COLOMBIA

impala

MULTIMODALISM DRIVING DOWN CARBON EMISSIONS IN COLOMBIA


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Dear Stakeholder,

Infrastructure development is a matter of national importance to emerging economies such as Colombia. First, as a key component of managing and responding to domestic demand for products and services, but more importantly as a means to enhance supply-side potential, foster development, and address issues of inequality and climate change.

With the development of a vast inland port at Barrancabermeja, as well as the introduction of 120 double-hulled barges and over 20 tugs to manage both wet and dry freight movements on the Magdalena River, Impala Terminals stands poised to capitalise on an economic opportunity that has hitherto lain dormant. The benefits will be broad based and, with the ongoing support of the Colombian Government and local partners, sustained.

Forging access to markets is core to the worldwide mission of Impala Terminals. We believe that the way in which market access is attained is as important as the economic benefits.

With global CO_2 emissions having risen by 50 percent since 1990, the need for companies to assess, monitor and reduce negative environmental impacts has never been greater.

In 2014, Impala Terminals undertook an assessment, in partnership with sustainability experts Environmental Resources Management (ERM), to understand the potential for reducing greenhouse gas emissions as a result of the shift in transportation that Impala Terminals is seeking to enable: from a national reliance on transporting commodities from point-of-source to point-of-export by truck only, to a multimodal solution whereby Colombia's vast river network could be utilised more fully.

While this study is theoretical at this stage, and the data is fundamentally conservative, our business model looks set to deliver results that are simply astounding: a reduction in greenhouse gas emissions of nearly 70 percent for the transportation of oil products and close to a 60 percent saving in emissions for dry cargo.

I commend this detailed report to you, and look forward to demonstrating the success of our model in future.

Yours sincerely,

ALEJANDRO COSTA
CEO, Impala Terminals Colombia

DRIVING DEVELOPMENT, REDUCING CARBON EMISSIONS

In 2014, Impala Terminals, in partnership with Environmental Resources Management (ERM), assessed the potential for reducing greenhouse gas emissions at its operations in Colombia. The results were remarkable.

TRANSPORTATION AND DEVELOPMENT

The correlation between the growth of gross domestic product (GDP) and the growth of transportation, both passenger and freight are well documented. Transport enables development and development leads to more demand for movement of people and goods. Global economic development is accelerated by fast, smooth and efficient transport as it facilitates economies of scale while maintaining good connections with markets.

But in a world in which the links between transportation, the release of greenhouse gas (GHG) emissions and the resultant impact on climate change are equally well known, the necessity for leading international businesses to explore efficiencies in pursuit of lower emissions has never been more pressing.

IMPALA TERMINALS AND THE MAGDALENA RIVER

A vast proportion of Colombian commodities, including crude oil, are exported each year, conversely a significant volume of grain and other goods are imported. With limited existing road and rail infrastructure, as well as constrained pipeline capacity, fluvial transportation has been recognised by the Colombian Government as offering an important opportunity to enhance the country's economic growth.

Colombia's Magdalena River flows northwards for more than 1,500 kilometres from south of Bogota to the Caribbean Sea. Its delta basin covers nearly a quarter of the country. It hosts two-thirds of the population and produces over 80 percent of GDP. Yet the undoubted potential of the Magdalena has never been fully realised. That is changing, in part thanks to an investment of over USD1 billion by Impala Terminals into a multimodal transportation system – a system in which modern fluvial transportation is central.

INVESTING FOR THE FUTURE

Impala Terminals is introducing a fleet of over 20 tugs and 120 double-hulled barges to manage both wet and dry freight and will shortly complete construction of a major new river port at Barrancabermeja.

This new Impala Terminals-led network and multimodal logistics system will provide commodity producers and importers with a valuable alternative to the already strained Colombian road network: accessing markets more safely and more efficiently than ever before. Importantly, this development will leverage substantial savings in GHG emissions.

Future operations will involve Impala Terminals transporting goods by truck from multiple points of production to the river terminal at Barrancabermeja, and from there, tugboats will push barge convoys along the Magdalena River corridor to Barranquilla. Similarly, Impala Terminals intends to use barges in equal measure on the return journey.

This report represents a first step in accounting for, and documenting, projected GHG emissions directly stemming from Impala Terminals' operations in the proposed Magdalena River project.

Leading sustainability specialists "ERM", our project partner in this assessment, followed specifications and methodologies as outlined in the WRI/WBCSD GHG Protocol Corporate Standard, hereafter referred to as the Corporate Standard.

THE RESULTS

As outlined in detail in this report, Impala Terminals' multimodal scenario was found to be responsible for substantially lower GHG emissions on a 'per kg' basis when compared to the existing 'baseline' scenario in which commodities are solely transported across Colombia via truck.

The 'smart' transportation mix model developed by Impala Terminals is one that will be refined in future years as operations ramp-up. Importantly, it is also a model that Impala Terminals will seek to learn from and develop elsewhere globally - the benefits which extend well beyond reductions in GHG emissions - are as broad based as they are fundamental to our goal in accessing markets responsibly and, in so doing, helping to develop the economies of countries in which we operate.

WET CARGO

67%

REDUCTION IN GHG INTENSITY

0.030 $kgCO_2e/kg$ for the multimodal scenario versus 0.092 $kgCO_2e/kg$ for the baseline scenario), **representing a 67 percent reduction in GHG intensity**.

DRY CARGO

56%

REDUCTION IN GHG INTENSITY

0.022 $kgCO_2e/kg$ for the multimodal scenario versus 0.050 $kgCO_2e/kg$ for the baseline scenario), **representing a 56 percent reduction in GHG intensity**.

"We believe that the way in which market access is attained is as important as the economic benefits".

TECHNICAL ASSESSMENT

ASSUMPTIONS

The current system of transportation in the region, ie, cargo transported by truck only, was treated as the "baseline scenario" in the assessment. Impala Terminals' proposed future system, ie, using truck and barge transport was known in the assessment as the "multimodal scenario". Moreover, each scenario separately took into account the transport of wet cargo (eg, crude oil, naphtha), and dry cargo (eg, wood, grain).

The following summarised report sets out the approach taken to calculate Impala Terminals' projected "Scope 1" GHG emissions arising from each transport scenario (baseline and multimodal) to support a comparison of the two 'carbon footprints' between the two scenarios.

ALTERNATIVE TRANSPORT MODES

GHG emissions, if alternative modes of transport were used to move the same volumes of goods to the Port of Barranquilla and back, were calculated for (1) baseline and multimodal scenarios using 'regular' Colombian vehicles that were assumed to be less fuel efficient, and (2) for freight train transport where the truck transport component of both scenarios was switched to rail transport.

SUPPLY CHAIN EMISSIONS

Companies are giving more and more attention to emissions across their supply chains, with many opting to report their "Scope 3" emissions, ie, those indirect emissions other than from purchased electricity, in conformance with the WRI/WBCSD GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard, hereafter referred to as the Scope 3 Standard[2], which provides guidance to businesses to report GHG emissions that include indirect emissions resulting from value chain activities.

This standard aims to assist companies in understanding their full value chain emissions impact in order to focus their efforts on the most significant GHG reduction opportunities, as Scope 3 emissions can often represent the greatest source of emissions for businesses. Scope 3 emissions are divided into upstream and downstream emissions, depending on the financial transactions of the reporting company. Upstream emissions are defined as 'indirect GHG emissions related to purchased or acquired goods and services', while downstream emissions are known as 'indirect GHG emissions related to sold goods and services'. Due to the nature of Impala Terminals' operations, emissions related to the distribution of the various cargo types and from product blending (ie, processing) would be represented in Impala Terminals customers' GHG emissions inventories as downstream Scope 3 emissions.

The 'carbon footprint' results were therefore reviewed in the context of Scope 3 supply chain emissions, ie, the resulting GHG emissions from the assessment were framed in such a manner that they can be used by Impala Terminals' customers to report their own footprints.

1 World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) GHG Protocol: A Corporate Accounting and Reporting Standard; last accessed on 1 November, 2014; http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf

2 World Resources Institute (WRI)/World Business Council for Sustainable Development (WBCSD) GHG Protocol: Corporate Value Chain (Scope 3) Accounting and Reporting Standard; last accessed on 1 November, 2014; http://www.ghgprotocol.org/standards/scope-3-standard

SUMMARY REPORT

Carbon emissions were calculated for routes carrying the most substantial volumes of wet and dry cargo. Calculations were based on fuel consumption figures for one truck (baseline scenario) versus one truck and one tugboat pushing six barges (multimodal scenario).

METHODOLOGY

Data items collected from Impala Terminals and used in the assessment were:

- Routes and corresponding distances
- Fuel type and fuel consumption figures
- Cargo load information
- Projected annual weight of cargo transported.

ROUTES

Crude oil and dry commodities are produced at a number of sites in Colombia, but the routes carrying the most substantial annual volumes of cargo were selected, as depicted on page 7. One typical round trip was considered for emissions calculations.

EMISSION FACTORS

GHG emission factors were derived from 2014 UK Government Conversion Factors for Company Reporting[3] to translate fuel use into carbon dioxide equivalent ('CO_2e') emissions, as shown below.

Fuel emission factors used

Fuel	Emission factor
	$kgCO_2e$/litre
Biodiesel B10	2.404
Biodiesel B12	2.351
Marine diesel	2.669

CALCULATIONS

a. GHG emissions calculations for one round trip were based on fuel consumption figures for one truck (baseline scenario); and one truck and one tugboat pushing six barges (multimodal scenario).

   Because emissions from the fuel use of one truck were being assessed against the much higher fuel consumption of one truck and one tugboat pulling a six-barge convoy along the river, it was deemed more useful to view emissions on a 'per kg' basis. Cargo load information was used to calculate emissions for each kilogramme of cargo transported in either scenario.

b. Annual GHG emissions calculations for each scenario were based on round trip emissions calculated as described above, and the annual number of round trips.

3 Department for Environment, Food and Rural Affairs (DEFRA) / Department of Energy and Climate Change (DECC): UK Government conversion factors for Company Reporting; last accessed on 1st November 2014; http://www.ukconversionfactorscarbonsmart.co.uk/

SELECTED ROUTES FOR BASELINE SCENARIO (IE, USE OF TRUCKS ONLY) – WET (FIG.1) AND DRY (FIG.2) CARGO TRANSPORT

Figure 1.

Crude oil transported by truck from Dorotea to Barranquilla.

Naphtha transported by truck along the same route back from Barranquilla (bpd = barrels per day).

Figure 2.

Dry goods transported by truck from Tausa to Barranquilla.

Dry goods transported by truck along the same route back from Barranquilla.

SELECTED ROUTES FOR MULTIMODAL SCENARIO – WET (FIG.3) AND DRY (FIG.4) CARGO TRANSPORT

Figure 3.

Crude oil transported by truck from Dorotea to Barrancabermeja, and by barge to Barranquilla.

Naphtha transported by barge and truck along the same return route.

Figure 4.

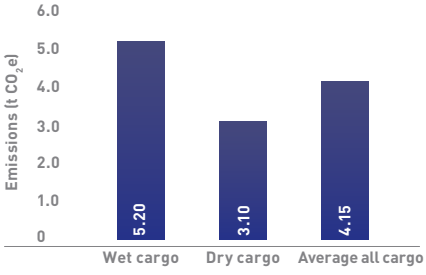
Dry goods transported by truck from Tausa to Barrancabermeja, and by barge to Barranquilla.

Dry goods transported by barge and truck along the same return route.

RESULTS

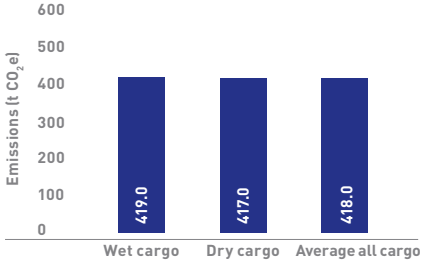
EMISSIONS FROM ONE ROUND TRIP BY CARGO TYPE – BASELINE SCENARIO

GHG emissions per round trip were 5.2 tCO_2e (wet cargo) and 3.1 tCO_2e (dry cargo). This difference was due to the fuel consumed during transport of wet cargo from Dorotea to the port of Barranquilla, over a single journey distance of 1,670 kilometres, being higher than fuel consumption for dry cargo transport over a single journey distance of 950 kilometres from Tausa to Barranquilla.



EMISSIONS FROM ONE ROUND TRIP BY CARGO TYPE – MULTIMODAL SCENARIO

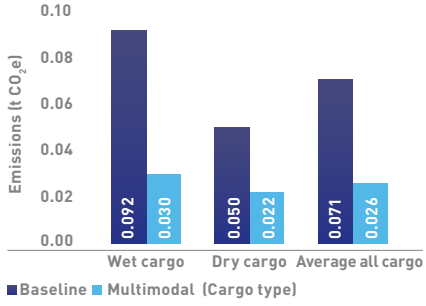
Emissions were 419 tCO_2e (wet cargo) and 417 tCO_2e (dry cargo), as shown below. Barge transport emissions are much higher as a tugboat consumes 41,176 gallons of marine diesel to pull six barges from Barrancabermeja to Barranquilla and back. The small difference in emissions between wet and dry cargo transport is due to the truck transport between Barrancabermeja and Dorotea, and between Barrancabermeja and Tausa respectively.



EMISSIONS ON 'PER KG' BASIS FOR BOTH SCENARIOS

When viewed on a 'per kg' basis, average emissions from multimodal transport are lower than from truck transport only.

Scenario	Wet cargo	Dry cargo	Average all cargo
	$kgCO_2e/kg$	$kgCO_2e/kg$	$kgCO_2e/kg$
Baseline scenario	0.092	0.050	0.071
Multimodal scenario	0.030	0.022	0.026
% reduction in emissions	67%	56%	63%



MULTIMODAL LOAD TESTING

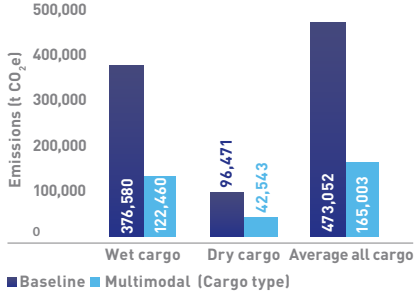
The Magdalena River depth currently imposes cargo load restrictions on barges, but with the dredging that is under way, increased barge loads will become a possibility for future operations. Trucks shift 100 percent cargo on the outbound journey and 70 percent cargo on the inbound journey in both scenarios for wet cargo transport. For dry cargo transport, trucks are loaded at 85 percent on the outbound journey, and at 100 percent on the inbound journey for both scenarios. Barges only carry 62 percent and 43 percent wet cargo on the outbound and inbound journeys. For dry cargo transport, the percentage load is 60 percent and 71 percent on the outbound and inbound journeys. The barge percentage load was increased to match truck loading, and emissions from multimodal transport with higher barge loads were found to be lower than emissions from the original multimodal scenario, by 38 percent (wet cargo) and 29 percent (dry cargo). When river capacity allows, loading will be an important factor to consider for further reduction of the GHG intensity of multimodal transport.

ANNUAL EMISSIONS BY CARGO TYPE FOR BOTH SCENARIOS

A forecast 4,083,220 tonnes of wet cargo and 1,930,000 tonnes of dry cargo will be transported annually when fluvial transport logistics commence in 2015. These figures and the weight of cargo moved during one round trip were used to calculate the total number of round trips per year for each scenario, and annual GHG emissions subsequently.

Scenario	Wet cargo	Dry cargo	Average all cargo
	tCO_2e	tCO_2e	tCO_2e
Baseline scenario	376,580	96,471	473,052
Multimodal scenario	122,460	42,543	165,003
% fall in emissions	67%	56%	65%

As before, the barge percentage load was increased to match the percentage load of trucks. Increased barge loads corresponded to annual emissions decreasing by a further 38 percent (wet cargo) and 29 percent (dry cargo), as fewer trips would be required to move the same yearly cargo quantities.



ALTERNATIVE CARGO TRANSPORT MODES IN COLOMBIA

Given that the average age of cargo vehicles in Colombia is 24 years[4], 'regular' Colombian trucks were taken to be 10 percent less fuel efficient than Impala Terminals' trucks. Large tugboats can burn between 100 and 200 gallons per hour[5], and it was assumed that 'regular' Colombian tugboat consumption would be at the upper end of this scale. Increased fuel consumption in 'regular' Colombian vehicles would result in higher emissions in both scenarios.

Rail transport would result in lower emissions across both scenarios, but as commercial rail infrastructure is not well developed in Colombia, large-scale rail transport is not yet a feasible option for Impala Terminals. Should there be increased investment in commercial rail, this could become a successful venture allowing for further emissions reduction.

SUPPLY CHAIN CARBON FOOTPRINTING REQUIREMENTS

The approach taken for this GHG assessment can serve as the basis for tracking future transport emissions. Furthermore, energy used during storage and blending activities at Impala Terminals facilities would need to be tracked and reported, not only to complete its own Scope 1 and Scope 2 emissions reporting, but also to prepare for eventual requests from customers for their Scope 3 accounting exercises.

4 US Department of Agriculture: Snapshot of Colombian Transportation and Infrastructure (2009); last accessed on 1 November, 2014; http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Snapshot%20of%20Colombian%20Transportation%20and%20Infrastructure_Bogota_Colombia_4-20-2009.pdf

5 US Environmental Protection Agency: Tug/Towboat Emission Reduction Feasibility Study (2007).

CONCLUSIONS

The multimodal scenario was found to be responsible for lower GHG emissions on a 'per kg' basis compared to the baseline scenario:

WET CARGO

67%

REDUCTION IN GHG INTENSITY

0.030 $kgCO_2e/kg$ for the multimodal scenario versus 0.092 $kgCO_2e/kg$ for the baseline scenario), **representing a 67 percent reduction in GHG intensity.**

DRY CARGO

56%

REDUCTION IN GHG INTENSITY

0.022 $kgCO_2e/kg$ for the multimodal scenario versus 0.050 $kgCO_2e/kg$ for the baseline scenario), **representing a 56 percent reduction in GHG intensity**.

FURTHER FINDINGS

- A higher percentage load for barge transport in future would further reduce multimodal scenario emissions.
- When looking at alternative modes of transport in Colombia, less fuel efficient Colombian truck and tugboat fleets would consume more fuel (10 percent increased fuel consumption assumed) and emit more GHGs than their Impala Terminals' counterparts; but using rail freight would reduce emissions across both scenarios.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