conditions of the Siberian tundra and taiga would also be accessible from this site. The proximity to the Northern Sea Route must also not be discounted, as this is an increasingly vital passage from China to Europe, reducing travel distance by nearly 25% or 4,500 kilometers. We also accept that currently, further development may be deemed ecologically unsustainable; however, we see some of this as necessary to the third, local-scale intervention—social mobilization of the workforce.

These combined interventions will help free existing communities from their reliance on monoindustrial work and monopolies. Despite the odds, in Norilsk a strong community exists that could advantageously mobilize new opportunities created from greater choice. Educational opportunity brings greater diversification and entrepreneurship. A more democratized society could provide the engine through which these systems would operate. With freedom, urbanization strategies could center on benefiting the wellbeing of the community and the planet.

## **CRITIQUE OF ALTER-URBANIZATION**

This proposal must address the issues arising from large-scale plans. There are obvious governance problems in the managing of such projects, particularly in light of embedded corruption within Russian politics. We acknowledge the problem of incentivizing development in an inhospitable environment and the difficulties associated with the politics and governance of large-scale operations.

From an environmental impact side, while more sustainable processes can be part of territorial development policies, it is not easy to reduce environmental impact along with the demands associated by

development of any scale. Similarly, there is the simple issue of continuing to develop an area that is heavily reliant on outside sources for maintaining its livelihood. Development creates its own problems.

The mobilization of global consumers presents as a challenge. There are many issues that may seem more pressing than nickel extraction, or more generally resource extraction. The gulf between general consumer and industrial consumer is considerable. Thus is it realistic to assume a pseudo-grassroots campaign could be a reality? And even if this were to happen, what regulations could go into place and who would continue to maintain and demand accountability, as interests wane or change?

Also, there's a level of speculation within the idea that community-led design and initiatives will contribute to more successful and environmentally less impactful outcomes. While the community may be directly impacted, there is a certain level of expertise required, in planning as well as in organization strategies. Assuming the community addresses its own needs, their decisions may have larger repercussions to the very much interconnected global community. Additionally, this exercise requires the difficult process of achieving consensus on common values that meet the needs of all.

An alternative approach considered but not our line of argumentation, is to halt nickel production in Norilsk and other similar regions. This would immediately cause a geographic shift in production sites, hence moving the same problem elsewhere. It is already known that easier to extract sulfide deposits, such as the Taimyr ones, will be exhausted first during the cycle of nickel resource depletion. Laterite deposits, typically formed in tropical climates, will then be tapped. Compared to sulfide nickel deposits, laterites are considerably more difficult and expensive to extract, and are more environmentally devastating; basically as a result of large-scale open cut mining and intensive hydrometallurgical processing (Mudd 2009).

Additionally, a loss or severe reduction in nickel will cause the collapse of industrial production and services linked to the extracted elements. Most types of stainless steel require nickel. Vehicles, computers, utensils and equipment as we know them would need to undergo significant redesign and we would become heavily reliant on reuse and recycling. Arguably building upon the existing recycling economy is a positive, and perhaps a net-zero point of consumption; which is also achievable. We also acknowledge the potential for new technologies, but a technological approach can bring about its own problems. Even considering nickel in monetary production, seemingly a more frivolous use of the metal, the act to remove it from coinage has been examined and deemed problematic for the cascading effects that the change would cause. Combined, this renders the elimination or reduction of nickel a quite unrealistic approach within the present state. However, as a speculative reflection, it's also pertinent to ask ourselves about the relation between the exploitation of extreme territories and the exclusive creation of necessities.

The complexity of non-ferrous minerals lies in the fact that they are currently irreplaceable elements in a diverse range of industries and that we have little control over a commodity derived from a geological process. While we may discover new ways to extract these minerals in a less environmentally and socially degrading way, we must deal with the systems in place; even if they are to our detriment and established that they are. For us, shrinkage is also difficult under current conditions, as demand for these minerals grows exponentially alongside production, or even over-accumulates with market speculation.

The development of these projects needs to be understood through the causes of primary element market "booms," and the maintenance of hyper industrialization in contexts of decline. We need to question community transformation under these conditions and the extent to which the existing industrial infrastructure should be sustained. We are trying to redesign and envision a different *process* from the current urbanization patterns characterized by the relational geography of the transnational corporation.