

# Extreme

## The New Frontiers of Energy Extractivism in Latin America



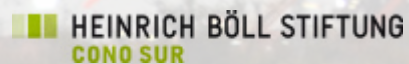
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Deepwater Horizon drilling unit on fire  
(Niezmany – US Coast Guard)

# What do we Understand by Extreme Energy?

By

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Original in Spanish. Translated by  
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Images of the fire on the Deepwater Horizon oil rig as it was drilling the Macondo well in the Gulf of Mexico in April 2010 are still fresh. The explosion killed eleven workers, and it was only after three months of intense work that the oil company BP managed to control the situation. By then, more than 700 million liters of crude oil and millions more of formation water had spilled into the Gulf. The magnitude of the disaster reflects the risks that will be posed by the expansion of the extractive and technological frontier. This is what analysts like Michael T. Klare have called “extreme energy”.

The concept pertains not only to the characteristics of hydrocarbons, but also to a context in which gas, oil, and coal exploitation entail ever greater geological, environmental, labor-related,

and social risks, coupled with high accident rates as compared to other traditional forms of resource extraction. The era of easily recoverable hydrocarbons is coming to an end, if it is not already with us. To sustain the fossil fuel energy matrix, companies and governments are now targeting tight sedimentary formations, heavy and extra heavy crude oil, bituminous sands, and even applying biotechnological innovations for enhanced hydrocarbon recovery in depleted wells.

Part of the same package are offshore reservoirs, which are increasingly farther away from the coast and in deeper waters; some are even extracted after piercing through thick layers of salt. Such fields are also enjoying the “gifts” of hydraulic fracturing (fracking) used to revert the decrease

in production. Coal reservoirs deep under the earth, inaccessible to conventional mining, as well as the gas contained in them (coal bed methane), spark the interest of governments and companies. Thousands of tons of carbon would be emitted to the atmosphere if such hydrocarbons were extracted and pumped into the energy market and the petrochemical industry, further extending the decay of our *fossil civilization*.

The other feature of this extreme extraction model is that in many cases accessing these reserves of gas, oil, and coal means expanding the extractive frontier over the lands of peasants and small scale producers, the waters of small-scale fishermen, and the territories of indigenous and Afro-descendant peoples. The expansion goes hand in hand with rights abuses, displacing populations and leading to the disappearance of knowledges and cultures, and the death of local and regional economies. That is, it constitutes a threat to the food and territorial sovereignty of peoples, a symbolic and material violence inherent to extreme energy that leads to an escalation of violence against bodies and non-human Nature. That is not only due to the intrusion in fragile ecosystems and the increasing degradation of those already impacted, but also to the continued reliance on the energy matrix that is responsible for the current climate crisis and global warming.

Moreover, this expansion of frontiers to extreme settings entails more hazardous working conditions. Those who work on extreme energy projects are not only exposed to harsh weather conditions –as in the Arctic or the high seas– but also to the toxicity of chemicals used for example in fracking; to biotechnological developments designed to increase levels of extraction and enhance hydrocarbon transformation processes; and to a higher risk of explosions and other accidents at work.

Additionally, the gas and oil found in deep and/or tight reservoirs, or in remote places, require more infrastructure, and the deployment of logistical support both to bring them to the well head and to inject them into the market. This translates into the drilling of thousands of wells, duct laying, installation of compressor stations, tanks, etc. In short, it results in greater territorial occupation, and industrialization of rural areas and the landscape in general, together with the expulsion of populations that are not functional to the new uses of the space.

On top of that, each barrel obtained from extreme energy projects requires higher energy consumption, i.e., its efficiency is lower. Their production also needs greater financial resources than conventional fuels. In many cases this means public subsidies, tax concessions and artificially inflated prices, all transferred from the taxpayers' pockets.



● Christening ceremony of P-52 drilling unit for exploitation of pre-salt in ultra-deep reservoirs (Ricardo Stuckert – Agencia Brasil)

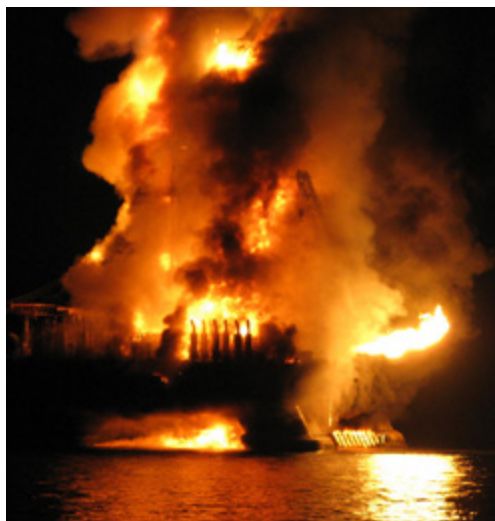
## Crude oil prices drop, extreme projects continue

The sustained drop in oil prices well below \$100 has not automatically changed the oil policies of Latin American governments nor has it made extreme energy projects unfeasible. There is undoubtedly a slowdown, but as long as there is no political will and enough mobilizing to move towards the defossilization of the energy matrix and the productive model (hydrocarbons as a non-energy input), these projects will continue to represent the new frontier in the face of the global depletion of the big conventional reservoirs.

To continue in the game, companies reduce the production costs by laying off staff or promoting their “voluntary retirement”; doing away with labor victories (non-financial benefits like breaks, food quality in the workplace, etc.); getting rid of intermediaries; developing and applying technological innovations; among other variables. The corporate sector also lobbies in order to receive incentives like subsidies, tax concessions, and domestic prices lower than their international equivalents. Thus the financial costs –in addition to the social and environmental– are transferred to the users, who pay more for energy and fuels, as is the case in

Argentina. It should also be noted that countries like Ecuador and Venezuela have made oil-for-loan deals with China, pushing the frontier in the Amazon region and the Orinoco Belt. In the case of the Bolivarian Republic of Venezuela, the loan amounted to more than 46 billion dollars.

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● Otto Candies / USCG Press.

## The extreme frontiers of Latin America

Even though from early 2014 and well into the year hydrocarbons from shale and fracking were in the agendas of most countries in the region with more or less conviction, this has not been translated into more advances in the territory. Regionally, the phenomenon of shale has only had a relatively large impact in Argentina in the Vaca Muerta formation. In Mexico, the other *fracking* protagonist, the impact has been milder. As for Colombia, authorities have a firm interest in moving in the same direction. This does not mean that interest in tight formations has faded away. It has actually gained momentum in Argentina, Mexico, and the southernmost part of Chile. "Production" costs for tight sands are considerably lower than those of shale, which makes them especially attractive for companies.

There is another frontier in the region that keeps expanding: offshore operations. Since the discovery of a pre-salt field a decade ago, Brazil made a strong bid for its exploitation. Brazilian authorities have not given much importance to shale blocks with oil and gas potential, nor have these been of interest to companies during the last rounds of oil leases. The impetuous decision to advance into the sea was seen in the conflict that arose in 2015, when the federal government tried easing environmental licensing systems for offshore exploitation, a reform resisted by the workers of environmental control agencies. In pre-salt formations, hydrocarbons are situated at a depth of 7,000 m; 90 % of proven oil reserves and 70 % of gas reserves are found there.

The French company Total drilled a well 200 km off the shore of Uruguay in 2016. Although the final depth is unknown, it was projected to go through

3,400 m of water column and another 3,000 m below the ocean floor in search of hydrocarbons: a milestone in the region, in a country without a record of hydrocarbon exploitation. Colombia is also moving towards deep-water extraction in the Caribbean Sea, as are Nicaragua and Honduras. Chile, due to successful drilling by the state-run company ENAP, seeks to consolidate its offshore developments in the Strait of Magellan and expand tight gas exploitation in Tierra del Fuego.

Meanwhile, heavy and extra heavy crude oil are key in countries like Venezuela, with its Orinoco Belt, and Colombia, in the plains region. Beyond the characteristics of its hydrocarbons and the formations that contain them, both the Amazon region and the South American Chaco constitute the new frontier par excellence for Bolivia, Colombia, Ecuador, Paraguay, and Peru. In many cases, drilling targets indigenous territories, peasant communities, and protected natural areas.

Behind the discourse of salvation and abundance with which extreme energy projects are promoted in our countries, there lie other realities like those mentioned above. With these lines we inaugurate a series of articles about the extreme nature not only of the energy projects but also of the infrastructure and finance required for the reproduction of globalized capitalism.

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● Deepwater Horizon Response (U.S Coast Guard photo by Chief Petty Officer John Kepsimelis).

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# Anihilating Space Through Time

## Extreme Infrastructures and the Expansion of Global Capitalism



It is undoubtedly true that the fossil fuel industry now employs increasingly extreme methods – both technologically and in terms of human and environmental oppression – to secure the oil, coal and gas needed to keep the wheels of capital accumulation rolling: hence the term “extreme energy”. But such “extreme production” is not unique to the energy sector: mining companies too are increasingly forced to open up remote and ecologically intransigent areas to extract the minerals they need, in turn necessitating new forms of “extreme technology” and “extreme finance” to wrestle minerals from the ground. Manufacturers are no less trapped: to exploit cheap labour, they must move production to sites that are more and more distant

from points of consumption, requiring “extreme infrastructure” to speed up the process of exchange, and hence profit-taking.

None of this is taking place without resistance –both from humans and from nature. While extreme forms of production signal the direction of travel that globalised forms of capital require if they are to expand, the ultimate trajectory will not be written in the masterplans that oil industry or mining executives draw up or by the deliberations of intergovernmental meetings, nor, indeed, inscribed within some presumed, steam-roller logic behind global capitalism, whose coherence is never as coherent as theorists project. It will be determined by the ways in which



Trans-Alaska Pipeline / U.S.  
Geological Survey Employee

those plans interact with other agents, human and non-human, both now and in the future. A better understanding of the systemic forces and ad hoc political alliances that are driving “extreme production” may therefore assist activists fighting “extreme extraction” in all in various forms, not least by identifying potential linkages to other struggles and by revealing some of the undoubted vulnerabilities that extreme extraction itself creates for capital.

### Infrastructure corridors

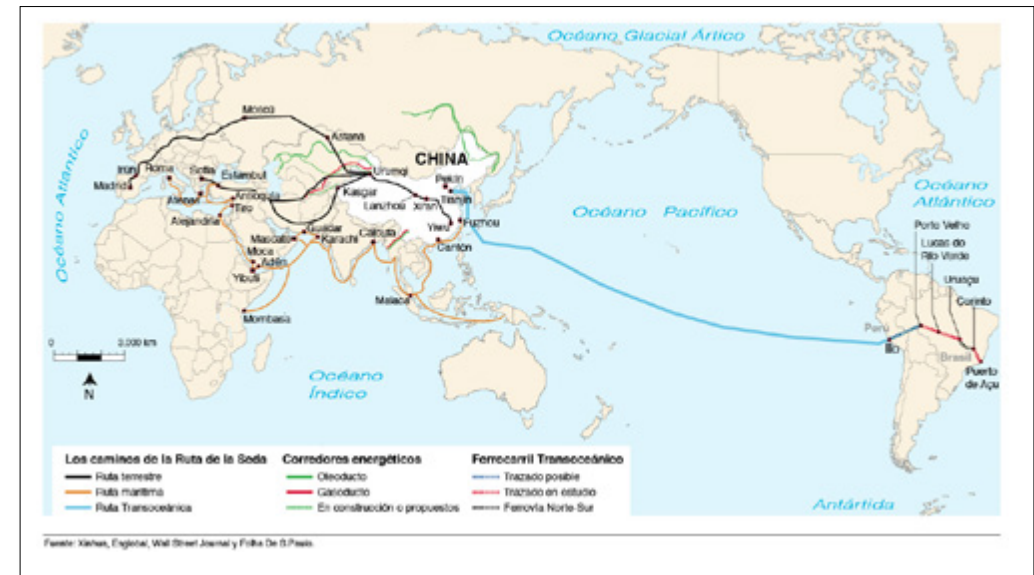
One area that is perhaps worth exploring is the current push by capital for “infrastructure corridors”, not least because it is where various strands of “extreme production” –from oil and gas companies to mining and agribusiness conglomerates and off-shoring manufacturers– are coalescing to make common cause. No (inhabited) continent is excluded. From Africa to Asia and the Arctic to South America, infrastructure masterplans have been drawn to reconfigure whole land masses (and the seas connecting them) into ‘production and distribution hubs’, ‘transit zones’, ‘development corridors’, ‘export zones’, ‘spatial development initiatives’, ‘inter-connectors’ and ‘intermodal logistics terminals’. Some of the plans are national in scale, others regional and still others continent-wide or near-global.

In Africa, over 30 corridors have been initiated, principally to enable the extraction of agricultural produce and minerals. The majority are ‘anchored’ around mining projects but many have ancillary agricultural corridors or

tourism developments as secondary offshoots. In southern Africa, a race is on to develop the shortest corridor routes to the sea from Zambia’s copperbelt province and the Democratic Republic of the Congo’s mineral-rich Katanga province. Corridors serving iron ore, copper, coal, nickel and other mines are also planned in northern and central Mozambique, Botswana, Ghana, Liberia and Sierra Leone.

No less ambitious plans are on the drawing board for South America. Under current proposals, some 579 projects, costing an estimated \$163 billion, have been identified, of which 89 per cent involve roads, airports, ports, inland waterways and ‘multimodal’ transport schemes, 9 per cent energy projects and the rest communications infrastructure. Of these, 107 have been completed and 169 are under construction: the rest are still at the planning stage.

All the countries of Asia have similar plans. In Indonesia, six corridors are being promoted under an ambitious 15-year, \$1 trillion Masterplan for Acceleration and Expansion of Indonesia’s Economic Development. Over 1,000 infrastructure and logistics projects are planned, including roads, railways (particularly to haul coal), airports and ports. Each of the six interconnecting corridors is centred on developing key industries or natural resources (notably coal and palm oil) through clustered manufacturing hubs and Special Economic Zones (SEZ). Plans are also afoot for marine corridors to connect the islands of the Indonesian



● 21st-Century Maritime Silk Road (Estudios de Política Exterior).

archipelago. Militarisation of these proposed sea routes and the exclusion of local fisherfolk is anticipated.

But the Big Daddy of attempted time-space annihilation (and, some would argue, of contemporary struggles for regional hegemony) is China’s ‘One Belt, One Road’ (OBOR) programme, officially launched in 2013. Encompassing 60 countries (thus potentially half of the world), OBOR is intended to create a network of free trade areas connected by both terrestrial and marine corridors stretching from the Pacific to the Baltic Sea. Its ‘belt’ (officially the ‘New Silk Road Economic Belt’) consists of four land corridors that would collectively connect China to Central Asia, Russia, Europe, the Persian Gulf, Southeast Asia, South Asia and the Indian Ocean. The ‘road’ is in fact a marine corridor (the ‘21st-Century Maritime Silk Road’)

designed to go from China’s coast to Europe via both the Indian Ocean and the South Pacific. The corridor would involve not only shipping but, reportedly, deep seabed mining in the Indian Ocean.

### Eliminating space and time

Multiple social, ecological and political dynamics lie behind this push for corridors; but one bundle of influential drivers stands out. They stem from a problem that some people in finance now term the ‘production-consumption disconnect’. This disconnect arises in part from economies of scale that have enabled more remote deposits of raw materials for industrial production to be extracted; in part from the increasing distances between those deposits and the industrial sites where the extracted



● Reginaspics / pixabay

resources are transformed into consumer goods; and in part from the distances between those production sites and the places where the 'global consuming class' live.

The problem is not new. Almost 150 years ago, Karl Marx revealed how the more that capital expands, the more it needs to improve infrastructure to 'annihilate space by time'. That reality remains a core challenge for contemporary infrastructure planning within would-be global politburos, such as the World Bank. Marx may not get a mention in the Bank's flagship 2009 World Development Report *Reshaping Economic Geography* (its takeaway policy summary: 'No country has grown to riches without changing the geographic distribution of its people and production for market access'); but 'annihilating space by time' is *the*

leitmotif that runs through the report's 380 pages.

Distance is a key theme, defined by the Bank not in Euclidean terms but as a measure of time and money – and, more specifically, 'the ease or difficulty for goods, services, labour, capital, information, and ideas to traverse space'. Distance matters because time matters. And time matters because the faster commodities can be produced and exchanged, the greater the profits for individual capitalists and the sharper their competitive edge over rivals.

To overcome diseconomies of space, bigger, more powerful and more efficient ships, trucks, trains, barges and cargo planes must be built. These in turn necessitate "extreme infrastructure" in the form of expanded or upgraded railway systems and ports, wider roads bigger bridges, deeper

canals, straighter rivers and longer airport runways. The resulting economies of scale in transport stimulate further economies of scale in production (and vice versa), reducing the costs of raw materials and finished goods, stimulating demand and triggering yet another round of pressures to reduce costs by compressing time and distance. One wave of innovation thus creates pressures for yet further innovation.

As bigger and faster forms of transport are developed and the costs of moving goods fall relative to other costs, the geographies of raw material extraction and production are reconfigured. Companies have a wider choice of locations for a factory, increasingly able to move anywhere in the world in search of cheap labour, favourable tax regimes or weak regulatory environments. It becomes more possible for capital to fragment production processes to an unprecedented degree and to move production further and further afield to areas that promise greater profitability, even though these may be often thousands of miles from the major points of consumption.

Likewise, remoter sources of raw materials become commercially viable. Until the 1950s, for example, the high costs of transporting iron ore (typically 60 per cent of production costs) meant that steel mills needed to be sited close to the point of iron ore extraction. But by the 1960s, developments in shipping had made it competitive for the Japanese steel industry to transport huge volumes of iron ore from Australia over 5,000 miles away. By the 1980s, bulk

carriers had been developed that were twice the size of anything previously available, enabling Japan to import iron ore from the newly-developed Carajás mine in the Brazilian Amazon over 12,000 miles away 'more cheaply than US Steel could ship its iron ore across the Great Lakes' (Bunker and Ciccantelli 2005).

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Today, the distances between points of production and points of consumption are often huge, involving multiple journeys and multiple forms of transport. A standard desktop computer, for example, typically involves the assemblage of some 4,000 components manufactured by as many as 250 different suppliers whose various factories are likely to be dotted around areas of cheap, skilled labour, notably Asia. Those components in turn rely on minerals being extracted from all over the globe. The coating for a standard monitor alone contains compounds manufactured from sulfur, zinc, silver, bauxite, gold and a host of other minerals whose names are unfamiliar to all but mineralogists – alunite, azurite, boronite, enargite, cerargyrite, realgar and tetrahedrite – all mined or processed in countries that are often





● Mike Kelley

thousands of kilometres from where the computer will be assembled, let alone finally be purchased and used.

To squeeze profits from such geographically dispersed sites of production, companies have increasingly adopted 'just-in-time' inventory systems, not least in order to cut down on the costs of traditional warehousing: trucks, trains and ships are effectively used instead as mobile warehouses. The slightest delay in transporting components can thus cause major financial losses. Similarly, the economies of scale that make mines such as Carajas

in the Amazon commercially viable require 'huge deposits of high-quality ore to fill ships on a regular basis and with minimum delay in harbour' (Bunker and Ciccantell 2005). In the calculus of global manufacturing chains, 'every day in ocean travel that a country is distant from the importer reduces the probability of sourcing manufactured goods from that country by 1 per cent' (World Bank 2009).

## Extreme finance

The combined pressures of economies of scale, the off-shoring of manufacturing, the extraction of oil, gas and minerals from remoter and remoter areas, the growth of a 'global consuming class' and just-in-time delivery systems are now playing out in the push for corridors.

But extreme infrastructure is costly – necessitating "extreme finance". Many of the individual projects, and certainly the wider schemes as a totality, are simply beyond the resources that can be raised through historical forms of infrastructure finance.

Take the mining projects that are intended to act as anchor investments for many of the corridors in Africa. In the past, mining companies have generally funded the dedicated infrastructure that connects 'pit to port' off their own balance sheets, albeit often with guarantees from multilateral development banks and tax breaks and other subsidies from states. But this is no longer an option for most new mines. The routes are too long and the scale of the infrastructure too costly, particularly for small- to medium-sized mines, for a single operator to finance by themselves. A study by the World Bank's International Finance Corporation found just one mining project that was 'bankable' as a purely privately financed project (di Borgo 2012). The costs are also beyond the wherewithal of many national governments and private banks, even when acting in consort. Although some projects could be financed by bringing in multilateral sources of finance, such as

the World Bank, such sources could not conceivably finance all the projects that capital needs for its 'annihilate space by time' demands. Oil and gas companies face a similar challenge with "extreme energy" projects.

Globally, there is now a massive gap between the available funding for new infrastructure and the amounts said to be needed. Some estimate that \$50–70 trillion will need to be raised between now and 2030, of which about 37 per cent would be for infrastructure in emerging countries. This would mean finding \$0.5 trillion to \$1.5 trillion every year over and above what is currently being spent – and that is just for road, rail, port, airport, water and telecom development: schools, hospitals and other social infrastructure would be extra. The shortfall in the transport sector alone is an estimated \$260 billion every year between now and 2030. The shortfalls in the energy sector are even higher – some \$530 billion a year (OECD 2015c). A study for the 2015 meeting of the leaders of the G20 was blunt: 'Traditional funding sources will not be sufficient to meet these financing gaps' (World Bank *et al.* 2015).

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● Integration and development hubs envisaged by the Initiative for the Integration of the Regional Infrastructure in South America (IIRSA) Maps: James Onnig

As in the past, capital has few options but to attempt to expand the pool of finance on which it can draw. The joint stock company, for example, arose in part to raise the huge sums needed to finance the infrastructure capital needed in the 1860s (as Marx remarked, 'Without joint stock, the world would still be without railways' – it would simply have taken too long for any owner-capitalist acting alone to accumulate capital sufficient for their construction). Likewise, multilateral development banks and syndicated bank loans emerged to finance post-colonial infrastructure development in the global South.

Today, capital must similarly move to tap new sources of finance, in this instance wider capital markets, if it is not to implode. Hence the new alliances that oil and gas companies, mining companies and others are building with new financial actors – notably private equity funds. Hence the re-engineering of infrastructure finance to make it more attractive to private investors by governments providing guaranteed income streams, compensation against new legislation that might affect profits and the like. And hence the push for Public-Private Partnerships (which are central to every one of the proposed corridors and, indeed, increasingly important to the financing of individual "extreme energy"

projects) to provide both an enticement to private investors and the foundation stone on which other extractive forms of finance can be built.

A failure to entice the sums required from investors thus creates a major vulnerability for capital's corridor programme: and, as such, it has turned the financing of "extreme infrastructure" into a potent emerging arena of struggle. This may offer scope for new alliances among those challenging corridors, "extreme energy" projects and other forms of "extreme extractivism". For those whose livelihoods are organised not around just-in-time delivery systems but around the collective right of all to survive, the linkages surely merit further exploration.

## Bibliography:

- Bunker, S. G. and Ciccantell, P. S. (2005) *Globalization and the Race for Resources*. Baltimore: The Johns Hopkins University Press.
- di Borgo, P. (2012) *Shared Mining Infrastructure: Too Good to be True? Trends, Challenges and Opportunities for Private Financing of Mining-Associated Transport Infrastructure in SSA*. Washington, DC: IFC, 2 February 2012.
- OECD (2015c) *Official Development Finance for Infrastructure: Support by Multilateral and Bilateral Development Partners: OECD Report to G20 Finance Ministers and Central Bank Governors*. September 2015.

World Bank (2009) *Reshaping Economic Geography*. World Development Report 2009. Washington, DC: World Bank.

World Bank/IMF/OECD (2015) *Capital Market Instruments to Mobilize Institutional Investors to Infrastructure and SME Financing in Emerging Market Economies: Report for the G20*.

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By  
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Original in Spanish. Translated by  
**Nancy Piñeiro.**

# Biotechnology in the Service of Extractivism



*The manipulation of living organisms in laboratories to help sustain the agribusiness model is a known fact; GMO seeds are an unwanted reality. However, little is known about the developments of synthetic biology in hydrocarbon extraction. ETC Group has recently published a report on this topic, the consequences of which are still hard to assess. We interviewed Verónica Villa, a member of the organization, who explains how the laboratories working on those investigations went from being critical of the oil civilization to underpinning its industry.*

movements and regulatory agencies. ETC Group, a Mexico-based organization working globally to research new technologies –mainly but not limited to the agricultural sector–, and their impact on communities, has published a report about it: *La biología sintética y las industrias extractivas* (available in English as ‘Extreme Biotech Meets Extreme Energy’). The report explores the new ways of genetic modification as it meets with extractive industries, especially with the oil industry. Verónica Villa, part of the group in charge of the Spanish version, talked to us about the report.

**G**radually, synthetic biology developments aimed at hydrocarbon extraction or processing have started to be applied experimentally outside the labs, even if its impacts are difficult to assess. This issue managed to remain unnoticed by most social

**–What is biotechnology and what has been used for historically?**

Those in the business argue that human communities have always used biological transformations, that everything is biotechnology and thus we

Synthetic biology projects itself as an oil industry ally capable of eliminating the frontiers of hydrocarbon extraction. (Christopher Halloran / Shutterstock.com)

should not be so critical of it. So there is a first distinction I really like making, and it is that there is a biotechnology related to the development of productive forces for the good of communities, but there is also a tipping point where biotech has been kidnapped and developed in the image and likeness of capitalist development. That is a process we can also find throughout the development of science and technology. So, biotech as we know it today is dominated by private companies and is dedicated to developments in the service of business. Even if they tell you there is a development that is going to be good for health, it turns out it has been previously privatized, so it is already inaccessible to most people.

***–In that context of biotechnology, what is synthetic biology or extreme genetic engineering?***

The synthetic has two senses. On the one hand, it means something that is not natural, as when you say a fabric is synthetic, it is neither cotton nor other organic material. The other sense points to a synthesis of processes. So, synthetic biology is thus named because it is a kind of biology that is not concerned with the course of natural processes in the metabolism of living beings; on the contrary, it seeks through manipulation to make metabolisms follow the path indicated to obtain an industrial product, for example, an active ingredient. That is where its relation with extreme genetic engineering comes from –synthetic biology shortens, alters, manipulates and suppresses processes.

An example of that is synthetic vanilla. You can put a yeast to a microorganism so it ferments into a sugary liquid, synthesizing the processes that the vanilla plant would make to produce such active ingredients, and thus obtain a substitute of vanillin, which is the ingredient that gives vanilla its flavor. That is why synthetic biology can be considered a branch of bioengineering, because it adopts mechanistic premises to manipulate living beings. All this is computer-assisted.

***–How was synthetic biology developed? How has it been used?***

The industries involved in synthetic biology discovered the way to substitute biosynthesized ingredients for botanical compounds for the cosmetics and pharmaceutical market. That means, of course, breaking the first link in the supply chain of raw materials –which, as we know, is mostly agricultural communities. That is what we call the second wave of synthetic biology.

And the third wave is the one aimed at helping extractive industries. It is something very funny because the promoters of the first wave criticized the oil industry; they said they were trying to replace the oil economy's filth. Now it turns out they serve the oil industry directly.

**Microbes for hydrocarbons**

The pioneers of synthetic biology were first dressed in green. The reasoning was that it was possible to substitute easy-to-produce agrofuels for oil because biomass cellulose would be



● ETC Group

predigested by sugar-fed microbes. They also wanted to push for a boom in algae biofuels. The CEOs of synthetic biology companies openly criticized the high greenhouse gases emission of fossil fuels. According to the ETC Group report: "Alan Shaw, CEO of the Synthetic Biology biofuel company Codexis, claimed that his company's technology would, 'enable the transition from an oil based economy to what is known as the sugar economy.' And that, 'biotechnology is a primary driver of this transition from a 20th century dependence on oil to what will be a 21st/22nd century dependence on sugar'."

***–How did synthetic biology go from criticizing oil industry to being its ally?***

At first, they realized that it was going to be impossible to replace the huge demand for fossil fuels, in terms of critical mass, with biomass fuels. Then they noticed that it is easier to imitate secondary petrochemical products and patent them. And finally

they got into the business of microbially enhanced hydrocarbon extraction, with the novelty that the microbes would be genetically modified for optimal recovery of hard-to-reach oil and gas reservoirs. So, of course, this is a very important shift in the business because they realized there are many new ways of reversing the oil peak. On the one hand, most reserves, which are unconventional, can be extracted; on the other hand, designer microorganisms can "refine" gases to obtain new products.

So it was merely a movement of businesses: the industry's old guard, such as Shell, BP, Total, allied with the new companies focused on synthetic biology, like Calysta, Intrexon, and Coskata.

***–What synthetic biology techniques are currently used in the oil industry?***

Synthetic biology can also be understood as a biological platform for the transformation of a carbon-based

compound into another, using living organisms that “process” them. One of these techniques is biological refining via gaseous fermentation, which uses methane and synthetic gas as raw materials to refine fuels and produce plastic and other industrial substances.

Biotech has been kidnapped and developed in the image and likeness of capitalist development.

*–That is to say, these organisms are introduced so that, so to speak, they eat the gas and defecate refined substances, like plastic.*

Exactly, that is the companies’ utopia. Another possible use is mining by microbes, which would enhance direct extraction techniques. If you go through the research, you realize that microbes that already feed on methane gas –the methanotrophs– were targeted by these companies who wanted to manipulate them.

We should take into account that between 40 and 60 % of oil is very hard to obtain, and requires tertiary recovery techniques. So the microbes designed through synthetic biology are helping that extraction by degrading oil to make it flow more easily. That is why it is called microbial enhanced hydrocarbon recovery. This technique already existed. But the new thing is that now the microbes used are genetically modified through synthetic biology. All this is in an experimental phase that also includes research to use mining

microbes to transform heavy crude into lighter oils, and methanogen microbes to convert coal into gas.

### Microscopic bubble?

*–What kind of companies are promoting those investigations?*

Among the big investors in synthetic biology are six of the ten biggest oil transnationals, six of the ten biggest agribusiness companies, six of the ten biggest chemical companies, and seven big pharmaceuticals. There are also public initiatives such as the REMOTE program (Reducing Emissions using Methanotrophic Organisms for Transportation Energy) of the US Energy Department, whose aim is to capture “stranded gas” from fracking and other oil and gas extraction operations using synthetic biology techniques.

*–Bearing in mind the oil companies’ need for stock market finance, and the risks posed by a decline in reserves, do you think these kind of investigations, beyond their real applications, can be aimed at showing through new techniques that these companies are “alive” in the market?*

Yes, of course, speculation in the stock market is very important, even if the technology is not a commercial success or is never put into practice. Our report also underscores how this gives arguments in favor of the ideology of false solutions to climate change, because methanotrophs will supposedly capture gas instead of burning it in the air. So these techniques are classified as carbon capture and storage, and

presented as part of climate change remediation and mitigation schemes that are being subsidized. So, you have an industry like fracking, extremely polluting, but they try to save face talking to their partners about synthetic biology: they can get those little bugs that will capture gas, arguing that those techniques allow for negative or net zero emissions.

*–What are in your opinion the greatest risks of using synthetic biology?*

We have the risks I have already mentioned with regards to their use in agriculture or extractive activities. For instance, if it is used to replace inputs produced by rural communities or if new frontiers are opened up for sugar cane or corn plantations serving as feedstock for the microbes, local economies would be disrupted. Environmental destruction is also an issue, since monocultures require more fertilizers, more pesticides, etc.

On top of all that, you have to think how this is going to interact with a living organism. The risks taken by a handful of companies have to do with problems that might be irreversible, like allowing a modified organism that has never existed before, whose interaction with other truly natural processes is unknown, to escape [into the natural environment]. Once that happens there is no going back. That is why we are trying to discuss this in our organizations, with the grass roots.

ETC Group advocates for precaution and, on that basis, they seek to declare a moratorium on the attempt to sustain

the oil industry through the manipulation of living organisms. As Verónica Villa stresses, “We cannot do without a democratic debate on the ethical and moral issues posed by the manipulation of life.”

So, you have an industry like fracking, extremely polluting, but they try to save face talking to their partners about synthetic biology: they can get those little bugs that will capture gas, arguing that those techniques allow for negative or net zero emissions.

### Source:

Grupo ETC (2015). La biología sintética y las industrias extractivas. Cuaderno 113, diciembre. English: (2015, November). Extreme Biotech meets Extreme Energy. Communiqué number 113.

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# Blowing up the Ocean



*Offshore fields, just as their onshore equivalents, are becoming more difficult to discover. New offshore oil and gas reservoirs are not enough to offset the energy depletion resulting from humanity's growing consumption levels. With this in mind, governments do not hesitate to approve hydraulic fracturing to maximize extraction in offshore wells.*

Offshore drilling began in California in 1896. Since then, the industry has developed methods to reach deeper reservoirs in more adverse conditions. For example, a well just drilled in Uruguay 250 km from the coast is 3,400 m deep and goes 3,000 m below the ocean floor (IPS, 9/06/2016). Equipment and technology necessary for such drilling operations are extremely expensive, its deployment demanding, in some cases, the expenditure of up to one million dollars daily (National Commission,

2011: 2). For that reason, high well productivity is a must to be able to justify the investment.

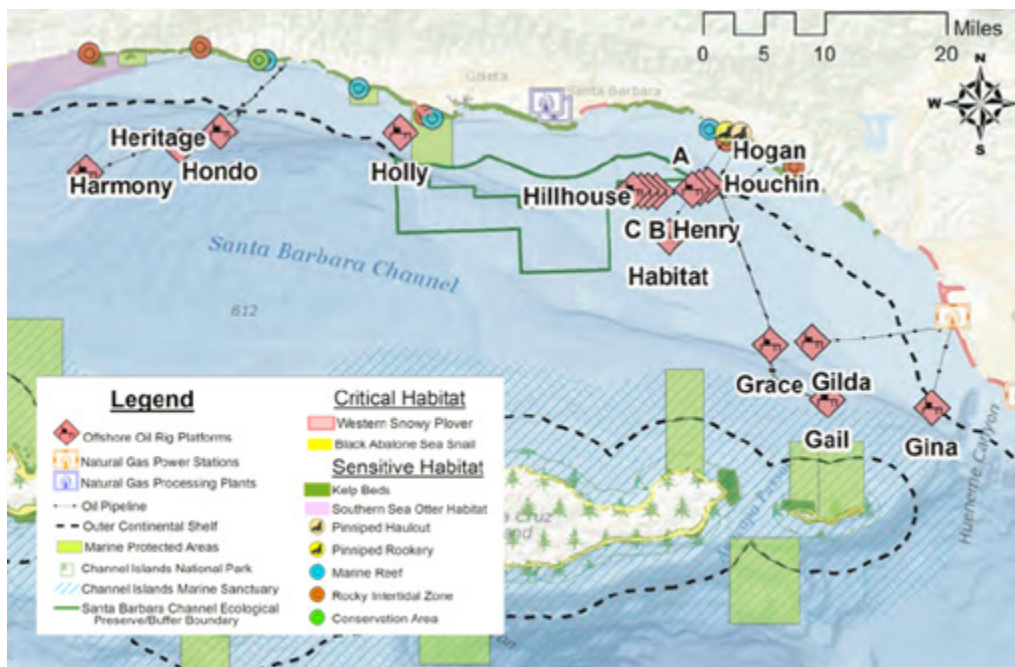
As it happens with onshore exploitations, the offshore industry regulates itself. The American Petroleum Institute (API), created by oil companies, is the highest authority deciding over the destinies of the sector worldwide. Governments accept its competence to regulate the activity and establish safety standards. However, once again, the industry's priorities go against the needs of the society and the current reality, marked by unprecedented global warming. API regulations are not as strict as to hamper the economic interests of the companies financing the API (National Commission, 2011: 228-229).

## Swept under the carpet

Maritime hydrocarbon exploitation entails a series of risks due to the hostile environment where it occurs. A mobile



Cover of the Center for Biological  
Diversity's report



● Hydraulic fracturing sites on the high seas, Santa Barbara Channel (FracTracker Alliance)

drilling rig makes the well and is followed by a permanent production platform. The platforms that receive the material extracted in the wells carry out a preliminary cleaning of the oil (removing brine) and gas (removing CO<sub>2</sub>) and then pump it onshore through several thousand kilometers of pipelines.

Brine is discharged in the sea, and CO<sub>2</sub> injected into deep permeable formations through a parallel well, following procedures known as Carbon Capture and Storage (CCS). However, this confinement is not guaranteed permanently, since there is no certainty that the seal capping the CO<sub>2</sub> will not rupture and let the gas escape. The method is a large-scale experimental trial, the

success of which cannot be guaranteed (van der Tuuk Opedal, Nils et al., 2013). In other words, the dust is being swept under the carpet.

Offshore and onshore wells share the same problems: pipe cementing failures, leaks due to inadequate cementing or through cracks in pipes and threads, and generalized corrosion (Vengosh, Avner et al., 2011). All marine structures are exposed to permanent corrosion from the moment they are installed, requiring constant inspection and cathodic protection methods to delay as much as possible the effects of decay. But even so, the life span of the installations is very limited (Technical Report, 2006).

## Hydraulic fracturing in offshore wells

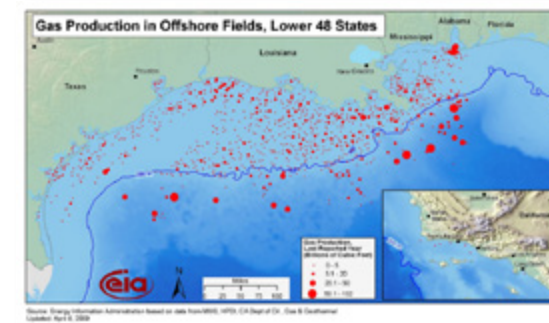
Offshore fields, just as their onshore equivalents, are also becoming more difficult to discover. New offshore oil and gas reservoirs are not enough to offset the energy depletion resulting from humanity's growing consumption levels. With this in mind, governments do not hesitate to approve hydraulic fracturing, or fracking, to maximize extraction in offshore wells. The industry faces different requirements. As is the case in any extractivist project, the need to maximize production in order to increase profitability is paramount. At the same time, the geological characteristics of some areas make the use of different techniques to enhance well productivity mandatory.

Hydrocarbon formations in the Gulf of Mexico are mainly made up of unconsolidated sandstones. Under such conditions, sand loosens from the rocks reducing the effective permeability of formations and blocking hydrocarbon flow into the well. To solve that drawback, a technique known as "frac packing" is used, by which a low volume of fluids is injected at a low pressure to fracture rocks near the wellbore. During fracturing, gross sand is injected to prevent fine sand from blocking holes and well tools. This operation uses a lower volume of water and chemicals than that used for unconventional fracturing. However, the Schlumberger report states that 65 % of sand-control operations in the Gulf of Mexico use the frac packing method, thus the generalized application of this technique means

there is a growing risk of environmental pollution (Schlumberger, 2002: 40).

Added to the problems that all offshore oil wells face, we now have the known issues of fracking: use of toxic chemicals, air pollution, waste generation, use of massive amounts of potable water. These operations require a mix of unidentified chemicals together with hydrochloric acid and hydrofluoric acid, which improve rock permeability. These are injected into the well at very high pressures in hostile environments.

Offshore fields, just as their onshore equivalents, are also becoming more difficult to discover. New offshore oil and gas reservoirs are not enough to offset the energy depletion resulting from humanity's growing consumption levels.



● Gulf of Mexico - Offshore Gas Fields (U.S. Energy Information Administration)

## Fire in the gulf

The most serious oil spill in the Gulf of Mexico occurred in 2010 when the Deepwater Horizon rig caught fire. The Commission investigating the accident highlights in its report an accumulation of mistakes on the part of BP (formerly known as British Petroleum), the owner of the well; the staff of Transocean (owner of the drilling rig); and finally Halliburton, in charge of cementing of the casing. As usual, there was not only one reason for the disaster. Halliburton used inappropriate slurry for the conditions of that well. In order to cut costs, BP's CEO ordered not to run cement evaluation logs, which would have detected the failures at the bottom of the well that later lead to a blow-out. Transocean operators did not know how to interpret pressure variation results from seal tests. Finally, when the uncontrolled gas release began, the blowout preventer (BOP) that should have completely shut the well and stopped the gas leak also failed (National Commission, 2011: 89-127).

The operation's magnitude exceeded the control capacity of the state agency Mineral Management Services (MMS), in charge of monitoring and controlling drilling activities. There were ongoing communication failures between the different actors involved and the Government officials. The MMS was closed as a result of the accident, and the Bureau of Ocean Energy Management,

Regulation and Enforcement (BOEM-RE) was created, with more authority and scope of action. However, as if nothing had happened, the new federal agency approved massive drilling and fracking on the US coasts.

These series of fatal mistakes took place in the United States, a country with the means and experience necessary to control such problems. If we compare the legislation of the US to that of Mexico –its neighbor and Gulf of Mexico oil drilling companion–, we see the difference in regulations. If in the US poor regulation cannot be effectively implemented, in Mexico, legislation and controls are downright non-existent (Greenpeace México, 2012: 21).

Eleven workers died as a result of the Deepwater Horizon oil rig fire, and it was the biggest ecological disaster in the US. During the accident, 4.9 million barrels of oil (780,000 m<sup>3</sup>) were spilled, contaminating 1,728 km of coastline and affecting countless numbers of marine and coastal species. Incalculable damage has been caused to local economies, dependent on fishing and tourism, leaving thousands unemployed.

But the accident in the Gulf of Mexico was not the only one. Similar catastrophes occurred in the North Sea, Indonesia, Mexico, and Brazil. In every case, spill containment and emergency efforts have been made difficult by the inhospitable environment in which this type of drilling operations

takes place. Marine platforms are out of reach for helicopters; it is only possible to access by water. Waves and

wind hinder provisioning of supplies as well as crew change or medical assistance.



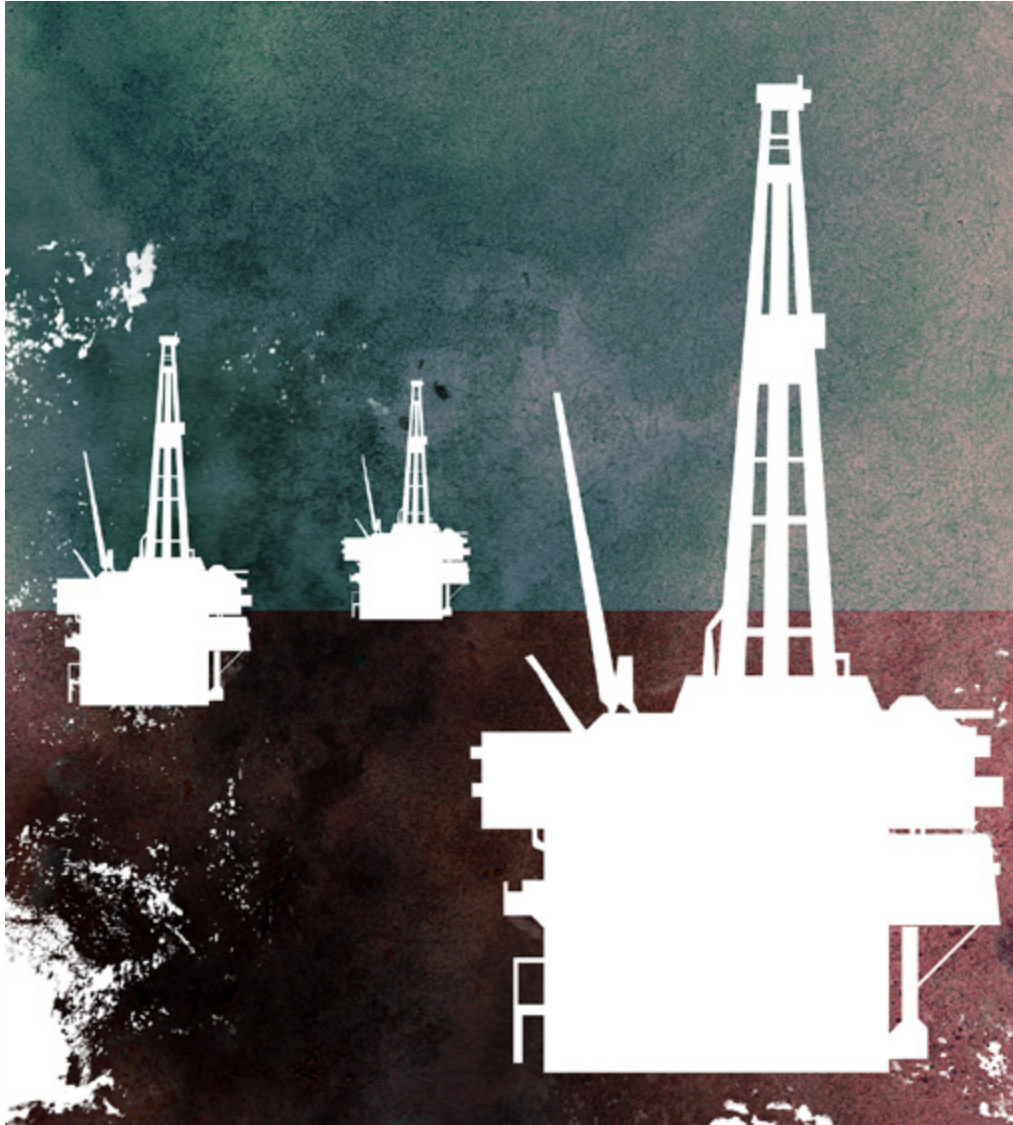
● Vessels assisting in the drilling of the Deepwater Horizon relief well in the Gulf of Mexico (AP Photo / Patrick Semansky)

Operators are authorized to dump toxic waste into the ocean (Truthout, 24/06/2016 y NPDES, 23/01/2014). This happens both off the US coast as in unconventional drilling off the UK coast (The Guardian, 15/06/2016). Restrictions are only applied when the waste contains oil traces. In such cases, it is sent to big pools where oil is separated from water before the latter is discharged into the sea. Generally, this process begins with a visual inspection to verify that the water in the pools does not have any oily remains

on the surface. Toxic products are then discharged in highly sensitive areas that are already impacted by human activities (Center for Biological Diversity, 2014). For instance, the Gulf of Mexico is seriously contaminated, not only by the use of fertilizers, pesticides, and the discharge of agriculture chemical waste, but also by the oil industry.



To this we must add the risks faced by workers. A well pad worker typically works long shifts of up to 20 hours per day, which, according to the statistics, increases sevenfold the risk of work-related deaths (Oil + Gas Monitor, 13/09/20).



● Jarred Rodríguez for Tuthout.org

## Sources:

Center for Biological Diversity, 2014.

Troubled Waters. Offshore Fracking's Threat to California's Ocean, Air and Seismic Stability. September, USA.

— 28/06/2016. Obama Administration Permitted 1,200 Offshore Fracks in Gulf of Mexico

Environmental Protection Agency, Re-issuance of National Pollutant Discharge Elimination System (NPDES), 23/01/2014. General Permit for Offshore Oil and Gas Exploration, Development and Production Operations Off Southern California, 79 Fed. Reg. 1643.

Greenpeace Mexico (2012). Perforar aguas profundas. La gran estupidez. Mexico.

Inter Press Service (IPS), 09/06/2016. Uruguay busca un futuro petrolero en sus aguas ultraprofundas.

National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (2011). Deep Water – The Gulf Oil Disaster and the Future of Offshore Drilling. Report to the President. January, USA.

Oil + Gas Monitor (Jeffrey Raizner and Doyle Raizner LLP), 13/09/2013. Offshore Fracking Injuries.

Schlumberger, 2002. Frac Packing: Fracturing for sand control.

Technical Report, 2006. Material Risk – Ageing Offshore Installations.

Petroleum Safety Authority Norway (PSA). Report Nro 3496.

The Guardian, 15/06/2016. UK fracking firm plans to dump wastewater in the sea.

Truthout (Mike Ludwig), 24/06/2016. Obama Administration Approved Gulf Fracking During Deepwater Horizon Disaster.

van der Tuuk Opedal, Nils et al., 2013. Potential Leakage Paths along Cement-Formation Interfaces in Wellbores; Implications for CO2 Storage. Science Direct.

Vengosh, Avner et al., 2011. A Critical Review of the Risks to Water Resources from Unconventional Shale Gas Development and Hydraulic Fracturing in the United States. Environmental Science & Technology. Critical Review. August, USA.

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Building of P-51 FPSO rig, which operates in the Brazilian pre-salt (Keppel Corporation)

By  
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Original in Portuguese. Translated into Spanish by **Rosa Santa Isabel**. Translated from Spanish into English by **Nancy Piñeiro**.

# Pre-salt:

## Extreme energy from the Entrails of the Earth



*Spain and Holland fight for the rights to the sea, but it belongs to the seagulls and those who know how to sail it.*

Leila Diniz

### 1) Human time and geological time

Discovered in 2006, the so-called Brazilian pre-salt province takes up an area of 800 km by 200 km along the Atlantic coast in the states of Santa Catarina, Paraná, Rio de Janeiro, and Espírito Santo. According to the National Petroleum Agency classification (ANP in Portuguese), it includes the sedimentary basins of Santos, Campos, and Espírito Santo. It is the biggest crude oil reservoir discovered in the past 10 years, with an estimated 80 to 170 billion barrels (needless to say, such calculations cannot be trusted!). By way of comparison, in 2014

the biggest proven oil reserves were in Venezuela, with 298.3 billion barrels.

Even onshore, in a supposedly more controllable environment, and at more superficial depths, the survey, extraction, transport, and storage of oil and gas are highly complex and risky, with numerous accidents, explosions, and spills; what about oil exploitation at 300 km offshore, with waves of up to 12 meters, currents of 2 knots, carried out at 7 thousand meters below the water level, with high pressure drilling and temperatures of up to 302°F?

Underneath the large salt layer of the South Atlantic, in extreme temperature and pressure conditions, chemical and physical reactions allowed for the formation of hydrocarbons from the decomposed organic matter: the immense fauna and flora of the ancient supercontinent of Gondwana. These deposits are found both on the Brazilian and African coasts.

It is estimated that the pre-salt, considered to be the most important oil frontier in Brazil, was formed between 100 and 130 million years ago, with the slow separation of the American and African continents. In terms of geological time, History and Prehistory are but a moment. After all, what are 150,000 years of hominids or 2,500 years of Western history or 2,016 years of Christianity or even 300 years of capitalism as compared to Earth's time? If the ghosts of that recent historical past still haunt the mental and infrsubjective territories of postmodern societies in the 21<sup>st</sup> century, what about that deeper temporal abyss with Earth's time?

## 2) Addicted Brazil: pre-salt as *droga prima*<sup>1</sup>

With oil prices at USD 100 per barrel, pre-salt –a huge challenge in terms of its exploitation– became the main investment target of the State, the state-controlled oil company Petrobras, and the Ministry of Mining and Energy during the administrations of Luiz Inácio Lula Da Silva (2000-2010) and Dilma Rousseff (2011-2014). Petrobras' business plan for 2013-2017 projected investments for USD 236.7 billion. The Ten-year Energy Expansion Plan for 2014-2024 (PDE, by its Portuguese acronym) forecasted a 121.7 % rise in oil production, going up from 2.3 to 5.1 million barrels per day, and a 65.2 % rise

1 Translator's note: *droga prima*, from the Portuguese *matéria prima* (raw material), literally "raw drug", i.e., oil as a drug (addictive substance) of which capitalism cannot get rid.

in natural gas production, going from 87.4 to 144.4 million m<sup>3</sup>/day. With its name associated to the host country of the FIFA World Cup and the Olympics, and with strong publicity on radio, TV, and internet, the company's slogan was pretty clear: "Petrobras: the challenge is our energy".

Without having at least a contingency plan, it did not matter how extreme pre-salt energy was; Petrobras, backed by a powerful media superstructure, and national symbolism in full bloom, could face any risk, no matter the costs. At the same time, the company was setting up a huge oil infrastructure, steering public and private investment towards it, and mobilizing an economy and society increasingly more dependent on that resource. The infrastructure includes ports, refineries and petrochemical complexes; shipyards, probes, ships, and platforms; pipelines and tanks, gas treatment units, and roads. It also involves sectors associated to mining activities, and the steel and metal industry, in addition to the armed forces to "protect pre-salt" by acquiring fighter planes and developing a nuclear-powered submarine.

In 2014, Brazil ranked 13th in the world ranking of oil producing countries (with 2.3 million barrels/day), and 5th in global oil consumption (with 3.2 million barrels/day). Domestic consumption rose by 57 % between 2004 and 2014. In 2016, ten years after its discovery, pre-salt reached an output of 1 million barrels per day (bpd), i.e., 40 % of oil production in Brazil, obtained from 52 producing wells, according to Petrobras.

Lower oil prices as from 2014 and the economic and political crisis did away with the dreams of an oil country, leading states and municipalities dependent on that expansion into bankruptcy, like Campos and Macaé, in the north of Rio de Janeiro, the south of Espírito Santo, Bahia, Rio Grande do Sul, Pernambuco, Ceará. With the "*petrolão*" of the operation known as *Lava Jato*,<sup>2</sup> carried out by the Public Prosecutor's Office, the state's governance political strategy came to light, and with it the power pacts sustained in part through "tips" from the State and Petrobras' investments, involving regional political oligarchies, the financial sector and big construction companies. Taking into account only those "tips", in its 2014 financial report the company acknowledged losses of more than USD 1 billion. Petrobras' debt reached USD 200 billion; its market value in 2002 was USD 15 billion; in 2010, USD 350 billion, and USD 70 billion.

Due to the lack of resources for pre-salt exploitation investment, the government sought to "attract" big international oil companies for the licensing of new exploration blocks, without holding any deep debate with society. Dilma was still in the presidency, in the middle

2 Editor's Note: The *Lava Jato* operation ("Car wash"), also known as *Petrolão*, is a corruption investigation conducted by the Brazilian Federal Police. It became public in March 17th 2014 with the execution of more than a dozen arrest and imprisonment warrants, which reached several politicians and businessmen in the country. The aim was to investigate a money laundering scheme said to divert more than 10 billion Brazilian reais.

of a crisis –with several Petrobras executives, politicians, and businessmen in jail– when she began implementing a gradual process of privatization and asset sale as part of a plan of disinvestment and private appropriation of important resources of the national oil company by construction firms and politicians from the ruling and opposition sectors. The economic crisis deepened and it dissolved the political governance pact that sustained Dilma up to that moment.

As interim president, Michel Temer and its soon-to-be minister, José Serra,<sup>3</sup> announced a bill of law that would cut to 30 % the requirement for Petrobras' participation in pre-salt exploitation. As Petrobras' president, Pedro Parente, stated in an interview with CBN (21/09/2016), pre-salt exploitation is economically viable even with oil prices around USD 40 a barrel, bearing in mind that in the early stages of exploitation the drilling of a well could take 330 days, and in 2016 that time was cut down to 90 days. With the privatization of TRANSPETRO, in charge of the transport and pipelines network, the sale of 66 % of Carcará to the Norwegian oil company Statoil, and Chinese

3 Ed. Note: Dilma Rousseff was impeached and removed from office. The process was petitioned by the Chamber of Deputies on suspicion that there were grounds for "criminal responsibility". However, the main accusation was not related to the bribery scandal in Petrobras, but to the violation of fiscal laws, and masking of the budget deficit. During the proceedings, the head of State was replaced by Michel Temer, who continued holding the presidency after Dilma's removal from office, and appointed Serra as Foreign Affairs Minister.

investment through an oil-for-loans deal in addition to the new licensing rounds announced for 2017, the road chosen by the new Administration in relation to the pre-salt and Petrobras becomes clear.

### 3) Environmental licensing: the right to say 'No!'

In recent years, the environmental licensing process has been sharply and consistently criticized by the government and oil companies. The media broadcast a discourse of environmental racism, in which indigenous populations, environmentalists, academics and independent technicians from public institutions are accused before society of being the main obstacle to the plans of economic acceleration (PAC, by its Portuguese acronym).

Environmental legislation, prior consultation, socio-environmental impact studies and assessments, public hearings, contingency and monitoring plans, restrictions and compensations: for the State and the companies, they are the main "enemies" of jobs and the Brazilian economy. Even nature itself, with its endemic species of reptiles and amphibians, is deemed as an obstacle to development!

For the State, pre-salt operations licensing should be a quick process, since the resource is expected to be the main agent of economic acceleration. The licensing of Polo Presal, in the Santos basin, is a good example of this. It is the biggest sedimentary basin on the Brazilian sea, from Arraial do Cabo, in Rio

de Janeiro, to Florianópolis, in Santa Catarina. There are 8 platforms in this area only; the first tests were conducted in 2009, and production start-up begun in 2010 in the Lula field (FPSO<sup>4</sup> Ciudad de Angra dos Reis).

The technicians of the General Oil and Gas Coordination (CGPEG in Portuguese) and the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA in Portuguese), in charge of granting Brazil's offshore environmental licenses for all the oil and gas operations, proposed that licensing of such activities should be done in a coordinated, cumulative and synergic way, in contrast to individual and isolated impact assessments for each of the projects. At first, both Petrobras and IBAMA's licensing board thought the proposal was relevant, given the reach and spatial and temporal magnitude of the impacts of all the oil operations projected in that sedimentary basin. Also, the fundamental principles of precaution and prevention had to be factored in, as well as transparency, and consent of the affected populations.

According to the Association of Federal Environmental Officers in the State of Rio de Janeiro (ASIBAMA-RJ, by its Portuguese acronym), during five public hearings with a high regional civil society turnout different environmental projects were initiated, which included socioeconomic factors, identification and monitoring of foreseeable impacts,

●  
4 Ed. Note: Floating, Production, Storage and Offloading (FPSO).



● "Yemayá is against Pre-salt!" Art intervention in Praia do Arpoador, Rio de Janeiro - Campanha Antipetroleira Nem Um Poço a Mais.

mainly for the *quilombolas*,<sup>5</sup> fishermen and indigenous communities living in the region. Petrobras accepted the Terms of Reference and organized several meetings with the Forum of Traditional Communities, which participated in the licensing. After the first granted license, the company, supported by IBAMA's board, began questioning the whole process and ceased the dialogue,

●  
5 Ed. Note: *Quilombolas* are the inhabitants of rural communities (*quilombos*) composed of descendants of enslaved Africans, who keep a strong cultural identity; most of them depend on subsistence agriculture. *Quilombos* originated as refuge/resistance communities created by slaves who could escape from the plantations during Brazil's slavery period.

unilaterally breaching the agreements.

In a public letter of November 2015, ASIBAMA-RJ denounced: "Let's look at the facts, and the unfortunate role recently played by Petrobras: 1) the company commits itself to a project that will tackle the inadequacies of the existing environmental impact study and will provide qualified information in the subsequent processes of environmental licensing, relevant to the same region, and with important cumulative effects; 2) the previous license is granted by IBAMA on the grounds of that commitment; 3) Petrobras adopts different initiatives that indicate they are taking precautions to execute the project; 4) based on such initiatives, CGPEG

recommends and IBAMA issues most of the installation and operation licenses contemplated for stage 1 of the Polo Presal; 5) finally, Petrobras, more than two years after agreement on conditions, lodges an appeal before the Licensing Board requesting the cancellation of the conditions”.

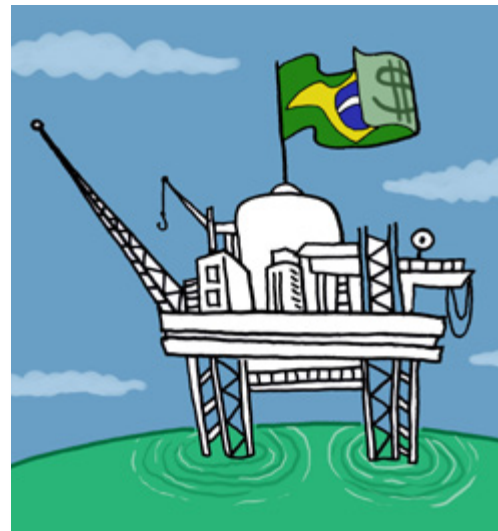
Also in the second stage of licensing, Petrobras sets an utterly irresponsible aim of doubling national production by 2017, with a leap from 10 to 23 platforms in the Santos basin. Those were mega projects under study: the installation of 13 new “production and flow developments”, and 7 new “long-term tests” with the FPWSO<sup>6</sup> Dynamic Producer and the FPSO BW Ciudad de São Vicente were planned. The total value

Petrobras’ board of licensing going against its own technical team ignored proceedings and regulations, breached agreements with traditional communities, undermined the value of the prior informed consent procedure, and made installations and oil operations exempt from any conditions.

was R\$ 120 million, in addition to the licensing of the Libra field, in which there were five long-term tests projected with the FPSO Pioneiro, and investments for

more than R\$ 6 billion. Petrobras’ board of licensing –going against its own technical team– ignored proceedings and regulations, breached agreements with traditional communities, undermined the value of the prior informed consent procedure, and made installations and oil operations exempt from any conditions.

In a communiqué, ASIBAMA-RJ denounces “the dangerous trends in environmental licensing in Brazil”, and points to the unbridled pace of that expansion: “The unilateral withdrawal of the environmental projects that were a precondition for Stage 1 of pre-salt, and the position of the licensing director re-



● Marcelo Rampazzo.

garding the delay in the scheduling of environmental projects in Stage 2, both show that the companies’ interests trump those of the rest of the groups involved” (05/09/2015).

IBAMA showed the power of a unilateral board, subject to the interests of the companies, when it reduced the participation of civil society to the public hearings, when it rejected the independent technical team of IBAMA itself, when it failed to observe the terms agreed upon with the civil society of affected communities, when it failed to build communication channels with the traditional peoples of the region.

#### 4) Local resistance and social actors of the energy transition

In the oil-producing Brazil, local resistance and struggles against the installation and expansion of the industrial complex are violently attacked by Petrobras, state governments –both neoliberal and developmentalist–, and even by nationalist left and right wing social movements, because, as the poet Drummond de Andrade said: “Some die for oil convinced that they die for the motherland”.

However, at sea and along the Atlantic coast, pre-salt exploitation generates a wide range of impacts, as well as serious conflicts and socio-environmental injustices in all its stages: before installation, during prior consultation; during operations, and monitoring; or after accidents or environmental crimes, and in the reparation processes. There is also a permanent and systematic violation of human rights, economic, social and environmental rights of traditional fishing peoples, *quilombolas*, indigenous peoples, peasants, other rural groups,

and people living in the urban industrial districts where these projects take place.

Bearing in mind the totality of the industrial complex –hydrocarbon refining, uses, flaring and discharge of derivatives (plastic, gasoline, diesel, naphta, kerosene, lubricants, fertilizers, cosmetics, anxiolytics, etc.), and emissions of CO<sub>2</sub> and other greenhouse gases– it can be seen that oil affects the local and global society, and it is directly linked to different diseases, mainly cancer. Oil kills. In spite of that, no state or private campaigns are warning about those risks.

At sea, the prohibition of traditional fishing routes, heavy ship traffic, installation of pipelines, and exploratory surveys scare the fish away to increasingly further distances, out of the reach of artisanal and family fishing boats. Countless dredging operations and docks building for the installation of ports such as Açu (north of Rio de Janeiro), Super Porto e Itaoca *offshore* (south of Espírito Santo), or the construction of shipyards like Jurong (in Aracruz, Espírito Santo) also destroy strategic fishing areas, mangroves and great marine biodiversity. Contamination of those areas, known as *laminhas*, destroys the habitats of many species of shrimp, shellfish, lobsters, and crabs, where baits are obtained for each type of artisanal and family fishing. The contamination and destruction of *laminhas* affects food sovereignty, and in a deep way, the livelihood and work of many women who live off shellfish (*marisqueiras*).

6 Ed. Note: Floating Production Workover Storage and Offloading (FPWSO).



● Demonstration against the installation of an oil rig in an artisanal fishing area in Espírito Santo - Campanha Nem Um Poço a Mais

On land, the traffic of trucks; crude storage facilities; gas treatment units; pipelines invading indigenous lands, *quilombolas*, coastal communities, rural settlements and peasant communities, all contaminate the water and soil, and hinder people's cultures and livelihoods. In a few years, small communities dedicated to artisanal fishing turned into urban, industrial and/or port districts, attracting thousands of workers, mostly men, for a short time to build production plants. Without public health policies, education, water systems, proper sewage, and security, each of those districts replicate a social tragedy: unemployment, prostitution, violence, early pregnancies. This has a huge impact on the life of the whole native society, especially on women and young people. This is the case of Barra do Riacho, in the north of Espírito

Santo, and Campos and Macaé, in the north of Rio de Janeiro.

In cities and urban districts, cycling activists, garbage recyclers, visual artists, communicators, independent researchers, academics, human rights activists, environmentalists, women and youth groups join the struggle of traditional peoples. Along the pre-salt areas, local resistance multiplies, as do protests, complaint letters, manifestos, legal processes, video and text productions, murals, and more.

In the territories threatened and trampled on by the oil complex, people organize around local struggles, articulated in forums and regional and national campaigns, such as the Association of Men and Women of the Sea (AHOMAR), in Bahía de Guanabara (Rio de Janeiro);

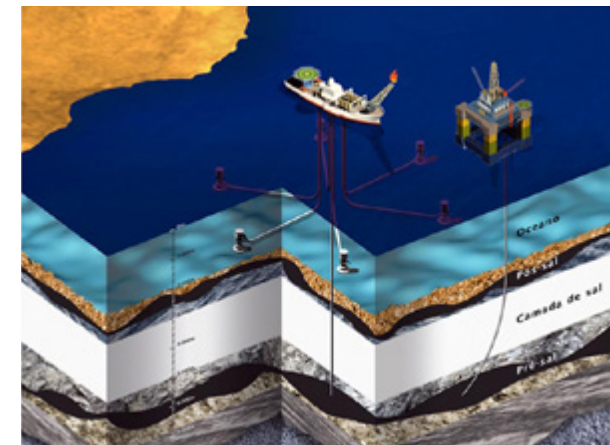
the State Federation of Fishermen from Espírito Santo; the Forum of Oil and Gas Affected Peoples (Rio de Janeiro); the Forum of Traditional Communities of South of Rio de Janeiro and north of Sao Paulo; in addition to networks and movements, such as the National Movement of Artisanal Fishermen and Women (MNPP); the National Forum of Climate Change and Social Justice; the Campaign "Not One More Well"; the Group Carta de Belém, and the Brazilian Network of Environmental Justice. They denounce at different institutional levels the destruction of nature and the Earth's climate, the contamination of life, water, and people. They urge the companies, states, municipalities, and the corresponding public bodies, to provide social and environmental justice. The actors of the energy transition are plural and heterogeneous. They defend natural territories, and territories of the mind, to be free of oil, and free to live well and coexist. There will be limits to oil dependence and the farce of development. Long is the time of the Earth.

### Sources:

CBN Brazil. (21/09/2016). "Pré-sal é viável com o petróleo abaixo de US\$ 40, diz presidente da Petrobras". [Interview to Pedro Parente.](#)

ASIBAMA-RJ (05/09/2015). "A desconstrução do licenciamento ambiental do pré-sal".

Countless dredging operations and docks building for the installation of ports such as Açú, Super Porto e Itaoca offshore, or the construction of shipyards like Jurong also destroy strategic fishing areas, mangroves and great marine biodiversity.



● Pré-sal / Jornal Brasil em Folhas

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# An Iceberg Called “Vaca Muerta”



*Vaca Muerta (literally, ‘dead cow’ in Spanish) is often used as a synonym for the nearest town, Añelo, but its limits go well beyond that small locality in the Patagonian province of Neuquén, which has become the capital of unconventional hydrocarbons. The name Vaca Muerta to Argentinians now usually conjures up fracking, but it is much more than that. Therein lies its extreme nature.*

**V**aca Muerta is the only massive shale oil and gas project that has reached commercial scale outside the United States and Canada. Set in the north of the Argentine Patagonia, it sparked an anti-fracking movement due to the environmental impacts associated to the technique. However, the transformation triggered by it over a vast terrain concerns more than air, water, and soil pollution –and their social,

cultural, public health, and economic dimensions. A wider view is necessary to measure the intensity of the fracking boom.

Massive exploitation of unconventional reservoirs first made its appearance in Argentina early in the present decade<sup>1</sup>, amidst a decrease in oil and gas extraction, and growing fuel imports.<sup>2</sup> The federal government, then headed by Cristina Fernández, and the company YFP –now partially controlled by the



1 Even if by 2006 there were 40 wells drilled in tight sands and 2 in shale formations in Neuquén province, it was only in 2012 when the upsurge began, reaching more than 1,150 unconventional wells currently in production. Energy Ministry Statistics, August 2016.

2 Fossil fuels make up around 90 % of primary energy sources in the country. In 1998, there was a peak in oil extraction, and the peak for gas was in 2004. Since then, conventional extraction levels have been falling.



Loma Campana concession, Argentina's most drilled area for shale extraction through fracking  
(Image: Alexis Vichich)



● Well drilling in Loma La Lata Norte area, Añelo, Neuquén province (Image: Fabián Ceballos)

state but run by the Spanish Repsol<sup>3</sup> at that time— cast them as the only choice for the country in the face of the *energy crisis*. Since then, the shale formation called "Vaca Muerta" has a leading role in the "*Argentina, energy power*" saga, displacing transgenic soy monoculture as a protagonist.

"According to estimates, proven reserves in the Vaca Muerta field, combined with those of the San Jorge and Austral Magallanes basins, amount to approximately 27 billion barrels of oil and 802 TCF (trillion cubic feet) of gas, of which 80 % corresponds to Vaca

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3 In May, 2012, the Argentine government seized 51 % of YPF's shares, previously owned by Repsol. The process ended two years later with a compensation settlement between the parties.

Muerta,"<sup>4</sup> highlights the third part of the report "Strategic Studies for Territorial Development of the Vaca Muerta Region", drafted by the national government together with technical teams from the provinces of Neuquén, Río Negro, La Pampa, and Mendoza, as part of the Institutional Strengthening Program of the Under-secretariat of Territorial Planning of Public Investment

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4 It is worth noting that the advance and public planning of unconventional activities was internationally triggered by the US Energy Information Agency, and that estimates, return and profitability rates of shale formations are being questioned. For example, the Polish energy agency reduced its shale gas resource estimate for Poland to a tenth of what its North American equivalent originally estimated. That is why, coupled with the low productivity of wells and social resistance, some projects of big companies like Chevron were aborted (EJES, October 2016a).

(2016). This equals "more than 6 times the amount of conventional oil reservoirs and, for shale gas, more than 27 times the amount of conventional gas reservoirs," underscores the report published in February 2016 (pp. 123-124). And it concludes, "If the necessary conditions are in place, and the hypotheses mentioned are confirmed, the aforementioned amounts would entail, not only the possibility to reach [fossil fuel] self-sufficiency, but also an opportunity for Argentina to become an exporting and price-setting country."

In just a few lines, Strategic Studies goes from *proven* reserves to *hypotheses mentioned*, but it still keeps a tone typical of brochures: "The agriculture and livestock boom that begun towards the end of the 19th century covered a much larger area and lasted many years, but it did not have the magnitude that the shale phenomenon could have. Neither is it comparable to the industrialization process of the mid-20th century in terms of geographic concentration or potential for massive initial growth [of Vaca Muerta] (Undersecretariat of Planning, 2016: 124)." This short passage clearly reflects the place given by the state to massive development of unconventional hydrocarbons.

Five years after the first announcements, both provincial governments the Pink House [Argentina's presidential residence] —which now houses the businessman Mauricio Macri— and

have kept to their bet on Vaca Muerta,<sup>5</sup> even if the global decline in crude oil prices in 2014 somewhat dampened the initial enthusiasm. In the last five years, Vaca Muerta ceased to be just a shale formation of 30,000 km<sup>2</sup> and became a "Region" taking up unequal parts of Neuquén, Río Negro, La Pampa, and Mendoza. Now it is also said to be apt for tight oil and gas exploitation. Its relevance goes beyond the energy sphere and it is built around a dismissal not only of socio-environmental criticism<sup>6</sup> but also of warnings about the short-lived production horizon of those reservoirs —as fracking wells empty out fast— and about extraction costs.<sup>7</sup>

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5 The domestic price of oil above international values, as well as the rise in the price of gas at well head and fuel prices at the pump reflect the decision to keep betting on unconventional fuels.  
6 Warnings about the environmental and health impacts of this technique were dismissed by provincial and national authorities, who repeated the arguments of oil and service companies as if they were their own, made fun of critiques, and dubbed opposition as "environmental terrorism". See Pechen pidió educar en contra del "terrorismo ambiental" (*Río Negro*, 14/12/2013 and *La Mañana Neuquén*, 21/03/2014).  
7 Based on the North American experience, the Post Carbon Institute concluded that the production decline curve in unconventional wells is reduced in more than half after the second year (EJES 2016b). Also, the North American company Exxon announced towards the end of October, 2016, that "Quantities that could be required to be de-booked as proved reserves on an SEC basis amount to approximately 3.6 billion barrels of bitumen at Kearl [Canada], and about 1 billion oil-equivalent barrels in other North America operations," that is, 19 % of its total reserves, if it determined that the financial costs make such projects unfeasible (Exxon Mobile press release, October 28th, 2016).



## Geological maneuver

The Vaca Muerta boom made the sub-soil swap places, as in a game of chess: it emerged from the depths of the Earth displacing what exists –peoples, cultures, economies, lives– to become the new surface. The landscape is now valued in barrels of oil equivalent. What existed before is prehistory. In the case of Neuquén, official reports documenting the advanced processes of soil and water degradation as a result of almost a century of hydrocarbon extraction were doomed to silence (UNDP, 2010).<sup>8</sup> A study issued by the UNDP in 2010 warned that the situation could seriously affect agro-industrial development,<sup>9</sup> which since the mid-1990s has been presented as the centerpiece of different provincial plans aimed at diversifying the economy.

Against this backdrop of a geological 'castling move', small-scale producers, and peasant and indigenous communities are caught between resistance –to preserve land/territorial tenure, livelihoods and modes of production–, and negotiation with a view to participating in the abundance being marketed or, at least, receiving some kind of benefit in the face of a seemingly unavoidable



● Chelo Candia.

advance of drilling (OPSur, 4/08/2016 and 20/10/2016). The same applies to labor expectations: high salaries paid by the oil industry diminish interest in agricultural activities. Both the authorities of Neuquén and Río Negro<sup>10</sup> affirm that productive and extractive activities can coexist, even in spite of well explosions, leaks, and other accidents recorded in the orchards area.<sup>11</sup>

Diego Rodil, technician at the National Institute of Agricultural Technology (INTA), argues that "the incompatibility of these activities can be seen in the

8 See also UNDP and Neuquén Province (1998) and Copade. General Directorate of Programs and Projects. General State Secretariat of Neuquén (2006).

9 Beyond the authorities' current opinions regarding these reports, the diversification discourse has not changed, although the actors did. The leading role is now played by big investors, linked to high-tech "corporate farms". See OPSur (7/06/2016), (13/06/2016) and Scandizzo (2016).

10 In Río Negro, the advance of oil exploration and exploitation occurs on the fertile valley that positioned the province as the country's most important producer of pears and apples.

11 The most recent was a salt water spill from a well, flooding the adjacent orchard and drying out poplars and fruit trees (*Río Negro*, 29/10/2016). For more information, see the book by Martín Álvarez Mullally (2015).

increased loss of productive soil and the increase of abandoned native forests; health risks in fruit due to light pollution; fragmenting of productive space, which makes controls en bloc more difficult (...) and irrigation systems maintenance more complex (...); added to a high risk of water tables and surface water contamination." He also warned that "export standards could change, and fruit could be rejected in the future."<sup>12</sup> He highlights, "From the capitalist logic of free market, land rent for hydrocarbon extraction is much higher than its value for agricultural use. But in this equation, the cost represented by the loss of productive soil, with its infrastructure, the loss of social capital which also took years to build, and the jobs lost, are not taken into account." These statements are included in his report "Advance of the Hydrocarbon Frontier on Productive Soil. Estación Fernández Oro, Alto Valle del Río Negro," (Rodil, 2015) which he planned to present at the Seventh Congress of Ecological Economics of the Argentine-Uruguayan Association of Ecological Economics, which took place in Neuquén in November, 2015. However, even though his presentation had been already accepted by the organizing committee, the National Institute of Agricultural Technology did not authorize his participation.

12 In this regard, organic producer Jessica Lamperti, from Allen (Río Negro), denounced that a client stopped buying her products because there is fracking in that locality. For more information see *Río Negro*, 01/11/2015.

The growing demand for urban soil, due to the urbanization process in the Alto Valle del Río Negro and Neuquén, also generates a strong advance over orchards, where land sales flourish, and fruit groves are replaced with square feet of cement. While this trend pre-dates the unconventional boom, the construction of Vaca Muerta as a land of abundance speeded up the process. According to the Strategic Studies report, between 2009 and 2013 around 2,300 hectares were lost in the Alto Valle del Río Negro and Confluencia regions. The report points out, "Without taking into account those that could have been lost between 2013 and 2015, another 2,440 productive hectares are expected to be lost only due to the urbanization required by population growth." If the hydrocarbon sector recovers the level of activity prior to the fall in oil prices, the population of the Metropolitan Region of the Valle and Confluencia would

The incompatibility of these activities can be seen in the increased loss of productive soil and the increase of abandoned native forests; health risks in fruit due to light pollution; fragmenting of productive space, which makes controls en bloc more difficult; added to a high risk of water tables and surface water contamination.

increase by 200 thousand inhabitants in at least five years, reaching a total of 1 million inhabitants, according to official estimates. For example, Añelo, a

city that often serves as an operations base for Vaca Muerta, went from having 2,500 inhabitants in 2010 to 6,000 in 2014, after the boom. If the activity surges again, the city could have 41,000 people in about five years, as the estimates published in the Strategic Studies report indicate.

It is worth mentioning at this point that while the official planning problematizes the loss of productive soil resulting from the expansion of urbanization, it does not do the same with the installation of well locations –which replaces the fertile topsoil with limestone soil compaction of 40 to 50 cm– and the infrastructure needed for oil and gas projects.

The massive exploitation of shale and tight sand formations entails an expansion of the geographic and technological frontiers but, as a consequence of large-scale infrastructure and logistics, it also makes way for starting up new ventures.

### Extractivist synergies

The massive exploitation of shale and tight sand formations entails an expansion of the geographic and technological frontiers but, as a consequence of large-scale infrastructure and logistics, it also makes way for starting up new ventures. The federal government and provincial agencies that participate in the strategic planning of the Vaca Muerta Region speculate that there will be a synergistic reactivation of both

the potassium extraction project in the south of Mendoza, which was suspended by the mining company Vale<sup>13</sup> in 2013, and the construction of the hydroelectric complex Chihuidos, which would mean both generating electricity and controlling over the Neuquén river waters, whether it is to enable new irrigation areas, avoid floods or ensure supply for the hydrocarbon sector.<sup>14</sup>

Meanwhile, from the business sector, Dow Chemical noted that an increase in the gas supply –thanks to the massive development of reservoirs in the Neuquén basin– would enable the expansion of their site in the petrochemical industrial park in Bahía Blanca, in the south of Buenos Aires province.<sup>15</sup> In 2013 this US company partnered with YPF to jointly develop El Orejano area, in Neuquén, and secure the gas supply for its PBB Polisur plant (YPF, 15/12/2015). Towards the end of the 1990s, both companies, together with Petrobras, set up the Mega SA company to supply its plants in the south of Buenos Aires with gas from the Loma La Lata field in Neuquén.

- 13 It is relevant to note that in 2010 Vale signed an agreement with YPF to secure the supply of gas (El Cronista, 07/12/2010). From early 2016 there has been rumors about the reactivation of the mining project (El Diario de La Pampa, 26/04/2016 and Los Andes, 13/09/2016).
- 14 See Subsecretaría de Planificación Territorial de la Inversión Pública de la Nación (2016: 105).
- 15 Corporate media like Revista Petroquímica (Petrochemical Magazine), reported on these statements as if they were the announcement of a mega project on the horizon.



● Infrastructure of the Vaca Muerta megaproject (Iconoclasistas / EJES)

But Vaca Muerta's expansive wave is much bigger if we take into account, for instance, the silica sand extraction in Dolavon (Chubut province), and Aldea Brasileira and Gualeguay (in Entre Ríos). This sand is used for injections during the fracking process, and it is used to prop open the rock fissures to let the gas and oil flow. According to studies by the US National Institute for Occupational Safety and Health, people exposed to silica dust, such as workers in fracking operations, are at risk of developing silicosis, an incurable lung disease.<sup>16</sup> In spite of that, 20 silica sand trucks leave each day from Dolavon to

Añelo.<sup>17</sup> In Entre Ríos, where there are more than 40 municipalities that have declared themselves 'fracking free', socio-environmental assemblies challenged last October the extraction of

- 17 On June 24th, 2016, the Legislature of that province declared silica sand to be a public good, which makes the state a strategic partner in the activity. "What is yet to be determined," said the Patagonian news outlet Big Sur, "are the royalties that the province will obtain for the extraction of its natural resources; what health impacts it will have for the populations of Dolavon, 20 de Julio, Gaiman, and Trelew; what environmental impact it will have on the waters of the Chubut river; what damage the passing of 20 sand trucks a day will do to the routes; what added value can be generated in the area besides the '40 direct jobs' promised by YPF; and what will happen when there is only one well left. All that remains a mystery, but, meanwhile, the trucks come and go, silently uniting the provinces" (Big Sur, 04/07/2016).

● 16 More information in OPSur (27/05/2016).



● Advancing of the extractive frontier over fruit orchards in Río Negro province (Alexis Vichich)

sand in quarries in Gualaguay, pushed forward by authorities. By mid 2015 this province supplied half of YPF's demand of sand (OPSur, 07/10/2016 and *El Diario de Madryn*, 15/07/2015).

The works carried out so far in the Vaca Muerta Region have to do with improvement and expansion of routes, and the simplification of import and export of inputs and capital goods. The recovery and expansion of railroads, and construction of aqueducts and gas and electricity supply networks are all in the pipeline. The federal government's report lists the following: "Among the projects under consideration are the extension of the railway branch from Barda del Medio to Añelo, where a classification and dispatch plant for the sand

coming from Dolavon (Chubut) would be installed. Currently interrupted is the construction of a new branch line from Chichinales to Rincón de los Sauces, as part of the potassium mining project, and there is also a historical plan of extending the railway from Zapala to Pino Hachado to link it with Chilean railroads for access by train to the Pacific ports" (Undersecretariat of Territorial Planning of Public Investment, 2016: 23).

The rail corridors are key to "synergize infrastructures, companies already established, and staff in RVM (Vaca Muerta Region) so as to direct services to the San Jorge gulf," as the Undersecretariat of Territorial Planning proposes. On the one hand, the plan is not only to build a rail network that speeds up

sand transport between Dolavon and Añelo,<sup>18</sup> but to go even further and link both basins, which would "articulate an operational/productive integration" (Undersecretariat of Territorial Planning of Public Investment, 2015: 263). On the other hand, Vaca Muerta reawakens the authorities' interest in inter-oceanic corridors, as part of the Initiative for the Integration of the Regional Infrastructure in South America (IIRSA)<sup>19</sup> and the South American Council of Infrastructure and Planning. This can be seen in the improvement works at border crossings in north Patagonia and the expansion of roads and railways –such as the train to Chile–, but also in the creation of new customs posts aimed, in principle, at easing the imports (*Río Negro*, 31/07/2014 and *La Nación*, 19/05/2015), but which also work for exports. If for Vaca Muerta the Pacific has always been close, now the plan is to bring it closer.

Fracking emerges as the tip of an iceberg called Vaca Muerta, whose drift can profoundly transform the territory, even more than the apparent water, air, and soil pollution risks associated with the technique or the loss of productive soil. One of the requirements for massive exploitation of unconventional reservoirs is the construction of infrastructure corridors that can optimize the flow of inputs, machinery, people, etc., which translates into a reduction

of production costs, since distance and time with global markets would also be shortened.<sup>20</sup> Such requirements not only determine the feasibility of oil and gas extraction in unconventional reservoirs, but also of mining projects or large-scale agro-industrial production. From the neck of this cow hangs a bell, and its ringing lures other extractive projects.



● Drilling Allen (Fabián Ceballos).

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18 See *La Nueva* (05/05/2015).

19 For a critique of IIRSA, see Raúl Zibechi (2006) and Ceceña, A. E.; Paula Aguilar and Carlos Motto (2007).

20 For a thorough analysis of this aspect, see Nicholas Hildyard's article (info TBD), which is part of this series on extreme energy.



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# Colombia: “Heavies” Expand the Extractive Frontier



*In July 2014 Ecopetrol and Pacific Rubiales announced the cancellation of their in situ combustion Star project, with which the companies aimed to increase hydrocarbon production at the Quifa field. Its failure had been predicted by social organizations and the oil industry union, Unión Sindical Obrera. Community leaders had been denouncing for years the environmental problems they suffered as a consequence of the oil activity. In spite of the negative experience, president Juan Manuel Santos' administration keeps an eye on heavy oils, but resistance to those projects keeps growing. Voices of opposition resound in Caquetá, Meta, Putumayo, and Magdalena Medio “Water, not oil.” This article seeks to review the situation of heavy oils in the country, and the role they play in the hydrocarbon sector, as well as the conflicts they create.*

A couple of decades ago, the Colombian economy started depending on oil exports. To increase the inflow of foreign currency, the national Government is extracting hydrocarbons at very high rates, leading to a sudden fall in reserves. According to the National Development Plan 2014-2018, oil makes up about 50 % of the country's exports. More than 60 % of hydrocarbon production is exported to international markets: “In 2013, it was estimated that Colombia had 2,445 million barrels of crude oil reserves, and in 2015 the country produced 1,009 KBPD. From its beginnings, the administration of the president of the Republic, Juan Manuel Santos, has identified the extractive sector as a pillar of the Colombian economy, providing incentives for its expansion. Six years after the president took office, the sector now accounts for 42 % of the country's exports” (FIDH & CAJAR, 2016: 7).

Panoramic view of the Rubiales field  
(La República, Colombia)



However, no reservoirs have been discovered since the 90s, when the big oil fields of Cusiana and Cupiagua<sup>1</sup>, in the east, were found.

The depletion of conventional reservoirs,<sup>2</sup> the high demand for hydrocarbons, and the high peak in oil prices early in the century shifted the interest of companies towards the exploitation of unconventional fields in many places around the world. Colombia follows that trend: between 2000 and 2015, the heavy oil production<sup>3</sup> in the country went from being 1 % of the total, to 53 % (*La República*, 20/06/2015).<sup>4</sup> The administrations of Álvaro Uribe Vélez and Juan Manuel Santos have promoted politics to attract foreign investment and have tried to expand oil and gas reserves by advancing over new frontiers. From the center of the country, where oil exploitation began in Colombia, conventional and unconventional oil production expands towards the Amazon region, Orinoco, Pacific, the savannah, the Caribbean Sea, and they even climb up the high mountains of the eastern Andes. Thus the extraction of *extreme energy*

is promoted, so called due to the geological complexity of the fields, the incorporation of risky technologies, the elevated energy and water demands, as well as the bigger capital investments, higher environmental and labor risks. Quifa, located in Puerto Gaitán, department of Meta, is one of several heavy oil fields under exploitation.

## Heavy oils

Thirty percent of the total world reserves is made up of conventional oil, and 70 % of unconventionals, of which 25 % are heavy oils, and 45 % are extra heavy oils, and bitumen. The major heavy oil reservoirs are located in Alberta, Canada (tar sands); in the Orinoco Belt, Venezuela (extra heavy oils); Russia, and the US. Latin America is the continent concentrating the biggest reserves in the world of this kind of crude oil, hosting 48 % of them: 2 billion BOE. Venezuela boasts around 1.7 billion BOE (representing 87 %), whereas Colombia's reserves only make up 0.6 % of the total: 12 million BOE (*Campetrol*, 18/06/2015). Heavy oils also account for an important part of the reserves of Ecuador, Mexico, Peru, and Brazil.

Heavy oils comprise an estimated 40 % of Colombia's hydrocarbon reserves and about half of its oil production. According to the company Ecopetrol (Empresa Colombiana de Petróleos), "the proportion of conventional crude oils (sweet or light) will fall in the following 10 years from 15 % to 10 % and from 32 % to 21 %, while unconventionals (heavy crudes) will go up from 52 % to 69 % of the total production"

- 1 The Cusiana field was discovered in 1991. After assessments and commercial viability reports, reserves of 2 billion barrels of light crude oil were announced.
- 2 Sweet or light crude oil of easy extraction and refining.
- 3 Heavy crude oils have a gravity of 10 to 20 API, and a viscosity of 100 to 10 000 cp. \*Calculation of API gravity uses surface measurement of specific gravity of degassed oil. The formula relating specific gravity (S.G.) at 60°F to API gravity is API Gravity = (141.5/S.G.) - 131.5" Conaway (1999).
- 4 It should be noted that the market price of heavy oils is lower due to its high content of sulfur and heavy metals.



● Well on fire at the Quifa field during the development of the STAR Project (Still frame capture by Óscar Vanegas)

(*La República*, 20/06/2015). What is more, estimates indicate that the country's heavy oil reserves will reach 60 % of the total in 2016, that is, 15 % more than the current amount (*Ape.com.co*, 23/08/2013).

The boost in heavy crudes exploration and exploitation results from policies implemented by recent national Governments. Between 2002 and 2010, Uribe Vélez's administration granted important benefits to foreign investors, under the slogan of "investor confidence" and liberalization of the sector. By decree n° 1760 of June 26, 2003, Ecopetrol's organisational structure was modified, and the National Hydrocarbon Agency (ANH, by its Spanish acronym) was created. The Agency was given complete administration of the

Nation's hydrocarbon reserves. In 2008, the ANH promoted the Heavy Crudes Development Project, which through a special round for boosting the heavy crudes market granted areas for the appraisal phase. Thus, eight special areas were granted under Technical Appraisal contracts to six well-known companies: Ecopetrol, Exxon, BHP Billiton, Talisman, Shell, Pacific Rubiales, and Pluspetrol (Colombia Energía, 23/01/2013). In the Colombia licencing round 2010, of the 78 blocks awarded for oil exploitation, at least 50 were located in the departments of Meca, Casanare, Arauca, and Vichada, which concentrates the highest production of crudes with an API gravity below 17° (UPME, 2012).

Although heavy crudes are contained in 6 of the country's 16 onshore basins,

developments have begun in 4 of them: Llanos Orientales, Magdalena Medio, Putumayo, and Caguán; in the fields of Rubiales, Apiay, Ombú, Castilla, San Fernando, Teca, Nare, and Jazmín. The major reservoirs are located in the Llanos Orientales, and have been estimated in between 6,806 MMbbl y 319,455 MMbbl (Colombia Energía, 23/01/2013), while the Rubiales field is deemed to be the main discovery of heavy oil, and its reserves have been estimated in 4.17 million barrels of oil of 12.5° API. This field was recently given back to public control after an intense struggle led by the oil workers organized under the union Unión Sindical Obrera (USO), political parties such as the Polo Democrático, and other sectors supporting state control of resources. The field had been owned by the Canadian Pacific Rubiales for decades, which, in addition to Quifa, was also in charge of Sabanero and Rubiales. Towards the Piedemonte Llanero region, Ecopetrol is operating the Chichimene, Castilla, and Apiay fields. Humberto Calderón Berti, founder and president of oil company Vetra, and also Venezuela's Energy and Mining Minister between 1979 and 1983, stated, "We may not have an oil belt in Colombia,<sup>5</sup> [...] there are signs of a heavy oils belt<sup>6</sup> in the Llanos region, which could have important reservoirs" (Colombia Energía, 23/01/2013).

## High risk extraction

Heavy crudes have high viscosity and density, making its extraction, transport, and refining notably complex. Due to their high content of salt and toxic substances like sulfur, heavy metals, and sometimes, hydrogen sulfide, they are even more contaminating than conventionals. As is the case with other unconventional hydrocarbons, heavy oil exploitation is energy intensive, consumes high volumes of water and chemicals, requires special infrastructure and greater investments, and it causes more environmental damage. Thermal and chemical stimulation are applied during the extraction process, for which different steam injection or *in situ* combustion are used. This significantly reduces the recovery factor,<sup>7</sup> which ends up being less than 20 %, whereas in conventional wells it can be of up to 35 %. That is to say, less oil can be extracted from the hydrocarbons contained in the reservoir. Some of the extraction techniques are: i) water steam injection, predominantly used in heavy and extra heavy crudes; ii) introduction of liquids through injection wells; iii) tertiary or enhanced recovery, which basically consists in injecting a mix of water and chemical solvents and heating the well bottom to a high temperature.

5 He refers to the Orinoco Oil Belt (FPO, by its Spanish acronym), a vast area rich in heavy and extra heavy crude oil, situated to the North of the Orinoco River in Venezuela. It is deemed to be the biggest crude oil reservoir in the world.

6 The Llanos basin has a heavy crude oil belt, composed of, among others, the Castilla, Quifa, and Rubiales fields.

7 Percentage of oil or gas in a given field that can be extracted through primary or secondary techniques.

*In situ* combustion is a conventional thermal technique based on heating the reservoir to recover high viscosity crudes.<sup>8</sup> It burns part of the oil in the reservoir (about 10 %) to generate heat –air or oxygen can even be injected into the well–, so that volumetric sweep efficiency can be increased, that is, the crude that can be extracted after reducing its viscosity. While the combustion area expands, the oil heats up, distilling the most volatile fractions through thermal cracking. Although the method is quite old, it still has serious limitations and generates many technical and environmental problems, which is why other thermal processes, like steam injection, have been favored. Some techniques are in pilot phase, such as the use of CO<sub>2</sub> through carbon capture and storage (CCS), considered to be a type of geoengineering. This method "captures" CO<sub>2</sub> using pipelines and injects it at high pressure deep into the earth so that it pushes the crude up to the surface.

Energy needs for heavy and extra heavy crude exploitation are very high. Some of the main problems are the huge volumes of water and the high risk of contamination by sulfides and heavy metals (nickel, vanadium, and molybdenum). Thus, impacts of the activity increase both in extraction and refining sites (Acción Ecológica, 2013: 8).

8 Although most combustion projects are implemented in heavy crude oil reservoirs, they are being increasingly used to recover light oil in deep reservoirs. In the US, currently operational combustion projects in light crude reservoirs outnumber those in heavy crude reservoirs.



Yet another key hurdle of heavy crudes is transportation. For example, gasoline is used to dilute crude oil. This represents additional monetary and logistic costs. In some countries, like Venezuela, with important heavy and ultra heavy crude reserves, upgraders have been installed to facilitate transportation of crude oil. These units, similar to refineries, reduce the density of heavy crudes through special treatments, obtaining synthetic crude oil, and thus make it easier to export and market (Acción Ecológica, 2013). In spite of these possibilities, only huge reserves justify such investments.

Another alternative to mobilize heavy crudes is modifying the system of pipelines and instead transporting the oil while it's hot, making the use of dilutants such as gasoline unnecessary. However, all these options entail greater environmental risks and require intensive energy use. In the Colombian case, until 2015 hundreds of tank trucks were used to transport crude oil, which traveled daily through the highway connecting Campo Rubiales to the

rest of the country. Later, the Bicentennial oil pipeline and its booster stations ER1 and ER2 became operational. During all the years of truck transportation, the vehicles generated air pollution due to airborne particulate matter (red powder, gas, oils, and other chemicals), seriously affecting the farmers living near the highway.

The Star technology was tested in the laboratories of the Colombian Oil Institute, but several onsite drilled wells had to be abandoned due to technical failures.

### Star Project or *in situ* combustion

In 2011, Ecopetrol and Pacific Rubiales decided to implement a Star technology (Synchronized Thermal Additional Recovery) pilot project in Quifa,<sup>9</sup> a field whose reserves were originally estimated in 900 million barrels (Vanegas, s.f.). The Canadian company promoted this new technology to double reserves in heavy oil fields, and increase the recovery factor up to 45 %.

The Star technology was tested in the laboratories of the Colombian Oil Institute (ICP in Spanish), but several onsite drilled wells had to be abandoned due to technical failures. Some reached a downhole temperature of more than

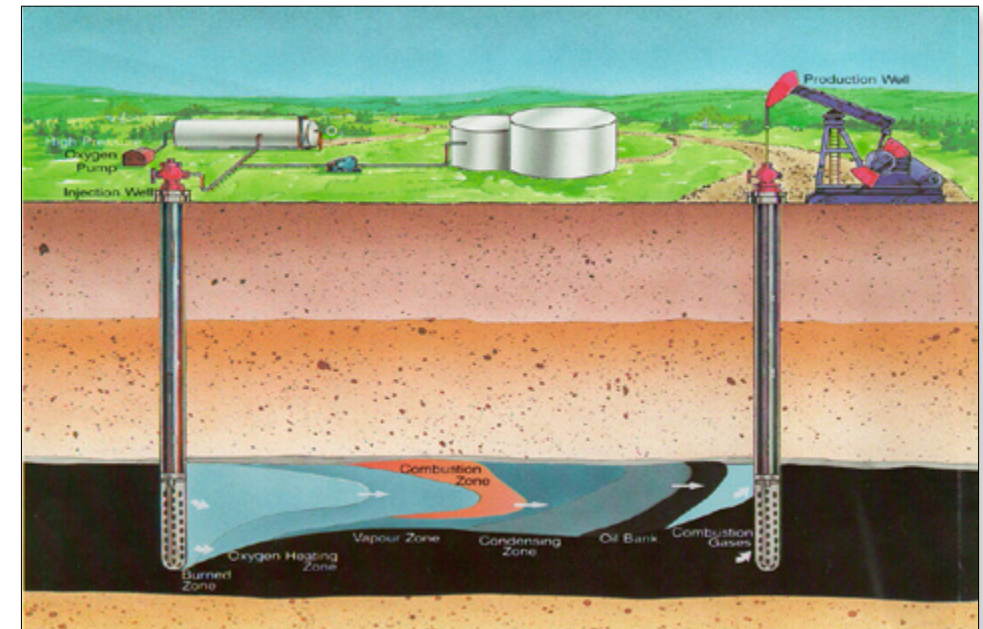
2,100 °F, melting the pipelines (Vanegas, s.f.) and causing uncontrollable fire and explosions that expelled sand and ashes spreading over a radius of thousands of meters, causing irreparable damage to the ecosystems. Combustion gases reached to the surface and contaminated the air with hydrogen sulfide, carbon dioxide, and sulfur dioxide, among others. A recent report by the International Federation of Human Rights and the lawyers' collective Corporación Colectivo de Abogados "José Alvear Restrepo" details the community's numerous complaints, including serious impacts on streams and *morichales*,<sup>10</sup> the flora and fauna, in addition to air pollution and other problems (FIDH & CAJAR, 2016: 46-50).

People in the communities warned the authorities that the streams were drying up, and the aquifers were contaminated with discharges and oil spills, but no response came from bodies like the National Authority of Environmental Licensing, in charge of following up on the environmental management of the projects. Springs and ponds in the area presented residues from oils and other chemicals. According to the community, as a result of the seismic survey and following the implementation of the Star project, groundwater levels had a sharp decrease (Vanegas, s.f.).

In addition, the Colombian Geological Service and Colombia's National Seismic Network reported that from the

9 Quifa is a continuation of the Rubiales and Piriri fields.

10 A type of palm tree that grows on the Amazonas and Orinoco river basins.



● In situ combustion process scheme (insitucombustion.ca)

onset of the Star Project, seismic activity increased in Puerto Gaitán, a region with little or no seismicity. From April 2nd 2013 until June 28th 2016, 976 quakes have been recorded, and from January 31st 2014 there have been at least 99 quakes of magnitude 4 or higher on the Richter scale, which have been reported by the Colombian Geological System (FIDH & CAJAR, 2016: 69). This phenomenon is explained by the increase of water injection at the Rubiales and Quifa fields; the FIDH and CAJAR report warns that Pacific Rubiales is injecting more than 3 million barrels of water per day at the aforementioned fields (2016: 68 – 69).

In January 2014, the comptroller appointed to the mining and energy sector claimed that while Pacific Rubiales ensured that the Star Project was a

success, Ecopetrol acknowledged that the goals had not been met. According to the state company's assessment in January 2014, the project met 60 % of the production baseline agreed upon in 2011 (Blu Radio, 27/01/2014). The Comptroller's General Office reported that more than USD 250 million were invested in the project, without achieving the expected results.

On July 23rd 2014, a joint report by Ecopetrol and Pacific Rubiales announced the end of the Star pilot project. The closure was preceded by numerous complaints by the affected communities, organizations and politicians who forecasted its failure and the many environmental problems it would cause. In spite of the negative experiences, Juan Manuel Santos' administration has set eyes on increasing production at heavy



● Poster of the campaign against the Rubiales field concession (Unión Sindical Obrera)

crude oil fields. In line with this, in 2015 Ecopetrol finished the construction of a deasphalting demonstration plant in Chichimene, Meta, with technology developed by the Colombian Oil Institute. The plant will have a processing capacity of 200 oil barrels per day, it received investments of over USD 35 million, and it was built in a year and a half. Its purpose is to reduce the viscosity of heavy and extra heavy crude oils of the Llanos region for easier transport through pipelines.

By way of conclusion, instead of walking the path of sustainability, investing in research and application of alternative sources of energy, it is the fossil fuel path that is given priority. However, resistance to these projects keeps growing in the region and the country. Voices of opposition resound in Caquetá, Meta, Putumayo, and Magdalena Medio. Opponents and proponents of extractive projects are coming head to head. Colombia's new peace will have as a leading actor the struggles over water and against oil.

**Fuentes:**

Acción Ecológica (2013). *Pungarayu. El horror de los crudos pesados*. December, Quito, 169.

Ape.com.co (23/08/2013). "Crudos pesados: Un negocio de talla mayor".

Blu Radio (27/01/2014). "Contraloría encontró diferencias entre Ecopetrol y Pacific por proyecto Star"

Campetrol (18/06/2015). "Crudos pesados: el reto para Colombia".

Colombia Energía (23/01/2013). "Crudos pesados, la gran apuesta del sector".

Conaway, C. (1999). *The Petroleum Industry: A Nontechnical Guide*. Tulsa: Pennwell Publishing Co. In *Oilfield Review* 18 (2006): 35-59.

FIDH & CAJAR (2016). *El costo humano del petróleo: Estudio de impacto en los derechos humanos de las actividades de Pacific Exploration & Production Corp. en Puerto Gaitán*.

International Energy Agency (2012). *World Energy Outlook*.



● Unión Sindical Obrera.

*La República* (20/06/2015). "Ecopetrol necesita aumentar eficiencia en crudos pesados".

Portafolio (03/08/2011). *Producción mundial de crudo pesado crecerá el 44 % en 10 años*.

Schlumberger, *Oilfield Review* (2006). *La importancia del petróleo pesado*. Pp. 38 – 59.

UPME (2012). *Escenarios de Oferta y Demanda de Hidrocarburos en Colombia*. Ministerio de Minas y Energía, República de Colombia, December, Bogotá.

VANEGAS, Oscar, s/f. *Verdades sobre el Proyecto Star*

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# Violence as a Model



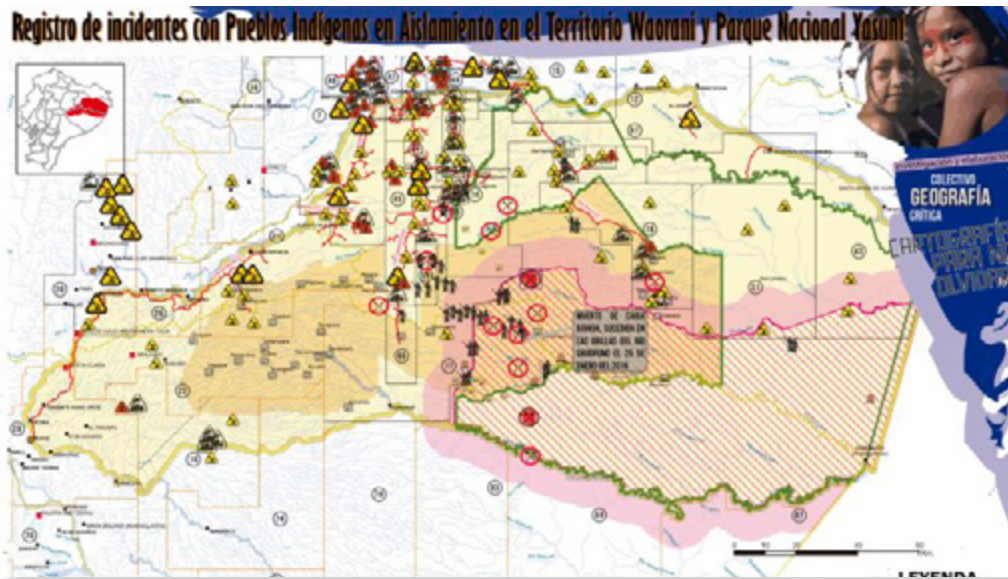
*The oil frontier has fenced off and put pressure on indigenous territories, unleashing acts of violence such as the massacre of groups in voluntary isolation, the death of members of the Waorani indigenous people –recently contacted–, and of mestizo peasants. These events are not limited to a given moment in history, but are part of Ecuador's extreme extractive model.*

**E**xtrême energy is a concept generally associated with the application of new and sophisticated technologies that facilitate the expansion of the oil frontier, which entails huge geological, environmental, and social risks. In Ecuador, this type of energy is derived from crude oil exploitation in fields situated inside and around the mega biodiverse territories of the Amazon. These are traditionally occupied by indigenous peoples, of which at least two are uncontacted: the Tagaeri and the

Taromenane, culturally related to the Waorani. This means that the extreme nature of energy in this case does not come from the technological component, but from the processes it triggers.

The group most affected by Ecuador's oil history has been the indigenous, on whose ancestral territories the extractive infrastructures are installed. The Waorani people, with a territory stretching from the Napo river to the Curaray river, is one of the most impacted, not only by oil exploration –beginning at the end of the 30s–, but also by the rubber industry before, from 1890 to 1920, a time when they were held captive and enslaved in the big plantations. Commerce along the rivers also affected the communities located in Shiripuno and Tiputini. Many deaths were registered back then; years later, the Waorani extended their territory after being displaced by rubber exploitation and

The expansion of the oil frontier triggers violence against indigenous peoples in Ecuador.  
(Remi Benali)



● Mapping of incidents affecting indigenous peoples in isolation (Paola Maldonado and Braulio Gutiérrez, Colectivo de Geografía Crítica)

agricultural estates. This led to conflicts and attacks with other indigenous peoples of the area (Cabodevilla, 2010).

The first oil period began in 1937, when Shell set up a camp in Arajuno, built roads and airports, and hired Kichwa workers, who had several confrontations with the Waorani, situated from Arajuno up to the mouth of the Yasuni. It has been recorded that the Waorani attacked Arajuno and killed 20 Kichwas. Later, the war against Peru in 1942, linked to oil interests, also endangered the Waorani. There were no Waorani in Peru. It is told that the Peruvians sailed up all the rivers, including the Yasuni, and captured Waorani, Sapara and Kichwa people.

In 1956, Evangelical missionaries from the US Summer Institute of Linguistics (SIL) entered Waorani territory and

enforced contact, grouping and relocation of most of the clans, with the logistical support of oil companies. Such actions favored the entry of companies, since the Waorani were displaced from their vast ancestral territory, and cornered to a much smaller one. The success of this move was due to the interrelation between missionaries-Waorani and oil companies-the military (Cabodevilla, 2010). Many attacks and deaths occurred in the same period of time in clashes between already contacted and uncontacted Waorani, and also with the Tagaeri, who were already isolated.

The isolation of Waorani groups –mistaken for Tagaeris– dates back to the oil boom during the 60s and 70s. Some researchers claim that the isolated Tagaeri and Taromenane refused contact during the pacification, relocation

and loss of territory suffered as a result of the expansion of the oil frontier and the work of the SIL (Proaño, 2010).

In 1964 concessions were granted by the Ecuadorian government to the oil company Texaco for exploration and exploitation in 500,000 hectares of tropical forest, in the current provinces of Sucumbíos and Orellana, ancestral territories of the Cofán, Kichwa, and Waorani peoples. Three years later, the company discovered the first commercial oil field in the region of Lago Agrio, on the border with Colombia. In the following years it expanded its operations southwards. In its 28 years presence in the country, Texaco drilled 399 wells and built 22 production stations. When it left, in 1992, the oil fields began to be operated by the state-owned Petroecuador, currently Petroamazonas EP.

Texaco, in consortium with the State Petroleum Corporation (CEPE, by its Spanish acronym) hired the French exploration company CGG to carry out the seismic survey south of the river Napo, a territory traditionally occupied by the Waorani and other isolated peoples. The expansion of the extractive frontier where isolated peoples took refuge, and the deadly incidents that occurred in oil blocks during the 70s and 80s made these communities visible to the public opinion. Those decades saw direct confrontations between oil workers and isolated indigenous peoples. One of the most notorious incidents occurred in 1977 in Shiripuno, where three CGG oil workers died speared by the Tagaeri (Cabodevilla, 2010). In 1987, the Bishop of the Aguarico Vicariate, Monsignor

Labaka, and the nun Inés Arango both died speared. After several attempts, they could not halt extractive activities in the area. They had entered Tagaeri territory because the army would evict the zone to let CEPE begin the seismic survey. Before embarking on his trip, the Bishop is quoted to have said: "If I don't go, they will be killed" (Cabodevilla, 1999).

In the 80s, a new policy opened up the country for oil leasing –rounds were organized for foreign companies to start exploring and exploiting in indigenous territories and protected areas, such as the Yasuni National Park. The landing of new oil companies in the zone meant more pressure on indigenous territories, which translated into more violent episodes. One of the most striking is the attack to the oil camp El Tigüino in 1989, in which an oil worker and a woman were speared to death, and two Tagaeri warriors were shot. Days after the incident, a green helicopter opened fire at the Tagaeri house, and three women were riddled with bullets (Cabodevilla, 1999).

Until 2012, Ecuador launched 11 international oil leasing rounds, thanks to which some 15 transnational companies disembarked in the country. There are currently 65 oil blocks, of which 38 are operational and 27 are about to be leased. Nineteen big operational blocks are owned by Petroamazonas, and the other 19 –mostly small– are operated by transnational companies. Chinese companies are typically operating blocks or supplying services to other firms.

## Oil marks

Oil exploitation in Ecuador has left a nefarious impact both on the Amazon ecosystem –known for its mega biodiversity–, and the indigenous and peasant population living there. A detailed description of the disaster can be found in court documents from the trial initiated against Texaco, currently Chevron, by Amazon inhabitants. Some studies indicate, for example, that Texaco's entry in today's Sucumbíos speeded up the process of extinction of the Tetete people, now non-existent.

In an attempt to pass regulations that would protect isolated peoples, in 1999 the Ecuadorian government declared the southern area of the Yasuni National Park, with 758,048 hectares,

Oil exploitation in Ecuador has left a nefarious impact both on the Amazon ecosystem, and the indigenous and peasant population living there. Some studies indicate, for example, that Texaco's entry in today's Sucumbíos speeded up the process of extinction of the Tetete people, now non-existent.

“untouchable zone of conservation –where it is forbidden in perpetuity any kind of extractive activity– the dwelling and development lands of the Huaorani groups, known as Tagaeri, Taromenana, and eventually others who

remain uncontacted”.<sup>1</sup> During the last 20 years, the territories of the Tagaeri and Taromenane have been occupied by oil blocks and camps, the limits of which overlap with ancestral Waorani territory, the Yasuni National Park, and parts of the untouchable area.

Eight years later, in 2007, by Decree n° 2187, the Ecuadorian government designated the Untouchable Tagaeri-Taromenane Zone (ZITT, by its Spanish acronym), ratifying that “in this area the right of the Huaorani and ancestral peoples in voluntary isolation to carry out traditional activities of hunting and fishing, as well as the customary use of biodiversity resources with subsistence purposes will be guaranteed”.<sup>2</sup> Article 2 of the Decree established a “Buffer Zone of ten kilometers wide adjacent to all the untouchable area”. In the “buffer zone it is forbidden to carry out extractive activities of forest products with commercial purposes; also forbidden is the granting of mining licenses.”

However, the web page Geoyasuni.org offers interesting information about the situation in the Buffer Zone, which has an area of 467,530 hectares. Seventy eight per cent of the surface is occupied by oil blocks: 59.99 % in Ecuador, and 18.02 % in Peru, while the blocks Ishpingo, Tambococha, Tiputini (ITT) and 31 intersect with the Untouchable Zone, with a surface of 30,202.25 hectares, and 10,391.80 hectares respectively.

- <sup>1</sup> Executive Decree N° 552, published in Suplemento del Registro Oficial N° 121, February 2nd 1999.
- <sup>2</sup> Executive Decree N° 2187, January 3rd 2007.



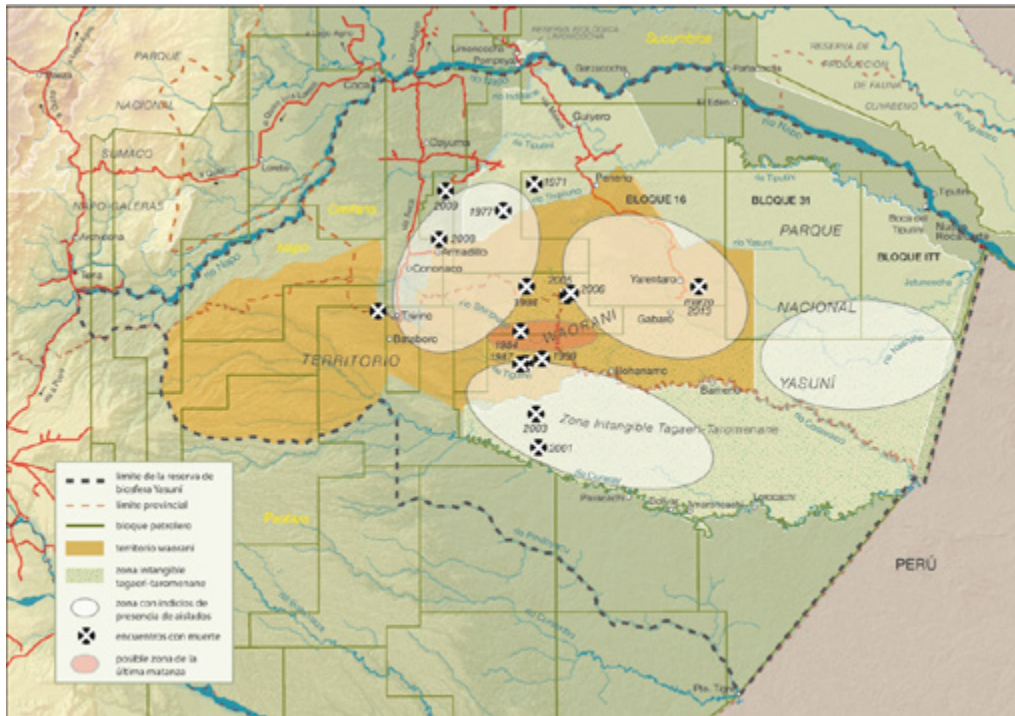
● Demonstration against exploitation of the Yasuni Park (EFE)

The untouchable zone of the Yasuni National Park, intended for the territories of peoples in isolation, is completely surrounded by oil concessions. To the north it borders blocks 14 (Petroriental), 16 (Repsol), 31 (Petroamazonas) and 43 (Petroamazonas); to the west, block 17 (Petroriental); to the south, blocks 83 (Andes Petroleum), 84 (Hydrocarbons Secretariat) and 87 (Hydrocarbons Secretariat); to the east, blocks 39 (Repsol Exploration Peru), 121 (SubAndean) and 67 (Perenco) in Peru.

Moreover, according to research conducted in 2008, there is presence of isolated indigenous peoples outside the limits of the Untouchable Zone. This report shows that the Yasuni National Park and its buffer zone are areas of transit for Isolated Indigenous Peoples. Their presence has been documented around the communities

of Dicaro, Yarentaro, Iro, and Gabaron, within block 16, operated by Repsol. The permanent presence of isolated indigenous peoples in block 14, between the rivers Tivacuno y Mencaro (Tiwino river), is also confirmed (Proaño and Colleoni, 2008). It is evident that the current limits of the Untouchable Tagaeri-Taromenante Zone do not coincide with the territoriality exerted by the isolated peoples.

The presence of external agents such as the oil companies gave way to collateral activities, like disorderly colonization, legal or illegal logging activities, construction of roads, and the ecological destruction of the territories inhabited by isolated indigenous peoples. In addition to generating high levels of noise that, according to several testimonies, disturb the isolated peoples, it has also created the conditions to



● Map of the Yasuni Biosphere Reserve showing oil blocks and the presence of uncontacted indigenous peoples (S. Crespo and P. Cabrera)

intensify interethnic conflicts due to the pressure exerted on their territories. Thus the fundamental rights of these peoples are being violated.

In the last two decades violent acts have been registered, which are directly or indirectly related to the oil policies promoting the extension of the extractive frontier:

The massacre of 2003, in which at least 15 isolated indigenous people died. Although it did not happen near oil infrastructure, its perpetrators –Waorani warriors of the Babeiri group– belong to a community highly dependent on the oil activity.

The attack of March 2008, in which a lumber industry worker was speared, and died. It happened a few kilometers near the oil road known as Auca road, close to the Armadillo oil field.

The attack of 2009, in which three members of a settler family were speared to death, and a baby was kidnapped (and found alive two days later, near the site of the attack). This happened a few meters from the Hormiguero oil well, in block 17, operated by the Chinese company Petroriental.

The attack of March 5th, 2013, in which two Waorani elder died speared. It happened a few kilometers near the road leading to the Daimi well, near the Yarentaro community. A few meters

from the place, an oil crew was working in block 16, operated by Repsol.

The massacre of end of March 2013, in which at least 20 Taromenane were killed in revenge for the death of the Yarentaro elders. It possibly happened 30 km from the Armadillo field, and the perpetrators came from the fields in block 16. It should be noted that the Inter American Commission on Human Rights had granted precautionary measures to the Taromenane. That is, the Ecuadorian state had the obligation to protect these peoples, which it failed to do.

On January 25th 2016 another violent event was registered in the river Shripuno. One Waorani men died speared, and a woman was injured. The attack occurred within the Untouchable Zone, some 25 km in a straight line from the Armadillo block.

In spite of all these events, governments have always prioritized the economic returns of oil exploitation and promoted the expansion of the extractive frontier, neglecting the rights and lives of indigenous peoples, even of isolated communities protected by the Constitution of the Republic: “The territories of the peoples living in voluntary isolation are an irreducible and intangible ancestral possession and all forms of extractive activities shall be forbidden there. The State shall adopt measures to guarantee their lives, enforce respect for self-determination and the will to remain in isolation and to ensure observance of their rights. The violation of these rights shall constitute a crime

The lack of political will in this regard perpetuates the violence, and the violation of collective human rights, which deepen the extreme nature of the Ecuadorian crude oil.

of ethnocide, which shall be classified as such by law.”<sup>3</sup>

There is also international legislation protecting the rights of isolated indigenous peoples, for example, according to the United Nations guidelines for indigenous peoples in voluntary isolation, contracts with extractive purposes shall be immediately terminated and forbidden (United Nations, Human Rights, 2012). However, pressure exerted by the companies to expand the extractive frontier curbs the possibilities of implementing protection policies for the affected groups. Instances of recent decisions by the State that will worsen pressure on indigenous peoples have occurred in blocks 14, 17, 43, 31, 83, and 66 in Armadillo field.

Armadillo was offered for leasing as a marginal field, in the 10th Oil Round in 2012, in spite of the fact that by the time there was already evidence of isolated peoples in the area. The field was not granted to any company, so Petroamazonas began surveying. In

●  
3 Second paragraph, subsection 21, article 57 of the Political Constitution of the Republic of Ecuador (2008). [English version retrieved from: <http://pdpa.georgetown.edu/Constitutions/Ecuador/english08.html>]

February 2015 Petroamazonas signed a contract with the Ecuaservoil consortium (Belorusneft, Edimpetrol) to optimize the operation of the block. A campaign was launched to prevent the approval of an environmental license for seismic survey –intended to be done even outside the block–, due to evidence of isolated peoples in the area. The east and southeast parts of the block were finally excluded from the survey, but this does not eliminate the risk, since presence points are outside the exclusion zone. It was also possible to halt the development of the Yampuna, Avant, Tiwae, and Aguila platforms, situated in blocks 14, and 17. Still, the threat continues. The Chinese company Petroriental is presenting the terms of reference to begin seismic survey in the aforementioned blocks.

If they have no territory, they have no place where they can exert their rights. Thus it is necessary to create one while they remain in isolation, in accordance to the national and international legislation on indigenous rights, so as to protect their rights and prevent genocide. Unfortunately, government officials of the different administrations have tried to deny the presence of isolated indigenous peoples.

Furthermore, in August 2013, the Ecuadorian government decided to put an end to the Yasuni ITT initiative, which sought to keep in the subsoil 20 % of oil reserves of block 43, situated inside the

National Park. One of the arguments of the initiative was precisely that the place is home to isolated indigenous peoples, so it was necessary for the prevention of genocide. Procedures to begin exploitation of blocks 31 and 43 were nonetheless put in place right away.

On January 25th 2016, at about the same time that the Yasuni massacre was taking place, the government signed a contract for provision of services with the Chinese firm Andes Petroleum for exploitation of blocks 79 and 83, on territories where the government itself has acknowledged the presence of isolated peoples, that are also home to the Sapara and Kichwa ethnic groups.

The most serious violation against isolated peoples is that they do not have a territory– it is a violation of collective human rights. If they have no territory, they have no place where they can exert their rights. Thus it is necessary to create one while they remain in isolation, in accordance to the national and international legislation on indigenous rights, so as to protect their rights and prevent genocide. Unfortunately, government officials of the different administrations have tried to deny the presence of isolated indigenous peoples. As an example we have the statements given to the media in February 2010 by the former Minister of Non-Renewable Natural Resources, the economist Wilson Pastor. He said there was no clear evidence of the presence of isolated peoples, and that it could be a “made up fact”, influencing with his omission the policies that affect peoples in voluntary isolation (Acción Ecológica, 8/04/2013).

In the same vein, the Minister of the Environment, Marcela Aguiñaga, said in August 2013, after the March massacre: “The Minister of Justice will have to make a statement regarding the scientific evidence of the presence or absence of these peoples in the zone” (Vera, 23/08/2013).

Any kind of protection program for isolated indigenous peoples must contemplate the adjudication of a territory and the prohibition of oil extraction therein. That must also be a step towards a transition to a new economic model, a post-petroleum Ecuador. The lack of political will in this regard perpetuates the violence, and the violation of collective human rights, which deepen the extreme nature of the Ecuadorian crude oil.

### Sources:

- Acción Ecológica. *Etnocidio: Del Horror a la búsqueda de responsabilidades*.
- Cabodevilla, M. A. (1999). *Los Huaorani en la historia de los pueblos del oriente*. CICAME, 2nd Edition.
- (2010). *La Nación Waorani. Noticias Históricas y Territorio*. Orellana, Ecuador.
- Pappalardo, S.E. and De Marchi, M. (2013), *Geografía de la Zona Intangible Tagaeri Taromenane ¿Una jaula petrolera?*
- Proaño, José (2010). *Voces de la Selva. Noticias recientes sobre los Pueblos indígenas aislados en la Amazonía ecuatoriana*. Quito, Ecuador.

Proaño José and Colleoni Paola (2008). *Taromenane Warani Nani. Pueblos Indígenas en Aislamiento Voluntario Tagaeri Taromenane en la Amazonía ecuatoriana*. Ediciones Abya Yala, Quito.

United Nations. Human Rights (2012). *Directrices de protección para los pueblos indígenas en aislamiento y en contacto inicial de la Región Amazónica, el Gran Chaco y la Región oriental de Paraguay*. OHCHR, Geneva.

Vera, Carlos Andrés (23/08/2013). *Los Taromenani no existen*, in Polifocación.



● Presentation before the IACHR on the Tagaeri and Taromenani case, and the legal and illegal exploitation of their natural resources. (IACHR)

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# Extreme Orinoco:

## The Oil Belt and the Mining Arc, High Risk Extractivism



If we analyzed Venezuela's extraordinary crisis in historical terms, we would notice that it is a long-term one, marked by the exhaustion of the oil rentier accumulation model. Not only can this be seen in the consequences of the "Dutch disease" in the Venezuelan economic structure; the remarkable instability of the international energy market; the sharp macroeconomic imbalances unfolding since the 80s; or the sustained growth of the domestic consumption of natural resources and, in more general terms, of social metabolism, but it is also seen in the meaningful transformations that took place in the makeup of the Venezuelan oil. This means that the favorable conditions that enabled an accelerated development of rentier capitalism in the 20s and 60s have been progressively transformed, with relevant economic, political, geopolitical, and environmental implications. The conventional reservoirs

of Zulia (West) and north of Monagas and Anzoátegui (East) –most of them with more than seventy years of massive exploitation– are on the road to depletion, and facing rising costs for primary and secondary recovery.

This situation has given the Orinoco Oil Belt (FPO, by its Spanish acronym) greater historical importance; it is a vast accumulation of heavy and extra heavy crude oil in the north of the Orinoco river, extending over more than 55,000 km<sup>2</sup>. Since President Hugo Chávez' administration –mainly since 2004–, the project was relaunched and reformulated to set ambitious "production" goals with the aim to increase it up to 4 million barrels/day in the FPO only, with investments of up to USD 236 billion until 2021. At the time, President Chávez described the FPO as the basis that would transform Venezuela into "energy world power".

Orinoco Mining Arc area, where Venezuela's gold, diamond, and coltan reserves are said to be concentrated (Lapatilla.com)

The national government has succeeded in reaching historic extraction rates in the FPO during the last years: 1,228,300 barrels/day in 2014 –as compared to 563,000 barrels/day in 2006–, especially in the Junín and Carabobo blocks. Thus, heavy and extra heavy crude oil extraction went from accounting for 38 % of the total oil extracted in Venezuela in 2006 to 58.8 % in 2014.

Notwithstanding, the fall in oil prices in 2014 and the national economic crisis mean that huge obstacles are being faced to meet the expansion goals set for the FPO, and the business itself has become shaky. The projects in the belt require constant drilling to sustain production, and the liquidity crisis of *Petróleos de Venezuela (PDVSA)* makes it impossible to keep up with the pace. A slowdown in production growth in FPO is likely, which is also part of a sustained drop at the national level, at least since 2011. The total oil production rate in 2015 was 2,746,000 barrels/day, in a country that has been having a yearly average production of over 3 million bpd.

Although the government bets on maintaining and accelerating investments in the belt, at least until now this project does not seem to provide answers for the crossroads at which the national model of capital accumulation stands. In this sense, the country is not only moving in the direction of unconventional hydrocarbons, but also towards an expanded and intense penetration into “new commodity frontiers”. This entails a significant geo-economic reorganization of the

national territory to relaunch extractivism, this time with a profile that can be described as “extreme”.

In this new national map, which began unfolding in 2004-2005 during Chavez government –and keeps formalizing under the current administration of Nicolás Maduro–, the Orinoco basin represents a key geographical core, where a big “development pole” is being imposed, trying to unify the FPO with the mega project of the Orinoco Mining Arc (AMO). The AMO is a large mineral belt of 111,843.70 km<sup>2</sup> (12 % of the national territory, the size of Cuba), which covers all the north of Bolívar, south of the Orinoco river, and is being negotiated for the extraction of gold, diamond, iron ore, coltan, bauxite, among other minerals. Together, the AMO and the FPO make up an enormous development pole of 175,000 km, and are part of what President Chavez dubbed in 2011 the “Strategic Action Plan in Two Horizons”.

### Extreme Orinoco: the new geographic pole of high-risk extractivism

The shift of oil extraction towards the FPO and the AMO, together with a re-launching of offshore gas projects in the long Caribbean and Atlantic coasts, or the advance of the coal frontier in the Sierra de Perija, among others, shows that the Venezuelan economy has entered a new historical phase, this time under a profile of extreme energies. This is the case, whether one looks at the greater environmental



● “Water is worth more than gold”, the motto that binds together struggles against extractivism in Latin America (*Diario Jornada*, Argentina)

and geological risks posed by these projects, to the greater intensity of the intervention and transformation methods used in the territories, to the higher energy consumptions of the extractive activities involved, or to higher production costs. But also, at the same time, the extreme nature is due to increasing deregulation of capital accumulation (in the form of primitive accumulation) negotiated in the agreements with transnational companies, and the policing and military devices of control and surveillance of occupied zones. All these elements take place in an environmental context scarred by a century of oil exploitation, and in other less disturbed ecosystems in the new extraction frontiers, which are vulnerable to the drive of territorial colonization.

Three to four barrels of water are used in the FPO to obtain one barrel of (enhanced) synthetic crude oil. It is necessary to deploy an even bigger infrastructure network for the extraction, processing (which in this case is double, since it requires enhancement before refining), and distribution of these extra heavy crudes. Huge amounts of toxic waste are generated (including coke and sulfur), and spills can be far more devastating, just to mention a few consequences. In the AMO, the scale of mining intensity are unheard of in the history of Venezuela. The huge footprint of materials in such large-scale open-pit mining projects entails high levels of deforestation and loss of biodiversity, in one of the most delicate bioregions in the country, which is home to the majority of its indigenous peoples.



Large quantities of water would be necessary to obtain one ounce of gold, in exchange for serious contamination with cyanide, arsenic, and other toxic substances that threaten many of the vital rivers that makeup the Orinoco basin, one of the main water reservoirs of the country.

It is important to highlight that these projects do not only impact the territories where they take place, but they also affect the whole life of the country for they hamper the distribution of water in densely populated urban areas, alter rain patterns and make a greater contribution towards climate change, among other repercussions. As mentioned before, in addition to socio-environmental externalization, economic externalization also worsens. In spite of the negative timing –in terms of investment and profitability–, in order to boost expansion of un conventionals, the great needs of natural resources of capitalist centers and emerging economies, and the links in Venezuela between foreign debt and repayments in oil –mainly to China–, promote and drive forward the growth of these projects.

At the beginning of 2016, PDVSA announced its plans to invest USD 900 million for exploration and production, especially in the Orinoco Oil Belt. In September that same year a project of great magnitude –“like few in the world”– was announced; it would encompass the drilling of 480 wells with the aim to raise production in the belt in 250,000 bpd during the following 30 months. The investment reached USD 3,230 million and involves companies like Schlumberger, Horizontal Well Drillers, Baker Hughes, Halliburton, and the Venezuelan Y&V. Likewise, Venezuela has secured financial support from China to increase production, commitment from Russian companies like Rosneft, and Venezuelan corporate federations to keep investing in the project.

The key of the business lies in deepening the economic flexibilization of regulatory frameworks, doing away as far as possible with obstacles to the corporations’ profits. For example, since early 2016, the Oil Minister, Eugenio Del Pino, has proposed that the FPO should have a “special investment scheme to reach its full development”. These measures are part of the “Comprehensive Regionalization Law” (LRI), passed in November 2014 –Official Gazette No. 6151 Special, Decree 1425–, which contemplates the creation of “Strategic National Development Zones” (ZEDN) and “Special Economic Zones” (EEZ), taken from the Chinese model. In these zones a comprehensive liberalization process of geographical regions becomes formal, with suspension of tariff restrictions and taxes, simplification



● Telesur.

of paperwork requirements, fiscal and customs incentives for the companies, labor flexibilization (and also environmental, as is suspected), creation of *ad hoc* territorial authorities, among others. On February 19th, President Maduro decreed the FPO as a ZEDN, and did the same on the 24th with the AMO.

Those projects, especially the AMO, are imposed by force, without consulting the inhabitants of the affected areas, many of whom are indigenous. Neither is there any transparency regarding the agreements reached, if we take into account not only the lack of information and data about the operations, but also the secrecy that so far has been typical of agreements signed with transnational mining companies. The factor completing these extreme modalities of appropriation of natural resources and generation of energy has to do with the

security measures taken to protect the exploitation zones. Together with the decree for the creation of the ZEDN in AMO, a Military Security Zone was established “with the aim to relaunch new business that will enable the comprehensive development of the southern margin of the Orinoco river”. Likewise, at the end of October, the Defense Minister, Vladimir Padrino López, activated the Special Security and Protection Unit

Far from being a solution, these trends deepen the extractivist and rentier nature of the Venezuelan economy, its profound dependence on food imports, its tendency towards high energy and materials consumption, and its socio-ecological unsustainability.





● Map of the Orinoco Mining Arc (Bolivarian Government of Venezuela)

in the FPO. These measures constitute the militarization of natural resources and the establishment of low-intensity states of exception, in the context of intense political dispute and geopolitical tensions over the control of these strategic resources.

As we have seen, extreme energies unfold not only for the search of hydrocarbons and mining resources in more environmentally and geologically risky and complex areas, but they also entail comprehensive policies that seek to regulate territories, economy and life. The crisis of the progressive period in Latin America, the stagnation of the global economy, and dangerous geopolitical disputes over the control of strategic natural resources are factors that explain the pressure to advance with high risk extractive activities.

Far from being a solution, these trends deepen the extractivist and rentier nature of the Venezuelan economy, its profound dependence on food imports, its tendency towards high energy and materials consumption, and its socio-ecological unsustainability. Moreover, they are very telling of the inability of the leaders and sectors of the opposition to propose an alternative model that promotes the autonomy of territories and the economy, and the capacity to guarantee a dignified and healthy life for present and future generations. Meanwhile, indigenous communities, and social and environmental organizations keep offering resistance inside and outside the new commodity frontiers in Venezuela, to try to stop the advance of this extreme extractivism.

## Sources:

AVN (21/10/2016). "Activan unidad especial de seguridad en Faja Petrolífera del Orinoco".

AVN. (25/01/2016). "Proponen para la Faja Petrolífera del Orinoco régimen especial de inversiones".

Baptista, A. (2004). *El relevo del capitalismo rentístico: hacia un nuevo balance de poder*. Caracas: Fundación Polar.

Official Gazette of the Bolivarian Republic of Venezuela (2014). Decree with the full rank, value, and force of the Comprehensive Regionalization Law for the Socio-productive Development of the Homeland. 6151 Special. Decree 1425.

Ministerio del Poder Popular de Petróleo (25/10/2016). "Del Pino y Sechin conversaron sobre el consenso entre productores".

Ministry of Petroleum of the Popular Power. (19/02/2016). "Presidente Maduro decretó Faja Petrolífera del Orinoco como Zona de Desarrollo Estratégico".

Moore, Jason W. (2000). "Sugar and the Expansion of the Early Modern World Economy", in *Review*, 23(3), pp. 409-433.

Navarro, I. (2016). "Pymes y Pdvsa invertirán \$900 millones en la Faja".

PDVSA (2015). "Informe de Gestión Anual 2014".

PDVSA (2016). "Informe de Gestión Anual 2015".

PDVSA (24/02/2016). "Presidente Maduro firmó decreto de Zona de Desarrollo Nacional del Arco Minero del Orinoco".

Reuters (8/07/2016). "Venezuela y China unen esfuerzos para elevar producción de la Faja Petrolífera del Orinoco".

Teran Mantovani, E. (2014). *El fantasma de la gran Venezuela*. Caracas: Fundación Celarg.

Teran Mantovani, E. (2016). "Las luchas contra el megaproyecto del Arco Minero del Orinoco, Venezuela". EJAtlas.

Últimas Noticias (21/09/2016). "Pdvsa inicia la perforación más grande del mundo en la Faja Petrolífera del Orinoco".

Últimas Noticias (24/02/2016). "Crean Zona de Desarrollo Estratégico del Arco Minero del Orinoco".

UNEP (2013). "Recent Trends in Material Flows and Resources Productivity in Latin America".

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# Coal 2.0: Another Chapter in the Latin American Unconventional Plot



*In spite of global campaigns to discourage its use and reduce CO<sup>2</sup> emissions, coal proponents insist and even claim that its exploitation by the unconventional technique known as underground gasification is “clean”. Others jumping on the bandwagon are those who suggest extracting gas trapped in coal seams. Latin America has fewer reserves of this resource in comparison to other regions, but that does not mean our territories are safe from them.*

**U**ntil the mid 60s, coal was the main primary source of energy in the world; it still is for China, and continues being very important in the United States, Germany, and Australia, and also in some East European and Asian countries. In contrast, it has a marginal participation in Latin American energy, accounting for approximately 8% of primary sources, although in some

countries, like Chile, it goes up to a third. In 2013, coal production in the region was only 2 % of the world total.<sup>1</sup>

However, in spite of its scarce relevance, coal exploitation is triggering serious conflicts in Latin America. For instance, in Colombia –the main “producer” in the region– it is directly linked to human rights violations and it is responsible for adverse socio-environmental impacts.<sup>2</sup> In Venezuela, the expansion of the extractive frontier has unleashed territorial disputes in the



- 1 Colombia, with almost 89 %, and Venezuela, with almost 11 %, accounted for the regional exports. Growth has been significant between 1990 and 2009, increasing five-fold. As for Venezuela, exports were almost the only destination of production. In Colombia, it went from accounting for 62 % of the production in 1990, to almost 95 % in 2009 (Yáñez *et al.*, 2013).
- 2 For more information see Roa Avendaño, T. and Navas, L. M. (Coord.) (2014); Garay Salamanca, L. J. (Dir.) (2013); and Moor, M. and van de Sandt, J.



● Map of CBM reservoirs in Colombia (Julián De Bedout Ordóñez)

Sierra de Perija.<sup>3</sup> While in Chile, where the #NoMasCarbon campaign (No More Coal) was launched, the potential exploitation of five mines put the Isla de Riesco on alert, in the southernmost part of the country. These types of problems and conflicts are an unavoidable reference point when discussing projects of *clean coal*, promoted as such because they supposedly help reduce greenhouse gas emissions (GHG).

### Friendly Coal

Coal trapped in deep mantles, in thin seams of low quality, can undergo a controlled underground combustion process to obtain synthesis gas or *syngas*. In addition, through the use of carbon capturing systems, emissions are reduced and the *in situ* process solves the problems caused by ashes, since they remain in the combustion cavity. The same happens with gas in the rock, which has taken the lives of mining workers for centuries. For decades, it has been possible to extract it by adapting techniques used in hydrocarbon exploitation, which enable GHG emissions reduction, since it is not released in the atmosphere, to

3 For more information see the articles by Teran Mantovani, E. (7/04/2011) and (10/11/2016).

guarantee safety in the mines. These are, very briefly, some of the arguments of *environmental friendliness* presented by those who promote underground coal gasification and coal seam gas exploitation.<sup>4</sup> Its supporters also claim that they constitute alternatives not only for matrix diversification and energy imports reduction –a problem common to the countries of the region–, but also, as in the case of shale, they promote gas as the bridge fuel towards clean sources.

Beyond the conviction of their advocates, these developments seek to overcome the technical and financial limits that prevent the exploitation of coal in seams that are too deep or too thin, or have a low quality, which is the case of most of the existing reserves in the world. The challenge is to generate the conditions for gas –synthetic or trapped in the rocks– to reach the energy and petrochemical markets, therefore prolonging the fossil fuel matrix.

### Colombia on the methane crusade

To extract coalbed methane it is necessary to drill down into the seam, and in the first stage, extract mainly the water it contains. As the hydrostatic pressure drops, methane is liberated from the rock. In some cases, hydraulic fracturing (*fracking*) is applied to increase seam permeability. Some of the main problems posed by these operations

4 For a description and critical assessment of UCG, see Ochandio, R. (18/06/2015).

are the management of process water –usually brackish–, contamination of surface and underground water sources, and subsidence (sinking of the soil).<sup>5</sup>

This technique has been used commercially for at least three decades in the United States, Canada,<sup>6</sup> and Australia. There are also policies for its implementation in China (Petroleoamerica.com, 12/2016), Indonesia, and Mozambique (Anderson, 2014). In Latin America, Colombia –main coal producer and exporter–, became the first country to grant concessions for coalbed methane exploitation. In March 2016, the president of the Natural Gas Colombian Association, Eduardo Pizano, announced that the State had approved the first license for the Drummond company, in the Department of Cesar. Exploitation would begin with the drilling of 70 wells, requiring an investment of USD 126 million (*El Pilón*, 18/03/2016; y *La República*, 17/10/2015).

According to a report commissioned by the National Hydrocarbons Agency (ANH, by its Spanish acronym), the more “attractive” regions for these kind of exploitations are Cesar-Ranchería, La Guajira, Cordillera Oriental, and Cauca-Patía, the four basins with the highest potential in the country. In this sense, the Agency stated in 2013 that

5 A summary of the critical aspects of coal seam gas exploitation can be found in the infographics published by Frack Off (11/07/2013).

6 On the impacts in Canada see Caldicott, A. (03/02/2009) and in USA: *San Juan Citizens Alliance*.

it was working on the drafting of regulations that would open exploitation areas for leasing (Colombia Energía, 03/12/2013).<sup>7</sup> Soon after, in the 2014 Colombia Round, 8 blocks were offered for coal seam gas exploration (*El Herald*, 22/02/2014).

In this race, the Ministry of Mines, the National Mining Agency (ANM), and the ANH joined the *Global Methane Initiative*, a multilateral voluntary alliance “to promote the reduction, recovery, and use of methane as a clean energy source, creating an international network of partner governments, members of the private sector, development banks, universities, and non-governmental organizations”.<sup>8</sup>

## Experimenting with the “energy from hell”

In 1913, Vladimir Lenin described underground coal gasification (UCG) as the “great victory of technology” that would liberate workers from the dangers of working in the mines. Today, in southeast Queensland, Australia, it is called Syngas, the energy of hell. It is with this reflection that Dr. Mariann

7 The *Policy Guidelines on the Granting of Exploration and Exploitation Rights for Coalbed Methane and the Development of Technical Regulations for its Exploitation* were already established in 2008; three years later studies about reserves were initiated. The country's important coal potential, and accidents reported in mines due to the presence of gas motivated the survey (Colombian Geological Service).

8 ANM, Taller Internacional. *Gas metano Asociado a Carbón: Diferencias conceptuales y técnicas entre CBM y CMM*.

Lloyd Smith (11/2015) begins her report on the impacts of underground coal gasification in that country. The work, together with the “Independent Scientific Panel Report on Underground Coal Gasification Pilot Trials”, published in 2013 (OPSur, 7/12/2016), are key critical materials of the technique, and they acquire special relevance because its proponents cite the Australian experience as successful.<sup>9</sup> They even claim that UCG is commercially exploited in that country, when in fact the projects of Cougar Energy, Linc Energy, and Carbon Energy<sup>10</sup> have not been approved for commercial activity.<sup>11</sup> What is more, throughout

9 To mention only one example, Cristián Barrientos, manager at Mulpun Energy –joint venture between Antofagasta Minerals and Carbon Energy for the development of a project near Valdivia, Chile–, stated to *El Mercurio* (17/08/2010) that “at an international level the process has been successful, and it is being commercially carried out in Australia, South Africa, China, and Russia”. On the same project see also the coverage of one of Valdivia's TV channels, which echoes the advantages listed by promoters of underground gasification.

10 On Google's financial information page, Carbon Energy is listed as providing comprehensive services in underground coal gasification, from site selection to termination of the process. Its projects include Bloodwood Creek, in Australia; Claromecó basin, in Argentina; Proyecto Mulpún, in Chile; and Haoqin Coal Field, in China. The state of the Australian and Chinese projects is a mystery that will not be solved in this article; however, we can confirm that in Chile, the *Proyecto Mulpún* has been stalled for years due to financial disagreements, while in Argentina, prospection requests by *Grupo Delmo* –also present in Australia, and with which Carbon Energy has an agreement for gasification developments– have not even been approved.

11 Research has been carried out mainly in Western Europe, USA, China, the former USSR, and Australia; large-scale superficial schemes based

2016, prohibition of the technique has been pushed for in Queensland (OP-Sur, 27/04/2016) and Victoria (OPSur, 31/07/2016), with the aim of preserving their agriculture-based economy. Moreover, Linc Energy executives are subject to criminal charges (OPSur, 14/11/2016)<sup>12</sup> after it was determined in a report by Queensland's Environmental Department that the company had been responsible for contaminating farmland used for growing wheat, barley, cotton and grazing cattle. The state government imposed an “excavation exclusion zone” of 314km<sup>2</sup>, due to hydrogen leakage and methane in the soil. Farmers are banned from digging deeper than two meters (Solomons y Willacy, 10/08/2015).

Not only in Australia did the authorities decide to stop this technique. Last October the Scottish government announced it would not approve UCG after reading the findings of a report conducted by the University of Glasgow. The Energy Minister, Paul Wheelhouse,

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on seams have been developed in the Soviet Union for more than 40 years. In spite of research and pilots all around the world, no viable UCG [Underground Coal Gasification] project has been commercially developed in the West,” stated David Creedy and Heather Tilley (2001) in their summary of a report issued by the Department of Trade and Industry's Cleaner Coal Technology Transfer Programme of the United Kingdom. The Independent Scientific Panel of Queensland reached a similar conclusion ten years afterwards. Interestingly, the Spanish newspaper *El País* published an article on the topic in 1980, stressing the potential of UCG, but warning of its embryonic state (Vaquero, 12/10/1980).

12 Other records on the impacts of this technique can be found in Sosa, S. M. (2016).

stated that UCG “poses numerous and serious environmental risks”.<sup>13</sup> Months before that, Cluff Natural Resources had cancelled a project in that country. According to Friends of the Earth Scotland (25/8/2015), this was due to pressure from organized opposition, which requested the technique to be included in the current moratorium on unconventional gas.

## The South also exists

In spite of the attention received by coal exploitation in Chile and Argentina, its reserves are significantly lower in terms of energy and development models than those of Brazil, Colombia, Venezuela, and Mexico,<sup>14</sup> and they do not rank high in global terms. However, both countries are among the few in the region in which UCG has been or is being promoted.<sup>15</sup>

Chile's dependency on energy imports cleared the way for the launching of the Mulpún Project in 2009, by Antofagasta Minerals, owned by the Luksic Group –one of the biggest in the country– and the Australian Carbon Energy. The environmental body had approved the first stage; however, since 2013 the project

13 For more information see BBC (6/10/2016).

14 Proven reserves in Latin America and the Caribbean, 2009, in million tn: Brazil, 32,312; Colombia, 6,720; Venezuela, 1,368; México, 1,211; Argentina, 422; and Chile, 148 (Bariloche Foundation e IEE- San Pablo University, 2013). Brazil has more reserves but, as they contain low calorific value coal, it imports most of what it consumes.

15 The others would be Brazil and Colombia, but the information is not precise (Correa, M. J. et al., 2014).



● Coal exploration in the Claromecó Basin (Isidoro Schalamuk)

is interrupted due to financial problems. That same year a spokesman of Antofagasta Minerals maintained that the company was also interested in gasifying coal deposits near the southern city of Punta Arenas (Diálogo Sur. cl, 2/5/2013).

Meanwhile, in Argentina the development of unconventional –with commercial exploitation of gas and oil, and shale and tight reservoirs in north Patagonia– seems to clear the way for the assessment of other sources and techniques with limited development at the global level. This context helps understand why UCG projects are being promoted, and why coal seam gas was even included as an unconventional source of energy in the Hydrocarbons Law reform of 2014.

In 2010, the company Barranca Sur Minera announced the discovery of coal in the Claromecó basin, in the province of Buenos Aires. The discovery was made public in the company's

own interest, given that YPF had been granted a concession in the same area. Other statements of discovery, presented by individuals, and more than 100 prospecting requests filed between February 2008 and January 2010, have not received as much publicity. Such requests are still pending approval by provincial Mining Department, whether it is due to non-compliance with requirements –e.g., pending documents– or because the official body did not reach a decision yet.<sup>16</sup>

Towards the end of 2014, the secretary of Public Services of Buenos Aires stated that the government was interested in taking advantage of coal's energy potential in the province. After the change of government in December 2015, no further statements were made, but officials of the sector said off-the-record that interest is still latent (OPSur, 19/08/2016). It is relevant to note that in 2010 the provincial Ministry of Production carried out the *Study of Clean Technologies for Exploitation and Utilization of Mineral Coal*, and in May 2015 the Under-Secretariat of Public Service Development began procedures for file 2174-369 on the *Production of Electric Energy through Gasification of Mineral Coal in Claromecó Basin*, which is continuing.

In addition to the Buenos Aires projects, two more would be under evaluation in the southern province of Santa Cruz, one of them presented by Guevara and Asociados (Correa *et al.*, 2014), and the

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16 For more information see OPSur (10/09/2016).

other one by the local branch of the National Technological University of Rio Turbio (CAI, 25/11/2015), *the cradle of Argentine coal*. Regarding the role of public universities in the experimentation and promotion of UCG, the leading institution in the country is the Institute of Mineral Resources of the National University of La Plata, which signed a cooperation agreement with Delmo Group.

Beyond the particular underground gasification projects, in the last decade there was an attempt in Argentina to position it as an energy source. Construction of a coal-fired power plant began in Rio Turbio, home of the only coal reservoir in the country currently under exploitation. Although the plant was inaugurated at the end of 2015, at present it is not operational due to malfunction (InfoSur, 09/09/2015). Also at the end of the same year, President Cristina Fernández introduced a bill in parliament to create the company Yacimientos Carboníferos Fiscales S.E., in which “the development of exploration and exploitation of mineral coal and its derivatives as source of power energy generation” is declared as being in the national interest (OPSur, 9/12/2015 y 24/11/2015).<sup>17</sup> The initiative was approved in the Chamber of Deputies but has not been voted in the Senate yet. Also in 2015 a bill was introduced to promote the production of liquefied fuels derived from gas and mineral coal (HCDN, 2015).

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17 For more information see OPSur (9/12/2015) and OPSur (24/11/2015).

Attempts to reinvent coal do not seem to stop. But the bans on underground gasification in Australia and Scotland illuminate the resistance to such attempts.

Meanwhile, in Argentina the development of unconventional seems to clear the way for the assessment of other sources and techniques with limited development at the global level.



● Linc Energy pilot plant in Chinchilla, Australia. (Linc Energy).

Consult the bibliography of this article in: <https://tinyurl.com/krss7an>

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