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African Refining Value Study

Presentation to the AGM

African Refiners Association

24th March 2014

- Soumendu is a Vice President in Wood Mackenzie's Downstream consulting team.
- He has 18 years experience in the energy and natural resources sector, working on strategy, opportunity identification, market entry, transaction support, national policy development and operational assignments for private and public sector clients. Soumendu has worked on market entry plans for fuels depots in Africa, infrastructure studies in Africa as well as competitive assessments of mining and smelting/refining projects in Africa and the Middle East.
- Prior to joining Wood Mackenzie, Soumendu worked for CRA International in the UK and Middle East for 5 years, assisting host governments with retail service station privatization and national strategies on infrastructure development and industrial diversification.
- Previously, Soumendu worked for ExxonMobil for 10 years in a variety of operational and planning roles within the downstream sector in the UK, India and Singapore. This included market entry studies on LPG and Refining and retail fuels network planning responsibilities, retail site profitability analysis and implementing site acquisition and divestment programs across Asia Pacific.
- Soumendu graduated from the University of Cambridge with a Masters degree in Chemical Engineering.

- Chris is a member of Wood Mackenzie's Downstream Consulting team based in London.
- Prior to this Chris gained 5 years experience within the downstream industry, working for BP and Petroplus at the Coryton Refinery in the UK. During this time Chris held roles in process engineering, providing technical support, operational optimisation and project development. Followed by a role in production planning, with responsibilities for setting and executing the refinery's commercial plan, co-ordination between the refinery, trading, marketing, and shipping operations teams.
- Since joining Wood Mackenzie Chris has worked on a range of projects covering refining and storage industry valuation and opportunity screening, transaction support, fuels markets analysis, crude and feedstock valuation and business competitive assessments.
- Chris holds a First Class honours degree in Chemical Engineering from the University of Bath.

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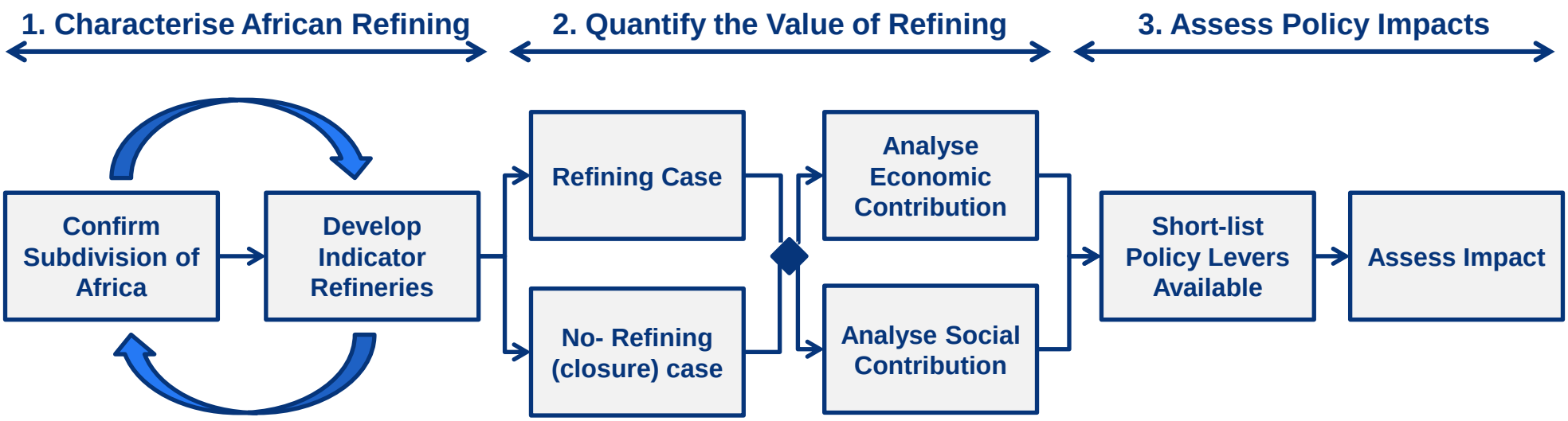
Our study demonstrates the impacts of African refineries on their host nations via a three-step process

Our overall 3 step approach



What is the value contribution of the refining industry in Africa and what are the implications of the policy interventions available to host governments?

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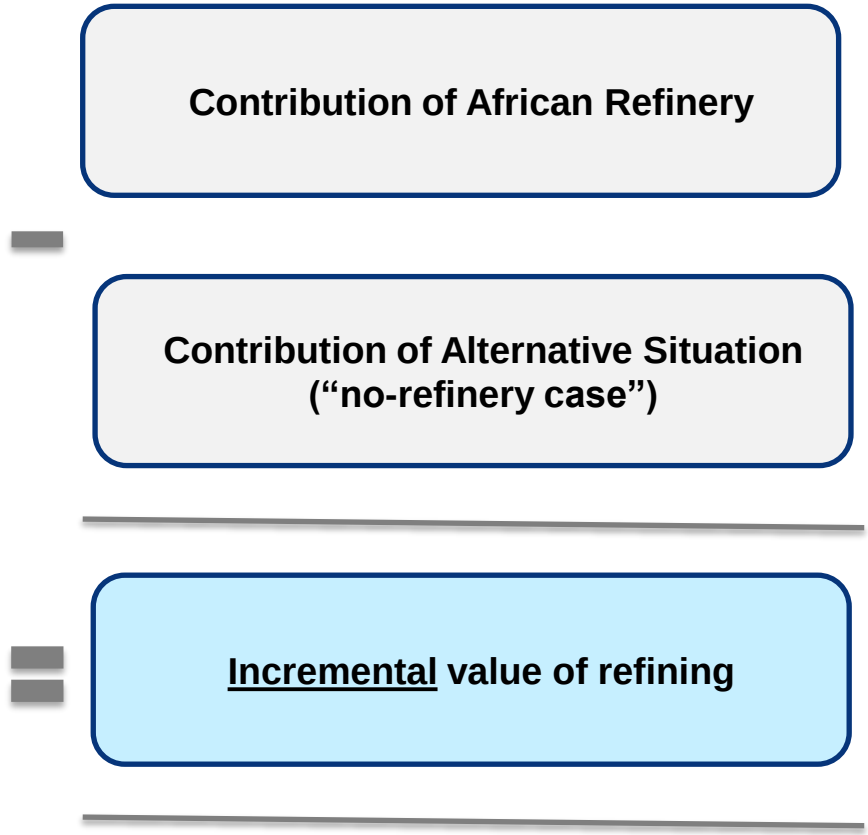
Value contribution from refineries is evaluated based on the host nation's alternative

Description of Approach

- The contribution provided to various sources of value has been determined for African refineries
- The difference between the existence and absence of an African refinery represents the incremental value contribution the refinery provides
- Throughout this study, we compare the value from refineries with a corresponding 'no-refinery' case

Illustration of Approach



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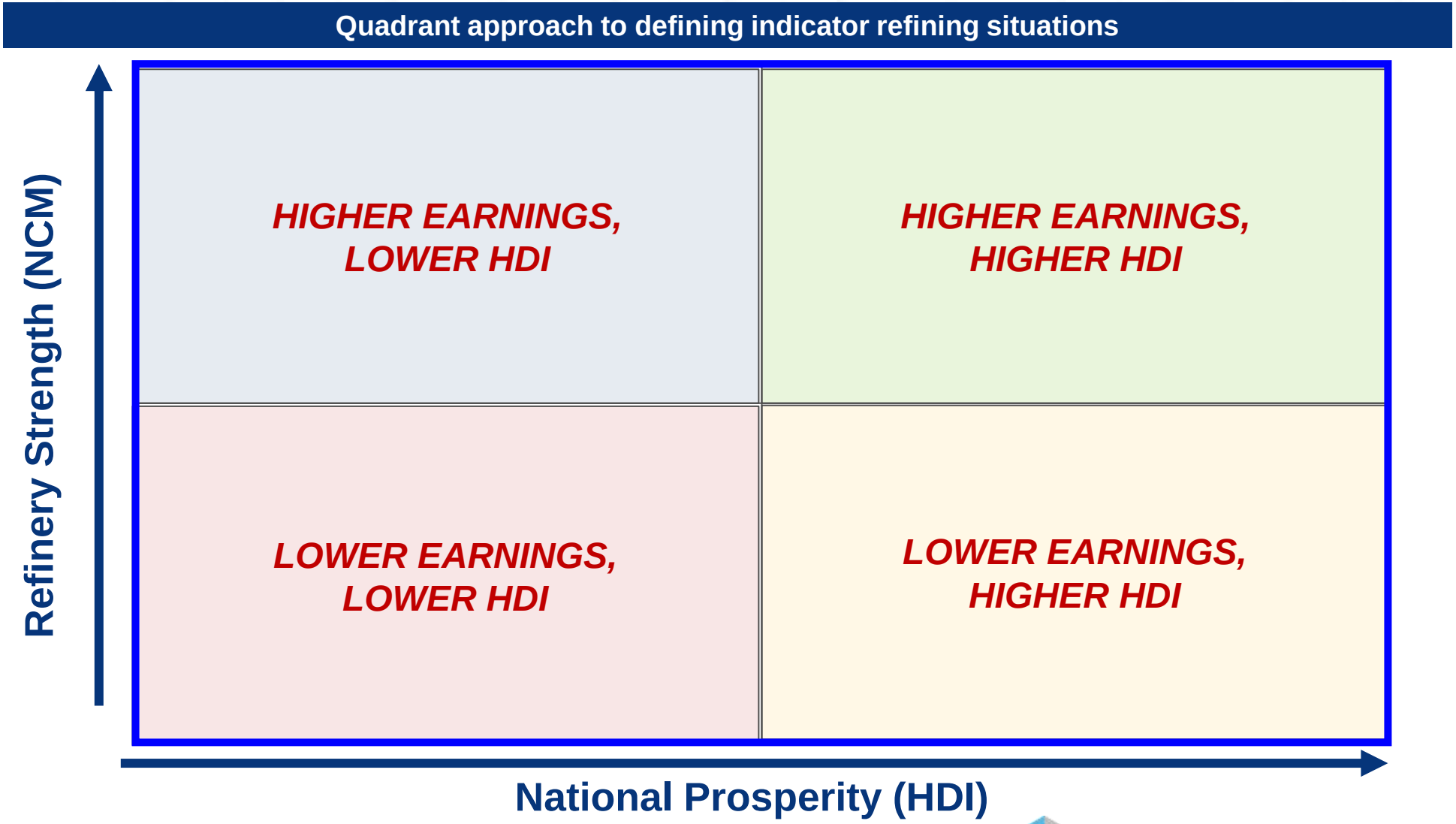
We consider four indicative refining situations throughout to reflect the broad range of actual asset / country circumstances



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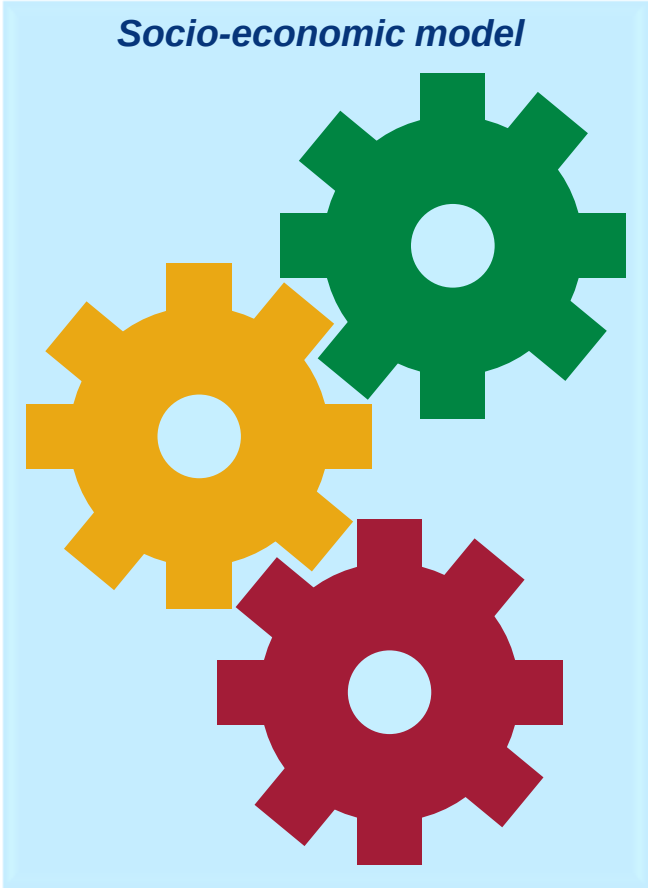
We developed an xls model for members to estimate the socio-economic value contribution from their own assets

Overview of model available to members

- Refinery gate prices for crude and products
- Refinery capacity, yields
- Refinery staffing and salary levels
- Data on the local economy/society
- Type and level of any government support



- Refinery Net Cash Margin
- Total net job creation
- Refinery impact on local economy
- Net impact on local economy
- Net environmental benefits

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Refining gives improved security of supply versus fuels imports

Benefits of refining vs. importing for secure fuels supply		
Risk to supply	**Refining**	**Importing**
Piracy	Lower	Higher
Unfavourable marine conditions	Lower	Higher
Trade embargos	Lower	Higher
Competing markets	Lower	Higher

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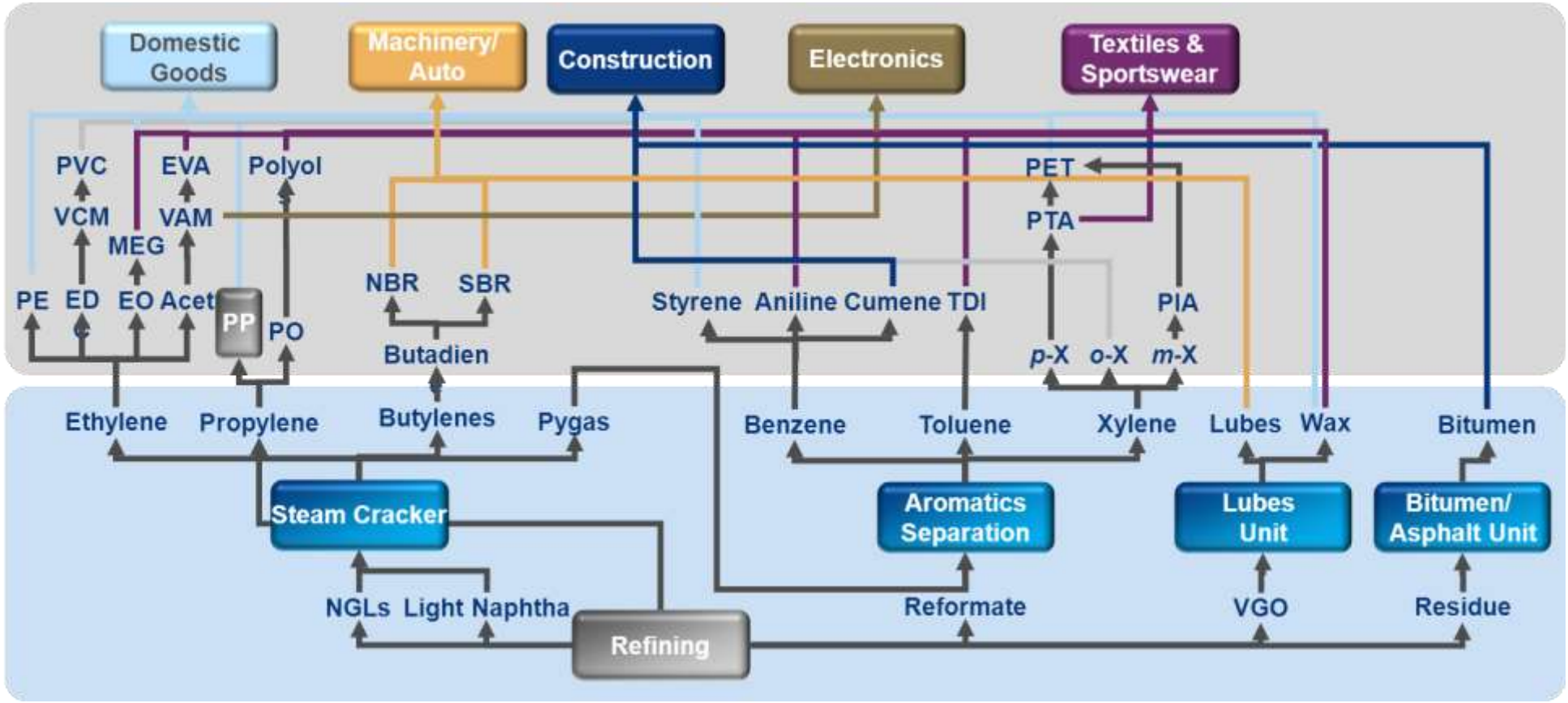
Refining can provide a springboard for broader industrial development via non-fuels production

Potential integration opportunities downstream of refining



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Refining can be environmentally beneficial by eliminating unnecessary tanker journeys and associated CO_2 emissions

Comparison of Shipping Distances in Crude and Refined Product Imports

Shipping Saving in Refinery Case =

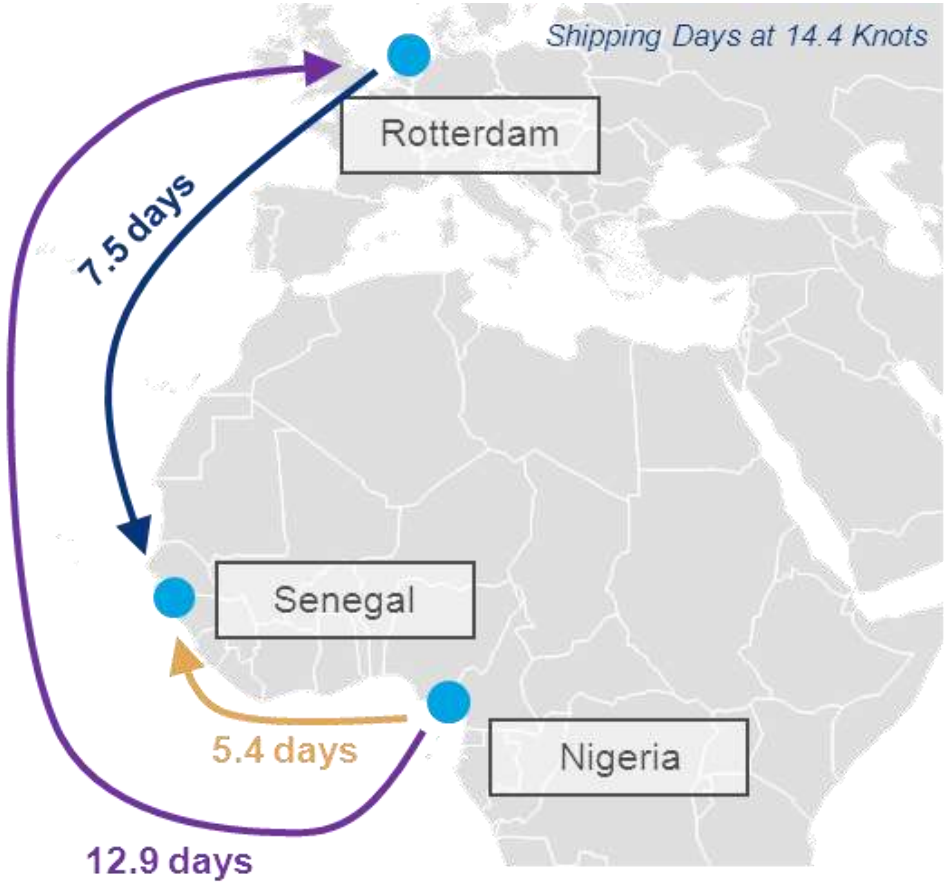
Crude Export +
Refined Product Import –
Crude Import Flow

Roundtrips mean that twice the number of shipping day savings are realised for each delivery

Crude (Erha) Imports

Refined Product Imports

Crude Export Alternative



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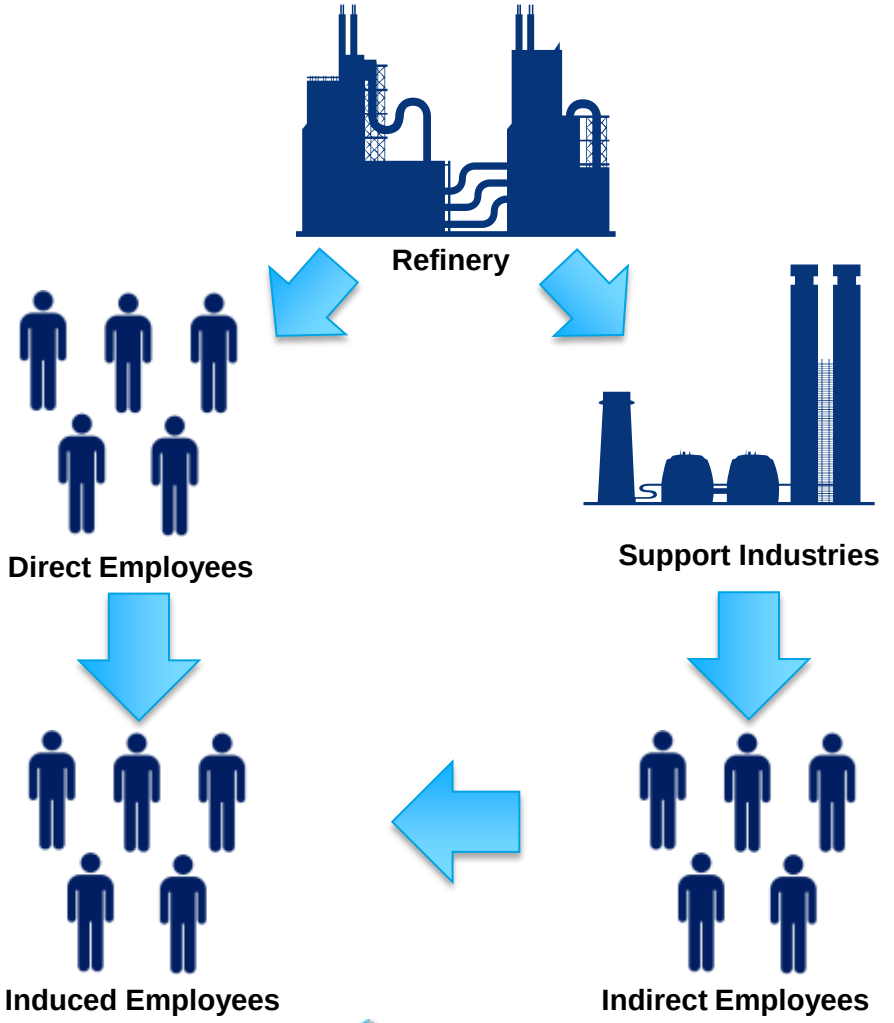
Direct job creation at refineries filters across society through indirect and induced multiplier effects

Illustration of employment multiplier effect

- An oil refinery supports job creation through three channels;
  - » Firstly, the refinery employs people directly to run the refinery.
  - » The operation of the refinery requires inputs from other industries, which also creates employment. This is called indirect employment.
  - » Finally, both the direct and indirect employees spend their wages, supporting other businesses. This is called induced employment



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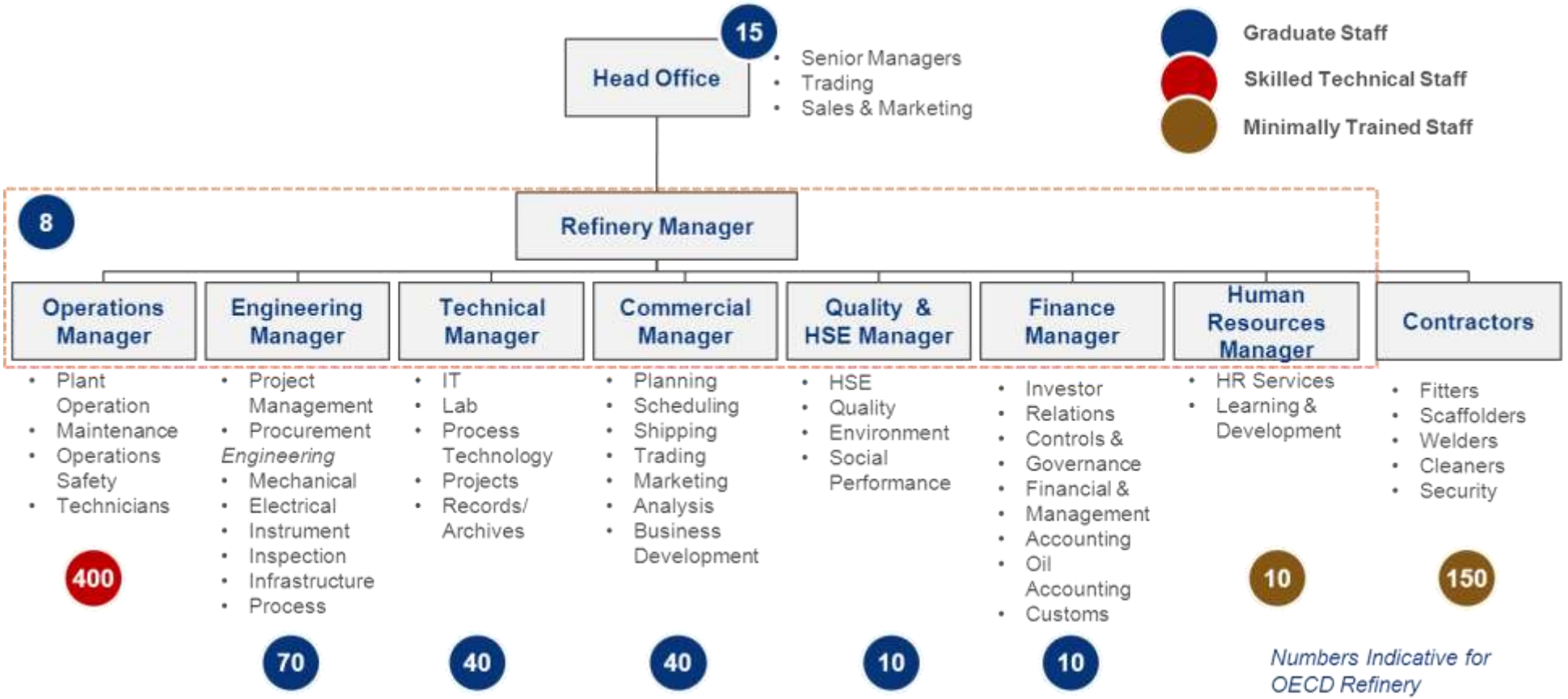
Refineries provide 500-1000 more graduate/highly skilled jobs than a similar capacity fuels import terminal

Generic refinery organisation chart



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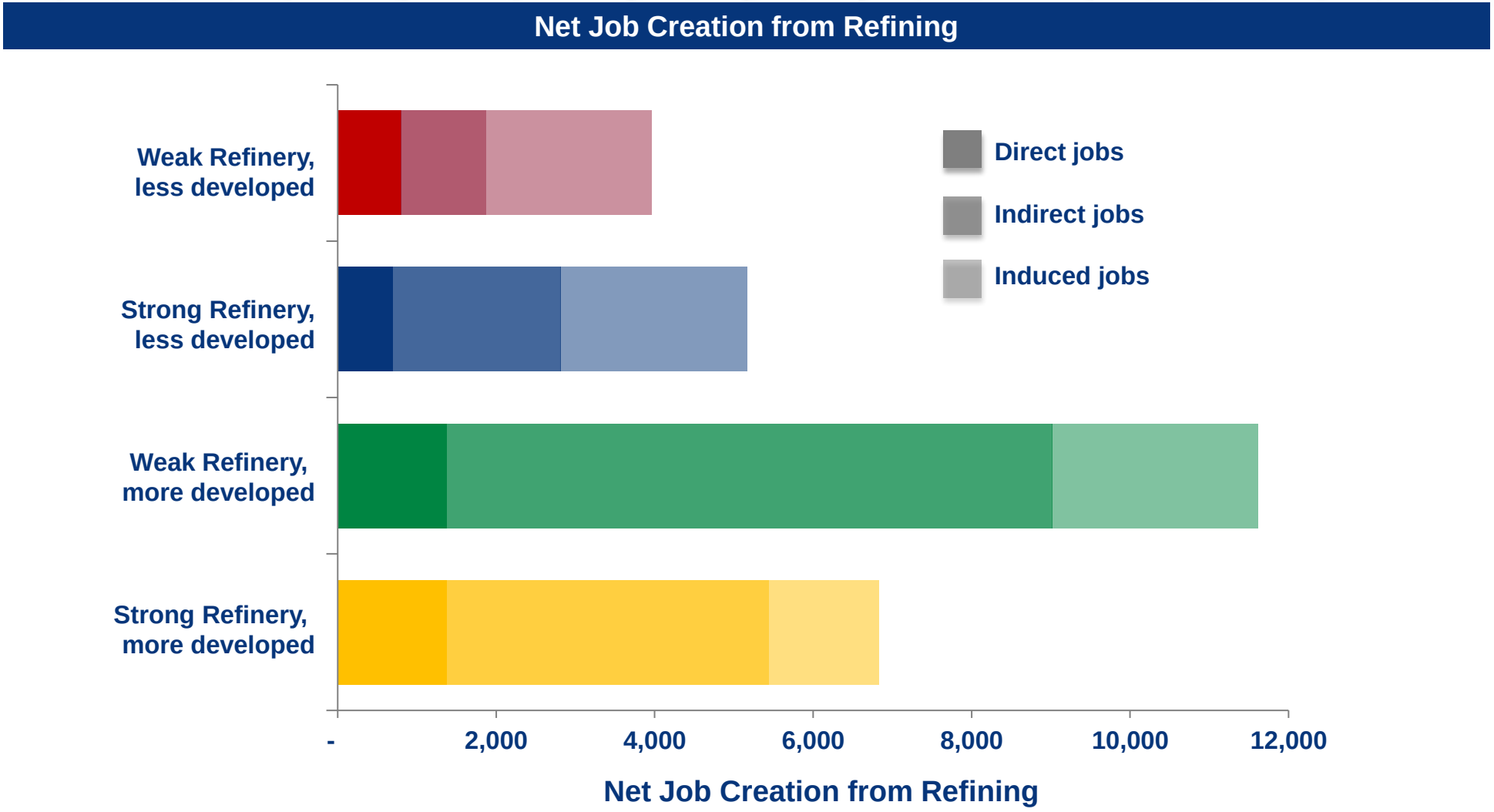
We estimate the total job creation generated by a refining presence may reach up 10,000 in some countries



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Our analysis shows that social benefits from refining are evident for most nations, especially those with lower HDI

Value of refining?	Results of Analysis				
	weak/less	strong/less	weak/more	strong/more	Summary
Provides skilled employment opportunities					
Increases transparency					
Contributes to social stability					
Provides security of fuels supply					
Reduces environmental emissions					
Summary					

Strong · Moderately Strong · Moderate · Moderately Weak · Weak

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We extended our analysis to assess the economic impact of refining via the GVA approach

Approach to measuring direct GVA

Net Cash Margin (NCM $/bbl) – Estimated based on the NCM of the 4 indicator refineries. It is worth noting that the NCM we used is net of any Government subsidies.

Indicator Refinery Capacities (bbl/d) – Estimated based on the capacities of the indicator refineries in each refinery case

Indicator Refineries Utilisation Rates (%) – Estimated based on the utilisation rates of the indicator refineries plotted in refinery case

Indicator Refinery Salaries (p.a.) – Estimated based on the salary benchmarks of the indicator refineries in each refinery case.

Number of Refinery Employees per Indicator Refinery – Estimated based on refinery employees numbers of the indicator refineries in each refinery case

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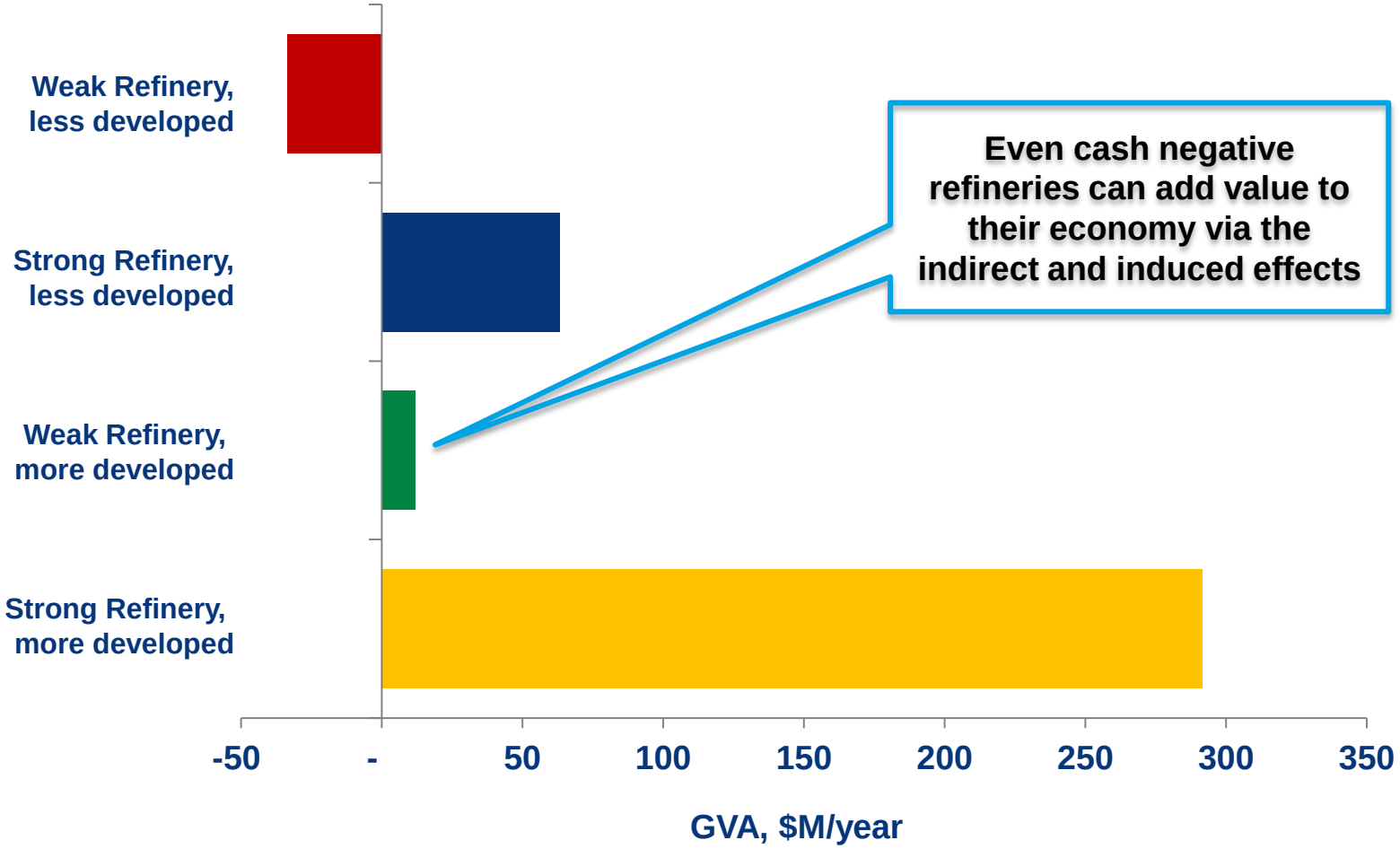
We find that even weaker refineries can provide a positive contribution to local economies

Added Value to Local Economies – Refineries on Standalone Basis



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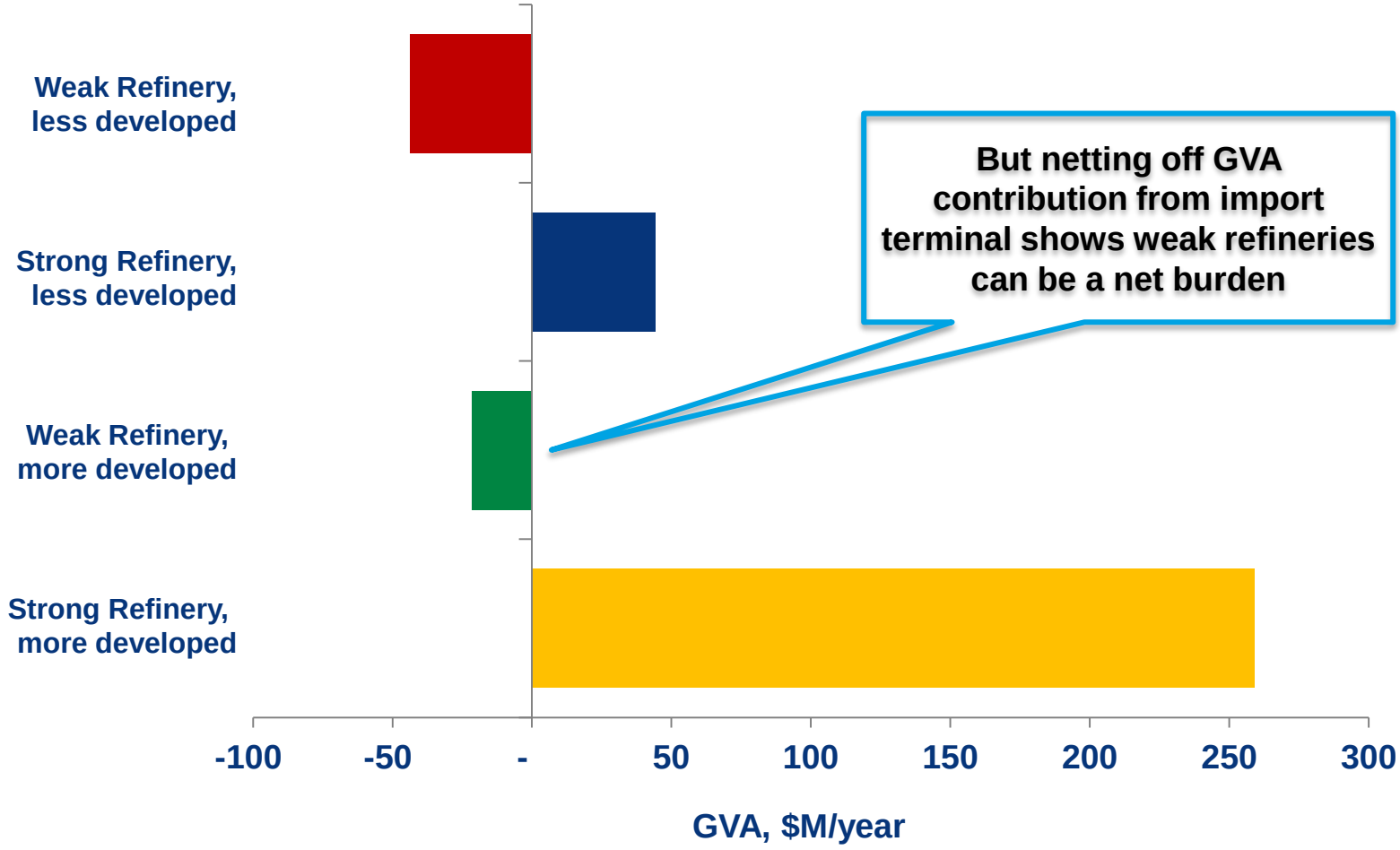
Although only those refineries with a history of investment give higher economic benefit than importing fuels

Added Value to Local Economies – Refineries Net of Import Terminal



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Our analysis shows that economic benefits from refining are evident for all nations

Value of refining?	Results of Analysis				
	weak/less	strong/less	weak/more	strong/more	Summary
Creates employment					
Adds value to local economies					
Increases tax revenues					
Supports value chain integration					
De-risks economies					
Summary					

Strong · Moderately Strong · Moderate · Moderately Weak · Weak

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Tightening environmental legislation would bring considerable benefits, but mandated investment could risk refinery closures

Extract from "Refinery and Health Study for Sub-Saharan Africa (SSA)", World Bank, 2009

$6bn of investment in African refineries to improve environmental performance would result in $43bn of health savings to African nations over a 10 year period

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Government support may represent an attractive solution for host nations

Potential Symbiotic Relationship Between Refiners and Host Governments

- Margin support
- Human capital investment
- Financial/loan support for investments

- Greater job creation
- Greater wealth creation
- Improved public health

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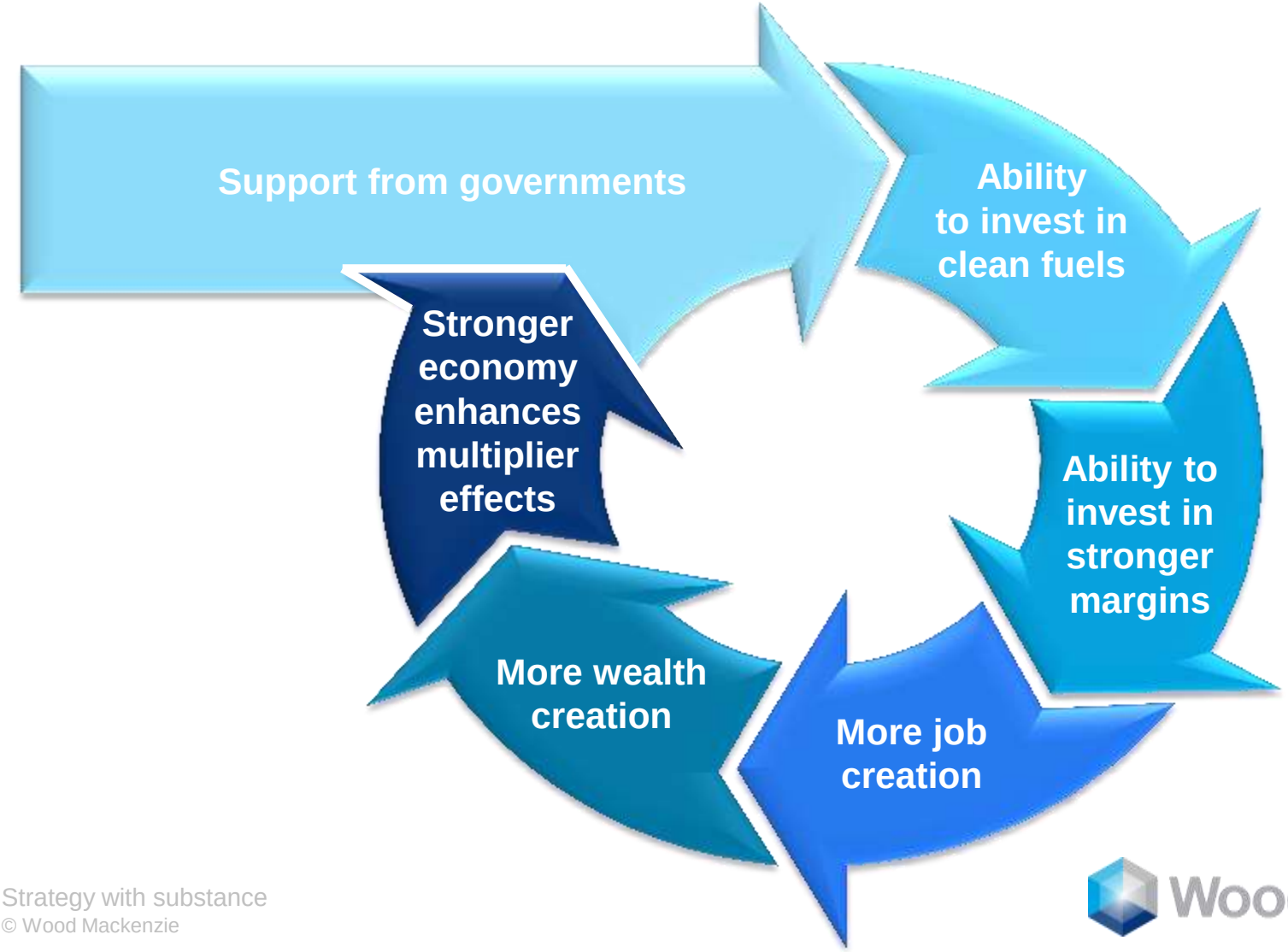
Strengthening the cash-generating position of African refineries would yield considerable benefits for all

Government Support to Kick-Start Refinery and Economic Development



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Thank you for your attention

Any questions?

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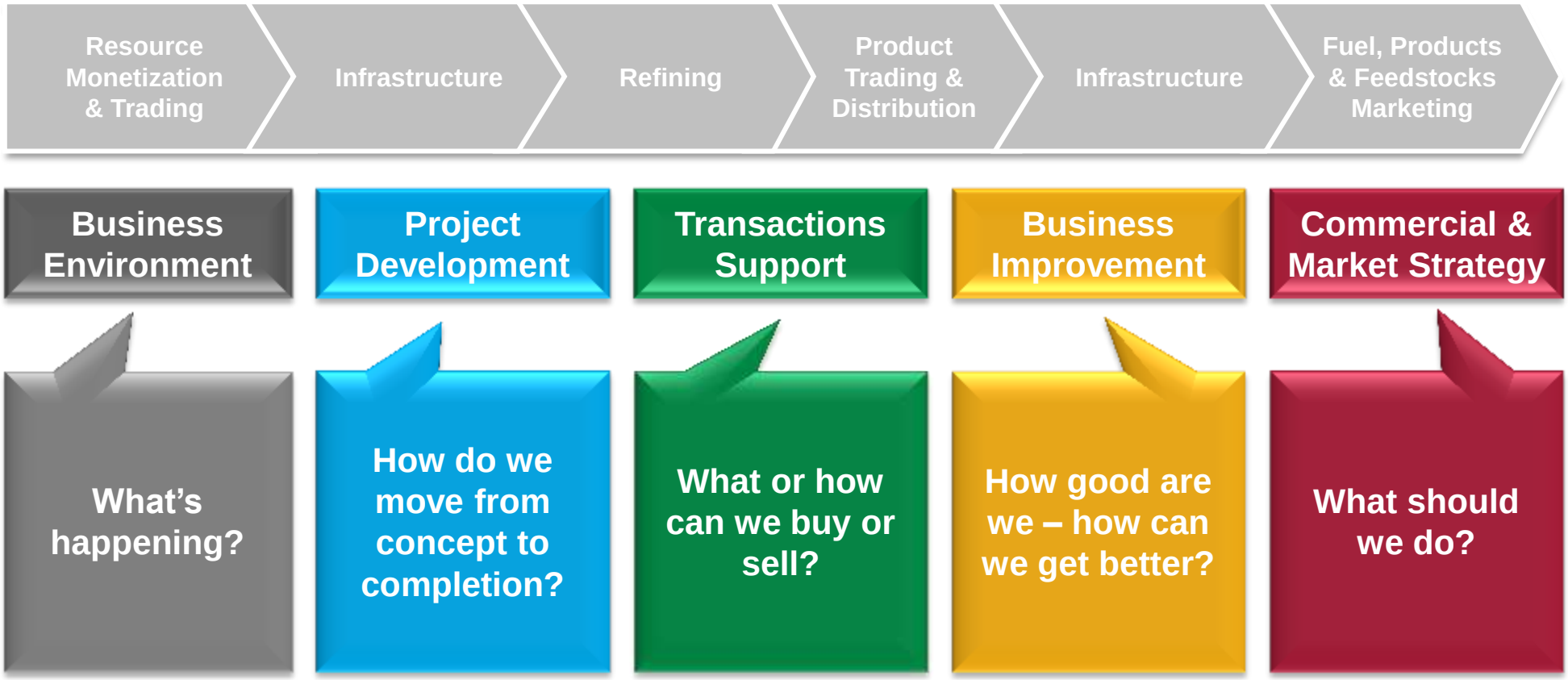
Wood Mackenzie works with clients throughout the downstream value chain in five main offering areas

Illustrative hydrocarbon value chain



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Business Environment	Project Development	Transactions Support	Business Improvement	Commercial & Market Strategy
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Supply / Demand & Trade Flows Analysis	Commercial Feasibility/Business Case Development	Lenders' Market Adviser	Performance Improvement	Market Entry / Exit Strategy
Energy Policy Advisory	Partner Identification & Selection	Valuation Modelling Inputs	Capability Development	Opportunity Screening
Risk Management	Offtake Agreements & Contracting	Transaction Synergy Analysis & Planning	Knowledge Transfer	"What If" Analysis & Business Planning
Dispute Resolution & Expert Witness	Project Finance Advice	Mandate Winning & IM Support	Workshops & Training	Project Development & Contracting

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