The UNFC for Petroleum applied to the Orinoco Belt Field

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Presentation to First Session of UNECE Ad Hoc Group of Experts on Supply of Fossil Fuels
Geneva - 10-11 November 2004
The Orinoco Belt field is just north of the Orinoco river, in the southern edge of the Maturín sedimentary basin, Eastern Venezuela.
It was discovered in 1938, but commercialisation started only in the 1980’s. It is 460 km E-W and up to 40 km N-S. The 6 main producing areas, defined on the basis of volumes of hydrocarbons in place and productivity, cover 13 600 km².
Tar, bituminous oil, petroleum, heavy crude and “non conventional” oil have been used indiscriminately to characterise the hydrocarbons in the field. Temperature in the reservoirs varies between 50°C at 800 m and 60°C at 1100 m.
Petroleum classification

Petroleum
(Hydrocarbons*)

Natural gas
(NGL)
(Condensate)

Crude oil

Natural bitumen
(Natural asphalt)

1st: Criterion for classification of Natural Bitumen or Crude Oil: Dynamic viscosity (milliPascal.seconds)

10 000

1000

Crude oil

Criterion for classification: Density (kg/m³)**

Light
Medium
Heavy
Extraheavy

World Petroleum Congresses (Martinez, 1987)

* Hydrogen and carbon exclusively
** Reservoir temperature, atmospheric pressure, gas free basis
Hydrocarbons in the Orinoco Belt field are characterised as crude oil of extraheavy density and natural bitumen.
Evaluation of the field was completed in 1977, following completion of:
* 662 evaluation wells
* 120,000 km seismic lines
* 373 crude oil, 129 natural gas and 206 connate water analyses
* 5 Mm of well logs and >3200 m of cores.

**Evaluation comprised 2500 man/years and cost USD 615x10^6**
The Orinoco Belt field is the largest petroleum accumulation in the world.
from Salamanca to Zaragoza...
Aníbal R Martínez

Medieval England

Ad Hoc Group of Experts on Supply of Fossil Fuels 2004

Orinoco Belt field

...from Leiston Abbey in East Anglia to St David’s Head and Pembroke...
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2004
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Orinoco Belt field

...from Paris... beyond Frankfurt...
The volume of extraheavy crude oil-initially-in-place in the field is $119 \times 10^9$ m³, and that of natural bitumen-initially-in-place $63 \times 10^9$ t.
The volume of hydrocarbons in the 6 main producing areas is 80% of the petroleum-initially-in-place.
Four strategic associations are producing 75 000 m³ extraheavy crude oil of 993/1014 kg³/m³ density, upgraded to a product for export of 904/871 kg³/m³ density*

*8/11 to 25/31° API
A volume of $50 \times 10^6 \text{ m}^3$ natural bitumen was produced during 1991-2002, for making of the new fuel orimulsion.
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Not to scale

Martínez, Punta del Este, 2000
Orinoco Belt field
(extraheavy crude oil)

Proven reserves  5,6x10⁹ m³
Unproven reserves  16x10⁹ m³
Contingent resources  22,4x10⁹ m³
Recursos prospectivos  0,7x10⁹ m³
Orinoco Belt field (natural bitumen)

Proven reserves 300x10^6 t
Unproven reserves 600x10^6 t
Contingent resources 14,4x10^9 t
UNCF as applied to petroleum
Subcategory E1.2
Exceptional Economic
may in some areas be used
for the hydrocarbons in
the Orinoco Belt field
Subcategory F1.1
Project in Production
applies to all
the four strategic associations
in operation in
the Orinoco Belt field
Subcategory G1
Reasonably Assured Geological Conditions
applies to all
the Orinoco Belt field,
except for plays
in the Espino graben
in the Zuata main producing area
UNFC applied to Orinoco Belt field (extraheavy crude oil)

111 Proven reserves 5,6x10^9 m³
121 Unproven reserves 16x10^9 m³
221 Contingent resources 22,4x10^9 m³
334 Recursos prospectivos 0,7x10^9 m³
UNFC applied to Orinoco Belt field

(natural bitumen)

111 Proven reserves $300 \times 10^6$ t
121 Unproven reserves $600 \times 10^6$ t
221 Contingent resources $14.4 \times 10^9$ t