ENERGY AND THE JAMAICAN ECONOMY:
IMPLICATIONS FOR THE COMPETITIVENESS OF THE MINERALS/MINING SECTOR.

16th Caribbean Energy Conference
Hiton Hotel
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OUTLINE OF PRESENTATION

i. Segments of Jamaica's Mining Sector
ii. Industrial Minerals / Industrial Minerals Sector
iii. Some Applications of Limestone

iv. State of the Energy Sector
v. Petroleum Consumption
vi. Impact of Energy Cost and Unavailability
vii. Energy Strategies and Expected Outcomes

viii. State of the Bauxite and Alumina Sector
ix. Repositioning of Noranda
x. JISCO's Proposal
xi. Possible Role for and Impact of Renewables

xii. Estimated LNG Demand
xiii. JAMALCO'S Gas-fired Power Plant
xiv. Bogue Power Plan Conversion to LNG
xv. Conclusions.

SEGMENTS OF JAMAICA'S MINING SECTOR

i. **Bauxite/Alumina Sector**

Dominated by foreign capital: JISCO, UC RUSAL, Noble, Noranda. **GOJ a partner in two joint ventures.**

Exploration for rare earth metals in 'red mud'.

ii. **Precious/Base Metal Sector**

On-going exploration for Au, Cu, Ag. Carube Exploration acquired the prospects held by Oz Minerals.

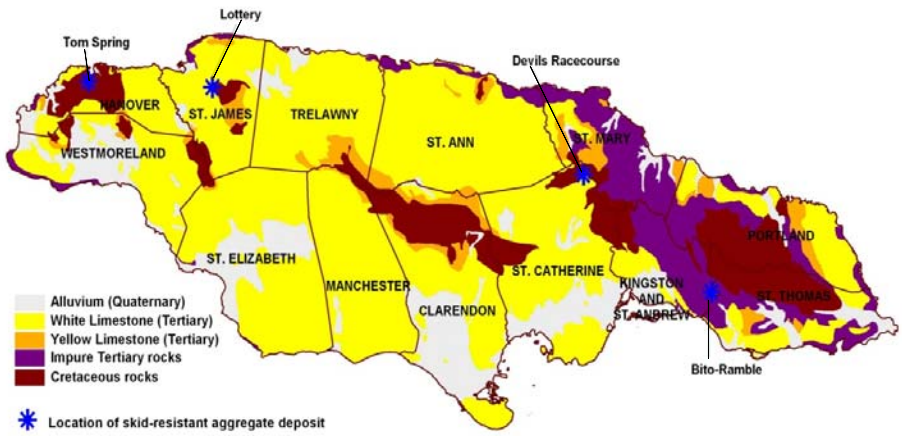
iii. **Industrial Minerals Sector**

Significant prospects based on the quality and size of the resources/reserves, industry needs, and long term trends.
Integration into the local economy and import substitution.
Increased exportation of value-added products.
Annual value projected to be US$224 million by 2021.

INDUSTRIAL MINERALS

Commercially valuable non-metallic, non-fuel rocks and minerals used in their natural and processed states in the various segments of industry.

LIMESTONE AND HARD ROCKS



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SOME APPLICATIONS OF LIMESTONE

Iron & steel 

Flue gas treatment 

Construction 

Civil engineering 

Drinking & Process water 

Waste water & sludge 

Chemicals 

Pulp & paper 

Agriculture & forest 

Glass 

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STATE OF THE ENERGY SECTOR

i. No commercial exploitation of fossil fuel resources.

ii. 88% of energy needs imported. (Bauxite / Alumina: 28%, Power Generation: 24%, Transportation: 42% (aviation, road/rail, shipping).

iii. Industry-stifling electricity prices: US$0.21 kWH – US$0.32 kWH.

iv. No drilling in oil/gas prospects. Frontier state in the oil/gas business.

v. Developing large-scale renewable energy sector.

vi. Significant opportunities for energy efficiency initiatives.

vii. Long-term projection: Increased energy cost with BAU scenario.

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IMPACT OF ENERGY COST AND AVAILABILITY

i. Energy: A major input in the Minerals/Mining Sector, especially in the value-added areas. A major determinant in value-chain progression.

ii. Energy: The single largest cost, approximately 32% - 37%, of the production cost per tonne of alumina.

iii. Energy: A major contributor to an industry's / country's competitiveness.

The absence of huge quantities of cheap (and clean) energy is a primary contributor to the current state of Jamaica's Mining Sector, particularly the Bauxite/Alumina Industry.

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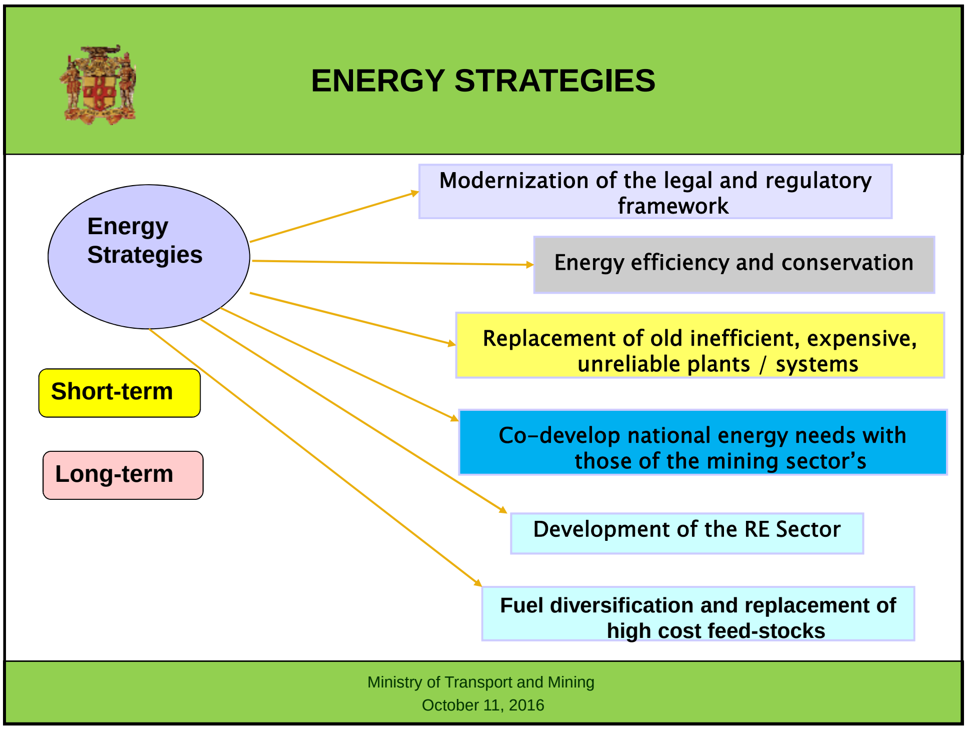
ENERGY STRATEGIES
Energy Strategies
Modernization of the legal and regulatory framework
Energy efficiency and conservation
Replacement of old inefficient, expensive, unreliable plants / systems
Co-develop national energy needs with those of the mining sector's
Development of the RE Sector
Fuel diversification and replacement of high cost feed-stocks
Short-term
Long-term
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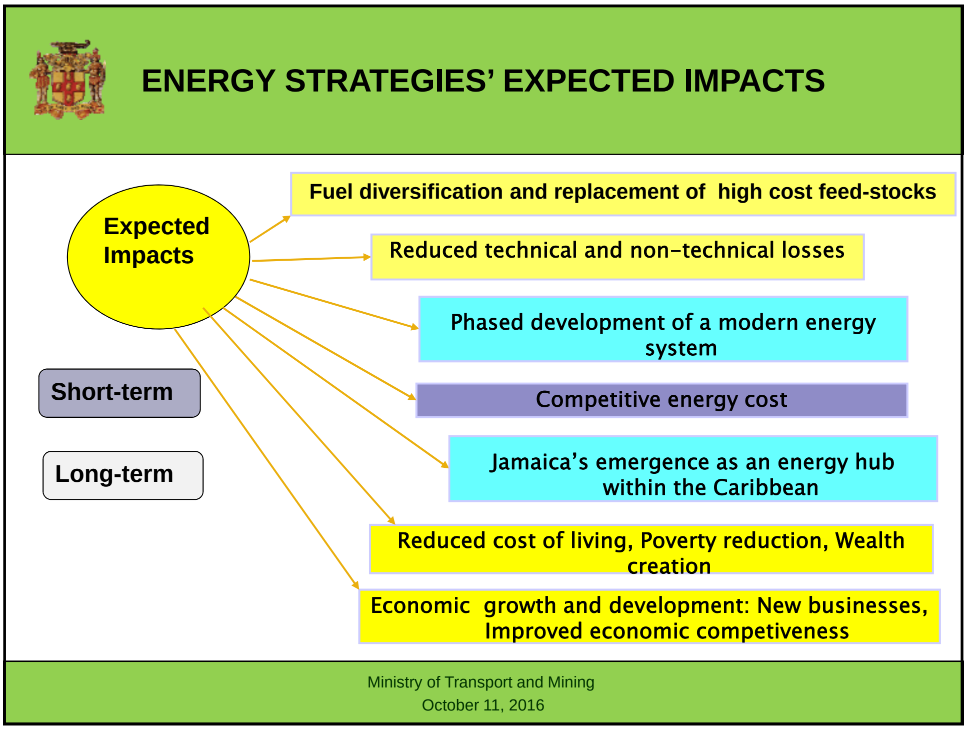
ENERGY STRATEGIES' EXPECTED IMPACTS
Expected Impacts
Fuel diversification and replacement of high cost feed-stocks
Reduced technical and non-technical losses
Phased development of a modern energy system
Competitive energy cost
Jamaica's emergence as an energy hub within the Caribbean
Reduced cost of living, Poverty reduction, Wealth creation
Economic growth and development: New businesses, Improved economic competiveness
Short-term
Long-term
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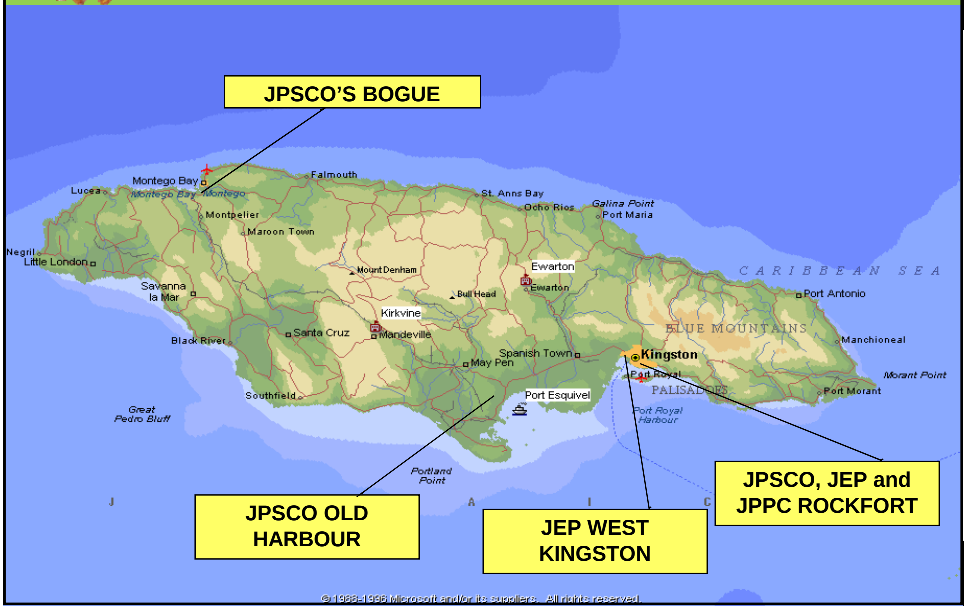
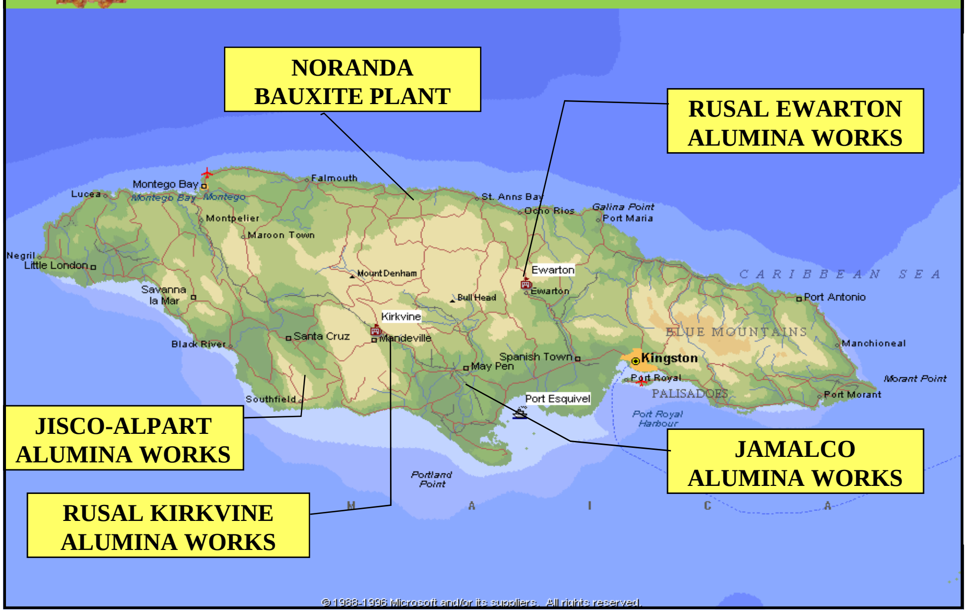
LOCATION OF POWER PLANTS



LOCATION OF BAUXITE AND ALUMINA WORKS



STATE OF THE BAUXITE/ALUMINA SECTOR

i. Two alumina plants shutdown since May 2009.
Largest plant (1.65 mtp) sold to JISCO, being modernized/expanded.
Noranda Bauxite Works declared Chapter 11 bankruptcy.

ii. Over 2,000 jobs lost since 2009. Migration of skilled professionals.

iii. Significant reduction in GOJ earnings from the sector.

iv. Reduced global competitiveness.

v. Further sectoral decline, if cost of energy and other major inputs not resolved.

vi. Further ownership changes pending: Noranda Bauxite Jamaica.

NEW DEVELOPMENTS

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REPOSITIONING OF NORANDA BAUXITE WORKS

1. Repositioning of a 5.2 MT/Yr bauxite mining facility.
2. GOJ (51%) – Noranda (49%) – Annual ‘Asset Usage Fee’.
3. GOJ to consider changes to the ‘Bauxite Levy’ regime.
4. GOJ to consider a partnership with new investors: Value chain progression: Alumina, Chemical Grade Alumina (Hydrate), etc.
5. Possible increase in bauxite production to 7 MT/Yr.
6. Limestone quarrying: ‘Wider Caribbean’ and South American markets.

JISCO ALPART’S PROPOSAL

Phase 1: Expenditure of approximately US$1 billion:

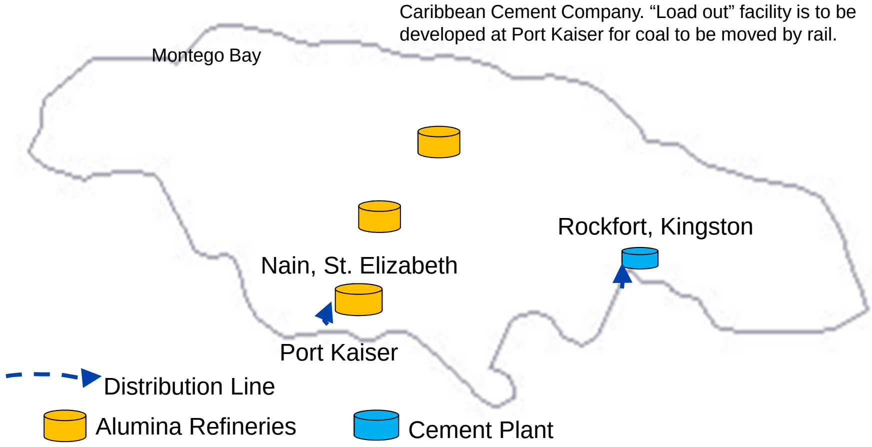
i. Modernization and expansion of the alumina plant.
ii. Dredging and upgrading of Port Kaiser: Panamax and Post Panamax vessels.
iii. Commence power plant transformation form HFO to coal / LNG: 1,000 MW.
iv. Build-out of a modern agriculture and irrigation facility.

Phase 2 : Approximately US$2 billion (Special Economic Zone):

i. Aluminium smelter – 0.5 million tons of electrolytic aluminium / year.
ii. Aluminium fabrication facilities - 0.5 million tons of aluminium rods and fabrication products.
iii. One million tons per annum iron and steel extrusion facility.
iv. Construction materials plant (cement plant, bricks, etc.).
v. Tool / Machinery manufacturing: mechanical and electrical equipment maintenance services.
vi. Ancillary logistic system and supporting transportation infrastructure.

COAL DISTRIBUTION SYSTEM

Coal may possibly support the reopening of JISCO ALPART and related industrial activities. Coal already powers the Caribbean Cement Company. "Load out" facility is to be developed at Port Kaiser for coal to be moved by rail.



POSSIBLE ROLE FOR AND IMPACTS OF RENEWABLES

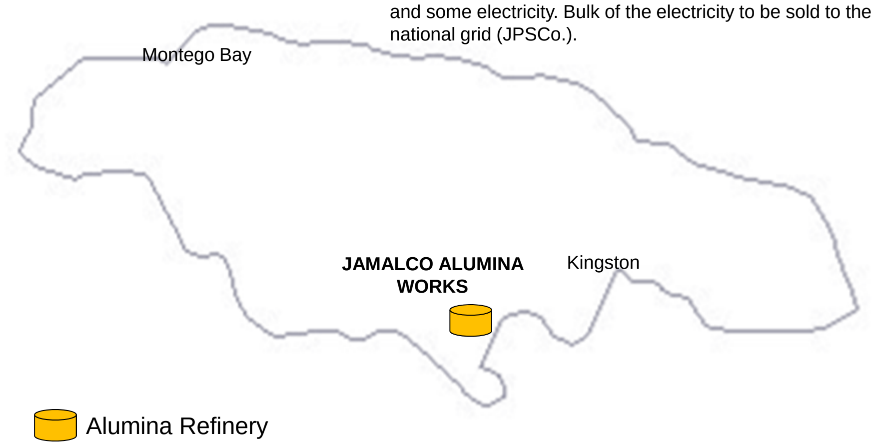
i. Free energy source.
ii. Possibility to develop new industries / employment.
iii. Low and stable long-term energy price.
iv. Remote locating of mini-systems.
v. Isolation from international energy market dynamics.
vi. Avoided import costs.
vii. Climate benefits.
viii. Positive currency impact.
ix. International obligations.

ESTIMATED LNG DEMAND

PLANT	GENERATION CAPACITY, MW	ESTIMATED LNG DEMAND, MT / YEAR
JPSCo Bogue	120	150
JPSCo Old Harbour	190	220
JEP Old Harbour	124	160
JAMALCO's Calciners		88 - 105
JPSCo Hunt's Bay	248.9	300
JEP West Kingston	66	79
JPSCo / JEP	120 - 170	150 - 212
Add new generation	120	150
JISCO'S DEMAND?		

JAMALCO'S LNG-FIRED POWER PLANT

CAP and Noble Resources Ltd proceeding to build a 50MW co-generation gas-fired power plant to provide primarily steam and some electricity. Bulk of the electricity to be sold to the national grid (JPSCo.).



FEEDSTOCK CONVERSION OF JPSCO'S BOGUE POWER PLANT

i. Conversion from Automotive Diesel Oil (ADO) to gas. Bogue power plant is a 120MW gas turbine cogeneration plant.

ii. Fuel supplier: New Fortress Energy of the Fortress Investment Group, USA.

iv. Twice weekly shipments from the 140.5 M^3 Golar Artic (Korean built, Holland based) via the 6,500 M^3 Coral Anthelia (Demark based). Storage in seven (7) 1,000 M^3 tanks at the power plant. Gas fed directly into the power plant.

12 – 15 hrs: Filling of Coral Anthelia by the Golar Arctic

Coral Anthelia's round trip from Portland Bight to Montego Bay: 1 day.

Coral Anthelia's off-loading to the NFE Bogue facility: 3 - 4 hrs (no transfer is if a cruise ship is in port. Night transfer of LNG allowed)

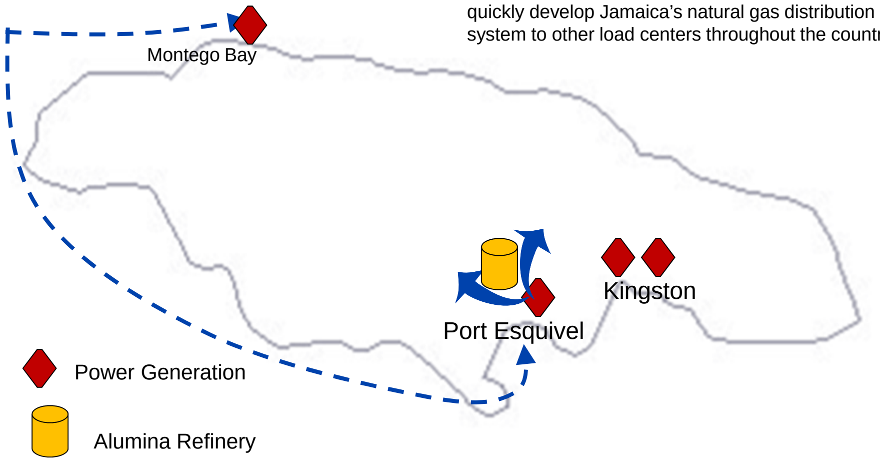
v. Projected cost of the LNG: US$14.11/MMBTU.

vi. Construction and conversion completed.

vii. First gas delivery delayed by Hurricane Matthew.

LNG DISTRIBUTION SYSTEM BUILD-OUT

The "beach head" for natural gas importation in the south of the island makes it possible to effectively and quickly develop Jamaica's natural gas distribution system to other load centers throughout the country.



PROJECTED IMPACTS OF PROPOSED PLANS

i. Improved economic competiveness / economic expansion.
   Revival of the Alumina Sector:
   a. Improved competitiveness of alumina plants.
   b. 2,400 jobs to be recreated, increased employment.
   c. Increased FX earnings.
   d. Increased tax revenues to GOJ, etc.
   e. Economic revival of some sections of the country.

ii. JPSCo's LNG supplier, New Fortress Energy Co., positioning Jamaica as an energy hub within the Caribbean.

iii. Increased stability of public electricity supplies: voltage stability, lower technical losses, improved grid security.

vi. Diversification of fuel sources, environmental benefits and lower electricity prices.

THANK YOU.