

# Capital Markets Day

December 3, 2015



HYDRO



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# Cautionary note in relation to certain forward-looking statements

Certain statements included within this announcement contain forward-looking information, including, without limitation, those relating to (a) forecasts, projections and estimates, (b) statements of management's plans, objectives and strategies for Hydro, such as planned expansions, investments or other projects, (c) targeted production volumes and costs, capacities or rates, start-up costs, cost reductions and profit objectives, (d) various expectations about future developments in Hydro's markets, particularly prices, supply and demand and competition, (e) results of operations, (f) margins, (g) growth rates, (h) risk management, as well as (i) statements preceded by "expected", "scheduled", "targeted", "planned", "proposed", "intended" or similar statements.

Although we believe that the expectations reflected in such forward-looking statements are reasonable, these forward-looking statements are based on a number of assumptions and forecasts that, by their nature, involve risk and uncertainty. Various factors could cause our actual results to differ materially from those projected in a forward-looking statement or affect the extent to which a particular projection is realized. Factors that could cause these differences include, but are not limited to: our continued ability to reposition and restructure our upstream and downstream aluminium business; changes in availability and cost of energy and raw materials; global supply and demand for aluminium and aluminium products; world economic growth, including rates of inflation and industrial production; changes in the relative value of currencies and the value of commodity contracts; trends in Hydro's key markets and competition; and legislative, regulatory and political factors.

No assurance can be given that such expectations will prove to have been correct. Hydro disclaims any obligation to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise.



# Well-positioned in challenging markets

Svein Richard Brandtzæg

Capital Markets Day 2015



# Building competitiveness through HSE, CSR and compliance



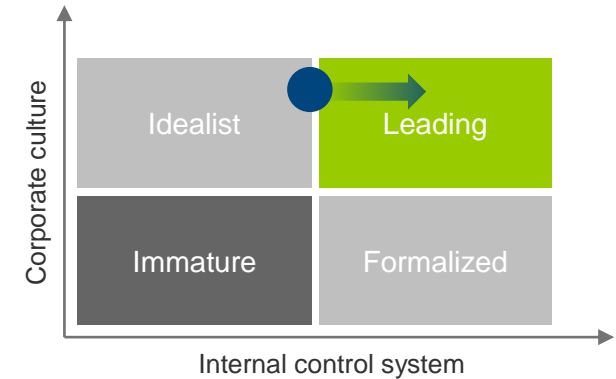
Safety performance (TRI) at industry benchmark

3.1\*



Carbon-neutral from a life-cycle perspective

On track



Hydro highly ranked in global compliance comparison study\*\*

- HSE, CSR and compliance always first on the Hydro priority list and part of the company's license to operate
- Strong correlation between financial and non-financial performance
- Clear lines of responsibility throughout the organization and in all business areas on HSE and CSR
- Leading practice on compliance culture, but with improvement potential to clarify and harmonize internal control system

\* TRI rate YTD end-Oct-15 – total recordable incidents per million hours worked

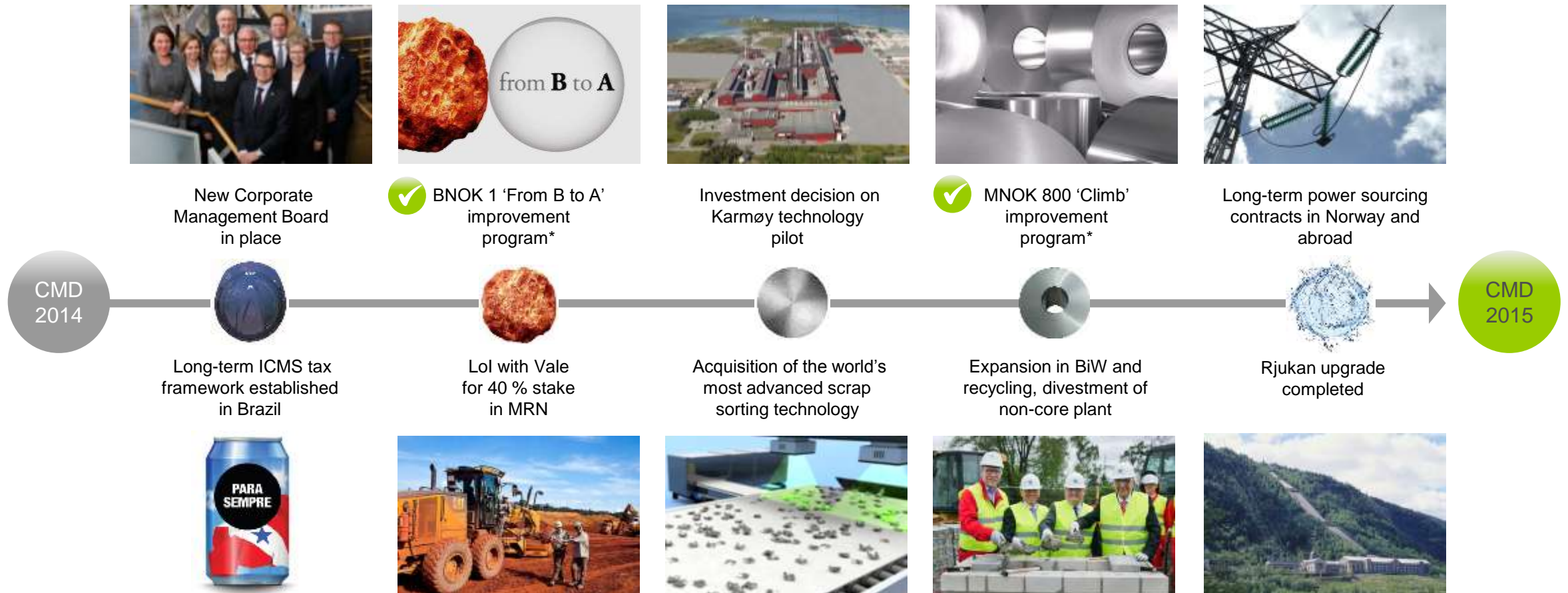
\*\* Deloitte: comparative study 2015 on behalf of Hydro

Hydro's aspiration for higher value creation



*Better Bigger Greener*

# 2015: Optimizing and high-grading in challenging markets



\* Based on status start of December

# Ambitious aspiration on track

	Ambitions from CMD 2014	Timeframe	Progress <sup>1</sup>	Status
<i>Better</i>	• Improve safety performance, reduce TRI < 2	2020	3.1	●
	• Realize BNOK 1.5 from ongoing improvement efforts	2016	0.8 BNOK	●
	• Replace expiring power contracts for Norwegian smelters	2020	4.1 TWh	●
	• Lift Paragominas production to 9,9 mill mt/yr	2015	9.9 mill mt/yr	●
	• Lift Alunorte production to 6,2 mill mt/yr	2015	5.9 mill mt/yr	●
	• Convert > 85% <sup>2</sup> of alumina sales to PAX-based pricing	2020	35 % PAX <sup>3</sup>	●
	• Extend technology lead with Karmøy technology pilot	2016	Investment decision	●
<i>Bigger</i>	• Expand automotive BiW capacity to 200,000 mt/yr <sup>4</sup>	2017	On track	●
	• Start production of >40,000 mt/yr UBC <sup>5</sup> recycling line	2015	Completed	●
	• Realize 100,000 mt/yr capacity creep in fully-owned smelters	2025	~10 000 mt/yr	●
	• Secure and develop bauxite resources for future decades	Long-term	MRN Lol	●
<i>Greener</i>	• Become carbon-neutral from a life-cycle perspective	2020	On track	●
	• Increase recycling of post-consumed scrap above 250,000 mt/yr	2020	135,000 mt/yr	●
	• Deliver on re-forestation ambition 1:1	2017	On track	●

1) Based on 2015 estimate or YTD annualized  
 2) Based on sourcing volume of ~2.3 million tonnes per year  
 3) Based on sourcing volume of ~ 2.7 million tonnes for 2015  
 4) Refers to nominal capacity  
 5) Used beverage can

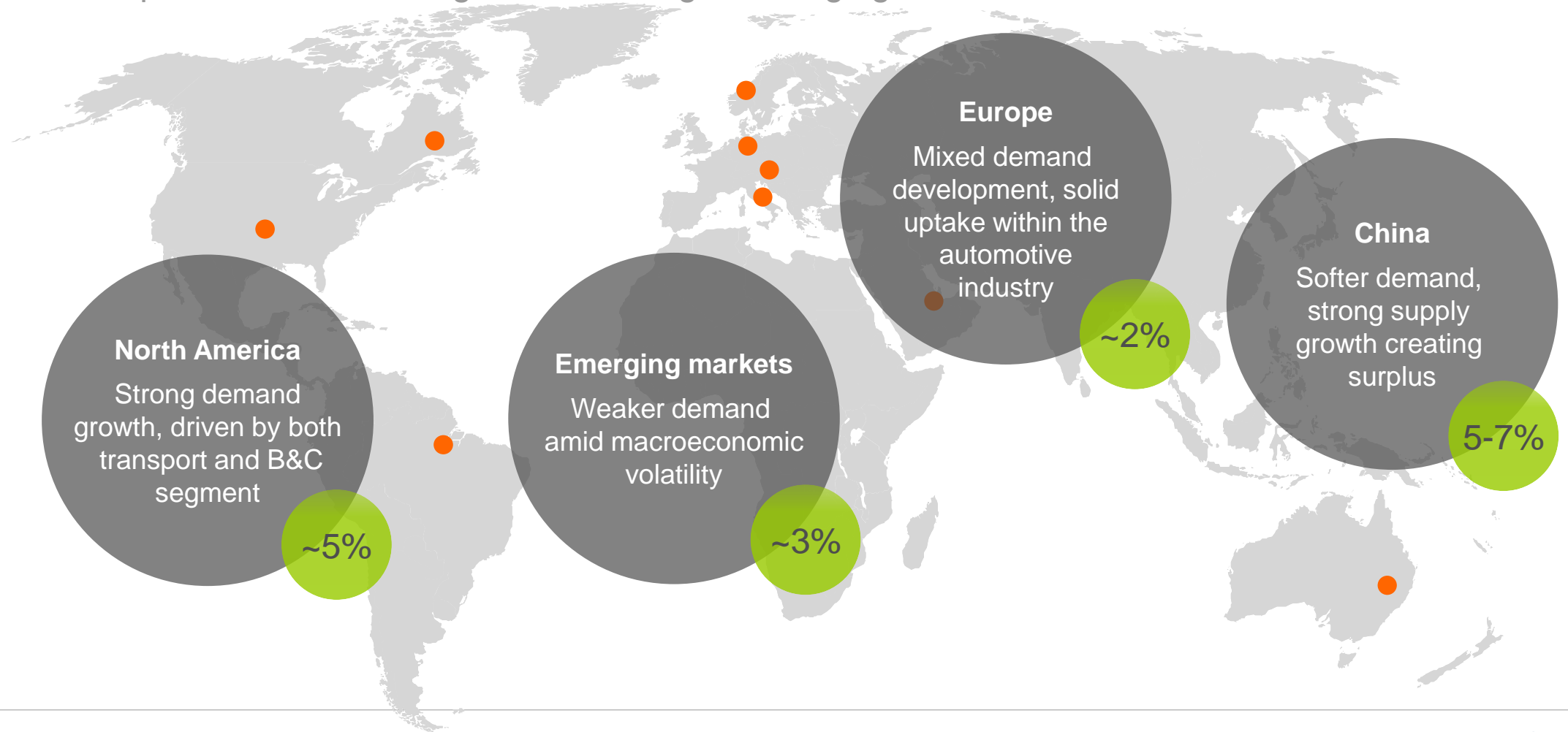


Strong demand  
growth, near-term  
supply overhang



# Primary demand growth of 4-5% expected in 2016

Mixed developments in mature regions, softening in emerging markets



# Aluminium's many qualities support robust long-term demand growth

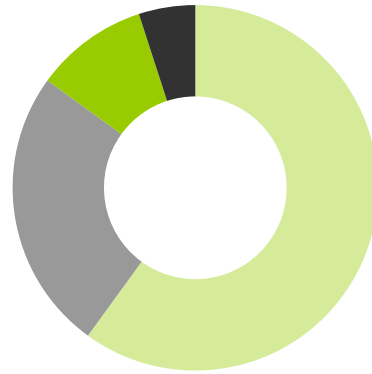
Highly versatile material with wide range of applications and end-user benefits

Aluminium demand per segment



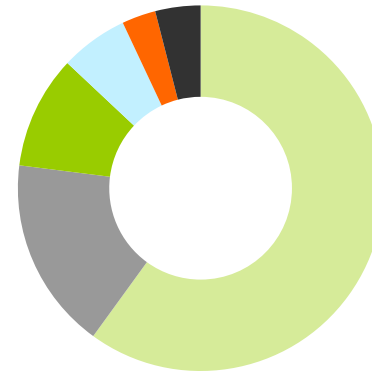
- Transport
- Construction
- Packaging
- Foil
- Electrical
- Consumer durables
- Machinery & Equipment
- Other

Copper demand per segment



- Electrical wire
- Roofing and plumbing
- Industrial machinery
- Other

Steel demand per segment



- Construction
- Engineering
- Transport
- Energy
- Home appliances
- Other

Global primary aluminium demand growth 2015-2025

3-4 %  
CAGR

Source: CRU, Global Insight

# Aluminium continues to win ground in automotive

Hydro continues developing solutions to accelerate substitution trend



13 %  
CAGR\*  
~75% growth  
last year

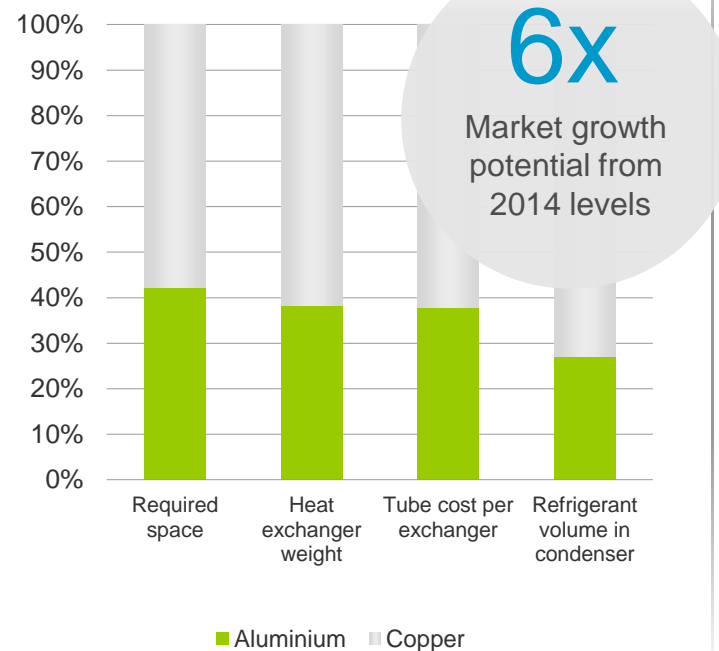
# Aluminium also gaining market share from copper

Price competitive with copper on a volume conductivity equivalent basis

Further potential to substitute copper with aluminium in automotive cables



Aluminium shows clear advantages within HVAC & R vs copper



Strong potential within long-distance transmission lines in emerging markets



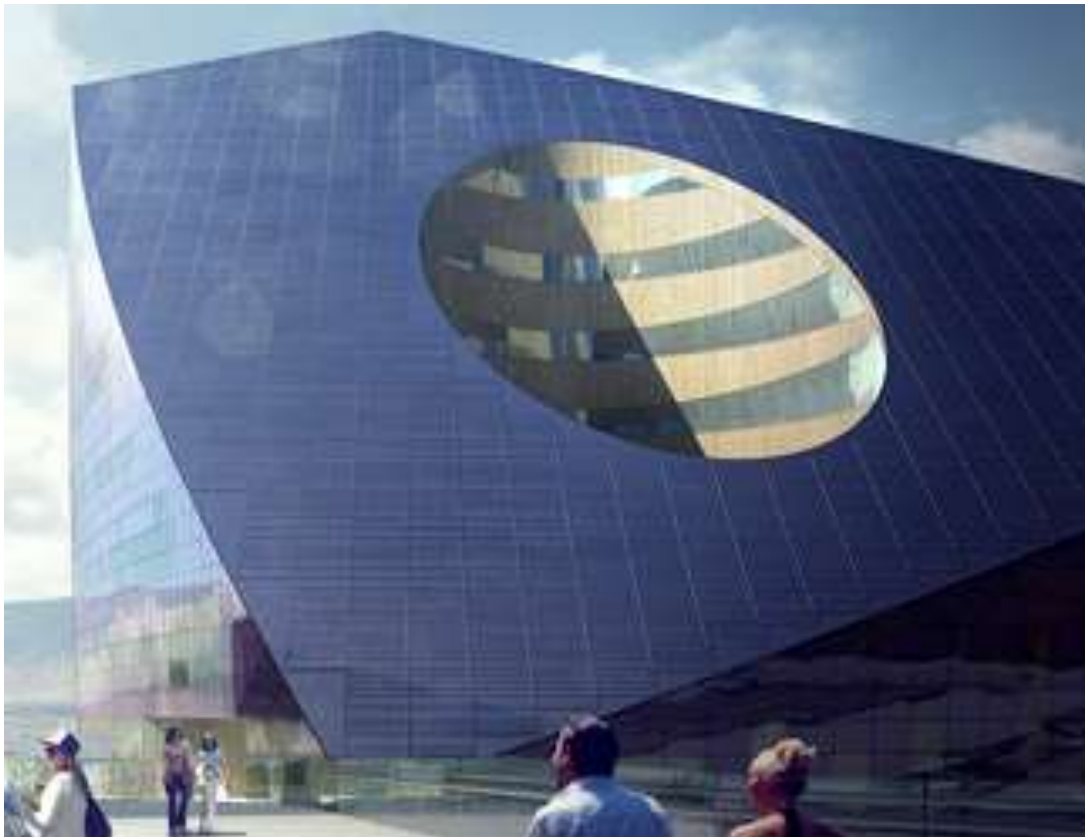
1)Based on 25 kg of copper cabling in a car, and replacing this all with aluminium.

2)Cumulative annual growth rate

Source: CRU; Sapa analysis

# Aluminium is a key enabler for sustainable buildings

Growth supported by energy-efficiency legislation



## Energy-efficiency legislation supports aluminium

Buildings account for ~ 40% of energy consumption worldwide, triggering response from the legislators



**European Union**  
2012 Energy Efficiency Directive



**US**  
Building Energy Use laws

## Benefits of aluminium in buildings

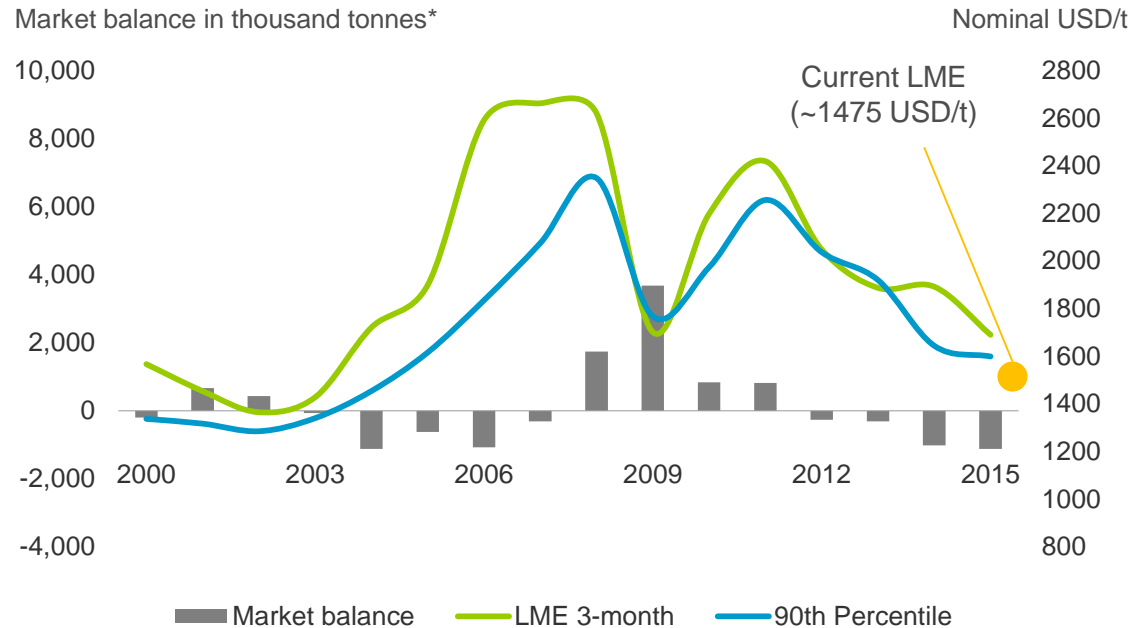
- Light weight contributes to efficient use of materials
- Design flexibility and formability enable optimized building shapes
- High light reflectivity, electrical and thermal conductivity support overall energy-efficiency
- Recyclability reduces energy consumption from a lifecycle perspective
- Suitable for indoor and outdoor use: corrosion resistant, durable, low maintenance, safe and non-toxic

# Aluminium price falls on global oversupply and lower cost curve

Disrupting the strong correlation between LME and 90<sup>th</sup> percentile smelters

## World ex-China

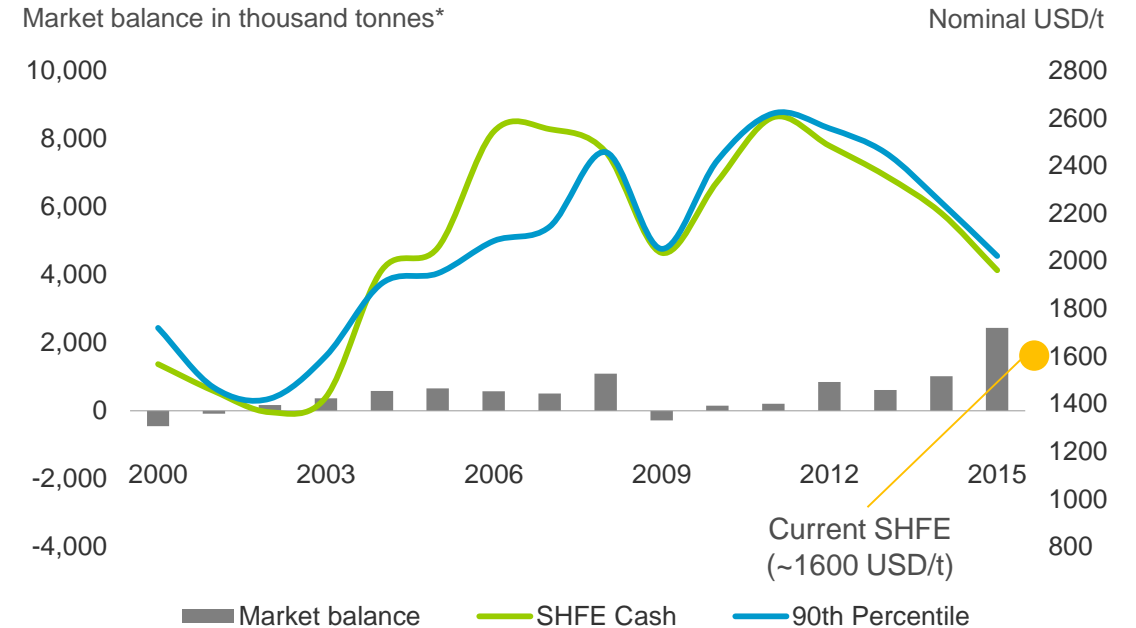
Market balance in thousand tonnes\*



- Cost curve moving down due to lower underlying cost elements, currency and curtailments

## China

Market balance in thousand tonnes\*



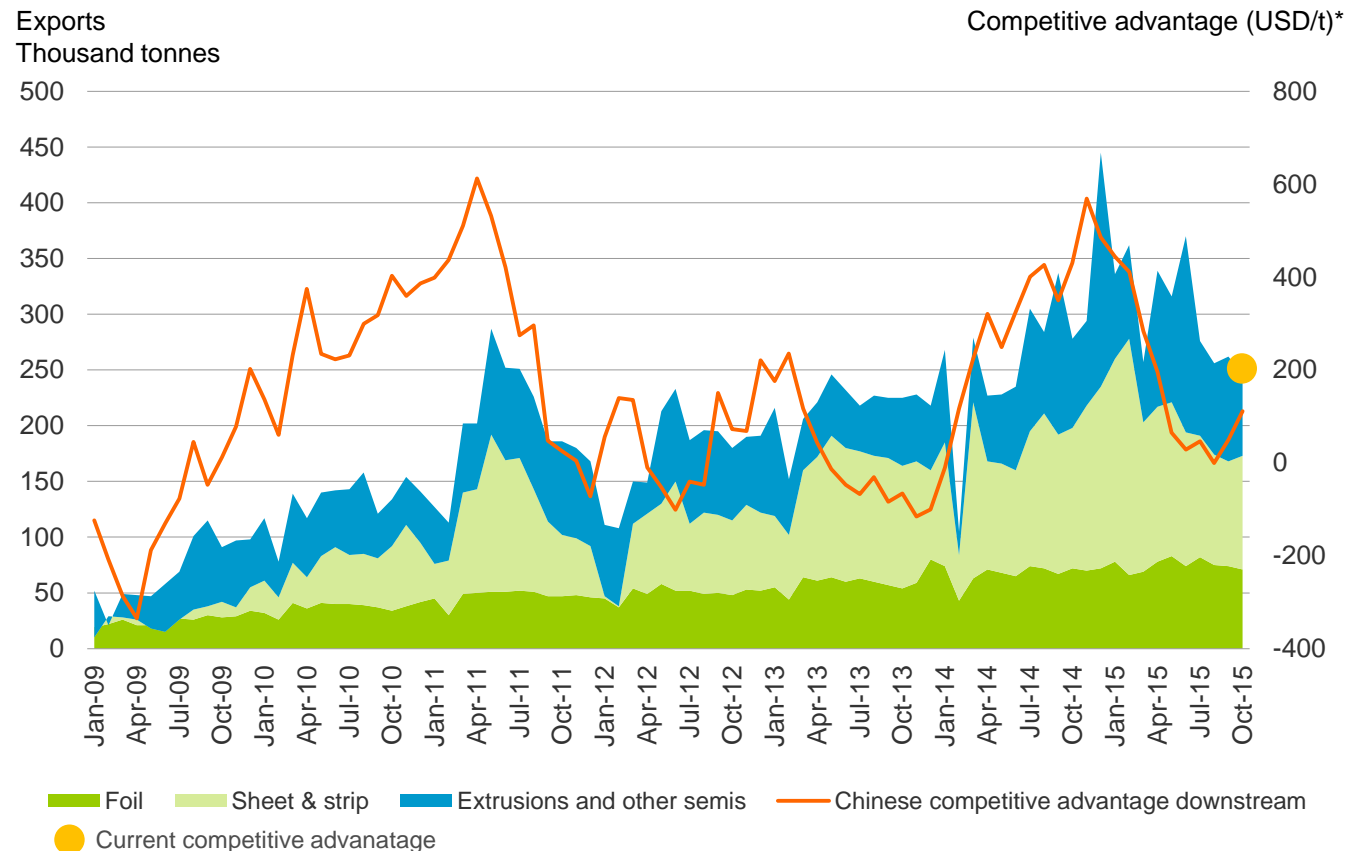
- SHFE price falls into uncharted territory
- At present, a large share of primary smelters cash negative
- Closures have been announced, still overcapacity

Source: CRU, Hydro Analysis

\*Primary production less primary demand

# Chinese semis exports close the supply gap in the rest of the world

Driven by arbitrage opportunities and domestic oversupply



- Growth in net semis exports over the last year amid relatively higher all-in prices outside China
  - Facilitated by 13-15% VAT rebate on downstream products
  - Removal of 15% export tax on some simple product categories
  - Some semis exported for remelt
- Moderating export levels during last months on the back of reduced arbitrage opportunity

Source: CRU, Antaika, Hydro Analysis

\*Est. metal cost China versus Europe

Europe: LME cash + European duty-paid standard ingot premium

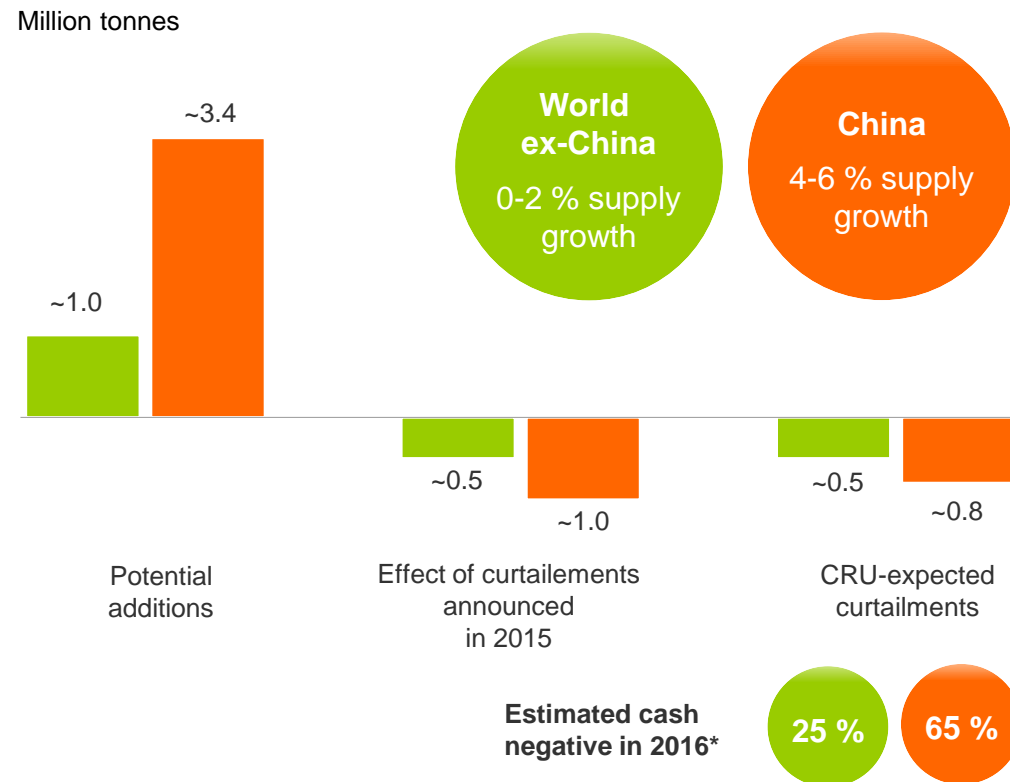
China: SHFE cash + avg. local premium + freight – export rebates (~13%)



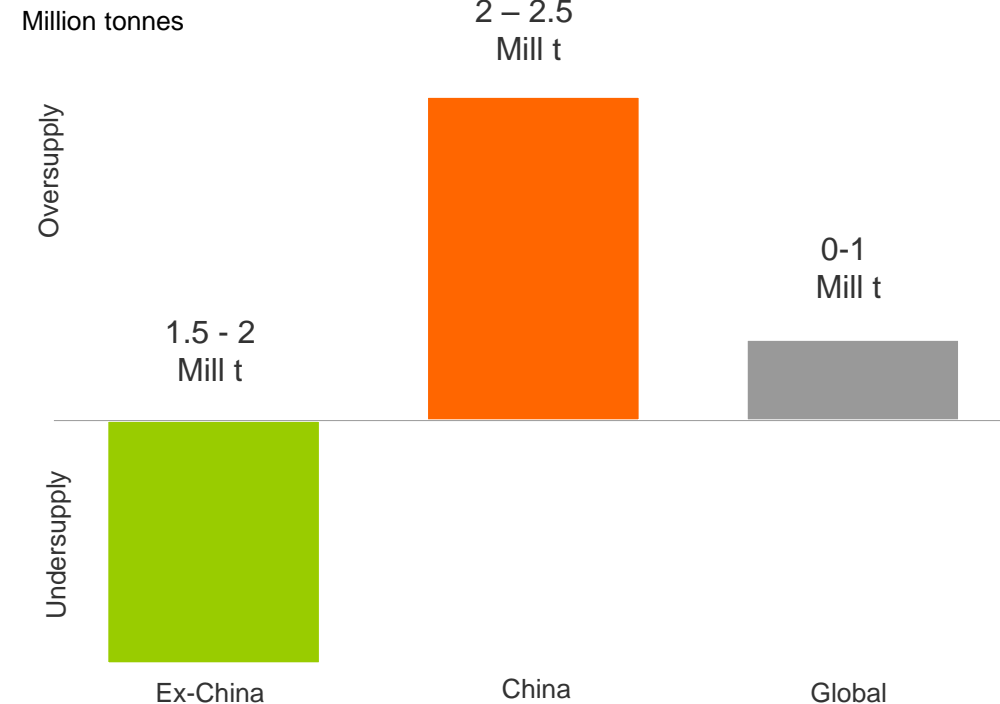
# 2016 to remain oversupplied due to capacity additions

But expected to moderate as a result of curtailments and slower supply growth of 2-4% globally

## Supply development 2016\*



## Market balance 2016\*\*



Source: CRU, Hydro Analysis

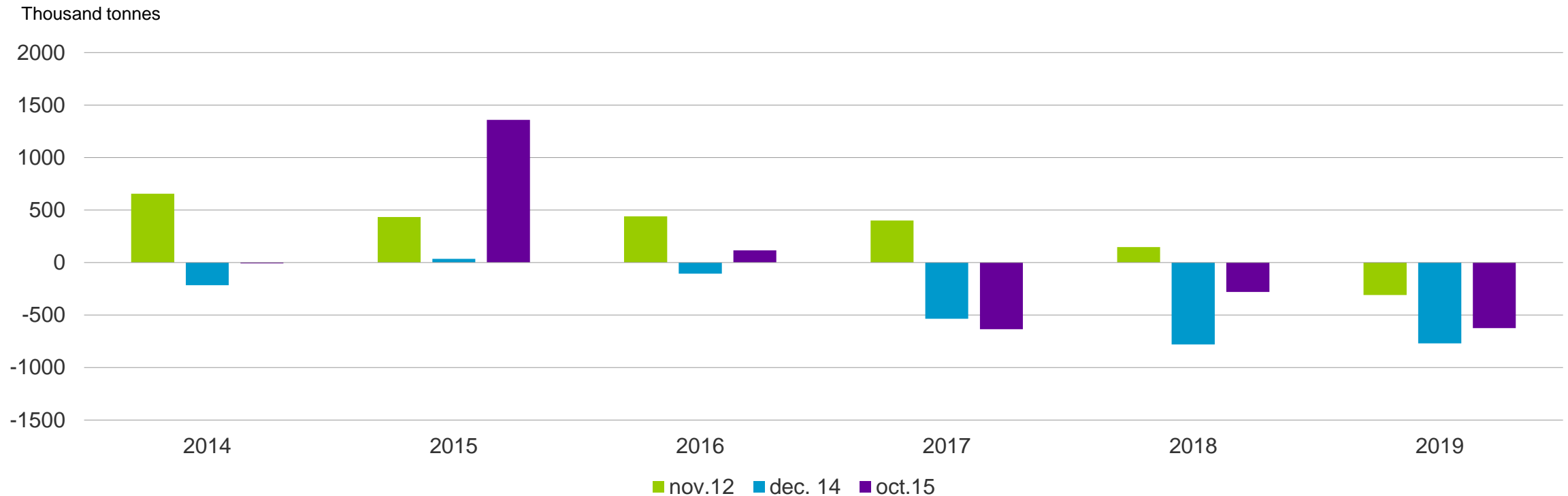
\*Based on CRU BoC curve 2016 and CRU price assumptions of LME 3m at 1500 USD/t and SHFE at 10.300 RMB/t

\*\*Includes CRU's expected curtailments

# Potential return to global undersupply expected in 2017

External analysts expect rebalancing in around a year

CRU estimates of global primary metal balances at different points in time\*



Source: CRU Aluminium Outlooks at different points in time

\* CRU unallocated curtailments: 2016 1.3 million tonnes, 2017 2.5 million tonnes, 2018 1.2 million tonnes, 2019 0.5 million tonnes

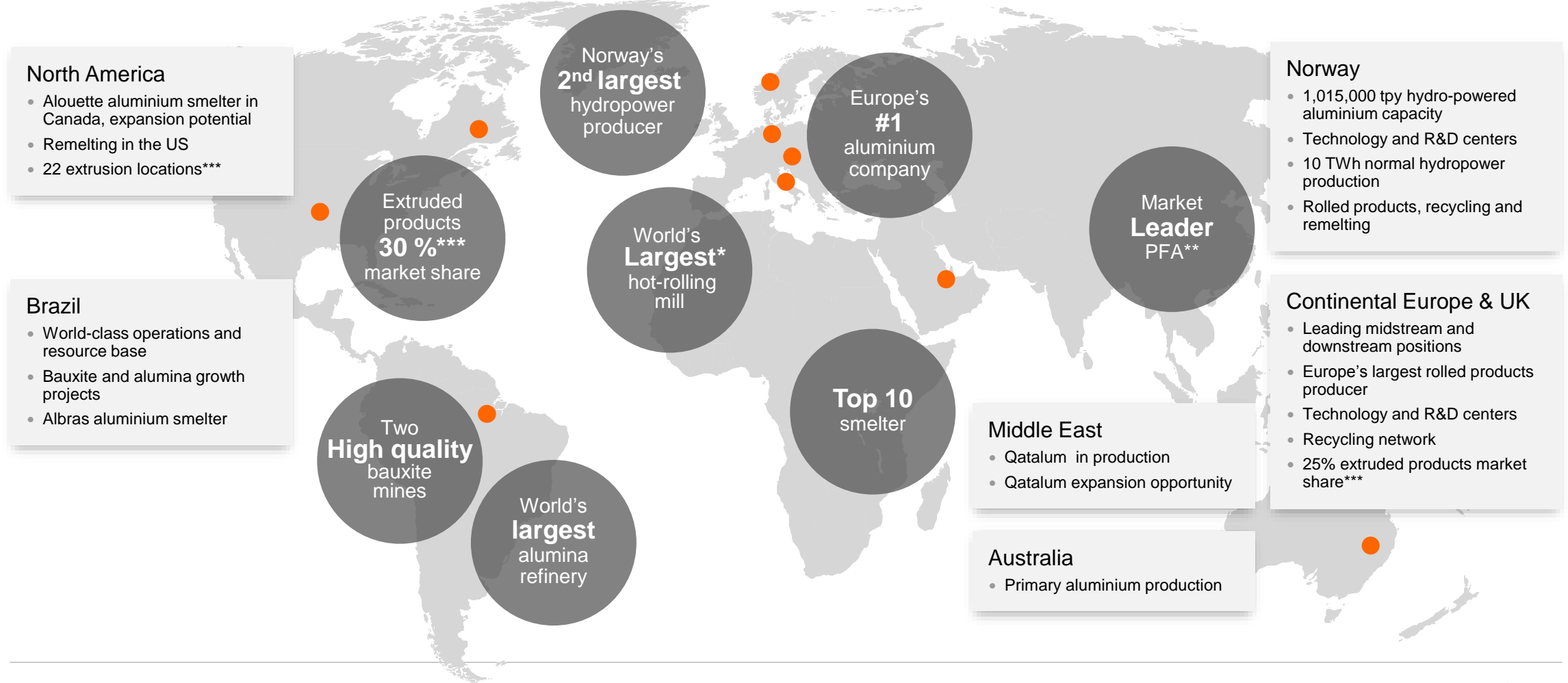
\* CRU expected additions: 2016 3.2 million tonnes, 2017 2.8 million tonnes, 2018 2.3 million tonnes

Our path towards  
realizing the aspiration



# Attractively positioned world-class assets with global reach

Now in a first-quartile position on the industry cost curve



\* Outside China  
\*\* Primary Foundry Alloys  
\*\*\* Sapa JV

# Harvesting the benefits of integration

Combining dedicated business models in each area within an overall company framework



## Risk and opportunity management

- Diversification and multi-cycle exposure
- Wide range of growth opportunities

## Improvements drive

- Industry-leading performance culture
- Best-practice sharing and cross-discipline learning
- Synergies in overhead cost

## Technology and innovation

- Efficiency, competence and products development
- Step-change innovations and spin-off effects

## Customers and market intelligence

- Local partnerships and global reach
- Market insight and feedback

## Corporate responsibility

- Benchmark safety performance
- Life-cycle carbon-neutral by 2020 ambition
- Unified responsible practices in every step of the value chain

## The Hydro brand

- Stronger voice on framework conditions
- Reliable and trustworthy customer, supplier and business partner
- Attractive employer worldwide

# Continuing to shape the industry's strongest improvement culture



## Bauxite & Alumina

- 'From B to A' delivered<sup>1</sup> BNOK 1 in cost and efficiency gains
- Paragominas production lifted above nameplate capacity
- Alunorte production stabilized
- Strong commercial performance:
  - 35% of alumina sold on PAX in 2015<sup>2</sup>
  - Value-in-use bauxite pricing



## Primary Aluminium

- USD 300/t improvements completed in 2013 in fully-owned smelters
- Additional USD 100/t<sup>1</sup> realized
- USD 140/t delivered<sup>1</sup> by 2015 in JV program
- Technology driven incremental capacity increase of ~ 20 kt<sup>1</sup> in 2015



## Rolled Products

- 'Climb' improved efficiency by MNOK 800 1 year ahead of plan<sup>1</sup>
- High-grading to lift margins:
  - Increasing BIW capacity to 200 kt<sup>3</sup>
  - Added >40 kt of UBC<sup>4</sup> recycling
  - Divested the non-core Slim plant



## Energy

- Secured long-term sourcing of 4.1 TWh/yr in Norway and 2.6 TWh/yr outside Norway
- Lifted normal hydropower production to 10 TWh per year

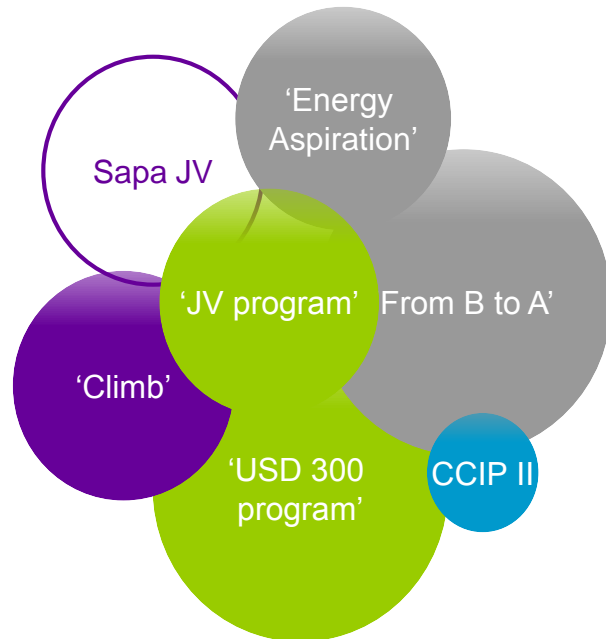
1) Based on status start of December  
2) Based on sourcing volume of ~ 2.7 million tonnes per year  
3) Refers to nominal capacity  
4) Used beverage can

# Making continuous improvements a Hydro trademark

Proven track-record of productivity gains

Hydro's improvement drive until 2014

Total improvements 2011-2014: BNOK 3.7<sup>1</sup>



Hydro's mid-term improvement target

Launched at Hydro's CMD 2014



Hydro's new improvement ambition

Total improvements of BNOK 2.9 from 2016-2019<sup>3</sup>



1) Includes USD 300 from 2009-2011

2) Based on status start of December

3) Includes some larger investments of 3.2 billion NOK in 2015-2019: AL3 and UBC in Rolled Products, 100+100kt capacity creep in Primary Metal, Alunorte debottlenecking in B&A.

4) Real 2015 terms

# Stepping up improvements throughout the value chain



\* Includes some larger investments of 3.2 billion NOK in 2015-2019: AL3 and UBC in Rolled Products, 100+100kt capacity creep in Primary Metal, Alunorte debottlenecking in B&A



# Extending the technology and innovation lead

Key to maintain and further improve Hydro's competitive position



## Bauxite & Alumina

- Debottlenecking to go beyond nameplate capacity in Paragominas to 11 mill t/y and Alunorte up to 6,6 mill t/y
- Developing technology for utilization of residual bauxite
- Enhanced precipitation process control for improved quality and output



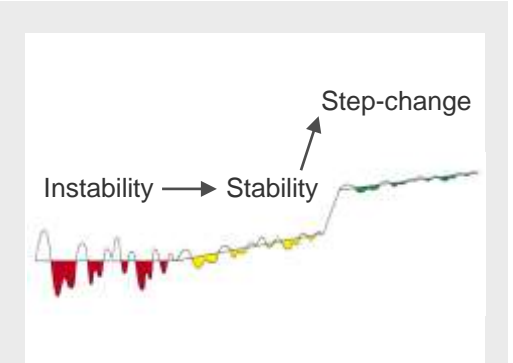
## Primary Metal

- Testing aluminium production technology with world's lowest energy consumption of 11.5-11.8 kWh/kg
- Use technology development to create spin-off effects for existing capacity
- AFM technology to capture high-tech market auto segments in automotive
- Recycling strategy supported by world-leading sorting technology\*



## Rolled Products

- Automotive line 3 to lift Body-in-White capacity to 200,000 t/yr\*\*
- State-of-the-art UBC recycling line
- Utilize leading technology competence to exceed customer expectations, e.g. step-change innovation in foil (HyFoil)
- De-bottlenecking of Alunorf hot-rolling mill



## Technology approach

- Hydro's technology strategy encompasses entire value chain from bauxite to recycling
- Gradual approach to ensure full stability at existing level ahead of step-change developments

\* Acquired WMR Recycling GmbH

\*\* Refers to nominal capacity

# Establishing a new efficiency standard with the Karmøy technology pilot

With spin-off effects for the entire portfolio

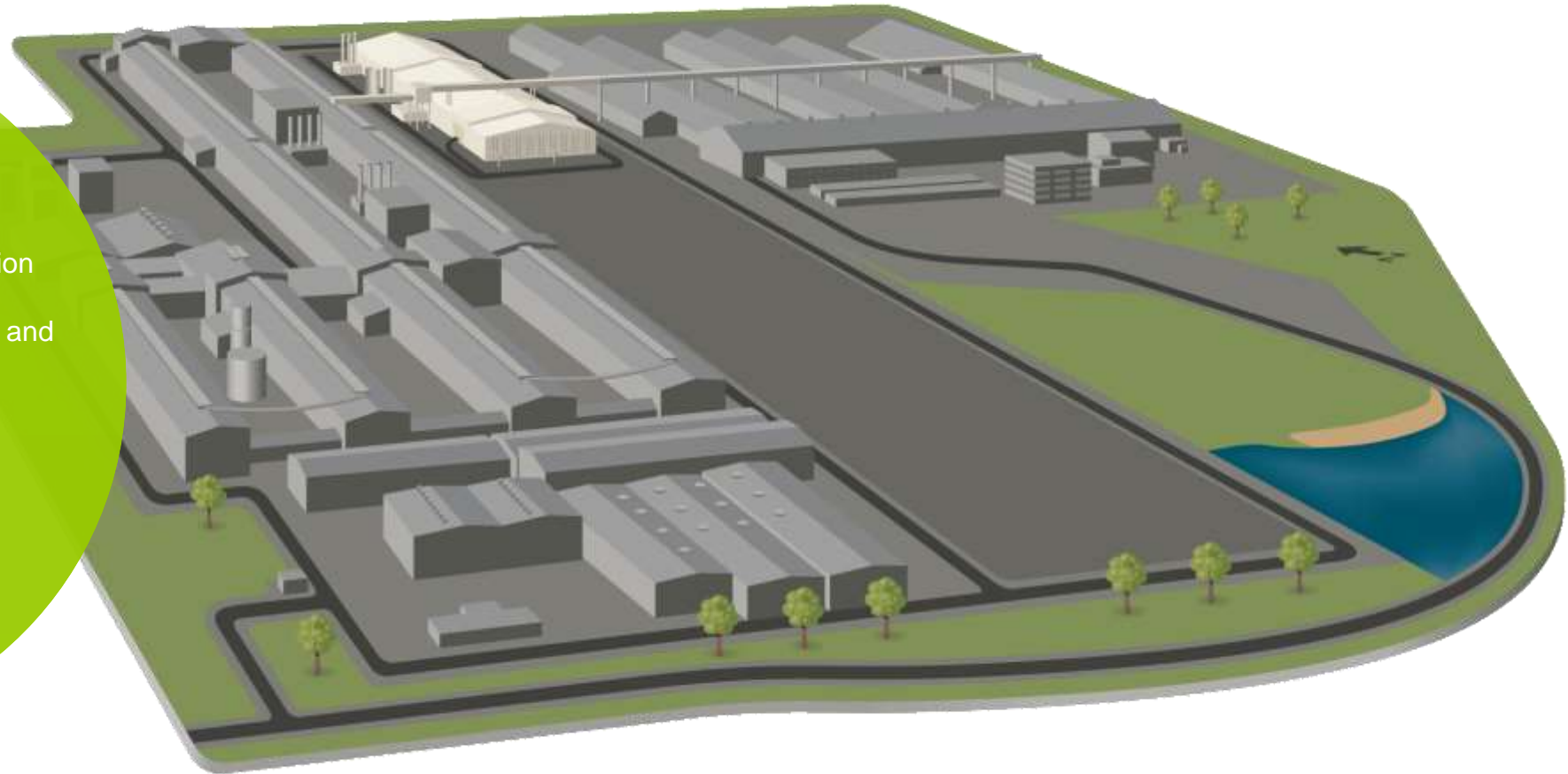
## Next-generation technology

R&D as the next step in cost optimization

Testing the world's most energy-efficient and climate-friendly smelter technology

Significant spin-off effects to raise production and reduce costs in current assets

Potential build decision expected in H1 2016\*



\* Build decision contingent upon power solution for the Norwegian smelter portfolio as well as market balance and outlook

# Attractive commercial positions throughout the value chain

Building on strong in-house commercial competence



\* Including production at stand-alone remelters

# Utilizing moderate power prices to improve on cost and predictability

Recent long-term sourcing contracts in Norway, Germany and Canada

## New power contracts in Norway 2014

Agder Energi	1,0 TWh/yr	2021-2030
Lyse	0,7 TWh/yr	2021-2030
Axpo	0,5 TWh/yr	2021-2030
Agder Energi	0,5 TWh/yr	2021-2030

## New power contracts in Norway 2015

Lyse	0,33 TWh/yr	2031-2040
Axpo	0,25 TWh/yr	2021-2030
Eidsiva	0,30 TWh/yr	2021-2030
BKK	0,5 TWh/yr	2021-2030

## New power contracts outside Norway 2015

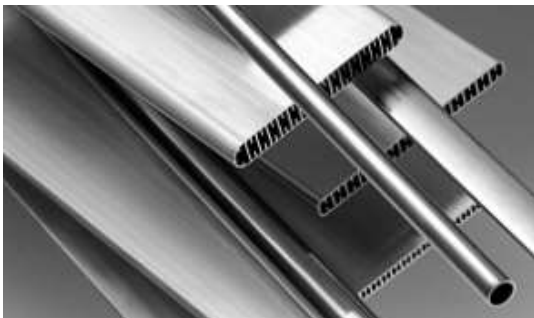
Axpo / Germany	0,9 TWh/yr	2018-2025
Hydro Quebec / Canada (Alouette)	1,7 TWh/yr*	2017-2029



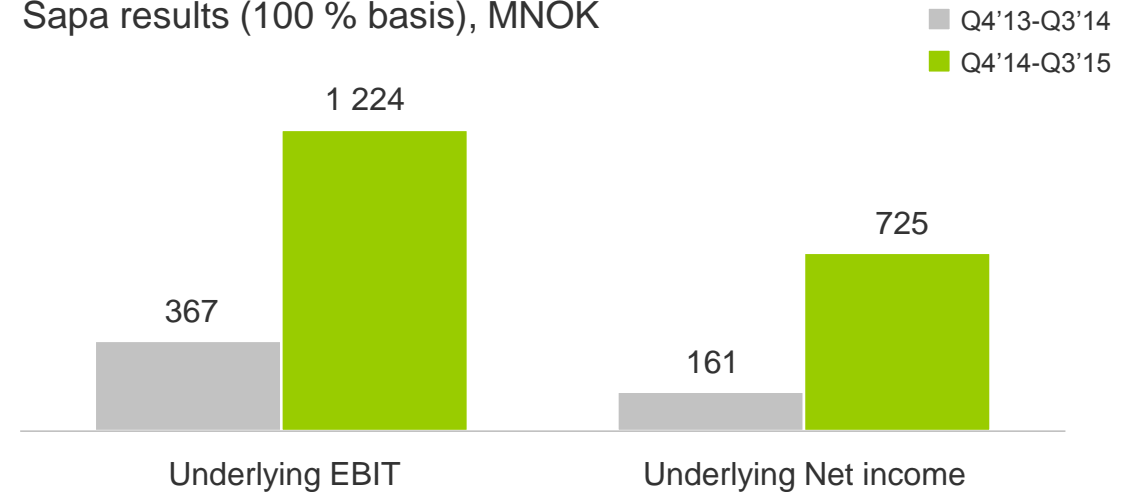
\* Hydro's share

# Strong improvement trend in Sapa

More applications and quality-focused customers



Sapa results (100 % basis), MNOK



- Strong demand in North America, stable in Europe
- BNOK 1 in synergy gains to be delivered ahead of plan
- Positive currency effects

Strengthening  
relative industry position  
with ambitious targets



# Managing industry cyclicality through a prudent financial framework

## Operating and commercial excellence

### Cost improvements:

- 3,7 BNOK 2011-2014\*
- 0,8 BNOK 2015
- 2,9 BNOK 2016 -2019

## Financial strength and flexibility

### Investment grade credit rating:

- > BBB Stable
- Funds from operations/Net adjusted Debt > 40%
- Net adjusted Debt/Equity < 55%

## Disciplined capital allocation

- Long-term sustaining capex 3.5-4 BNOK per year. Below depreciation
- Total capex:
  - 2015 BNOK 5,8
  - 2016 BNOK 8,6

## Reliable shareholder remuneration policy

### Revised dividend policy:

- Current dividend 1 NOK/share
- 40% payout ratio over the cycle

## Effective risk management

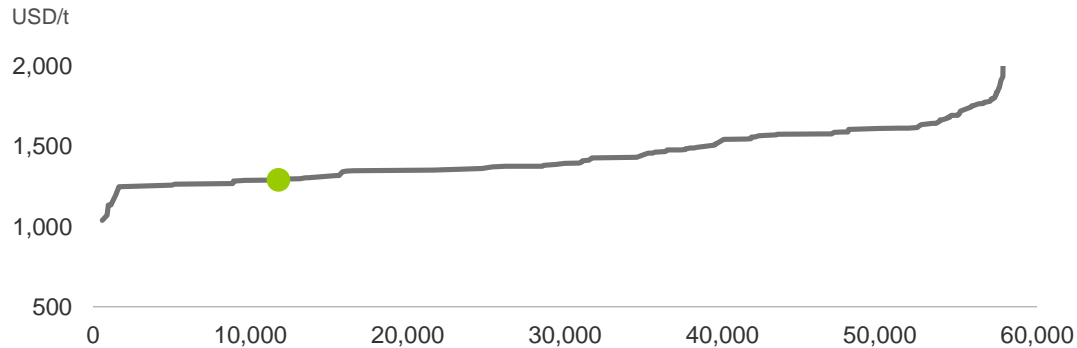
- Strong balance sheet
- Improving relative position
- Diversified business

\* Includes USD 300 from 2009 -2011

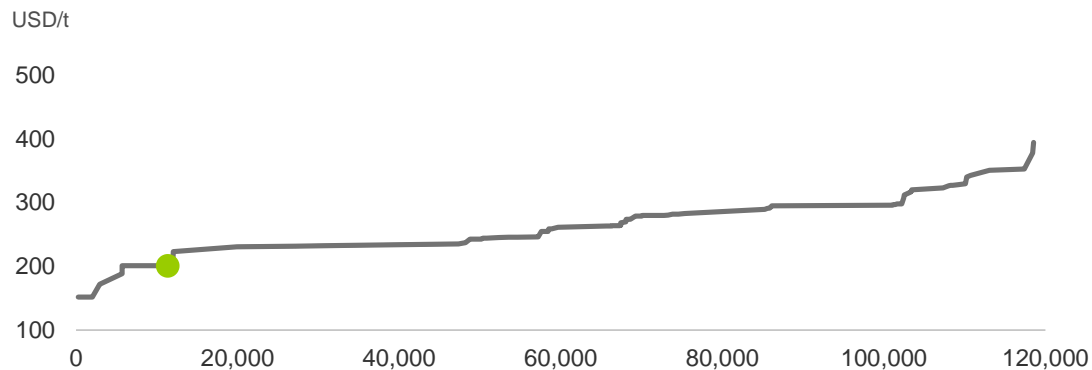
# Leading performance compared to aluminium peers

Strong relative position drives value-creation in challenging markets

First-quartile aluminium producer

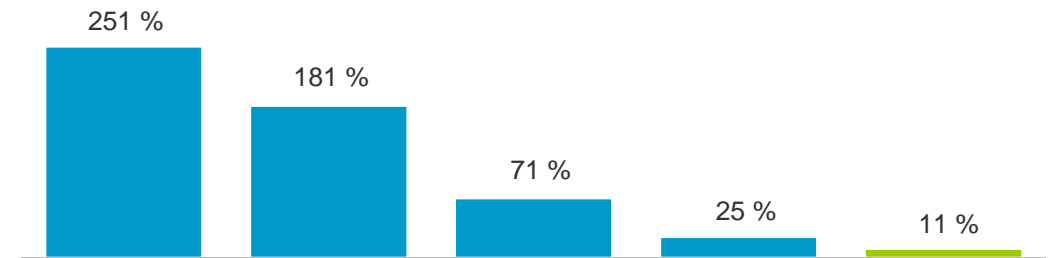


First quartile alumina position



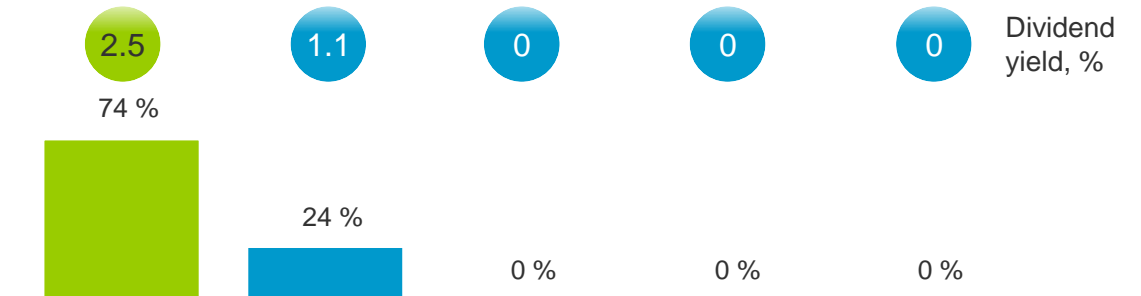
Strongest balance sheet,

Total Debt/Total Equity, 2010-2014



Highest underlying payout ratio and dividend yield

2010-2014



Source: ThomsonOne, CRU, company filings

Total debt/Total Equity= (Long Term Debt + Short Term Debt & Current Portion of Long Term Debt) /Equity attributable to shareholders

Dividend yield = Dividend Per Share / Market Price at Year End

Underlying dividend payout ratio = Dividend Per Share / Underlying Earnings Per Share

■ Peers ■ Hydro

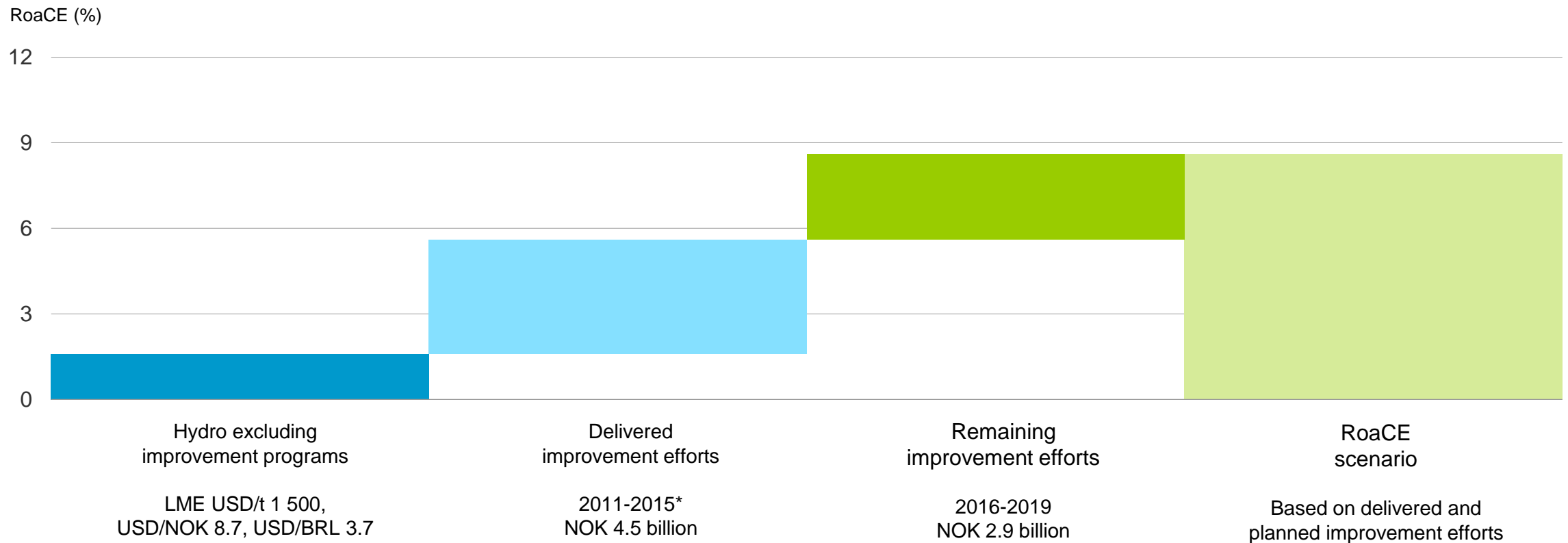
Aluminium peers included: Alcoa, Century, Chalco, Rusal





# Hydro's roadmap towards sustainable profitability

Solid contribution from improvement efforts and currency tailwinds compensate for lower prices



Last 4 quarters underlying EBITDA as basis. Adjusted using Hydro sensitivities to LME 1 500, Hydro realized premium of 275, USD/NOK 8.7, USD/BRL 3.7  
 Remaining improvement efforts are real 2015 and after depreciation. Sapa improvement efforts are excluded from improvement efforts  
 \* USD 300 from 2009

# Ambitious mid-term strategic goals within the Hydro aspiration

	Ambitions	Target	Timeframe
<b>Better</b>	• Improve safety performance, strive for injury free environment	TRI<2	2020
	• Deliver on <i>Better</i> improvement ambition	BNOK 2.9	2019
	• Secure new competitive sourcing contracts in Norway post 2020	4-6 TWh	2020
	• Lift Paragominas production	11 mill mt/yr	2018
	• Lift Alunorte production	6.6 mill mt/yr	2018
	• Shift alumina sales to PAX-based pricing	> 85% PAX*	2020
	• Extend technology lead with Karmøy technology pilot	Build decision	2016
<b>Bigger</b>	• Realize technology-driven smelter capacity creep	200,000 mt/yr	2025
	• Lift equity bauxite production	19 mill mt/yr**	Long-term
	• Expand BiW capacity	200,000 mt/yr***	2017
	• Ramp up UBC line to full capacity	>40 000 mt/yr	2017
<b>Greener</b>	• Become carbon-neutral from a life-cycle perspective	Zero	2020
	• Increase recycling of post-consumed scrap	>250,000 mt/yr	2020
	• Deliver of reforestation ambition	1:1	2017

\* Based on sourcing volume of ~ 2.3 million tonnes per annum  
 \*\* Provided the acquisition of the 40% stake in MRN from Vale  
 \*\*\* Refers to nominal capacity

# Finance

Financial strength through  
relative positioning and  
balanced capital allocation

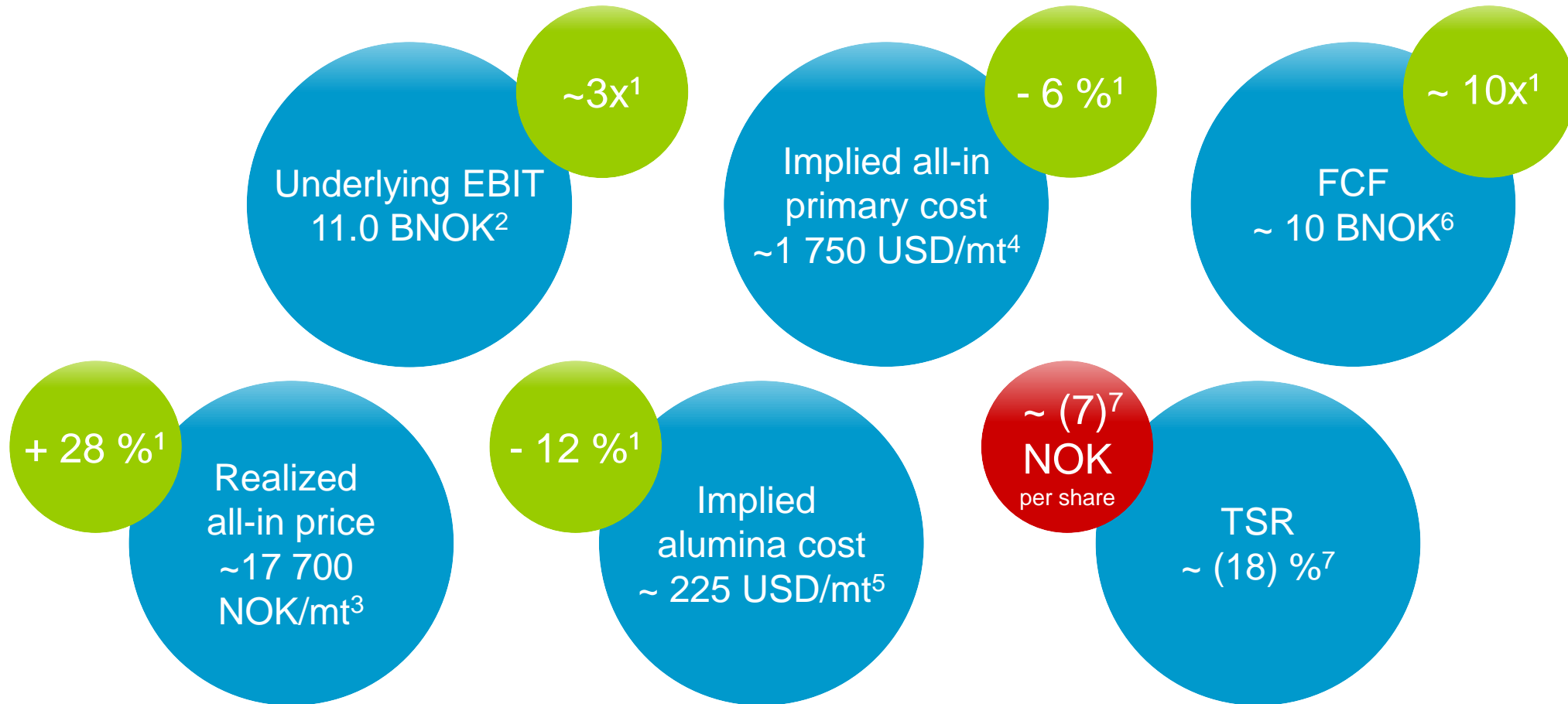
Eivind Kallevik

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# Financial highlights



1) Q4 2014 – Q3 2015 compared to Q4 2013 – Q3 2014

2) Underlying EBIT. Sum 12 months rolling Q4 2014 – Q3 2015

3) (Realized aluminium price + realized premium above LME)\*realized USD/NOK. Average 12 months rolling Q4 2014 – Q3 2015

4) Realized all-in price minus Underlying EBITDA margin (incl. Qatalum) per mt primary aluminium sold. Includes net earnings from primary casthouses. Average 12 months rolling Q4 2014 – Q3 2015

5) Realized alumina price minus underlying EBITDA for B&A, per mt alumina sales. Average 12 months rolling Q4 2014 – Q3 2015

6) Free cash flow (consolidated) = Net cash flow from operations - investments. Sum 12 months rolling Q4 2014 – Q3 2015

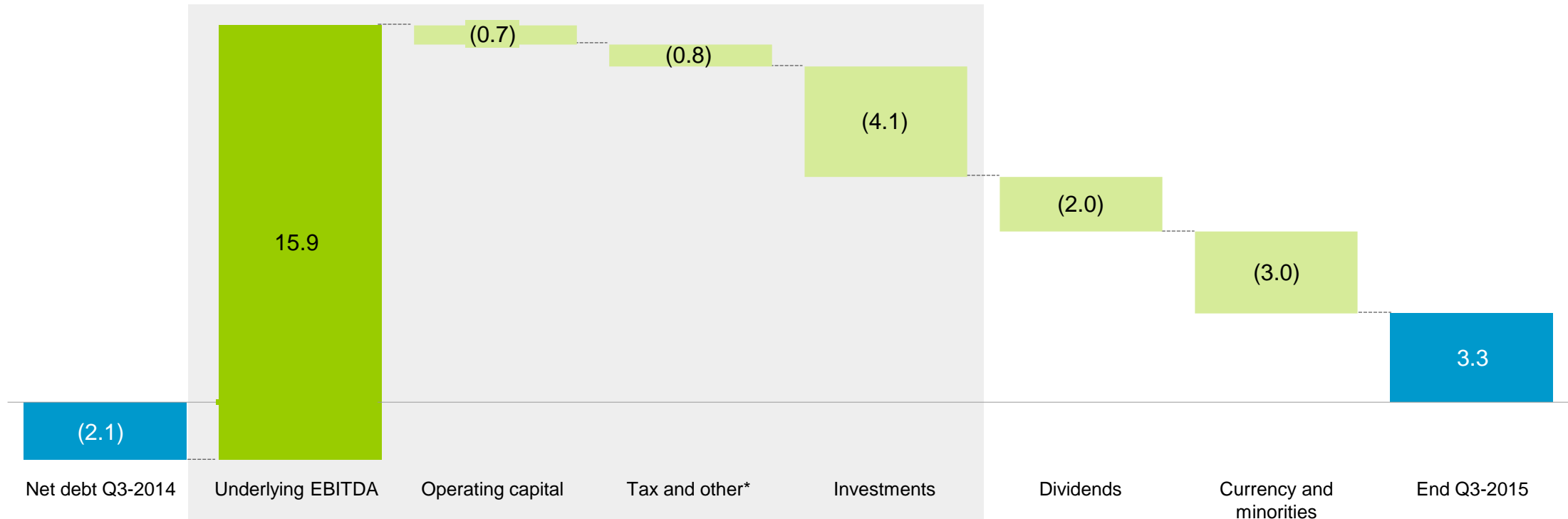
7) Hydro share priced development + dividend paid. End Q3-2014 – end Q3-2015

# Robust free cash flow generation and net cash position

At realized all-in price of ~2 400 USD/mt

NOK billion

Consolidated FCF 10.3 BNOK



\* Including ~1.5 BNOK in VAT reimbursement in Brazil

# Prudent financial framework

Relative positioning and reliable dividend in cyclical industry

## Operating and commercial excellence

Improving efficiency, strengthening margins

Improvement efforts

- 3.7 BNOK 2011-2014 <sup>1)</sup>
- 0.8 BNOK 2015
- 2.9 BNOK 2016-2019

Managing working capital

## Financial strength and flexibility

Investment grade credit rating

- > BBB Stable

Financial ratio targets over the cycle

- FFO/NaD <sup>2)</sup> > 40%
- NaD/E <sup>3)</sup> < 55%

Strong liquidity

## Disciplined capital allocation

Long-term sustaining capex below depreciation

- 3.5-4.0 BNOK per year

Total capex incl. growth

- 2015 BNOK 5.8
- 2016 BNOK 8.6 <sup>4)</sup>
- Average 2016-2018 BNOK 6.6 <sup>4)</sup>

Attractive organic growth prospects for the future

M&A optionality

## Reliable shareholder remuneration policy

Sector competitive TSR

Revised dividend policy

- Dividend 1 NOK/share
- 40% payout ratio of Net Income over the cycle

Special dividends and share buybacks in the toolbox

## Effective risk management

Volatility mitigated by strong balance sheet and relative positioning

Hedging policy

- Operational LME and currency hedging
- Limited financial hedging
- Long-term debt in USD

Diversified business

1) USD 300 program from 2009

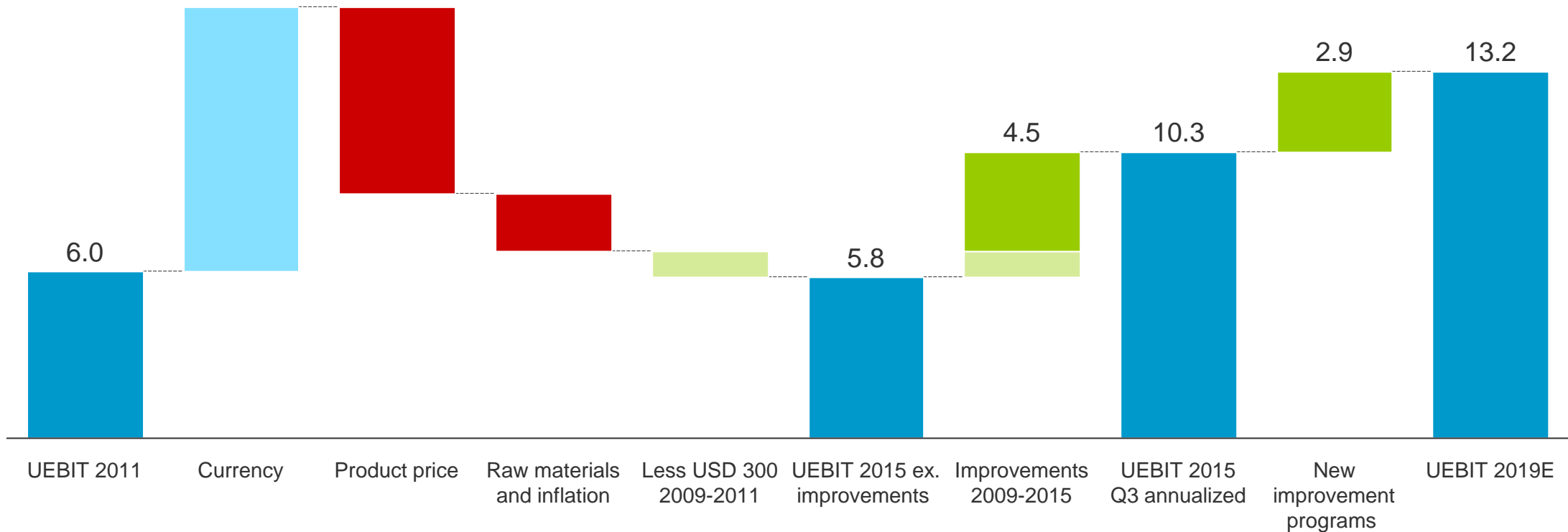
2) Funds from operations / net adjusted debt

3) Net adjusted debt / Equity

4) With Karmøy Technology Pilot gross investment, before ENOVA support

# Lifting earnings potential with industry-leading improvement ambitions

NOK billion

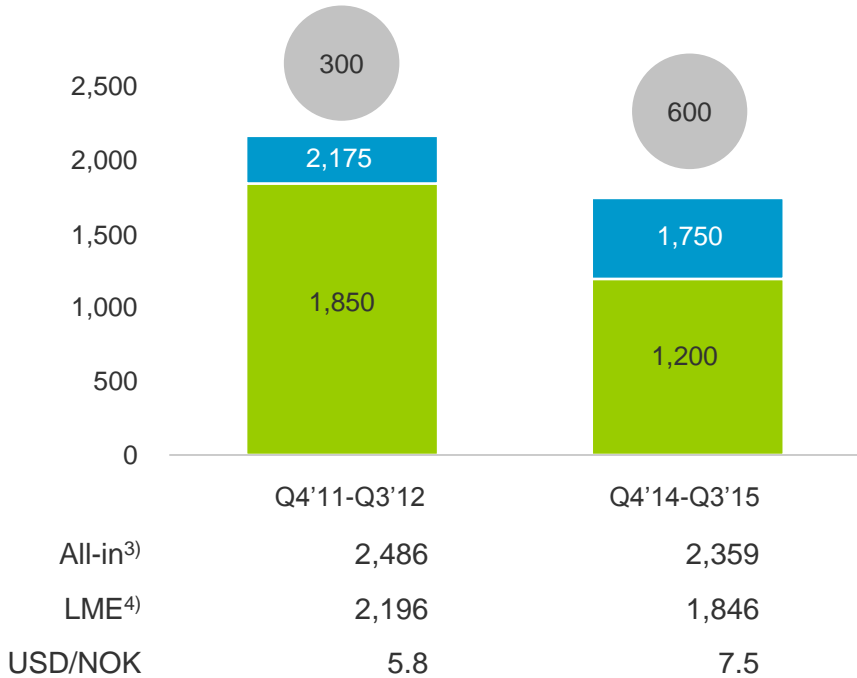


Hydro UEBIT excluding Extruded Products before 2013 and Sapa after 2013. Improvements exclude Sapa

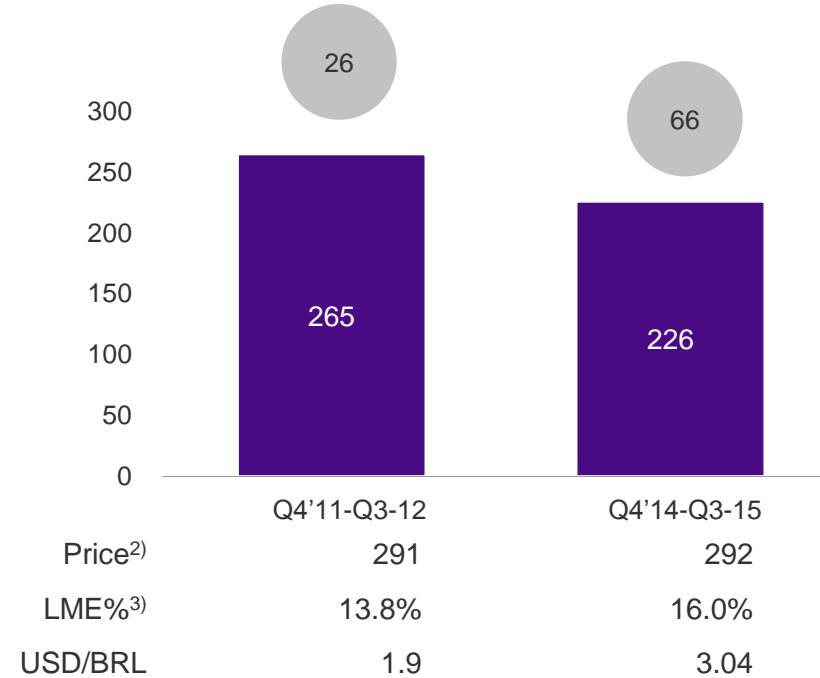
# Structurally improved cost position

Productivity gains supported by currency

All-in implied primary cost and margin, USD/mt <sup>1)</sup>



Implied alumina cost and margin, USD/mt <sup>1)</sup>



■ All-in Implied EBITDA cost per mt 
 ■ LME Implied EBITDA cost per mt 
 ● All-in EBITDA margin per mt

■ Implied EBITDA cost per mt 
 ● EBITDA margin per mt

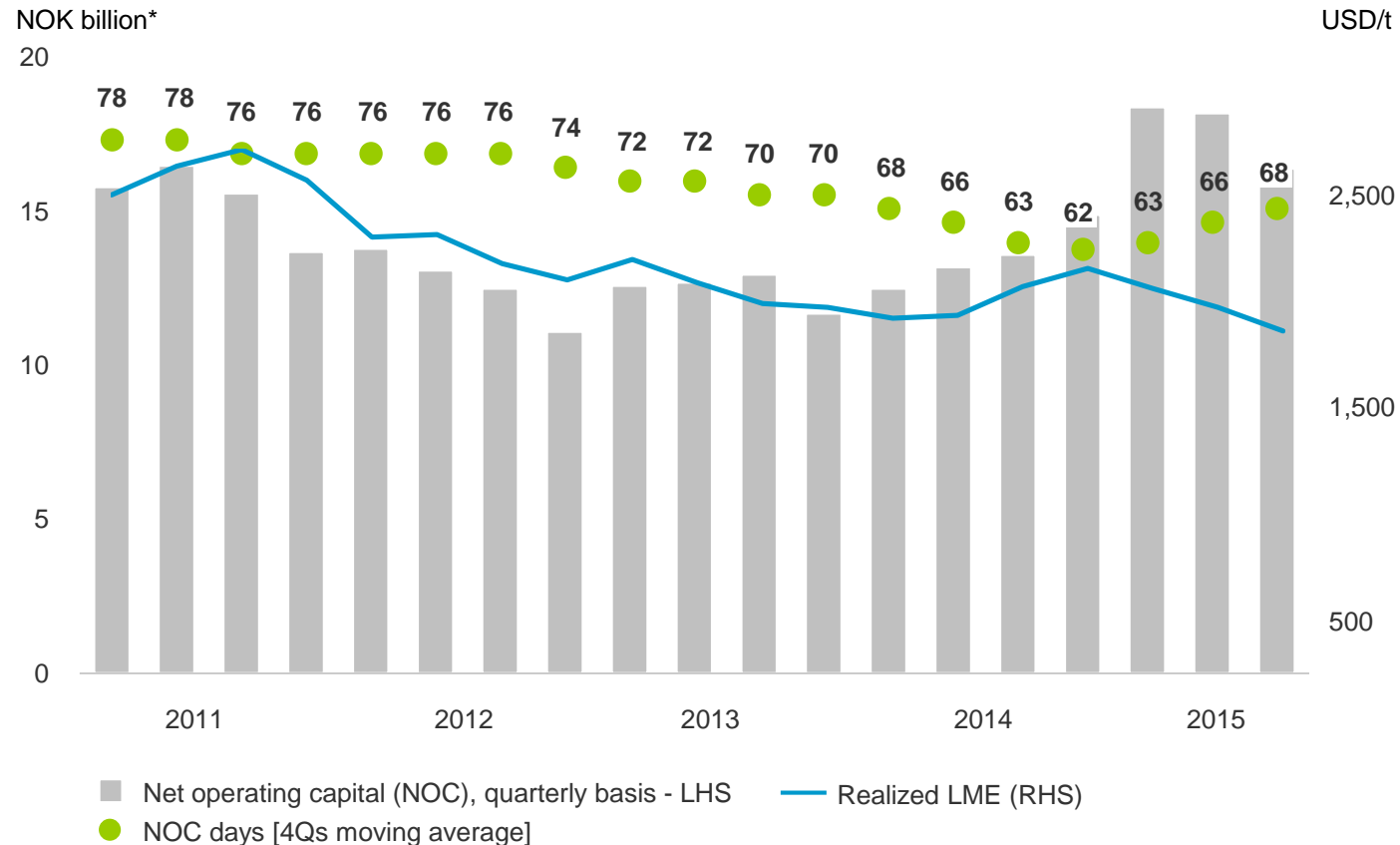
1) Realized all-in aluminium price minus underlying EBITDA margin, including Qatalum, per mt aluminium sold  
 2) Realized LME aluminium price minus underlying EBITDA margin, including Qatalum, per mt primary aluminium produced  
 3) Realized LME plus realized premiums, including Qatalum  
 4) Realized LME, including Qatalum

1) Realized alumina price minus underlying EBITDA for B&A, per mt alumina sales  
 2) Realized alumina price  
 3) Realized alumina price as % of three month LME price with one month lag



# Optimizing working capital remains key priority

Release in Q3 following the above-average build-up earlier in the year

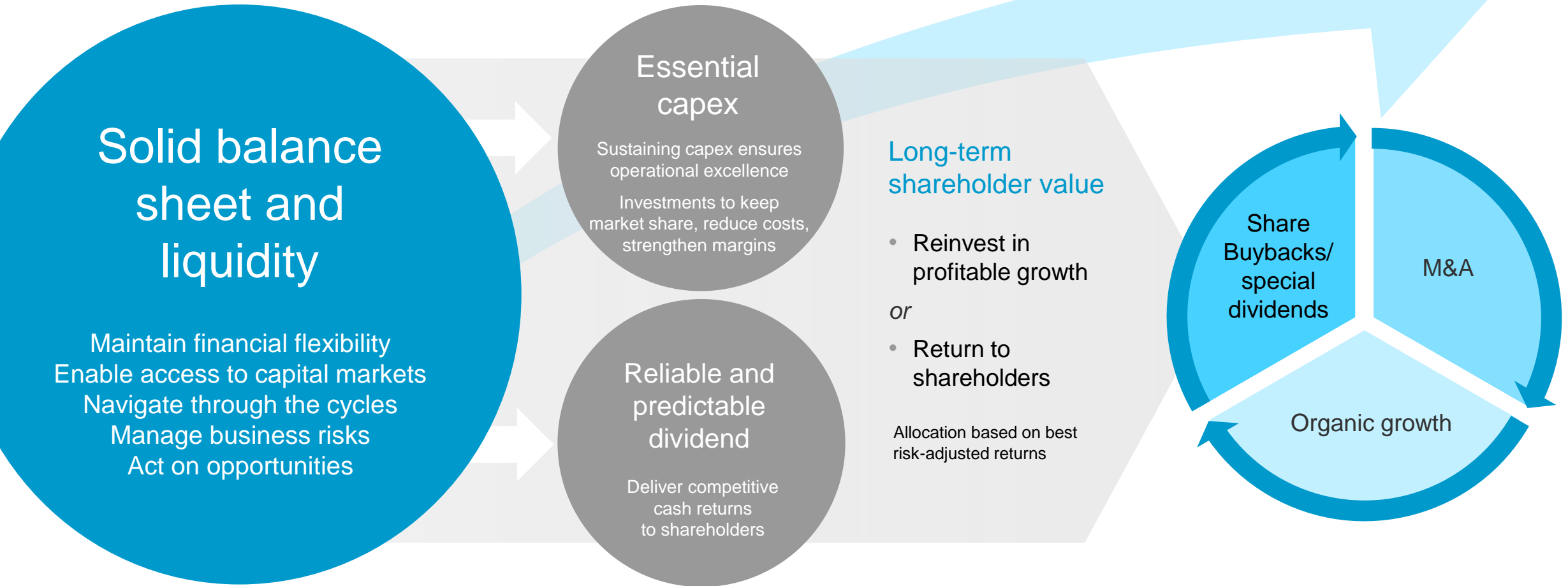


- Net operating capital generally moves with LME development
- Inventory build-up start of 2015
  - Intensified business activity on the back of tighter markets and higher all-in prices in 2014
  - Replaced by supply overhang and subsequent collapse in premiums in early 2015
- NOC release in Q3-15 driven by
  - Lower all-in prices
  - Inventory reductions in Rolled Products and Primary Metal
- Falling LME indicates potential for further NOC release

\* Pro-forma, excluding extruded products for Q1 2011 – Q3 2013  
LHS = left hand side. RHS = right hand side

# Driving long-term shareholder value

Balancing capital allocation and financial strength

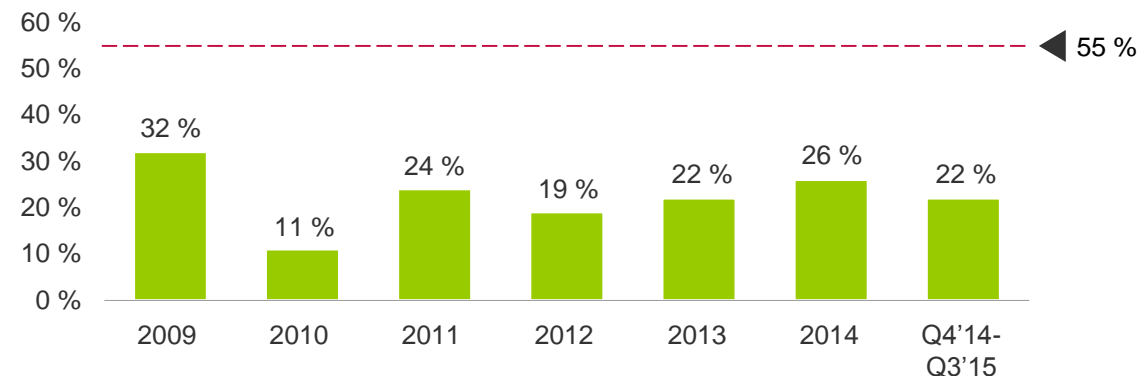


# Maintain investment-grade credit rating

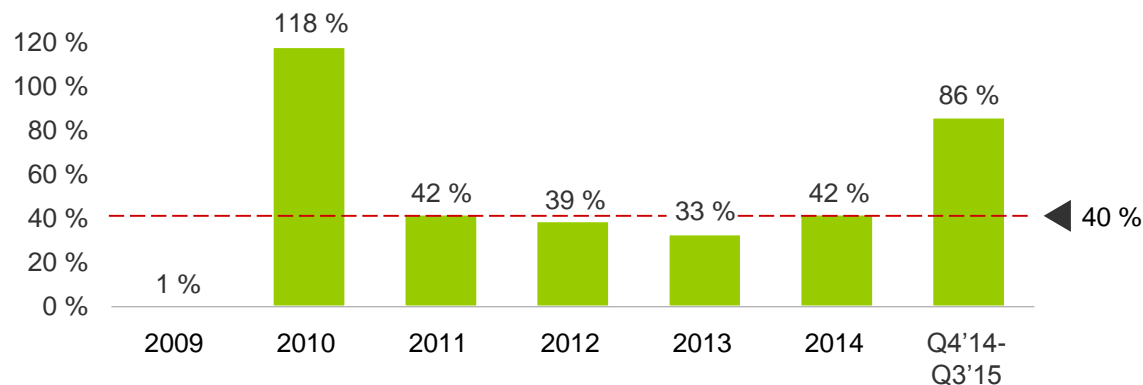
Funds from operations determine the balance sheet structure

- Maintain investment-grade rating
  - At least BBB Stable
  - Currently: BBB (S&P), Baa2 (Moody's), both with stable outlook
- Financial ratio ambitions over business cycle
  - Adjusted funds from operations to net adjusted debt > 40%
  - Net adjusted debt to equity < 55%
- Strong liquidity
  - NOK 9.4 billion in cash and cash equivalents by end-Q3 2015
  - USD 1.7 billion credit facility with maturity 2020, currently undrawn

Net adjusted debt / Equity



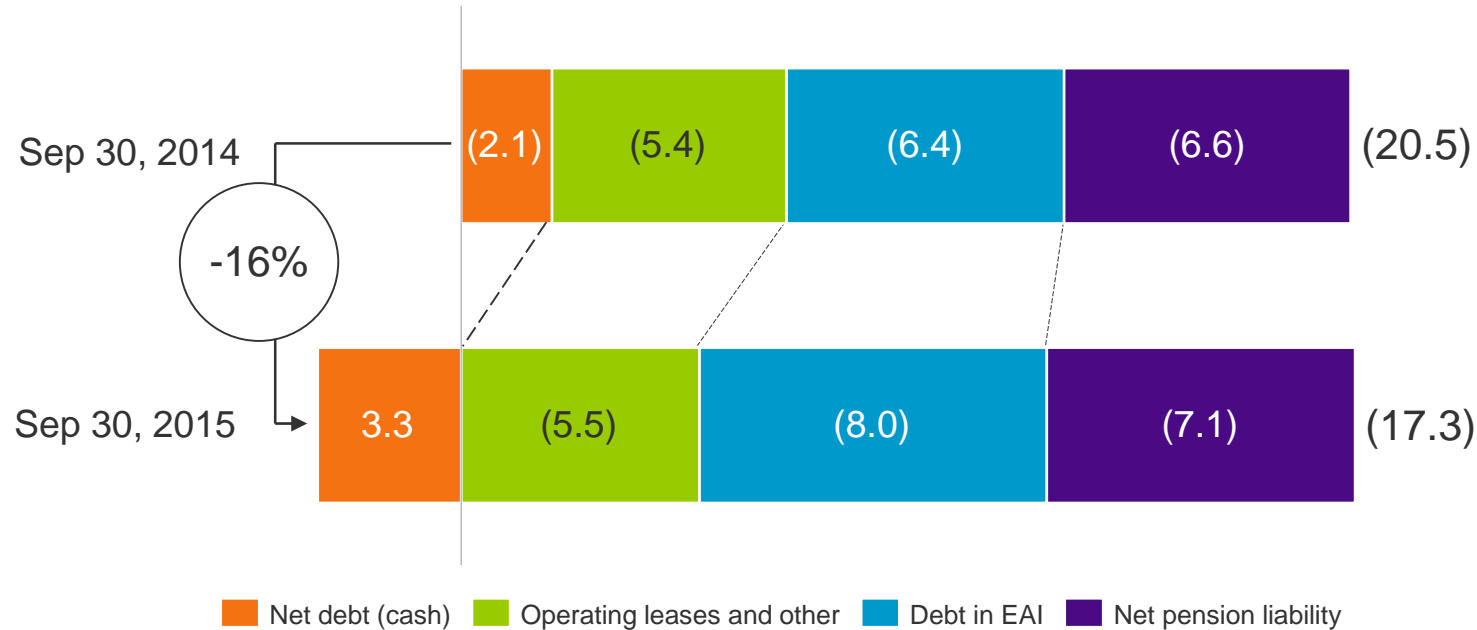
Adjusted funds from operations / Net adjusted debt



# Maintain a solid balance sheet

Net adjusted debt reduced on higher cash position

NOK billion



- Increase in Qatalum and Sapa net debt mainly driven by weaker NOK

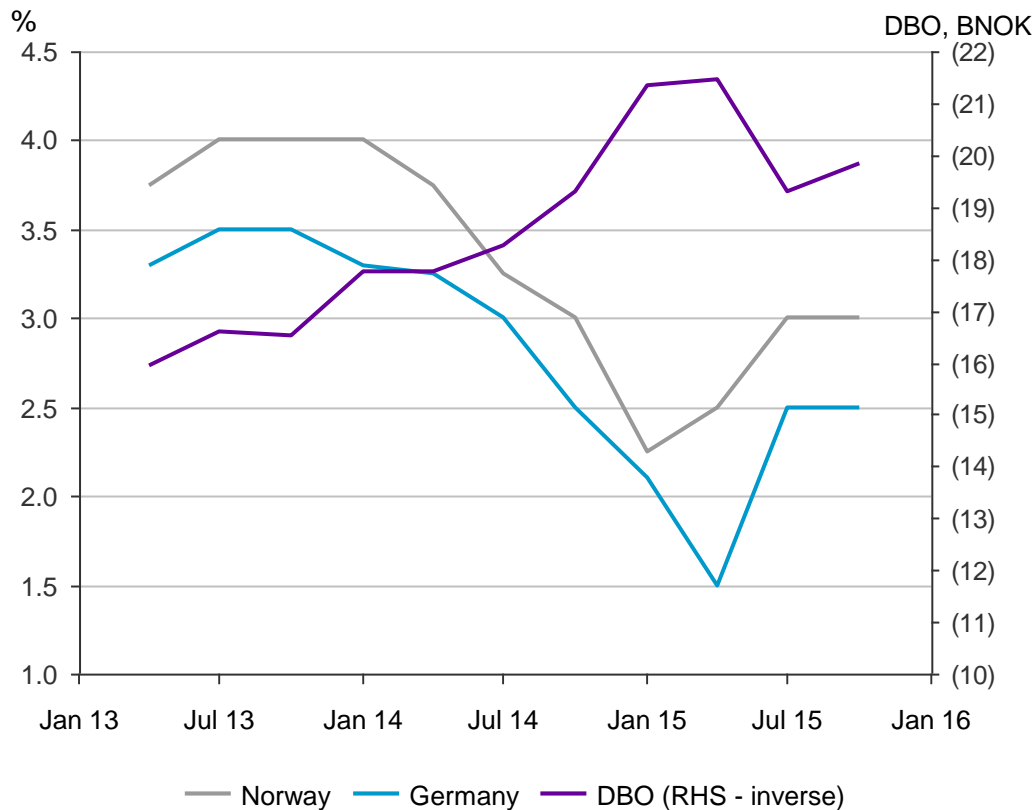
MNOK*	Sep. 2015	Sep. 2014
Sapa (50%)	1 250	860
Qatalum (50%)	6 770	5 490

- Increase in net pension liability due to lower discount rates and a weaker NOK

\*USD/NOK balance sheet date exchange rates 8.50 in Sept.2015 and 6.45 in Sept 2014

# Pension obligations increase with falling discount rates

Discount rates development vs Defined benefit obligation (DBO)\*\*



Defined benefit obligation sensitivity to 0.5 pp change in discount rates\*

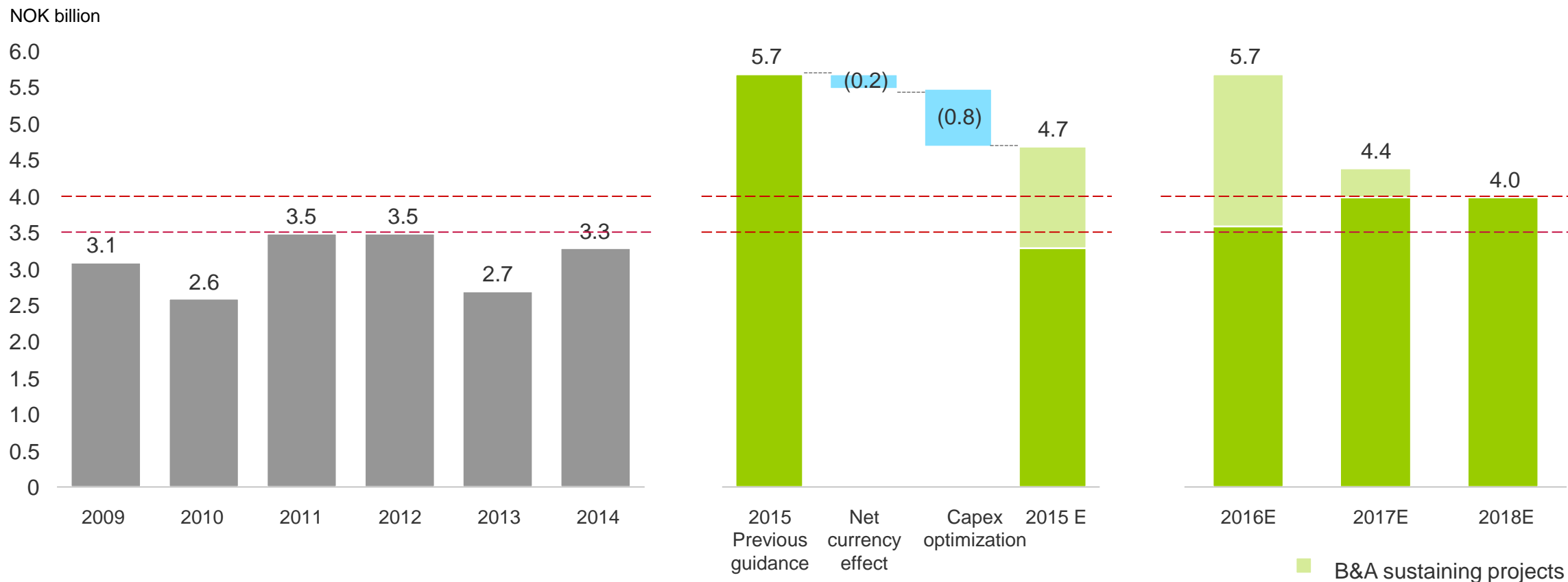
		Norway				
BNOK		2.00	2.50	3.00	3.50	4.00
Germany	1.50	(22,8)	(22,0)	(21,2)	(20,6)	(20,0)
	2.00	(22,1)	(21,3)	(20,6)	(19,9)	(19,3)
	2.50	(21,5)	(20,6)	(19,9)	(19,2)	(18,6)
	3.00	(20,8)	(20,0)	(19,2)	(18,6)	(18,0)
	3.50	(20,1)	(19,3)	(18,5)	(17,9)	(17,3)
	4.00	(19,4)	(18,6)	(17,9)	(17,3)	(16,7)

\*Sensitivities show the effects of 0.5 percentage point change in discount rates while keeping the other assumptions unchanged, e.g. salary and pension expectations, and the mortality basis. DBO in Germany is subject to a translation effect from changes in EUR/NOK exchange rate. EUR/NOK rate of 9.5 as of Sept 30, 2015 used as a basis.

\*\* Norwegian discount rates are based on the covered bond market as reference, German discount rates are based on the yields of high quality corporate bonds. Maturity of the bonds shall be consistent with the estimated term of the pension obligations.

# Long-term sustaining capex NOK 3.5 - 4 billion

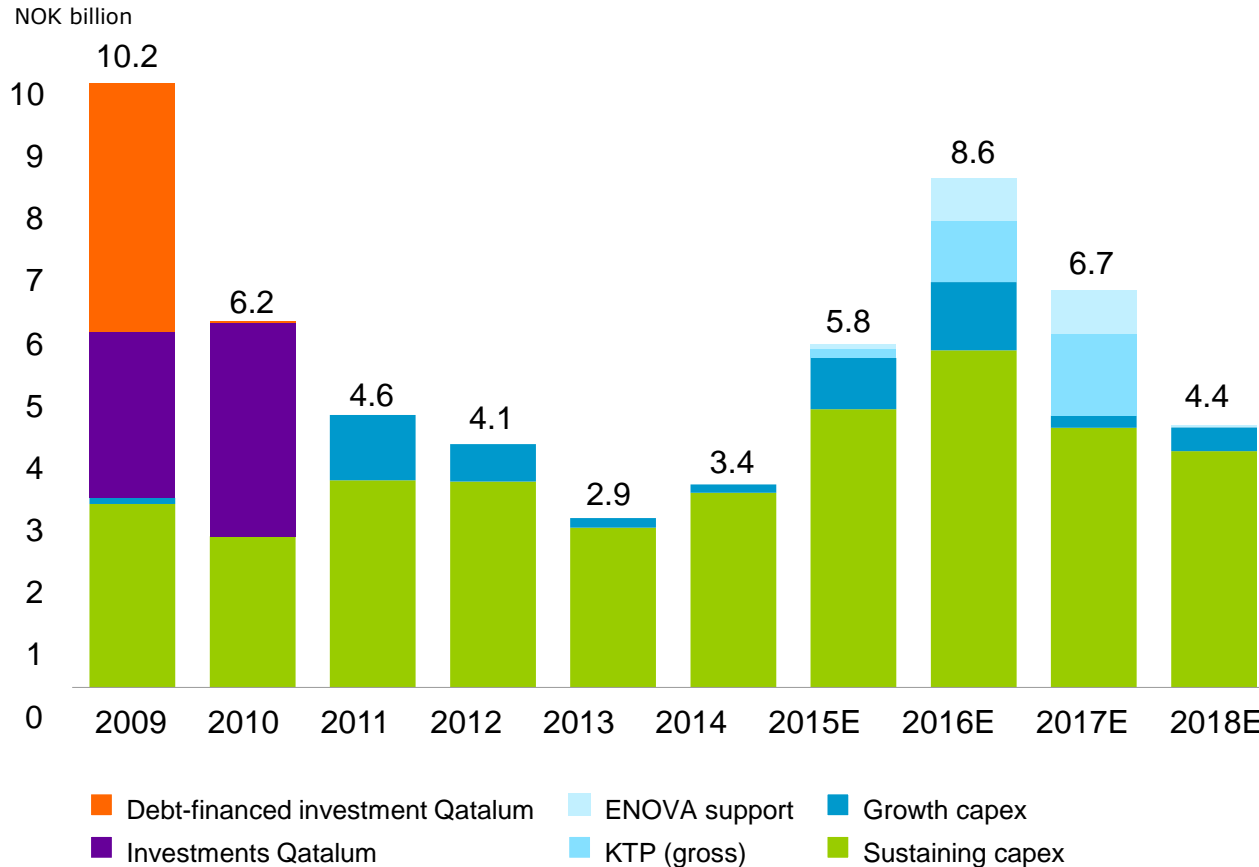
Higher than average sustaining capex driven by long-life investments in Brazil



Excluding Extruded Products from 2013 onwards

# Majority of sustaining capex allocated upstream

High-grading and technology growth investments

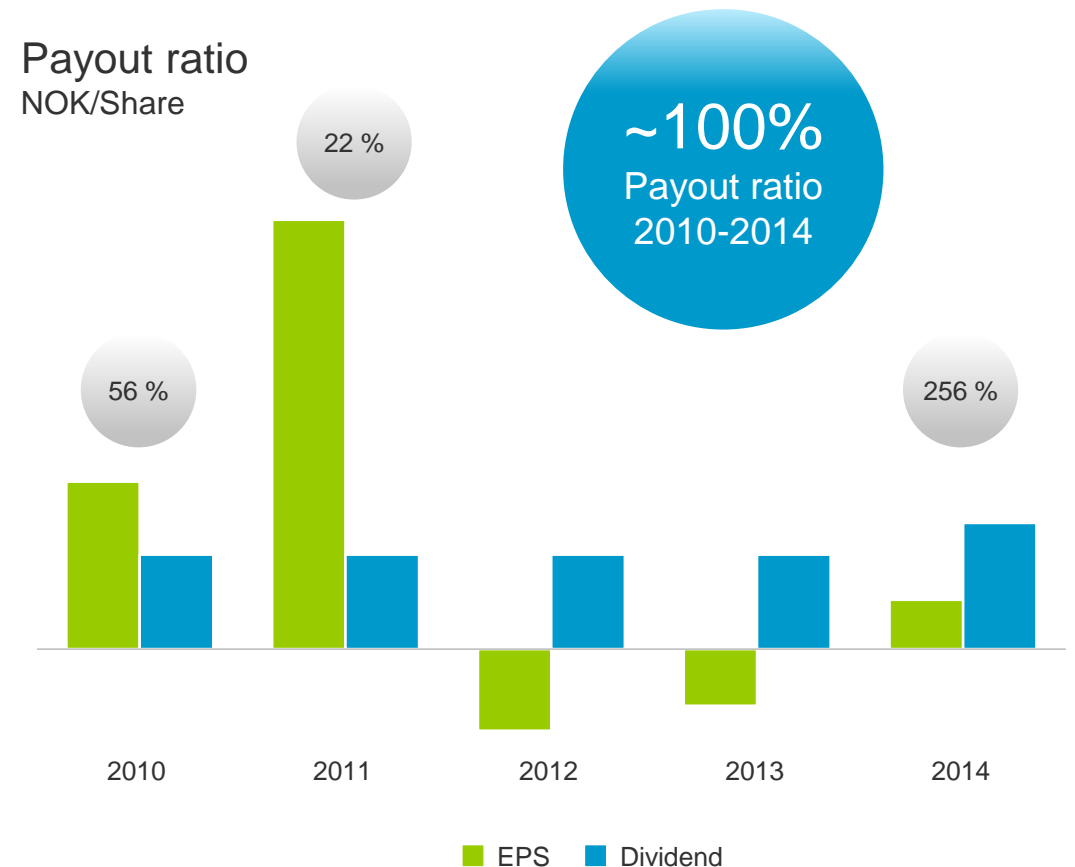


- Sustaining projects for 2014-2016:
  - Red mud disposal area
  - Bauxite tailing dam
  - Smelter relining
  - Energy rehabilitation
- Ongoing organic growth projects:
  - RP Automotive line
  - RP UBC recycling line
  - Clervaux recycling upgrade
  - Alunorf debottlenecking
  - Energy projects
  - AFM technology
- WMR technology acquisition in 2015
- Karmøy technology pilot (KTP) 2015-2018\*:
  - Gross investment 3.9 BNOK
  - Of which ENOVA support 1.5 BNOK

2011 excludes Vale assets acquisition  
 Excluding Extruded Products from 2013 onwards  
 \*Provided a build decision in early 2016

# Aiming for stable and competitive cash return to shareholders

- Revised dividend policy at the start of 2015
  - 40% of net income over the cycle
  - Average 2010-2014 payout ratio of ~100% reflects weak earnings in the period
- Committed to a stable and reliable dividend level
  - Current dividend 1 NOK/share since 2014
- Share buybacks and extraordinary dividends considered when liquidity position, capital structure and earnings outlook allow



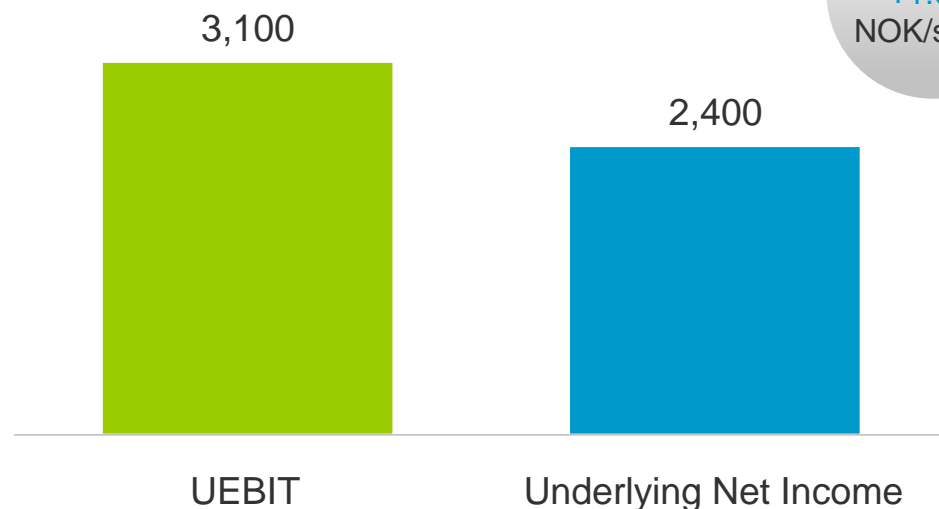
Payout ratio - dividend paid divided by reported EPS from continuing operations  
2011 includes Alunorte revaluation gain



# Significant exposure to commodity and currency fluctuations

Aluminium price sensitivity +10%\*

NOK million



Aluminium price sensitivity +100 USD/mt:

- UEBIT 1 820 MNOK
- UNI 1 400 MNOK
- UEPS +0.62 NOK/share

Currency sensitivities +10%\*

*Sustainable effect:*

NOK million	USD	BRL	EUR
UEBIT	2 830	(930)	(270)
UEPS	0.92	(0.29)	(0.09)

*One-off reevaluation effect:*

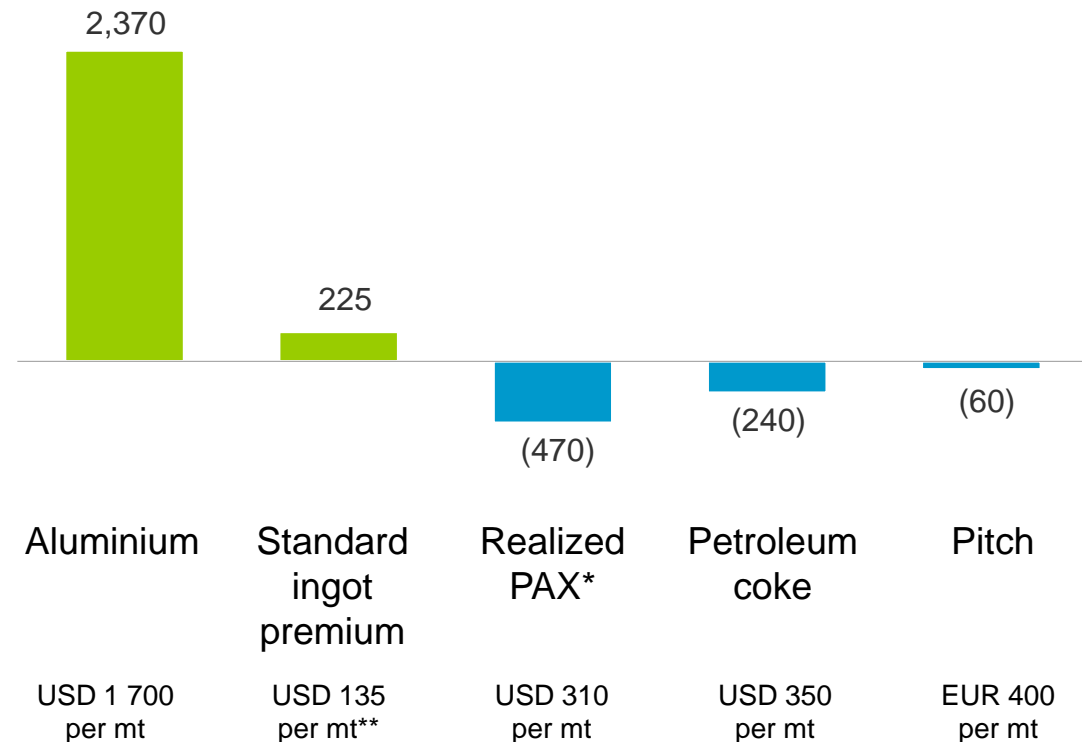
Financial items	(990)	500	(1 760)
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- Annual sensitivities based on normal annual business volumes. LME USD 1 700 per mt, fuel oil USD 360 per mt, petroleum coke USD 350 per mt, caustic soda USD 275 per mt, coal USD 50 per mt, USD/NOK 8.20, BRL/NOK 2.30, EUR/NOK 9.10
- Aluminium price sensitivity is net of aluminium price indexed costs and excluding unrealized effects related to operational hedging
- BRL sensitivity calculated on a long-term basis with fuel oil assumed in USD. In the short-term, fuel oil is BRL-denominated
- Excludes effects of priced contracts in currencies different from underlying currency exposure (transaction exposure)
- Currency sensitivity on financial items includes effects from intercompany positions
- 2016 Platts alumina index (PAX) exposure used

\* Excluding Sapa JV

# Primary Metal sensitivities

Annual sensitivities on underlying EBIT if +10% in price  
NOK million



## Revenue impact

- Realized price lags LME spot by ~1-2 months
- Realized premium lags market premium by ~1-2 months

## Cost impact

### Alumina

- ~1.9 tonnes per tonne aluminium
- ~14.5% of 3-month LME price per tonne alumina, increasing volumes priced on Platts index
- ~Two months lag

### Carbon

- ~0.35 tonnes petroleum coke per tonne aluminium, Pace Jacobs Consultancy, 2-3 year volume contracts, half yearly pricing
- ~0.08 tonnes pitch per tonne aluminium, CRU, 2-3 year volume contracts, quarterly pricing

### Power

- 13.7 MWh per tonne aluminium
- Long-term power contracts with indexations

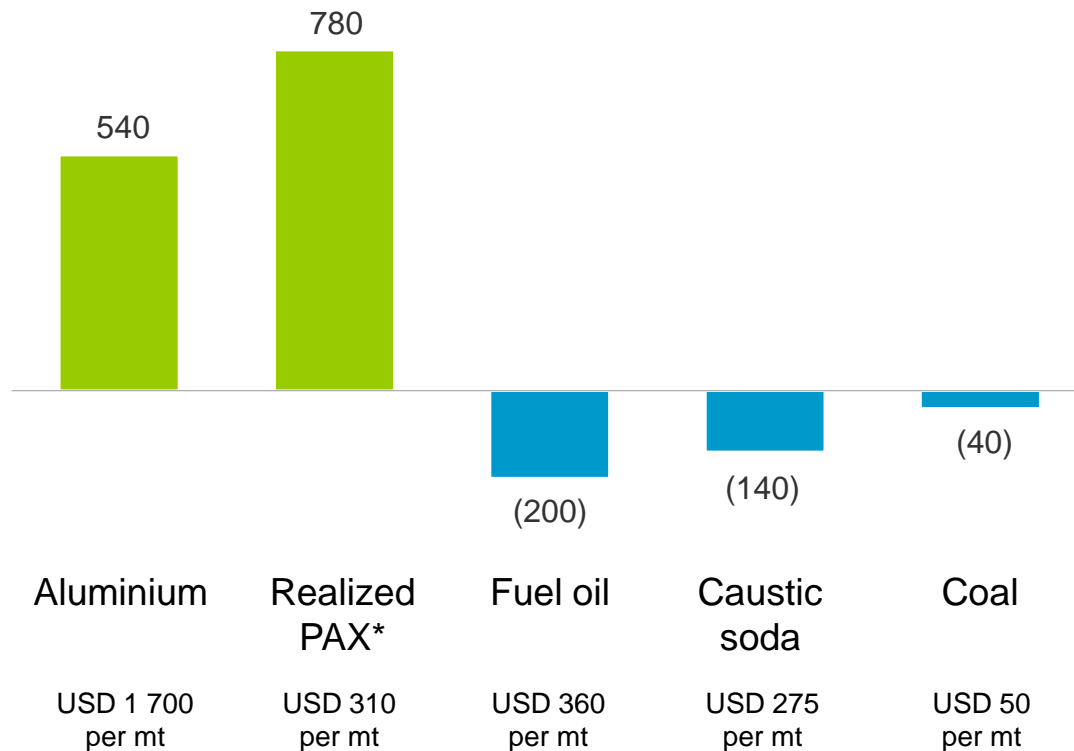
\* 2016 Platts alumina index exposure

\*\* Europe duty paid. Hydro realized premium USD 342 per mt

Currency rates used: USD/NOK 8.20, BRL/NOK 2.30, EUR/NOK 9.10

# Bauxite & Alumina sensitivities

Annual sensitivities on underlying EBIT if +10% in price  
NOK million



## Revenue impact

- ~14.5% of 3-month LME price per tonne alumina
  - ~One month lag
- Realized alumina price lags PAX by one month

## Cost impact

### Bauxite

- ~2.45 tonnes bauxite per tonne alumina
- Pricing partly LME-linked for bauxite from MRN

### Caustic soda

- ~0.1 tonnes per tonne alumina
- Prices based on IHS Chemical, pricing mainly monthly per shipment

### Energy

- ~0.11 tonnes coal per tonne alumina, Platts prices, one year volume contracts, weekly per shipment pricing
- ~0.11 tonnes heavy fuel oil per tonne alumina, prices set by ANP/Petrobras in Brazil, weekly pricing (ANP) or anytime (Petrobras)
- Increased use of coal as energy source in Alunorte

\* 2016 Platts alumina index exposure  
Currency rates used: USD/NOK 8.20, BRL/NOK 2.30, EUR/NOK 9.10

# Limited financial hedging, flexible business model

- Volatility mitigated by strong balance sheet
- Improving relative position to ensure competitiveness
- Diversified business:
  - Upstream cyclicalities balanced with more stable earnings downstream
  - Exposed to different markets and cycles
- Hedging policy:
  - Fluctuating with the market
  - Operational LME hedging in Primary Metal and Bauxite & Alumina
  - Operational LME and currency hedging in Rolled Products and Metal Markets to secure margins
  - Flexibility to hedge LME or currency in certain cases
  - Maintaining long-term debt in the revenue currency (USD)

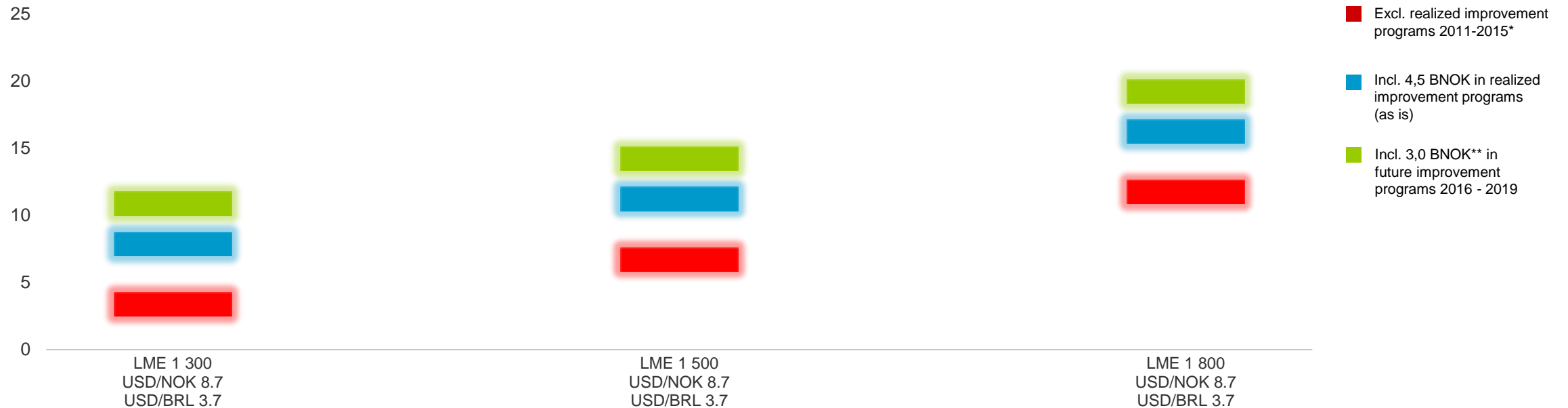


# Improvement efforts lift EBITDA potential

Scenarios are not forecasts, but represent earnings potential based on sensitivities

## Indicative EBITDA-range in 3 scenarios

NOK billion



### Additional factors influencing earnings (not included in the scenarios):

Production volumes, alumina sales pricing on PAX, energy prices, downstream margin developments, raw material cost development, premiums, inflation, currency, other

Last 4 quarters underlying EBITDA as basis. Non-LME related revenues/cost and other currencies unchanged. Improvements used for scenarios exclude Sapa. Hydro realized premium above LME of ~ 275 USD/t.

\* USD 300 from 2009

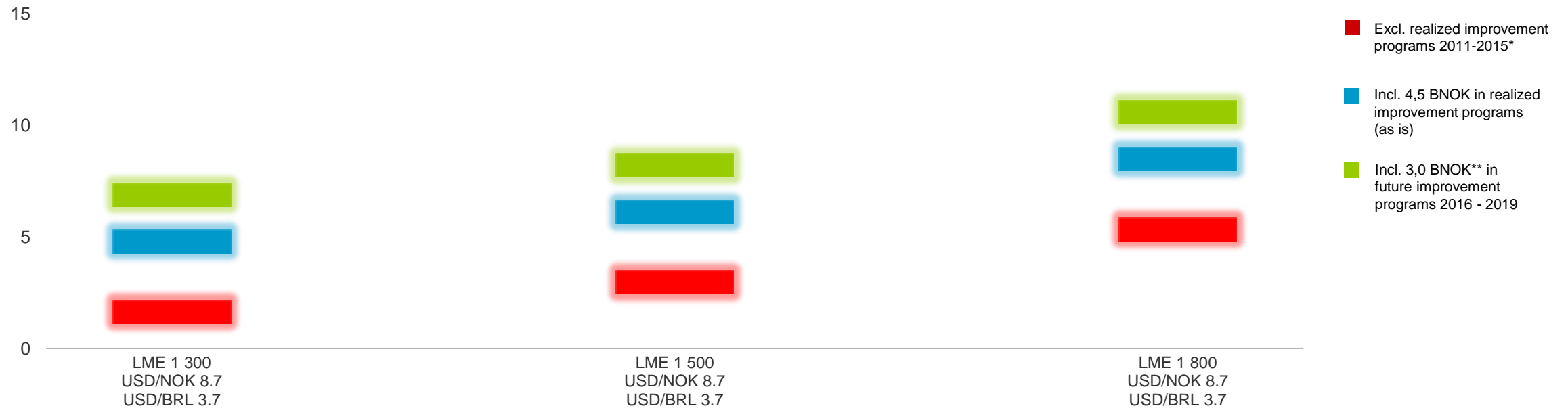
\*\* Future improvement efforts in real 2015 terms, before depreciation.

# Improvement efforts and capital discipline contribute to FCF growth...

Scenarios are not forecasts, but represent earnings potential based on sensitivities

## Indicative Free cash flow (FCF) range in 3 scenarios

NOK billion



### Additional factors influencing earnings (not included in the scenarios):

Production volumes, alumina sales pricing on PAX, energy prices, downstream margin developments, raw material cost development, premiums, inflation, currency, taxes, investments, interest expense, other

Last 4 quarters underlying EBITDA as basis. Non-LME related revenues/cost and other currencies unchanged.

Improvements used for scenarios exclude Sapa. Hydro realized premium above LME of ~ 275 USD/t. Long-term capex 3.5 – 4.0 BNOK per year.

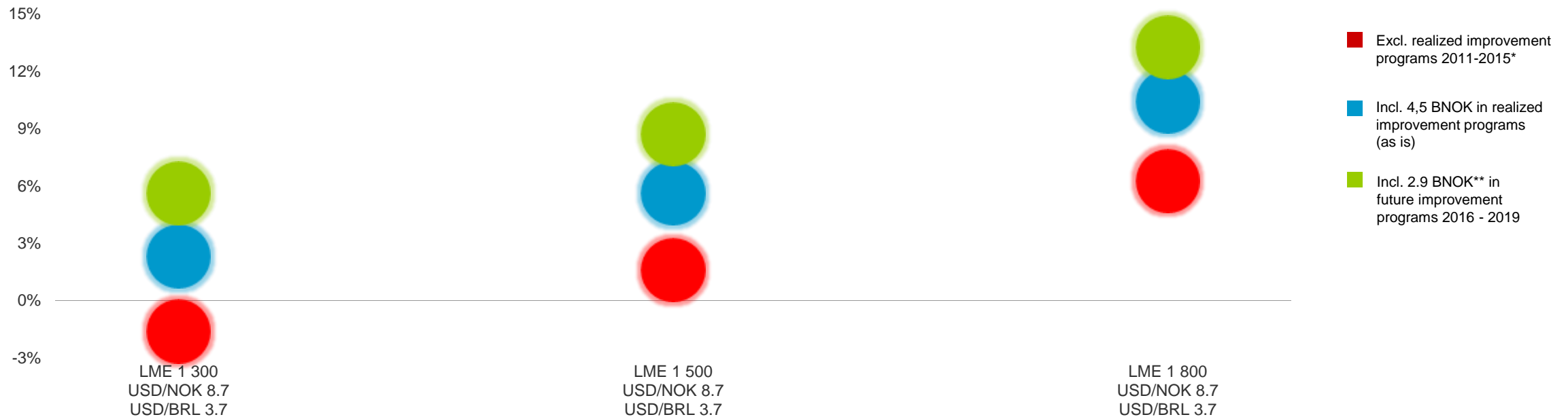
\* USD 300 from 2009

\*\* Future improvement efforts in real 2015 terms, before depreciation

# ...and lift potential for competitive returns

Scenarios are not forecasts, but represent earnings potential based on sensitivities

## Indicative RoaCE range in 3 scenarios



### Additional factors influencing earnings (not included in the scenarios):

Production volumes, alumina sales pricing on PAX, energy prices, downstream margin developments, raw material cost development, premiums, inflation, currency, taxes, interest expense, other

Last 4 quarters underlying EBITDA as basis. Non-LME related revenues/cost and other currencies unchanged.

Improvements used for scenarios exclude Sapa. Hydro realized premium above LME of ~ 275 USD/t.

\* USD 300 from 2009

\*\* Future improvement efforts in real 2015 terms, before depreciation

# Hydro's aspiration underpinned by firm financial targets

Medium and long-term


	Ambition	Timeframe	CMD 2015 update
Improvement programs	2.9 BNOK	2016-2019	4.5 BNOK 2009 - 2015E
Sustaining capex	3.5 - 4.0 BNOK	Over the cycle	4.7 BNOK 2015E
Average capex incl. growth	6.6 BNOK*	2016-2018	5.8 BNOK 2015E
Dividend payout ratio	40% of net income	Over the cycle	~100% 2010-2014
FFO/net adjusted debt	> 40%	Over the cycle	86% 4Q'14 – 3Q'15
Net adjusted debt/equity	< 55%	Over the cycle	22% 4Q'14 – 3Q'15
RoACE	Competitive**	Over the cycle	10.3% 4Q'14 – 3Q'15

*Better Bigger Greener*

\*With Karmøy Technology Pilot gross investment, before ENOVA support

\*\* Measured against a relevant peer group





Financial strength through  
relative positioning and  
balanced capital allocation

- Continuous cost and margin improvements
- Working capital management
- Financial strength and flexibility
- Disciplined capital allocation
- Reliable shareholder remuneration policy
- Effective risk management

# Market outlook

Kathrine Fog

Capital Markets Day 2015



# Agenda market outlook

- 1 Macroeconomic and downstream outlook
- 2 Primary metal market
- 3 Bauxite and alumina market
- 4 Long-term outlook



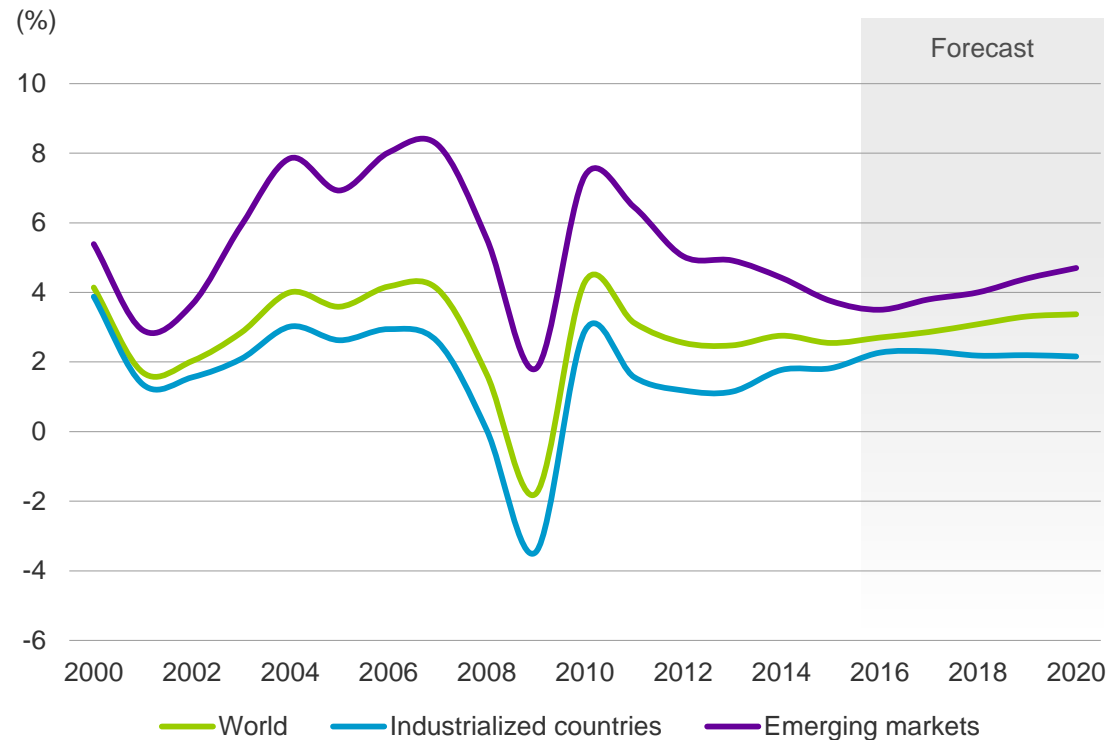
01

# Macroeconomic and downstream outlook

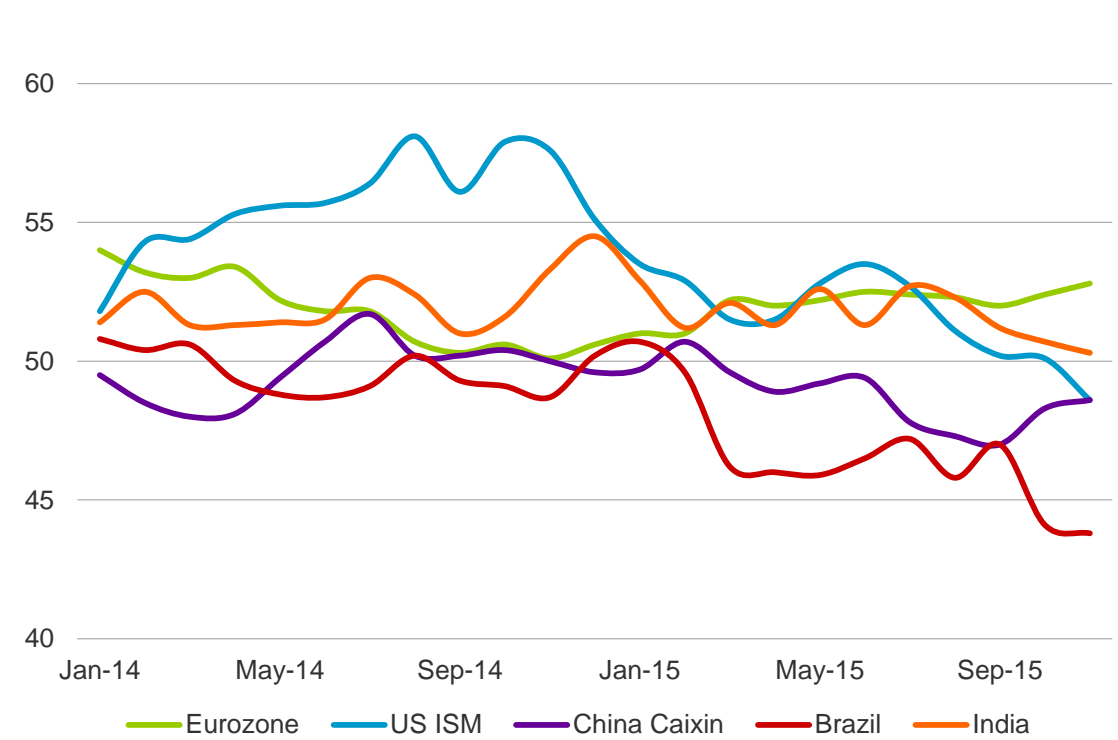
# Macro outlook affected by emerging markets slowdown

Improving global economic growth medium term

## Real GDP, annual growth



## Manufacturing Purchasing Manager Indexes

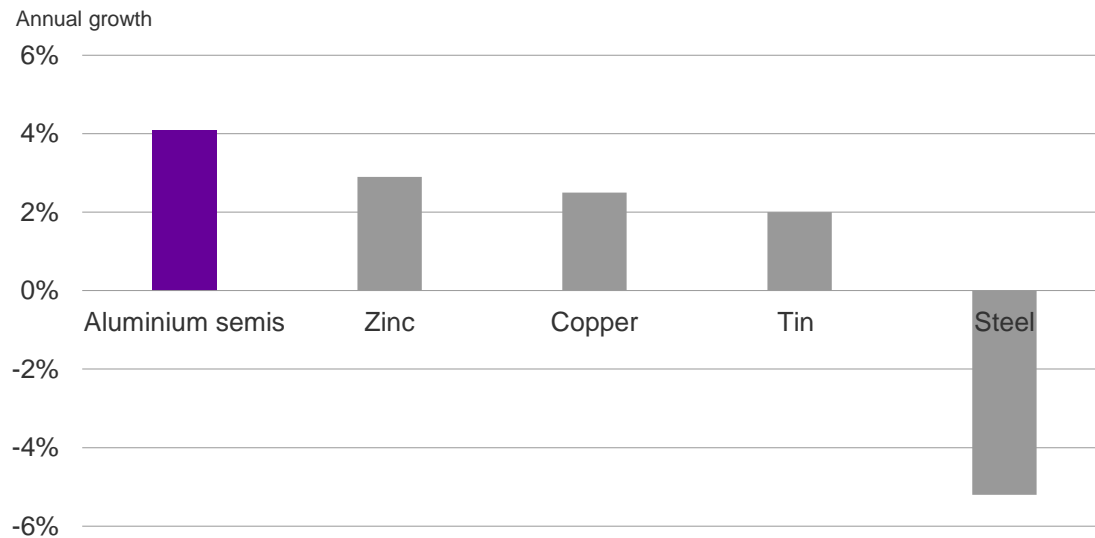


Source: Global Insight, Markit, Thomson Reuters

# Aluminium demand holding firm despite macro economic volatility

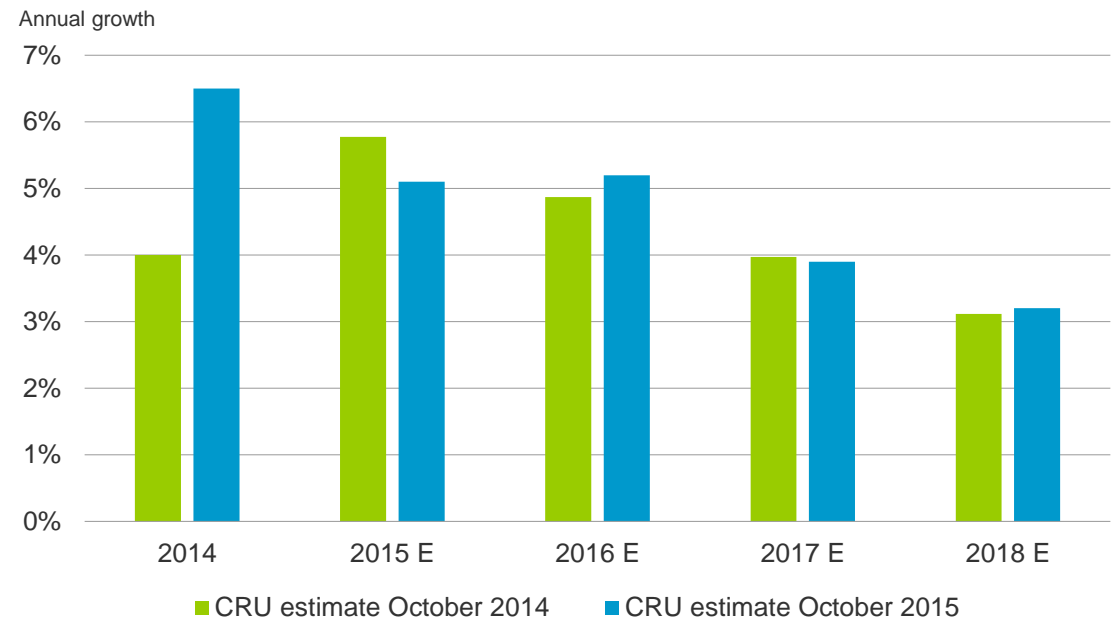
Both macro and substitution effects driving demand growth

## Demand for selected base metals, China 2015



- Aluminium demand more diversified than other base metals
- Steel and copper more affected by construction market

## Semis demand, North America



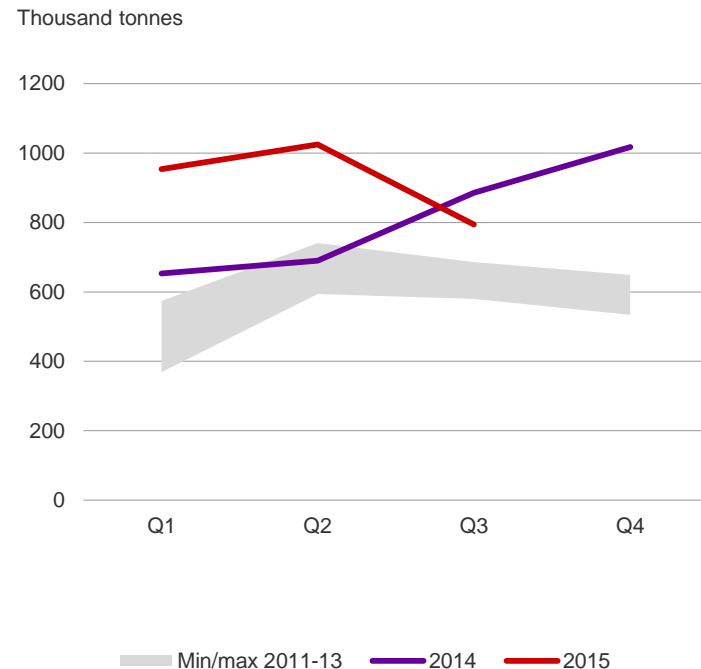
- Solid momentum in building & construction
- F-150 production lifting semis demand in transport
- Eurozone semis demand stable

Source: CRU, Hydro Analysis

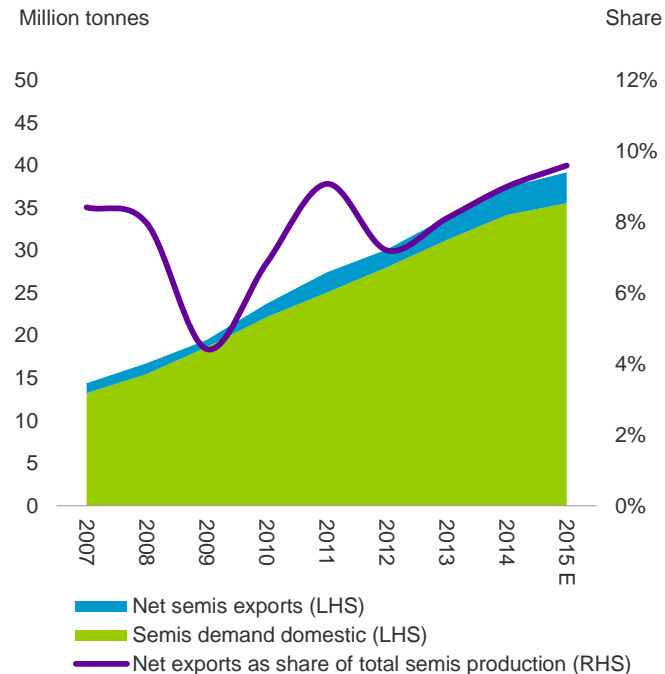
# Increased Chinese semis exports over the last year driven by arbitrage

Largely stable development as share of total semis production

## Quarterly net semis exports



## Net semis exports as share of total semis production



## Comments

- Moderating export levels during last months on the back of reduced arbitrage opportunity
- Some semis exports regarded as semis for remelt
- Further shifts in Chinese surpluses and liquidity issues might increase export levels

Source: CRU, Antaika, Hydro Analysis  
\*Annualized YTD net semis exports (incl. October)

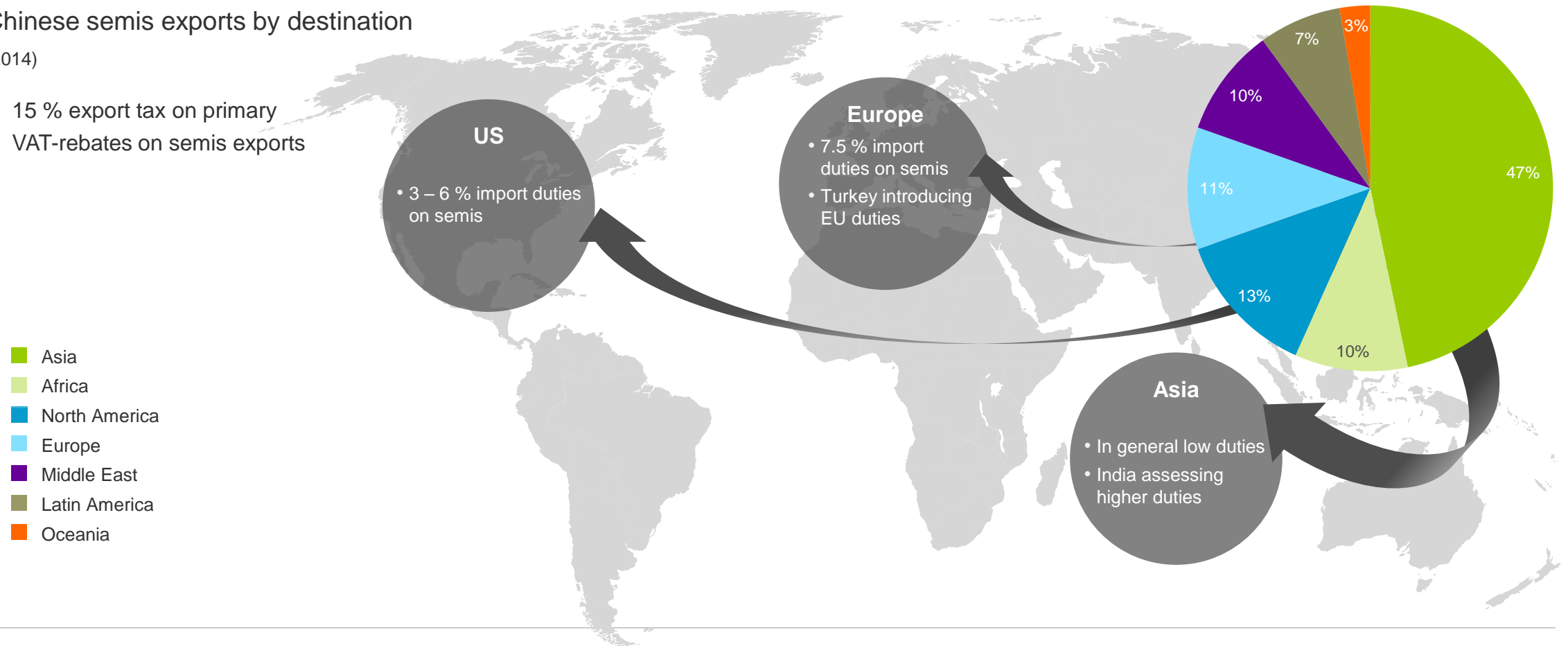
# Asia key region for Chinese semis exports

Trade regulations and duties impacting trade flows

## Chinese semis exports by destination

(2014)

- 15 % export tax on primary
- VAT-rebates on semis exports



Source: Hydro Analysis, Antaike

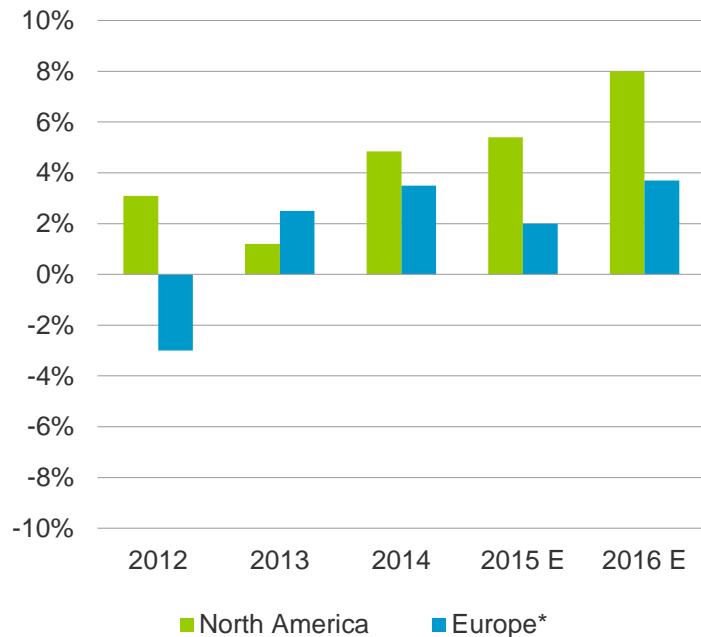


# Transport segment continues to drive demand for rolled products

Transport increasing its share of total rolled products demand

## General rolled products demand, selected regions

YoY-growth

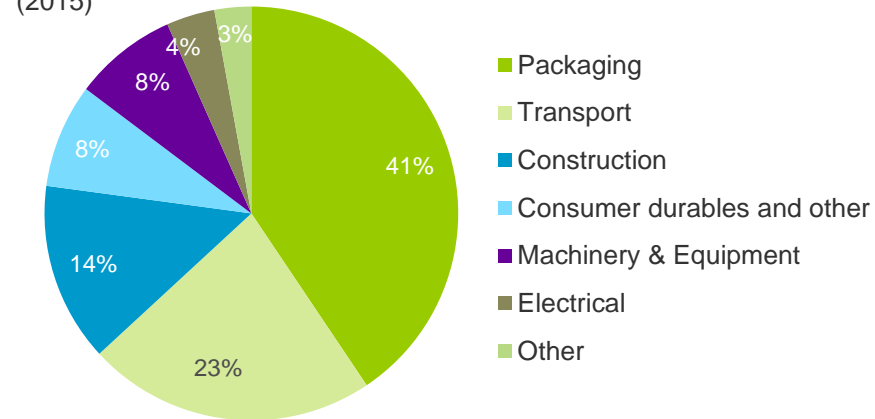


## Expected market development

- Strong demand contribution from increased aluminium usage in transport segment
- Healthy growth expected in packaging segment driven by end-consumer packaging

## Global segment composition, rolled products

(2015)



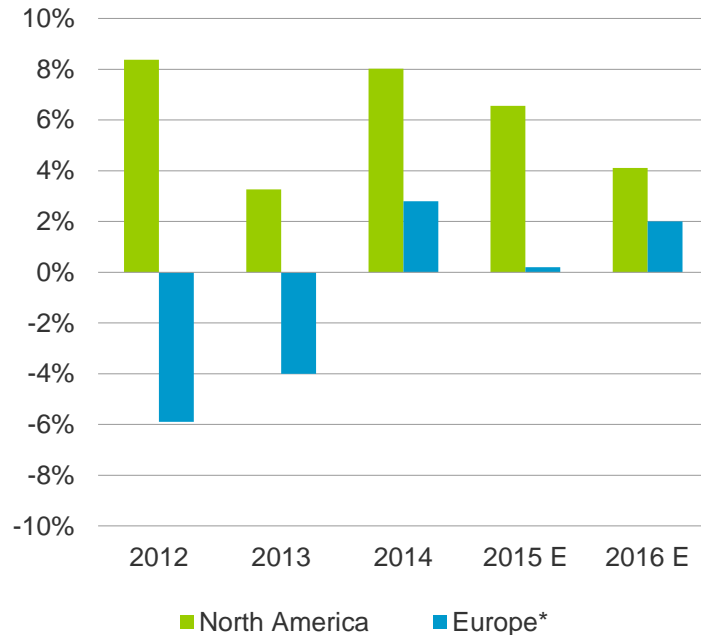
Source: CRU, Hydro Analysis  
\*Total EU27+EFTA

# Solid uptake in the US extrusion market

Gradual improvement expected in Europe

## Extrusion demand, selected regions

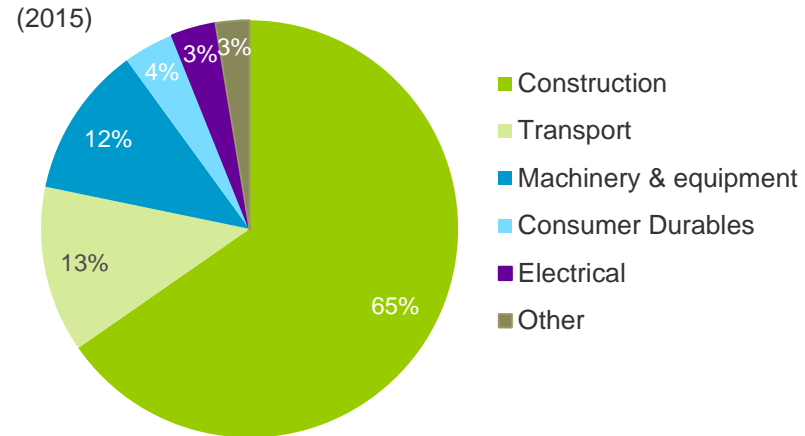
YoY-growth



## Expected market development

- US housing market sustaining positive momentum
- Construction activity in peripheral Europe showing recovery signs, although from low levels
- Growth in transport segment

## Global segment composition, extrusion (2015)



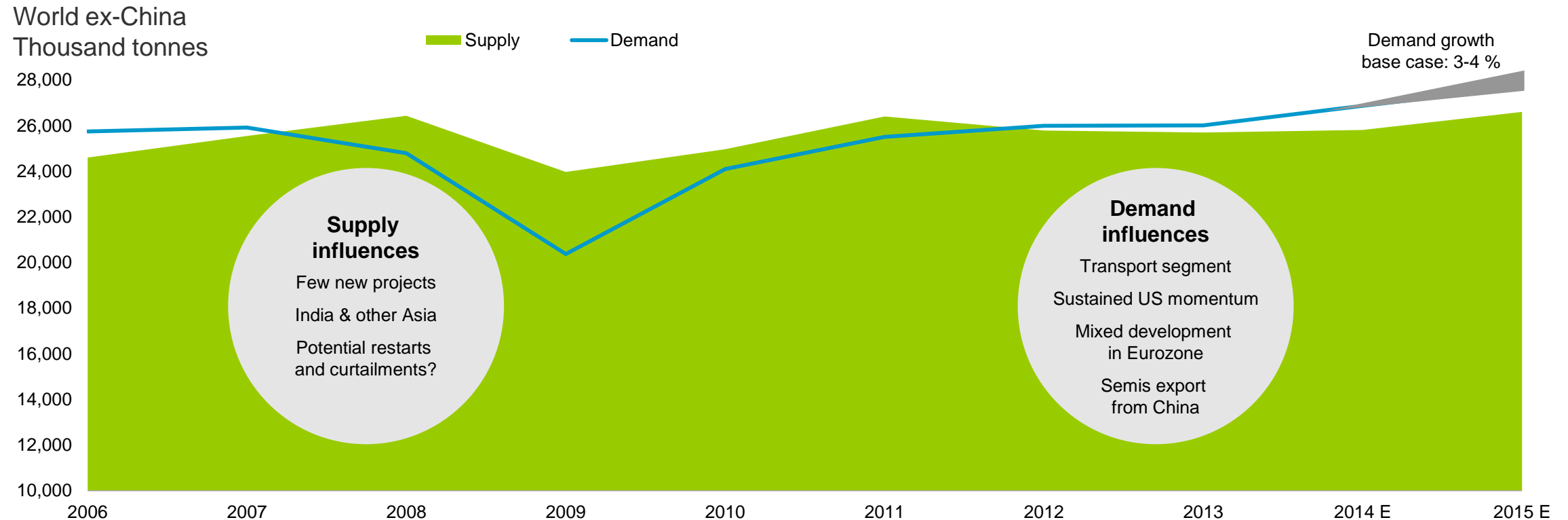
Source: CRU, Hydro Analysis  
\*Total EU27+EFTA

02

Primary metal market

# Recap Capital Markets Day 2014: Expectations for modest inventory decline also in 2015

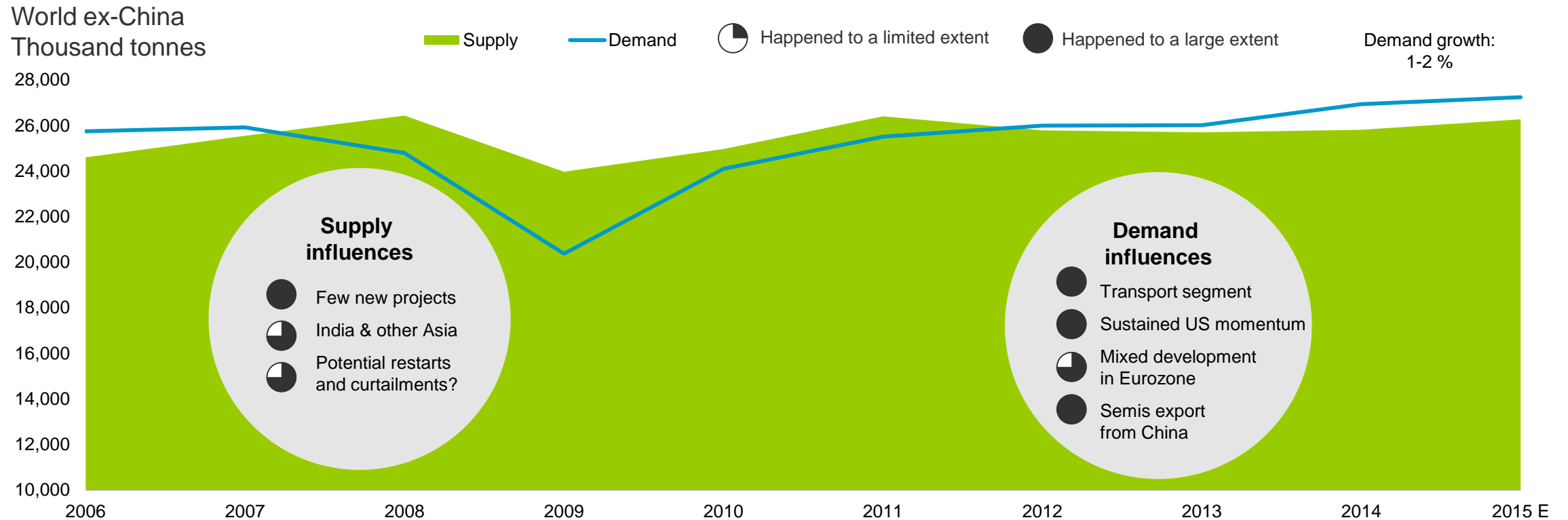
Tight market balance continuing



Source: CRU, Hydro Analysis

# Market balance progressing largely in line with expectations

Weaker demand in some emerging markets, semis for remelt exports from China limiting market deficit

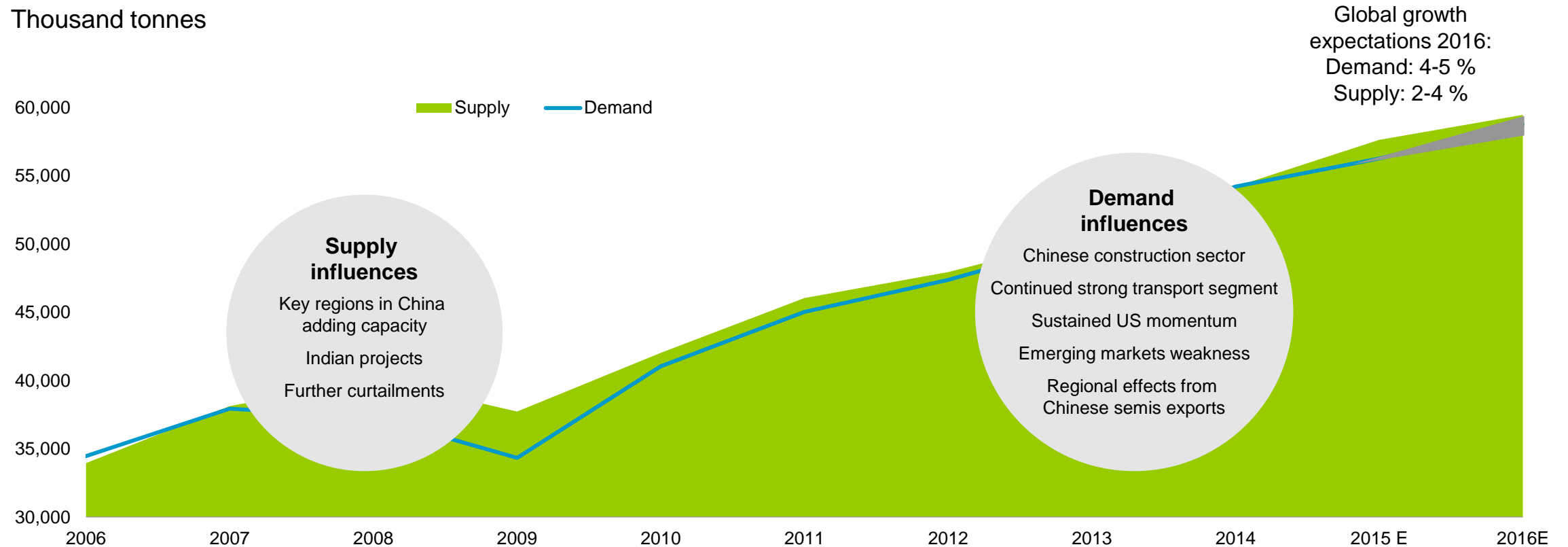


Source: CRU, Hydro Analysis

# Global surplus expected to moderate in 2016

Surplus moderating from ~1 million tonnes to 0-1 million tonnes

Global  
Thousand tonnes



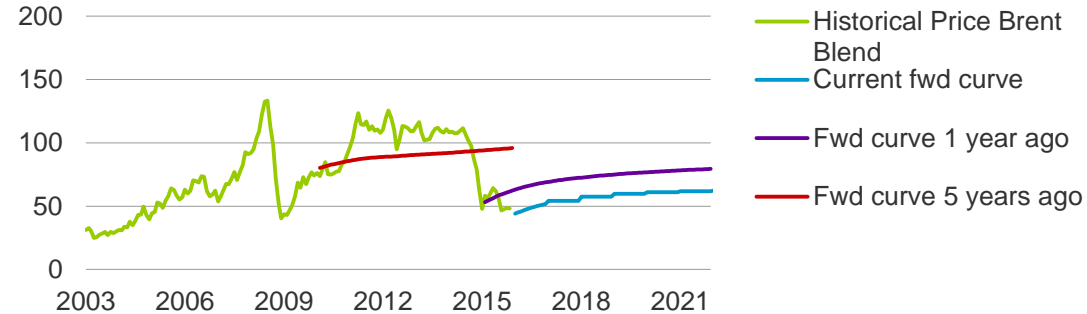
Source: CRU, Hydro Analysis

# Aluminium costs affected by lower energy cost and FX developments

Oil and coal prices trending lower, large movements in currencies vs USD

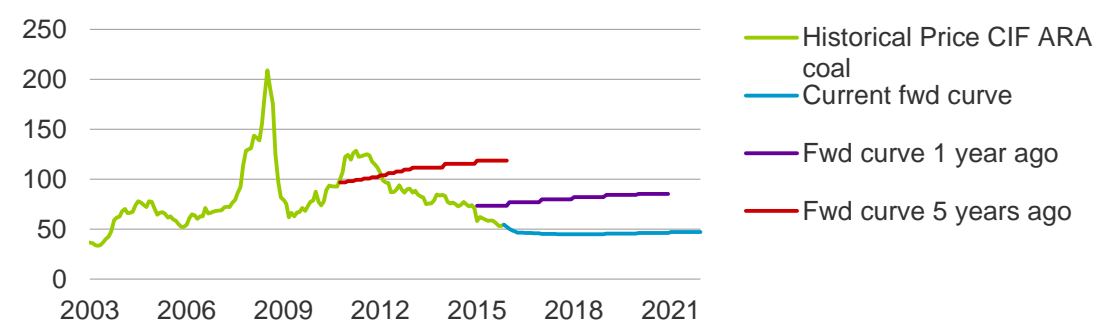
## Oil price

USD/barrel

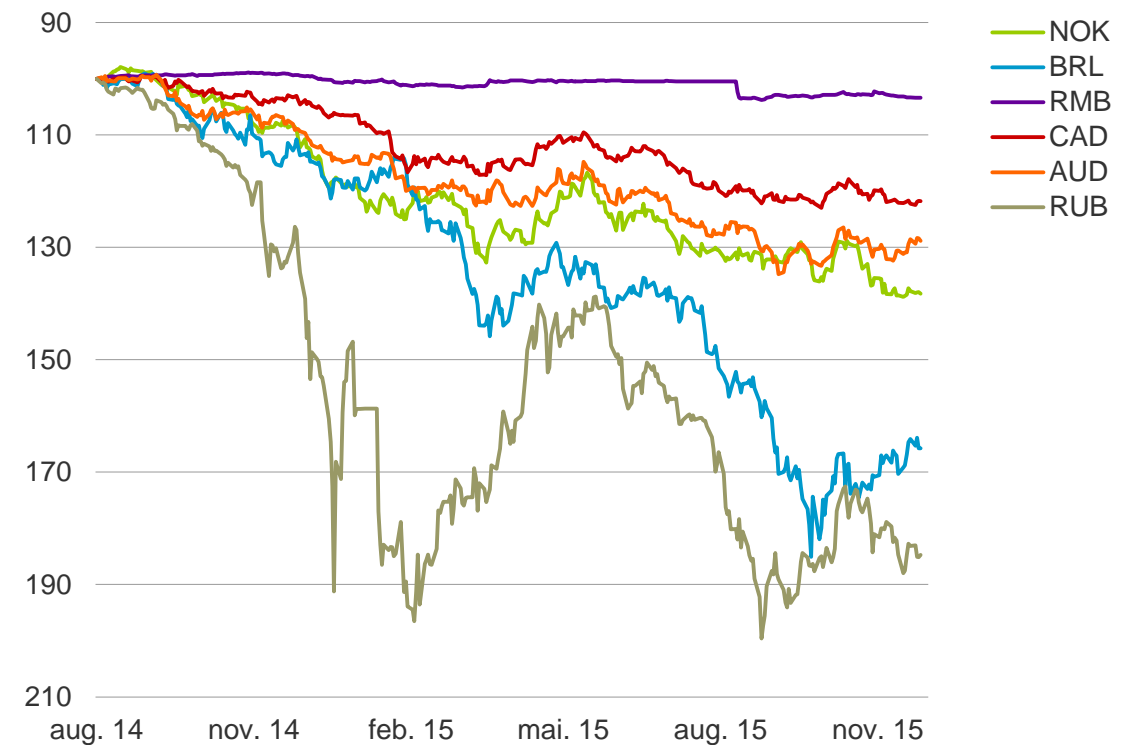


## Coal price

USD/tonnes



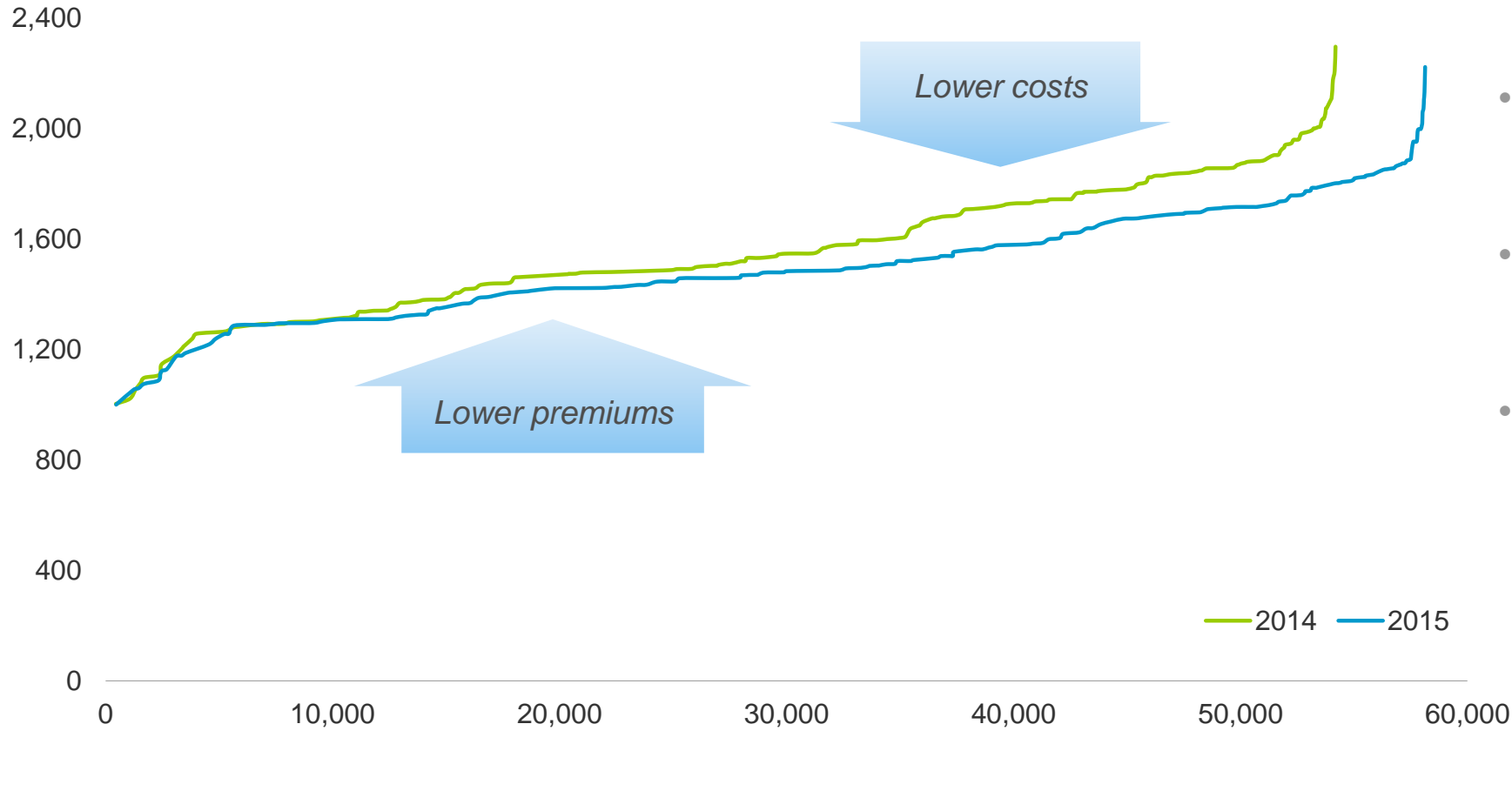
## Currencies Indexed vs USD, Aug 1<sup>st</sup> 2014=100



Source: Thomson Reuters

# Currency movements influencing relative positions on global cost curve

Global Business operating cost, 2015  
USD/tonne

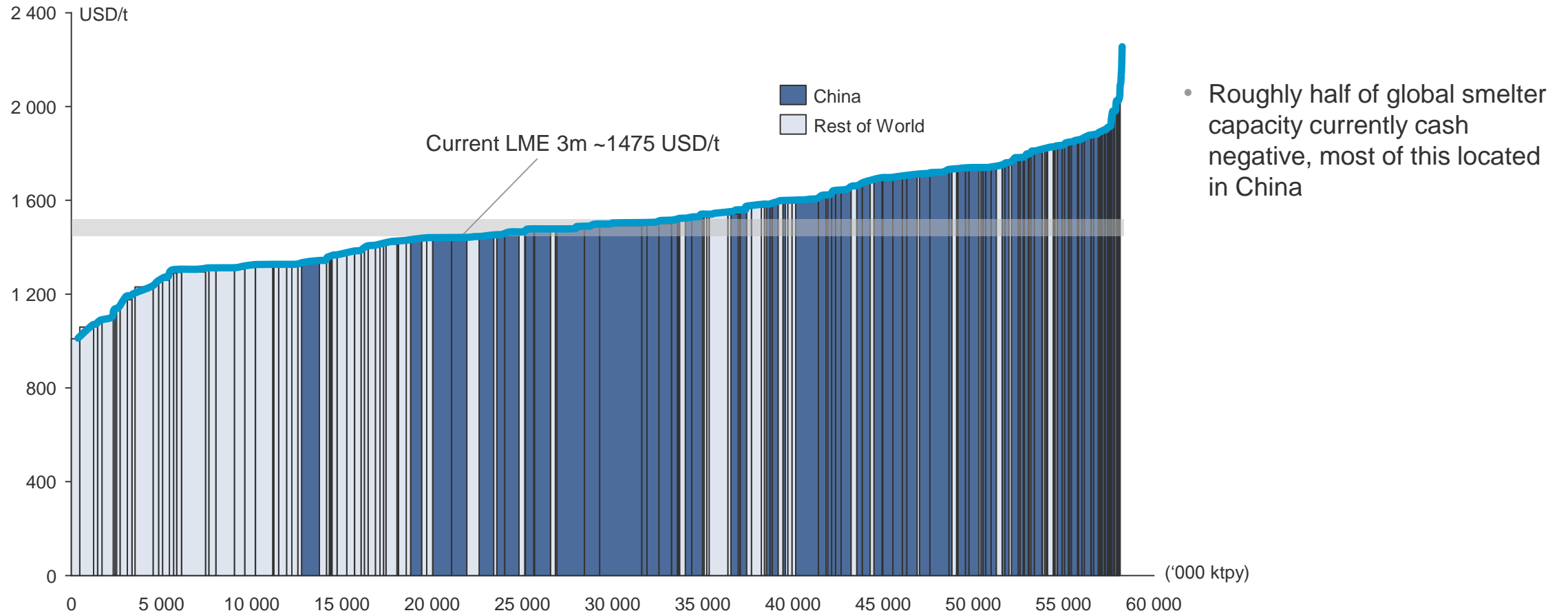


- USD denominated smelters losing relative competitiveness
- Chinese smelters to a larger extent benefitting from lower coal prices
- Lower premiums pushing business operating costs up

Source: CRU, Hydro Analysis



# Most Chinese smelters in the 3<sup>rd</sup> and 4<sup>th</sup> quartile on the global cost curve



Source: CRU, Hydro Analysis

# Market balance in China remains uncertain

## Uncertain supply growth

- Large capacity increases of past years unlikely to be repeated
- Focus shifting from top-line growth to bottom-line profitability
- Slower demand growth not yet impacting investments
- Continued focus on supporting local employment, but financial positions are becoming constrained

## Softer demand growth

- Construction activity still weak, but housing prices picking up
- Transport sales rebounding, moderate car production
- Government stimuli

## Upstream positioning

- Depleting domestic bauxite resources affecting costs
- Investment focus may shift from inland (Xinjiang / Inner Mongolia) to coastal areas (Shandong)
- Power market reform reducing power cost

## SHFE 3 month prices at all-time low

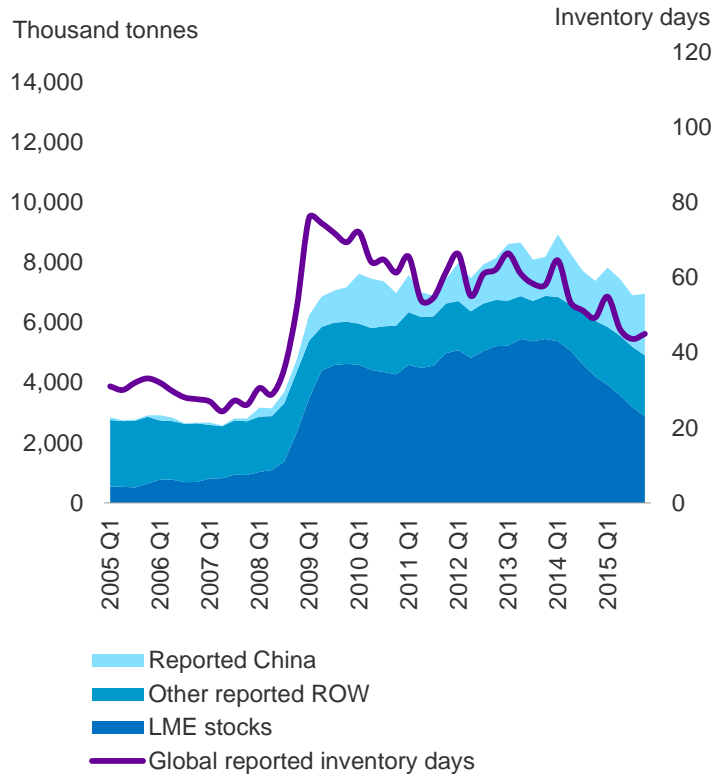
RMB/tonne



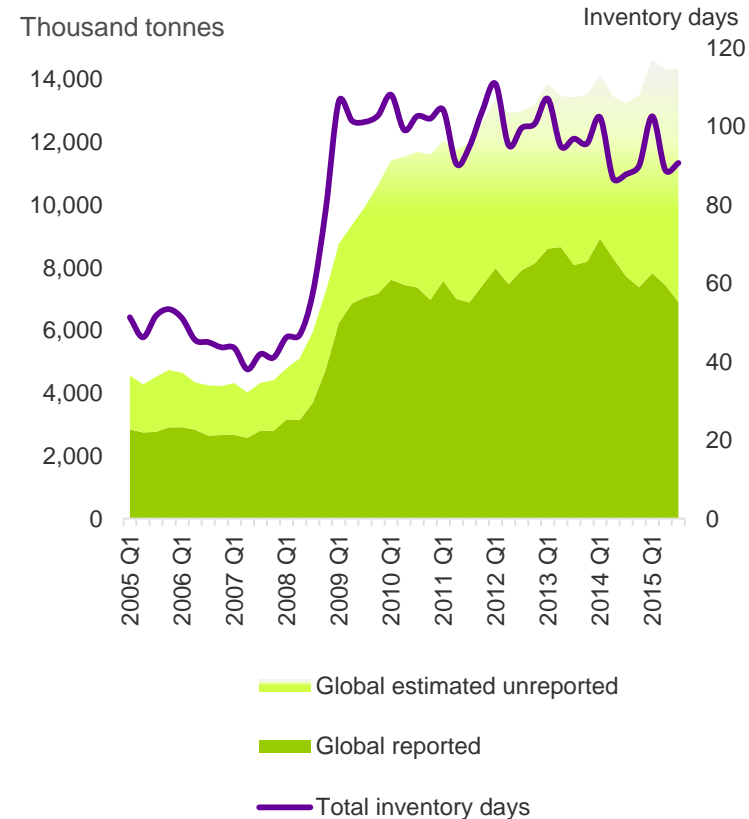
Source: Hydro Analysis, Thomson Reuters

# Global reported stocks decreasing, uncertain unreported volumes

## Global reported stocks and inventory days



## Total global stocks and inventory days



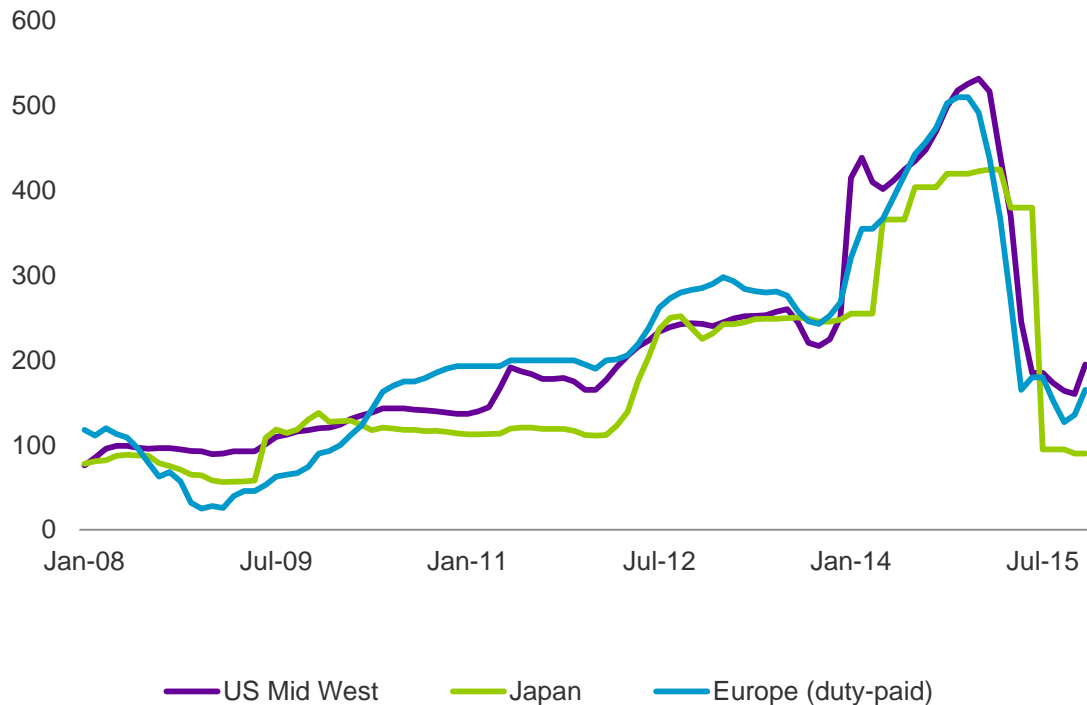
- Reported stocks decreasing over last year
- LME stocks lowest since the financial crisis
  - Influenced by new LME warehousing regulations
- High uncertainty regarding absolute level of unreported volumes

Source: CRU, Hydro Analysis

# Regional standard ingot premiums falling back to historical levels, all-in price fall in NOK moderated by currency effect

Regional standard ingot premiums

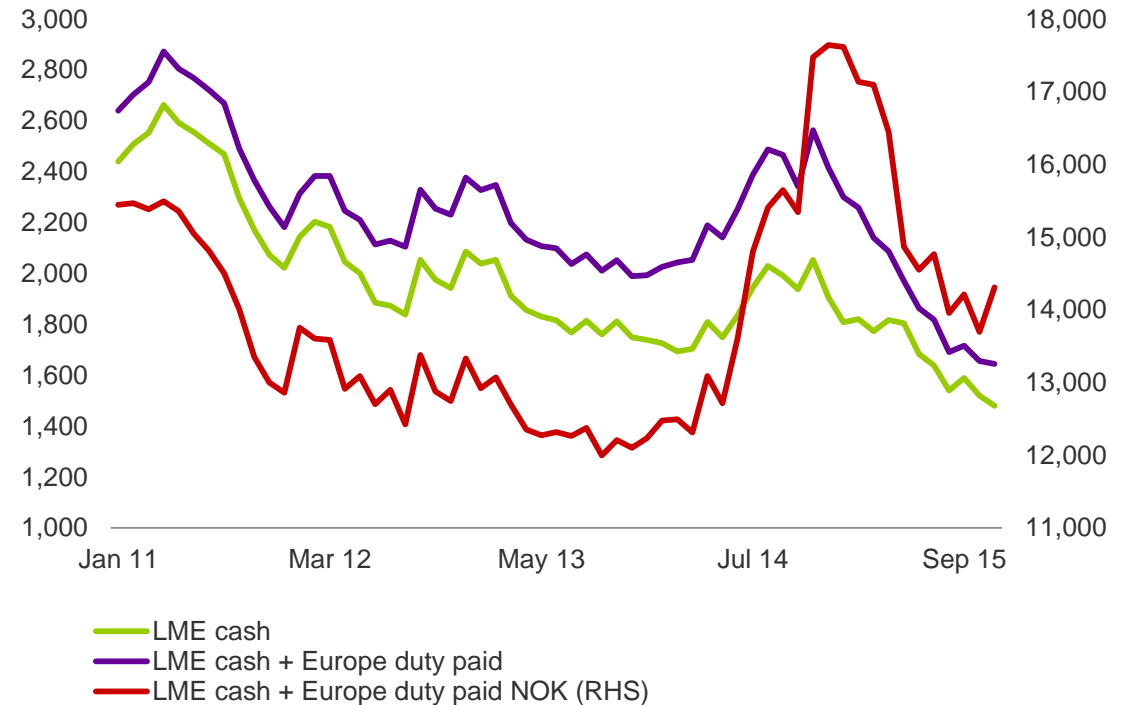
USD/tonne



All-in price

USD/tonne

NOK/mt



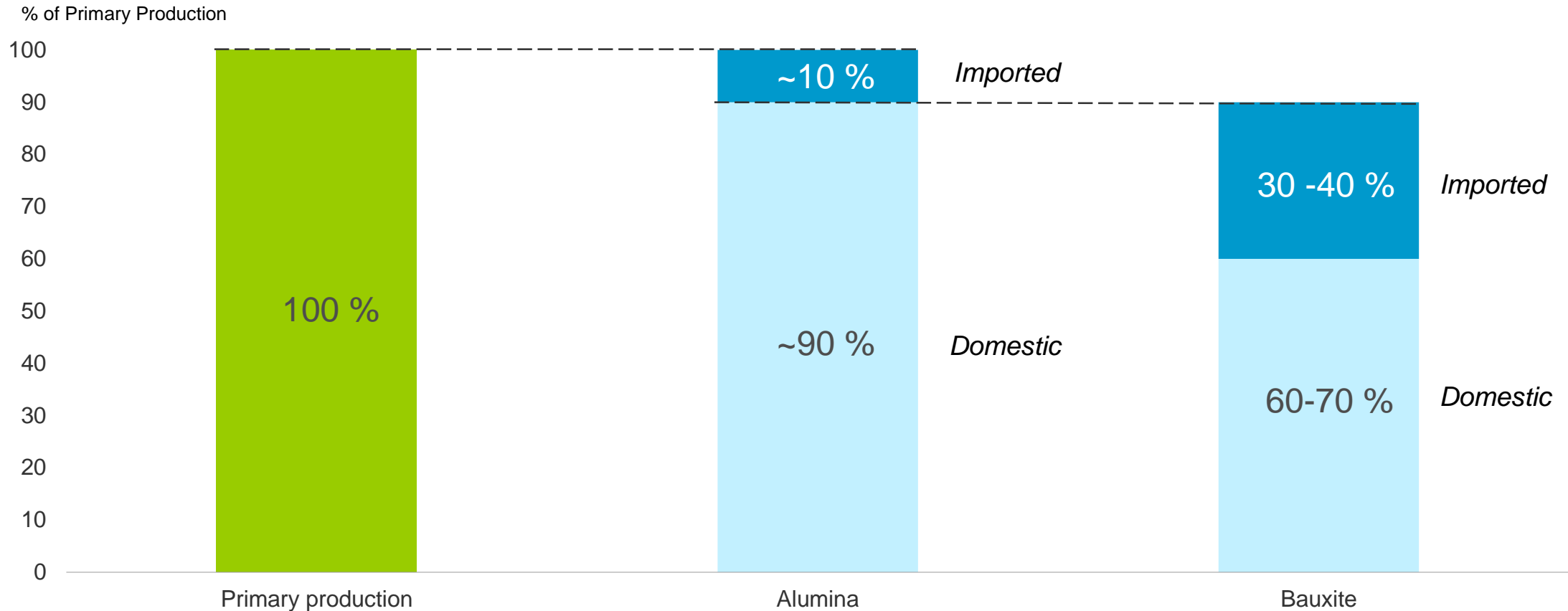
Source: CRU, Hydro Analysis

03

## Bauxite and alumina market

# Chinese primary production dependent on imported resources

Around 40% based on imported raw material in 2012-2014

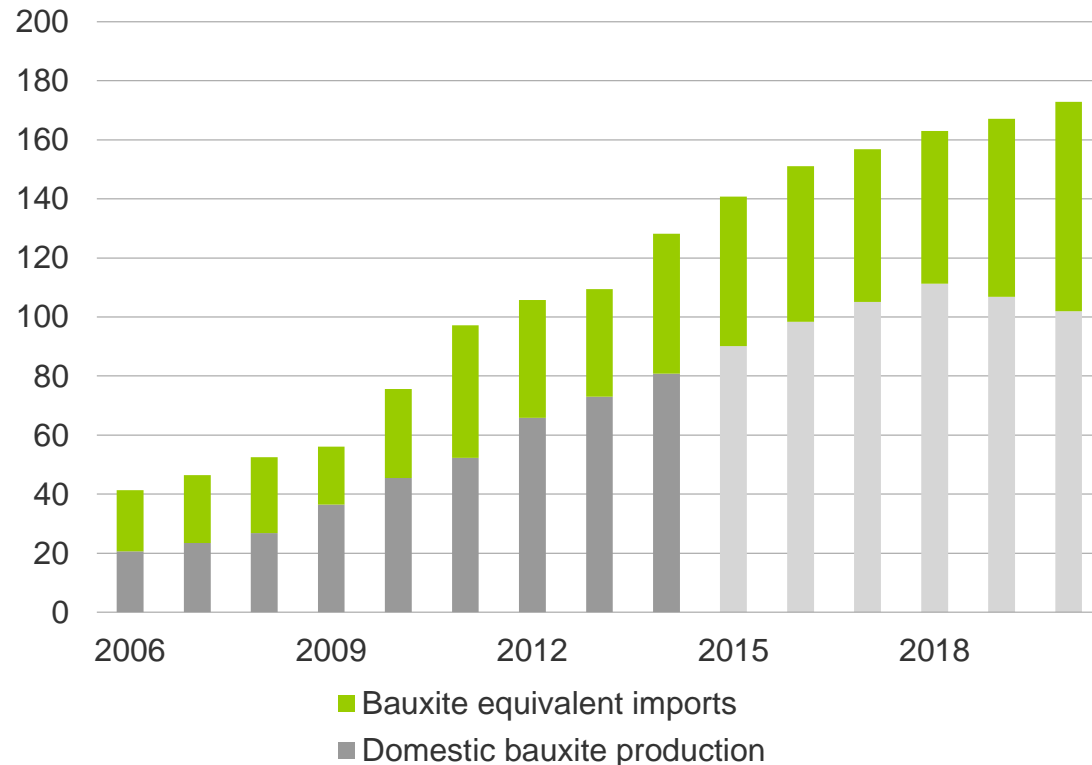


Source: CRU, China customs

# Chinese bauxite import dependency expected to increase

Domestic bauxite production not keeping pace with demand

Million tonnes



## Chinese bauxite import requirements remain high

- New domestic resources not sufficient to meet demand longer term
- Domestic bauxite resources with lower quality and higher costs
- Current new investments and announcements in alumina refineries in coastal areas dependent on imported bauxite

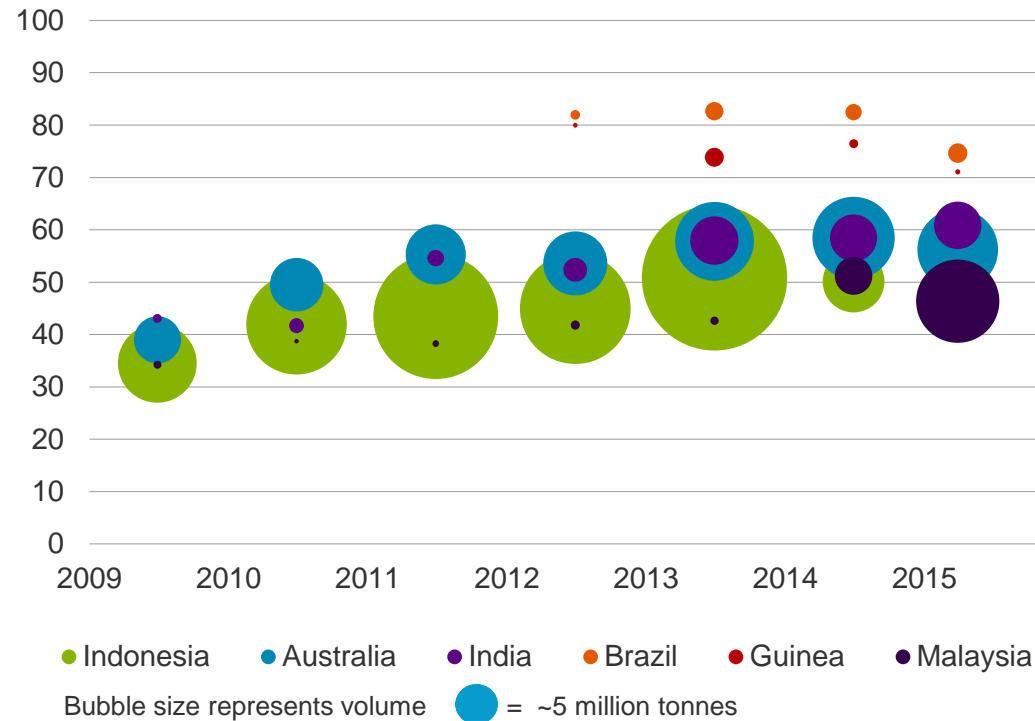
Source: CM Group

# Malaysia emerging as largest bauxite exporter to China in 2015

Brazilian bauxite traded at a premium on the back of higher freight, but also higher value in use

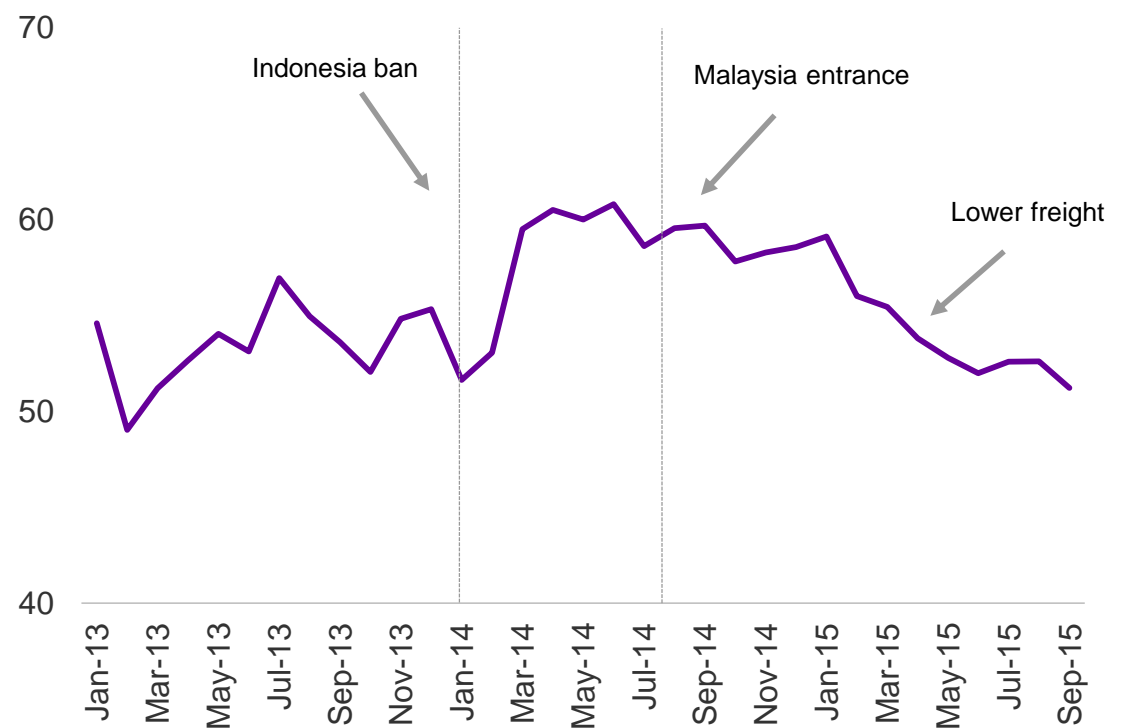
China bauxite imports, volume and price by country

USD/tonne CIF



Bauxite price CIF China

USD/tonne



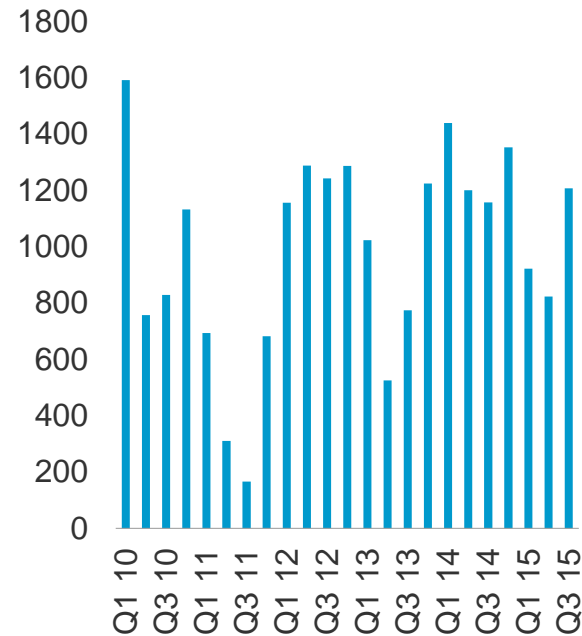
Source: China Customs



# Alumina prices falling on the back of oversupply and lower costs

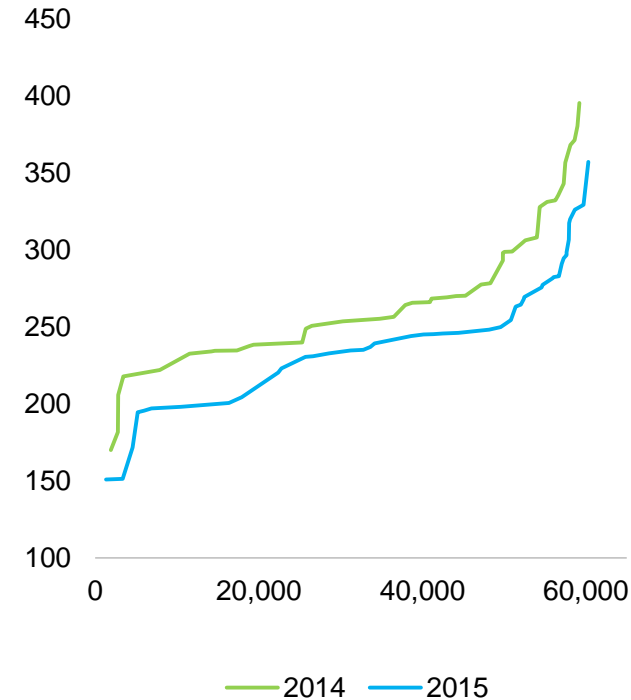
## Lower Chinese alumina imports creating oversupply ex. China

Chinese alumina imports quarterly, thousand tonnes



## Cost curves shifting down

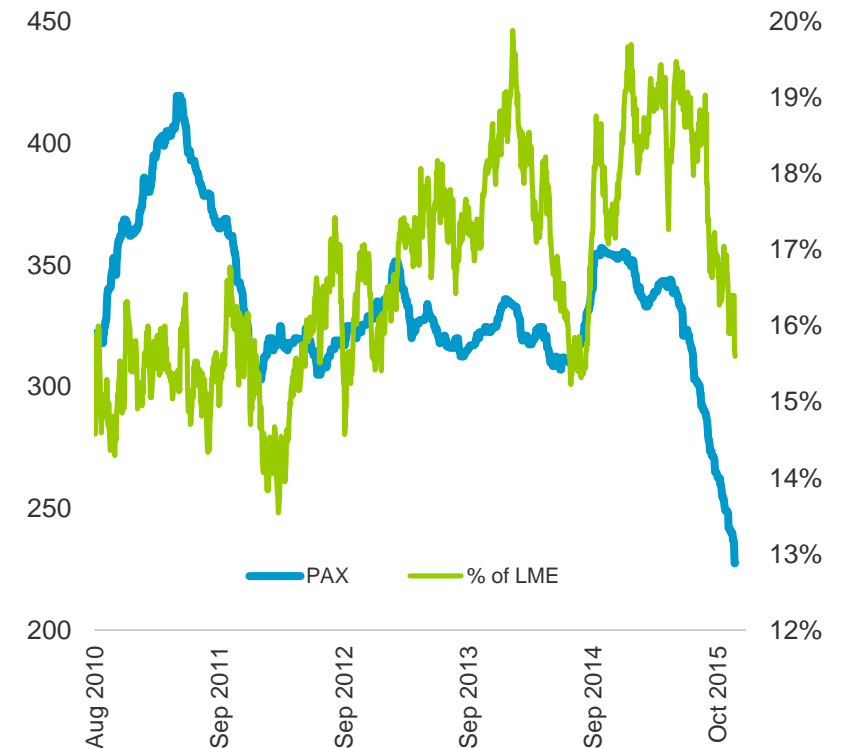
World ex. China USD/tonne



## Alumina price falling

USD/tonne

Share of LME

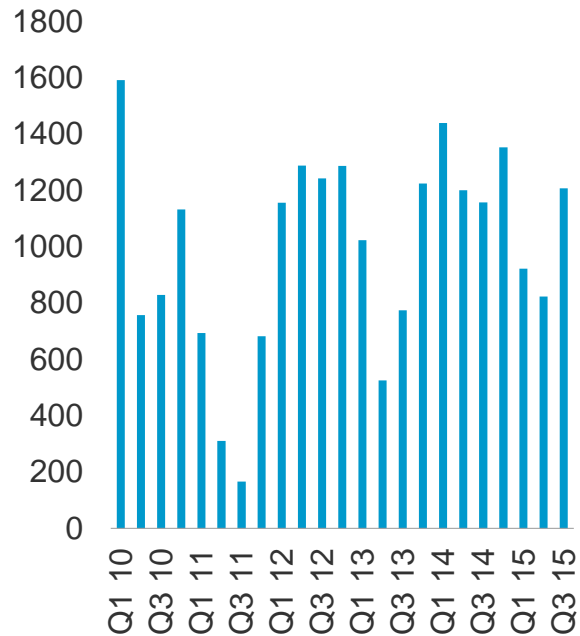


Source: China customs, CRU, Hydro analysis

# Alumina prices falling on the back of oversupply and lower costs

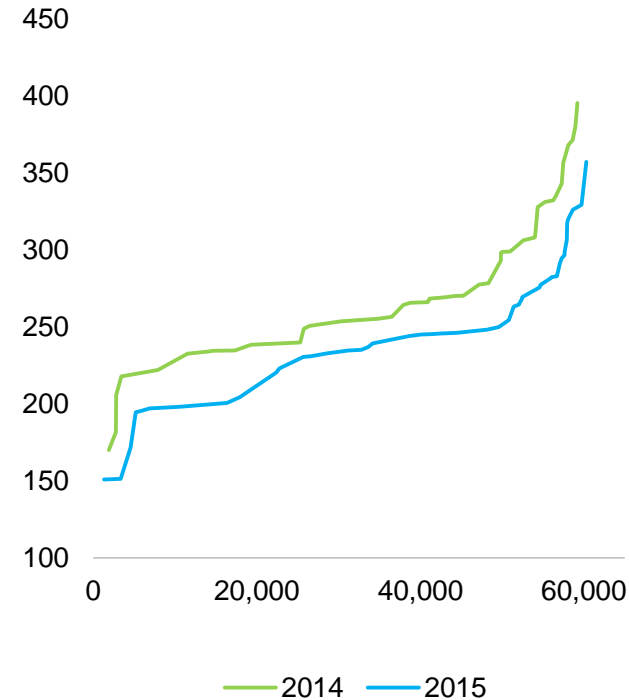
## Lower Chinese alumina imports creating oversupply ex. China

Chinese alumina imports quarterly, thousand tonnes

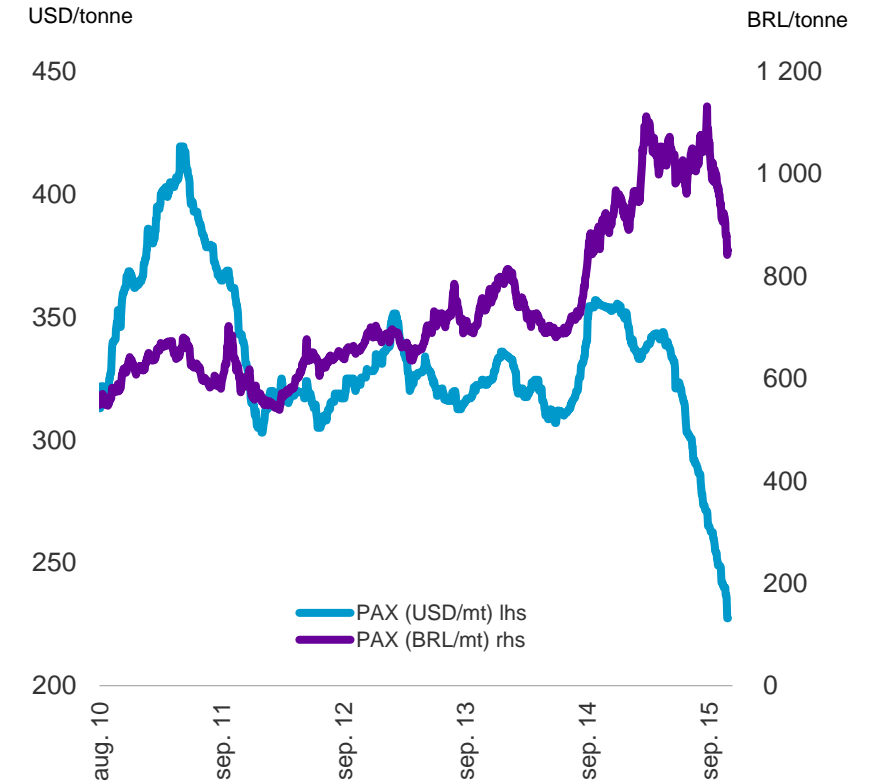


## Cost curves shifting down

World ex. China USD/tonne



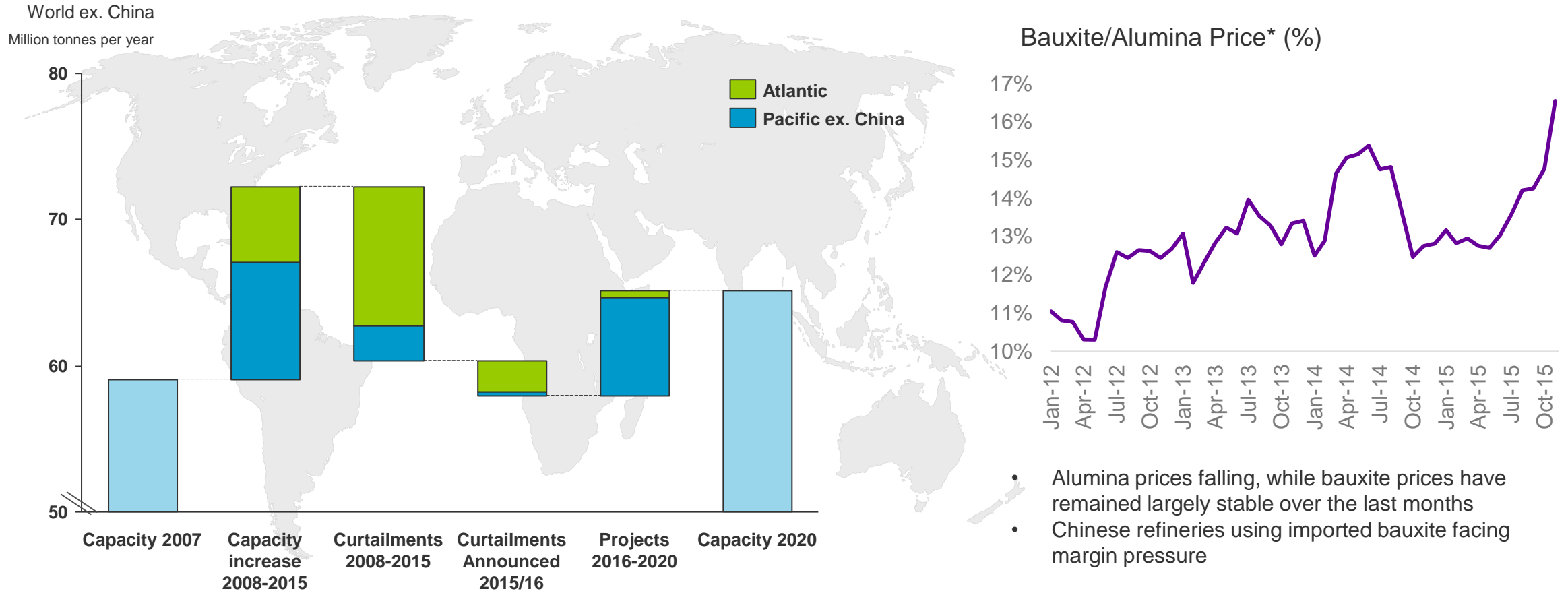
## ...but falling less in BRL



Source: China customs, CRU, Hydro analysis

# Few new alumina projects seen world ex-China in the coming years

Further curtailments probable



Source: CRU, China customs

\*CIF China bauxite relative to Chinese alumina price (Ex-Henan). Proxy for November using actual alumina data and CIF bauxite for October






04

Long-term outlook

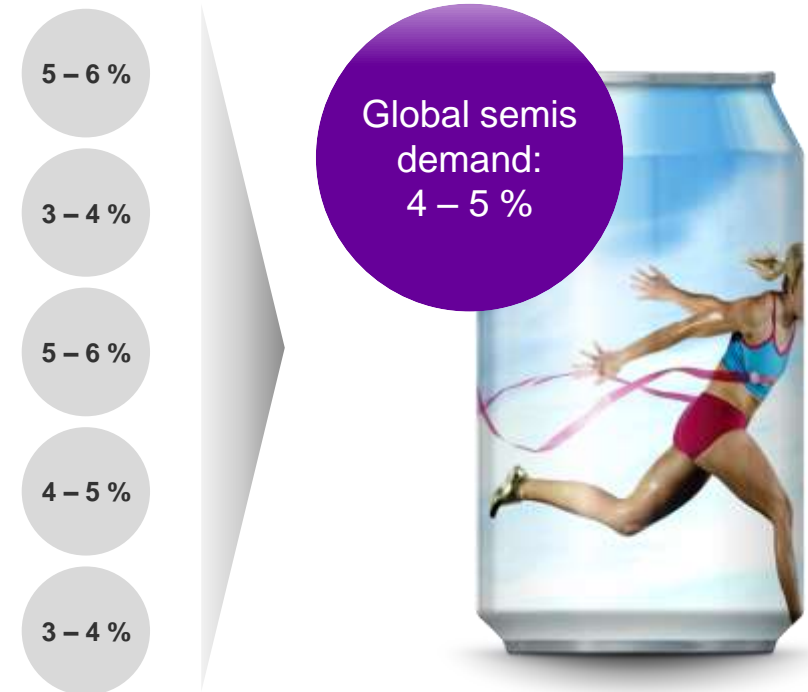
# Strong growth drivers across segments providing solid demand outlook

Short-term macroeconomic volatility, long term fundamentals still in place

## Strong demand drivers in key aluminium segments

	<b>Transport</b>	Growth in automotive vehicle production Aluminium content in cars increasing Growth in other transport modes, e.g. railway
	<b>Construction</b>	Urbanization Housing market recovery in mature regions Energy neutral buildings
	<b>Electrical</b>	Urbanization Copper substitution
	<b>Machinery &amp; equipment</b>	Improving industrial sentiment in mature regions Manufacturing activity and industrial growth in emerging countries
	<b>Packaging</b>	Urbanization Environmentally-friendly solutions

## Semis demand CAGR 2015 – 2025

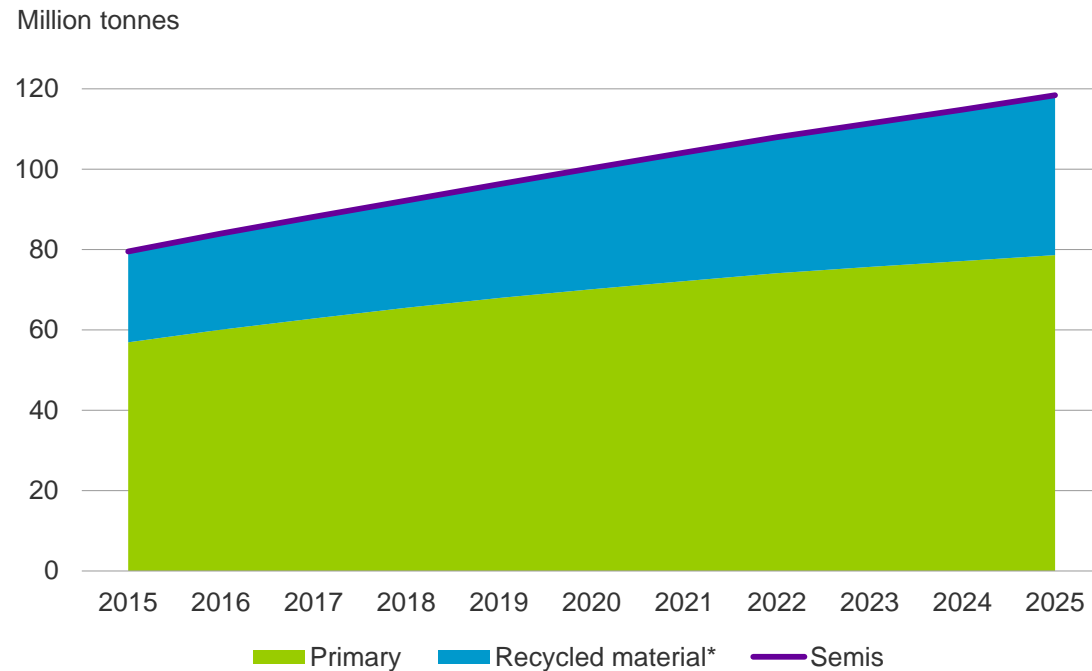


Source: CRU, Hydro Analysis

# Growth in global semis demand creates opportunities for both primary and recycled material

Recycling share increasing, primary demand growth remains firm

Global demand outlook



CAGR 2015 – 2025



Source: CRU, Hydro Analysis  
\*Post-consumed and fabrication scrap

- Demand in mature regions boosted by transport segment, short-term softness in emerging markets
- Lower aluminium prices amid lower input costs, FX developments & market surplus
- Roughly half of global smelter capacity currently cash-negative; most of this located in China
- Chinese bauxite import dependency continue to increase
- Solid long-term demand outlook supported by strong growth drivers across segments



*Better Bigger Greener*

# Bauxite & Alumina

Alberto Fabrini

Capital Markets Day 2015



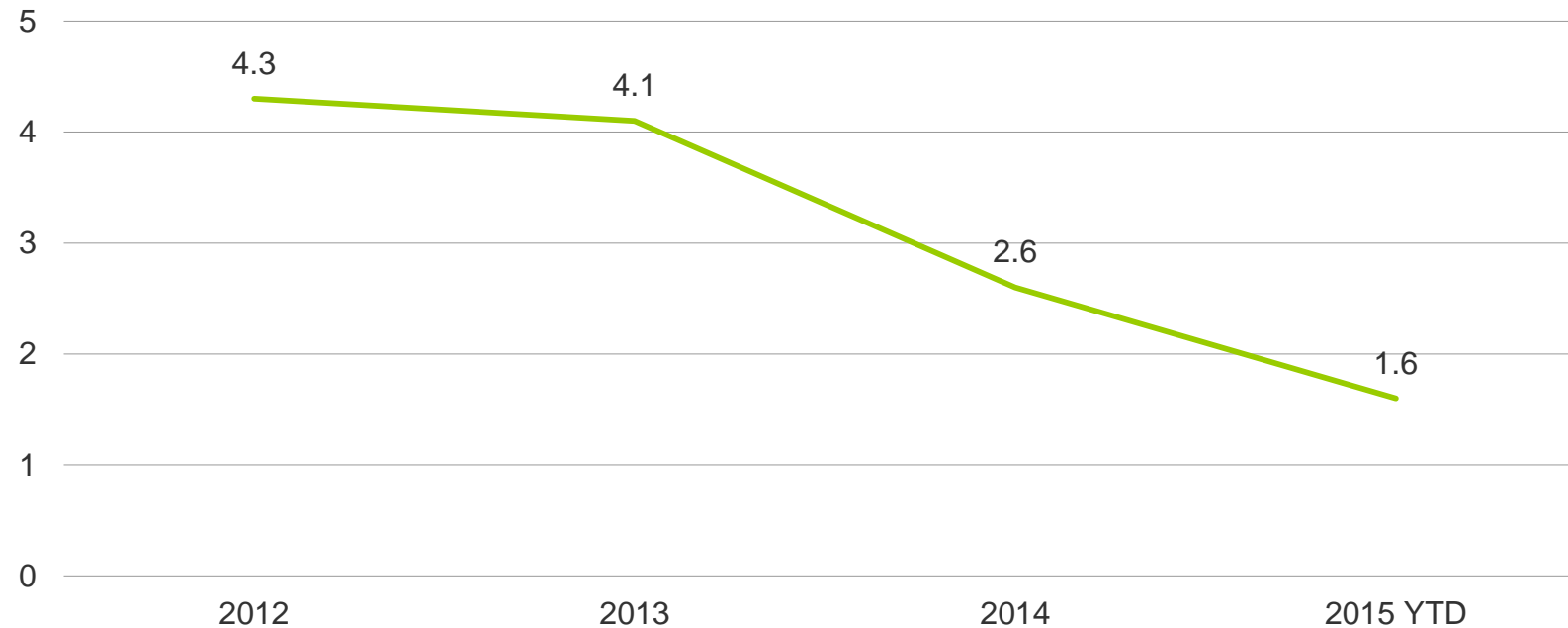
HYDRO



# Safety performance improves with operational stability

More than 60% TRI reduction compared to 2012, almost 40% down since 2014

Total recordable injuries (TRI) per million hours worked



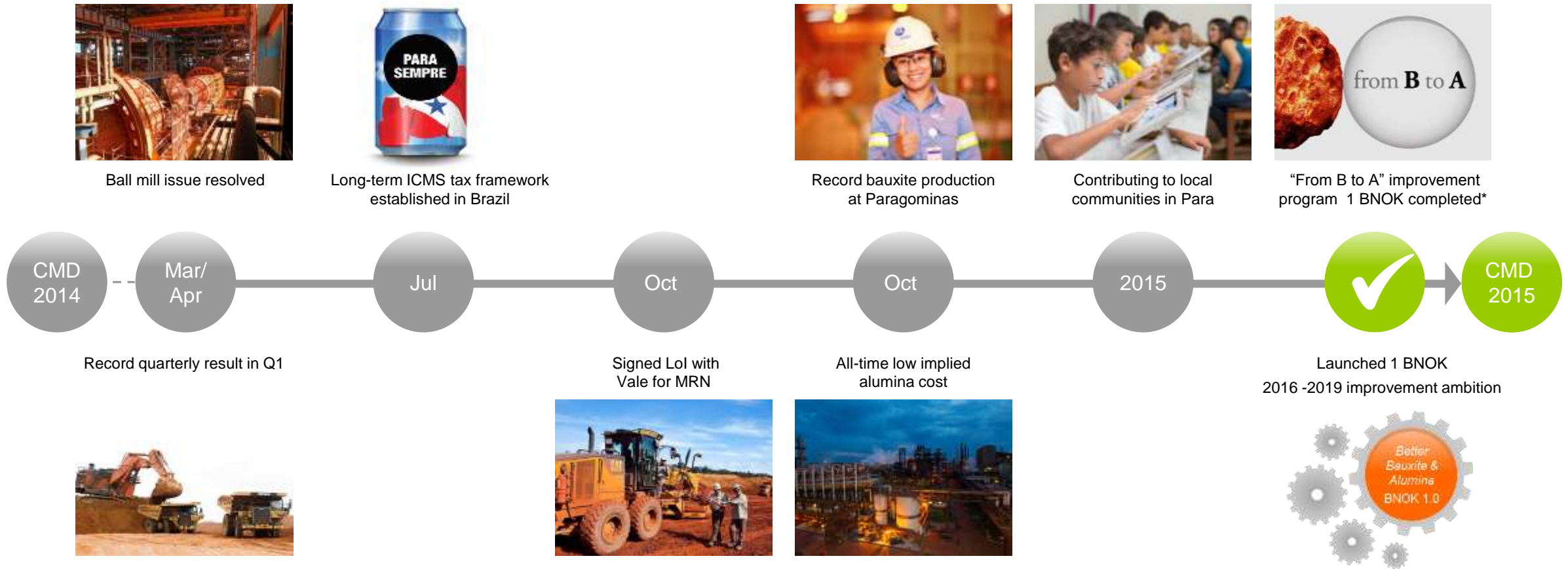
# Bauxite & Alumina strategic priorities

Aiming for operational and commercial leadership

## *Better*      *Bigger*      *Greener*

- Strive for an injury free environment
- Continue with operational improvement drive in world class operations
- Price bauxite and alumina on own fundamentals
- Secure and develop bauxite resources for future decades
- Further mature CAP project and Paragominas expansion
- Further improve organizational capabilities and environmental performance
- Deliver on reforestation ambition 1:1 in 2017

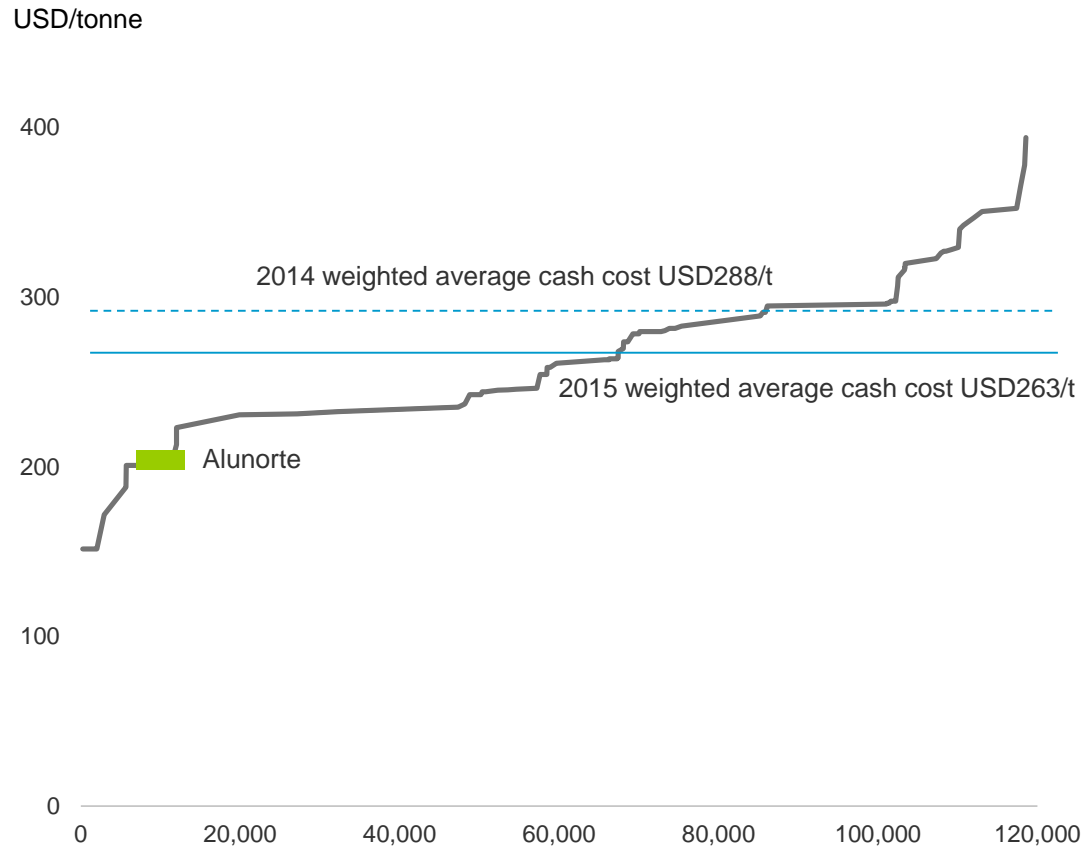
# Bauxite & Alumina: Lifting performance, securing bauxite supply



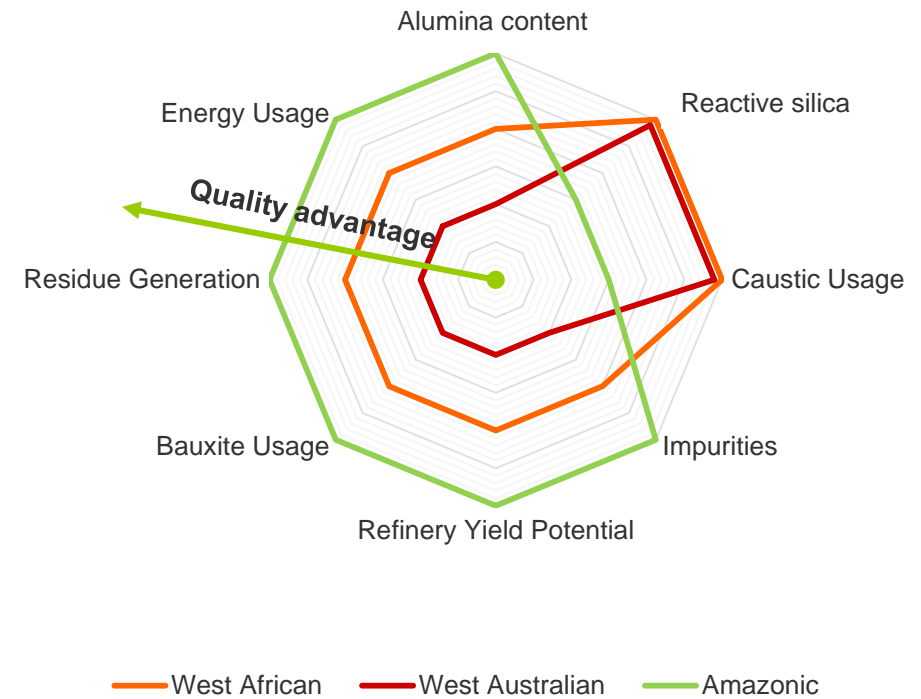
\* Based on status Dec-2015

# World-class quality assets

First quartile alumina cost position and bauxite quality advantage



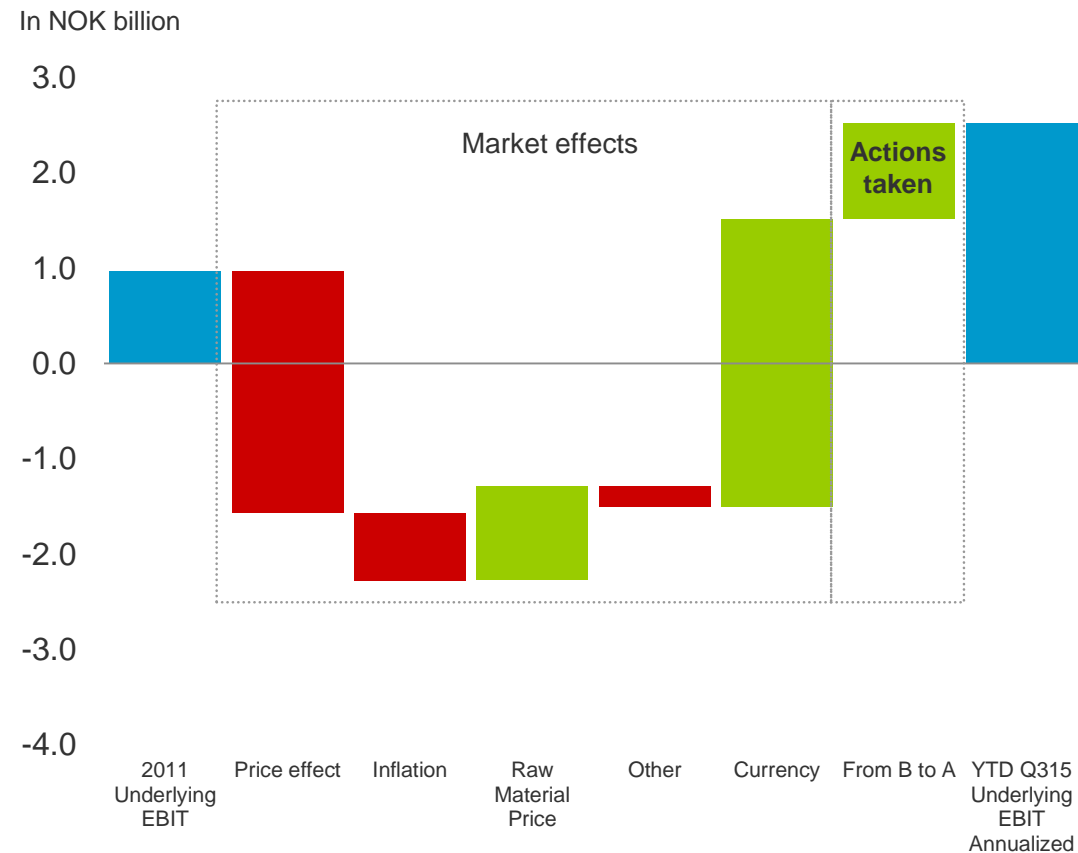
Bauxite quality comparison



Source: CRU

# Ambitious “From B to A” improvement program delivered

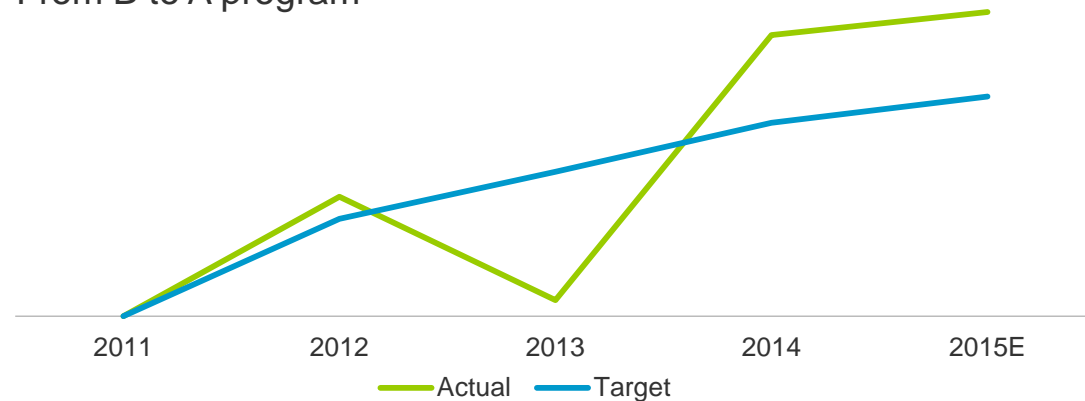
Currency development offsets price effects



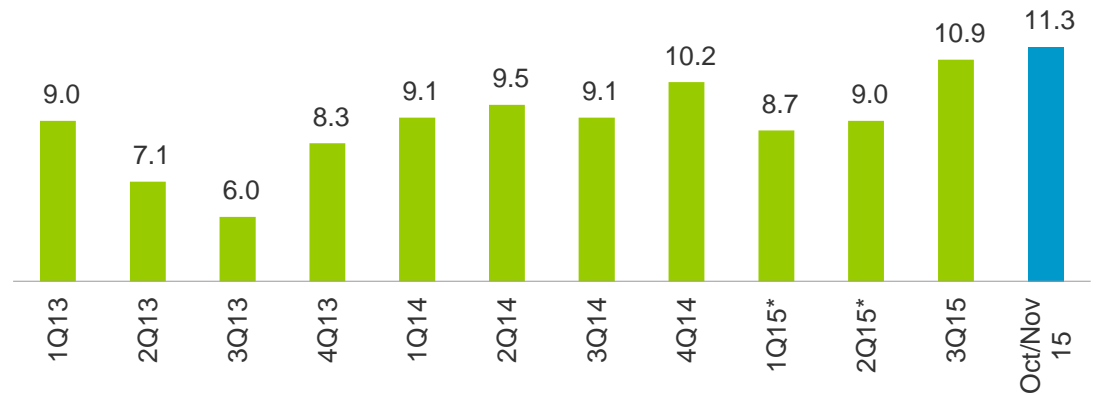
\* Based on status Dec-2015

# Paragominas delivering beyond planned cost improvements

From B to A program



Production, annualized million tonnes



- Production above nameplate capacity
- Productivity improvements driven by debottlenecking at beneficiation plant and optimization of mining operations
- Fixed cost reduction mainly driven by manning reduction of 25%
- Improved process control and plant stability (BABS<sup>1</sup>)
- Short-term issue with ball mill resolved<sup>2</sup>

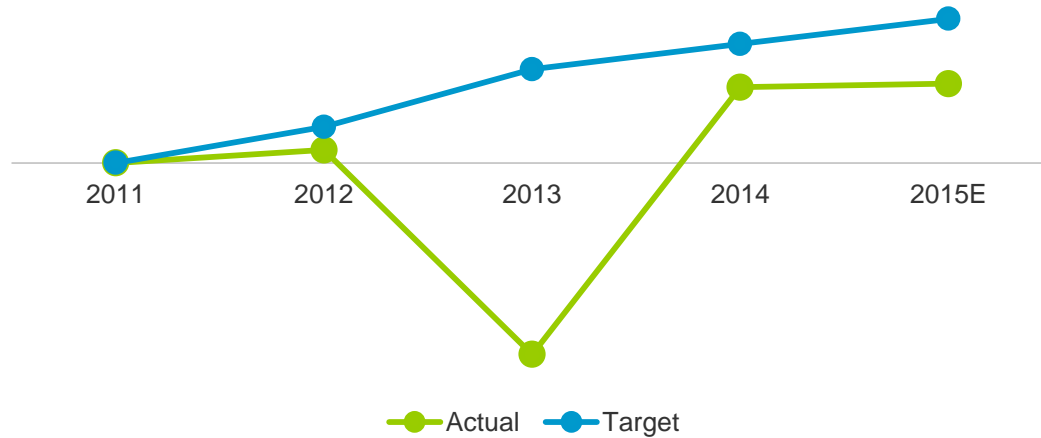
1) Bauxite and alumina business system

2) Extended maintenance period in March / April 2015 resulted in lower bauxite production

# Alunorte improvement efforts continue

Stabilized operations – first step towards lifting production

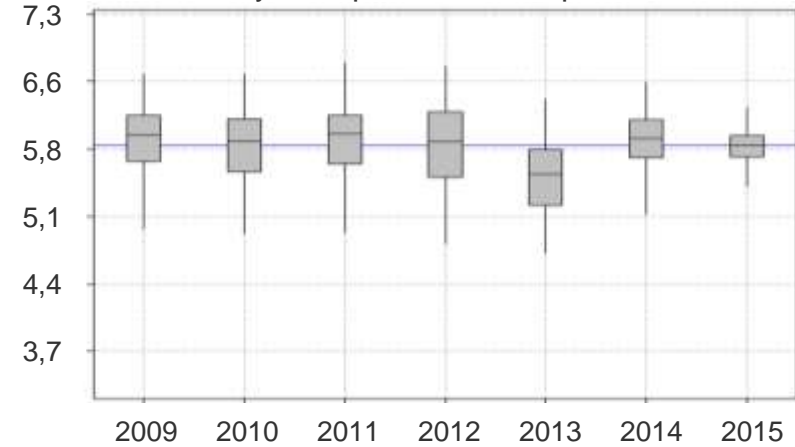
From B to A program



- Strong recovery during 2014, stabilizing in 2015
  - Continuing efforts to increase production after stabilizing production environment (BABS\* implementation)
  - Increasing raw material efficiency
  - Targeted manning reductions partly moved into 2016

Reducing production rate variability through BABS

Million tonnes\*\* Hydrate production boxplot



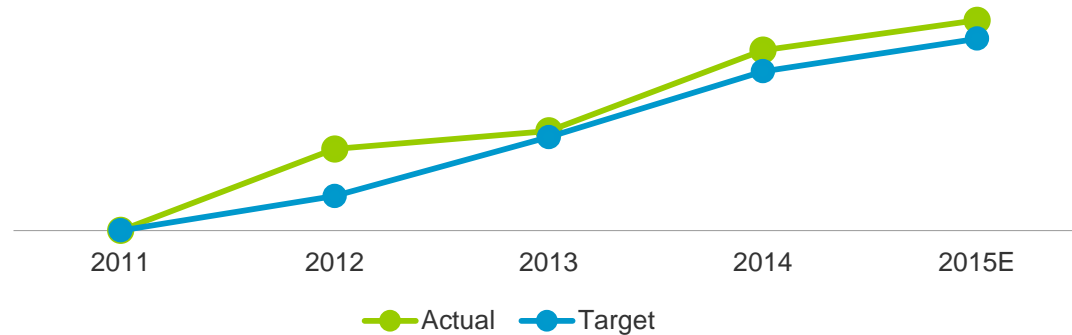
- Increased robustness in power supply – preventing serious power outages
  - Automation of substations and powerhouse

**6.2**  
million tonnes  
annualized alumina  
production  
Oct/Nov

\* Bauxite and alumina business system  
\*\* Annualized production

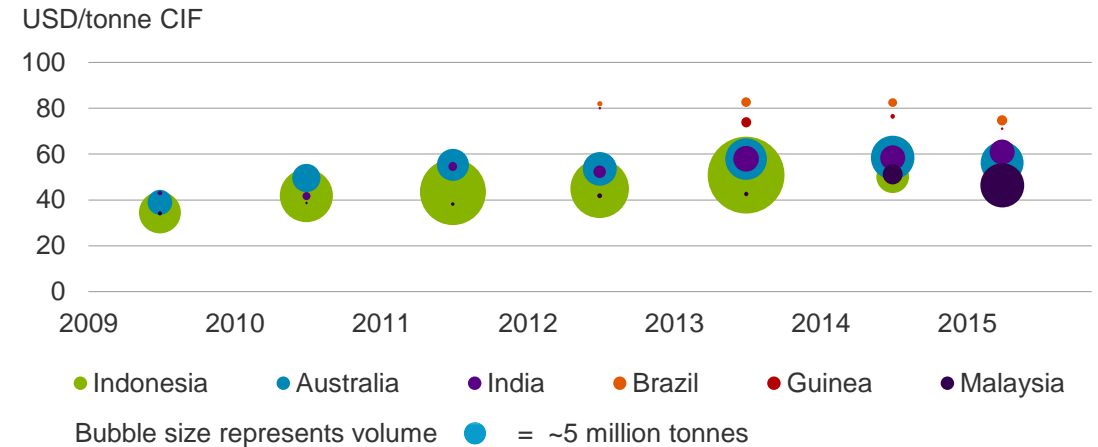
# Pricing alumina and bauxite towards own market fundamentals

From B to A program



- Future pricing to reflect fundamentals of bauxite and alumina value chain
  - Underlying price improvement from moving portfolio to PAX-based pricing
  - Alumina price trend - capturing larger part of aluminium value chain profits
  - Increased logistical flexibility and optimized scheduling

China bauxite imports, volume and price by country



- Advantageous bauxite quality enables export to China despite freight disadvantage

Source: China customs



# Long-term sustaining projects on track

Investments for the next 10-20 years



## Paragominas tailing dam

- Investment into further heightening of tailing dam and new tailings disposal area
- Optimized tailing disposal area for long-term mine operations
- First phase containing infrastructure investments for full lifetime of the tailing dam
- To be completed in second half of 2017
- Investment BRL 600 million – ~10% to be spent by end 2015



## Alunorte red mud deposit

- Dry disposal of bauxite residue using press filtration
- Reduces total cost of bauxite residue disposal
- Increased concentration of solids reduces the required storage area and environmental footprint
- Increasing deposit lifetime compared to existing filtration technology
- To be completed in Q3-2016
- Investment BRL 1.0 billion – ~50% to be spent by end 2015

# Paragominas – new mining technologies support future improvements



- Debottlenecking to ~11.0 million tonnes/year by 2018
  - Minor capex requirement
- Use of residual bauxite
  - Potential to increase Paragominas lifetime by another 4 to 5 years
  - Improved long-term mine planning and mining accuracy supported by integrated economic modelling

# Alunorte – new production technologies and advanced process control to lift production



- Enhanced precipitation process control – improving quality and output
- Differential extraction of alumina from bauxite
  - Potential to achieve a significant reduction in caustic soda usage
  - Allows for economic utilization of residual bauxite
- Debottlenecking up to 6.6 million tonnes/year by 2018
  - Significantly improving utilization and financial performance of existing assets
  - Improved coal boiler performance reducing cost

# New improvement ambition launched

Further strengthening the competitiveness of first quartile operations

## Alunorte

- Increase production
- Improve energy consumption
- Reduce fixed costs

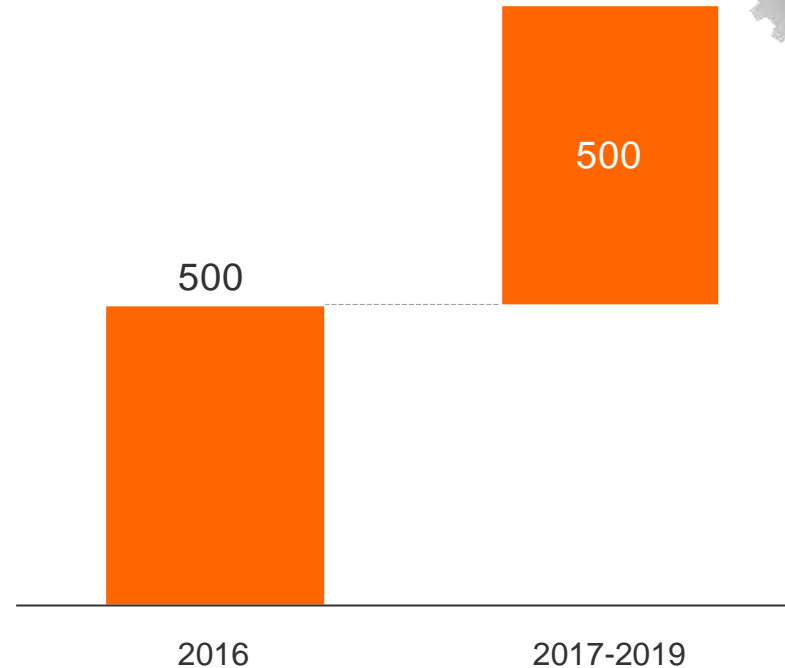
## Paragominas

- Support production above nameplate capacity
- Improve product flow and minimize tailings

## Commercial

- Increase logistical flexibility and optimize scheduling

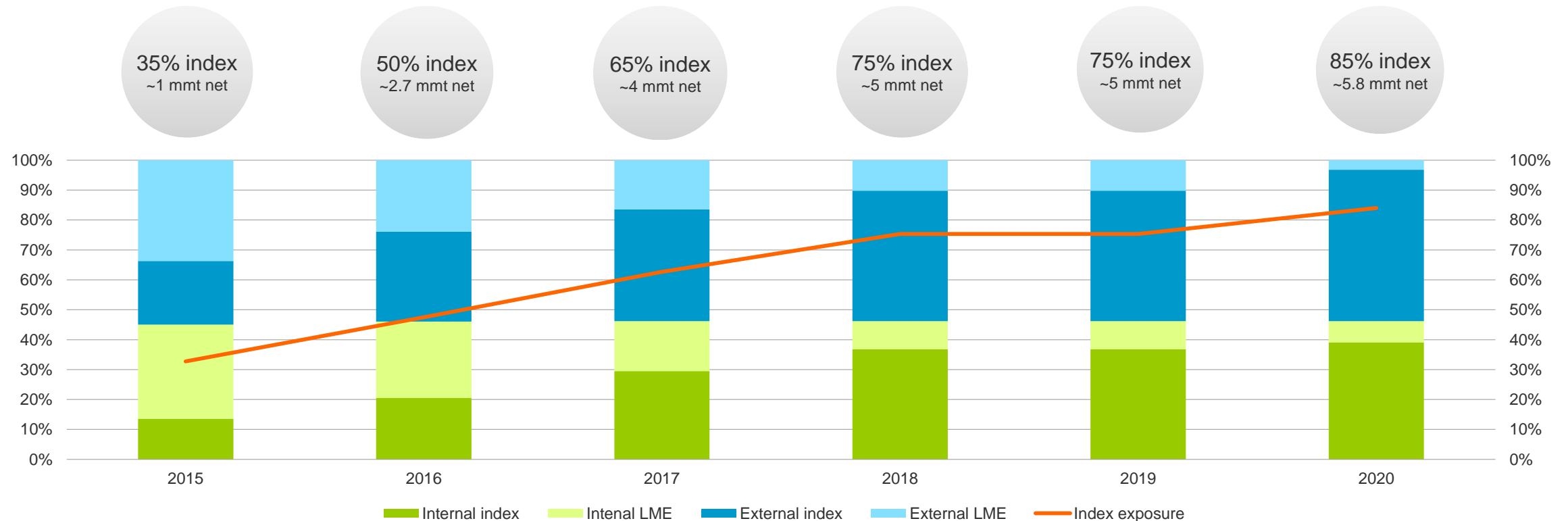
BNOK 1.0 improvements 2016 – 2019



# Shift of alumina sales to index-based pricing continues at full speed

B&A gain of ~1.1 BNOK if all volume was sold on index at current prices\*

Sales exposure to index and short term pricing\*\*



\* LME 1450 USD/mt, Index 230 USD/mt, NOK/USD 8.6

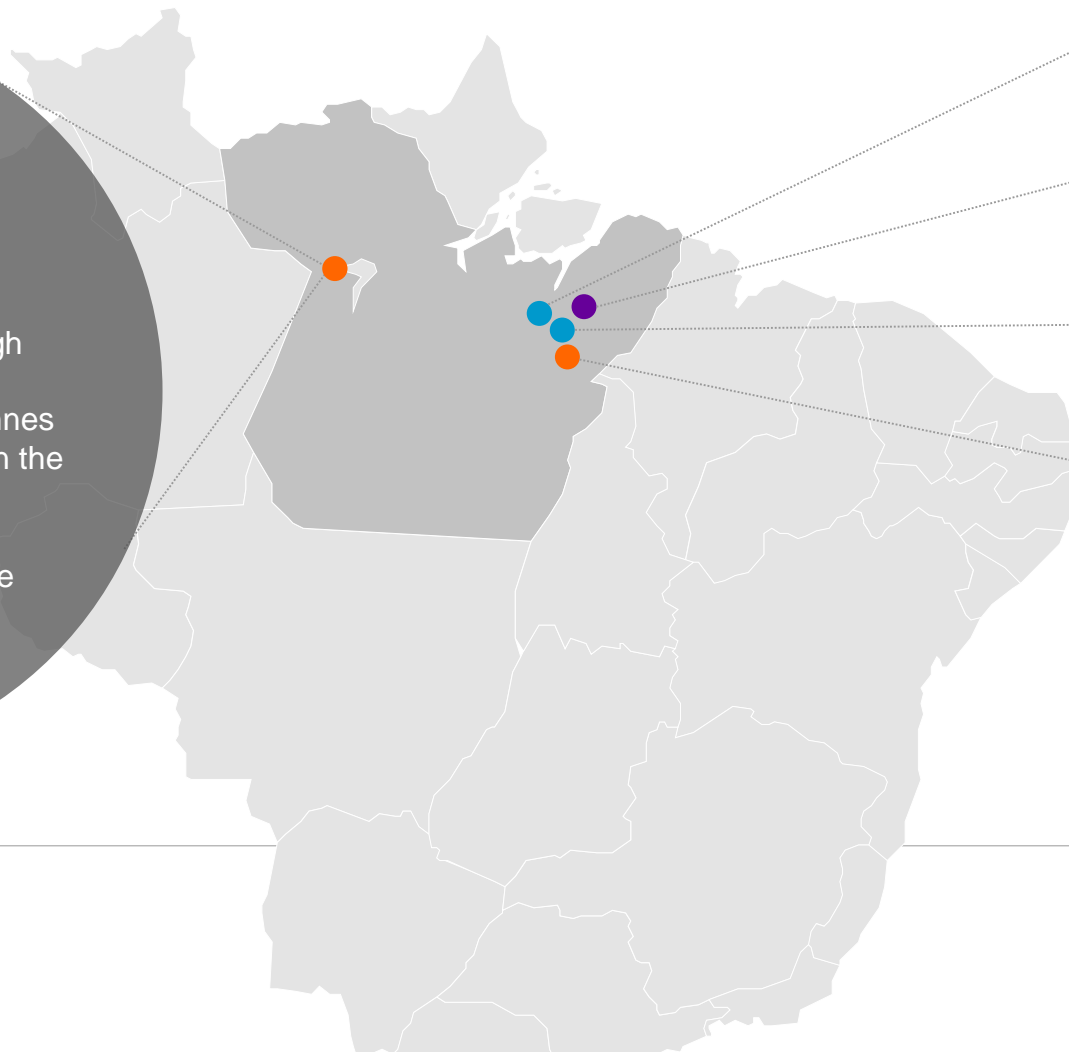
\*\* Rounded figures. Indicating volumes available for index pricing. Includes minority sales priced at % of LME with floor. Based on annual sourced volumes of 2.3 million tonnes (2015 based on 2.7 million tonnes)

# Strengthening aluminium cluster in Pará by lifting equity bauxite production

Ensuring optimal long-term development of Hydro Alunorte's second source of high-quality bauxite

Hydro entered Lol with Vale to raise MRN ownership to 45%

- First-quartile cost position, high quality bauxite
- Annual capacity 18 million tonnes
- Largest mine in Brazil, top 3 in the world
- Hydro currently owns 5%
- Hydro has commercial off-take contracts for Vale's 40 %



## Alunorte

Capacity: 6.6 million tonnes  
92% Hydro ownership

## Albras\*

Capacity: 460 000 tonnes  
51% Hydro ownership

## CAP Project

Capacity: 1.9 million tonnes  
81% Hydro ownership

## Paragominas

Capacity: 11.0 million tonnes  
100% financial exposure  
Expansion possibility to 15 million tonnes

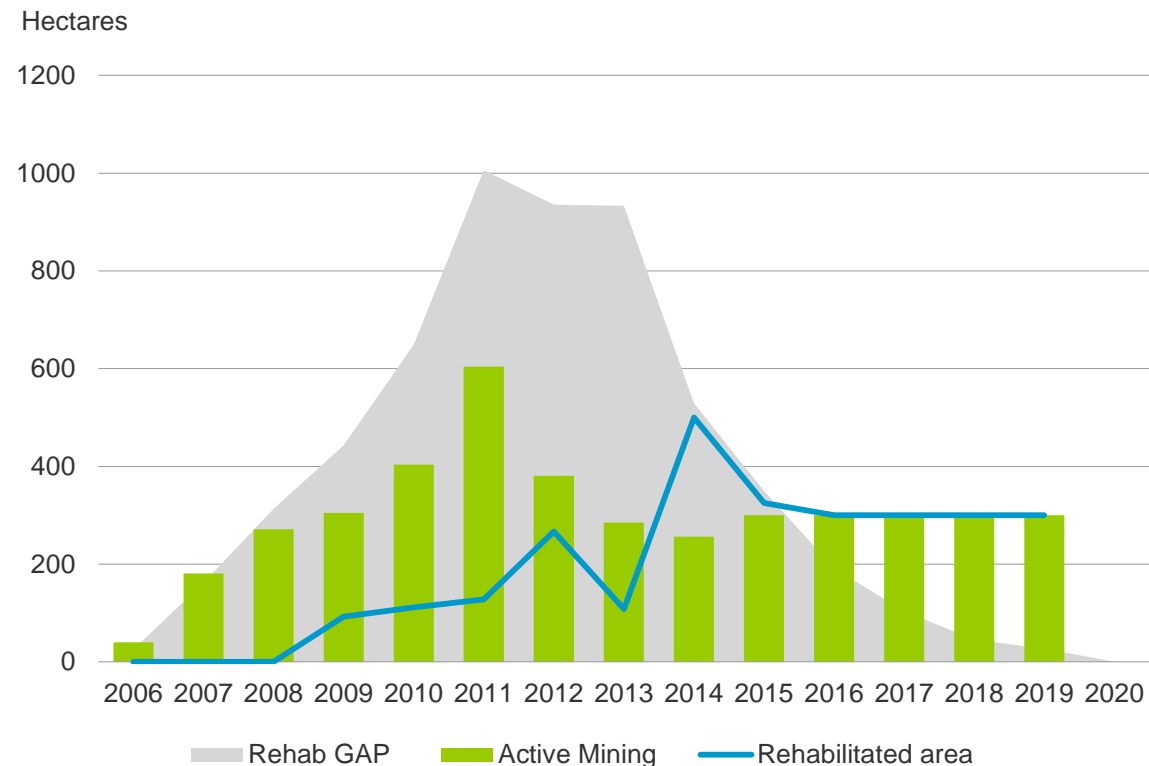
- Bauxite
- Alumina
- Aluminium

\* Included in Primary Metals business area

# Making progress on ambitious environmental goals

Research partnership on biodiversity creates the basis for state-of-the-art approach to mining rehabilitation

## Rehabilitation gap and schedule



- 4 projects: reforestation, big mammals, entomology and fungi
- More than 45 researchers and scholarship students involved
- Initial 5-year program of partnership
  - University of Oslo
  - Federal University of Pará
  - Federal Rural University of Amazônia
  - Goeldi Museum

# Bauxite & Alumina mid-term goals

Creating shareholder value through efficient and commercial use of raw materials

Ambitions	Target	Timeframe
• Improve safety performance, strive for injury free environment	TRI <2	2020
• Deliver on new improvement ambition	BNOK 1.0	2019
• Lift alumina production at Alunorte through stabilization and debottlenecking	6.6 million mt	2018
• Lift Paragominas production through debottlenecking	11 million mt	2018
• Shift alumina sales portfolio to index-based pricing	>85 %*	2020
• Deliver on reforestation ambition	1:1	2017

*Better Bigger Greener*

\* Based on annual sourced volumes of 2.3 million tonnes



# Energy

Arvid Moss

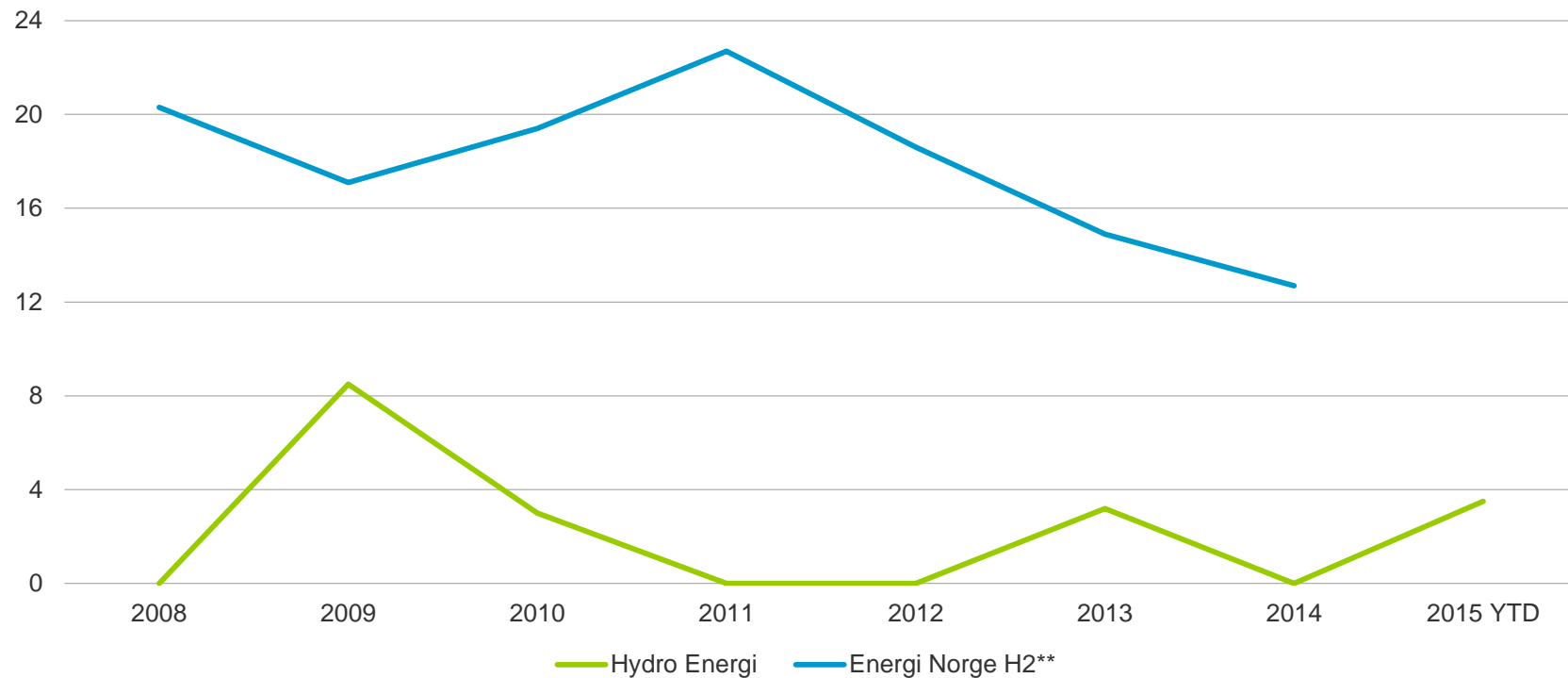
Capital Markets Day 2015



HYDRO

# Aiming for an injury-free working environment

Total recordable injuries (TRI) per million hours worked



TRI rate YTD end-Nov (own employees) – cases per 1 million hours worked

\*\* Source: Energi Norge, Own employees, H2 statistics for full year 2014. H2= number of injuries with or without absence per million working hour

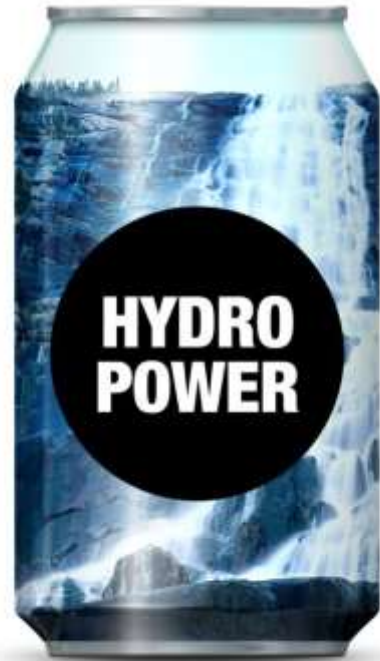
# Energy strategic priorities

## *Better* *Bigger* *Greener*

- Realize full potential of strong asset base and competencies
- Further improve operational and commercial performance
- Provide competitive global energy sourcing and competence
- Mature captive growth opportunities
- Raise income potential from market operations and commercial optimization
- Leverage value from Nordic power surplus
- Capitalize on strong climate position over time
- Capture value of the green certificate scheme in new growth projects
- Promote responsible energy policy in the regions where Hydro operates

# Energy has a dual mission in Hydro

Strong, sustainable value creator *and* energy provider throughout the value chain

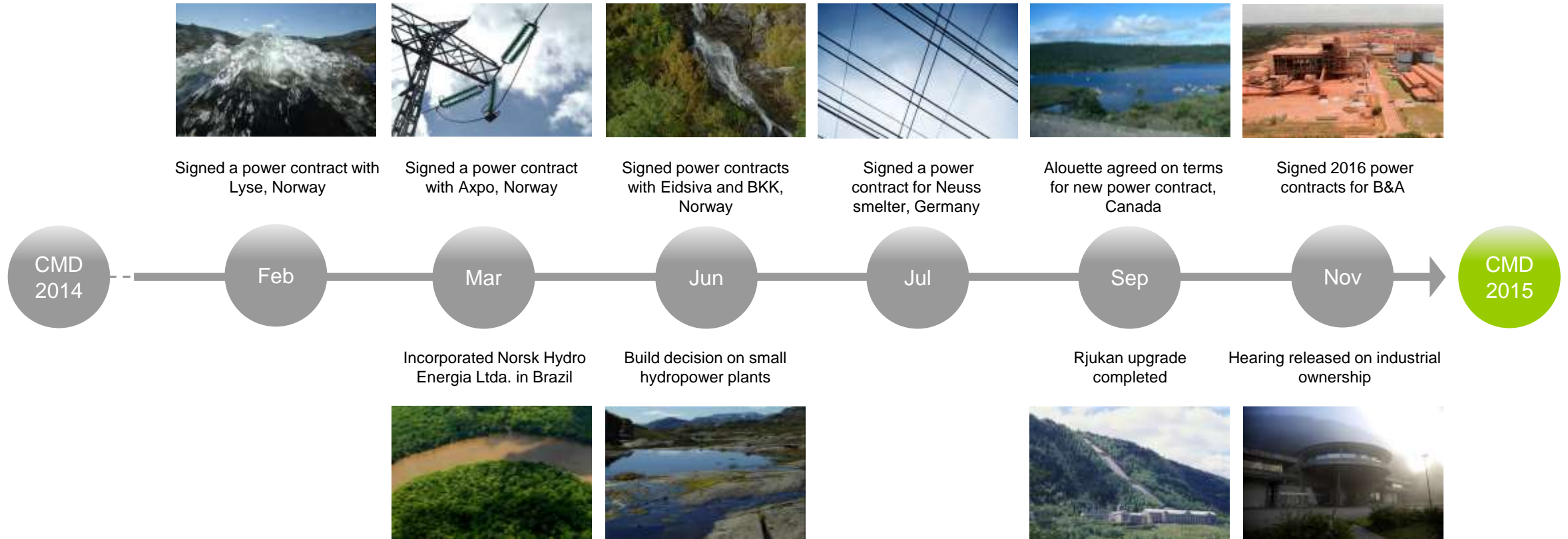


To own, operate and maximize value of Hydro's energy assets



To provide competitive power sourcing and global energy competence

# Energy: Securing power supply, maximizing asset value

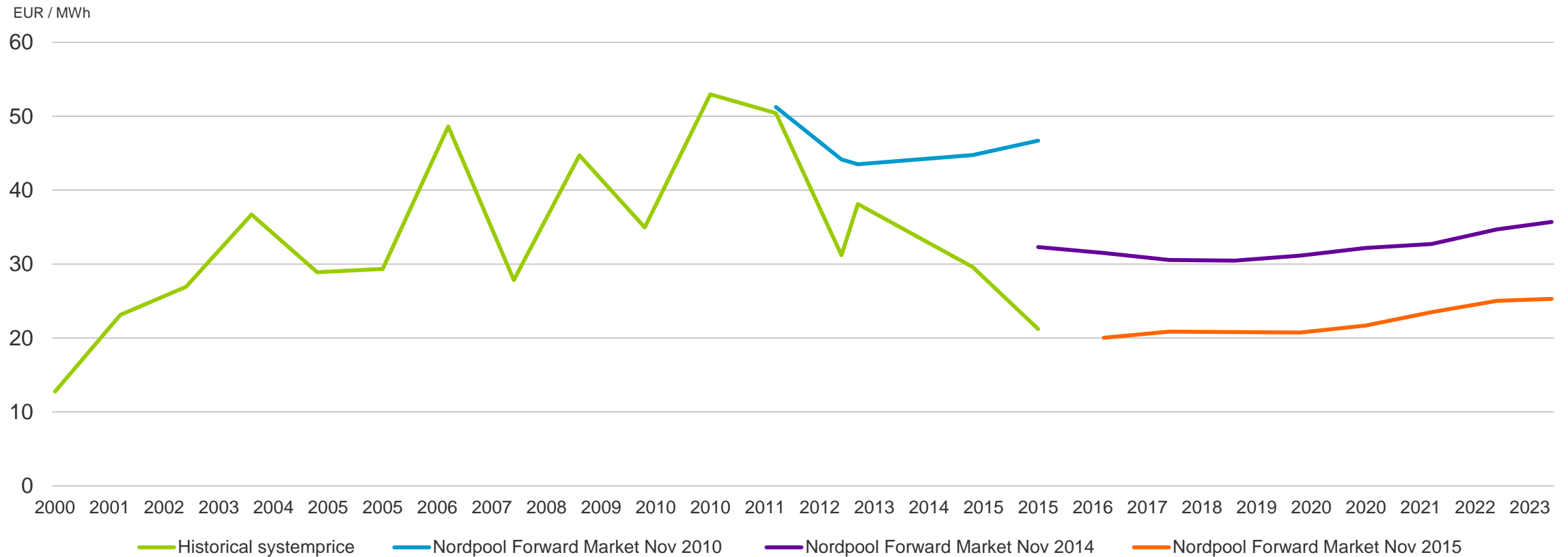


01

Power Markets

# Nordic power prices decline over the last years

Downward trend also reflected in forward curve

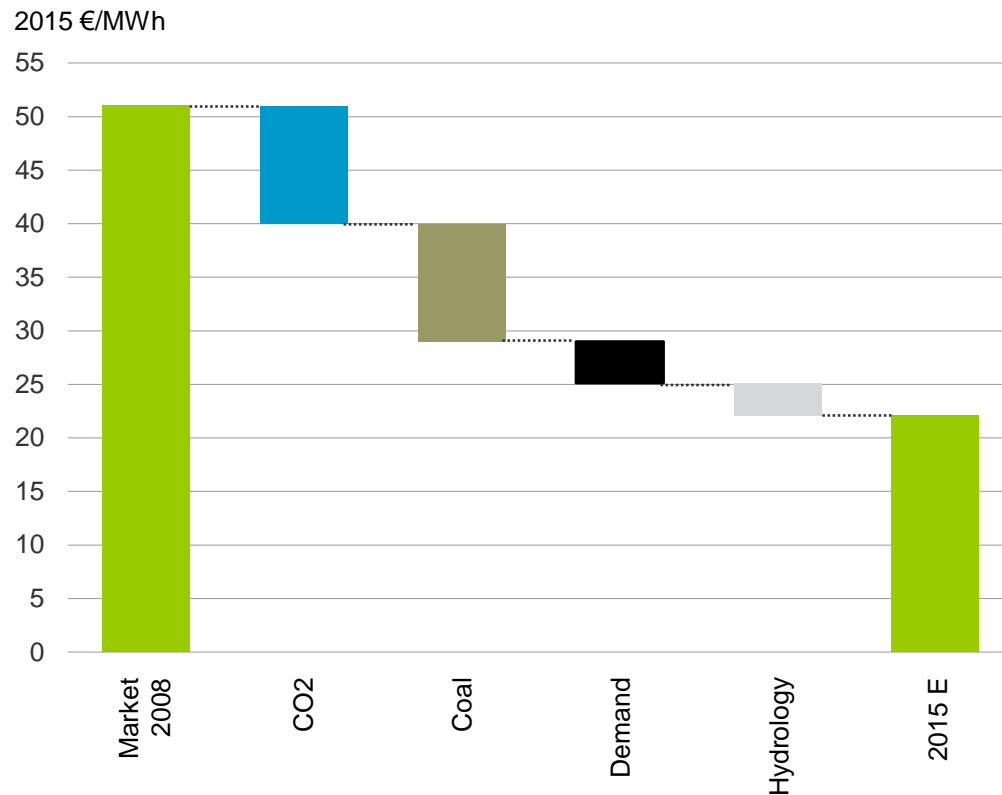


Source: Nordpool Spot  
Prices expressed in yearly averages

# Nordic power prices halved from 2008 to 2015

Mainly driven by lower CO2 and coal prices, as well as lower demand and higher inflow

Nordic system price and the most important price drivers



- More inflow in 2015 compared to 2008
- Total Nordic nuclear is relatively similar in both years
- Other drivers not included here e.g. changes in renewable and thermal generation

	2008	2015E
CO2 (2015 €/tonne)	24.3	6.9
Coal (2015 USD/tonne)	164	58
Demand (TWh)	403	390
Inflow Jan. to Oct. Norway and Sweden (TWh)	167	185

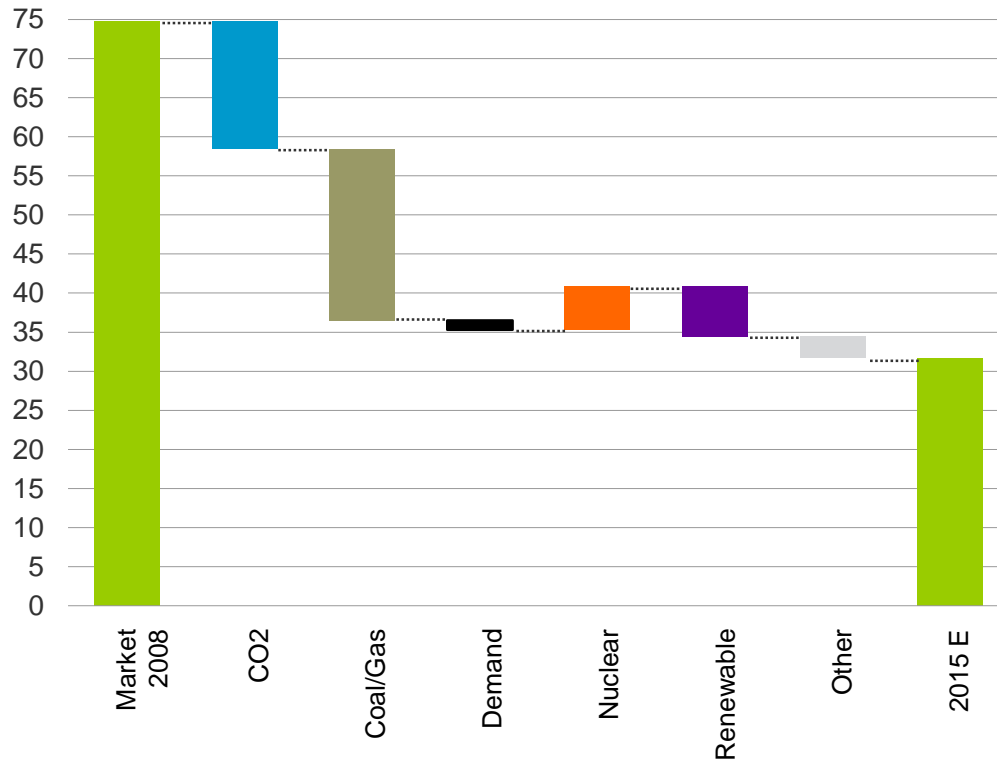


# German power prices drop 60% from 2008 to 2015

Mainly driven by lower CO2 and coal prices

German power price and the most important price drivers

2015 €/MWh



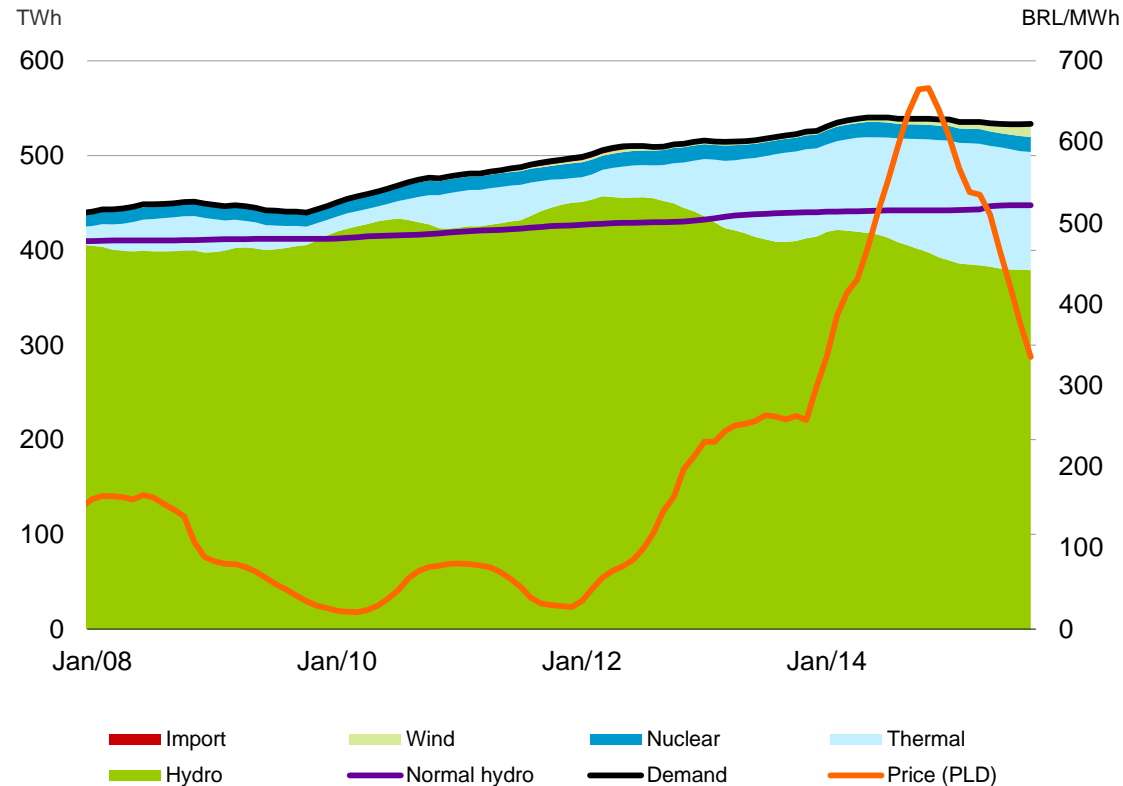
- Growth in renewable power offsets reduction in nuclear capacity
- Other drivers not included here e.g. changes in thermal generation and transmission capacity

	2008	2015E
CO2 (2015 €/tonne)	24.3	6.9
Coal (2015 USD/tonne)	164	58
Demand (TWh)	528	515
Nuclear (TWh)	141	80
Renewable (TWh)	95	166

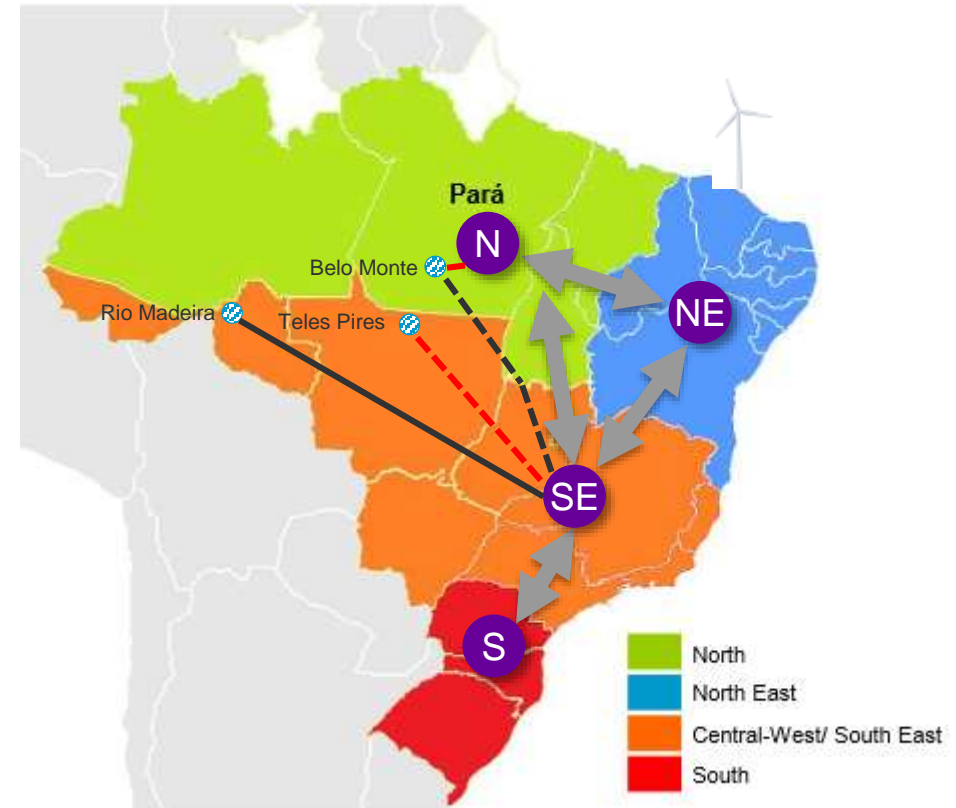
# Interconnected Brazilian hydropower-based system

Thermal power has increased in importance during recent dry years

Brazilian power balance and price development



Interconnected power system, Brazil

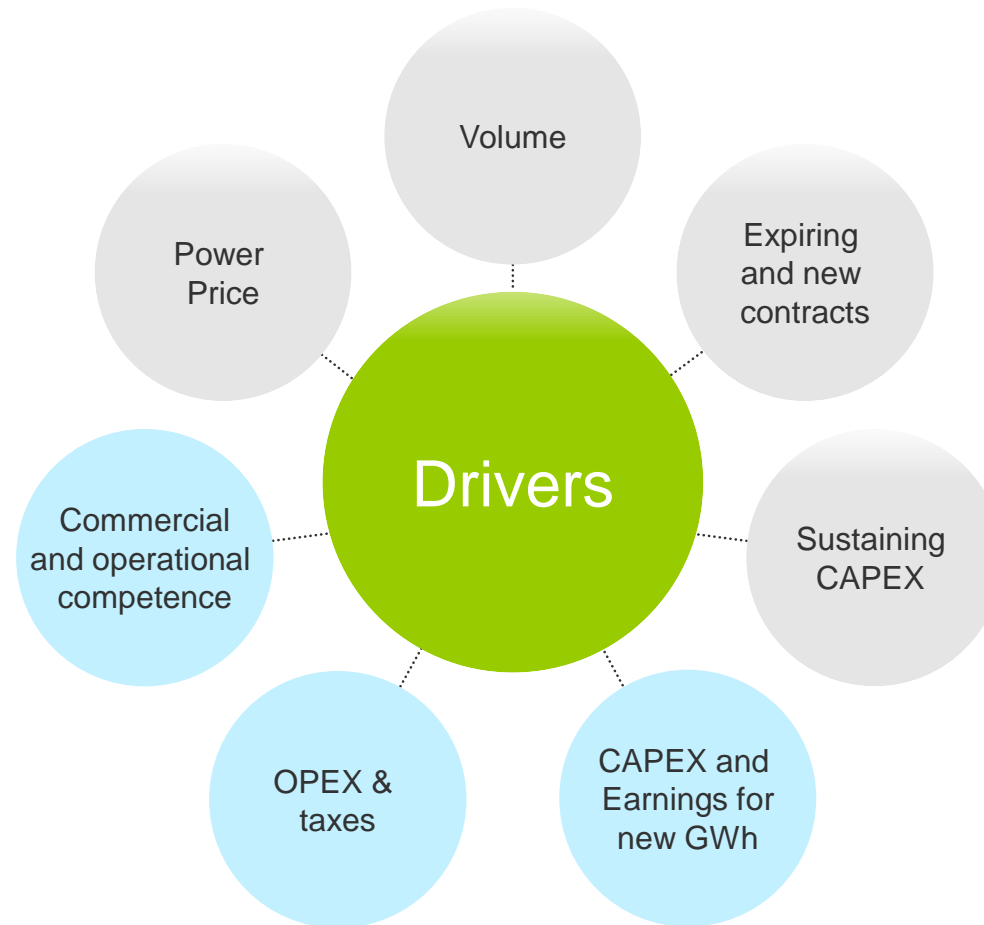


\*Source: ONS, EPE, ANEEL.

02

## Energy in Hydro

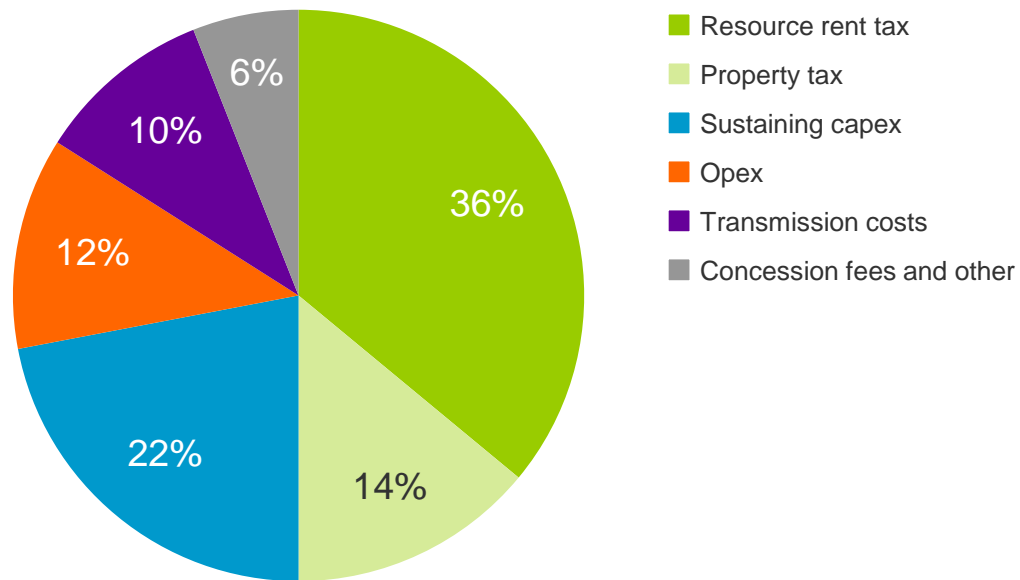
# Value creation in Energy dependent on wide array of factors



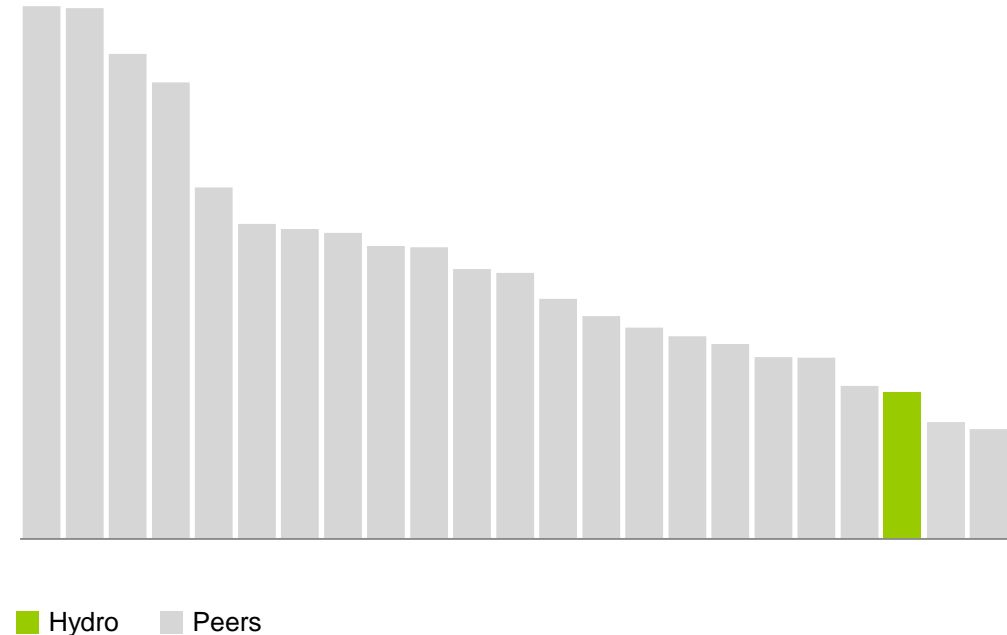
# Competitive production costs driven by economies of scale and operational improvements

Taxes and fees account for a large share of costs, making sustainable framework conditions crucial

Average operating cost, incl. tax/fees, by category  
2007-2014



Total operating costs for Norwegian power producers\*  
NOK/GWh



\* Based on PA Benchmarking survey

# Maximizing value from commercial optimization

Leveraging benefits of flexible hydropower in an environment of increasing balancing needs

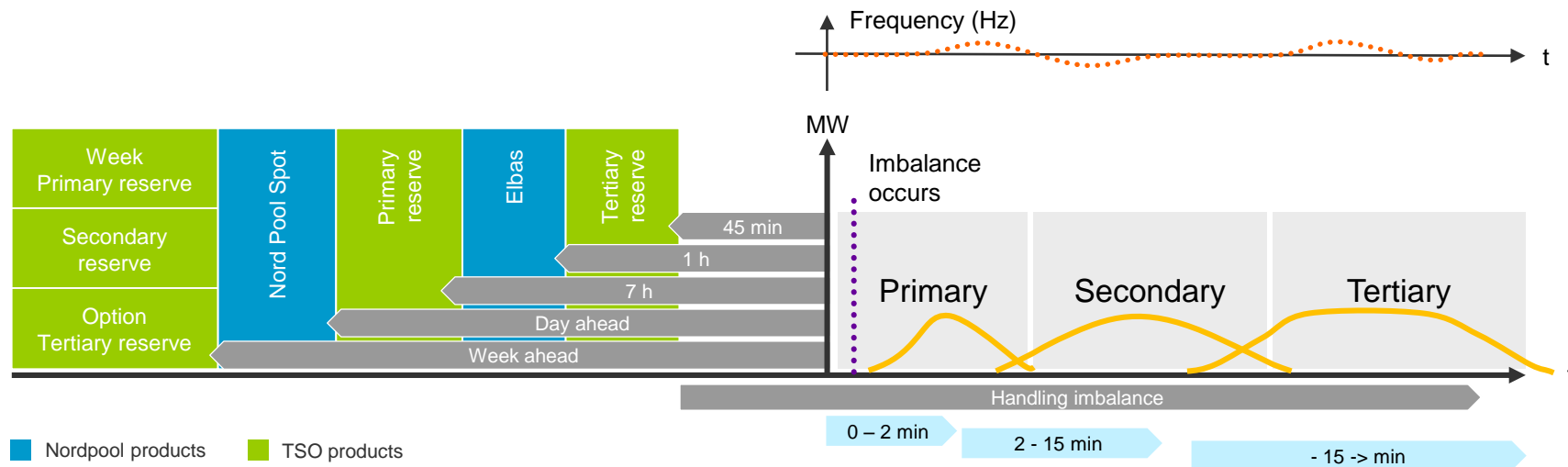
Hydro has one of the strongest commercial competence centers in the Nordic power market

Commercial insight and risk competence from day-to-day asset optimization and trading

- Key to understand market development and to support long-term sourcing

Physical assets optimized in spot markets and balancing markets

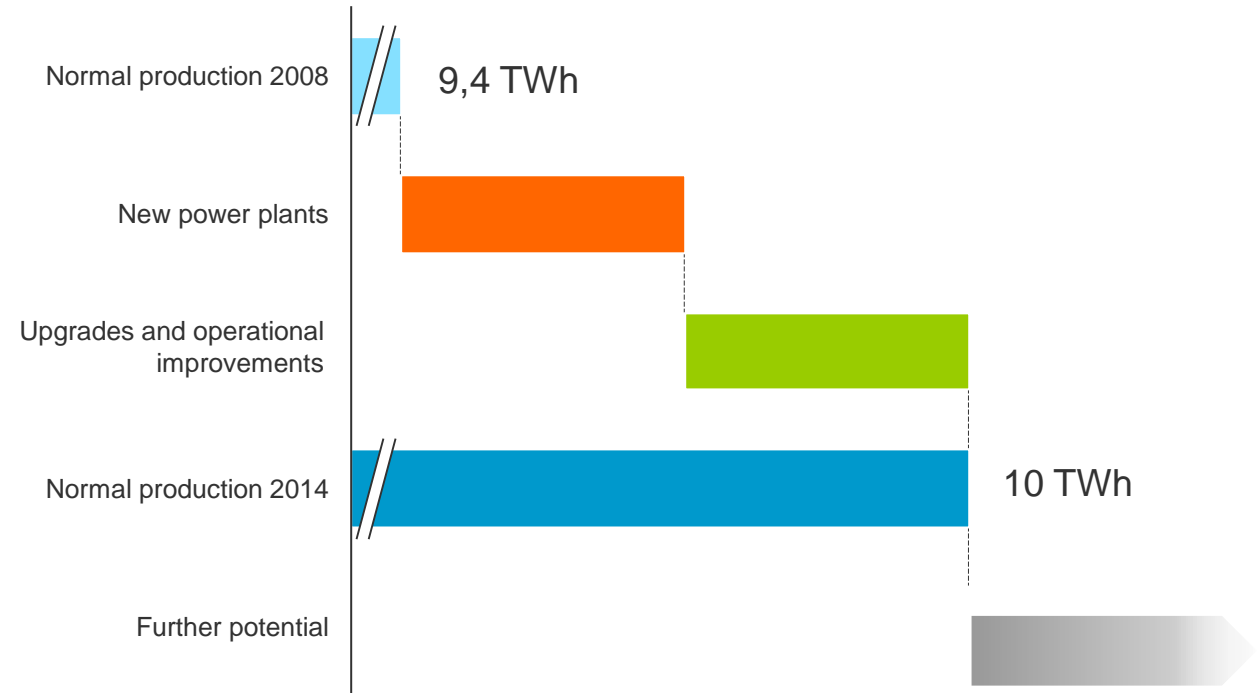
- Increasing balancing needs with renewables
- Flexible hydropower production allows Hydro to capitalize on price volatility and mitigate risks
- Smelter consumption flexibility key to future power system operation



# Delivering value from growth

Driven by capacity additions, debottlenecking and operating competence

- The normal production in Hydro's power plants raised from 9.4 in 2008 to 10 TWh in 2013
  - New power plants since 2008
    - Holsbru, Vasstøl, and Vigeland acquisition
  - Improved power plant efficiency from replacement of turbine runners
  - Improved optimization through competence
    - E.g. handling flooding situation to minimize water losses and ensure safe operations
- Further potential
  - New power plants under construction
    - Midtlæger, Mannsberg
  - Utilizing regulatory frameworks supporting renewable power generation
  - Turbine runners as part of rehabilitations
  - Further improving long-term optimization



# Providing competitive global energy sourcing and competence

Commercial competence, analytical capability and market insight

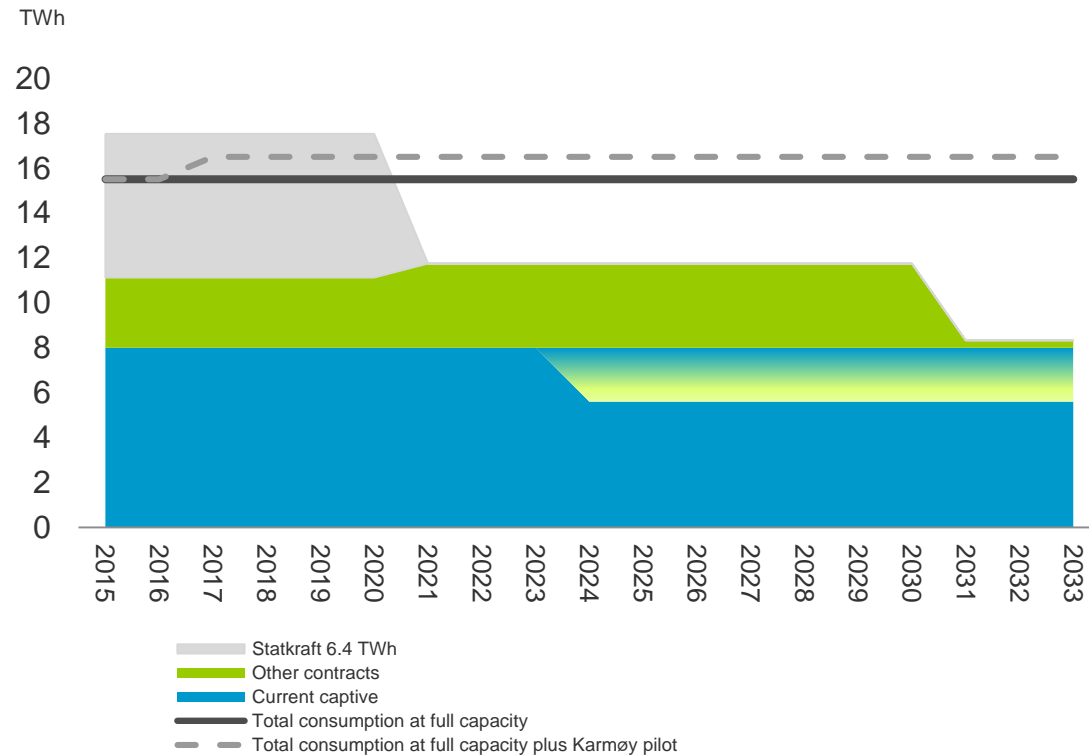
B&A	Primary Metal	Rolled Products
Assist with updating of energy sourcing strategies		
Analyze energy markets and provide insight		
Optimize electric power portfolio		
Lead power sourcing negotiations		
Improve security of power supply and manage grid agendas		
<ul style="list-style-type: none"> <li>Fuel switch evaluations</li> <li>New power contracts for B&amp;A operations</li> <li>Overall energy matrix optimization</li> <li>Increased Energy presence in Brazil to lead the sourcing processes and explore commercial opportunities</li> <li>Norsk Hydro Energia Ltda established as a vehicle for the power market operations</li> </ul>	<ul style="list-style-type: none"> <li>3.75 TWh power sourcing secured for the Norwegian smelter portfolio 2021-30</li> <li>330 GWh power sourcing for the Norwegian smelter portfolio 2031-40</li> </ul>	<ul style="list-style-type: none"> <li>Execution of hedging strategy</li> <li>New power contract secured for 2018-25 for Rheinwerk smelter</li> <li>Gas/power sourcing for rolling mills</li> </ul>



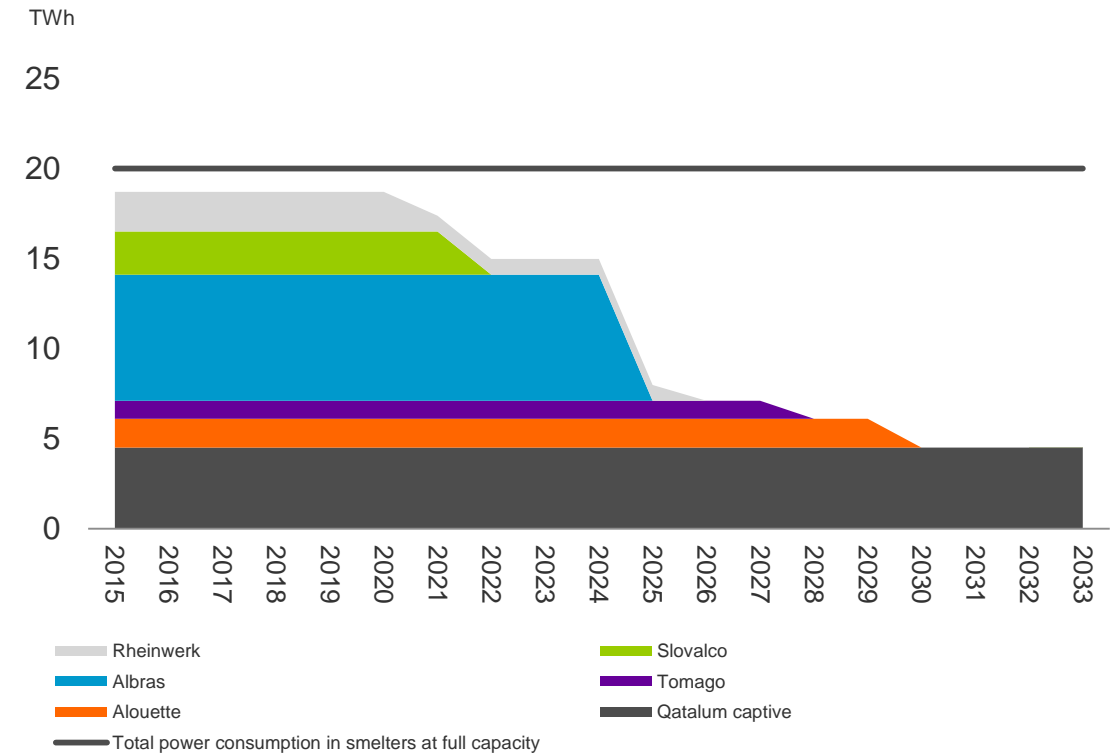
# Improving smelter cost position with competitive power sourcing

Utilizing moderate pricing environment in Norway and abroad

Sourcing platform for fully-owned smelters, Norway\*



Sourcing platform for JVs and Rheinwerk smelter\*\*



\* Net 8 TWh captive assumed available for smelters

\*\* Albras and Slovalco on 100% basis

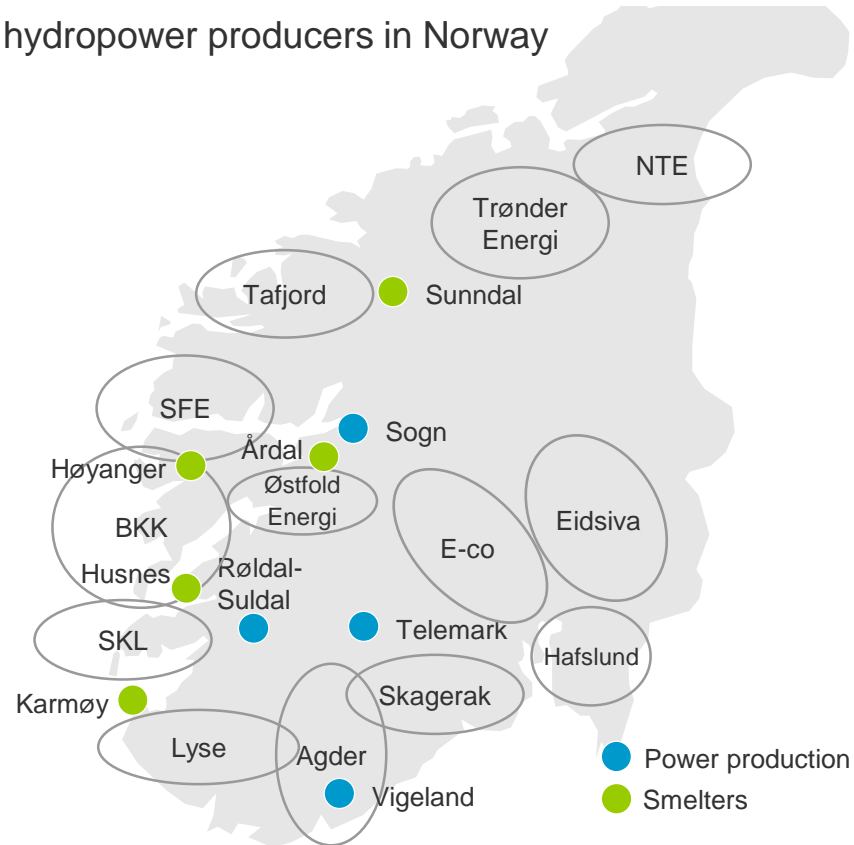
03

Industrial ownership  
framework for RSK  
assets

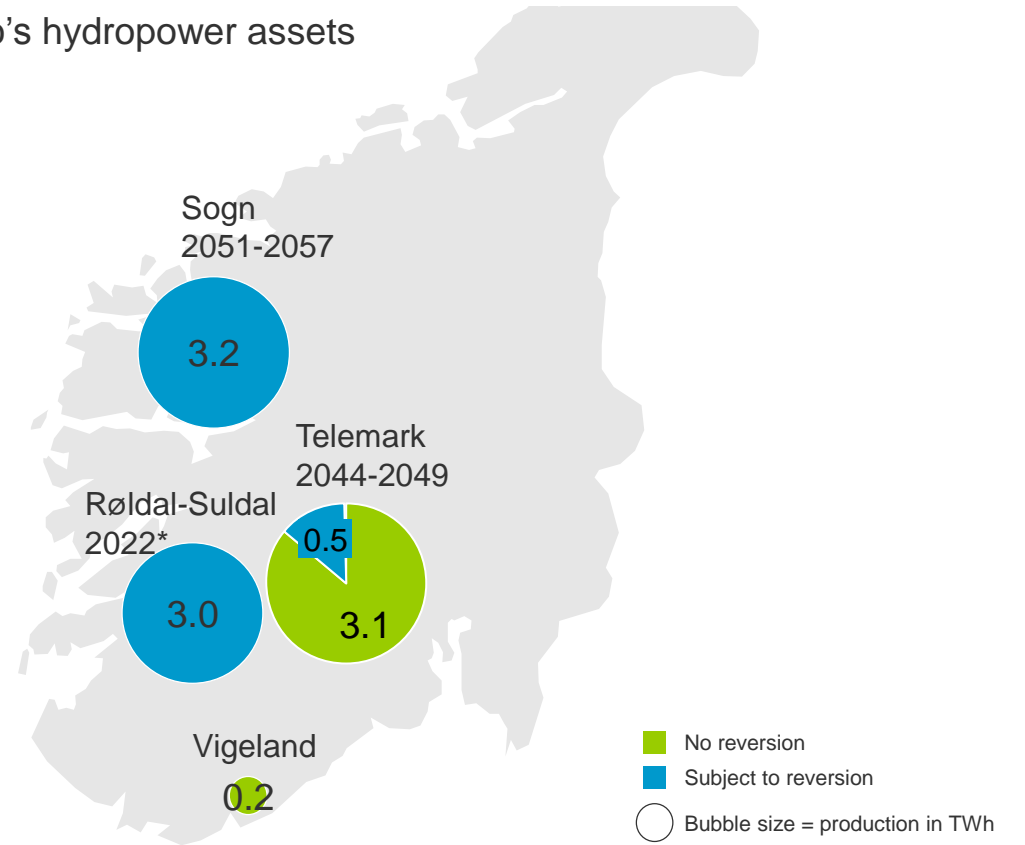
# Norwegian reversion regime

Private ownership not to exceed 1/3 in Norwegian waterfalls

Regional hydropower producers in Norway



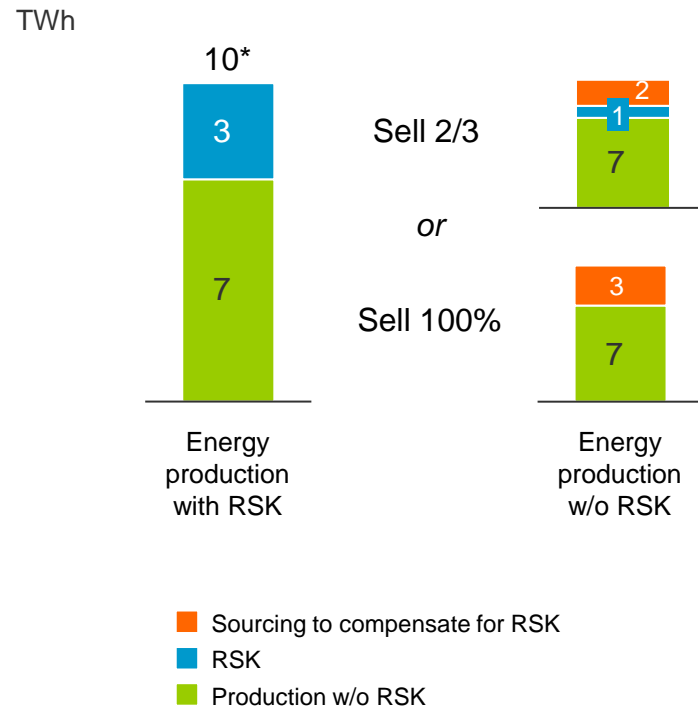
Hydro's hydropower assets



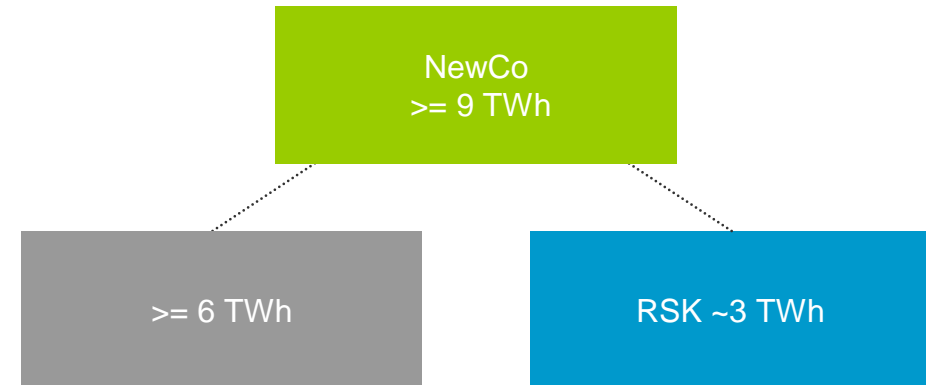
\* Reversion year

# Broad optionality to maintain asset value within the reversion regime

## Sell to a publicly-owned entity



## Merge into a larger publicly-owned asset with one or several owners



- Retain full production as part of a larger asset
- Max 1/3 Hydro (private) ownership
- No reversion after such a transaction
- Need partner(s) with min 6 TWh to maintain equity volume

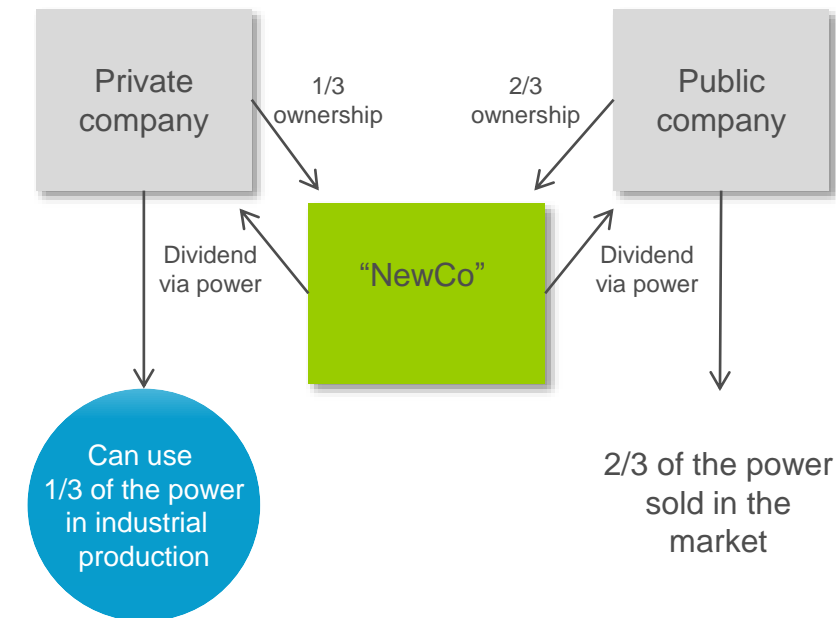
The diagrams on this slide are simplified for illustration purposes  
 \* Normal production

# Maintaining industrial ownership of RSK volumes is Hydro's preferred alternative

Government proposal to allow private entities physical hydropower offtake from minority stakes

- Law proposal from government on industrial ownership published 9 November
- Proposal for hydropower JVs:
  - Maximum 1/3 private ownership maintained
  - Allow private owners access to physical power
  - Pro-rata power offtake in line with ownership share
- The new law would allow Hydro to maintain access to physical power through restructuring RSK assets into 1/3 ownership position in company with liability

Proposed model for industrial ownership (ANS/DA)



04

## Sustainability and climate agenda

# Hydro's climate strategy is to be carbon-neutral from a life-cycle perspective by 2020

Hydro  
carbon neutral  
in 2020  
From a life-cycle  
perspective



Integrated into business strategy in all business areas

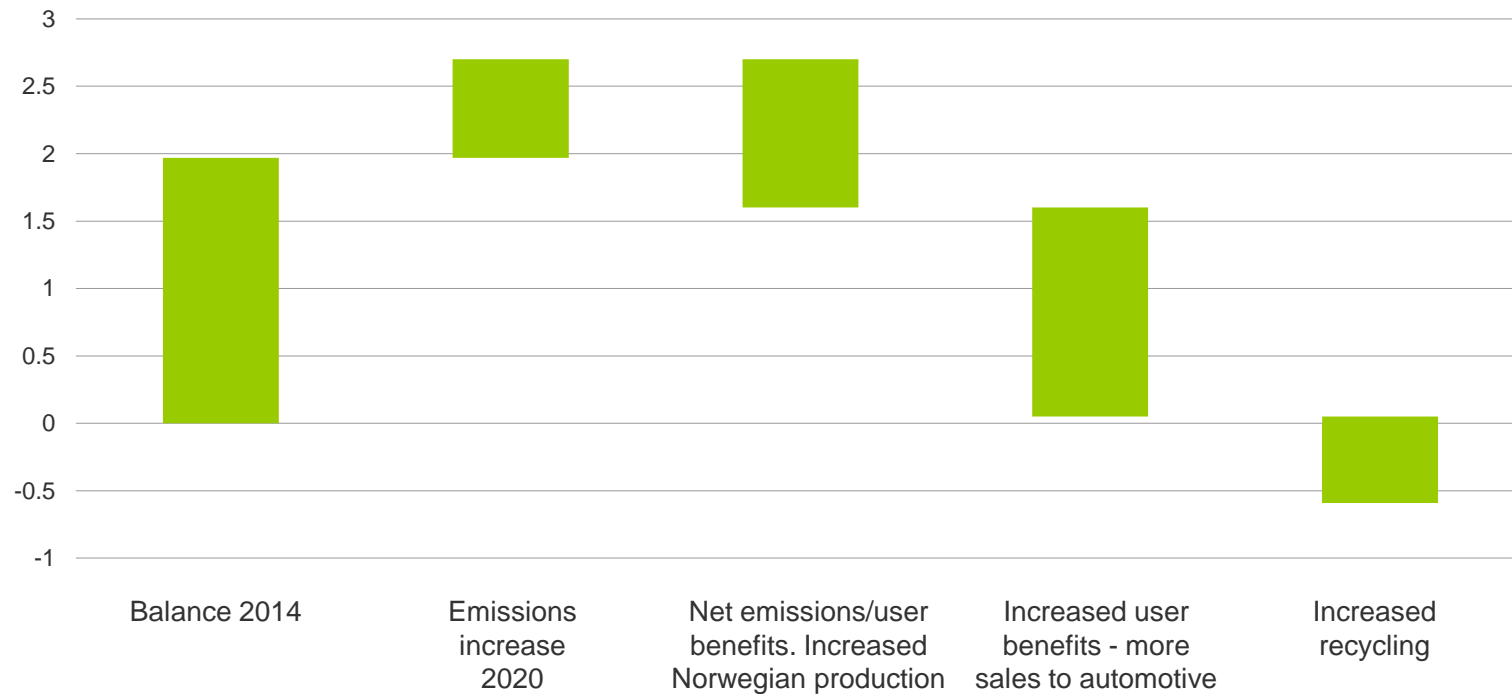
- Increasing energy-efficiency and reducing emissions in production processes in aluminium plants, rolling mills, and alumina refinery
- Increasing production of renewable hydropower, evaluating potential of switching to renewable energy sources or natural gas in production processes
- Developing products and solutions, establishing partnerships with advanced customers, and identifying new applications for metal and downstream products
- Supporting global energy-efficiency goals by helping customers reduce energy consumption and emissions and by promoting sustainable frameworks
- Reducing waste and saving ~95% of energy by recycling of post-consumed scrap in Primary Metal and Rolled Products
- Utilizing advanced sorting technology and developing recycle-friendly alloys

# Gradual reduction in life-cycle carbon balance towards 2020

Use-phase benefits of aluminium products have the largest effect

Hydro's carbon balance 2014 - 2020

Million tonnes CO2



Life-cycle carbon-neutral ambition

On track



# Energy mid-term goals

Creating shareholder value by maximizing value of own hydropower assets and ensuring reliable and competitive energy supply for Hydro

Ambitions	Target	Timeframe
• Improve safety performance – injury free environment	TRI <2	2020
• Robust industrial ownership for RSK – maintain physical power offtake post 2022	3,0 TWh	2022
• Deliver additional production volumes through upgrades/sustaining investments	~0,1 TWh	2020
• Secure new competitive sourcing contracts in Norway post 2020	4-6 TWh	2020
• Support competitive energy supply as well as energy policy and framework development for other business areas	Progress	Continuous

*Better Bigger Greener*

# Primary Metal

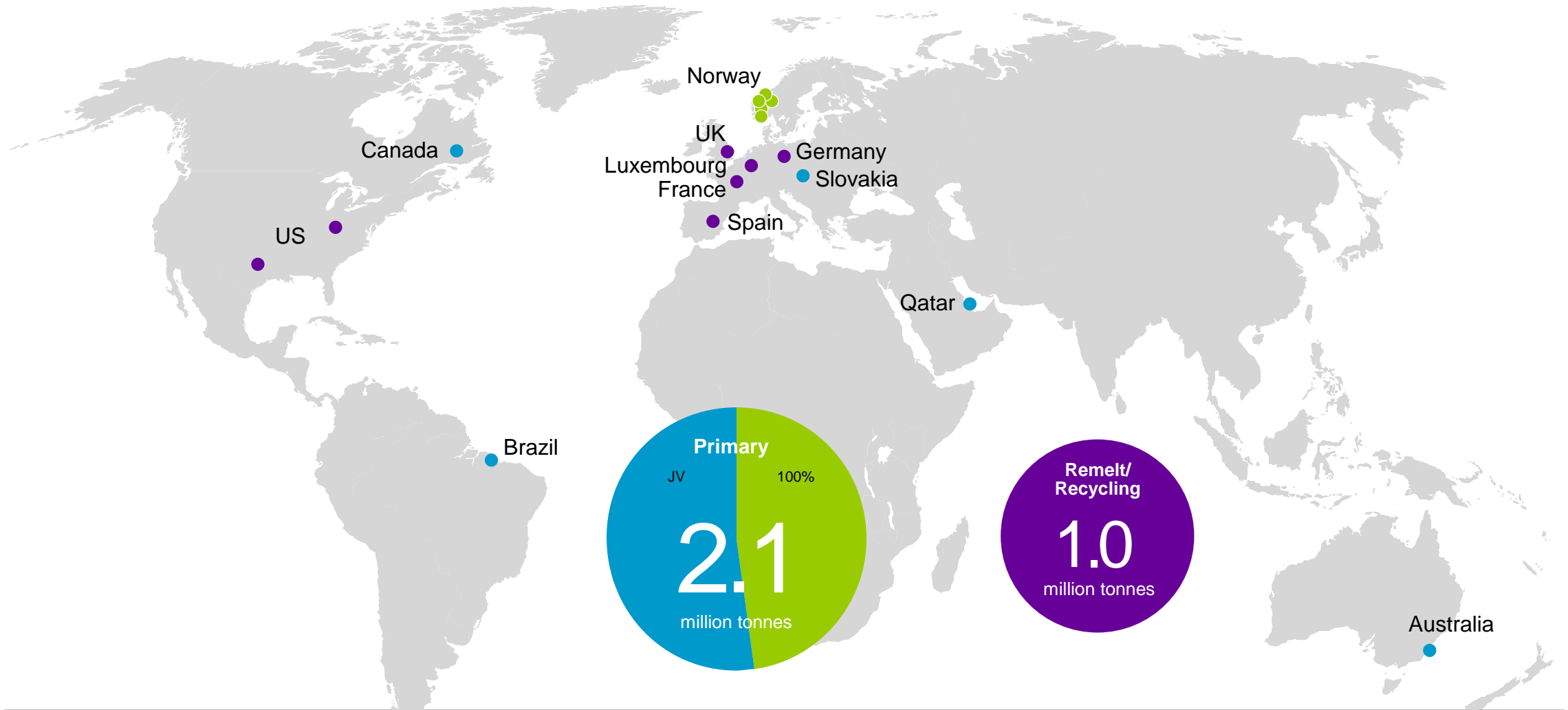
Hilde M Aasheim  
Hans Erik Vatne

Capital Markets Day 2015



HYDRO

# Primary Metal and Metal Markets production portfolio

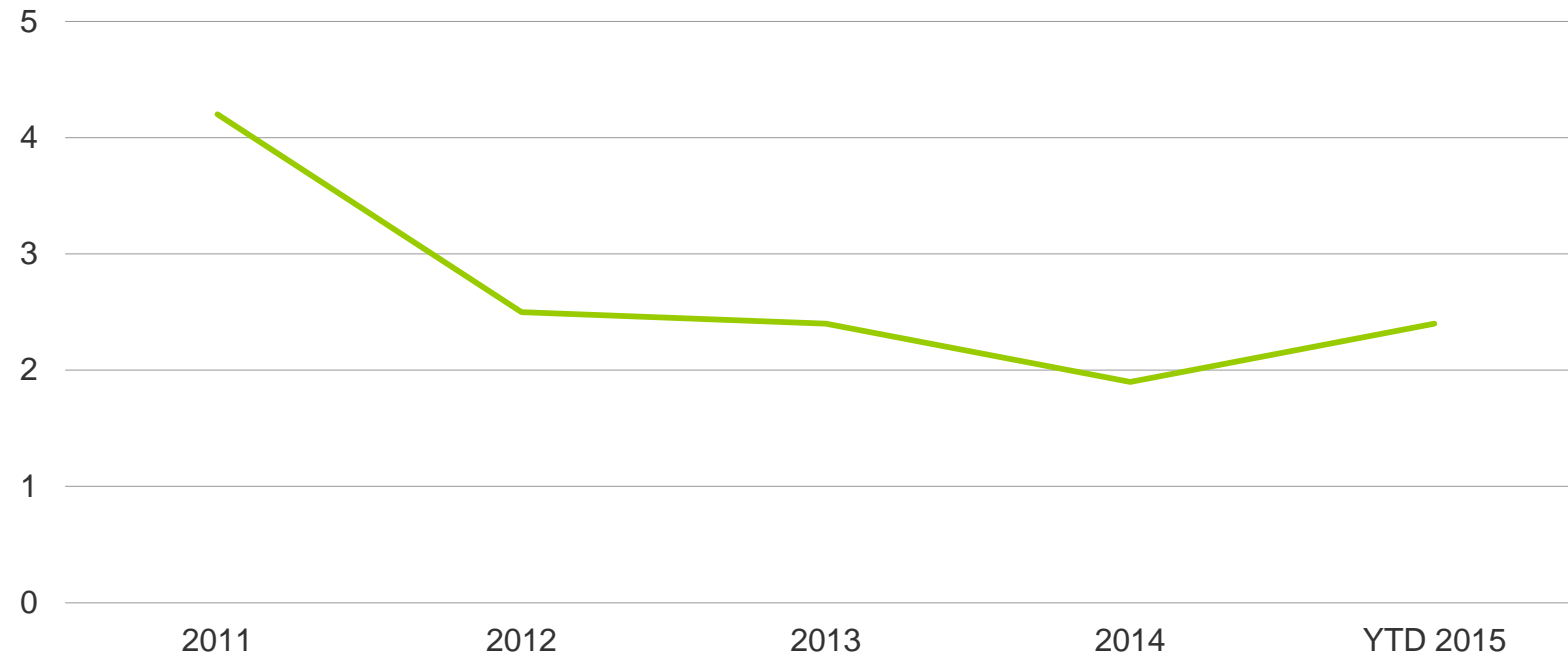


2.1 million mt is consolidated capacity. Slovalco and Albras are fully consolidated, Tomago and Alouette are proportionally consolidated and Qatalum is equity accounted. 90.000 mt of capacity is currently mothballed in Hydro Husnes. Neuss, which is a part of Rolled Products, is not included. 1.0 million mt includes stand-alone remelters, recycling facilities and additional casthouse capacity at primary plants.

# Striving for an injury-free environment

Among the best in the industry

Total recordable injuries (TRI) per million hours worked



# Primary Metal strategic priorities

World-leading aluminium producer

## *Better* *Bigger* *Greener*

- Strive for an injury-free environment
  - Deliver on improvement programs
  - Secure competitive power sourcing
  - Develop products and services towards advanced customers to improve margins
- Realize 200,000 mt creep
  - Extend technology lead with the Karmøy technology pilot
  - Further mature growth options
- Grow recycling business to improve margins and environmental footprint
  - Reduce energy consumption and emissions in all processes
  - Develop products and solutions to help customers reduce energy consumption and emissions

# Primary Metal: Extending the technology lead and driving improvements



ENOVA support for Karmøy technology pilot approved by ESA



Record quarterly result in Q1



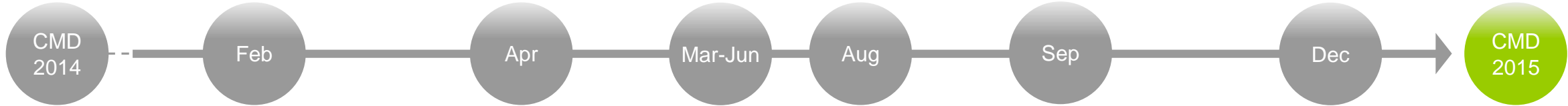
Hydro Karmøy invests to high-grade product portfolio



Alouette agreed on terms for new power contract



NOK 1.0 bn 2016-2019 improvement ambition



Investment decision on technology pilot made



Invested in world's most advanced sorting technology



~1.05 TWh new power contracts secured from 2021-30 in Norway



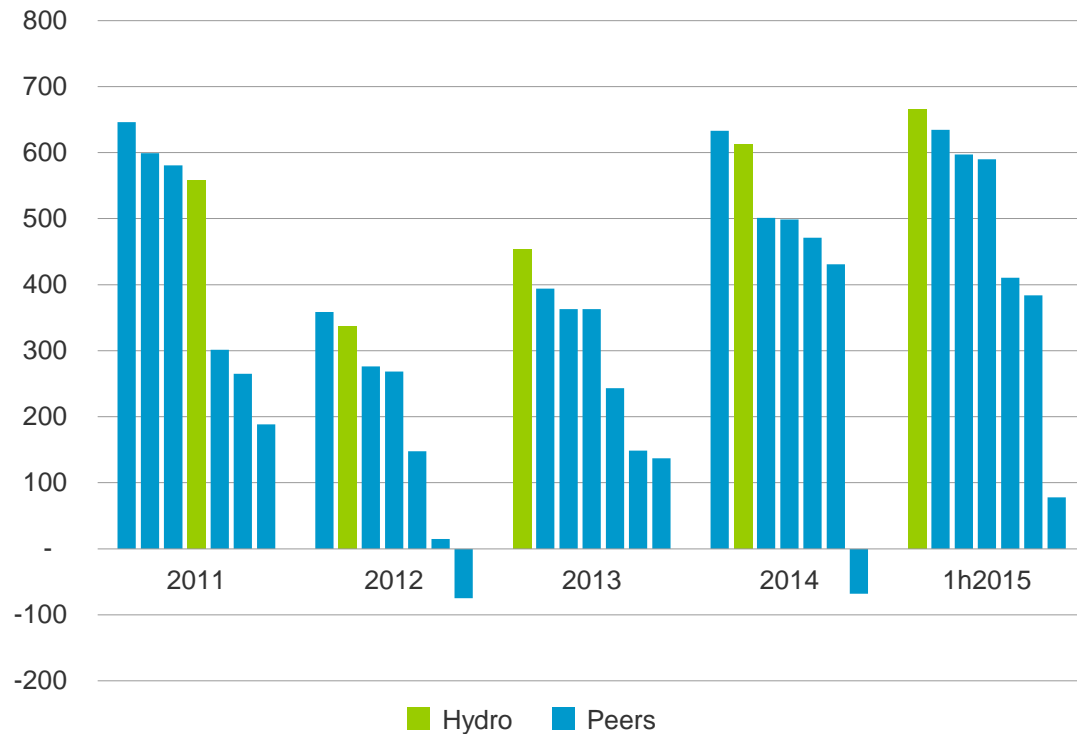
Clervaux remelter investment - improved recycling capabilities



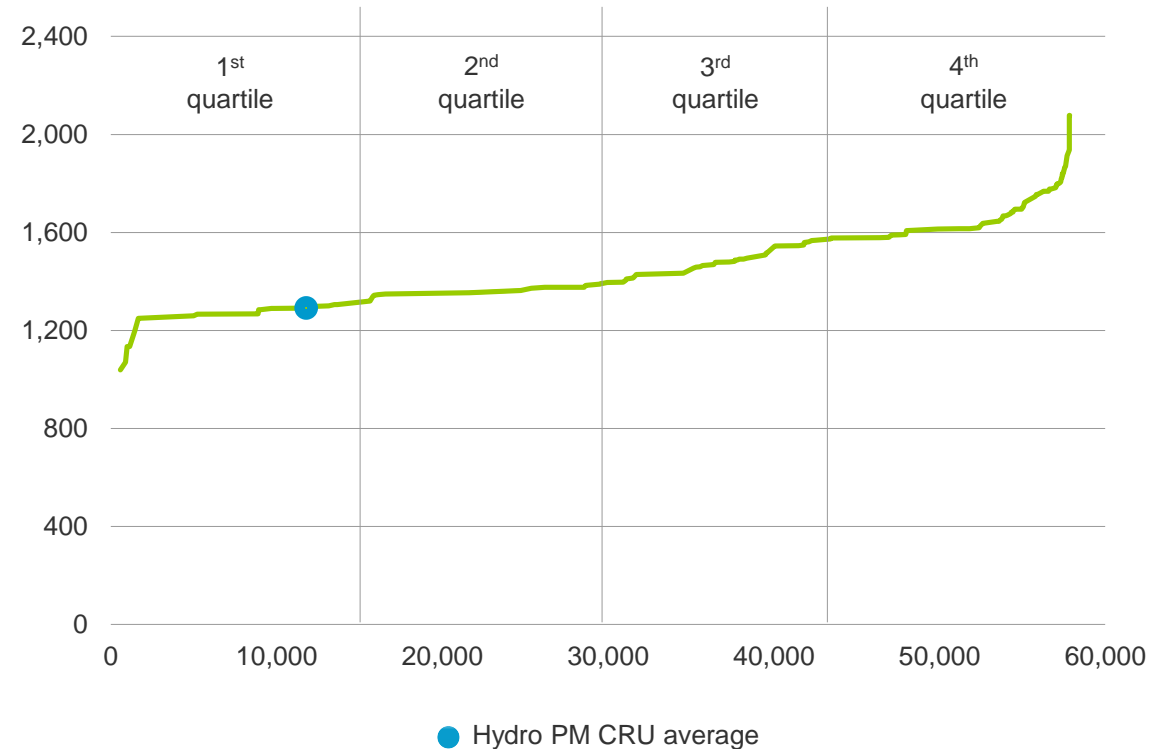
# Strengthened relative position

Improvement programs and currency tailwinds are main contributors

Underlying EBITDA per mt in USD for respective aluminium divisions<sup>12</sup>



2015 CRU global business operating cost curve<sup>3</sup>, in USD per mt



1) All figures based on public accounting data, not verified by Hydro. Data not adjusted for different accounting principles and non-specified underlying items. Hydro makes no representation as to the accuracy or completeness of such information. The analyses are based on assumptions subject to uncertainty and therefore intended only for general comparisons across companies and should not be used to support any individual investment decision. All results are provided for informational purposes only. Hydro figures includes Primary Metal, Metal Markets and attributable share of EBITDA and production in Qatalum.  
 2) Companies included in the graph: Hydro, Rio Tinto Alcan, South 32 (BHP), Rusal, Chalco, Alba, Alcoa  
 3) Assumptions: LME 1 699 USD, USD/NOK 7.96, USD/BRL 3.85, USD/EUR 0.91.



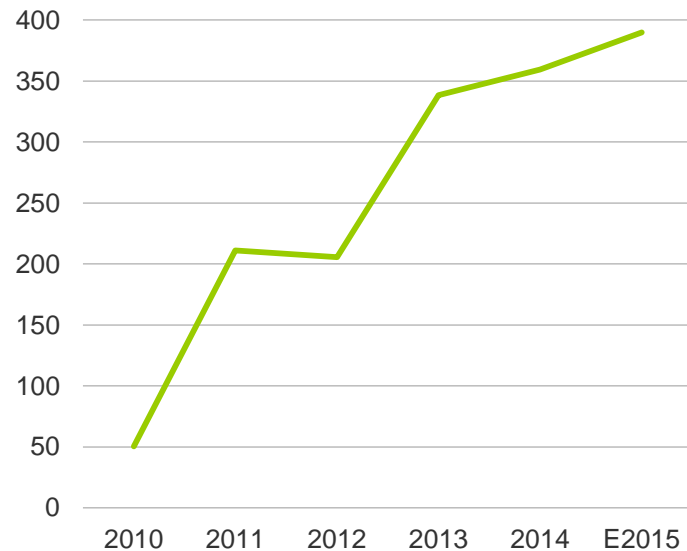
# Improvement culture is a part of Hydro's DNA

New NOK 1 billion technology driven improvement ambition

## Fully-owned smelters improvements continue beyond USD 300

Improvements 2009-2015, corresponding to NOK ~2.0 billion

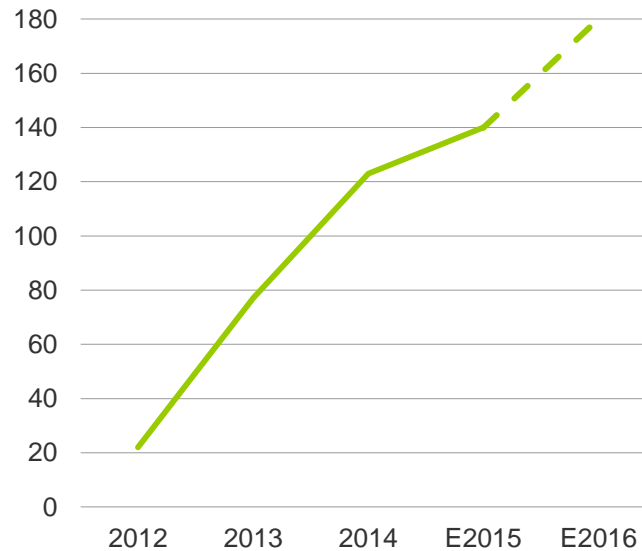
In USD per mt in real terms



## Joint venture improvement program on track

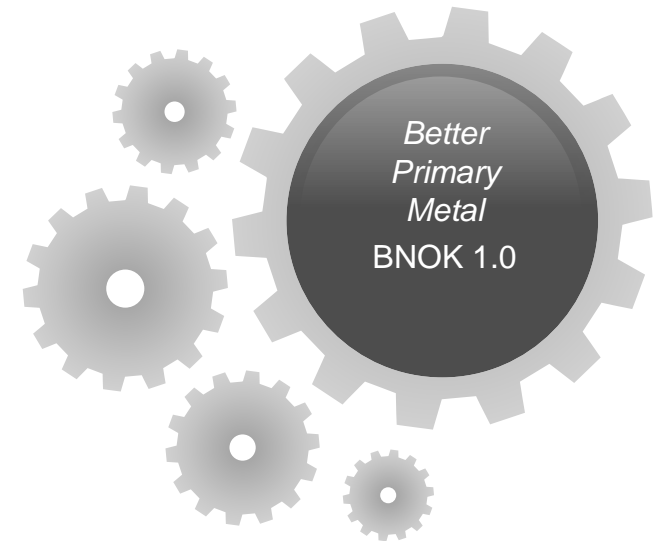
USD 180 per mt improvements 2011- 2016, corresponding to NOK ~1.2 billion

In USD per mt in real terms



## New BNOK 1.0 improvement ambition

Includes remainder of USD 180 program, To be delivered from 2016 to 2019

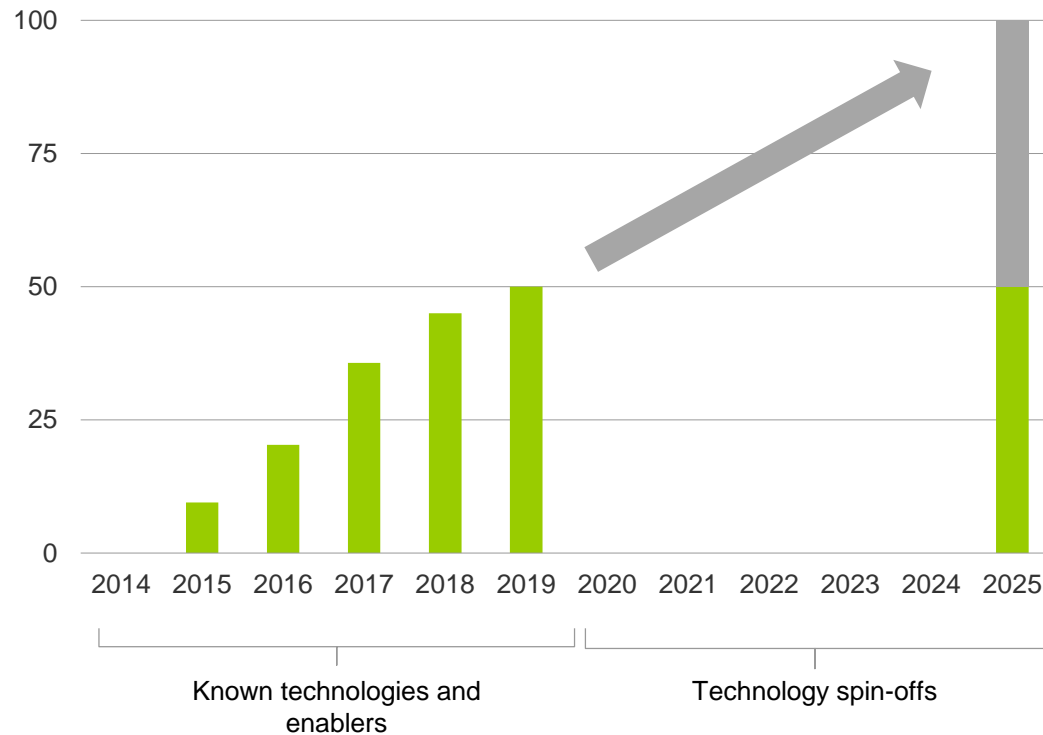




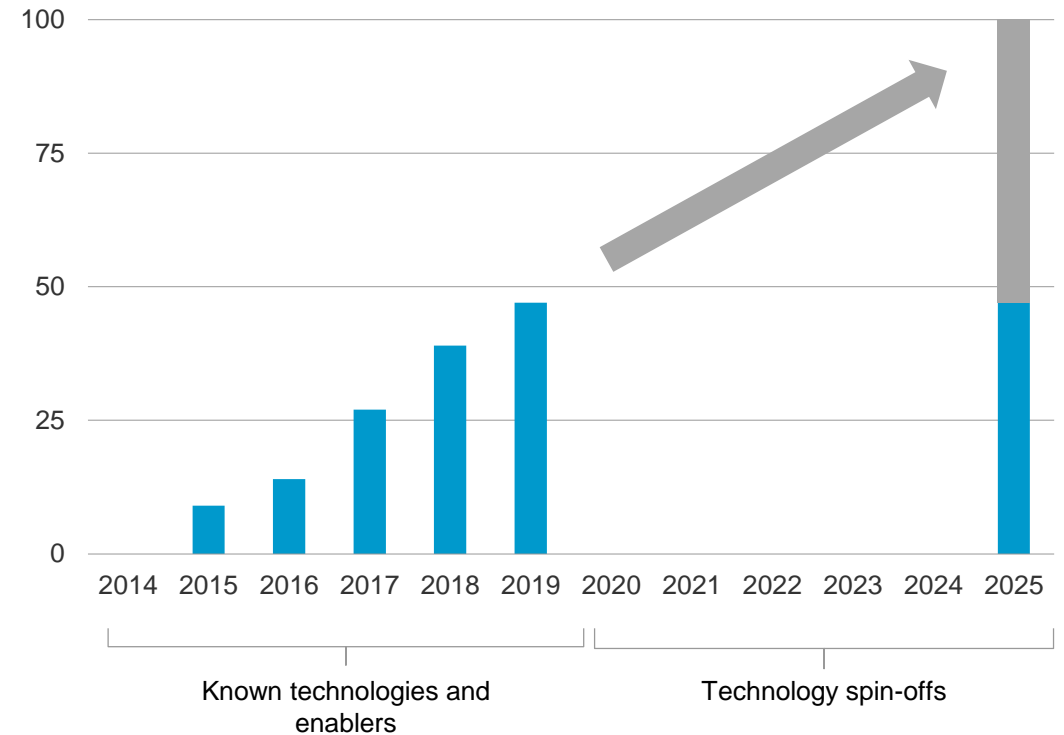
# Improvement culture and technology go «hand in hand»

Technology-driven capacity increases of ~200 000 mt over the next decade

Production fully-owned<sup>1</sup> smelter portfolio 2014-2025, in mt



Production joint venture<sup>2</sup> portfolio 2014-2025, in mt



1) Årdal, Høyanger, Husnes, Sunndal and Karmøy

2) Volume as consolidated in Hydro from Alouette, Tomago, Albras, Svalco and Qatalum

# Continuous technology development



## HAL 300

- Operating for several years in Sunndal and Qatalum
  - 13.5 kWh/kg
  - 314 kA
  - 1.5 kg CO<sub>2</sub>/kg Al



## HAL4e

- To be used in Karmøy technology pilot
- Benchmark on energy-efficiency and environment
- Hal4e
  - 12.3 kWh/kg / 450 kA / <1.5 kg CO<sub>2</sub>/kg Al
- Hal4e Ultra
  - 11.5-8 kWh/kg / 415 kA / <1.5 kg CO<sub>2</sub>/kg Al

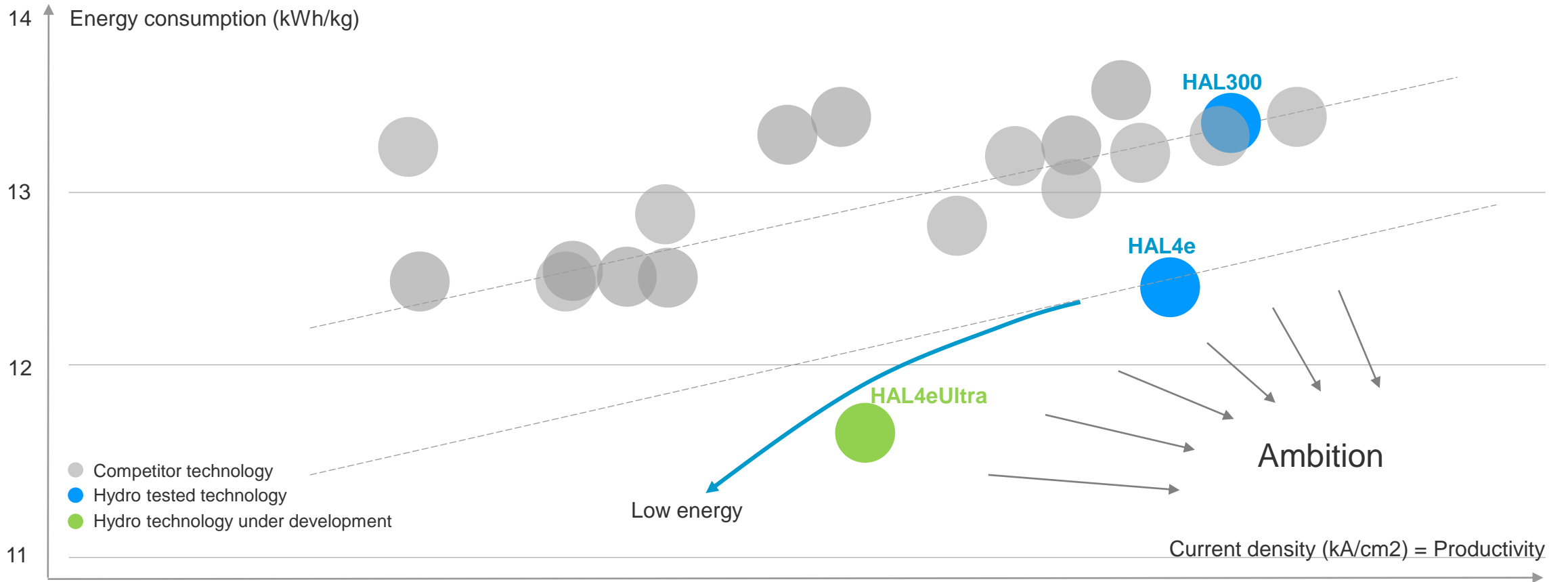


## R&D vision

- 10 kWh/kg
- Carbon capture-ready cell
- Higher degree of automation and autonomous control system

# Electrolysis technology – challenging the laws of nature

Hydro with benchmark combination of energy consumption and productivity



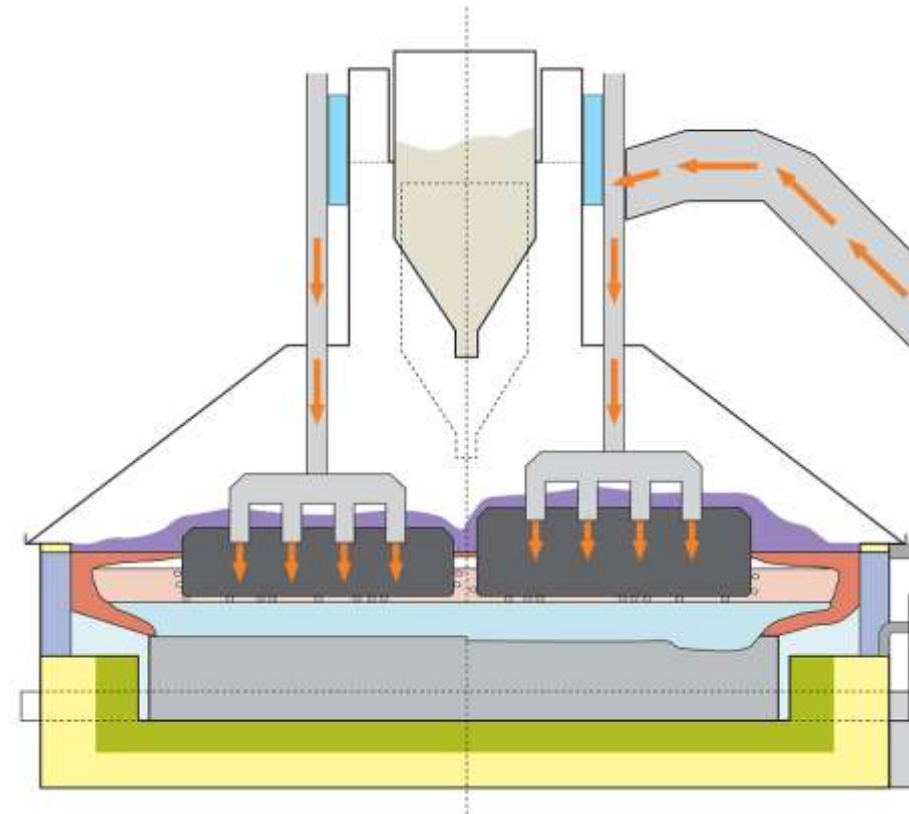
# Technology innovations in HAL4e

## Key enablers for improved performance

- Milli-Volt chasing: reduce Ohm's resistance
- Anode-cathode distance
- Heat balance
- Control of magnetic fields
- Reduce operational variations with improved control system

## Examples of innovations behind HAL4e performance

- Copper inserts
- Anode developments and yoke design
  - Optimized anode yoke design - up to 0.3 kWh reduction in energy consumption per kg aluminium
- Cathode developments
- Process control system
- Heat recovery



# Karmøy technology pilot concept

- Karmøy technology pilot with annual production of 75 000 mt
  - 48 cells HAL4e technology, 12 cells HAL4e Ultra
- Pilot also responding to need for improved performance of existing smelters in challenging market conditions
  - New spin-off technology elements and improved process control
  - Pilot will reduce risk and cost of implementation
- Around ~50% of 200 000 mt creep ambitions coming from Pilot
  - estimated annual EBITDA effect of NOK ~300 million\*
- Build-decision dependent on total power solution, market balance and outlook



\* Calculation based on actual EBITDA margin in 2014

# Hydro in the forefront of casthouse and recycling technology

AFM (adjustable flexible mould) – sheet ingot casting technology

- Improved capabilities towards advanced automotive segment
- Automated start up giving improved safety
- Reduced cost (e.g. scrap rate, changeovers\*) internally and for customers



Advanced shredding and sorting technology

- Improved capabilities for utilizing post-consumed scrap
- Utilizing X-ray transmission to sort elements
- Core technology protected through patents



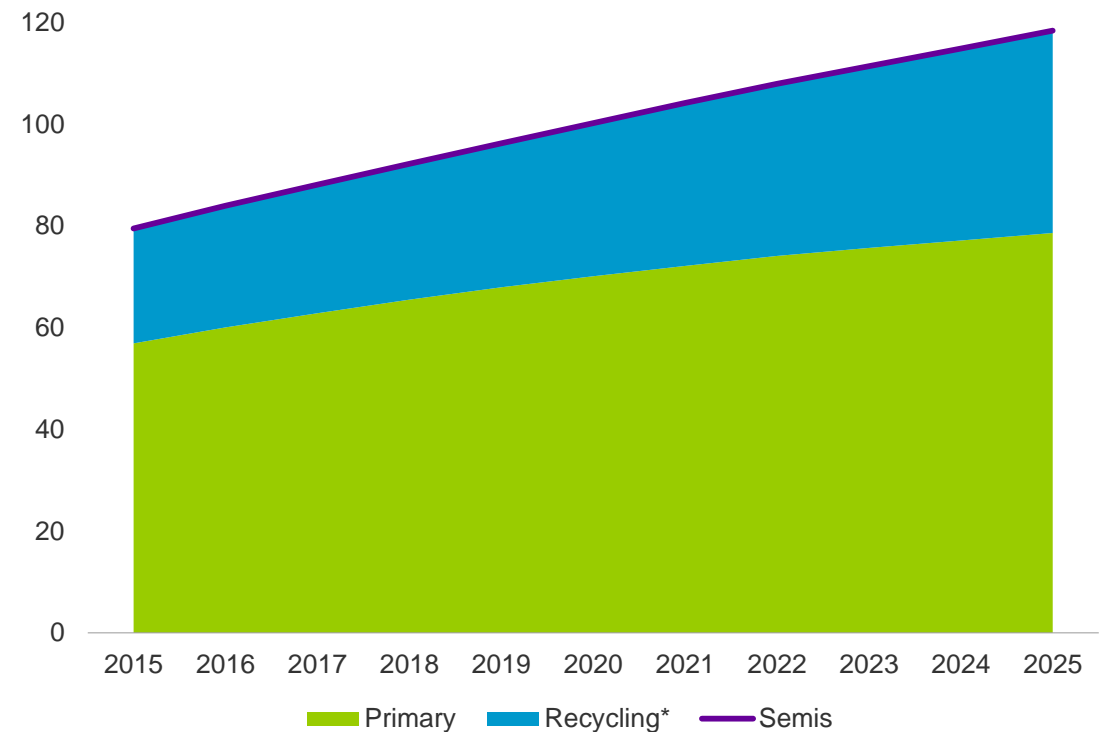
\*The process of changing the form-set to allow for the casting of another dimension

\*\* WMR Recycling GmbH

# Taking advantage of the growing post-consumed scrap stream

- Expect increasing amount of post-consumed scrap
- WMR acquisition allows Hydro to “dig deeper” into scrap pile
- Benefit from increased margins through utilizing lower-grade scrap
- Trend towards customer demanding recycled and sustainable materials
- Positive contribution to Hydro’s overall carbon footprint

Primary vs. scrap-based metal usage globally, in million mt



Source: CRU, Hydro Analysis  
\* Post-consumed and fabrication scrap

# Targeting the high-growth automotive segments

Strong commitment to quality

## Sheet ingot

- AFM<sup>1</sup> implementation in both Årdal and Høyanger – rapidly increasing automotive volumes
- Large shift in portfolio - entry into new product segments/ alloys, in particular automotive body sheets

## Extrusion ingot

- Working closely with customers to develop alloys with tailor made properties
- Advanced production of alloys to automotive customers – heat exchangers one of the main end-products

## Foundry alloy

- Increasing PFA<sup>2</sup> demand from automotive sector

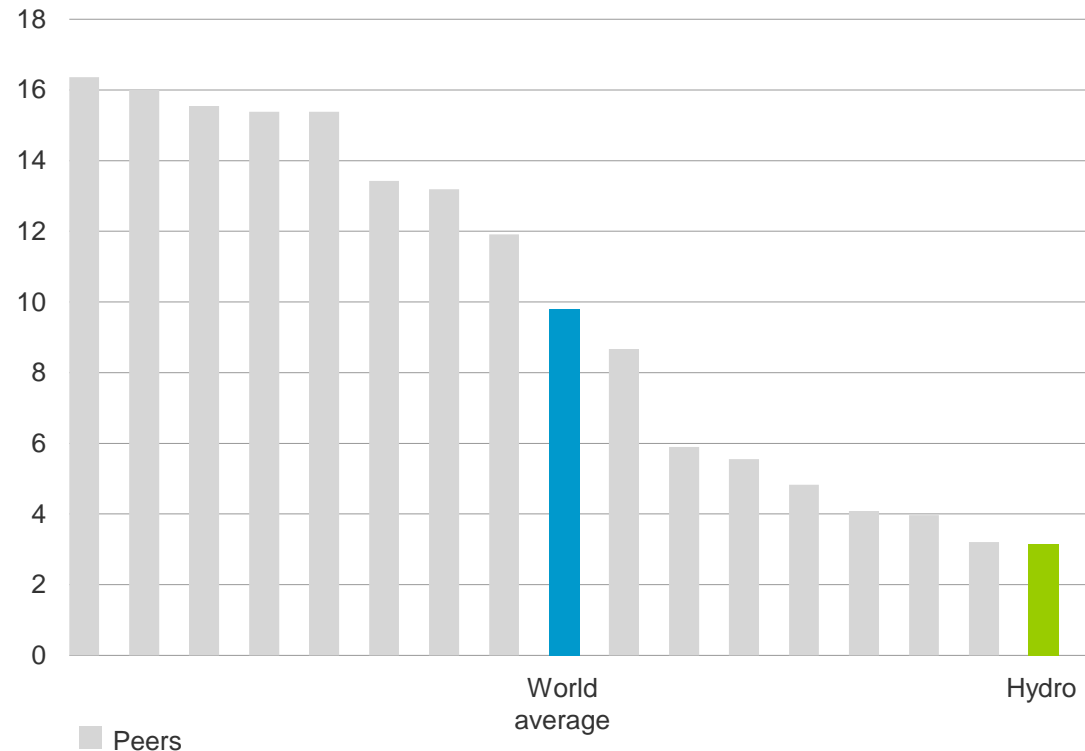


1) Adjustable flexible mould  
2) Primary foundry alloys



# Green energy base gives Hydro low carbon footprint

Indirect emissions, in tonne CO<sub>2</sub>/t al



- Primary Metal consumes ~31 TWh of energy per year in primary smelters\*
- ~2/3 of current aluminium capacity covered with long-term hydro power supply
- ~1/3 of current aluminium production covered with equity power
- Current aluminium capacity >80% with energy coverage until 2024

Source: CRU 2012  
\* Hydro's consolidated share

# Primary Metal mid-term goals

Creating shareholder value by strengthening relative cost position through lean operations and technology

Ambitions	Target	Timeframe
• Improve safety performance – strive for injury-free environment	TRI <2	2020
• Deliver BNOK 1 bn under new improvement ambition	BNOK 1.0	2019
• Realize ~200 000 mt technology-driven capacity creep	200 000 mt	2025
• Verify world's most energy efficient primary technology, including spin-off elements	complete Pilot*	2017**
• Increase post-consumed scrap recycling to improve margins and environmental footprint	150 000 mt	2020

*Better Bigger Greener*

\*Karmøy technology pilot

\*\*Dependent on build decision early 2016

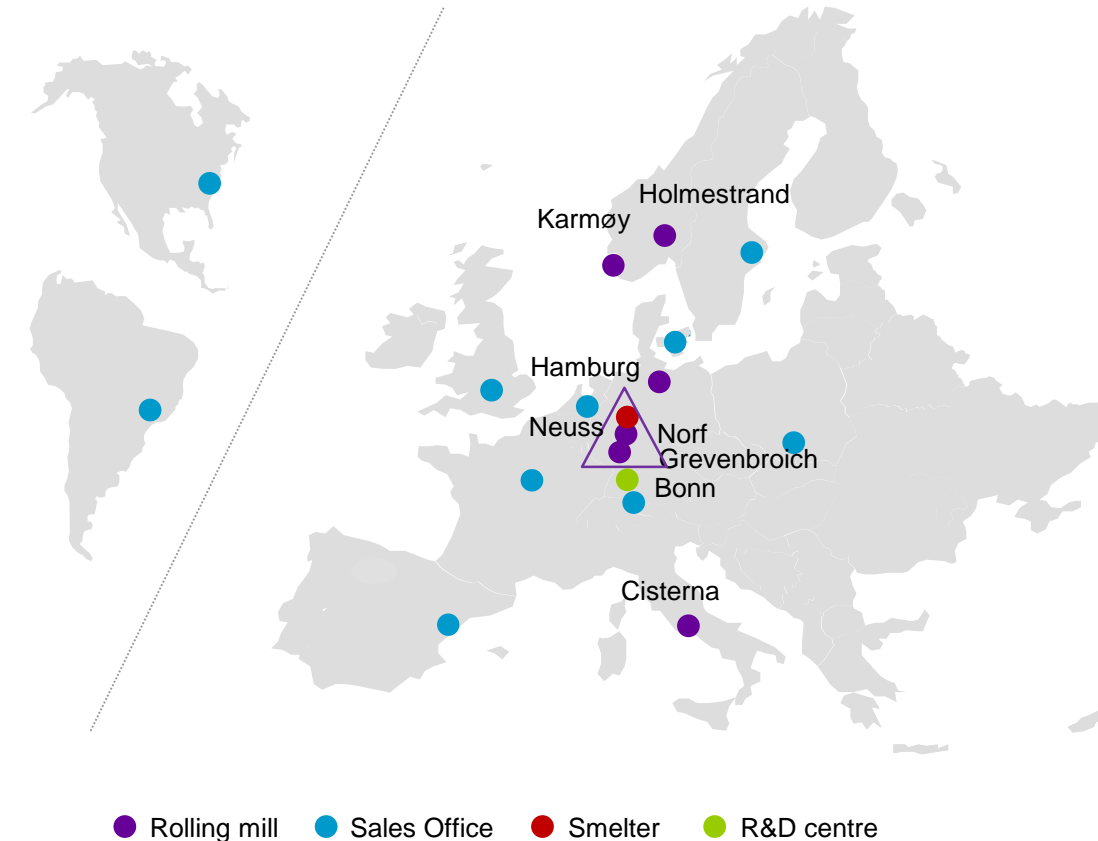
# Rolled Products

Kjetil Ebbesberg  
Capital Markets Day 2015



# Hydro Rolled Products

Aiming to be No. 1 in Europe and world benchmark



- Strong European production base and global sales force
- 1 million tonnes of flat rolled products per year
- Unique integrated aluminium cluster:
  - smelter
  - world's largest rolling mill
  - dedicated conversion mill
- Casthouse network and integrated recycling capacity
- Industry-leading R&D facility

# Improving weak safety performance is our number one priority

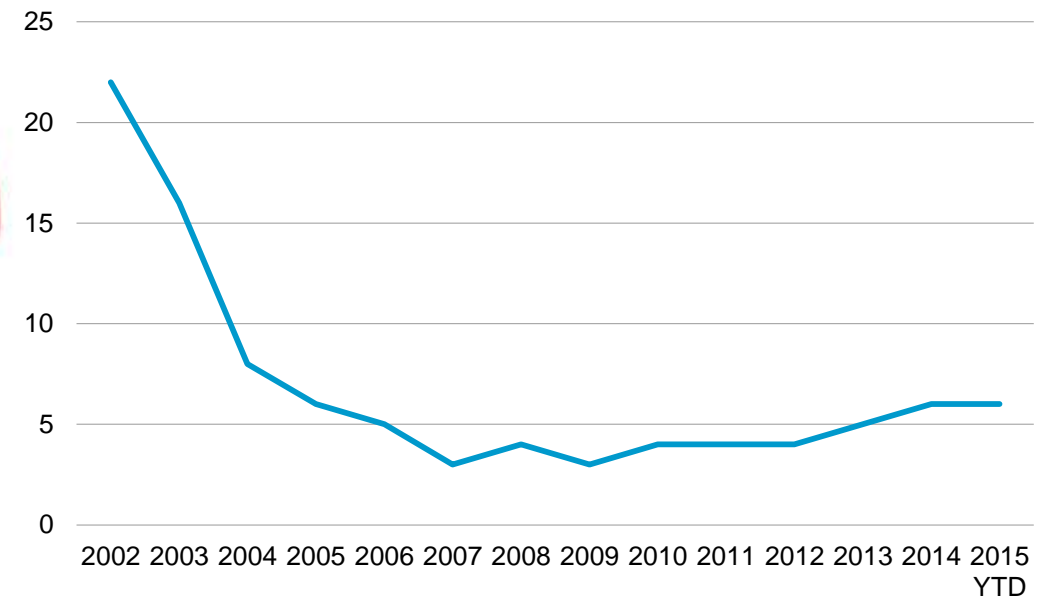
Increasing awareness and fostering safety culture

- Continue with risk management, which has reduced the severity of accidents
- Strengthening continuous improvement and learning through employee involvement
- Increasing accountability and competency through leadership training programs

I take time to think about risks



Total recordable injuries (TRI) per million hours worked



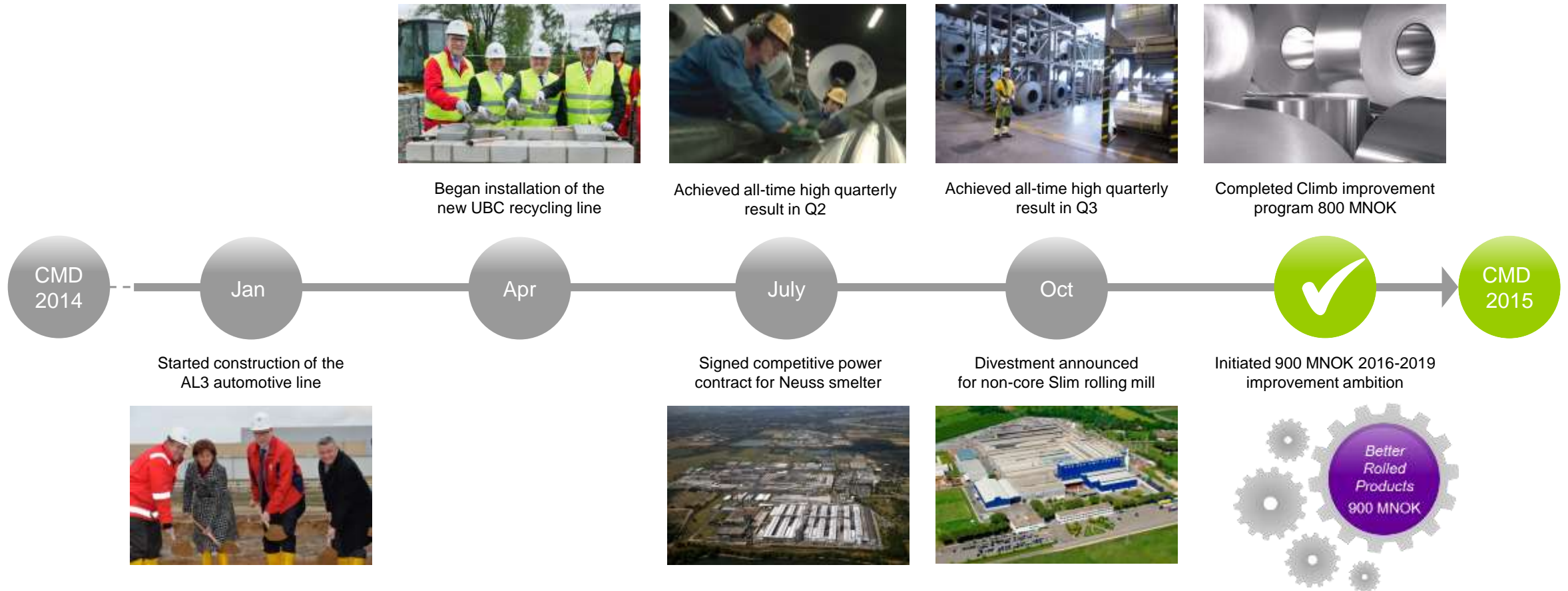
# Rolled Products strategic priorities

Building on solid foundation, pursuing attractive opportunities

## *Better* *Bigger* *Greener*

- Improve safety performance and drive for operational excellence
- Differentiate through innovation, quality, service and lead time
- Enhance market positions and portfolio high-grading
- Strengthen relative industry position
- Fulfill customer and environmental needs
- Key contributor to Hydro's overall carbon-neutrality ambition

# Rolled products: High-grading portfolio and improving cost position



# Strong positions in market segments with high focus on quality and innovation



<b>Ambition</b>	<b>Automotive</b> Gain No.2 position in European BiW	<b>Foil</b> Defend global No. 1 in high-end plain foil	<b>Beverage can</b> Maintain No.3 position in Europe	<b>Lithography</b> Defend global No.1 position	<b>Special products</b> Maintain No.1 position in Europe
<b>Market growth</b>	World ~11% Europe ~10%	World ~2-3% Europe ~1%	World ~4-5% Europe ~2-3%	World ~1% Europe ~2%	Europe ~2-3%



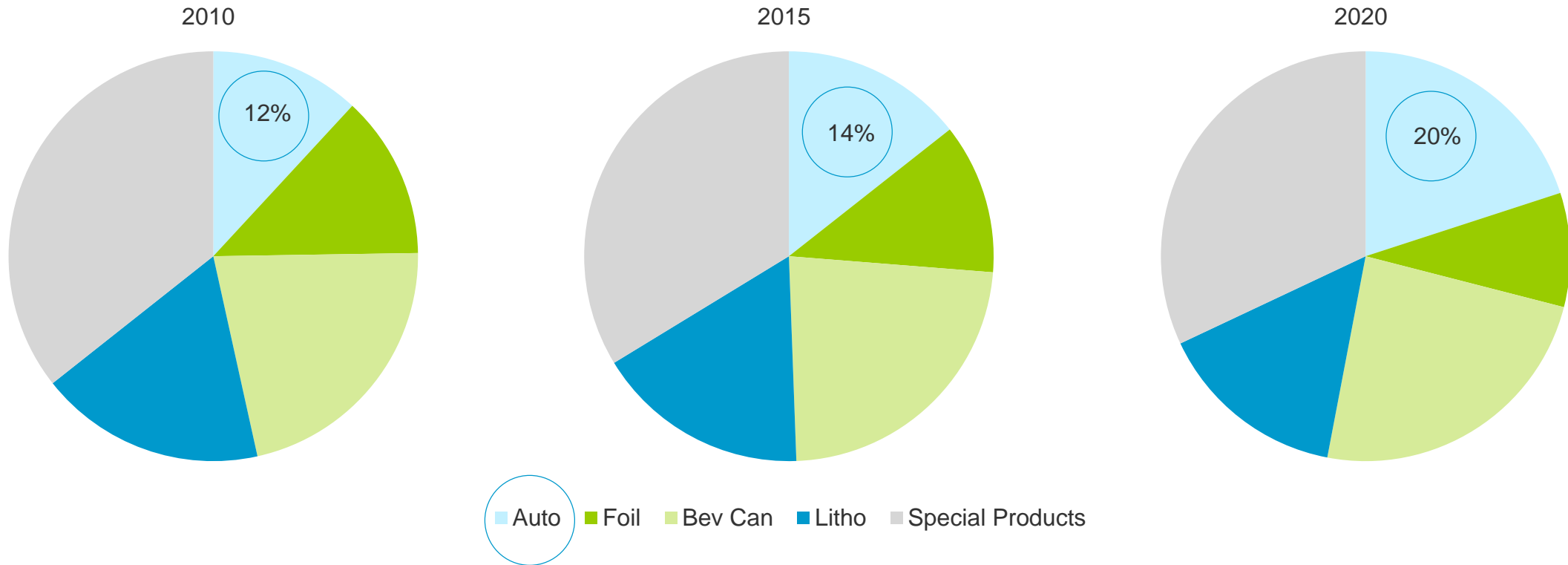
Market growth as compound annual growth rate 2015 – 2020 in %



# Optimizing product portfolio by expanding in higher-margin segments

Pursuing attractive automotive growth opportunity

Sales by segment



# «Climb» improvement program delivered one year ahead of time\*

Target

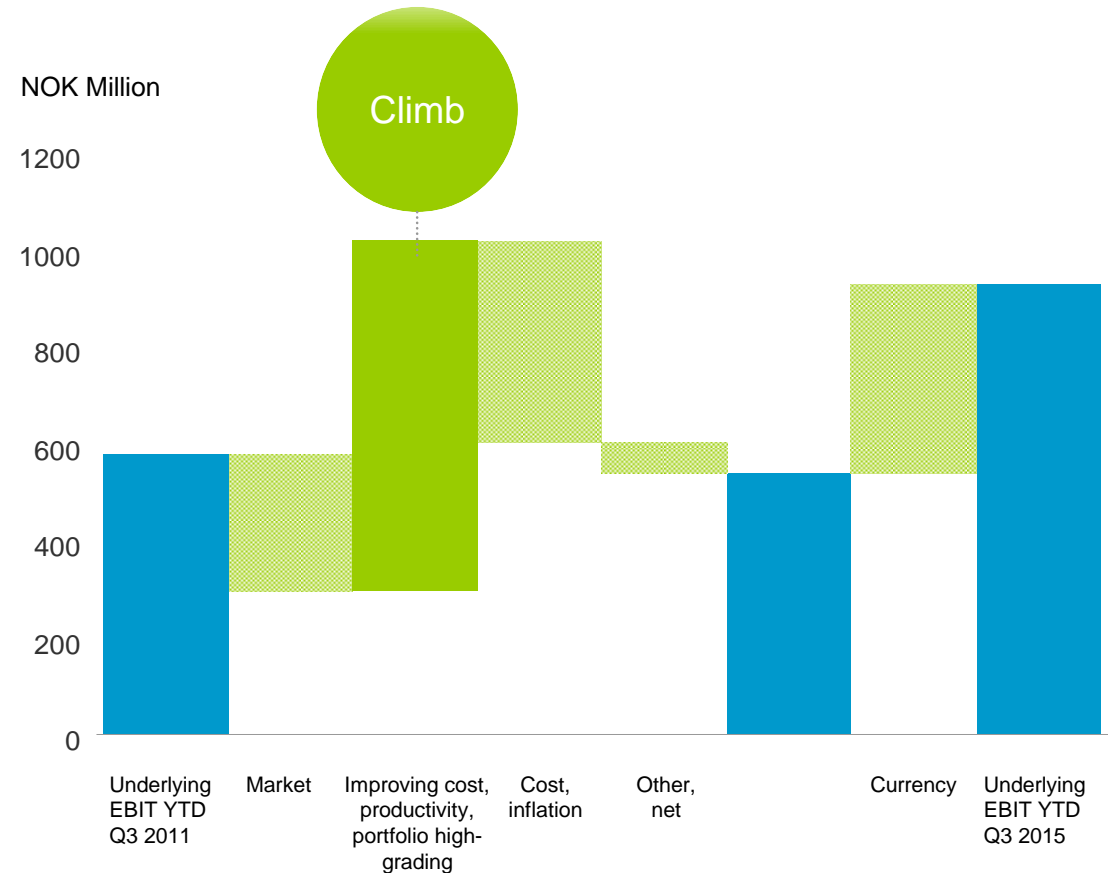
800 MNOK

Time period

2012-2016

Contributions driven by

- High-grading product portfolio
- Margin and portfolio mix
- Productivity improvement
- Reducing net cost level



\* Based on status start of december 2011 as baseline. Realized in nominal terms

# New improvement ambition launched

Significant contribution from recycling, operational improvements and portfolio high-grading

Target

**900 MNOK**

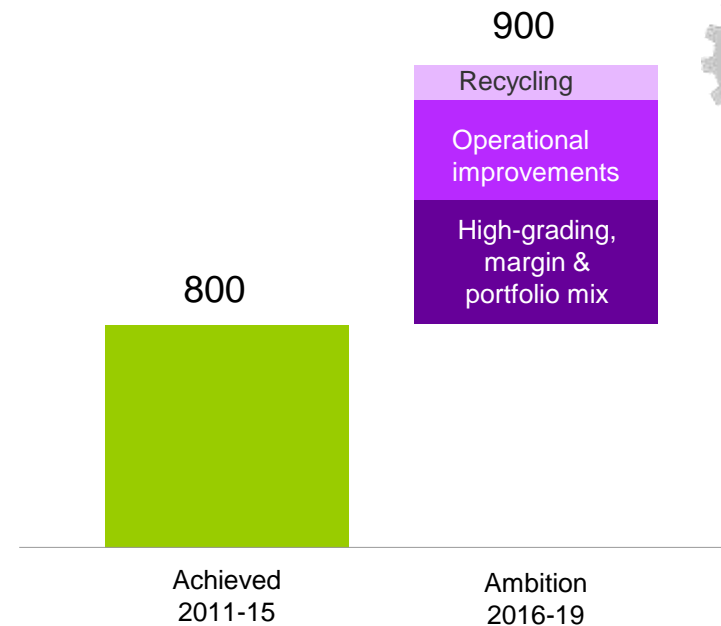
Time period

**2016-2019**

Improvement driven by

- Recycling
- Operational performance
- Supply chain management
- Automotive growth
- Product high-grading
- Margin and portfolio mix
- Culture change

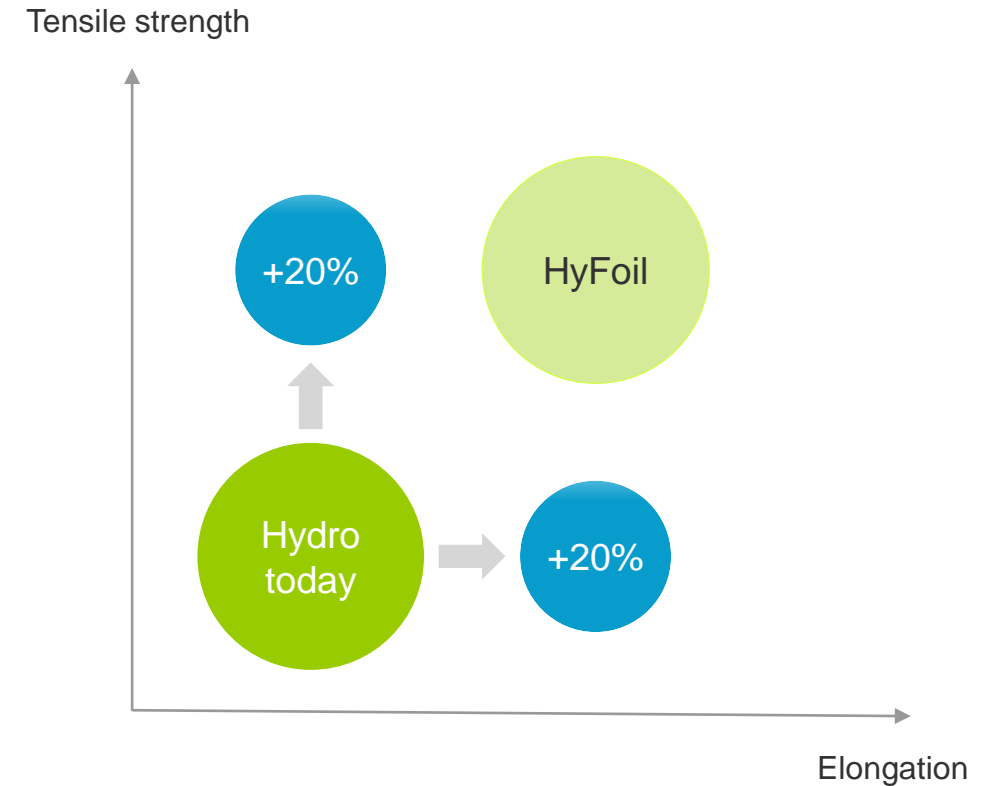
NOK Million



# Step change in efficiency and quality of foil products

High-grading our leading high-end foil by further enhancing foil strength and elongation

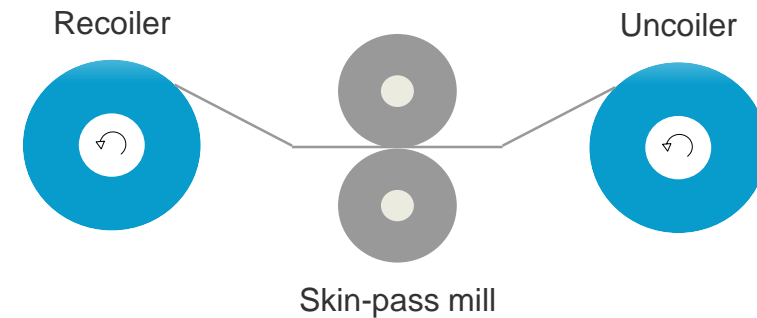
- Next generation converting foil: sophisticated alloy combined with shorter production routing
- Significant customer advantages
  - Faster speed on their converting lines
  - Thinner gauges
  - Better technical properties
- Proof of concept ongoing



# Step change in automotive surface quality

Automotive skin pass mill offers increased design flexibility for OEMs<sup>1</sup>

- EDT<sup>2</sup> surfaces are required by OEMs. Today rolled with standard cold mills
- Dedicated process at new AL3 line will generate significantly improved EDT surface
- A step change in formability of BIW parts
  - More complex forms possible
  - Full freedom of design for automotive customers



1) Original equipment manufacturer  
2) Electric discharge texture

# Automotive line 3 moves Hydro towards No. 2 position in European BIW

Realizing an attractive growth opportunity



- Lifting nominal capacity to 200,000 mt/year
- Includes dedicated skin pass mill for EDT surfaces
- On time and on budget, start of production Q4 2016
- Sales contracting ahead of plan

# Used beverage can recycling facility ready for start-up in end-2015

Lowering the metal cost and contributing to Hydro's carbon neutrality target



- Strengthening unique aluminium cluster
- >40 kt/year of liquid aluminium from recycled beverage cans
- State-of-the-art sorting technology for full control of alloy composition
- End-of-life-cycle recycling underlining responsible use of resources

# Fulfilling customer and environmental needs

User phase benefits of aluminium products - the biggest contributor to Hydro's carbon-neutral ambition

## Optimizing plant efficiency

Emission reduction through state-of-the-art rolling technology

## Extending R&D lead

Developing products with environmental benefits in the user phase

## Recycling

Strengthening recycling capabilities to secure sustainable metal supply



### Packaging

Aluminium packaging reduces food waste and keeps food fresh without cooling



### Cars

Aluminium replaces heavier material, saving 3 – 4 times more CO<sub>2</sub> emissions than aluminium production needs



### Buildings

Heat insulation with aluminium roller shutters saves more energy than needed to produce aluminium



### Renewable energy

Aluminium is a major part of all renewable energy solutions, such as photovoltaic modules or wind turbines




# Rolled Products mid-term goals

Creating shareholder value with technology, product innovation and customer relations

Ambitions	Target	Timeframe
• Improve safety performance – injury free environment	TRI <2	2020
• Deliver on new improvement ambition	900 MNOK	2019
• Differentiate through product innovation, quality and service	Min.1 step change/year	Annually
• Build up automotive BIW capacity	200 kmt*	2017
• Fully ramp up new recycling capacity with UBC line	>40 kmt	2017
• Lift post-consumer scrap recycling	>100 kmt	2020

*Better Bigger Greener*

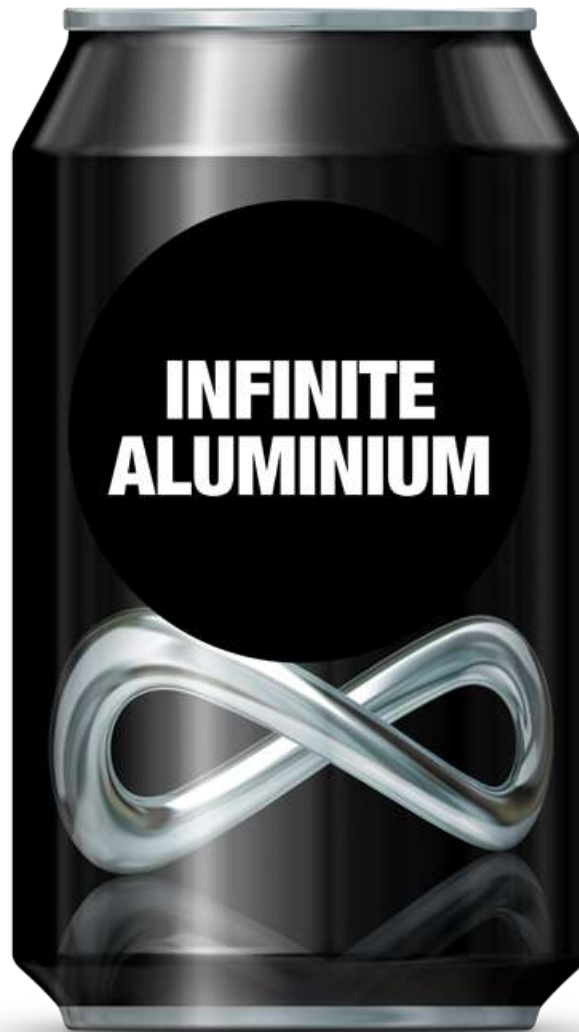
\* Refers to nominal capacity



# Hydro 2016

Well-positioned to create value  
in challenging markets

- Strengthening relative industry position through improvement ambitions and R&D lead
- Securing resources for future decades
- Re-positioning portfolio towards high-margin markets and advanced customers
- Financial strength through relative positioning and balanced capital allocation



# Investor Relations in Hydro



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Next events  
**Fourth Quarter Results**  
**February 17, 2016**

For more information see  
[www.hydro.com/ir](http://www.hydro.com/ir)