

BROOK HUNT

Mining & metal industry consultants

What role for Suriname in the new alumina dynamic

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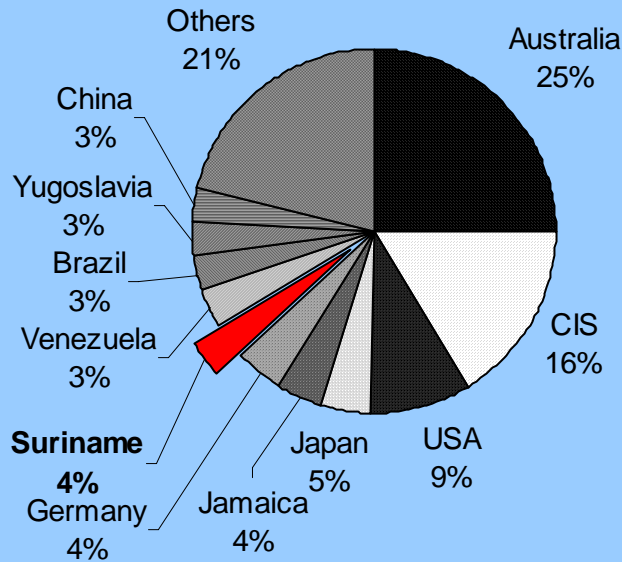
Scope of the Presentation

- **Review of historical market developments.**
- **Primary demand outlook**
- **Primary supply developments**
- **Aluminium market outlook**
- **Alumina market outlook**
- **Structural issues facing the bauxite/alumina sector**
- **How does Suriname compare with its AWAC/BHP Billiton Peer's ?**
- **Alcoa and BHP Billiton bauxite/alumina project pipeline**
- **Key issues for Suriname going forward**
- **Conclusions**

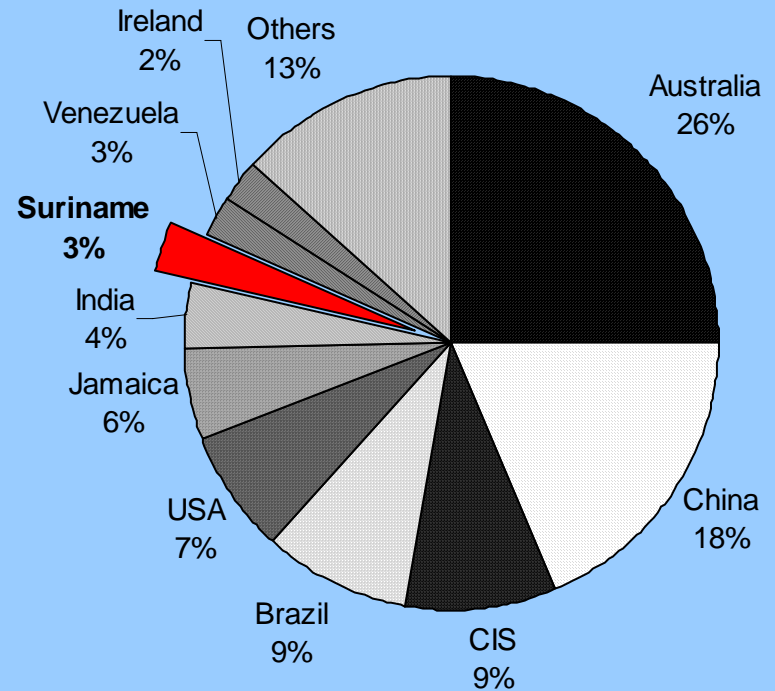


Global Alumina Market Size

1985, 35Mt

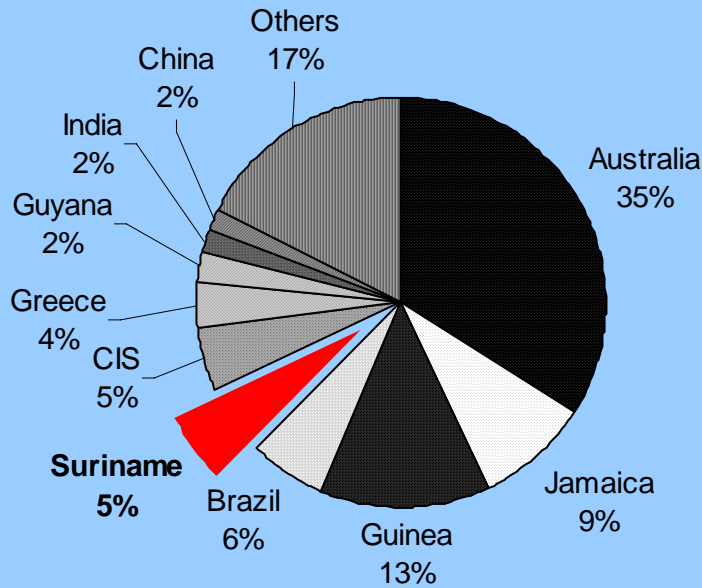


2006, 74Mt

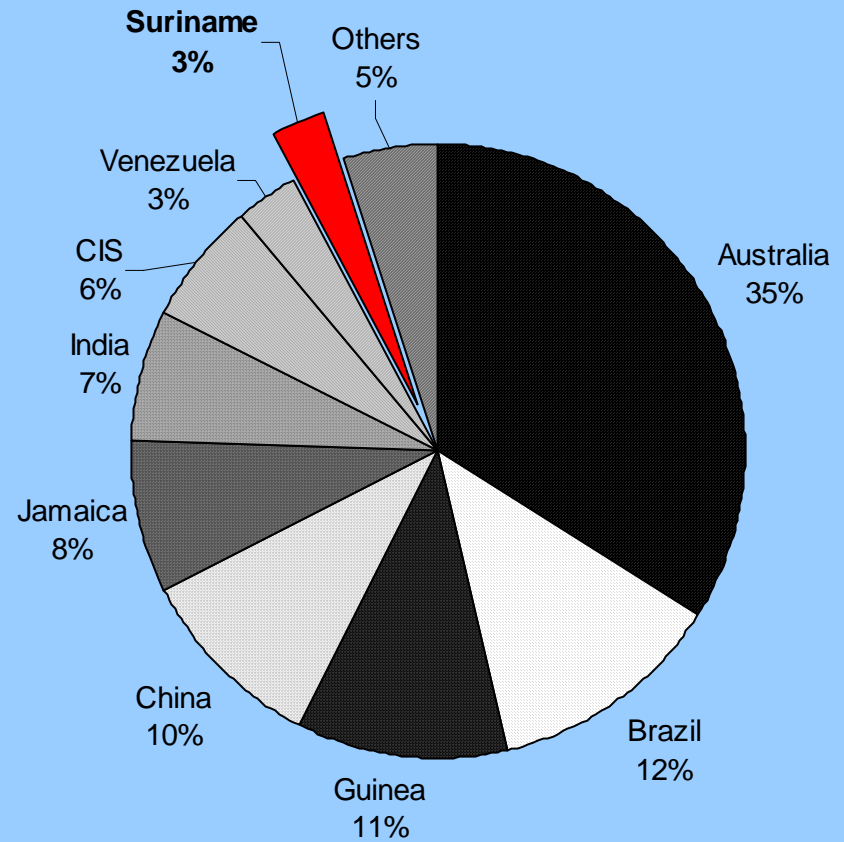


Global Bauxite Market Size

1985, 82Mt



2005, 176Mt



Key Aluminium Market Features 2005-2006

- **Robust Industrial Production (IP) and consumption growth (particularly China). Product premia increased throughout 2006 having been flat in 2005.**
- **Tight alumina market and high prices in 2005 and in H1 2006 limited the ability of some Chinese smelters to produce metal.**
- **Rising power tariffs and production costs and the potential for smelter closures has boosted sentiment and price expectation.**
- **Reported stocks (IAI, LME, Comex, Japan Port, Merchant) remained flat throughout 2005 (40 days consumption) but fell to 33 days at the end of 2006 the lowest level on record.**
- **Non-fundamental investors have been increasingly active across the LME complex and have reinforced strong fundamentals.**
- **Global supply unable to meet demand requirements in 2006.**
- **Highest average metal prices (in nominal terms) since 1988.**



Historical Global Aluminium Market Balance (Mt)

	2000	2001	2002	2003	2004	2005	2006
Smelter Production	24.5	24.5	26.1	28.0	29.9	31.9	33.9
<i>% change</i>	3.5%	-0.2%	6.5%	7.6%	6.6%	6.9%	6.0%
Global Consumption	25.2	24.2	25.5	27.8	30.3	32.0	34.2
<i>% change</i>	7.1%	-3.9%	5.5%	8.9%	9.1%	5.4%	6.9%
Implied Surplus/Deficit	-0.7	0.3	0.5	0.2	-0.4	0.0	-0.3
Reported Stocks (Days) <i>IAI+LME+Comex+Port+Consumer</i>	44	54	55	53	40	39	33
Cash LME Price \$/tonne (Nominal \$)	1549	1444	1349	1432	1716	1897	2566



Historical SGA Market Balance (Mt)

	2000	2001	2002	2003	2004	2005	2006
Refinery Production	48.6	49.9	51.6	55.0	58.2	61.2	68.8
<i>Capacity Utilisation</i>	94%	90%	90%	95%	97%	97%	97%
Smelter Demand	48.0	47.8	51.1	54.9	58.6	62.6	66.4
SGA Market Balance	0.7	2.0	0.4	0.0	-0.3	-1.4	2.4
Stocks (Days of Consumption)	40	55	55	51	46	35	46
Short-term Contract Price: \$/tonne	232	162	148	222	292	322	577
% of LME	15%	11%	11%	15%	17%	17%	23%
Spot: \$/tonne	284	149	148	283	420	468	420
% of LME	18%	10%	11%	20%	24%	25%	16%
LME Cash Price: \$/tonne	1549	1444	1349	1432	1716	1897	2566



Primary Aluminium Demand Outlook

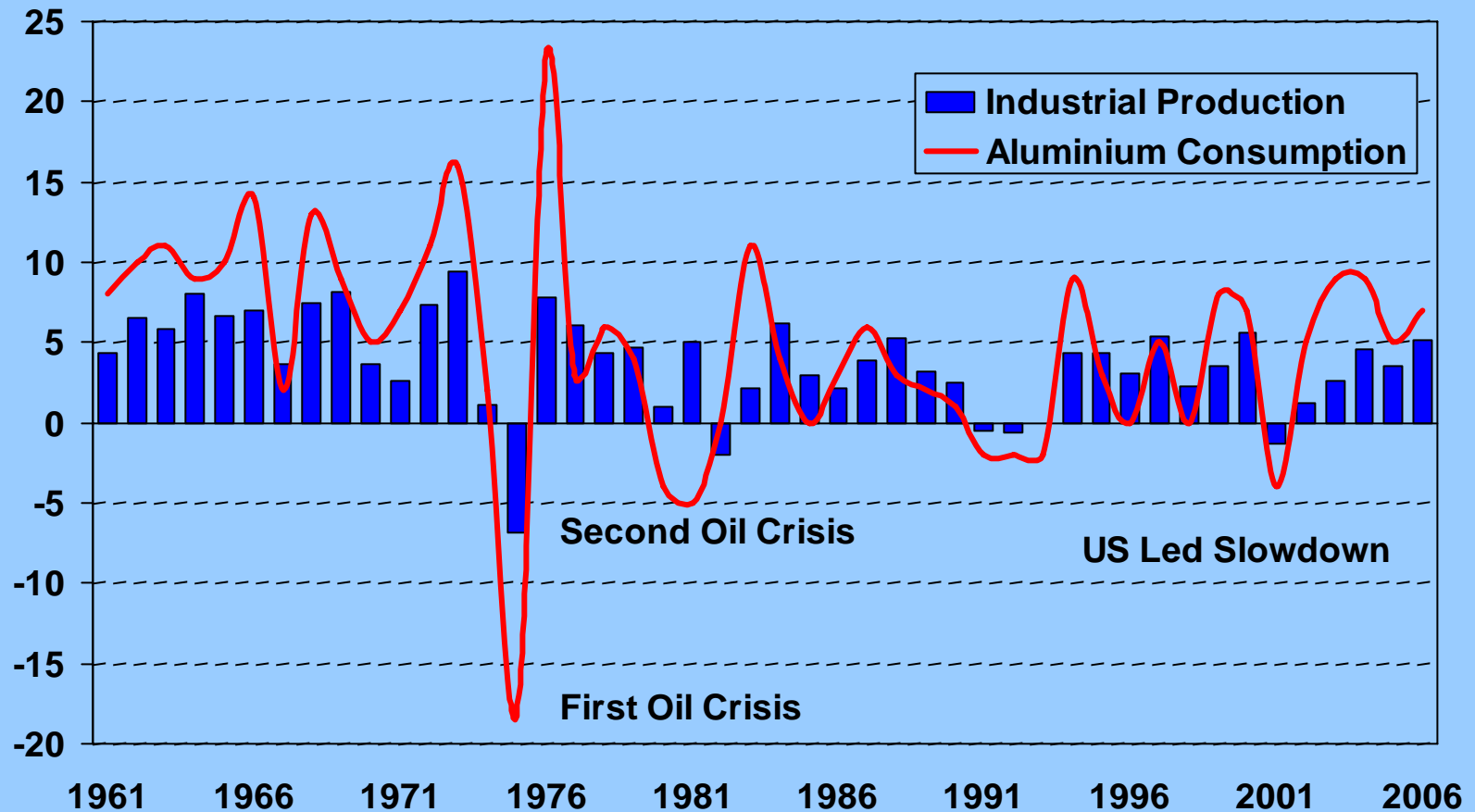


Primary Consumption 2000-2006, (Mt)

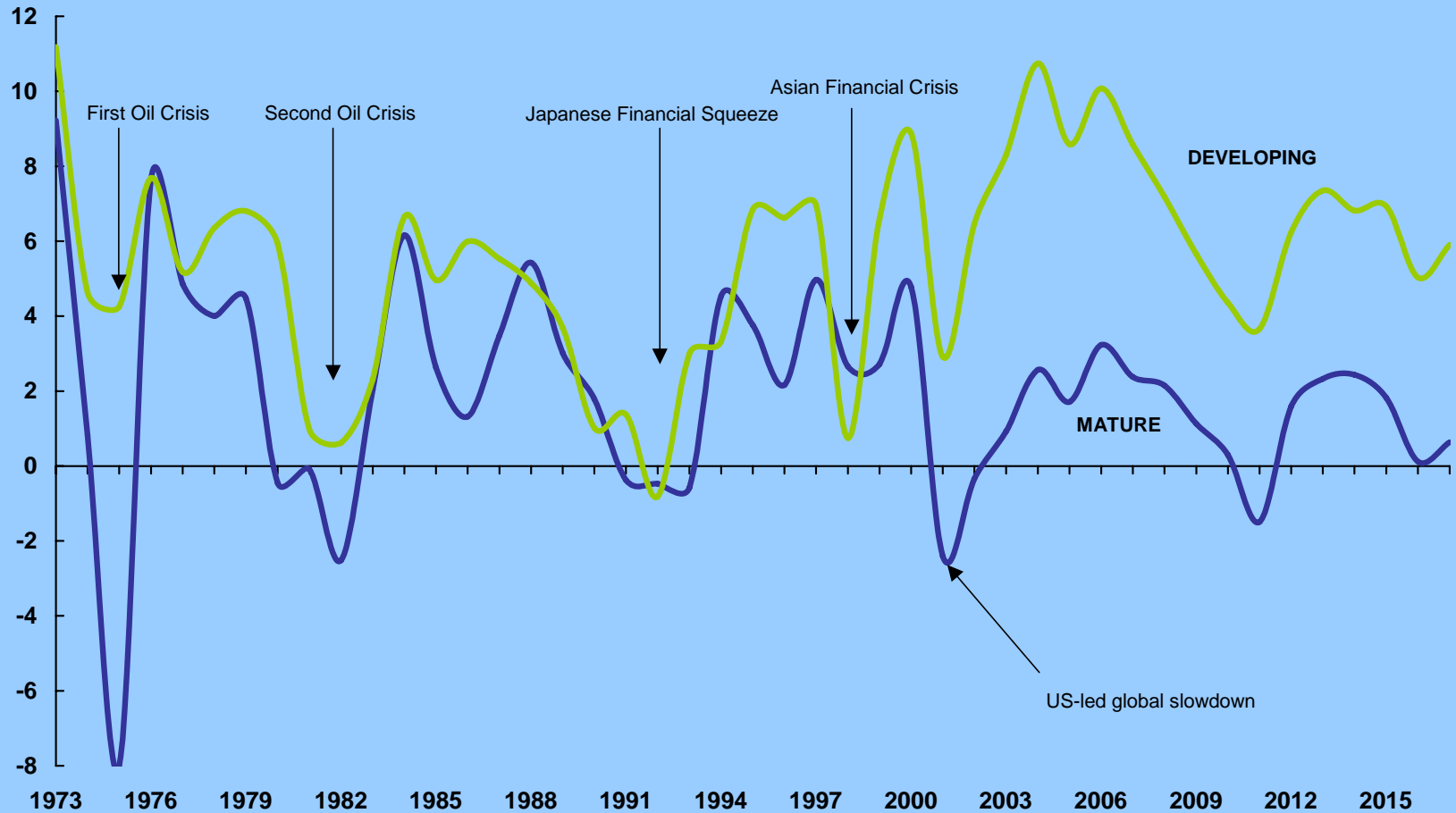
	2000	2001	2002	2003	2004	2005	2006	Growth Rate 2006/2000	Change (Mt) 2006/2000
AFRICA	0.3	0.4	0.3	0.4	0.4	0.4	0.4	4.0%	0.1
NORTH AMERICA	7.1	6.3	6.5	6.5	7.0	7.2	7.3	1.6%	0.2
LATIN AMERICA	0.9	1.0	1.0	1.1	1.2	1.3	1.4	7.3%	0.5
JAPAN	2.2	2.0	2.0	2.2	2.4	2.3	2.3	1.6%	0.0
ASIA (Excl JAPAN)	6.7	6.9	7.7	9.1	10.5	11.8	13.4	13.0%	6.7
WESTERN EUROPE	6.1	5.8	6.0	6.5	6.7	6.8	7.0	3.0%	0.9
EAST/CENTRAL EUROPE	1.4	1.5	1.6	1.7	1.7	1.8	1.9	5.1%	0.5
OCEANIA	0.4	0.4	0.3	0.4	0.4	0.5	0.4	4.1%	0.1
TOTAL WORLD	25.2	24.2	25.5	27.8	30.3	32.0	34.2	6.0%	9.0
<i>Growth Rate</i>	7.1%	-3.9%	5.5%	8.9%	9.1%	5.4%	6.9%		
BRIC COUNTRIES									
BRAZIL	0.5	0.6	0.6	0.6	0.7	0.7	0.8	7.2%	0.3
RUSSIA	0.7	0.8	1.0	1.0	1.0	1.0	1.0	5.0%	0.3
INDIA	0.6	0.6	0.6	0.8	0.9	0.9	1.0	10.4%	0.4
CHINA	3.4	3.6	4.2	5.1	6.0	7.0	8.4	17.0%	5.0
TOTAL BRIC	5.2	5.6	6.3	7.4	8.5	9.6	11.2	14.0%	5.9
<i>Growth Rate</i>	15.9%	6.3%	12.8%	18.0%	14.4%	13.6%	15.8%		
<i>BRIC % of Global Total</i>	21%	23%	25%	27%	28%	30%	33%		



Year On Year Changes in Industrial Production and Aluminium Consumption



Industrial Production (IP) Forecasts



Primary Consumption Forecasts, (Mt)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Growth Rate 2016/2006	Change (Mt) 2016/2006
AFRICA	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	4.3%	0.2
NORTH AMERICA	7.3	7.3	7.4	7.5	7.5	7.4	7.6	7.8	8.0	8.2	8.2	1.3%	0.9
LATIN AMERICA	1.4	1.5	1.6	1.7	1.7	1.7	1.8	1.9	2.0	2.1	2.2	4.5%	0.8
JAPAN	2.3	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.1	2.1	-0.7%	-0.2
ASIA (Excl JAPAN)	13.4	15.2	17.0	18.3	19.3	20.2	21.4	22.8	24.4	25.7	26.8	6.8%	13.4
WESTERN EUROPE	7.0	7.2	7.3	7.4	7.4	7.5	7.7	8.1	8.4	8.9	8.9	2.5%	1.9
EAST/CENTRAL EUROP	1.9	2.1	2.2	2.3	2.4	2.6	2.8	2.9	3.1	3.3	3.5	6.0%	1.6
OCEANIA	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	2.2%	0.1
TOTAL WORLD	34.2	36.4	38.7	40.4	41.6	42.5	44.4	46.7	49.2	51.6	52.9	4.3%	18.8
<i>Growth Rate</i>	6.9%	6.6%	6.1%	4.4%	3.1%	2.2%	4.4%	5.3%	5.2%	4.8%	2.7%		
BRIC COUNTRIES													
BRAZIL	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	4.5%	0.4
RUSSIA	1.0	1.0	1.1	1.2	1.2	1.3	1.3	1.4	1.5	1.6	1.6	5.0%	0.6
INDIA	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.5	1.6	1.6	4.8%	0.6
CHINA	8.4	10.0	11.5	12.6	13.4	14.2	15.1	16.2	17.4	18.4	19.2	8.0%	10.9
TOTAL BRIC	11.2	12.9	14.6	15.8	16.8	17.7	18.8	20.1	21.5	22.7	23.7	7.3%	12.6
<i>Growth Rate</i>	15.8%	15.7%	12.9%	8.5%	6.4%	5.0%	6.3%	7.0%	7.0%	5.5%	4.5%		
<i>% of Global Total</i>	33%	35%	38%	39%	40%	42%	42%	43%	44%	44%	45%		



Primary Supply Developments



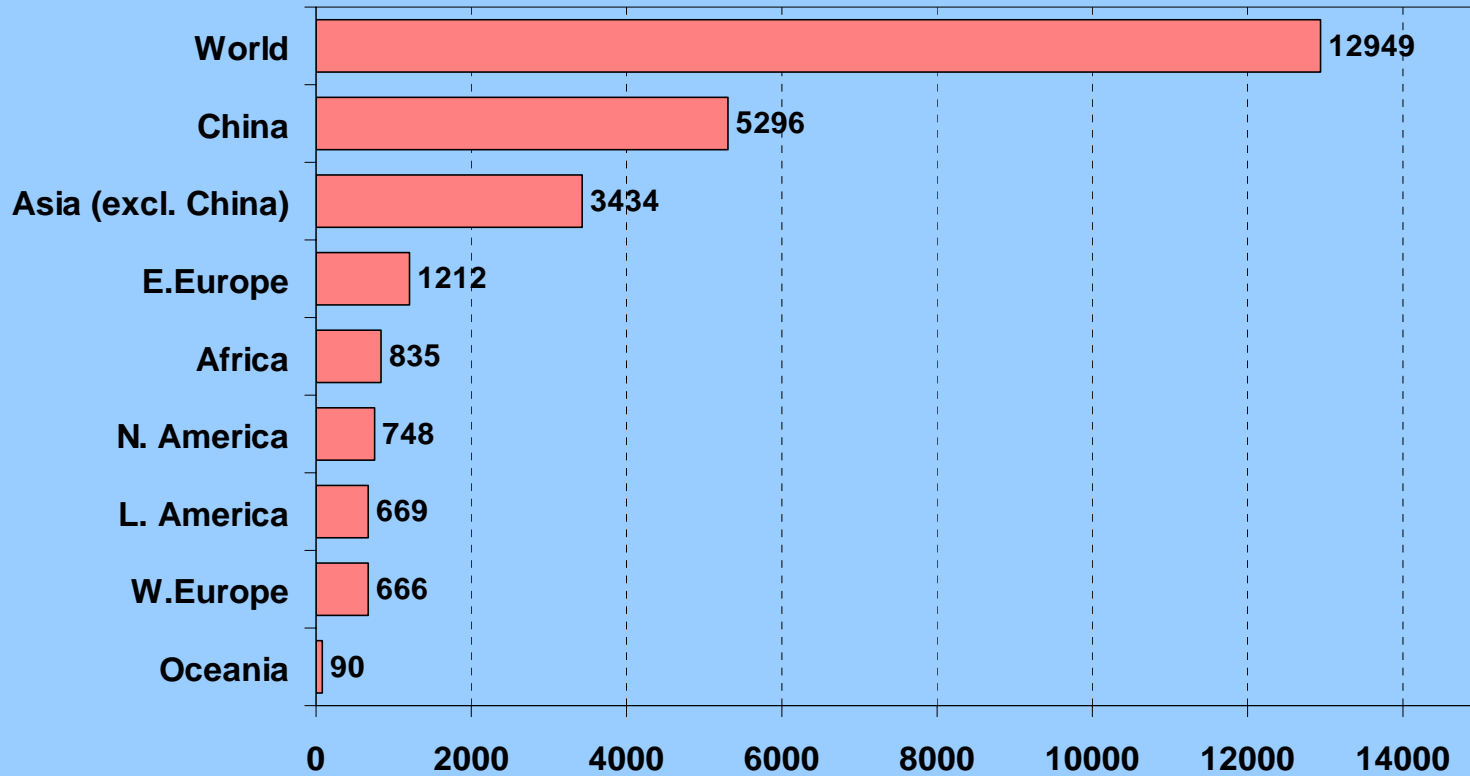
Aluminium Supply Issues 2006/2007

- Alumina market constraints evident in 2004/2005 removed.
- Combination of low and falling spot alumina prices and high metal prices make start-up of idled capacity more attractive particularly in China.
- High power tariffs will mean that smelter restarts outside of China will be limited but metal price is very supportive.
- Up to 1-1.5Mt of idled capacity in China is in a position to start-up if conditions are favourable
- In China massive expansion of power capacity means that power tightness is easing but tariffs remain high (set by government) even for captive power suppliers but many have cross equity in coal, power and the smelter so cross subsidisation benefits.
- Near/medium term Chinese smelter economics look attractive and government measures to clamp down on the sector appear to be having limited impact on the ground.



Smelter Output Growth 2006-2011 (kt)

(Assumes no Market-driven Adjustments)



China to account for 41% of additional supply
Asia to account for 67% of additional supply



Metal Market Balance and Price Forecast



Global Primary Aluminium Market Outlook (Mt)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Smelter Capability	33.9	36.9	39.2	41.1	43.6	46.8	48.8	50.0	53.5	54.5	55.3
<i>Market Adjustment</i>						-3.0	-5.0	-5.2	-4.7	-3.0	-1.0
Smelter Production	33.9	36.9	39.2	41.1	43.6	43.8	43.8	44.8	48.8	51.5	54.3
<i>% change</i>	6.0%	9.1%	6.2%	4.7%	6.2%	0.4%	0.0%	2.2%	8.9%	5.5%	5.5%
Global Consumption	34.2	36.4	38.7	40.4	41.6	42.5	44.4	46.7	49.2	51.6	52.9
<i>% change</i>	6.9%	6.6%	6.1%	4.4%	3.1%	2.2%	4.4%	5.3%	5.2%	4.8%	2.7%
Implied Surplus/Deficit	-0.3	0.5	0.6	0.7	2.0	1.3	-0.3	0.5	0.6	0.7	2.0
Implied Stocks (DOC)	47	49	52	56	73	82	74	55	49	47	55
Cash LME Price											
\$/tonne (Nominal \$)	2566	2500	2150	1873	1433	1386	1491	1633	1895	2050	1972
\$/tonne (2007 \$)		2500	2108	1800	1350	1280	1350	1450	1650	1750	1650

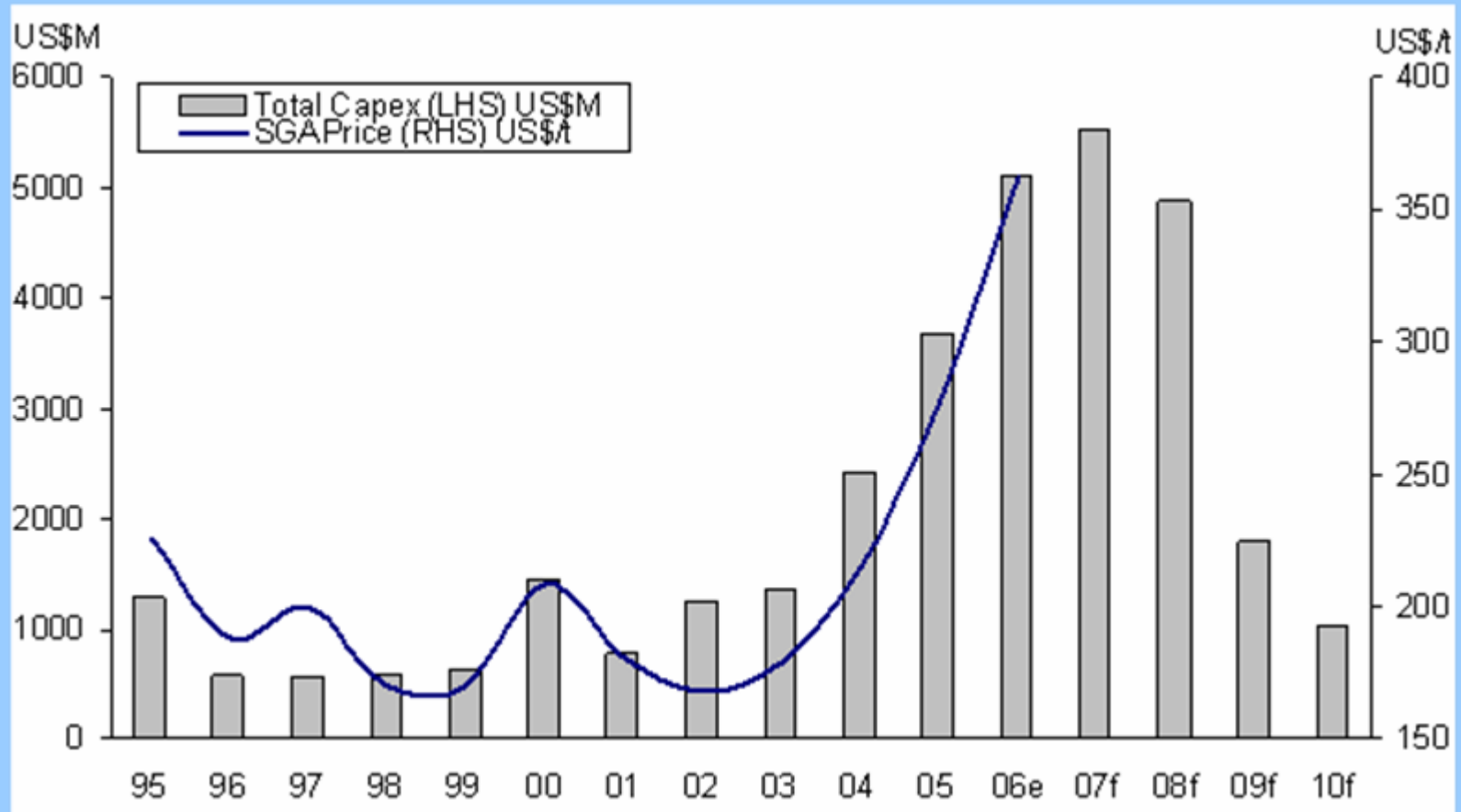
Future Long-run Metal Price US\$1650-1700/t



Alumina Market Developments

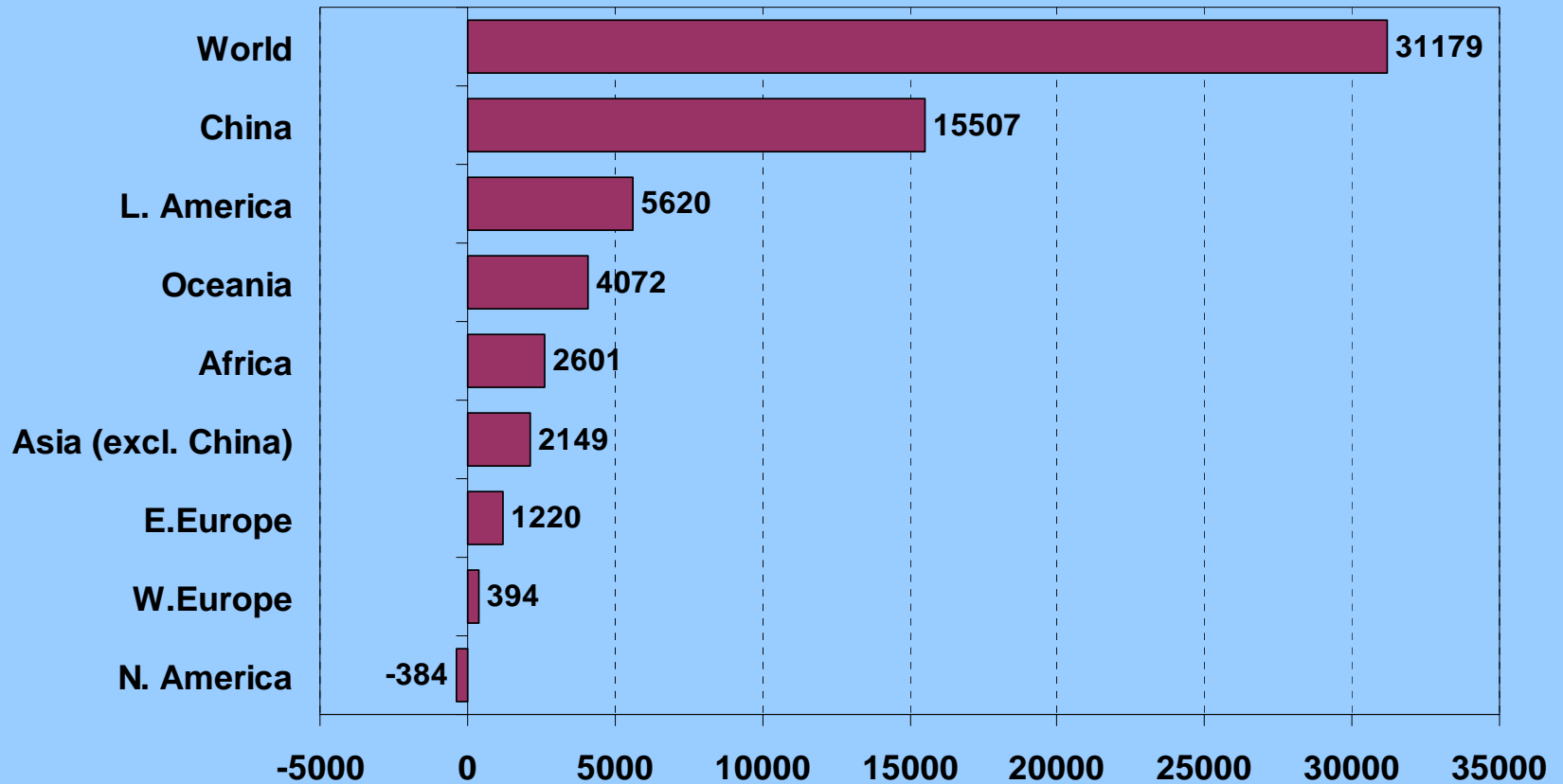


Refinery Capital Expenditure and Price



Refinery Output Growth 2006-2011 (kt)

(Assumes all expansions proceed as planned and no curtailments)



China to account for 50% of additional supply
Asia to account for 53% of additional supply

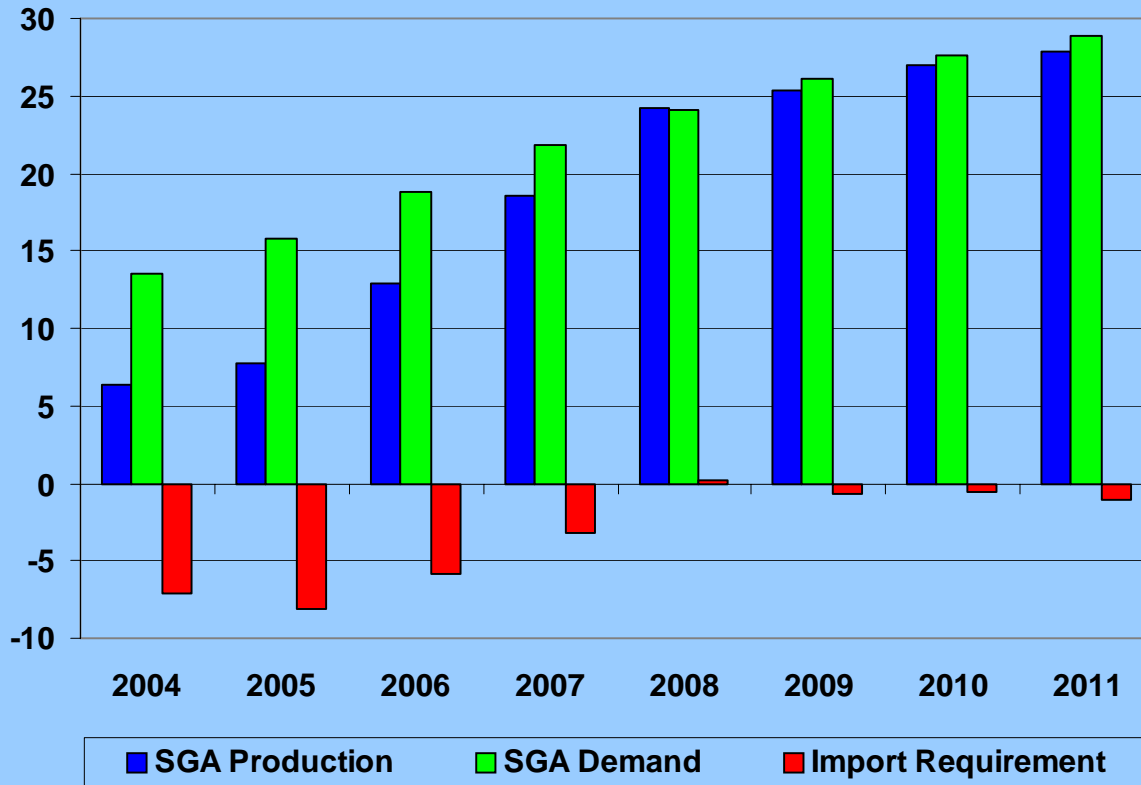


China Refinery Projects

Refinery	Province	Initial Capacity (kt/a)	Eventual Capacity (kt/a)
Baise	Guangxi	400	400
Baofeng Shenhua	Henan	350	1050
Dingtai Tuoyuan	Chongqing	150	300
East Hope Sanmenxia	Henan	400	1200
Feimei (Jiaokou)	Shanxi	800	800
Guixi Huayin	Guangxi	1600	3200
Guizhou Kaisheng	Guizhou	50	110
Kaiman (Sanmenxia)	Henan	600	1200
Lianyungang	Jiangsu	500	2400
Luneng Jinbei	Shanxi	1000	2000
Mengxi (Erdos)	Nei Mongol	400	400
Nanchuan	Chongqing	800	800
Nanchuan Xianfeng	Chongqing	150	300
Nanshan	Shandong	400	2100
Pingdingshan (Huiyuan Chemical)	Henan	300	300
Shanxi Tongde	Shanxi	400	1200
Wanji Xiangjiang	Henan	800	1200
Wuchuan	Guizhou	400	400
Wusheng	Shanxi	300	600
Xinfa Huayu (Chiping Xinfa)	Shandong	600	2000
Yangquan	Shanxi	800	1200
Yixiang (Yimei)	Henan	300	600
Yunnan	Yunnan	800	800
Zhongmei	Henan	400	1200
Zunyi	Guizhou	800	800
Total		13500	26560



China: SGA Production, Demand and Imports (Mt)



- Smelter output forecast to rise from 9.3Mt in 2006 to 14.6Mt in 2011
- SGA demand forecast to grow by an average of 11% or 2.2Mt/a over the next five years
- Domestic Production forecast to grow from 13Mt in 2006 to 28Mt in 2011.
- Net import position to fall from 6Mt in 2006 to zero by 2008 and +/- 1Mt from 2008 onwards
- But.....is the growth in alumina output sustainable ?



Global SGA Market Outlook (Mt)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Supply Potential	68.8	75.6	84.2	88.0	93.1	98.9	101.5	102.0	106.0	105.0	105.7
<i>Market Adjustment</i>	<i>0.0</i>	<i>-1.0</i>	<i>-6.0</i>	<i>-8.0</i>	<i>-9.0</i>	<i>-12.0</i>	<i>-16.0</i>	<i>-14.0</i>	<i>-10.0</i>	<i>-4.0</i>	<i>1.0</i>
Production	68.8	74.6	78.2	80.0	84.1	86.9	85.5	88.0	96.0	101.0	106.7
Smelter Demand	66.4	72.5	76.9	80.3	85.2	85.4	85.9	87.3	95.1	100.3	105.8
SGA Market Balance	2.4	2.1	1.3	-0.3	-1.1	1.5	-0.4	0.7	0.9	0.7	0.8
Stocks (Days of Consumption)	46	53	56	52	44	51	49	51	50	50	50
S-t Contract Price: \$/tonne	577	256	194	206	179	180	186	204	237	256	246
% of LME	22.5%	10.3%	9.0%	11.0%	12.5%	13.0%	12.5%	12.5%	12.5%	12.5%	12.5%
Spot Price: \$/tonne	420	225	208	220	220	220	225	225	230	240	240
% of LME	16.4%	9.0%	9.7%	11.7%	15.4%	15.9%	15.1%	13.8%	12.1%	11.7%	12.2%
LME Cash Price: \$/tonne	2566	2500	2150	1873	1433	1386	1491	1633	1895	2050	1972



Structural Issues Facing the Bauxite/Alumina Sector

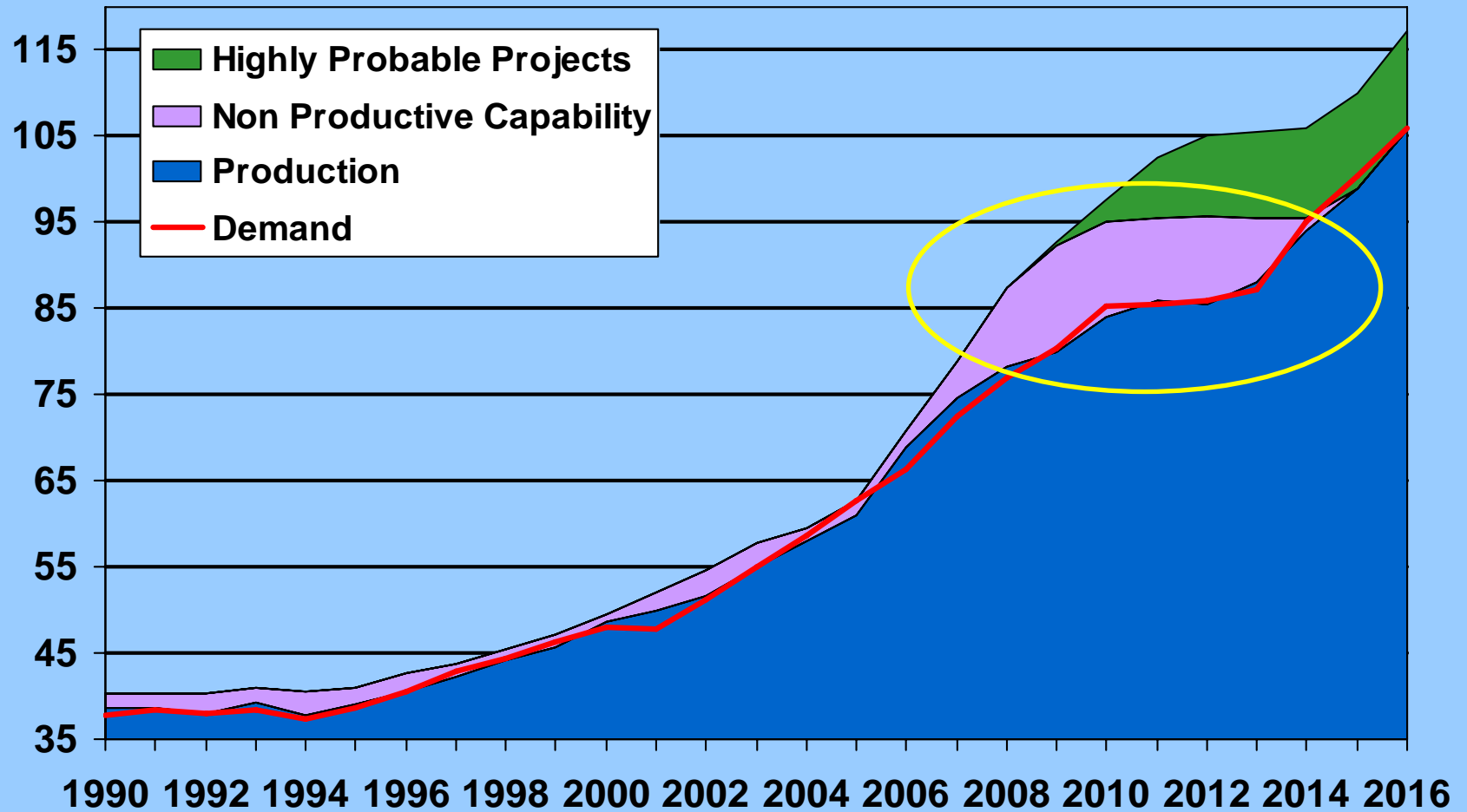


Structural Issues Facing the Alumina Sector

- **Medium term overcapacity**
- **Longer-term requirement for additional capacity**
- **Operating cost push.**
- **Capital cost push.**
- **Bauxite availability**
- **Robustness/viability of Chinese Alumina start-ups**



Global SGA Supply/Demand (Mt)

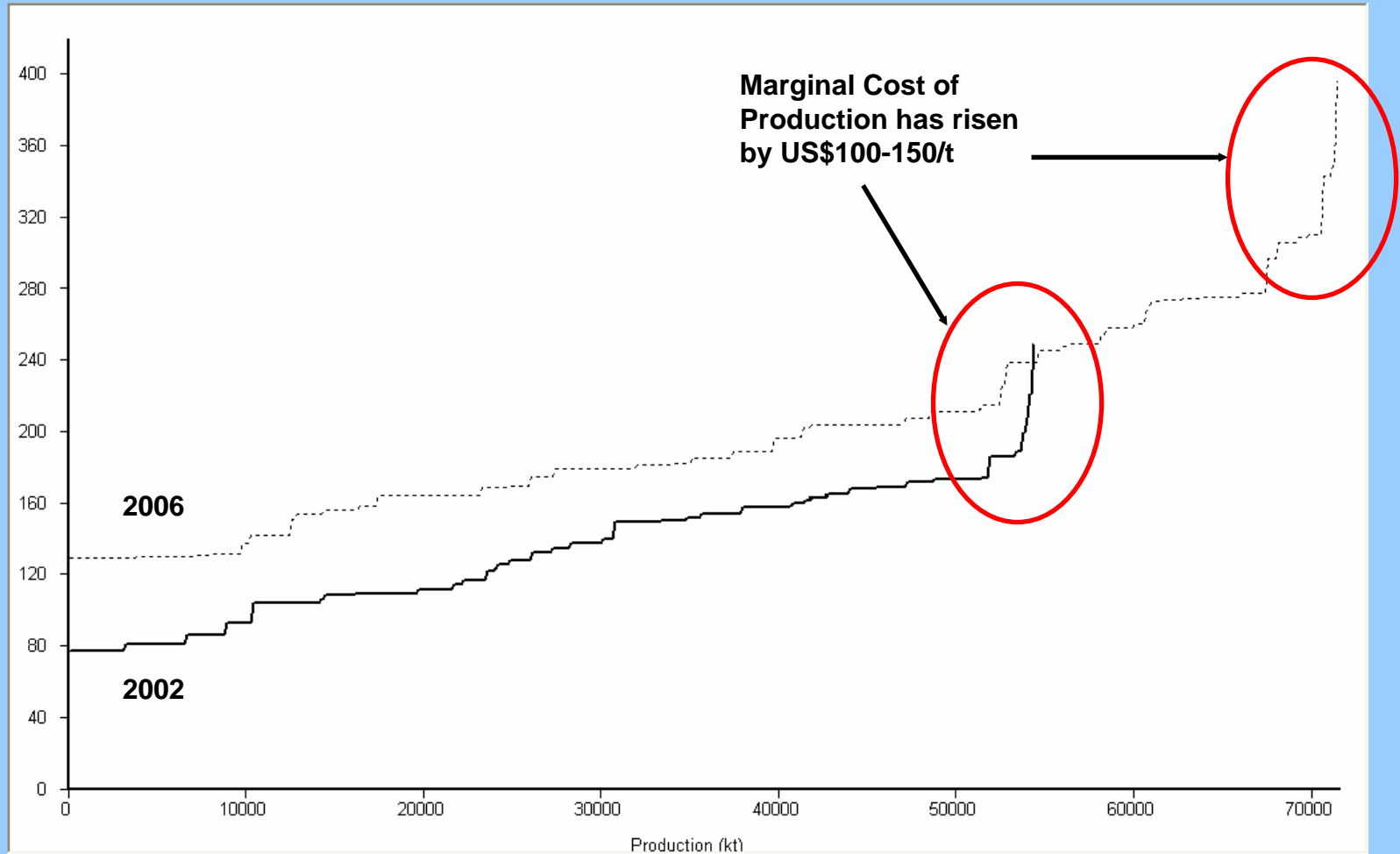


Requirement for new Refining Capacity

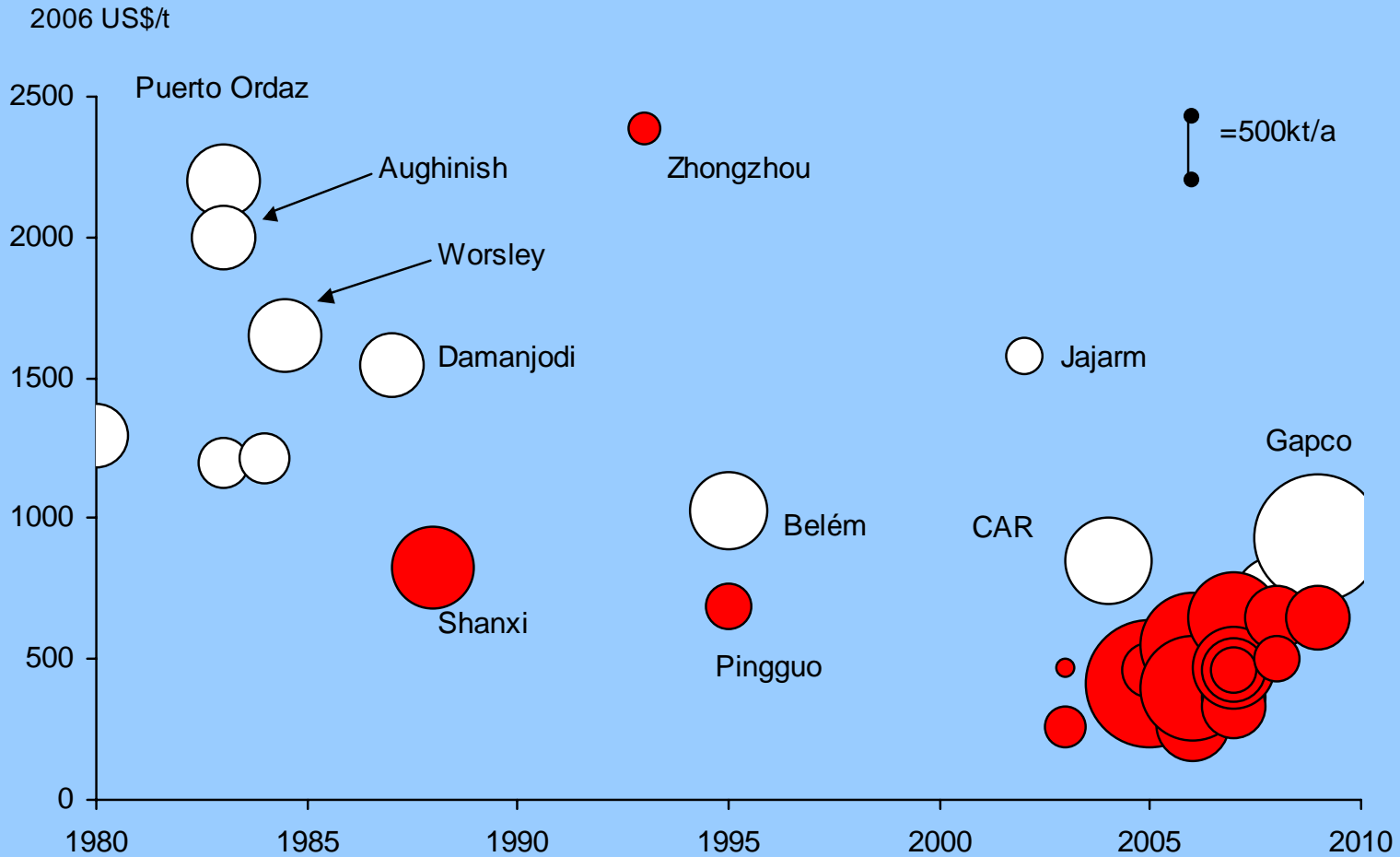
- **Global Primary Aluminium Demand and Supply projected to grow at 4% p.a or 1.9-2Mt/a over the next ten years.**
- **There will be the need for an additional 3.9-4Mt of SGA output each year.**
- **Global Demand for SGA Projected to rise from 66Mt in 2006 to 106Mt by 2016 i.e. +40Mt.**
- **Assuming historic trends continue (+0.2% p.a to capacity), creep will add a total of 1.5Mt to capacity by 2016.**
- **The net additional requirement for new capacity will be 38.5Mt or 3.85Mt/a.**
- **Based on historic precedent greenfield expansion will account for 39% (15Mt) and brownfield 61% (23.5Mt)**



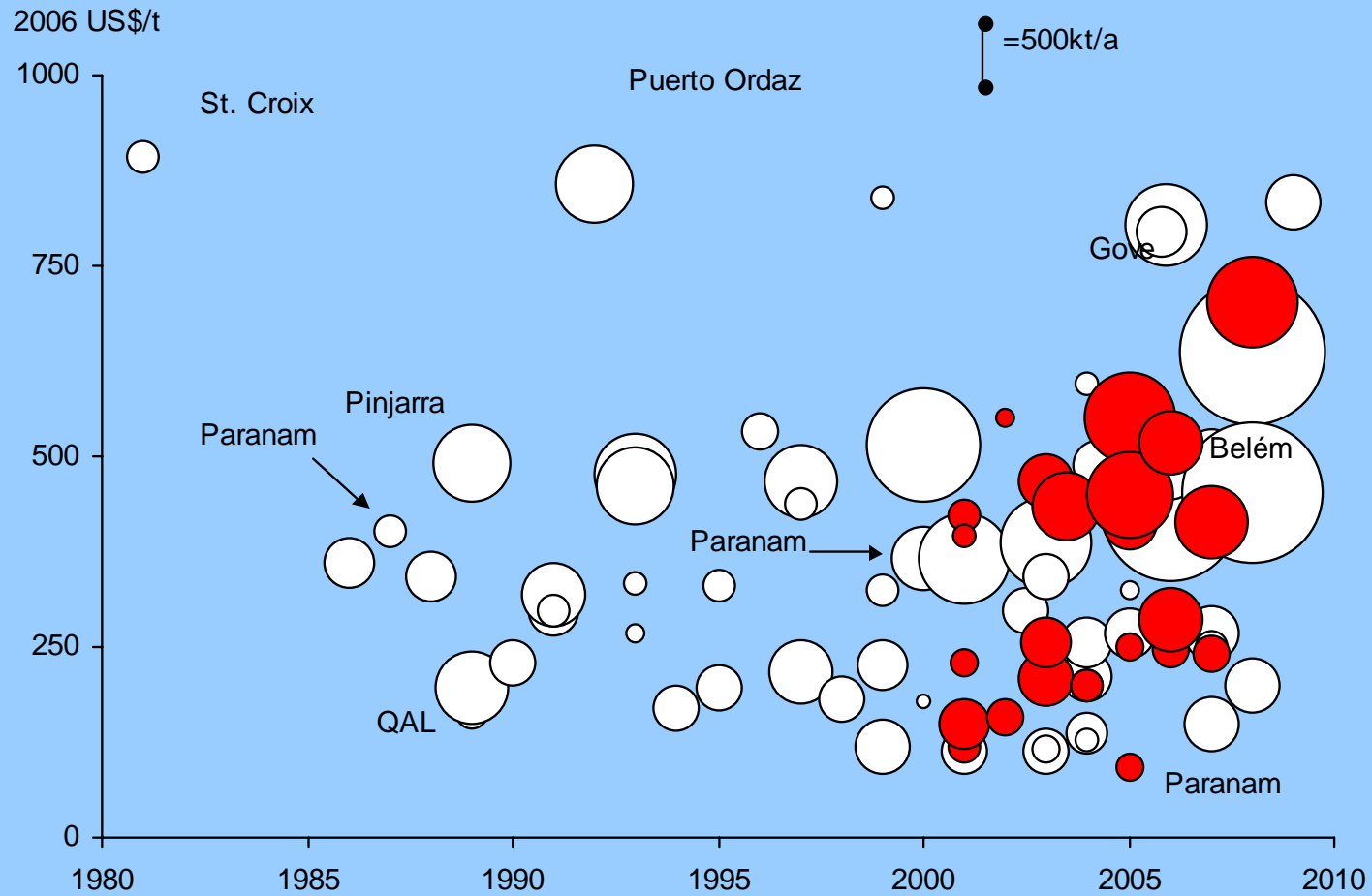
Global Refinery Cash Costs (US\$/t)



Greenfield Refinery Capital Costs, 1980-2010 (2006 US\$/t)

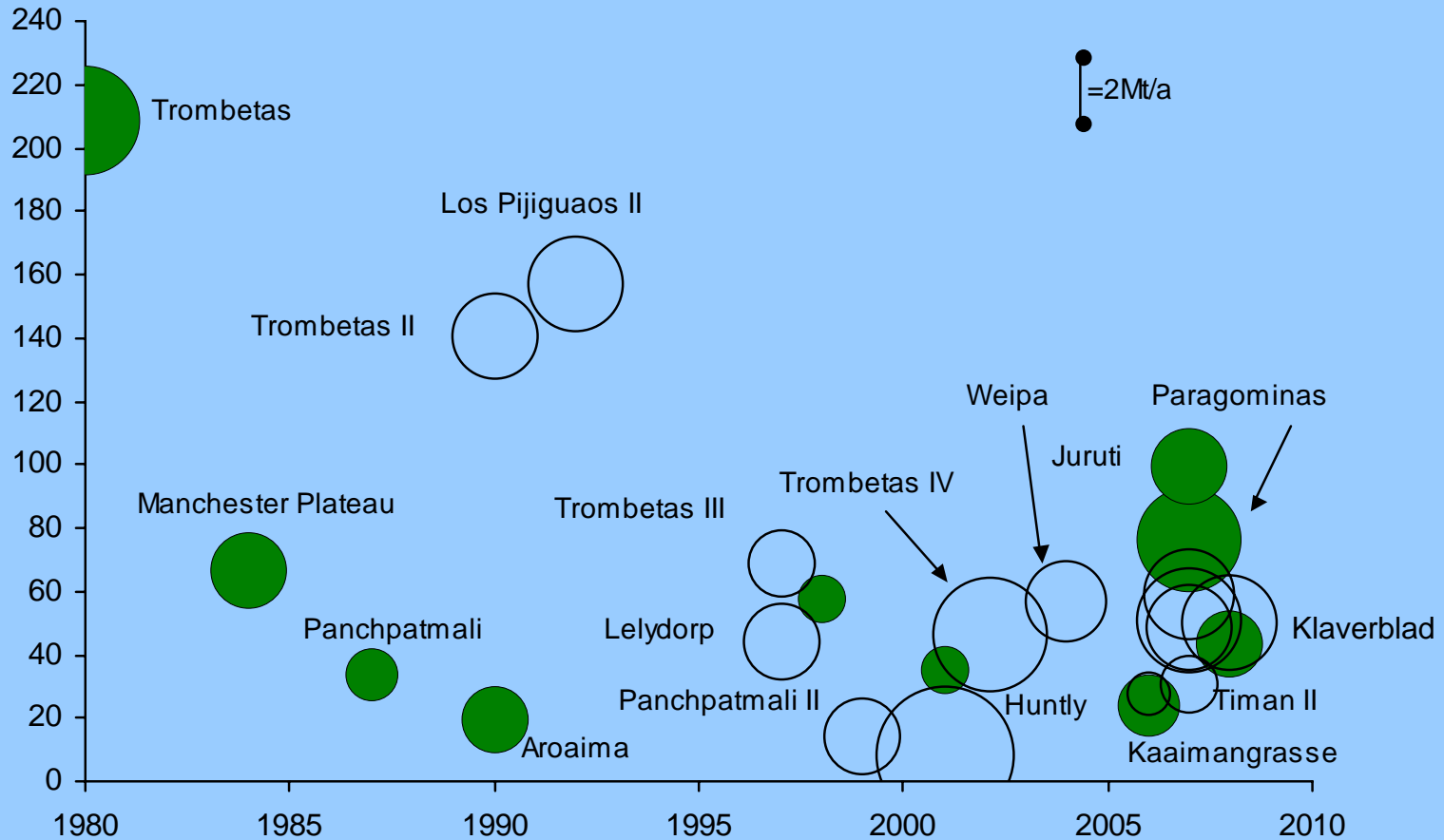


Brownfield Refinery Capital Costs, 1980-2010 (2006 US\$/t)



Mine Capital Costs, 1980-2010 (2006 US\$/t)

US\$/t Capacity

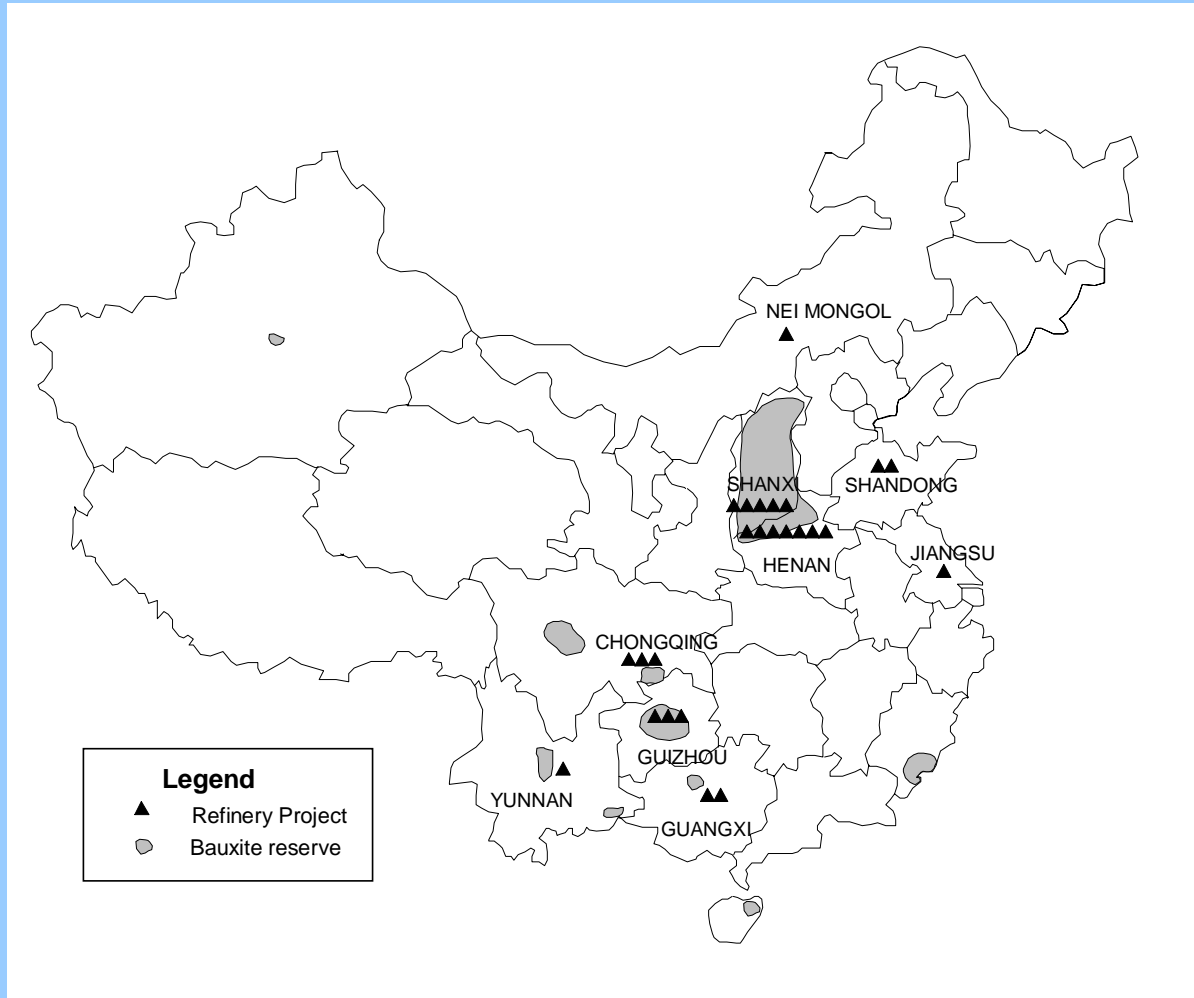


Bauxite Reserves/Resources by Country, 2005

Country	Reserves (Bnt)	Measured & Indicated (Bnt)	Total (Bnt)	% of World	Production (Mt)	Years @ 2005 Production
Guinea	7.4	8.6	16.0	28%	19.2	832
Australia	5.7	7.7	13.4	24%	60.0	223
Jamaica	2.0	2.5	4.5	8%	14.1	319
Brazil	1.9	2.5	4.4	8%	22.0	200
China	0.7	2.3	3.0	5%	18.0	167
India	0.8	1.4	2.2	4%	12.4	175
Guyana	0.7	0.9	1.6	3%	1.5	1086
Greece	0.6	0.7	1.3	2%	2.5	501
Suriname	0.6	0.6	1.2	2%	4.0	294
Kazakhstan	0.4	0.4	0.7	1%	4.8	147
Venezuela	0.3	0.4	0.7	1%	5.8	115
Russia	0.2	0.3	0.5	1%	6.4	70
Other	3.4	4.0	7.4	13%	5.6	1315
Total	24.6	32.1	56.8	100%	176.4	322



China Bauxite Reserves and Refinery Locations



China Bauxite Production/Requirements and Reserves

	2005	Bauxite Requirement	
		Chalco + Initial	Chalco + Ultimate
Production (Mt)	17	44.5	62.3
Reserves (Mt)	700	700	700
Reserve Base (Mt)	2300	2300	2300
Years (equivalent - reserves)	41	16	11
Years (equivalent - reserve base)	135	52	37

Significant exploration is underway reflecting high bauxite prices and concerns regarding the reserve base.

A further 670Mt of reserves have been discovered in Chongqing province during 2006. Chalco has the mining licence.

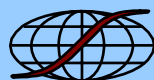
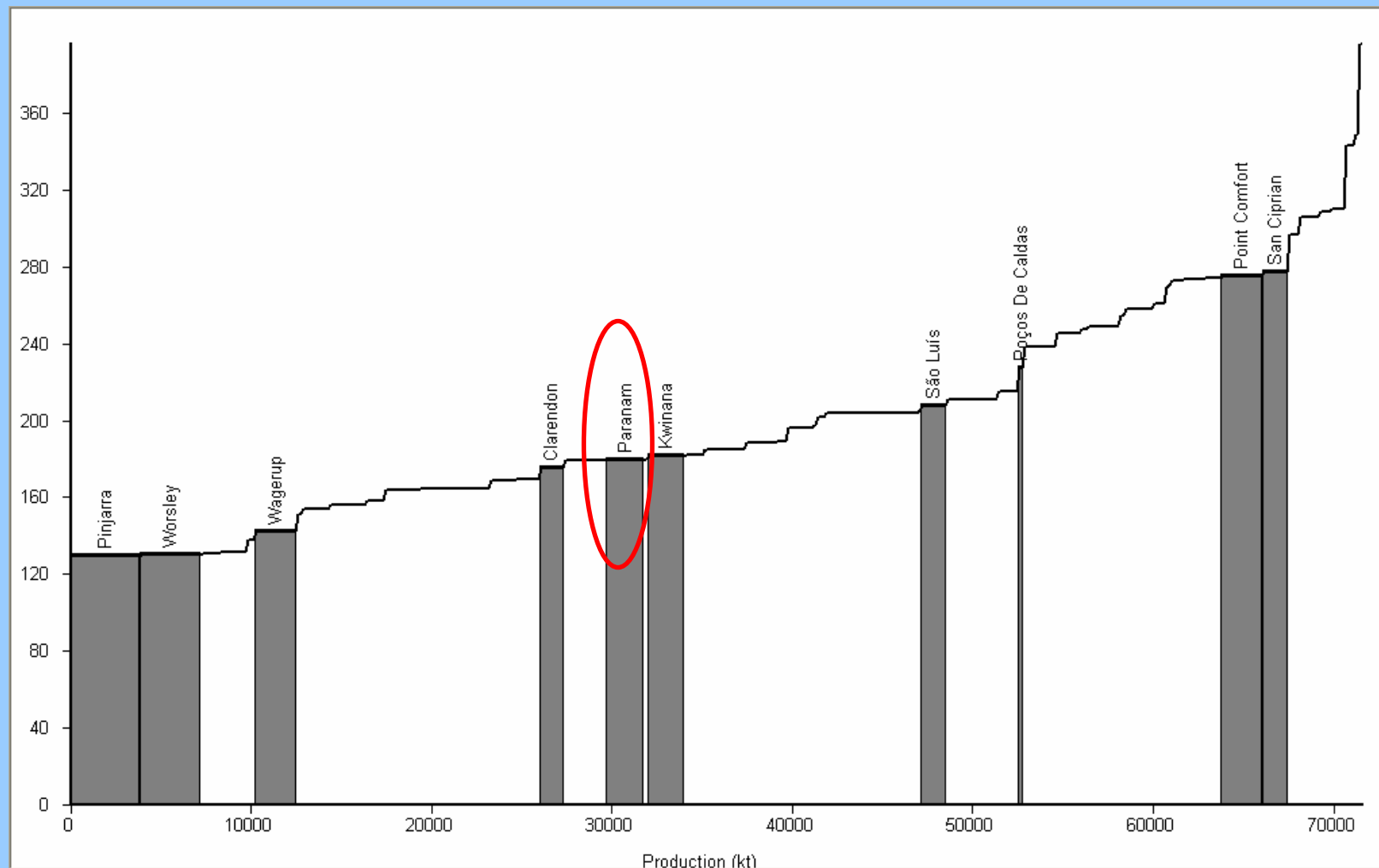
Three greenfield refineries with a planned ultimate capacity of potentially 6-7Mt/a will utilise imported bauxite. Imports will have to rise from 7Mt in 2005 to 16Mt/a + to meet bauxite demand. Uncertainty surrounding supplies of bauxite from Indonesia, Australia and India going forward.



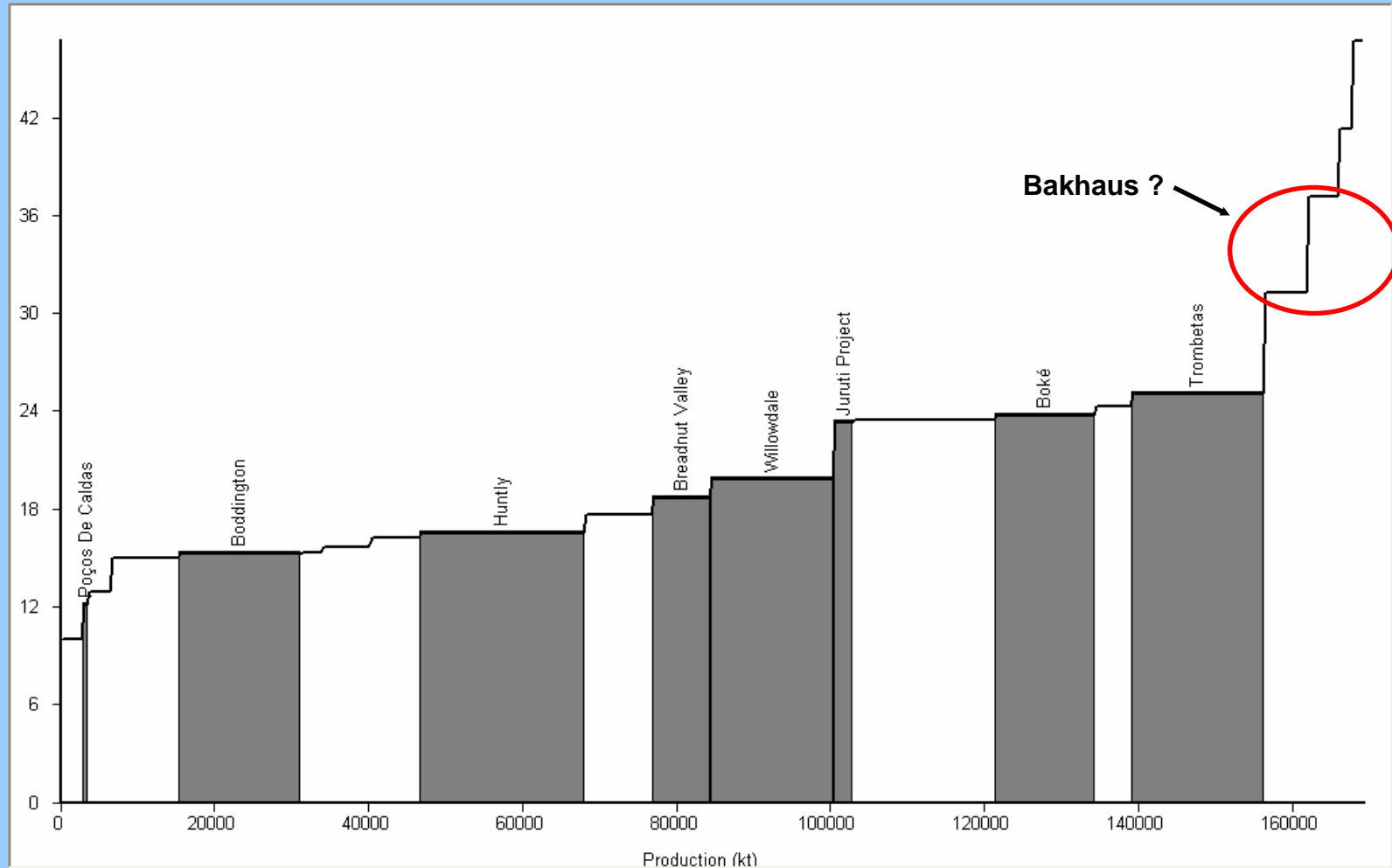
**How does Suriname compare with its
AWAC/BHP Billiton peers ?**



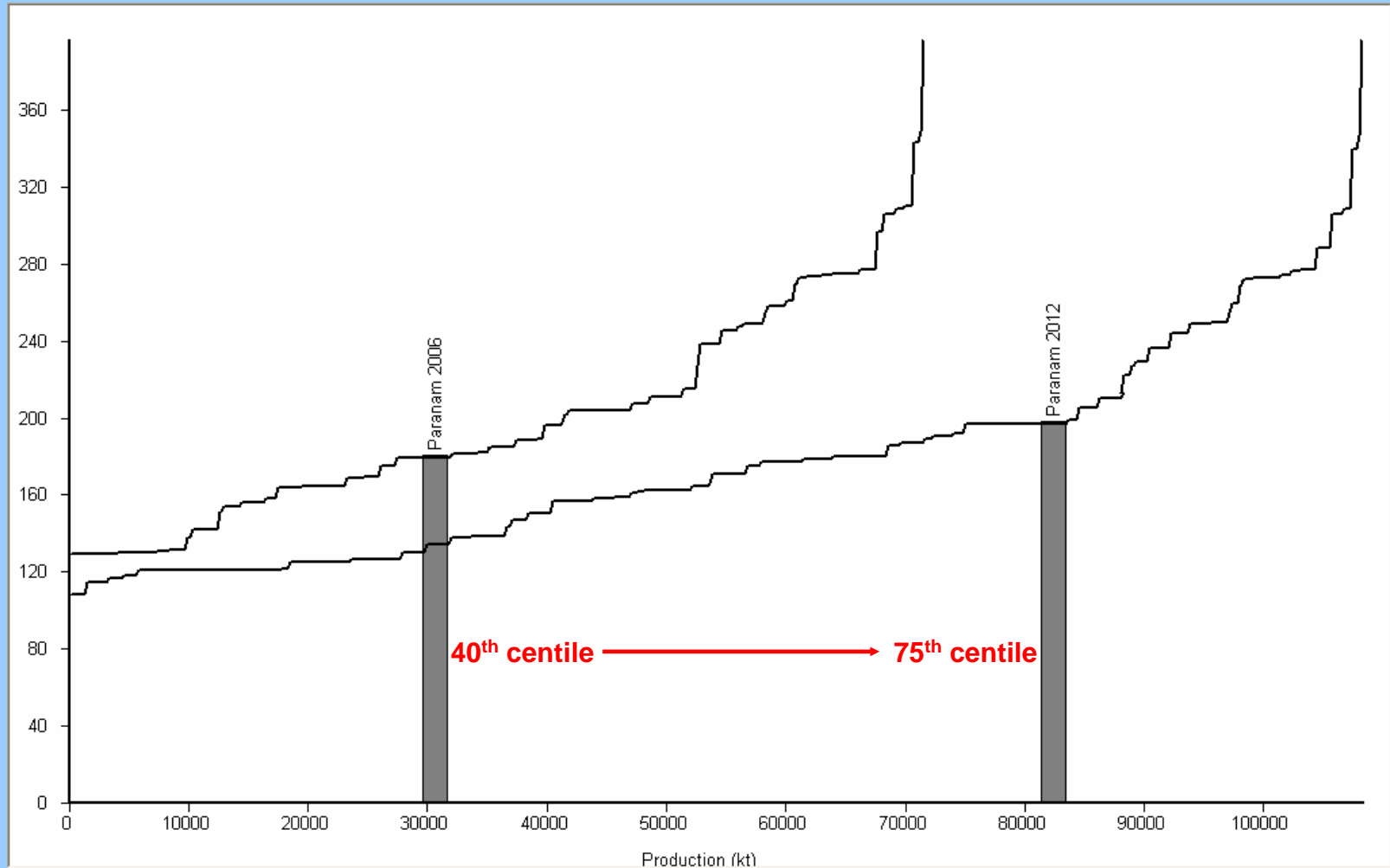
Alcoa/AWAC & BHP Billiton Refinery Cash Costs, 2006 (US\$/t)



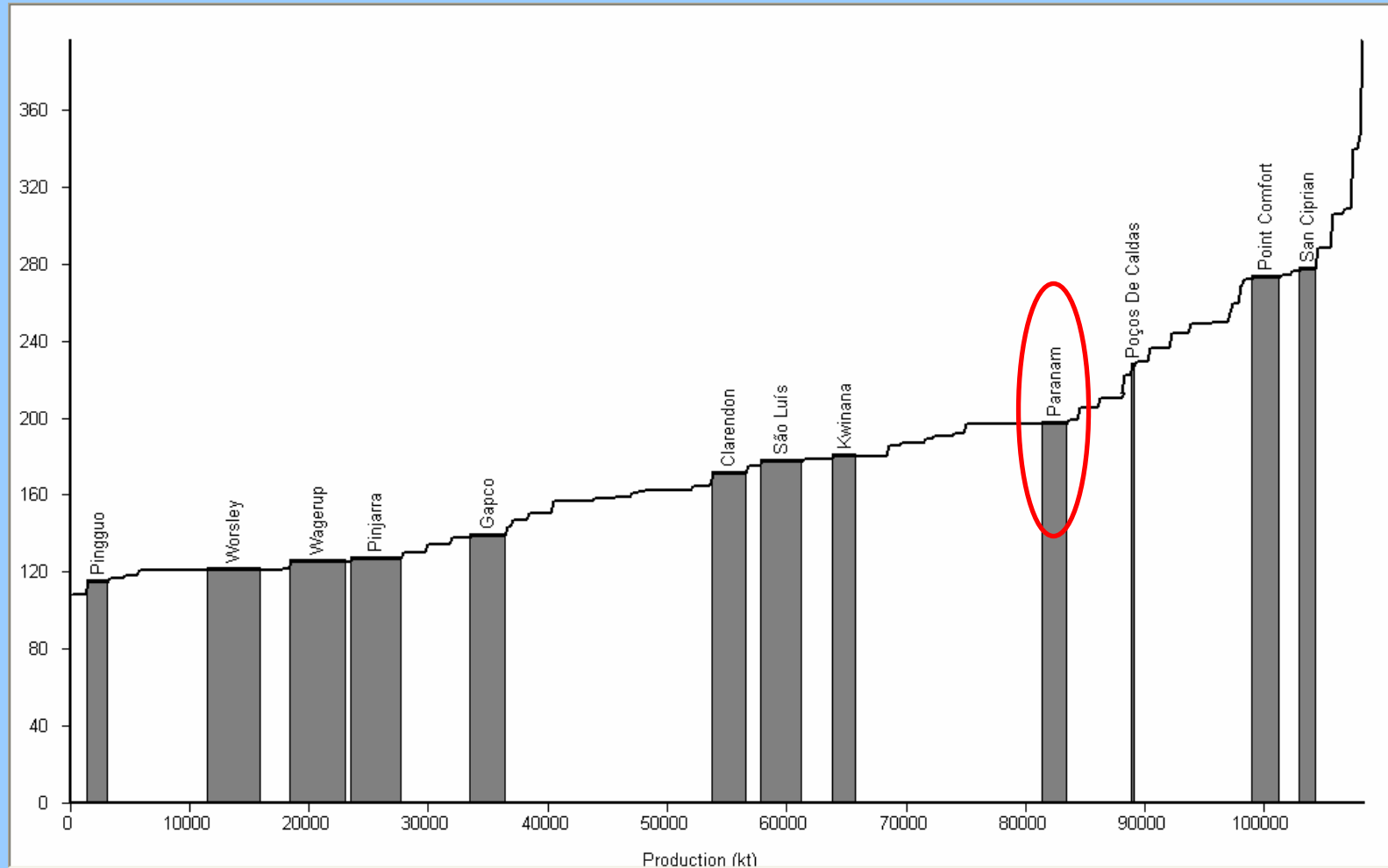
Alcoa/AWAC & BHP Billiton Mine C2 Costs (Cash+ Depn, Alumina Eqv Basis, 2012 (US\$/t)



Paranam Cash Costs, 2012 vs 2006 (US\$/t, \$2006 Basis)



Alcoa/AWAC & BHP Billiton Refinery Cash Costs, 2012 (US\$/t, \$2006 Basis)



BHP Billiton Project Pipeline



Alcoa/AWAC & BHP Billiton Project Pipeline

	Country	Project	Classification	Share	Capacity (kt)	Timing	Comments
BHP Billiton	Brazil	Alumar	Base Case	36%	2100	2009	Under Construction
	Guinea	Sangaredi	Highly Probable	33%	3200	2010	Country risk ?
	Australia	Worsley	Probable	86%	900	2012	Additional train
	Suriname	Paranam	Possible	45%	1000	2012	Brownfield expansion
	Suriname	Bakhaus	Possible	45%	1500	2012+	Greenfield Plant
Alcoa/AWAC	China	Pingguo	Highly Probable	50%	1850	2008/9	Equity agreement to be concluded ?
	Brazil	Alumar	Base Case	54%	2100	2009	Under Construction
	Jamaica	Clarendon	Highly Probable	100%	1350	2011	Consequent upon gas agreement
	Australia	Wagerup	Highly Probable	100%	2200	2011	Environmental approval in place
	Suriname	Paranam	Possible	55%	1000	2012	Brownfield expansion
	Suriname	Bakhaus	Possible	55%	1500	2012+	Greenfield Plant
	Guinea	Greenfield	Possible	50%	1500	2012	JV With Alcan
	Ghana	Greenfield	Possible	100%	1500	2012	Integrated mine/refinery/smelter



Key Issues for Paranam going Forward

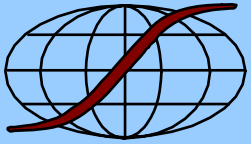
- **Medium term outlook (to 2010) for the refinery appears assured as there are no alternatives to the replacement of this capacity on these timescales.**
- **Long-term future of Paranam refinery is critically dependent upon the competitive supply of bauxite.**
- **Paranam will be moving up the cost curve due to new low cost entrants and Bakhaus bauxite due to low grade and extended supply chain...but beneficiation may provide a solution.**
- **Despite moving up the cost curve the refinery will remain cash positive even in the down cycle ensuring economic and physical viability.**
- **Paranam plant is fully written down so it has advantages versus some peers requiring major capex.**
- **Bakhaus Greenfield investment decision will be driven by financial criteria and will have to compete for investment dollars with other alternatives.**
- **Suriname offers a stable political/regulatory environment whereas some alternative locations expose principals to greater risk...Guinea, Ghana.**



What Role For Suriname in the New Alumina Dynamic ?

- **When Bakhaus issues are resolved Paranam has a major part to play in Alcoa/AWAC and BHP Billiton's alumina plans.**
- **Paranam will be a mid-tier producer but is reliable, viable and has good proximity to market.**
- **Suriname offers a stable political/regulatory environment whereas some alternative locations expose principals to greater risk...Guinea, Ghana.**
- **Bahkaus greenfield must provide equal or greater returns than alternative greenfield and brownfield investments in order for the go-ahead to be given.**
- **Suriname has an important role to play in the global bauxite/alumina sector.**





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What role for Suriname in the new alumina dynamic

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