



¿Why is it strategic to foster THE
INFORMATION MANAGEMENT
INDUSTRY AND THE
INTELLECTUAL PROPERTY
EXPORTS IN BOLIVIA?

This article highlights the need to update the current “Regulation for the Distribution of Natural Gas through Pipe Lines in Urban Areas as well as the Design, Construction and Operation of Natural Gas Pipe Lines in Indoors Installations”, to support the industry of information management and the intellectual property exports in the country.



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Market trends highlight the valuation of information management companies during the last five years has increased, even during the pandemic. For example, Google and Amazon grew over 200% in market cap in that period. In comparison, the development of heavy industry and energy for the manufacturing of finished goods, or the extraction of natural resources in the energy sector is now worth almost nothing, and the future of the industrialized world lies on the development of added value of intellectual property; whether in the form of software development, content, data processing or storage, and new financial solutions.

In fact, a great advantage of these new industries is that the purchase and sale of these new generation of products and services happens immediately. These goods do not require complex supply chain management and logistics. Therefore, this new industry is based on the development of creativity, where the entry barriers for Bolivia are far less demanding than in other industries.

UPDATE THE REGULATION

In order to bolster the development of this type of industry, a very important variable is the energy cost. Bolivia can be a very attractive location for the development of this industry by providing access to low energy expenses. To do this, an update is required in the "Regulation for the Distribution of Natural Gas through Pipe Lines in Urban Areas as well as the Design, Construction and Operation of Natural Gas Pipe Lines in Indoors Installations", approved by Supreme Decree No. 1996 on May 14, 2014. This law was first created as the Supreme Decree No. 28291, approved on August 11, 2005.

This current regulation, according to article 57, divides natural gas into the following sub-categories: a) Domestic; b) Commercial; c) Industrial and; d) NGV (Natural Gas Vehicle). Likewise, appendix 6, within the Natural Gas Industrial Installations guidelines, defines the Industrial Category as those establishments where Natural Gas is used as a Fuel, where raw materials are transformed into finished goods. Unfortunately, this classification excludes newer activities focused on the information management industry and export of intellectual property made in Bolivia, where industries focused on software development, telecommuni-

cations, financial technologies (Fin-tech) and Data management, among many others, could be included.

Moreover, the current regulation does not consider, the remarkable real estate development that the country has experienced during the last 14 years. The development of new corporate and financial hubs has supported the growth of shopping centers, food courts, hotels and corporate buildings to house many multinational companies as well as huge local corporations. Many of these hubs are where all this new flourishing technology-based revolution is taking place.

The growth of these companies requires controlled industrial refrigeration systems to store, and operate big data centers. However, when dealing with business centers located in urban areas, the energy costs per KW-hour are often around US\$ 0.15/KWH, vs. US\$ 0.07/KWH, which is the average rate in traditional industrial hubs around the country. It is clear that there is a competitive barrier for this industry, based on prohibitive energy prices.

Within a data center, the servers are not the only components that consume energy. For these servers to work properly, they require industrial cooling systems, as well as an entire UPS system made up of many batteries that must remain charged at all times in the event of a utility grid failures. There are also energy losses due to the extensive wiring that exists within a data center. Each of these elements represent a considerable percentage of the total energy consumption. Energy and capital are also wasted when servers have low utilization levels, between 5 to 10 percent. Though this seems to be required by



the industry's reliability standards in order to avoid a total collapse in the system in case there is a spike of data processing requiring a sudden increased utilization of data capacity. A common response from data center managers is that servers exist to provide capacity for extreme situations, such as shopping spikes the day before Christmas (McKinsey & Company, 2010).

CHEAP AND CLEAN ENERGY IS NEEDED

In order to foster the development of this new industry, which is located far from cheap energy industrial hubs and concentrated in new financial and corporate centers of the country, a large amount of cheap, clean and reliable energy is a must. This will enable the development of a competitive intellectual property industry in Bolivia. For this, it would be urgent to develop Distributed Generation Systems in each of these corporate centers. These hybrid systems can include renewable energy, as well as natural gas power generation, which are more resilient to seasonality, a variable that limits reliability of renewable energy sources.

Another limitation of the current regulations is that these grid-connected energy solutions based on natural gas power generators are not contemplated within the definition of commercial installation guidelines. According to Bolivian regulations, commercial installations are limited to a fuel consumption of just 100 MCF/month, but the gas consumption of these type of generators could be as much as 3,374.19 MCF per month. On the other hand, an industrial gas installation cannot be requested either, because again, the regulation describes an industrial process as the conversion of raw material into finished goods, which is not what occurs in a corporate office building or data center. However, the entire infrastructure of a data center combined with office buildings that supports this industry, could be equally or even more energy intensive than many other conventional industrial processes. As a reference, according to Digital Realty, a company specialized in the development and management of data centers around the world, the current global data center installed capacity uses around 90 billion Kilowatts/hour of electricity annually, which is the equivalent of 3% of all electricity used in the world. All this energy is more than all the electricity used in the United Kingdom (Digital Realty, 2021).

Capstone's dual mode microturbine systems can operate in parallel to the grid, in the same place where these new industries operate. This offers greater reliability in the energy supply as well as lower energy prices, and clean, effi-

cient electricity generation out of natural gas or renewable sources through hybrid systems. The microturbine's modular configuration allows a much greater redundancy in terms of energy availability in the event of energy shortages in the city. Additionally, by generating electricity in parallel to the grid, Capstone's microturbines can cover up to 80% of the energy consumption, and leave the remainder to the utility grid, thus achieving remarkable energy savings without disconnecting entirely from the grid. For a data center or corporate office, the result is having four redundant energy sources (the utility grid, natural gas power generators, UPS and emergency diesel generators).

Another advantage of being connected in parallel to the grid is that these devices can inject energy into the grid when necessary and serve as an additional redundancy layer for the national interconnected system, based on distributed generation systems. Although all of this is technically feasible, it is essential to regulate the implementation of bidirectional meters in the Bolivian legislation. This type of metering allows the measurement of energy that these systems inject into the grid and, through this, receive a financial compensation for the power provided, when it is necessary. The bidirectional meters and the implementation of such energy sale business model to the utility grid, will enable monetization and it will incentivize the development of clean distributed generation systems based on renewable energy sources such as solar and wind, as well as reliable natural gas power generators.

OPPORTUNITIES AND CHALLENGES FROM THE INFORMATION MANAGEMENT INDUSTRY IN BOLIVIA

In the era of Big Data, companies are focusing on a more complex analysis of information to better understand their customers' preferences based on statistical models. Data analytics supports improved projections of their investments, inventories and the coordination of their supply chains. On the other hand, customers demand mobile applications with real-time response and access, just as employees are finding new collaboration tools within the new normal of remote work.

As a result of all these disruptive changes, the need for computing capacity, data storage, and networking capacity is expected to grow exponentially, even in the midst of a global recession. To deal with this type of situation; IT departments strive to increase their computing capacity, resulting in an annual growth of 10% in the United States alone (McKinsey & Company, 2010).

The vast majority of the western industrialized world outsources its operations in countries such as China and India, taking advantage of a cheap and highly trained workforce, as well as low costs in taxes and energy. However, there is a great opportunity for other countries with emerging economies, such as Bolivia, to attract these international companies looking to outsource their operations. For Bolivia, this could help to reduce the unemployment levels of highly skilled workers in the country, while taking advantage of the new reality of remote work, and attracting migrants from other countries interested in relocating to our country while maintaining employment through remote work and enjoying the low cost of living that Bolivia offers.

These types of stimuli would undoubtedly promote a greater economic development by increasing the quantities of foreign currency circulating in the Bolivian economy. It could increase the occupancy rate and leasing of all the infrastructure in the country's real estate sector, which is currently overdeveloped and empty. However, Bolivia needs to have a solid IT infrastructure, as well as a cheap and reliable energy supply for the growing needs of this new Information Industry.

RESERVOIR MODELING SIMULATIONS AND CRYPTOCURRENCIES MINING

There is ample computing capacity in Bolivia. Basically, any activity that requires computing power can increase the utilization levels of these data centers. Some examples include the use of these servers to run mathematical models for reservoir simulations in the oil & gas industry; video rendering, which is the computing capacity that animation studios use to generate 3D animations; and cryptocurrencies mining, which is basically a validation mechanism to verify the authenticity of a cryptocurrency, preventing them from being cloned or creating new fake copies.

For cryptocurrency mining especially, the algorithms that are based on blockchain technologies, require enormous computing capacity to verify the authenticity and, in this process, create new blocks of data within the code of the coins (something very similar to DNA genetic code that identifies a person). The blocks' density increases after each transaction, thus requiring more and more time as well as computing power to carry out future authentication transactions.

Due to this permanent increase in the complexity of blockchain that has to be decrypted every time a transaction is made to check if the coins are real, the



computing capacity required worldwide to be able to authenticate these transactions will be increasingly large and complex in the future. In turn, the data centers that are currently operational must maintain the most up to date computing power infrastructure to quickly authenticate these transactions. If they are incapable to do this, their obsolescence will be unavoidable as a data center in another part of the world with more up to date computing power infrastructure will be able to authenticate these transactions faster and more efficiently.

Cryptocurrency mining could become a new source of income for Bolivia since the monetization process is based on the fact that each time a cryptocurrency transaction is requested, this request is received by several data centers, where the first one that manages to complete the authentication task faster is the one that receives a payment for the computing time that was invested in completing the task. This payment for authentication, is monetized by creating new cryptocurrency coins that are deposited into the digital wallet of the company that operates the data center. Then, this balance of cryptocurrency can be used to buy dollars or euros based on the price of the cryptocurrency at that moment in time.

As a reference, according to the Center for Alternative Finance in Cambridge, Bitcoin mining alone, one of the most valuable and popular cryptocurrency today, consumes approximately 110 Terawatt hours per year, 0.55% of the total energy produced in the world, or the equivalent to the annual consumption of countries such as Malaysia and Sweden (Harvard Business Review, 2021).

Therefore, it can be said that Bitcoin mining turns electricity into security. It's also why the system wastes energy by design (The New York Times, 2021).

Beyond the cryptocurrency mining industry, other applications that can be developed on Blockchain 2.0 technology can be the implementation of smart contracts based on which authentication mechanisms for digital contracts can be generated, identification documents,

as well as new applications that better protect the privacy of internet users. All this new authentication technology, based on what is called Blockchain 2.0, will allow avoidance of a series of legal problems such as fraud with property titles, sales, irregular financial transactions, among many others. Blockchain 2.0 technology will enable greater security when carrying out any type of legal procedure, where each individual or institution will have their documents validated in a unique and incorruptible way within a digital authentication format.

Likewise, the trend of data storage in the cloud, which is a new standard for security and reliability for the protection of important information, both at a personal and corporate level, also represents a great business opportunity for companies in the country. However, it represents a huge technological challenge that relies on a lot of energy. As a reference, according to an article on the New York Times, in 2012, the New York Stock Exchange alone, produced more than 2,000 gigabytes of data per day, which must be stored for years in data centers. On the other hand, according to Dell-EMC and the International Data Corporation, both estimate that more than 1.8 trillion gigabytes of digital information are created globally in a year (The New York Times, 2012).

In summary, in order to promote the development of the information management industry and intellectual property exports in Bolivia, it is vital to update the current regulations of the energy sector to support the growth of distributed generation sources in financial centers and corporate offices of the country. These places are where the offices and data centers of software, telecommunications, financial technology (Fintech) and content production industries, among many others, are concentrated. Without the regulatory change, the current electricity rates will continue limiting the competitiveness of these industries that are based on intensive energy consumption that now exceeds the electricity demand of conventional heavy industry, which has been the basis of the Bolivian economy.

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