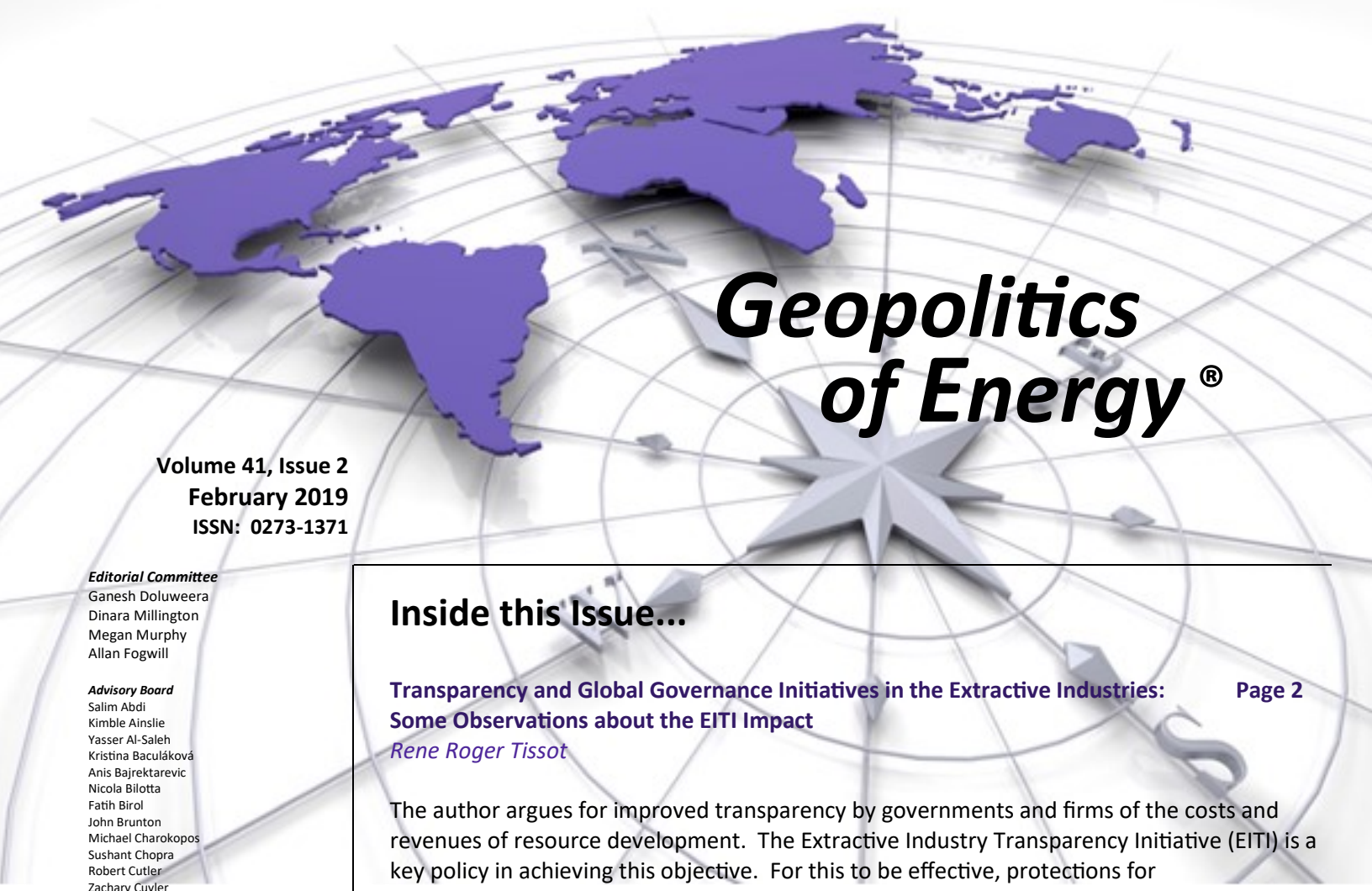

Geopolitics of Energy®

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Inside this Issue...

The author argues for improved transparency by governments and firms of the costs and revenues of resource development. The Extractive Industry Transparency Initiative (EITI) is a key policy in achieving this objective. For this to be effective, protections for competitiveness issues, and broad compliance requirements are needed.

The author discusses smart city solutions for Helsinki and Bratislava. The paper first analyses basic environmental parameters and air quality in both cities. Observations show very good air quality in Helsinki and poor quality in Bratislava. There are also significant differences in the stage of adoption of measures for providing a smart, sustainable environment in both cities. Bratislava's performance is worse, and it faces poor air quality, ineffective energy systems or transport when compared to Helsinki. The paper discusses the biggest urban problems in both cities and gives suggestions for solutions.

Energy utilities, stakeholders and regulators struggle with the appropriate quasi-market mechanisms for rate-making. Dr. Kaufmann argues that these performance-based mechanisms are superior to cost-based analysis as they can create market incentives for utilities to improve their business efficiencies. This provides a long-term win for rate payers.

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Transparency and Global Governance Initiatives in the Extractive Industries: Some Observations about the EITI Impact

Rene Roger Tissot

The relationship between lack of transparency and corruption in resource-dependent countries, causing what is often described as "the resource curse", is well documented. This motivated several organizations, NGO's and scholars to focus on the role of governance in natural resource activities. To reduce the "resource curse," countries were required to strengthen institutions. A way to achieve this was by improving the level of transparency, particularly as it relates to the revenues generated from the exploitation of the resources. The most important of those initiatives was the Extractive Industry Transparency Initiative (EITI). After nearly two decades of existence, and confronted with a changing geopolitical environment, can the EITI meet the difficult mandate of reducing corruption in resource-dependent countries?

EITI: A New Experiment on the Governance of Natural Resources

By the late 1990s, there was a growing agreement among scholars, international lending institutions and non-government organizations (NGOs) of the importance of transparency and accountability in the governance of natural resources. Several actors usually representing the development agenda enthusiastically promoted the idea of good governance via improved transparency (Alstine 2017). Transparency was described as "a shining light into the darkness making the invisible visible and disinfecting the state of unaccountability and corruption" (Amanze Ejiogu 2017).

The best way to shine that light was by making available information about the payments made by extractive firms to host countries and revenues received by the government from extractive firms. The most important effort at promoting transparency in the natural resource sector has been the EITI, implemented in 2002.

The EITI was conceived in the 1990s at the peak of the western liberal globalization era. It proposed an innovative global governance model for the natural resource sector, described as "collective governance": the EITI required a formal engagement from government authorities, the extractive industry and civil society in their decision-making and public policy discussions (Rich Eddie 2015).

Since corruption presents a prisoner dilemma situation, benefitting the perpetrator in the short term but impoverishing society in the long-term, the governance model advocated by the EITI included the concept of "collective action." To address this dilemma, the EITI proposed for civil society, governments and EI firms to join efforts and act "collectively" against the perpetrator of corruption. Essential to the success of the EITI was the existence of an active civil society.

The central thrust of the EITI was that by creating the mechanisms to promote transparency, scrutiny from citizens would increase, improving the quality of institutions and the governance of resource-rich countries. The concept was simple but powerful: encourage EI firms to disclose payments made to governments, and governments to disclose payments received from EI firms. Civil society would ensure the information was disclosed and correctives would be made when necessary. Market competition would force companies to self-regulate. EI firms would want to avoid the risk of public shaming which would have negative impacts on their share value. The initiative would also foster a level playing field among firms competing for access to resources, eroding the unfair advantage of those paying bribers for access.

Resource-rich countries would want to join the EITI because it was hoped, it would bring more accountability from the political elites and firms operating in the sector. It would also foster private investments. By joining the initiative, countries would be signalling to the investment community that they are a more credible and stable place for investment. Lending institutions and donor countries would expect that participant countries would improve their management

of resource revenues, reducing the risk of loan defaults and the dependency on the donor community to close budget gaps.

Despite its high-level of political backing, the EITI initially experienced some difficulties at securing support from the industry and resource-rich countries. EI firms expressed concern about the risks of violating contractual agreements by disclosing information without the full support and agreement from host countries (Hauffer 2010). EI firms were also concerned that by disclosing information, they would erode their competitive advantage, particularly during direct negotiations with host countries. If only some companies complied but others did not, these could be perceived as an undue advantage to those who did not comply. Governments complained that the initiative added more bureaucracy and cost. Political leaders were also concerned about the risk of exposing countries revenues to their own citizens. Overall the information submitted was criticized as being too late, not accurate, incomplete and/or complicated or of little relevance to civil society.

The EITI addressed many of those issues by reforming the standards required for the completion of the reports. The reports' requirements expanded to include information about exploration activities, licenses, contracts, ownership structures, and revenue use (Lujala 2018). A key feature of the Initiative was the creation of national multi-stakeholder groups (MSG) formed by representatives of the government, extractive firms and civil society. These MSGs were responsible for ensuring the information to be validated by the EITI boards was accurate and relevant.

There is no doubt about the EITI's success at positioning itself as the benchmark organization setting the standards for transparency in the extractive industries. There are currently 52 countries participating in the initiative. Most of the country members are from sub-Saharan Africa, with 24 countries participating in the initiative, followed by Latin America with nine country members, and one soon to be added: Argentina. Considering his disdain for global governance initiatives, it is not surprising that President Trump decided to withdraw the United States from the EITI in 2017. This moves in the opposite direction from other western developed countries that joined the initiative, such as Norway, the United Kingdom and Germany. Expected soon to join are the Netherlands, France and Australia.

The EITI has been less successful at attracting countries from the Middle East and North Africa (MENA). Russia is also missing from the list of member countries, although Kazakhstan is participating, having achieved meaningful progress toward compliance of the EITI's 2016 standards. If we add all the reserves of MENA plus Russia and the US, this group of countries accounts for 49% of global oil reserves and 57% of daily oil production.

Because of sub-Saharan over-representation, one could argue that the EITI was successful at recruiting the right type of clients. After all, most of these countries were also over-represented in the high corruption indexes. But has the initiative been successful at reducing corruption?

From the abundant literature, the general conclusion is that the EITI impact at reducing corruption has been unimpressive. An early study (Kolstad Ivar 2008) observes that increasing levels of transparency did not "affect the extent to which resource-abundant countries suffer the resource curse" suggesting that perhaps priority should have been given to how these countries used their revenues – the expenditure side of the ledger. An econometric analysis (Corrigan 2014) concluded that "while EITI membership may have improved transparency, the improvements in accountability may not be as determinative." In another study (Elizabeth Kasekende 2016), it was observed that the optimism regarding the ability of increased transparency through disclosure of payments leading to reduced levels of corruption might be misplaced. They conclude that "EITI is more effective in bringing accountability when there is an organized civil society freely and able to critically assess complex and technical information made available by governments and companies in the extractive sector and hold leaders responsible for decisions made."

The main challenge as observed by numerous studies is the difficulty at translating transparency into accountability due to the lack of political will and the limitations of civil society in many member countries to hold the perpetrators of corruption accountable.

Lack of Political Will

Several scholars have studied the features of countries more likely to join the EITI. The main variables explaining membership have been i) strong economic dependency on the extractive industry, ii) high level of corruption at the time of requesting to join, iii) dependency on foreign aid and foreign direct investments, and iv) a certain level of political and press freedom (Elizabeth Kasekende 2016). However, understanding the motivation for joining is also relevant. For instance, (Lujala 2018) observed significant delays between when a country announced its intention to join the EITI and compliance with the requirements (on average five years but for some countries such as DRC it was up to 10 years). Some of the delays may have been caused by the limitations from government officials and members of civil society at mastering some of the technical concepts to produce and analyze the information. However, another reason for the long delays could be due to opportunistic behaviour by corrupt governments.

In countries where corruption was rampant but financially vulnerable, political elites may have wanted to announce their desire to join the EITI in exchange for short-term benefits derived from the goodwill generated by the announcement. Some of these benefits include debt reduction or access to lending and/or increased levels of foreign direct investments. Once the process started, government authorities may have opted to delay or just ignore the requirements since exposing the financial cash flow of the government could have been perceived by political elites as too risky and threatening to their authority. On the other hand, firms that have already sunk capital into those countries would have been reluctant to stop their activities, indifferently of the country's level of compliance to EITI standards.

This lack of political will appears to have explained the situation in Nigeria, or Equatorial Guinea to name just two cases. (Amanze Ejiogu 2017), studying the EITI impact in Nigeria, mentions that the primary motivator when the initiative was introduced was the need to enhance the country's international reputation and secure some debt relief from the IMF. "At the time, Nigerians branch of EITI (NEITI) was given all the support it needed to function effectively. However, once debt restructuring was achieved, the reforms began to falter, and NEITI and its audit reports were relegated to the sidelines". According to the author, current president Muhammadu Buhari has sought to introduce anti-corruption reforms and re-empowered NEITI. This also seems to have been the case of Equatorial Guinea, which requested to join the EITI in 2005, and formally became a member in 2008 but by 2010 was delisted for failure to submit information. Equatorial Guinea is often described as the "poster child" of a resource curse kleptocracy. Gabon which joined in 2007 also lost its status in 2013.

Civil Society Weakness

The second key challenge is the weakness of civil society organizations. (shantayan Devarajan 2013) analyzed the challenges of civil society's ability to overcome government failures in Africa. According to the authors, "governance failures in Africa have been shaped by the relationship between citizens and its politicians, defining than the behaviour of state actors." Political elites extract rents, which they share with economic elites while failing to provide public goods to the population. Political elites secure their power through repression or clientelism when there is a certain level of political competition. Clientelism then is organized according to ethnic, religious, or tribal/geographic lines. Increasing transparency, in this case, would not directly strengthen the capability of civil society to hold these elites accountable. It would only inform the population about the level of corruption occurring in their countries between extractive firms and their political elites.

Civil society organizations are also vulnerable to cooptation by government authorities (James Van Alstine 2014) studied the case of Uganda's civil society organizations and concluded that due to their fragmentation, organizational deficiencies, and duplication of efforts, they have failed at "providing the counter voice necessary for the politics of accountability to emerge." Moreover, the increasing militarization of oil companies' areas of operations limits the capabilities of these organizations to reach affected local communities. At the village level, it is the industry and the private security firms at their service that has the most interaction with the local population (James Van Alstine 2014).

The increasing role of China as a purveyor of funds and investments has also weakened the impact of transparency initiatives in sub-Saharan Africa. African authoritarian regimes welcomed them. They addressed pressing infrastructure deficits while enjoying the fact that these funds and investments came with "no political strings attached." On the other hand, African leaders grew disenchanted with what they perceived as western donor countries excessive focus on democratization, transparency and strengthening of civil society, which can be perceived as a threat to their political power. Chinese modus operandi has been to deal directly with the person in charge, strengthening authoritarian regimes.

Beyond sub-Saharan Africa?

EITI efforts may have more impact in Latin America. Following a period of high commodity prices and resource nationalism, Latin America emerged in this decade economically vulnerable. Most of the region remains highly dependent on the extractive industries but unable to capture high rents as commodity prices declined. New administrations are reversing populist policies from previous decades and need foreign investments.

The key challenge in Latin America has been the difficulty of breaking the cooperation between economic and political elites. In the past, this has led to the emergence of "strong populist leaders." But Latin American populism has had a long history of economic mismanagement and political repression. However, the collapse of Venezuela, which was for almost two decades an outspoken critic of western pro-globalization, may help to consolidate the region's preference for governance models promoting democratic institutions, market-oriented models and strong civil society participation and transparency such as EITI. On the other hand, corruption is not exclusive to government bureaucrats, or politicians. Corruption is also prevalent in the private sector. This can result in an electorate fed up with the entire political class, opting for political adventurism as it seems to have been the case in Brazil.

Still, the region's economic challenges render governments vulnerable to external pressure and influence, which is as observed by the literature, one of the key influencers of EITI membership. However, success will rely on the political will to reform, allowing a strong civil society to hold their leaders accountable. I think the region fits both conditions.

In the Arab world, one may look at Tunisia as a plausible candidate for the EITI. A modest oil producer, but also the only country from MENA that implemented pro-democratic reforms following the Arab spring. Its economy is highly dependent on foreign investments and aid, there is an active civil society, and its democratic institutions have improved.

On the other hand, Saudi Arabia with its vast petroleum rents, weak civil society and concentration of power in the hands of the Al Saud Royal family, has never fit the profile of a "good candidate" to join the EITI. At first glance, one could have considered that the Kingdom's desire for economic reform, known as Vision 2030, may have offered an opportunity for change. Following the decline in oil price in 2014, the Kingdom has accumulated large fiscal deficits and embarked in a set of ambitious reforms known as Vision 2030. Central to the reforms is the diversification of the economy, attracting foreign direct investments into new activities. A partial privatization of Saudi Aramco has also been suggested. By joining the EITI, the Kingdom could have signalled to foreign investors, and the international lending community, its commitment to transparency and the rule of law. Unfortunately, recent events suggest that the Kingdom is not

prepared to allow an independent civil society to pressure the administration's transparency in the management and use of oil revenues. The role of foreign investors could be a key differentiator. But, even if there are rumours of foreign investors being more cautious in their approach toward Saudi Arabia, history shows that concentration of power and political repression is not enough deterrent for multinational corporations' investment decisions.

What's Next?

After near two decades of existence, initiatives such as the EITI might be perceived as a relic from the 1990s. With Trump's nativism and transactional approach to foreign policy, the increasing global influence of authoritarian regimes such as China, Russia and other emerging economies, and the rise of right-wing populism in Europe, there appears to be a retreat of the pro-globalization order that emerged in the 1990s. The EITI was modelled around that global governance model: liberal, market-oriented democracies with a strong civil society able to shame corrupt leaders and corporations that failed to be accountable for the revenues made from their extractive activities. However, even if the "liberal western global economic order" appears under threat, the expectation of the population for more transparency and accountability from their political leaders will continue to increase, as more people gain access to education, and the information can travel at the speed of a tweet.

In sub-Saharan Africa, there are examples of civil society organizations that have been able to overcome traditional clientelist relationships and were able to mobilize for the public good. These have occurred more often when local collective action has been able to address an outcome that impacts them directly (road construction, teachers' performance), and where mobilization can result in tangible benefits. Unaccounted payments may be too abstract for the population to mobilize. The challenge is for transparency initiatives to link more the disclosure of information to the day to day lives of the population.

Still, the ongoing surge on a young population, rapid urbanization, and increasing access to social media may be helping to change the balance of forces in favour of civil society. Old autocratic regimes are having more difficulty holding onto power indefinitely. Support for democracy remains very strong: seven out of ten respondents from the latest Afrobarometer survey said they support democracy. Moreover, African economies are increasingly exposed to excessive debt burden from China, and the population is disenchanted with Chinese companies' limited job creation and localization efforts. But ultimately the impact of the EITI in sub-Saharan Africa may also depend on the desire of extractive firms to factor in their investment decisions how transparent and accountable are the political leaders in the countries they operate.

In Latin America, even if people have shown dissatisfaction about how "their democracies work," most of the population still find democracy as the preferred form of government. Despite some setbacks, democratic institutions are the preferred form of government in Latin America. Because of the corruption scandals that traumatized many countries, the population is fed up with the high levels of corruption prevailing in the region. Civil society has shown its ability to hold corrupt leaders accountable with eighteen former president's and vice-president's implicated in corruption scandals.

The end of high commodity prices has exposed many of the resource-rich countries' corruption and ill-conceived policies. Corrupt leaders are having more difficulty buying political support by simply using excessive rents. The technical complexity of producing new resources will also require local NOCs to forge alliances and partnerships with foreign, private oil companies and to pay attention to their operating costs. Their governance models will be tested and participating in initiatives such as the EITI will help them in such efforts.

The recent electoral results in the US mid-term elections shows the limitations of Trump's anti-globalization and authoritarian infatuations. The EU is not collapsing, and other institutions that relied on global international collaboration are still functioning – such as the Paris agreement on climate change.

Transparency is necessary but not a sufficient condition to increase accountability. For that, increasing efforts must be made toward improving civil societies' ability to hold their political leaders and extractive industry firms accountable. Addressing corruption in resource-rich countries is a long-term effort, one that may seem futile at times but one that is as necessary as ever.

About the Author

Rene Roger Tissot is an Economist focused on extractive industries development issues. He is currently engaged in a PhD at the University of British Columbia Okanagan. Prior, Roger conducted research in Saudi Arabia and East Africa. His area of research focused on measuring the capabilities of local business in East African countries to participate in the petroleum and gas supply chain. Prior to that, Roger worked at a large Canadian oil and gas company where he directed the company's international government relations. Roger started his career at the Canadian Energy Research Institute (CERI) where he was responsible for economic analysis of Latin America petroleum and gas sector. Roger holds an M.A. in Economics from Universite Laval (Quebec) and an MBA from the University of Calgary. He also completed his Certificate in Public Accounting (CPA) in 2014.

Endnotes

[1]Iraq joined in 2010 but is currently suspended for inadequately complying with the validation process.
[2]https://gbtimes.com/beijing-defends-china-africa-cooperation-says-no-strings-attached
[3]For example, the concentration of power is in the hands of Crown Prince Mohamed bin Salman, increasing repression to social activists in addition to a series of controversial events such as the war in Yemen, the temporary kidnapping of the president of Lebanon, the detention of wealthy Saudi business people at the Ritz Carlton Hotel in Riyadh and the killing of Saudi journalist Jamar Kashoggi at the Saudi embassy in Istanbul.
[4]http://afrobarometer.org/blogs/africas-democracy-dying
[5]https://www.economist.com/the-americas/2018/11/08/latin-americans-are-dejected-about-democracy

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Solutions for a Smart Urban Environment

Air Quality, Transport and Energy Systems: Knowledge from Helsinki and Lessons to be Learned for Bratislava

Kristina Baculáková

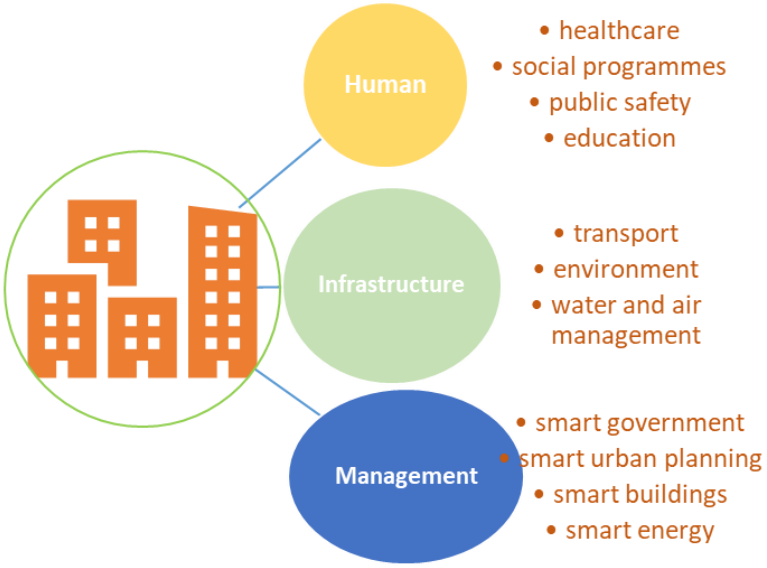
Introduction

Our cities are facing growth in population, largely by urban migration. Cities represent the centre of life, job possibilities, culture and facilities. As cities grow, they face different kinds of problems. One of the most crucial is managing the healthy and pleasant environment, mainly fresh air, reduction of CO_2 emissions, reduction of energy consumption and effective waste management. Therefore, it is the main topic of modern urban planning to prevent undesirable environment development. A modern city should connect smart ways of doing things with sustainable technologies. It is a long-term process. It has already started in most European cities. However, the level of progress is very different. In our paper, we look at the most current initiative of Helsinki in managing the smart environment within the smart city concept. We focus on maintaining air quality by transport reduction and sustainable energy production systems. We will also try to compare the program of Helsinki with possibilities for Slovakia´s capital – Bratislava.

Smart Environments as a Core Element of Smart City Concepts

The term smart city was adopted by technology companies [Cisco, 2005], [IBM, 2009] [Siemens, 2004] for the application of complex information systems to integrate the operation of urban infrastructure and services such as buildings, transportation, electrical and water distribution, and public safety (Harisson, Donelly, 2011). This has transformed into any form of technology-based innovation. Nowadays, the term is much more complex. A smart city today is not about applying ICT. It is about managing the sustainable economy, sustainable mobility (transport), a well-managed and resource-sparing environment, wise people, high quality of life and smart governance. The main goal of the smart city concept is to improve quality of life, the efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations concerning economic, social, environmental as well as cultural aspects (ITU, 2014). A city can be defined as 'smart' when investments in human and social capital and traditional transport and modern ICT communication infrastructure fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory action and engagement (Caragliu et al., 2009).

Figure 1: Smart City Concept and Its Core Elements



Source: author´s own

Scholars dealing with smart city concepts focus nowadays mostly on infrastructure development and smart governance. However, Hollands points out that smart cities are concerned with the transformation of life and work of city inhabitants (Hollands, 2008). He identifies elements of the smart city concept such as utilization of networked infrastructure to improve economic and political efficiency and enable social, cultural, and urban development infrastructure including ICT; business-led urban development; and social and environmental sustainability. Environmental sustainability means finding ecological and green solutions.

There are three main environmental challenges for cities:

- increasing levels of carbon emissions and worsening air quality (due to population growth and the number of vehicles);
- the increase in waste (recycling problems, waste management);
- worsening of water resources quality (illegal dumping, ageing infrastructure of water pipes) (Smart cities Dive, 2018).
- How can smart technologies solve the environmental problems of the cities? There are several options which are being adopted:
- emission measurement devices (usually measures other common parameters such as CO_2, NO_2, PMx (particulate matter); temperature, pressure, and humidity.) Measures can now be done on the traffic participation on certain levels of pollution; (Ahlers et al. 2018)
- optimizing the use of energy;
- prediction and waste management planning, using smart trash bins, fill-level sensor bins, recycling and re-use of materials, complementary use of side effects of waste management (greenhouse heating by landfill);
- smart public transport solutions are crucial to reducing CO_2 levels and improving air quality, reducing the number of cars entering the city, building cycling routes;
- water measurement devices, floods and drought predictions, pipe system restoration.

Basic Parameters and Air Quality in Bratislava and Helsinki

In this paper, we present the strategy of Helsinki for the smart environment and compare to the possibilities of Bratislava. First, we need to look at the parameters specific to the environmental quality measurement for both cities. We will focus on air quality. The population of Helsinki in 2018 was 643,272. Bratislava had a population of 422,932, but with its satellites, the population is rising above 600,000, which is comparable to Helsinki. The green area of both cities is also comparable. However, Bratislava has only about 2% of city greenery (parks, gardens, residential greenery). The rest of the greenery is represented by forest areas around the city. The population density of Helsinki is about 2,934/km^2 in the city area; however, if we consider the whole Helsinki area, the population density declines to 379/km^2 (the Metropolitan area of Helsinki – Pääkaupunkiseutu consists of four municipalities: Helsinki, Espoo, Vantaa, and Kauniainen). The density of Bratislava is lower, around 1,163/km^2. Given the fact that Helsinki has a higher density, we would expect significantly higher emissions. As seen in Table 1, the level of emission parameters is comparable to Bratislava; in some cases, even the maximum amount is below the amount in Bratislava (PM10, NO_2, SO_2).

Table 1: Parameters of Helsinki and Bratislava

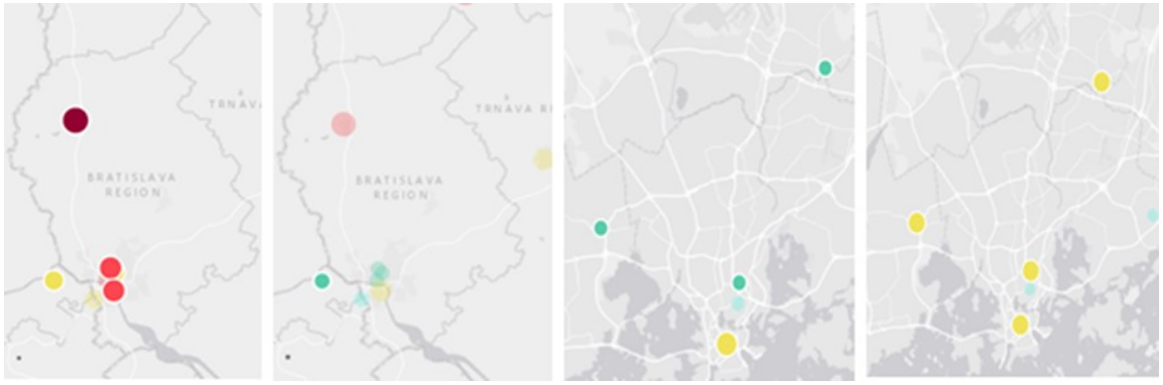
Parameter	Helsinki	Bratislava
Population	643,272	422,932
Density of population	2,934 /km^2	1,163 /km^2
Green area	10,000 ha	13,000 ha
PM2.5	Min/Max 4/76	46
PM10	Min/Max 2/57	63
O_3	Min/Max 0/48	14
NO_2	Min/Max 1/27	50
SO_2	Min/Max 0/4	28

Source: aqicn.orgm, shmu.sk.

The data in the table are taken from the national meteorological institutes of both countries, measuring the current pollution parameters in time. However, looking at the data from the European Air Quality Index, Bratislava is one of the most polluted areas. The air quality depends on current meteorological conditions; however, the long-time Air Quality Index shows mostly the same results. For better insight on the quality of air in both cities in winter, we observed 30 random days in November and December 2018, for the illustration we picked three random days. The observations are done within a 20-hour period/day.

Figure 2: Air Quality Index of Bratislava and Helsinki (3 Random Days Within 20-hours/day)

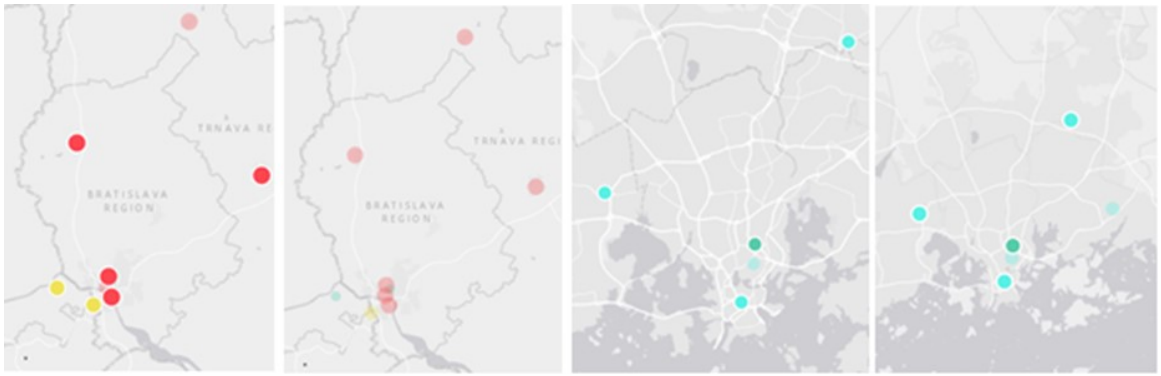
Day 1 - Bratislava / Helsinki - 0 h/20 h



Source: https://www.eea.europa.eu/themes/air/air-quality-index
Data for November 2018

Poor quality due to PM10
Moderate quality due to PM10
Fair quality due to PM2.5

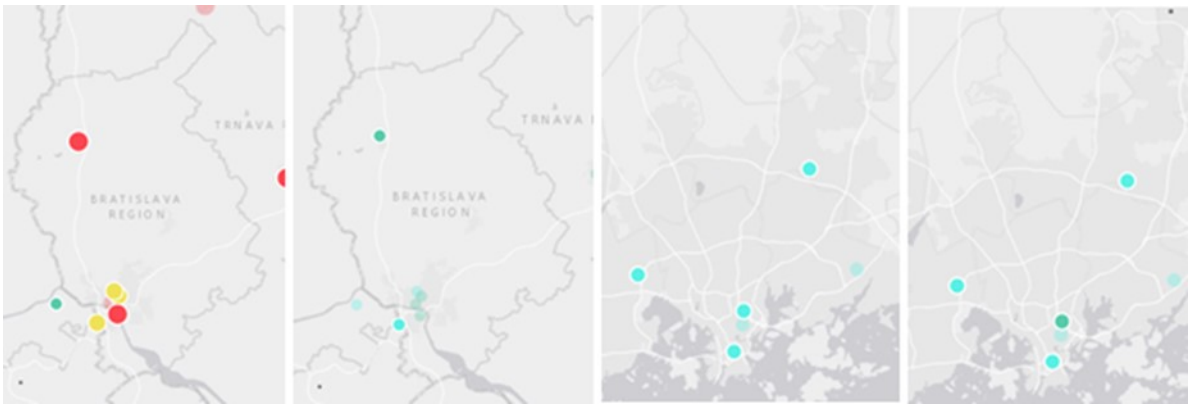
Day 2 - Bratislava / Helsinki - 0 h/20 h



Source: https://www.eea.europa.eu/themes/air/air-quality-index
Data for November 2018

Poor quality due to PM2.5
Moderate quality due to PM10
Good

Day 3 - Bratislava / Helsinki - 0 h/20 h



Source: https://www.eea.europa.eu/themes/air/air-quality-index
Data for December 2018

Poor quality due to PM2.5
Fair due to NO2
Good

The observations show poor to medium air quality in the Bratislava region for most of the observed days. On the contrary, Helsinki recorded mostly fair or good air quality during the observation. This is not surprising since Bratislava belongs to areas in Europe with the largest regional air pollution and acidification of rainfall. On the other hand, in Helsinki, the air quality is better than that of many large European cities. There is also a difference between the type of pollution and its source. PM2.5 represents the fine particles generated by traffic exhaust gases, street dust and burning wood in areas of single-family dwellings. Fine particle emissions can also be transported long distances, for example from industrial areas, energy production facilities and wildfires. PM10 refers to street dust. These particles are generated by asphalt, tires, brakes, etc. This pollution is, therefore, the result of traffic.

As visible from the illustration, the pollution in Bratislava is caused mostly by PM2.5 particles. This is due to the Bratislava region being heavily industrialized. Slovnaft, or Volkswagen, are among the biggest polluters. However, the main cause of current air pollution is emissions from domestic heating and transport emissions as well as high background concentrations (pollution where it is not possible to directly determine the source of emissions). In Slovakia, domestic heating is an even bigger polluter than the industry. The insufficient results in improving air quality are caused mostly by:

- low awareness – inappropriate practices in household heating; there is no positive example of a change in the pattern of behaviour;
- high background values of PM particles (industrial resources, agriculture);
- the weak social situation of marginalized groups (energy poverty);
- missing coordination between the various responsible bodies (ministries, local authorities, polluters, etc.) (Ministerstvo životného prostredia, 2018).

In Helsinki, if the air quality is worse, it is mostly due to the PM10 – street dust in the area with heavy traffic. PM2.5 particles are concentrated in single-family dwellings (due to burning wood).

Smart Solutions for the Environment in Helsinki

Helsinki is a growing capital, but with a solid condition for ecological urban development. Even though the air quality in the city is far better than in other European capitals, there are some areas (like the main streets in the centre of the city) where the air quality is worse. However, Helsinki has adopted a smart climate plan for sustainable urban development. The plan is built on five main goals, namely:

- reducing carbon emissions;
- ability to adapt to change;
- building a carbon-neutral city;
- maintaining the quality of the environment;
- creating Helsinki's green network (City of Helsinki, 2017).

Reducing carbon emissions is achievable by decreasing the private dependency on car transport and compact spatial planning. The spatial planning is prioritizing walkers and cyclists as well as developing good public transport networks and creating car-free zones. Hämeentie street, where the thoroughfare by car will be prohibited, is a good example. Also, new tramlines are being built in several cities, e.g., in Tampere. The total reduction of 60% in climate emissions will be proposed for 2030. The city also aims to become carbon neutral in 2040 which is very challenging considering the contribution from energy efficiency programs (City of Helsinki, 2017). Besides new strategic planning and reducing traffic, the city also implemented several other measures – use of electric buses, the testing of robot buses, building the bridge for trams, cyclists and pedestrians connecting Laajasalo and Korkeasaari via Kalasatama to the inner city.

Besides transport, other major sources of greenhouse gas emissions in Helsinki include energy production and energy consumption. Therefore, the city focuses on low-energy solutions. Most of the electricity and district heating in Helsinki is generated at the Vuosaari natural gas power plants. The degree of its efficiency is reaching almost 93 percent. There are several smart solutions adopted in different parts of the city, combining conventional and renewable sources of energy.

A hybrid heating system combining geothermal heat, an oil heating plant and solar thermal collectors has been introduced in Sakarinmäki School. The school can generate up to 80 percent of its energy use with renewable energy sources. Another interesting project is the Suvilahti electricity storage facility. It is the largest electricity storage in the Nordic countries. Finnish company Helen was the first one to integrate a megawatt scale lithium-ion battery energy storage system in the electricity grid. The Suvilahti electricity storage facility comprises 15 thousand lithium-ion battery cells that will temporarily store the energy generated by Helen's Suvilahti power plant and the plant in Kivikko.[1] The importance of energy storage is growing, especially concerning the usage of renewable energy sources – which are highly dependent on weather conditions.

Another interesting energy project is the underground heating and cooling plant located under the Esplanade Park at a depth of some 50 metres. Large heat pumps recover a significant amount of waste heat from properties for utilization in heat production. The new plant replaces fossil fuels and therefore reduces carbon dioxide emissions. This new plant is the third largest in Europe and has been in place since summer 2018 (HELEN, 2018).

Helsinki's urban territory has not significantly changed for some time. There were strict rules for construction, especially for high-rise buildings, which were banned in the city centre. Today, however, the city´s face is changing. There are three main smart city projects currently underway.

The Finnish capital aims to build three new neighbourhoods: Kalasatama, Vallila and Pasila. They will combine shops, offices and housing, to create living environments conducive to innovation, entrepreneurship and the wellbeing of its inhabitants. The main objective is to reduce commuting times for residents since everything could be found in one place. Another aspect is environmental sustainability.

Pasila is the part of the city which is known mainly for its expo and convention centre (mostly business-focused). Therefore, Pasila will focus on becoming the hub for business and media.

Vallila was a former industrial zone. Now it is being transformed into a multifunctional zone, with housing, offices and shops.

Kalasatama was also a former harbour and industrial area. There were several unsuccessful attempts to turn this area into a new residential zone. However, today, Kalasatama is one of the most advanced of all three smart city projects. The buildings in Kalasatama must connect to the urban network of heating and reversible air-conditioning, powered by immense heat pumps. "*They recover energy from the city's wastewater. The buildings must also integrate an intelligent energy network to benefit from the energy from the sun. Each building is provided with equipment for storing electricity so that people can generate at least 30% of their own energy and sell their surplus."* (DiversityMag, 2018).

Table 2: Smart Initiatives in Helsinki

Area	Initiative	Impact
Air quality	• transport-reduction of car use, car-free zones • use of electric vehicles • support of cyclist and pedestrian	• reduction of carbon dioxide emission • reduction of respiratory problems
Energy efficiency	• sustainable energy systems (heating and cooling plant, energy storage facilities, renewable energy use)	• reduction of energy needs • energy sustainability after the increase of the volume of inhabitants
Smart urban planning	• Pasila, Vallila, Kalasatama neighbourhoods • compact urban planning	• improvement of the quality of life • increase free-time hours

Source: author's own

Status of Bratislava

Bratislava is ranked as the 77th smartest city.[2] It seems that the sustainability and quality of life of the citizens in Bratislava is not ideal. Bratislava already introduced some smaller smart projects (e.g., solar benches that charge mobile phones and offer Wi-Fi, or shared bikes). Perhaps the most important is the involvement of Bratislava in the EU-GUGLE project.

This city is known for its poor-quality housing, prefabricated concrete buildings that were poorly insulated, energy inefficient and costly. The capital city is now looking to improve energy efficiency with a pilot project revolving around nearly zero energy building renovation models. The city chose 19 properties for the renovation project in two districts. New technologies such as thermal protection of the construction, replacement of existing windows with triple-glazed windows, renewable energy sources in district heating systems, application of heat recovery from the sewage, and air, heat pumps integrated in a low energy heat network or cogeneration systems should reduce the energy use by up to 75% (EU-GUGLE, 2018).

One of the most crucial problems in Bratislava is traffic. Traffic is collapsing today as the main means of transport is the car. Public transport relies on buses, trolleys and trams. There is no underground in the city. Cars, buses and trolleys use the same roads, and there are very few bus lanes. Every day, thousands of people travel to the capital to work. It is assumed that, during the week, the number of "inhabitants" increases by 130,000 people. The city has not been able to deal with this problem, yet.

The second most criticized area is urban construction. The city is in the hands of developers. Urban plans and strategies are missing – high-rise buildings are being built even in the city centre and there is even a clash of styles, and the construction is not compact.

Among the main problems of the city are:

- poor air quality – the air quality is one of the worst in Europe. This is due to heavy traffic and industrial production;
- traffic jams;
- old, energy-intensive buildings;
- chaos in urban construction;
- missing long-term sustainable city development plans.

Conclusion

In the paper, we analyzed the main environmental parameters and air quality of Helsinki and Bratislava and their smart city initiatives. The cities share similar characteristics – population, area, and green spaces. However, there are significant differences in air quality – while Helsinki belongs to the cities with the best air quality, Bratislava´s air quality is poor. The significant differences were observed in the cities' smart plans. Helsinki continuously works on reaching their carbon neutrality, energy efficiency and improved environment. Bratislava has only done the first steps to become a smart city in the future.

There are several reasons for these differences – first, we must think about the past regimes of the countries. The urban development of Bratislava suffered during the communist regime. The result is low quality, prefabricated concrete buildings which are energy inefficient and costly. During the construction of the new bridge, significant historical monuments were destroyed. The quality of the road network is inadequate. Another cause is the short-term focus of the projects, lack of financing, dependency on financial groups, and political preferences.

However, Bratislava, the capital in the heart of Europe has the potential to develop smart city initiatives. Proximity to Vienna and Budapest can support joint projects. After the municipal elections, Bratislava has a new mayor (a young architect), who has prepared an ambitious city development plan. We believe that Bratislava could be inspired by Helsinki mainly in the area of traffic, energy production systems as well as smart urban planning since both cities share some significant similarities.

About the Author

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Endnotes

[1]Kivikko is one of the largest solar power plants in Finland with 3,000 solar panels.

[2]2017 Motion Index

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Perhaps inevitably, the structural change taking place in energy utilities is prompting regulatory change. This view is supported by a recent Utility Dive survey that asked electric utilities how their current rates are regulated and what ratemaking approaches they expect to be using in 10 years.[1] Among investor-owned utilities, 48% said they are overwhelmingly regulated using the traditional cost of service regulation, but only 18% believed that would be true in 10 years. Seven percent of respondents said they are primarily regulated using performance-based regulation (PBR), but 30% expect PBR to be their main form of regulation in a decade.[2] Many energy utilities believe incentive-based mechanisms will become an increasingly important part of their regulatory landscape.

These trends are already evident in Canada's most populous provinces. Ontario is currently on its "fourth generation" of incentive ratemaking for electric utilities, and the development of a "fifth generation" approach will begin soon. In 2012, Alberta implemented province-wide PBR for both gas and electric utilities, and these plans were updated (with some modifications) in 2016. There are also currently approved PBR plans for gas and electric utilities in British Columbia, and Quebec's extensive PBR experience was most recently supplemented with the multi-year rate plan (MRP) approved in 2018 for Hydro Quebec Distribution.

Despite these developments, one prominent regulatory economist has cast doubt on the future of "RPI minus X" MRPs. In an article for *The Electricity Journal*, Dr. Jeff Makholm says he does "not envisage any near-term expansion of that particular form of rate control for the North American electricity industry."[3] Dr. Makholm bases this conclusion on what he calls "three perspectives on RPI minus X regulation:" 1) its origin as a UK import; 2) its difficulty in objectively integrating recent cost changes in the electricity distribution industry; and 3) the movement of PBR away from "a generalized competitive ideal" and towards more targeted, project-specific incentive regulation.[4]

This article responds to these three points and provides an alternate perspective on "Inflation-X" MRPs.[5] I believe a broader view reveals that North American MRPs are a home-grown innovation, not a UK import, and they can readily and objectively reflect electric utilities' current cost circumstances. "Inflation minus X" MRPs may also be a valuable complement to more targeted incentives, which are increasingly important in today's environment. Whether or not there is a "near term expansion" of MRPs is an open question, but they certainly remain a viable and potentially valuable regulatory mechanism for energy utilities operating under a variety of conditions.

The Origins of North American MRPs

On multiple occasions, Dr. Makholm refers to RPI-X regulation as a "UK import," which he claims was "originally conceived in 1983 by UK economist Stephen Littlechild." Professor Littlechild did prepare a 1983 report on this issue for the British government, but it did not specify how the value of X was to be determined.[6] Despite the lack of an explicit framework for setting the X factor, Littlechild's recommendation to adopt RPI-X regulation was accepted and, according to Dr. Makholm, hastily implemented by the Thatcher government in order to speed up the privatization of Britain's utility industries.

Several years later, the "Inflation minus X" approach was applied to US energy utilities. Dr. Makholm claims that, when importing this concept into North America, regulators were bound by stronger due process and evidentiary rules than those prevailing in the UK. These institutional constraints limited regulators' ability to "effectively invent an X factor…*Thus*, the X factor in the United States and Canada reflected an index-based method of measuring total factor productivity (TFP) growth relative to TFP growth in the economy at large" (emphasis added).[7]

This narrative is both incomplete and, in critical respects, inaccurate. It is also of more than historical interest since understating the origins of "Inflation minus X" regulation in North America is indeed helpful for understanding its potential application to the current electric utility industry. These origins, however, have almost no foundation in the British RPI-X experience.

The Inflation minus X concept was conceived and disseminated by American academics before Littlechild's 1983 report. The idea was first presented in the 1979 paper "Automatic Rate Adjustments Based on Total Factor Productivity Performance in Public Utility Regulation" by Fred Sudit of Rutgers University.[8] It was further elaborated in a widely-read article by William Baumol entitled "Productivity Incentive Clauses and Rate Adjustment for Inflation," published in 1982 in *Public Utilities Fortnightly*.[9] It is noteworthy, and relevant, that each of these papers makes explicit reference to productivity or "total factor" productivity in their titles. The reason productivity is highlighted is that productivity measures are central for setting what became known as the X factor in the authors' proposed rate-setting mechanisms. Each article also considers how "Inflation minus Productivity" formulas lead to just and reasonable rate changes, even though they are not linked directly to changes in a utility's own costs (the traditional basis for rate changes in North American cost of service regulation).

Proposed applications of "Inflation minus X" regulation also proceeded Littlechild's 1983 recommendation. The first such proposal was for the first industry in North America ever subject to federal rate regulation, US railroads. As early as 1980, the Interstate Commerce Commission (ICC) proposed to determine allowable increases in US rail freight rates using the average increase in rail carrier costs.[10] The Staggers Rail Act of 1980 required index-based regulation for the services of larger railroads to captive customers and established a Zone of Rate freedom for certain rail services. Under Section 203 of the Act, the boundary of this zone is to be adjusted each quarter by an "Index of Railroad Cost compiled or verified by the Commission with appropriate adjustments to reflect the changing composition of railroad cost, including the quality and mix of material and labour." The index used to adjust the maximum rail rates became known as the Rail Cost Adjustment Factor (RCAF).

There was a vigorous and protracted debate before the ICC regarding the appropriate form of the RCAF. The most fundamental issue was whether the rail cost index should reflect the trend in the total factor productivity (TFP) of the industry as well as the trend in industry input prices. In 1981, the ICC rejected a productivity factor as part of the original RCAF formula, primarily because of "the tenuous level of earnings in the industry."[11] In addition to the concern with earnings, the ICC was skeptical that a workable measure of TFP could be computed for the railroad industry.

To investigate the issue further, in 1982 the ICC began a proceeding to examine whether a workable measure of productivity could be established and used as the basis of an X factor in the RCAF formula. This proceeding involved some eminent economists, including William Baumol testifying on behalf of the American Association of Railroads.

After seven years of debate, the ICC reversed its earlier decision and in 1989 added an X factor to the RCAF. One reason for this change was that the railroad industry was beyond "the early, financially uncertain post-Staggers years." But even more fundamentally, the ICC was convinced that workable TFP indices could be computed for the railroad industry and that the inclusion of a productivity factor was consistent with a just and reasonable price standard.

In adding an X-factor to the RCAF, the ICC strongly affirmed that industry-wide rather than individual company TFP trends were the proper basis for the X factor. The main reason was that when prices reflect industry-wide productivity trends, returns for individual railroads are a direct reflection of their TFP performance relative to the industry average. All firms, therefore, have both an opportunity and an incentive to earn above-normal returns. Indeed, the ICC reasoned that "once we decide to reflect actual productivity in the (RCAF) index, the industry average is the only reasonable target".[12]

The TFP index also measured the productivity of the very companies that were subject to the RCAF, and changes in industry productivity were "rolled in" to the TFP index each year. Hence, the X-factor automatically reflected performance gains under the plan. The ICC concluded that a rolling average X-factor created a reasonable distribution of benefits between railroads and their customers. That is, "because the productivity adjustment is based on a lagged trend, rail carriers will have the temporary benefit of the full extent of their gains in productivity."[13]

The railroads' experience with developing "Inflation minus X" rate controls, including the computation of industry TFP indices as the basis for the X factor, took place before PBR was implemented for North American telecoms. The Federal Communications Commission (FCC) approved the first telecom Inflation minus X plan for AT&T in 1989. In 1991, the FCC approved a similar MRP for the interstate services of Local Exchange Carriers. In both cases, the FCC drew on the conceptual and empirical framework for Inflation minus X regulation that had been litigated before the ICC. Some of the same economists were involved in the railroad and telecom proceedings, so there was a direct transfer of knowledge across industries. North American energy utilities, in turn, drew on telecom PBR precedents and the telecom/railroad framework for setting X when developing Inflation minus X plans for regulated energy rates. The first such plans were proposed shortly after the FCC decisions, in the early to mid-1990s.[14]

This history shows that the North American approach towards Inflation minus X regulation has a homegrown pedigree. The North American focus on input price and TFP indices as the basis for the X factor drew on both the theoretical work of American academics and industries' regulatory experience. Clear, direct links connect this conceptual and empirical foundation to the current practice of basing X factors for North American energy utilities on industry TFP indices.

Dr. Makholm does not address this experience when discussing the origins of "RPI minus X" regulation for North American energy utilities. Instead, he maintains that the institutional environment in North America, particularly its focus on due process and "objective" evidence, somehow led regulators to opt for "an index-based method of measuring total factor productivity (TFP) growth relative to TFP growth in the economy at large." This claim is both curious and counter-intuitive. For years, North American regulatory institutions have fulfilled their obligation to establish just and reasonable rates by examining utility costs and making judgments on the utility's own prudently-incurred cost of service. Indices of industry TFP have rarely, if ever, played a significant role in the "objective" evidence regulators consider when setting rates in a cost-of-service institutional framework. Indeed, using *industry* TFP indices to adjust regulated rates represents a significant departure from using the *utility's own* cost and billing determinant data to set rates, which has been the dominant approach in North American rate-making for decades. While the centrality of TFP evidence in setting X factors in North American PBR has always differed from how X factors are set in the UK, there is no logical or factual connection between this difference and disparities in due process rules.[15]

A more straightforward and persuasive explanation is evident in the jurisdictions' Inflation minus X experiences. In the UK, the initial decision to adopt RPI-X price controls devoted almost no attention to the critical issue of how X would be derived. Without a well-defined framework, updates of X factors involved a considerable amount of discretion.[16] Decisions sometimes involved a "trial and error" process, with later reviews developing mechanisms to correct the deficiencies of earlier decisions.[17] After 20 years, this process evolved into the current "RIIO" framework, in which RPI minus X formulas remain central to regulation but are complemented by a number of other regulatory tools and targeted incentives.

In contrast, North American energy utilities had an explicit framework for setting X from the start. This framework highlights the importance of industry input price and TFP indices as the basis for the X factor. Although energy utilities have undergone significant regulatory change over the last 25 or so years, this approach for setting the terms of "Inflation minus X" MRPs has

been maintained with only modest adjustments. This remarkable stability, relative to the UK, can itself be viewed as a positive element of North America's institutional environment, but it is grounded in the conceptual and empirical foundation that emerged in North American performance-based regulation in the 1980s, not broad due process and evidentiary rules.[18]

Changes in Industry Cost and "Objective" TFP Measures

The origin of North American "RPI minus X" regulation warrants critical examination, because it sets the stage for the next component of Dr. Makholm's argument. In a section of the article entitled "The Search for Objectivity in RPI minus X," he says "Importing RPI minus X regulation to North America required strong emphasis on objectivity, scholarly support, and reproducible empirical analysis. This wider foundation for regulatory decision making not only comes from the due process foundation that guides North American regulation generally but also on the nature of North America's contested regulatory proceedings… objectivity and transparency are of paramount importance when judges and commissions decide such cases."[19]

"Objectivity" subsequently plays a key role in Dr. Makholm's analysis. While he never precisely defines the nature of "objective" TFP estimates (a concept that involves many facets), the article emphasizes a single element of objectivity: using defined criteria to determine the length of the sample period used to estimate industry TFP trends. Dr. Makholm says two possible criteria can be used for this purpose: a full business cycle; or long-run competitive equilibria in competitive markets, which he claims is consistent with the "competitive foundation for the entire concept of RPI minus X incentive regulation."[20]

Drawing on these criteria, Dr. Makholm considers data on recent TFP trends that he calculated for US electricity distribution utilities. His results show that the industry's TFP change in recent years is generally lower than in earlier years. He attributes this development to changing cost conditions in the electric utility industry. Dr. Makholm also finds that this work "presents a problem for any regulator seeking objectivity – for the trend displays neither a business 'cycle' for US electricity distributors nor a stable competitive equilibrium. The downward trend in measured productivity growth after 2000 reflects more *persistent* and *permanent* changes having to do with the changing nature of electricity distribution services" (emphasis added).[21] Given the importance of "objectivity" in Dr. Makholm's narrative, he believes these findings undermine the support for Inflation minus X plans more generally since traditional TFP measurement "does not provide an objective way to quantify such rapid changes in productivity growth in contested rate proceedings."[22]

To explore these issues, let's put to the side the actual values of Dr. Makholm's industry TFP estimates[23] and consider the following question: do measured TFP trends that reflect *persistent* and *permanent* changes in the electricity distribution industry present a problem for any regulator seeking objectivity? This is the crux of Dr. Makholm's argument. This concern is largely based on the "long run competitive equilibrium" criterion he espouses for selecting sample periods, which raises a related question: can long-run TFP trends in competitive industries change?

I believe the answer to the first question is no. In fact, "persistent and permanent changes having to do with the changing nature of electricity distribution" necessarily describes *objective* and observable industry developments. They're also not a passing fancy, but persistent and permanent changes. Any regulator evaluating an Inflation minus X proposal should *want* the TFP evidence it is considering to reflect current trends and developments, not ancient history. TFP evidence that incorporates ongoing, fundamental change in the electric utility industry is, therefore, *necessary* to satisfy regulators' "search for objectivity in RPI minus X regulation," not problematic.

On the second question, it is apparent that long-run TFP trends can and sometimes do change in competitive industries. One such example is likely familiar to many readers: natural gas production. In the early 2000s, some analysts believed an analog to the "peak oil" hypothesis was increasingly evident in North America's natural gas industry. From 2001-2006, production from

many existing gas basins was declining, and commodity prices were generally rising. Declining output coupled with rising market prices is consistent with declining industry productivity.

Shortly thereafter, however, industry conditions changed rapidly and permanently. Hydraulic fracturing combined with horizontal drilling technologies brought large quantities of shale and other non-traditional gas resources to the market for the first time. Natural gas output surged, and commodity prices plummeted, evidence of rapidly growing productivity. Technological change led to permanent changes in the natural gas industry that dramatically shifted the industry's long-run TFP about a decade ago.

Some readers may recall that US gas commodity prices were once regulated. Of course, it's purely hypothetical, but consider what would have occurred if fracking technologies were perfected when gas prices were regulated, and the Federal Energy Regulatory Commission applied RPI minus X regulation to gas commodity prices. For consumers to share in the industry's productivity gains via price reductions – and for regulation to emulate the observed outcome of the competitive natural gas markets that later existed and led to dramatic price declines – the fracking-induced change in industry TFP would need to be incorporated in FERC's (hypothetical) approved X factor. To be consistent with the "long run competitive equilibrium" criterion posited by Dr. Makholm, hypothetical price controls for gas production would have had to incorporate the rapid, but objective, change in industry TFP growth into the X factor, not view it as "a problem for any regulator seeking objectivity."

Another example is less familiar, but perhaps even more significant: retail and wholesale trade. In recent years, these industries have been radically transformed by their use of IT and related innovations. A recent study estimates that "the emergence of rapid innovation in the IT-using industries, making up two-fifths of the US economy, was the main source of sustained productivity growth (in the US economy) in 2000-2007. Innovation in these industries had been unchanged from 1960-1995…[24] The locus of US innovation is revealed by…a rank ordering of industries by contributions to (economy-wide) value added and productivity. The leaders in innovation among IT-using sectors, wholesale and retail trade, head the list. The leading firms like Walmart and Cisco have integrated supply chains around the world. These supply chains link electronic cash registers and business-to-business ordering systems with order dispatch and transportation scheduling at remote factories."[25] This example shows that even extremely "mature" and well-established industries like retailing can, and have, experienced shifts in their long-run TFP growth.

At least one other example is also relevant to this discussion: US railroads. As discussed, large US railroads were "early adopters" of Inflation minus X regulation for certain rail services. When an X factor was added to the RCAF in 1989, its initial value of 1.7% was equal to the estimated, multi-year trend in the industry's TFP growth. However, the rail industry was experiencing rapid TFP growth at that time due in part to the Staggers Rail Act and a more light-handed regulatory environment. Within a few years, this TFP acceleration led the X factor in the RCAF to grow to more than 5%; similar X factor values prevailed for much of the 1990s. This rapid change in industry TFP, compared to historical norms, appears to be at least as large as the difference between electricity distributors' pre- and post-2000 TFP growth that Dr. Makholm calculates and finds concerning.[26] The railroads' TFP changes were also readily incorporated into regulated price changes through the "rolling X factor" used in the RCAF, which is an approach that can also be implemented in electric utility MRPs if regulators choose to adjust TFP trends gradually to reflect new developments.

In sum, competitive markets are replete with evidence that an industry's long-run TFP trend is not etched in stone. Technological and other factors can lead to persistent industry TFP changes that differ from previously observed trends. The long-run behaviour of competitive industries, therefore, does not imply that a changing TFP trend for regulated utilities will necessarily give rise to "an unstable X factor." It simply indicates that industry circumstances

have changed, and the new conditions will impact the industry's TFP growth for some time. An objective X factor in electric utility MRPs should reflect these new circumstances, similar to how they are reflected in productivity (and price) trends in competitive markets.

MRPs and Targeted Incentives

Dr. Makholm's final perspective on the future of "RPI minus X regulation" concerns the changing emphasis of incentive regulation. He argues that "the public policy imperatives of green, customer -responsive, load-leveled power delivery require more than simply incentivizing competitive, cost-reducing behaviour. These new policy imperatives reflect as a desire to change what modern electric utilities do. Two types of incentive regulation are widely apparent for electric utilities today: 1) capitalizing expenses (or earning returns on expenses), and 2) earning returns on targeted outcomes."[27]

I agree with much of this. Targeted, project-specific incentive regulation is becoming more common, and it is likely to be increasingly important in the years ahead. Traditional Inflation minus X MRPs are also designed to incentivize competitive, cost-reducing behaviour. This objective is always important, but the current policy environment is clearly calling on utilities to do more than minimize costs.

However, Dr. Makholm erred in (implicitly) portraying comprehensive, Inflation minus X MRPs and targeted, project-specific incentives as substitutes. MRPs and performance incentive metrics (PIMs) are focused on achieving distinct regulatory objectives. MRPs are designed to lengthen regulatory lag, create stronger incentives to control costs, and reduce the burden and costs of the regulatory process. PIMs are aimed at achieving narrowly-defined regulatory objectives. Because these regulatory aims are distinct and generally non-overlapping, MRPs and PIMs are better viewed as complements rather than substitutes.

Indeed, there are several ways that an MRP can complement PIMs by supporting and strengthening utilities' commitment to policy initiatives. For example:

- Multi-year rate plans are, by definition, multi-year plans; a longer time horizon strengthens incentives to pursue long-term initiatives, particularly those involving upfront costs and multi-year payback periods. This supports Dr. Makholm's view that "long term regulatory commitments drive incentives."[28]
- Lengthening the planning horizon and regulatory lag can have a positive effect on a utility's corporate culture; management attention can shift from the regulatory process to the company's "basic business," to the long-run benefit of shareholders and customers.
- The comprehensive, cost-containment incentives created by MRPs encourage utility managers to consider all costs when making decisions. This includes examining the tradeoffs that can exist between up-front capital costs and future operating cost savings. This differs from targeted PIMs, and particularly proposals to capitalize expenses, which directly incentivize narrowly defined projects. Taking a comprehensive approach and considering all costs is particularly important in times of rapid technological change, like today.

It also should be remembered that, despite new public policy goals, distributors' main task remains the cost-effective and reliable delivery of power supplies. The lion's share of regulated costs is still associated with these functions. Executing this responsibility in the most cost-efficient manner, therefore, remains critical to customer welfare and effective regulation, and a well-designed MRP is focused on achieving these traditional regulatory objectives.

Finally, at the broadest level, Dr. Makholm says "the North American regulatory model represents an evolution of institutions to promote *orderly action* where the private interests of utility investors intersect with the *public interest* at large…the institutions of US regulation recognize that it ultimately had the practical goal of 'harmonizing relations' between parties who are otherwise in actual or potential conflict…"[29]

Naturally, anything that harmonizes relations and promotes orderly action is all to the good, but we should not forget that regulatory proceedings are *contested* because competing interests are at stake. This inevitably produces a certain amount of conflict, but in my experience, the antagonism inherent in the cost of service filings far exceeds that associated with MRPs. A direct, regulatory focus on company costs creates a kind of zero-sum mentality. In contrast, well-designed MRPs enhance overall incentives and contribute towards positive-sum, "win-win" outcomes for all parties. This is yet another way in which Inflation minus X MRPs can remain a valuable part of the regulatory environment and promote both the traditional and new regulatory objectives Dr. Makholm has identified.

About the Author

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Endnotes

[1]*Utility Dive, 2017 State of the Electric Utility Survey.*

[2]The remaining companies said they were regulated by a mix of cost of service and PBR methods.

[3]Makholm, J., "The Rise and Decline of the X Factor in Performance-Based Electricity Regulation." *The Electricity Journal* 31 (2018), 38-43.

[4]Makholm, J., *op cit*, p. 38.

[5]The "RPI" term in "RPI – X" refers to the Retail Price Index, the British equivalent of the US consumer price index. It is accordingly more appropriate to refer to US applications of this approach with a more generic "Inflation" term than the RPI, since no US MRPs will actually reference the RPI. I will therefore use the "Inflation minus X" formulation for the remainder of the article, unless I am directly referencing and/or quoting parts of Dr. Makholm's article which use RPI. It should also be noted that, to contain the length of this article, I am responding only to Dr. Makholm's three main points, even though many supporting and related claims could also be challenged.

[6]Stephen Littlechild, *Regulation of British Telecommunications' Profitability: Report to the Secretary of State*, February 1983. The report said only that the X factor was "a number to be negotiated."

[7]Makholm, J., *op cit*, p. 39.

[8]E. Fred Sudit, "Automatic Rate Adjustments Based on Total Factor Productivity Performance in Public Utility Regulation", in *Problems in Public Utility Economics and Regulation* ed. M. Crew, Lexington Books, 1979.

[9]William J. Baumol, "Productivity Incentive Classes and Rate Adjustment for Inflation", Public Utilities Fortnightly, July 22, 1982, pp. 11-18.

[10]ICC, Advanced Notice of Proposed Rulemaking, "Railroad Cost Recovery Procedures", Ex Parte No. 290 (Sub-No. 2), April 28, 1980.

[11]At the time of the Staggers Act, railroad finances had become perilous because the operating and pricing restrictions on railroads under cost of service regulation were untenable in the increasingly competitive markets for surface freight and passenger traffic.

[12]Interstate Commerce Commission, *Railroad Cost Recovery Proceedings*, Ex Parte No. 290 (Sub-No. 4), March 22, 1989, p. 16.

[13]ICC, *op cit*, p. 27. It is also important to recognize that in the railroad plan, the rolling X-factor is updated automatically based on new TFP information. This updating occurs each year and substitutes for periodic regulatory reviews of the X-factor. The rolling X-factor in this plan therefore represents an extremely light-handed regulatory approach. The regulator does not review the performance or earnings of individual railroads, and the X factor is updated automatically for relevant changes in the industry's unit cost.

[14]In some of these early energy plans, however, regulators did not have access to industry-wide trends in TFP and instead relied on company-specific measures of TFP growth. This was the case for the first PBR plan approved for Southern California Edison in the early 1990s, although

the California Public Utilities Commission said in its Order it would have preferred an industry TFP measure. The PBR proposal for Southern California Gas in 1995 did, in fact, include an industry-wide study of gas distribution TFP growth that was the basis of the Company's proposed X factor.

[15]Of course, parties proposing early PBR plans for energy utilities did maintain that the TFP evidence proffered in support of those proposals was objective and rigorous. This is to be expected, since utilities endeavor to put forward objective, rigorous and credible evidence in all regulatory proceedings (and vouch for the credibility of the evidence they do put forward). The issue, though, is whether North American utilities chose *not* to use the British RPI minus X approach and instead utilize industry TFP indices as the basis of proposed X factors in order to satisfy North American due process and evidentiary standards. I am not aware of any North American utility or regulator making such a claim, and if Dr. Makholm can identify any statements from regulators or other parties involved in early energy utility PBR proceedings that support this view, I would be happy to acknowledge this factual evidence and revise my opinion accordingly.

[16]I do agree with Dr. Makholm that this discretion could, and perhaps should, have been limited by broader institutional constraints. But even in North America, regulators can exercise considerable discretion over issues such as determining the appropriate cost of capital, evaluating the prudence of management decisions, and other factors that can have a material impact on a utility's approved revenue requirements and cost of service. American courts also often defer to the discretion of administrative agencies, including energy regulators, when statutes are unclear, a position enshrined in the US Supreme Court decision *Chevron USA, Inc. vs. Natural Resources Defense Council, Inc.* (1984).

[17]One such mechanism is the "information quality incentive" (IQI) that was implemented by the UK Office of Gas and Electricity Markets (Ofgem) in the early 2000s. The IQI was designed to reduce incentives for energy utilities to "game" their forecast capital expenditures over the upcoming price control period. Ofgem believed that a number of electricity distributors undertook such gaming in earlier price reviews, and it had a difficult time evaluating the veracity of utilities' forward-looking cost projections. The IQI was designed to create incentives for utilities to provide more accurate capital expenditure forecasts.

[18]Dr. Makholm emphasizes both the due process foundation and the "paramount" importance of objectivity and transparency in North American evidentiary standards for regulatory decision-making. As discussed in the following section of this article, Dr. Makholm says that "Importing RPI minus X regulation to North America required strong emphasis on objectivity, scholarly support, and reproducible empirical analysis. This wider foundation for regulatory decision making not only comes from the due process foundation that guides North American regulation generally but also on the nature of North America's contested regulatory proceedings…

objectivity and transparency are of paramount importance when judges and commissions decide such cases" Makholm, *op cit*, p. 39-40. While due process and objective, transparent evidence are indeed important in North American regulation, neither led utilities to reject UK-style RPI-X regulation in favor of industry-TFP tends as the basis for X factors.

[19]Makholm, *op cit*, p. 39-40

[20]Makholm, *op cit*, p. 40. While I concur with the reference to "the competitive foundation for the entire concept of RPI minus X incentive regulation," it appears to conflict with Dr. Makholm's earlier statement that "the sole purpose of the X factor (is) to adjust published government inflation indexes to fit the needs of a particular regulated industry" (p. 39). "Fitting the needs of a particular regulated industry" suggests the value of X can be quite flexible, depending on the needs of the regulated industry. It certainly does not imply that regulatory Inflation minus X price controls are grounded in a conceptual foundation that is designed to mimic the rigor, operation or outcomes of competitive markets.

[21]Makholm, *op cit*, p. 40

[22]Makholm, *op cit*, p. 41

[23]In my opinion, Dr. Makholm's estimates almost certainly exaggerate both the rate of TFP growth before 2000 and the rate of TFP decline after 2000. One important reason is that he uses kWh to measure electricity distribution output which, contrary to his claims in the article, is the exception rather than the rule in electricity distribution TFP studies. Most TFP studies used to set the terms of approved Inflation minus X plans in North America have used customer numbers rather than

volumes as output measures, particularly in recent years. TFP measures that use customer count rather than kWh are far more stable over time than Dr. Makholm's TFP results.

[24]Jorgensen, D., M. Ho, J. Samuels, "New Data on US Productivity Growth by Industry," ICT and Economic Growth Conference, Munich School of Management LMU, November 4-6, 2010, p. 18.

[25]Jorgensen *et al*, *op cit*, p. 19. In more recent years, the same forces discussed in this passage almost certainly apply to increasingly popular digital commerce and companies like Amazon.

[26]In Table 2, Dr. Makholm reports a 1973-2016 industry TFP growth trend of 0.5% and a 2005-2016 TFP trend of -1.6%; the 2.1% difference between these trends is less than the acceleration of TFP in the RCAF from 1.7% to over 5%.

[27]Makholm, *op cit*, p. 43.

[28]Makholm, *op cit*, p. 40.

[29]Makholm, *op cit*, p. 41.

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