## THE ORINOCO OIL BELT - UPDATE


Figure 1. Map showing the location of the Orinoco Oil Belt Assessment Unit (blue line); the La Luna-Quercual Total Petroleum System and East Venezuela Basin Province boundaries are coincident (red line).
Source: http://geology.com/usgs/venezuela-heavy-oil/venezuela-oil-map-lg.jpg

### Update on extra heavy oil development in Venezuela

2012 is likely to be a crucial year for the climate, as Venezuela aims to ramp up production of huge reserves of tar sands-like crude in the eastern Orinoco River Belt.[i]

Venezuela holds around 90% of proven extra heavy oil reserves globally, mainly located in the Orinoco Belt. The Orinoco Belt extends over a 55,000 $Km^2$ area, to the south of the Guárico, Anzoátegui, Monagas, and Delta Amacuro states (see map). It contains around 256 billion barrels of recoverable crude, according to state oil company PDVSA.[ii]

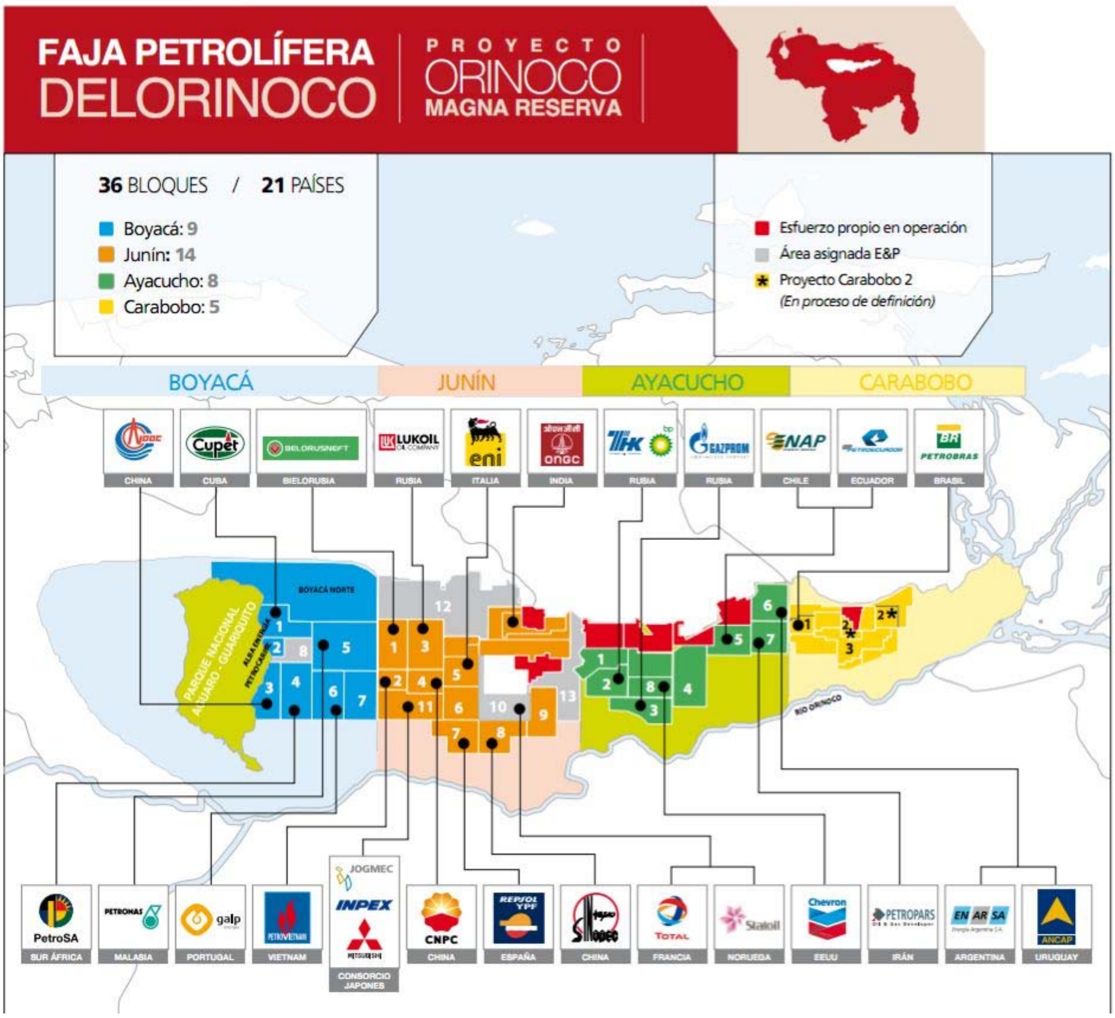
Certification of this resource means that, in July 2010, Venezuela overtook Saudia Arabia as the country with the largest oil reserves in the world.[iii] Petróleos de Venezuela SA (PDVSA), the state oil company, is also now the world's fourth largest company.[iv]

Development of the Orinoco Belt is the keystone of the Venezuelan government's future economic plans – oil accounts for 95% of the country's export earnings and around 55% of the federal budget.[v] The government has stated that it is seeking $100 billion of new investment to develop the Belt.[vi]

President Chavez announced at the end of 2011 that the country intended to boost its oil output to 3.5 million barrels a day by the end of 2012. Longer term, Venezuela wants to produce 4 million barrels of oil a day by 2014 and 10 million by 2030.[vii] This is called *Plan Siembra Petrolera (Sowing the Oil Crop*)

**Who is investing in the Orinoco Belt?**

The Belt is divided into 4 exploration areas, Ayacucho, Boyacá, Junín and Carabobo, with 36 licensing blocks. 22 of the blocks are joint ventures between subsidiaries of PDVSA and foreign companies, with the remaining operated solely by PDVSA (see map).




Source: caracaschronicles.com

The companies involved as minority partners with PDVSA in the Orinoco projects to date are: Alba Energía (Venezuela), Belarusneft (Belarus), Chevron (USA), CNPC (China), Cupet (Cuba), Enarsa (Argentina)/ANCAP (Uruguay), ENI (Italy), Galp Energy (Portugal), Indian Oil Corporation (India), a Japanese consortium (Jogmec / Inpex / Mitsubishi), ONGC (India), Petrocaribe, Petroecuador (Ecuador)/ENAP (Chile), Petropars (Iran), Petronas (Malaysia), Petrosa (South Africa), Petrovietnam (Vietnam), Repsol YPF (Spain), the Russian Oil Consortium (OAO Rosneft, OAO Lukoil, TNK-BP[viii] and OAO Surgutneftegas), Sinopec (China), Statoil (Norway), Suelopetrol (Venezuela), Total (France) and TNK-BP (Russia) – see table.

<u>Projects already in operation</u>

| **Company** | **Partners** | **Equity** | **Production** |
|---|---|---|---|
| Petroanzoategui | PDVSA | 100% | 120 mbd* |
| | | | |
| Petrocedeño | PDVSA | 60% | 155 mbd** |
| Total | 30.3% | | |
| Statoil | 9.7% | | |
| | | | |
| Petropiar | PDVSA | 70% | 163.6 mbd*** |
| Chevron | 30% | | |
| | | | |
| Petromonagas | PDVSA | 83.33% | 120 mbd**** |
| TNK-BP | 16.67% | | |
| | | | |
| Sinovensa | PDVSA | 60% | 107 mbd***** |
| CNPC | 40% | | |

Source: PDVSA Press Releases
* 2 November 2010
** 24 February 2011
***January 2012
****10 November 2011
***** 9 December 2011

<u>New projects</u>

| **Company** | **Shareholders** | | **Equity** | **Production capacity** | |
|---|---|---|---|---|---|
| (date created) | | | | | |
| Petromacareo | | Petrovietnam | | 40% | 200 mbd |
| (17/09/2010)* | | PDVSA | | 60% | |

| | | | |
|---|---|---|---|
| Petromiranda** | Russian Oil Consortium | 40% | 450 mbd |
| (20/04/2010) | PDVSA | 60% | |
| | | | |
| Petroindependencia*** | Chevron | 34% | 400 mbd |
| (25/06/2010) | Japanese Oil Consortium | 5% | |
| Suelopetrol | 1% | | |
| PDVSA | 60% | | |
| | | | |
| Petrocarabobo**** | Repsol | 11% | 400 mbd |
| (25/06/2010) | Petronas | 11% | |
| ONGC | 11% | | |
| Oil India Limited | 3.5% | | |
| Indian Oil Corporation Ltd | 3.5% | | |
| PDVSA | 60% | | |
| | | | |
| Petrourica***** | CNPC | 40% | 400 mbd |
| (14/12/2010) | PDVSA | 60% | |
| | | | |
| Petrojunín****** | ENI | 40% | 240 mbd |
| (14/12/2010) | PDVSA | 60% | |
| | | | |
| Vencupet******* | Cupet | 40% | |
| (03/12/2010) | PDVSA | 60% | |

Source: Official Gazette of the Republic of Venezuela
*        Gazette No. 39.512
**       Gazette No. 39.406
***      Gazette No. 39.453
****     Gazette No. 39.453
*****    Gazette No. 39.573
******   Gazette No. 39.573
******* Gazette No. 39.566

Most recently, in December 2011, it was announced that Russian state oil company Rosneft had signed an MOU with PDVSA for a 40% stake in the Carabobo-2 project.[ix] The MOU also provided for construction of a 10-million-ton-per-year upgrader and for pipeline construction to ship upgraded crude to the port of Araya for export. PDVSA and Rosneft also signed MOUs for other joint ventures to provide drilling and construction services in the Belt.[x]

Reportedly, Rosneft is to pay a $440 million signature bonus, followed by a further $660 million on finalization of the investment. Russia also agreed to provide a $1.5 billion credit facility to PDVSA, once the joint venture is approved by Venezuela, with annual disbursements capped at $300 million.[xi]

**Challenges to Venezuela's plans to develop the Belt**

PDVSA's multibillion dollar investment plans for the Belt are likely to be hampered by the company's high levels of debt. According to company data, it owed US$31.2 billion at the end of the first half of 2011 (up from $21.9 billion over 2010), including US$9.3 billion to suppliers.[xii]

According to commentators, in classic "resource curse" fashion, PDVSA's debt are largely a result of it being used as a cash cow by the government to fund vast state spending: "Tapped constantly to replenish government coffers, PDVSA funds projects ranging from health and education to arts and Formula One motor racing. From painting homes to funding medical clinics staffed by Cuban doctors, the restoration of a Caracas shopping boulevard and even a victorious team at the Rio carnival, there is little that PDVSA does not do."[xiii]

Another source describes the oil company and government indebtedness as follows:

> From 1998 to 2010 Venezuela's debt more than tripled (taking into account internal and external debt, PDVSA obligations, and commitments to its prime creditor, China). The country's total debt adds up to around USD 120 billion and accounts for about 50 percent of its GDP, which is almost double the average debt amount being carried by the rest of Latin America. The rising public debt derives from a serious mismanagement of oil revenue. Heavily subsidized oil exports to elsewhere in Latin America and China, in addition to the cost of extensive social programs have contributed the most to Venezuela's massive debt.[xiv]

This policy of raiding the PDVSA piggy bank appears to be intensifying. In the first half of 2011, according to PDVSA's own results, there was "a massive, ten-fold hike in [the company's] contribution to Chavez's off-budget special development fund Fonden to $7.3 billion, compared with $691 million during the same period of 2010".[xv]

The increase in financing to Fonden along with the steep rise in total contributions to the state (rising from $5.2 billion in 2010 to $18.2 billion in 2011) has been described as part of "an accelerating spending spree" to ensure a favourable outcome in the 2012 presidential elections.[xvi] The October contest is expected to be "one of the tightest elections of [Chavez's] 13 years in office."[xvii]

The government's desire to increase oil production has equally been linked, in the short term, to the President's re-election aspirations.[xviii] Most of this increase is to come from the new Orinoco fields, where the goal is to add 2.1 million barrels per day to total production.[xix] According to Chavez, the Belt will receive a further US$5 billion in 2012 to this end – however, the source of this financial injection is unknown.[xx] Operations in the Belt were also declared an emergency in 2011, in order to speed up the normally lengthy licensing processes for companies wanting to contract services and equipment.[xxi]

However, there are doubts over the PDVSA's ability to increase production. Over the past few years, the company has announced higher production targets only to regularly revise them downwards.[xxii] Apart from its high levels of debt, PDVSA has experienced serious operational problems such as power shortages, highlighting a lack of gas supply for oil operations, while critics also point to a lack of transparency that hides an increasingly poor safety record.[xxiii] It is also doubtful that enough skilled labour is available in the company on the scale required to develop a resource such as the Orinoco.[xxiv]

PDVSA is also asking its minority foreign partners to increase their production.[xxv] However, whether they can meet these expectations is also in doubt. Chevron's regional CEO recently stated that, while the company will start production on the Carabobo 3 block this year, the financing to develop the Orinoco Belt resource remains challenging: "These projects are going to cost billions of dollars so we are going to have to figure out where are going to come up with such large amounts of money".[xxvi] In addition, the minority partner in the Junín 6 project, a consortium comprising Russia's five largest oil companies, will reportedly not meet its 2012 crude production target (50,000 barrels a day). Indeed, it is likely to produce only a fifth of this amount.

In view of its development costs and the uncertain investment context, including Venezuela's current fiscal situation and the ongoing impacts of the nationalization of assets belonging foreign companies in strategic sectors of the economy in 2007,[xxvii] the Orinoco Belt is still seen by many analysts as high risk.[xxviii]

One concrete concern raised by companies relates to changes in taxation of "windfall profits" in April 2011, with the result that government take will rise more steeply as the price of a barrel rises.[xxix] The government has said that the new taxation regime will only apply to oil from the Orinoco projects once investment costs have been recovered, but for some companies the investment terms for the Orinoco Belt, including the application of the windfall tax, remain unclear.[xxx]

**Continued inflow of investment - and outflow of oil**

Nevertheless, despite these concerns, foreign companies, investors and governments still appear keen to get a piece of the huge Orinoco pie, as oil investment in the country in 2011 showed.[xxxi] In June, 9 Japanese banks agreed to loan PDVSA US$1.5 billion loan, reportedly to finance the expansion of two refineries for completion by 2015.[xxxii] In July, the company entered into a US$2 billion financing agreement with Italian oil major ENI.[xxxiii]

Under the deal, ENI will fund PDVSA's costs for the development of the Junín 5 block's early production phase to the tune of US$1.5 billion, with the remaining US$500 million going to construction of a new power station on the Güiria Peninsula.[xxxiv] The development plan for the block also includes construction of a new coastal refinery, to be completed by 2016 at a cost of a further $9 billion, to produce diesel for the European market. Overall, ENI's sees Venezuela as a key investment for the next decade.[xxxv]

PDVSA also appears to be continuing to seek large amounts of financing from the BRIC countries - by mid 2011, Venezuela already owed Brazil, China and Russia an estimated $US34 billion,[xxxvi] with China topping the list as Venezuela's primary investment partner.

In late November 2011, China agreed a further US$4 billion dollar loan to PDVSA – its third loan for this amount - on top of a US$20 billion credit line agreed in 2010.[xxxvii] The loan is intended to enable the PDVSA-CNPC joint venture in the Orinoco Belt, Sinovensa, to increase production. China will also extend another US$1.5 billion to PDVSA for refining projects and US$500 million for drills and equipment.[xxxviii] China is also constructing a refinery in Guangdong Province to process the extra heavy crude from the Orinoco Belt as well as a joint refinery project in Guarico, in Venezuela.[xxxix]

However, as the *Financial Times* comments: "the fact that China has lent more (now $32bn) to Venezuela than any other country in Latin America comes at a cost – and PDVSA is bearing the brunt of the burden."[xl] PDVSA is reportedly unable to discount the value of the oil it delivers to China (around 410,000 barrels a year) from the royalties it pays to the Venezuelan treasury, which means that "PDSA is sending oil to China but not being paid for it – by neither the Chinese nor the Venezuelan government. Assuming an average price of about $100 per barrel for 2011, that would cost PDVSA more than $15bn this year – money that the cash-strapped company with massive investment commitments can scarcely do without."[xli]

**Lack of information on environmental and social impacts**

The massive Belt development is bound to have major environmental and social impacts on the local region, as well as its climate impacts (see below).

According to the Venezuelan government, "the Orinoco River stands out because of its volume (37.384 m3/s) and length (2,140 km.). Along with its tributaries, this river is one of the lushest rivers in South America and the world. The basin of the Orinoco River occupies four-fifths of the Venezuelan territory and 94.5% of the basin unloads its water into the Atlantic Ocean."[xlii] This remote area is a "globally important wetland and a critical habitat to a number of endangered species" with high biodiversity.[xliii]

Developing the Orinoco Belt will require a huge amount of new infrastructure, in terms of the extraction and upgrading of the crude and also the refining equipment and transport infrastructure required for this kind of unconventional oil production.[xliv] Particularly given there is little existing power, water and transport infrastructure where the Belt is located.[xlv] Indeed, some companies have expressed concerns about the impact of the current lack of infrastructure, particularly for transporting upgraded crude, on development plans for the Belt.[xlvi]

In addition, services will have to be provided for the up to 100,000 additional workers that, according to the government, could be required.[xlvii]

In August 2007, PDVSA presented 2 environmental studies relating to the "sustainable development" of the Belt to the Ministry of the Environment.[xlviii] These studies estimated the current state of conservation in the Belt to be 80% while analysis of the Junín zone showed that current interventions by the oil industry had affected 6% of the zone's ecosystems and that measures must be taken to avoid future impacts.[xlix] PDVSA's head of environment highlighted that: "the area is singularly fragile, with a limited amount of land available for use, in terms of agricultural activities, which is why intervention in this zone must carried out carefully."

However, while there is a legal requirement in Venezuela for all oil projects to carry out environmental impact assessments, including baseline studies, these studies do not appear to have been published and there is no information on any more recent EIAs carried out by PDVSA in relation to operations in the Orinoco Belt.[l]

PDVSA's 2010 environmental report does contain some limited information on current atmospheric emissions, air quality monitoring and environmental permits in the Orinoco Belt. However, it does not give a comprehensive environmental impact analysis.

According to the table below, from February to April 2010, the air quality of the operations of Petrocedeño – a joint venture between PDVSA (60% shareholder), Total (30.3%) and Statoil (9.7%) - was evaluated. There were no air pollutants in excess of the legally established limits.

*Tabla N° 13*
**Características y resultados de los estudios de la calidad del aire realizados por Petróleos de Venezuela, sus Filiales, Negocios y Organizaciones**

*Año 2010*

| Organización ejecutora | Periodo de evaluación | Nro. de estaciones utilizadas | Contaminantes evaluados | Contaminantes fuera de norma |
|---|---|---|---|---|
| EEMM Petroperijá (Occidente) | Abril - Junio, 2010 | 3 Estaciones (semiautomática) | $SO_2$, $NO_2$, CO, $O_3$, $H_2S$ | ninguno de los evaluados |
| | | | | ninguno de los evaluados |
| | | | | ninguno de los evaluados |
| EEMM Petroquiriquire (Occidente) | Marzo, 2010 | 4 Estaciones (semiautomática) | PTS | ninguno de los evaluados |
| | Marzo, 2011 | | | ninguno de los evaluados |
| | Marzo - Abril, 2010 | | | ninguno de los evaluados |
| | Marzo - Abril, 2011 | | | ninguno de los evaluados |
| EEMM Petroquiriquire (Oriente) | Mayo, 2010 | 1 Estación (semiautomática) | PTS y $PM_{10}$ | ninguno de los evaluados |
| EEMM Petrocedeño (Producción) | Febrero - Abril, 2010 | 5 Estaciones (semiautomática) | $SO_2$, CO, $NO_2$, PTS, $O_3$, $H_2S$ | ninguno de los evaluados |
| | | | | ninguno de los evaluados |
| | | | | ninguno de los evaluados |
| | | | | ninguno de los evaluados |
| | | | | ninguno de los evaluados |

**Nota:** Las Evaluaciones de Calidad del Aire del Complejo Industrial José Antonio Anzoátegui cubre el área de acción de las siguientes Empresas Mixtas: Mejorador Petrocedeño, Mejorador Petropiar, Mejorador Petromonagas y Petrolera Sinovensa.

Source: PDVSA, 2010

Other environmental measures taken by PDVSA or its subsidiaries in the Orinoco Belt, according to the 2010 report, were as follows:

An evaluation was carried out of the reuse of the waste products of drilling and production, and design and engineering of waste management facilities in the Orinoco Oil Belt;
The José Antonio Anzoátegui Industrial Complex and Intevep are developing three (3) computer systems for the recording and processing of environmental information relating to waste management, environmental liability management and weather conditions;
The Executive Directorate of Orinoco Oil Belt and other production departments in the east and west of the country are developing automated systems related to monitoring and control (environmental monitoring, environmental measures and environmental bonds).

Perhaps the information in the report of greatest concern relates to the levels of pollutants at the Jose Antonio Anzoátegui industrial complex, which houses the 4 upgraders that process the crude from the Belt along with other related petro-chemical industries. As the table below shows, for the period January-September 2010, some pollutants appear to be above the legal limit.

*Tabla Nº 12*

**Características y resultados de los estudios de la calidad del aire realizados por Petróleos de Venezuela, sus Filiales, Negocios y Organizaciones**

**Año 2010**

| Organización ejecutora | Período de evaluación | Nro. de estaciones utilizadas | Contaminantes evaluados | Contaminantes fuera de norma |
|---|---|---|---|---|
| Refinería de Puerto La Cruz | Enero-Marzo 2010 | 1 Estación (automática) | $SO_2$, CO, $NO_2$, $O_3$, $H_2S$ | ninguno de los evaluados |
| | Marzo - Septiembre, 2010 | 2 Estaciones (semiautomática) | $NO_2$, $H_2S$, PTS, Pb en PTS y Fluoruros | PTS y Fluoruros |
| | Marzo - Septiembre, 2010 | | | $H_2S$ y Fluoruros |
| Complejo Industrial José Antonio Anzoátegui | Enero - Septiembre, 2010 | 1 Estación (automática y semiautomática) | $SO_2$, CO, $NO_2$, PTS, $O_3$, $H_2S$ | $SO_2$, PTS, $H_2S$ |
| | | 1 Estación (automática y semiautomática) | | $SO_2$ |
| | | 1 Estación (automática y semiautomática | CO y PTS | ninguno de los evaluados |
| | | 2 Estación (semiautomática) | PTS | ninguno de los evaluados |
| | | | | PTS |
| EYP CENTRO SUR. DISTRITO BARINAS | Octubre-Noviembre, 2010 | 2 Estaciones (semiautomática) | $SO_2$, CO, $NO_2$, PTS y $H_2S$ | ninguno de los evaluados |
| PLANTAS DE DISTRIBUCIÓN OCCIDENTE (EL VIGIA) | Mayo-Junio, 2010 | 3 Estaciones (semiautomática) | $SO_2$, $NO_2$, PTS y $O_3$ | ninguno de los evaluados |
| INTEVEP | Febrero - Septiembre, 2010 | 1 Estación (semiautomética) | PTS | ninguno de los evaluados |
| EEMM Petroboscan (Occidente) | Marzo - Junio, 2010 | 3 Estaciones (semiautomática) | $SO_2$, $NO_2$, PTS, $O_3$, $H_2S$ | ninguno de los evaluados |
| | | | | ninguno de los evaluados |
| | | | | PTS |

Source: PDVSA, 2010

Pollution due to the production of coke and sulphur waste from the upgrading process appears to be an ongoing problem at the José Antonio Anzoátegui industrial complex.

It was reported in August 2011 that PDVSA had contracted the Italian company Energy Coal to repair and modernize the whole system at the plant used for managing solid waste produced by upgrading crude from the Petropiar, Petromonagas, Petrocedeño y Petroanzoátegui projects, including for transporting waste from the plant to the river for onward transportation.[li]

Local civil society has also expressed concern about the health impacts of waste products generated at the industrial complex. In 2011, the Venezuelan press reported that a civil society organization had called on Chevron, Total, Statoil and TNK-BP, the four minority shareholders of PDVSA in the current projects in production on the Belt, to address the levels of coke being generated as a by-product of the upgrading of crude.[lii] The organization claimed that the situation relating to the production of coke was in violation of the Venezuelan Constitution (Article 127) and articles 42 and 43 of the country's Environmental Law, claiming that: "there were complaints by the inhabitants of villages near to the Jose Industrial Complex that they are suffering respiratory problems and allergies due to the waste products. The multinational companies cannot avoid their responsibilities, despite being minority partners of PDVSA." [liii]

The amount of toxic solid waste that is likely to be generated if full development occurs, particularly suphur and coke, and the risks arising from its transportation to the Orinoco river and along the River to the coast is a major cause for concern.[liv]

Moreover, the current state of environmental protection in the country as a whole does not offer much reassurance, according to a recent study by a network of 20 non-governmental organisations called ARA, which analysed loss of biodiversity, pollution, management of solid waste, impacts of oil extraction, management of water resources, management of protected areas and global climate change.[lv]

Summarizing the impacts of current oil extraction in the country, the report concluded that: "the fact that the Venezuelan government has access to extraordinary economic resources and the persistence of an economy based on the existence of overly cheap fuels, have created a culture where waste, uncontrolled consumption, the devaluation of nature and a lack of foresight, are having intense impacts on the country, including air, soil and water pollution, huge volumes of solid waste, and the waste of energy and resources."[lvi]

The report highlights the following specific concerns:

- Deterioration of sensitive ecosystems in production sites in the area of the Orinoco Oil Belt and of the ecosystem of Lake Maracaibo as a result of continuous spills and leaks;
- Loss of soil and the triggering of erosion processes in exploration and production zones in the Orinoco Oil Belt;
- Presence of environmental liabilities, including holding pits for waste products that are at risk of overflowing and leaching;
- Flaws in the handling of by-products of the refining process (mainly sulphur and coke) that are causing water, air and soil pollution;
- High levels of emissions of $CO_2$, $SO_2$ and $NO_x$ in refining and upgrading processes;
- Discharge of petroleum products and bodies of water, the product of failures in monitoring, maintenance and prevention processes;
- Pollution and degradation of soils due to the presence of waste products of oil exploitation, as well as from engineering works associated with this activity.[lvii]

Additionally, the report warns of the "enormous environmental and social risks associated with the development of oil and gas mega projects [including further development of the Orinoco Belt], about which there was a lack of adequate public information regarding the environmental and socio-cultural standards that were to be applied".[lviii]

Along with the other planned mega projects, developing the Orinoco Belt would mean:

> large-scale industrial development in areas that are seriously deficient in services such as potable water and disposal of solid waste and wastewater. Some of these projects will affect

> [Areas Under Special Administrative Regime][lix], sensitive eco-systems and important water basins. There is no clear information on risk management and compensation, nor on the monitoring and oversight procedures necessary to avoid serious environmental and social damage.[lx]

Moreover, the report finds that there is a lack of implementation of existing environmental regulations and monitoring by the Ministry of Environment and by oil companies and a lack of environmental impact management systems in many companies investing in Venezuela. Regulations are also outdated and there is a lack of technical expertise in the Ministry of Environment that is supposed to carry out the legally required EIAs.[lxi]

Overall, the report recommends a substantive overhaul of the country's policy framework in order to improve the management of environmental impacts in the oil industry and makes the following recommendations to the government and companies:

- The Government should strengthen its operational, financial, technical and human capacity in order to carry out better environmental monitoring and oversight; and develop legal and administrative measures and training to ensure that companies have responsible environmental policies and processes in place and can develop properly certified, ongoing environmental management systems;
- Reinforce the National Contingency Plan against Oil Spills;
- Update the legislative framework and technical regulations on the environment in order to address gaps, outdated elements and conflicts between legal instruments;
- Companies must carry out audits and evaluations of environmental liabilities, and put in place recovery plans.
- Improve environmental monitoring processes and operations in all areas of the oil industry, from exploration phase to the distribution phase.
- Put in place policies to ensure technical and ethics training to improve the professional capacities of civil servants and employees responsible for monitoring and overseeing environmental protection, both in the oil industry and in the Ministry of Environment;
- Develop wide-ranging policies to administer extractive activities that are based on environmental protection and aim to guarantee the monitoring and rehabilitiation of affected areas.[lxii]

**Climate protection**

The climate impacts of full development of the Orinoco Belt are likely to be devastating. Diesel from Venezuelan bitumen currently has well-to-tank GHG emissions second highest only to those of fuel derived from Canadian tar sands, according to the US Department of Energy.[lxiii] In terms of the country's emissions profile, while currently Venezuela produces only 1% of global emissions, according to ARA, the government's plan to increase oil production would mean an increase in oil production of around 5.8 million barrels per day (mbpd) in 2012, leading to a near tripling of GHG emissions from 30 million tonnes per year to almost 80 million tonnes.[lxiv]

According to ARA, the country not only has a "moral responsibility to contribute actively to finding a solution" to climate change, but is itself "highly vulnerable" to the impacts of climate change, which will impact on "food production, human health, energy demand, biodiversity and the risk of flooding, among other issues." [lxv]

In terms of policy framework for climate protection in Venezuela, according to ARA:

> There is no clarity about the existence of mitigation and adaptation strategies, with clear objectives and specific activities including their respective scope, timetable, costs and allocation of resources and responsibilities. In practice, there do not appear to be any clear mitigation strategies, since there has been no effective action taken to reduce GHG in the motor and oil industry sectors. Similarly, the proposed changes to the country's model of energy generation are based on the substitution of energy generation processes, principally hydro-electric power, by thermo electricity, which appears to be a step in the opposite direction. [lxvi]

For these reasons, ARA recommends a number of concrete steps be taken, both in terms of mitigation and adaptation policies. These include: the creation of a National Climate Change Office to coordinate and promote cross-sectoral action; the mainstreaming of climate change action into all government planning processes; the development of a national climate change education strategy and the promotion of an inclusive public discussion involving all stakeholders; regional and local adaptation planning; incorporating climate change into poverty reduction strategies; a national reforestation campaign; and roll-out of mitigation policies in the transport and energy sectors.[lxvii] Specifically in relation to the oil sector, the report calls for "the reduction in the volume of emissions from the oil industry, in particular from refining and upgrading of heavy oil."[lxviii]

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[i] For more background on the potential climate, environmental and social implications of increasing investment in unconventional forms of oil such as tar sands and extra heavy oil, see Heinrich Boell Foundation, 2009. *Marginal Oil: What is driving oil companies dirtier and deeper?* & Friends of the Earth Europe, 2010. *Tar Sands: Fuelling the climate crisis, undermining EU energy security and damaging development objectives*.

[ii] PDVSA Annual Report, 2010.

[iii] According to OPEC, Venezuela has 296.5 billion barrels of proven reserves (the largest in Latin America). 2010. "Venezuela's Oil Reserves Top Saudi Arabia's, OPEC Says", *Wall Street Journal*, 18 July; http://online.wsj.com/article/SB10001424052702303795304576454251217542830.html. Also "OPEC: Venezuela has world's largest oil reserves", *Oilprice.com*, 25 August 2011. Venezuela has 85% of Latin America's reserves, the most important oil producing region in the world after the Middle East.

[iv] In terms of proven reserves, production, refining and sales. For the first half of 2011, its total revenues were US$64.1 billion, while net income was US$4 billion, up 50% over 2010 "due to the healthy price of crude and less tax". However, its operating costs also rose from just under US$40 billion to just under US$61 billion and its debt levels continued to soar (see below). 2011. "UPDATE 1-Venezuela's PDVSA triples contributions to state", 7 December; http://uk.reuters.com/article/2011/12/07/venezuela-pdvsa-idUKN1E7B60GE20111207.

[v] US Central Intelligence Agency, 2011. *The World Factbook*; https://www.cia.gov/library/publications/the-world-factbook/geos/ve.html (accessed February 2012).
[vi] 2011. "Chevron Sees Production In Orinoco Oil Field In Early 2012", *Dow Jones Newswires*, 28 September; http://www.foxbusiness.com/markets/2011/09/28/chevron-sees-production-in-orinoco-oil-field-in-early-2012/print#ixzz1km9eJkUK & "Venezuela plans long-term boost in oil output", *The Associated Press*, 6 August; http://www.businessweek.com/ap/financialnews/D9OUPB5O0.html.
[vii] Ibid. Venezuela produced 2.36 million barrels of oil a day in November 2011.
[viii] BP divested itself of its interests in Venezuela to TNK-BP (which is jointly owns) in October 2010. "BP's interests included in the agreement for the Venezuelan sale are a 16.67 per cent stake in the PetroMonagas SA heavy oil joint venture in the Orinoco basin, a 40 per cent interest in the Petroperijá SA joint venture, and a 26.67 per cent interest in the Boquerón SA joint venture, all of which are operated by Venezuela's state oil company, Petróleos de Venezuela SA. BP's total net production from Venezuela is some 25,000 barrels of oil equivalent (boe) a day." BP, 2010. "BP to Sell Venezuela and Vietnam Businesses to TNK-BP", 18 July; http://www.bp.com/genericarticle.do?categoryId=2012968&contentId=7065603.
[ix] "The Carabobo-2 project comprises the Carabobo-2 North and Carabobo-4 West blocks. They are situated in the Orinoco heavy oil Belt and have a combined acreage of 342 sq km. The blocks are estimated to hold 40 bln barrels (6.5 bln tonnes) of oil in place. Crude oil production is expected to peak at above 400,000 barrels per day (25 mln tonnes a year)." 2011. "Rosneft Expanding Into Strategic Market Of Venezuela", *Eurasia Review*, 9 December;
http://www.eurasiareview.com/09122011-rosneft-expanding-into-strategic-market-of-venezuela/. Also "Rosneft, PDVSA Sign Deal for Venezuela Heavy-Oil Block", *Latin American Herald Tribune*; http://www.laht.com/article.asp?ArticleId=450404&CategoryId=10717, 8 December.
[x] Ibid.
[xi] Ibid. Venezuela has also signed a US$4 billion loan with Russia to buy arms in return for increased access by Rosneft and Gazprom to the Orinoco Belt (Junin 6 block) and to offshore gas fields. In a separate agreement, Venezuela and Russia both agreed to provide US$2 billion each in capital for a bank, Evrofinance Mosnarbank SA, that will finance housing projects and the Junin 6 block development. The bank is 49.9% owned by Venezuela's state development bank. 2011. "Venezuela Receives Russian Armaments Loan for Increased Energy Access", *Oilprice.com*, 12 October; http://oilprice.com/Energy/Energy-General/Venezuela-Receives-Russian-Armaments-Loan-for-Increased-Energy-Access.html & "Russia Lends Venezuela $4 Billion in Return for Oil Projects", 7 Oct; http://www.bloomberg.com/news/2011-10-07/russia-lends-venezuela-4-billion-in-return-for-oil-projects-1-.html. In December 2011, PDVSA also signed a US$1.5 billion deal with Repsol and Italy's ENI, to develop a huge new gas field in the Gulf of Venezuela. The Perla field is estimated to hold 17 trillion cubic metres of gas or 3 billion boe. 2011. "Venezuela to Open up Massive Natural Gas Field with European Investment", *Oilprice.com*, 29 December; http://oilprice.com/Energy/Natural-Gas/Venezuela-to-Open-up-Massive-Natural-Gas-Field-with-European-Investment.html.
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[xvi] Ibid.
[xvii] 2011. "Venezuela oil output to hit 3.5m bpd by 2012, Reuters, 31Dec. For an analysis of social, economic

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[xviii] Ibid.

[xix] 2011. "Venezuela oil output to hit 3.5m bpd by 2012, *Reuters*, 31 December & "Venezuela plans long-term boost in oil output", *The Associated Press*, 6 August; http://www.businessweek.com/ap/financialnews/D9OUPB5O0.htm. See also "Chavez wants higher OPEC quota for Venezuela", *Reuters*, 30 July.

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[xxi] 2011. "Pdvsa decretó la Faja en emergencia para acelerar proyectos", *EL UNIVERSAL* (Venezuela), 19 July; http://www.eluniversal.com/2011/07/19/pdvsa-decreto-la-faja-en-emergencia-para-acelerar-proyectos.shtml & "Concerns linger over Venezuela's Orinoco oil plans", 29 September, *Reuters*; http://uk.reuters.com/article/2011/09/29/venezuela-orinoco-idUKS1E78R1WN20110929

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[xxiii] See for instance 2011. "VenEconomy: Unproductive, Accident-Prone, and in Ruins"; *Latin American Herald Tribune*; http://www.laht.com/article.asp?ArticleId=462388&CategoryId=13303.

[xxiv] 2011. "Chevron Sees Production In Orinoco Oil Field In Early 2012", 28 September, *Dow Jones Newswires*; http://www.foxbusiness.com/markets/2011/09/28/chevron-sees-production-in-orinoco-oil-field-in-early-2012/print#ixzz1km9eJkUK & "Well of trouble for Venezuela's state oil giant", 21 August; http://www.iol.co.za/business/international/well-of-trouble-for-venezuela-s-state-oil-giant-1.1121913. In 2011, around US$400 billion of PDVSA's pension fund was lost after being invested in a fraudulent scheme set up by a US-based adviser to PDVSA and the Finance Ministry. 2011. "Well of trouble for Venezuela's state oil giant", *IOL* (South Africa), 21August; http://www.iol.co.za/business/international/well-of-trouble-for-venezuela-s-state-oil-giant-1.1121913. Also 2010. "Venezuelan Production and Exports Decline in June", *Energy Intelligence*, 30 July.

[xxv] 2011. "UPDATE 1-Venezuela-China oil firms to boost output by 2014", *Reuters*, 22 November; http://af.reuters.com/article/energyOilNews/idAFN1E7AL21V20111122.

[xxvi] Ibid.

[xxvii] In September 2011, for instance, it was reported that "Venezuela is facing about 20 international arbitration cases after a wave of nationalisations across 'strategic' sectors of the economy, including energy, metals, cement, food and utlities.' 2011. "Venezuela ready to pay Exxon only $1bn", *Financial Times*, 22 September; http://www.ft.com/cms/s/0/7bcc5e16-e530-11e0-bdbn00144feabdc0.html#ixzz1YmXB7ZHO.
In one of the most high profile cases, PDVSA is in dispute with Exxon over the latter's claim for US$12 billion in damages for the expropriation of assets seized by the Venezuelan government. Exxon was recently awarded US$908 million in one case before the International Chamber of Commerce but is seeking redress in other venues. 2012. "Exxon vs. Venezuela to go a few more rounds", marketwatch.com, 12 January; http://blogs.marketwatch.com/thetell/2012/01/12/exxon-vs-venezuela-to-go-a-few-more-rounds/ & "Verdict reached in Venezuela-Exxon Mobil dispute-sources", Reuters, 1 January; http://af.reuters.com/article/energyOilNews/idAFL1E8C100K20120101. Also 2011. "Venezuela negotiating with Exxon only through International Arbitration, Confirms Oil Minister", V*enezuelaanalysis.com*, 26 September; http://venezuelanalysis.com/news/6518. In announcing its 2010 results, the company said it had put aside $1.46 billion for the potential cost of arbitrations, including those relating to Exxon Mobil Corp and

ConocoPhillips. 2011. "UPDATE 4-PDVSA debt to suppliers leapt to $10.9 bln in 2010", Reuters, 26 July; http://www.reuters.com/article/2011/07/26/venezuela-pdvsa-idUSN1E76P0LG20110726.

[xxviii] 2011. "Venezuela oil output to hit 3.5m bpd by 2012, *Reuters*, 31 December. Also 2010. "Will PDVSA be able to deliver promised supply to China? Venezuela entangled by oil debt", *Buenos Aires Herald*, 24 August. At the end of January 2012, the rating agency Standard and Poor's lowered Venezuela's long-term foreign and local currency ratings due to a revised methodology that assigned a heavier weighting to political risk, seen as "a credit weakness for Venezuela" – although this risk is somewhat mitigated by Venezuela's huge oil and gas reserves. 2012. "S & P Lowers Venezuela's Credit Rating", *Latin American Herald Tribune*, 31 January; http://www.laht.com/article.asp?ArticleId=418137&CategoryId=10717.

[xxix] 2011. "UPDATE 1-Venezuela's Chavez hikes windfall tax on oil firms", *Reuters*, April 22; http://af.reuters.com/article/energyOilNews/idAFN2212275020110422?sp=true. "Under the new decree, PDVSA and its foreign partners will have to pay the government 80 percent of income from sales of oil at more than $70 per barrel, rising to 90 percent when prices reach $90 per barrel. All income from prices over $100 per barrel will be taxed at 95 percent [....] Between November and January, Venezuela collected $800 million from the windfall tax, Oil Minister Rafael Ramirez said in February."

[xxx] 2011. "Concerns linger over Venezuela's Orinoco oil plans", 29 September, *Reuters*; http://uk.reuters.com/article/2011/09/29/venezuela-orinoco-idUKS1E78R1WN20110929.

[xxxi] Apart from the companies already involved in the Orinoco Belt, in August it was reported that Venezuela had signed an agreement on oil sector cooperation with Turkey and, most recently, that the Peruvian state oil company, Petroperú, is to take a stake in the Ayacucho block after President Humala visited the Orinoco Belt in January 2012. However, after criticism from business lobbies about the high risks of such an investment, Peru's Foreign Minister played down the agreements with PDVSA stating that, while they gave Petroperú the option for future investment, the company would not be offering financing in the short term. See 2011. "Venezuela, Turkey Sign Oil Accord", Latin American Herald Tribune; http://www.laht.com/article.asp?ArticleId=375828&CategoryId=10717. Also 2012. "Petroperú to participate in Orinoco oil Belt", *EL UNIVERSAL* (Venezuela), 9 January; http://www.eluniversal.com/economia/120109/petroperu-to-participate-in-orinoco-oil-Belt. & "Petroperú not to fund the Orinoco Belt in the short term", *EL UNIVERSAL* (Venezuela, 9 January; http://www.eluniversal.com/economia/120109/petroperu-not-to-fund-the-orinoco-Belt-in-the-short-term.

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[xxxiii] Ibid. Also 2010. "ENI signs $17bn Venezuela oil deal", BBC, 23 November; http://www.bbc.co.uk/news/world-us-canada-11817233

[xxxiv] Ibid.

[xxxv] Ibid.

[xxxvi] 2011. "Indebtedness: Venezuela owes China, Russia and Brazil USD 34 billion", *EL UNIVERSAL* (Venezuela), 12 August; http://www.eluniversal.com/2011/08/12/venezuela-owes-china-russia-and-brazil-usd-34-billion.shtml

[xxxvii] The target is to increase production from 118,000 barrels a day to 1.1 million barrels a day by 2014. In return, "Venezuela will pay off the loans by shipping 400,000 barrels of oil a day to China at market prices". 2011. "Venezuela, China sign US$6b oil deals", *channelnewsasia.com*, 25 November; http://www.channelnewsasia.com/stories/afp_world_business/view/1167521/1/.html & "UPDATE 1-Venezuela-China oil firms to boost output by 2014", *Reuters*, 22 November; http://af.reuters.com/article/energyOilNews/idAFN1E7AL21V20111122.

[xxxviii] 2011. "Venezuela, China sign US$6b oil deals", *channelnewsasia.com*, 25 November; http://www.channelnewsasia.com/stories/afp_world_business/view/1167521/1/.html

[xxxix] 2010. "China eyes Venezuelan and Brazilian Oil". *Petroleumworld*, 13 March; http://www.petroleumworld.com/sati10031301.htm & "Will PDVSA be able to deliver promised supply to China? Venezuela entangled by oil debt", *Buenos Aires Herald*, 24 August. See also Ratliff, W., 2006. Research Fellow, Curator, Hoover Institution, Stanford University, "China and Venezuela: Pragmatism and Ideology" .

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[xl] 2011. "Reading the fine print on Venezuela's Chinese loans", *Financial Times*, 23 November; http://blogs.ft.com/beyond-brics/2011/11/23/reading-the-fine-prints-in-chinas-loans-to-venezuela/ - respond. Also 2010. "Will PDVSA be able to deliver promised supply to China? Venezuela entangled by oil debt", *Buenos Aires Herald*, 24 August.

[xli] Ibid.

[xlii] Embassy of the Bolivarian Republic of Venezuela, Washingto DC, USA; http://venezuela-us.org/ambiente/. Accessed February 2011.

[xliii] Heinrich Boell Foundation, op. cit., p. 26.

[xliv] As discussed in *Marginal Oil*, the construction of 5 upgraders and new refineries and export infrastructure plus transportation systems (rail and river) to take toxic solid waste and pipelines to transport upgraded crude and liquid waste are being planned. See also 2011. "Latin America Has One-Fifth of Global Oil Reserves", 15July; http://ipsnews.net/news.asp?idnews=56498.

[xlv] 2011. "Venezuela oil output to hit 3.5m bpd by 2012", Reuters, 31 December & "Chevron Sees Production In Orinoco Oil Field In Early 2012", *Dow Jones Newswires*, September 28; http://www.foxbusiness.com/markets/2011/09/28/chevron-sees-production-in-orinoco-oil-field-in-early-2012/print#ixzz1km9eJkUK.

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[xlvii] Ibid.

[xlviii] Ministry of the Environment, Venezuela, 2007. **"**Trabajan conjuntamente en mesas de trabajo MinAmb y Pdvsa realizan estudios de impacto ambiental en faja petrolífera del Orinoco", 2 August; http://www.minamb.gob.ve/index.php?option=com_content&task=view&id=572&Itemid=43.

[xlix] Ibid

[l] Ibid. According to PDVSA's 2010 Environmental Report, 111 EIAs were carried out but these are not public. It is not possible to say if any of these were related to the Orinoco Belt.

[li] PDVSA, 2011. "PDVSA firma convenios para la restauración estratégica de los sistemas de transporte de coque", 9 August; http://www.pdvsa.com/index.php?tpl=interface.sp/design/salaprensa/readnew.tpl.html&newsid_obj_id=9400&newsid_temas=1

[lii] 2011. "Reclaman a petroleras transnacionales la acumulación de coque: Afirman que los desechos generan problemas respiratorios", *EL UNIVERSAL* (Venezuela), 24 August; http://www.eluniversal.com/2011/08/24/reclaman-a-petroleras-transnacionales-la-acumulacion-de-coque.shtml.

[liii] Ibid.

[liv] Heinrich Boell Foundation 2009, op.cit.

[lv] ARA, 2011. *Aportes para un diagnóstico de la problemática ambiental de Venezuela*, May 2011. See also: http://red•ara•venezuela.blogspot.com.

[lvi] Ibid, Executive Summary.

[lvii] Ibid, p. 26.

[lviii] Ibid.

[lix] According to the Venezuela government: "Venezuela has one of the most extensive systems of protected areas in Latin America and the world — 34% of Venezuela's territory is dedicated exclusively to the conservation of its biological diversity. The protected areas are exist within a legal structure known as Areas Under a Special Administrative Regimen (ABRAE), which are distinguished by different categories such as national parks, natural monuments, recreation parks, wildlife refuges, national hydraulic reserves, wildlife fauna reserves, rural areas of integrated development, biosphere reserves, areas of protection and environmental recovery, zones of agricultural exploitation, protective zones, forest reserves, reserve zones for the construction

of reservoirs, public works protection areas, marine coasts of deep water, touristic interest zones, security zones, frontier security zone, and places of historical heritage." Embassy of the Bolivarian Republic of Venezuela, Washington DC, USA; http://venezuela-us.org/ambiente/. Accessed February 2011.

[lx] ARA, 2011, op.cit, p. 27.

[lxi] Ibid.

[lxii] Ibid.

[lxiii] US DOE National Energy Technology Laborotory, 2009. "Consideration of Crude Oil Source in Evaluating Transportation Fuel GHG Emissions", NETL, March 20, DOE/NETL-2009/1360. Cited in Heinrich Boell, 2009, op.cit.

[lxiv] ARA, 2011, op.cit, p. 36.

[lxv] Ibid. See this report for more detail on the climatic impacts that are already affecting Venczuela or are likely to affect the country in future, and related issues such as deforestation and energy intensity use rates.

[lxvi] Ibid, p. 37.

[lxvii] Ibid, pp. 37-38.

[lxviii] Ibid, p. 38.