

Energy

Arvid Moss

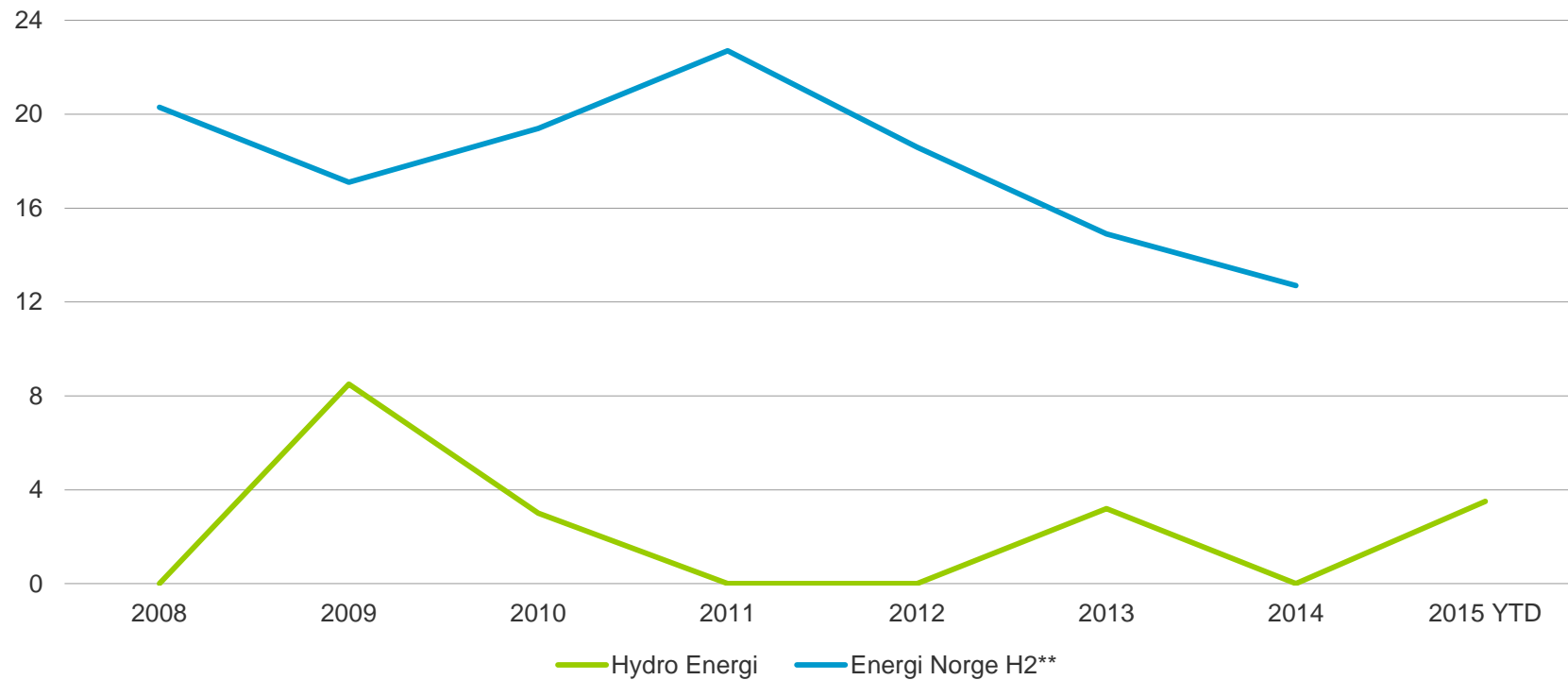
Capital Markets Day 2015



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

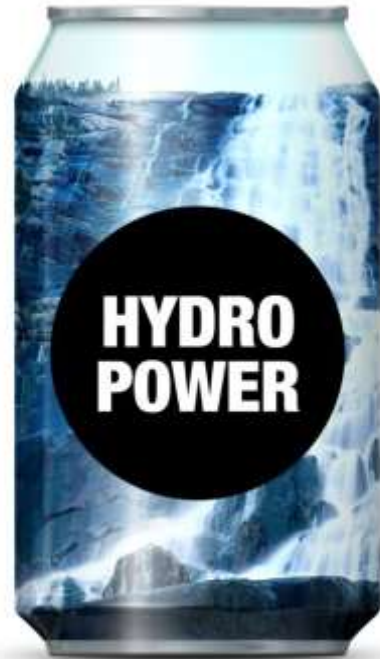
Energy strategic priorities

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

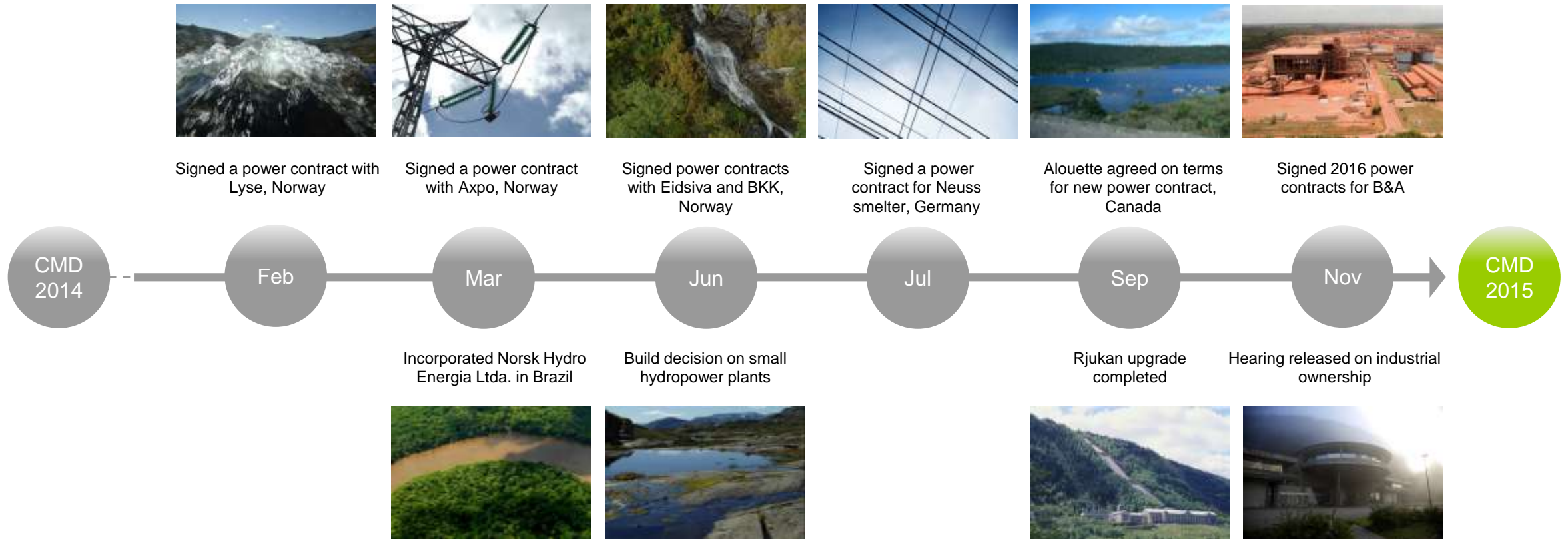


To own, operate and maximize value of Hydro's energy assets



To provide competitive power sourcing and global energy competence

Energy: Securing power supply, maximizing asset value

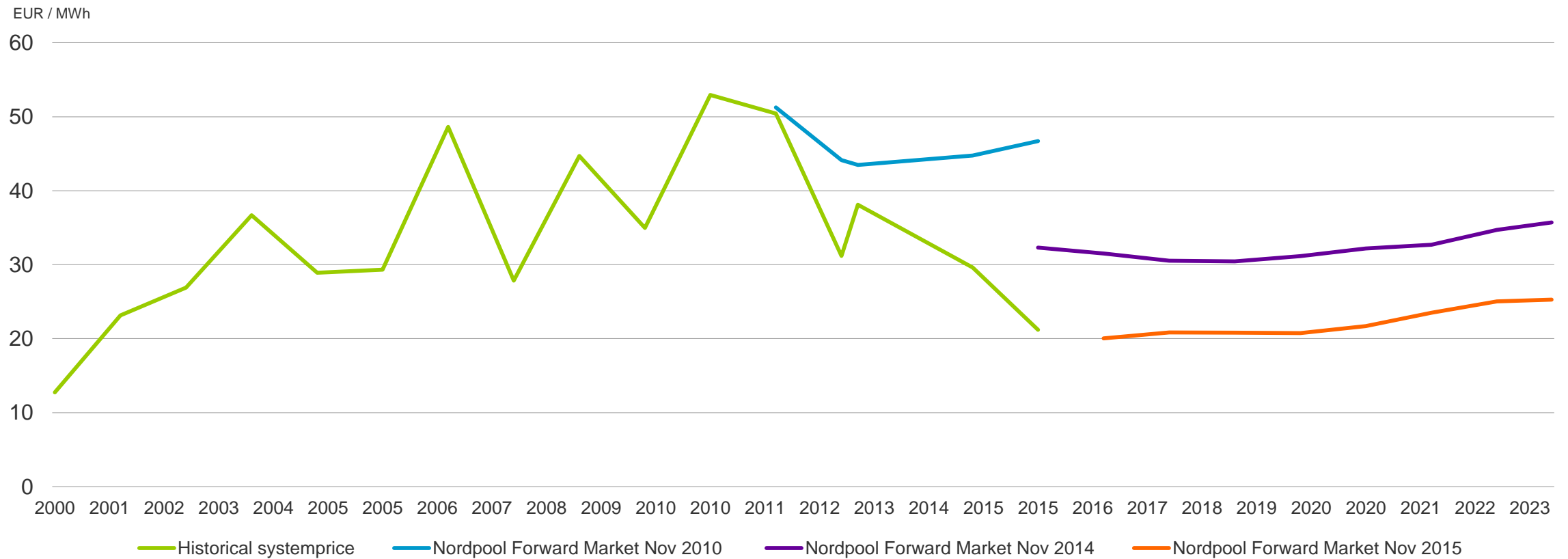


01

Power Markets

Nordic power prices decline over the last years

Downward trend also reflected in forward curve

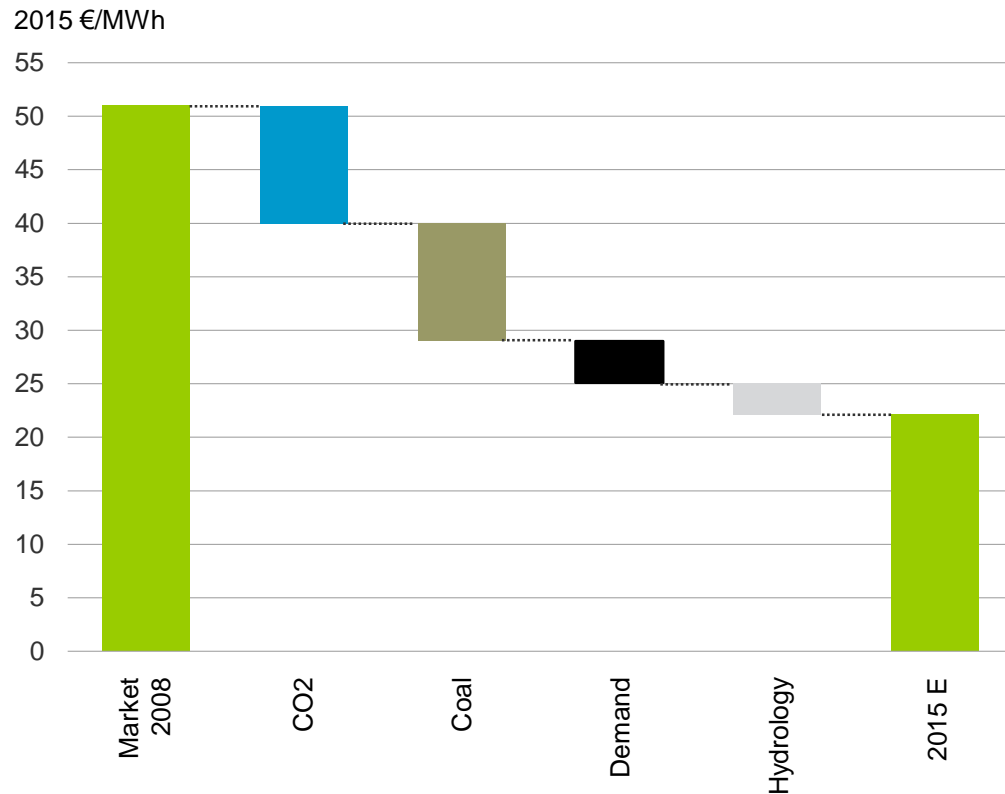


Source: Nordpool Spot
Prices expressed in yearly averages

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

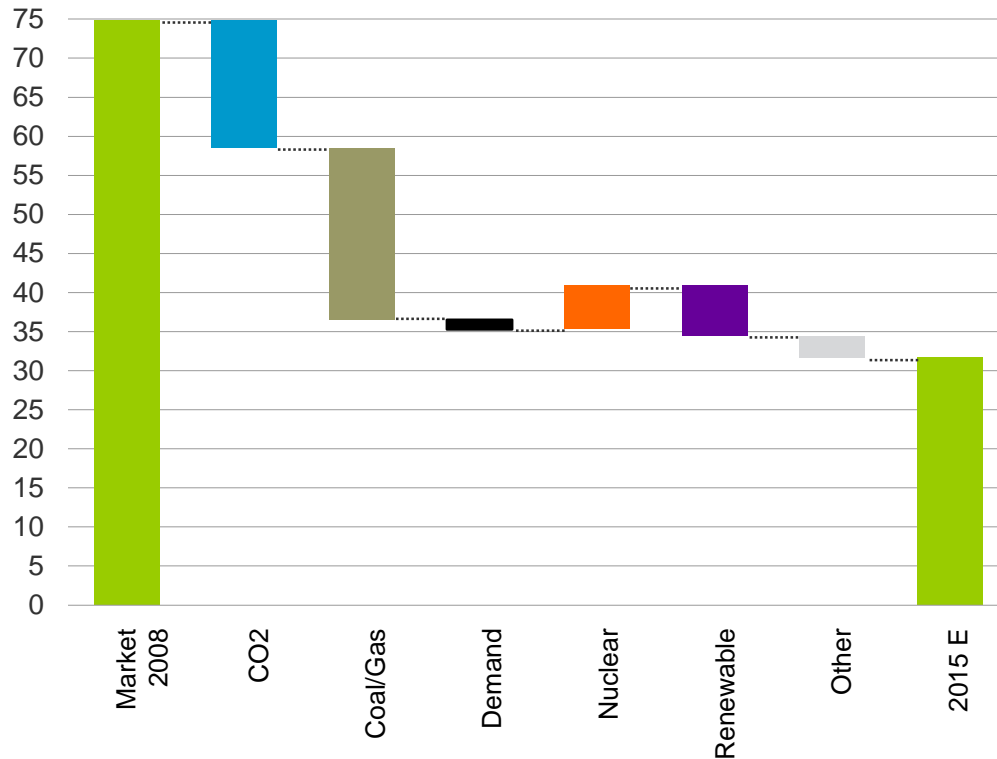
	2008	2015E
CO2 (2015 €/tonne)	24.3	6.9
Coal (2015 USD/tonne)	164	58
Demand (TWh)	403	390
Inflow Jan. to Oct. Norway and Sweden (TWh)	167	185

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



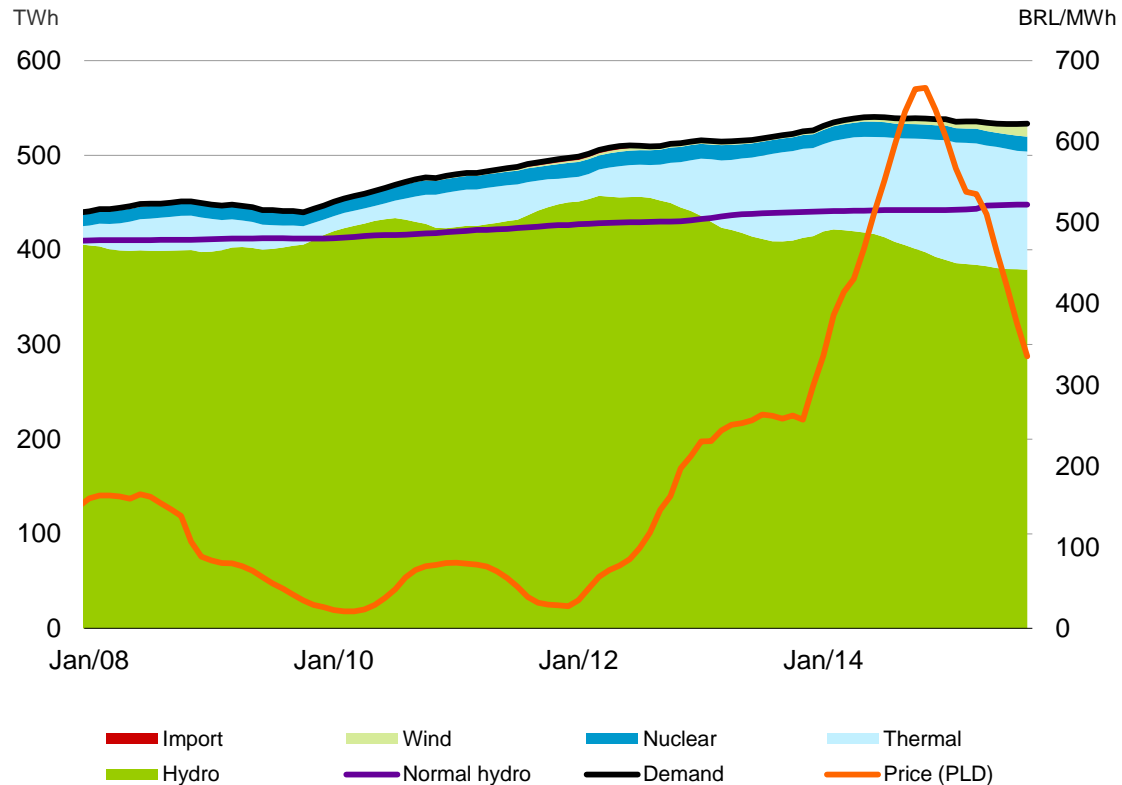
- Growth in renewable power offsets reduction in nuclear capacity
- Other drivers not included here e.g. changes in thermal generation and transmission capacity

	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

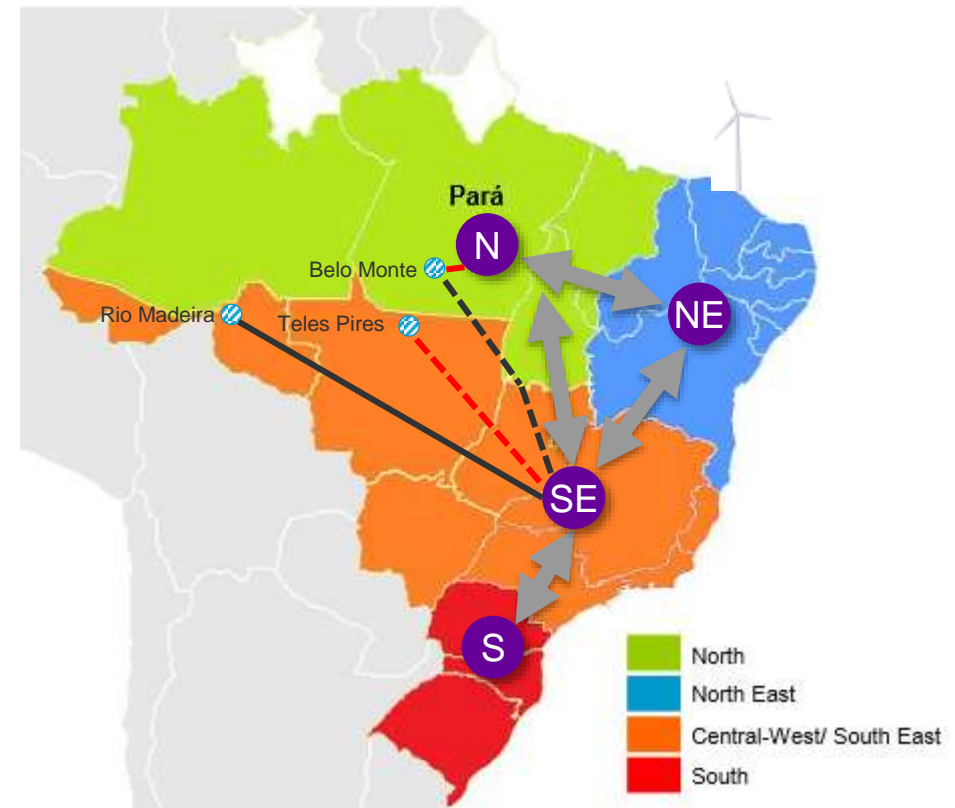
Interconnected Brazilian hydropower-based system

Thermal power has increased in importance during recent dry years

Brazilian power balance and price development



Interconnected power system, Brazil

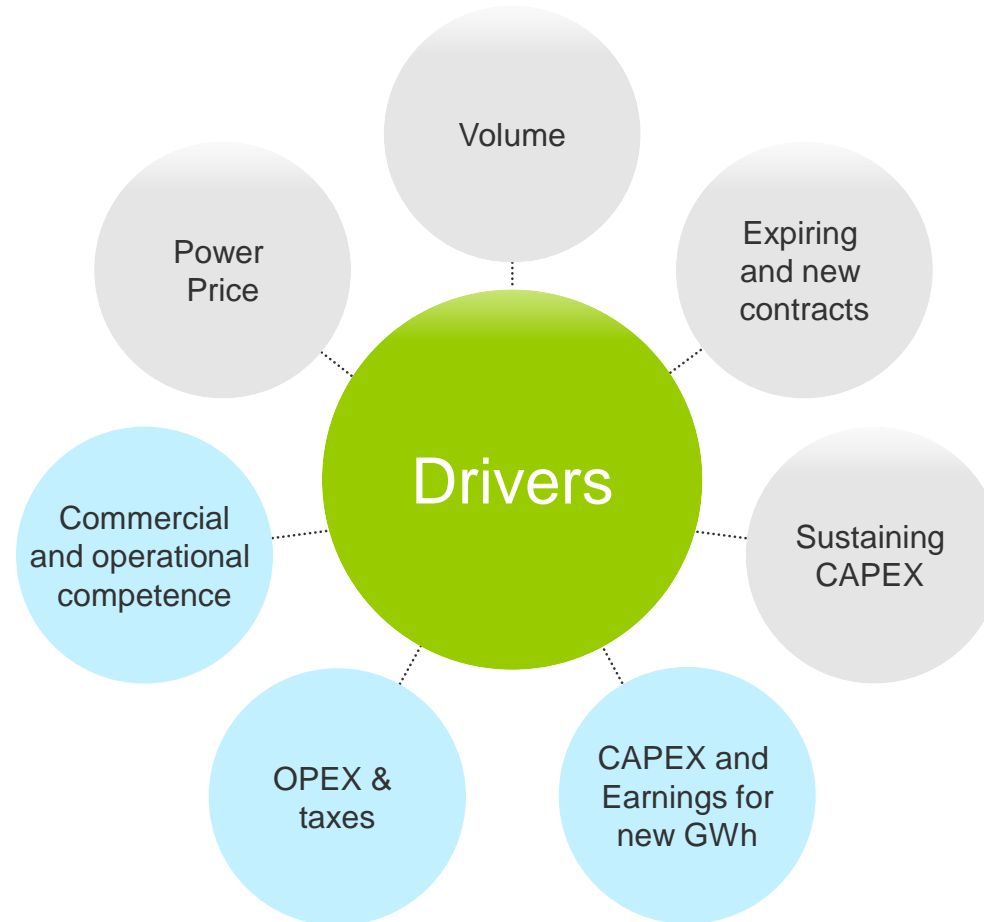


*Source: ONS, EPE, ANEEL.

02

Energy in Hydro

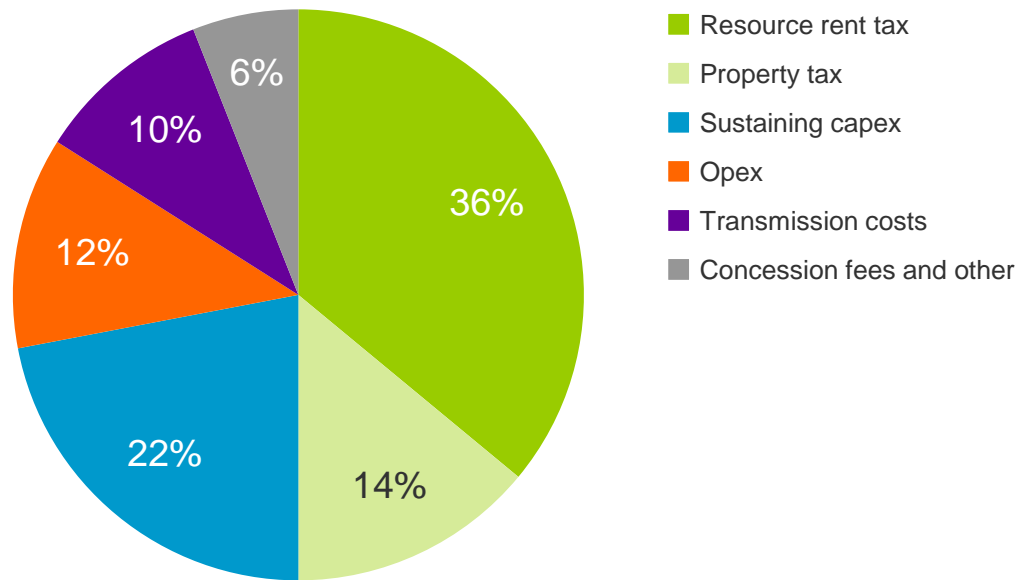
Value creation in Energy dependent on wide array of factors



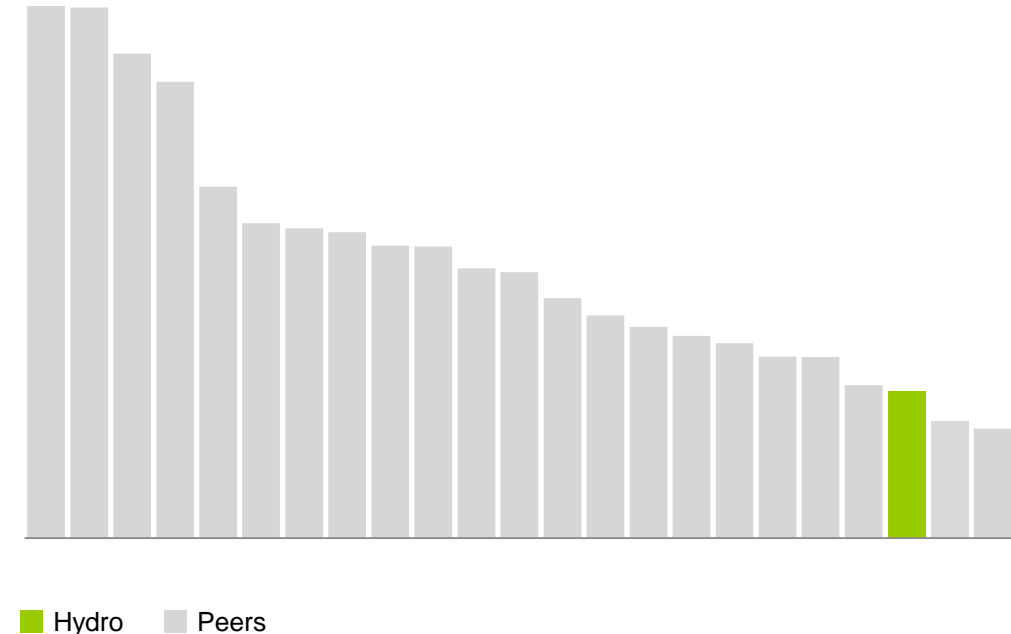
Competitive production costs driven by economies of scale and operational improvements

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

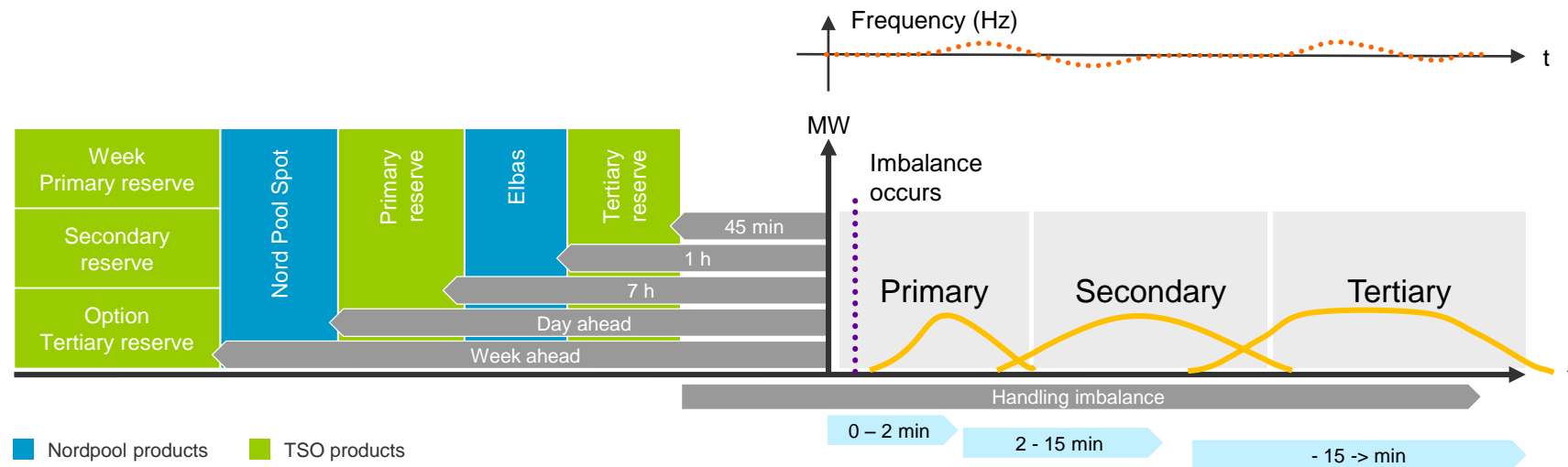
Hydro has one of the strongest commercial competence centers in the Nordic power market

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

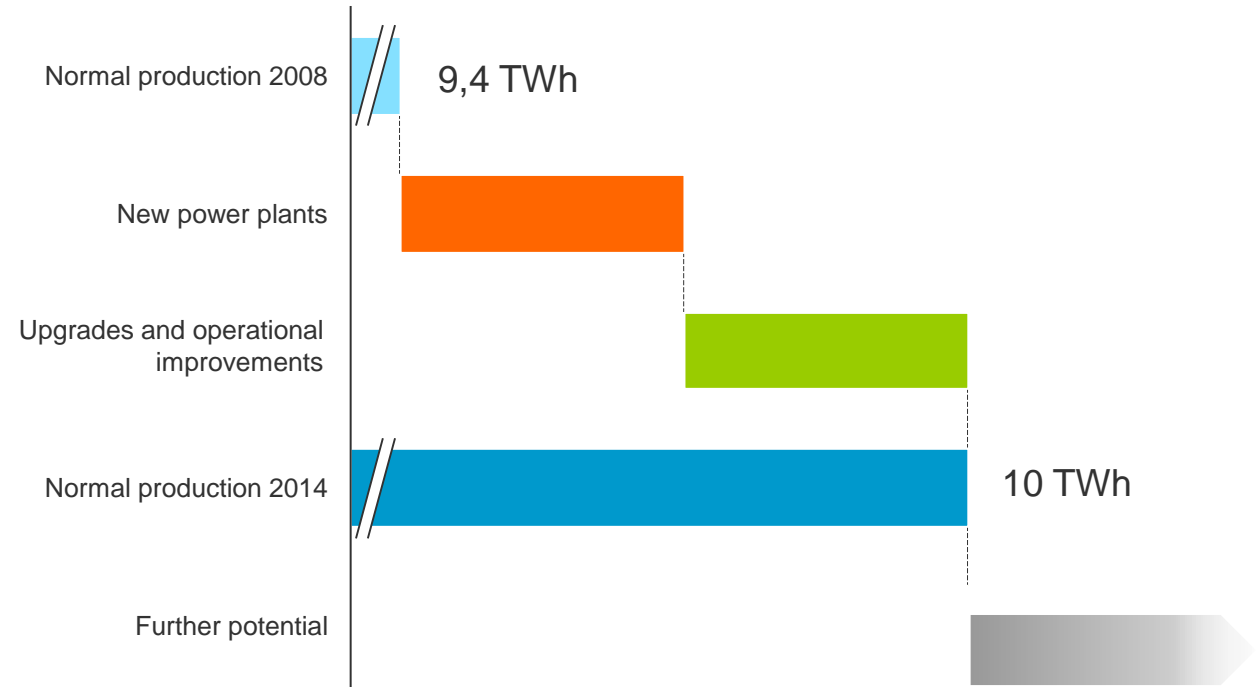
- Increasing balancing needs with renewables
- Flexible hydropower production allows Hydro to capitalize on price volatility and mitigate risks
- Smelter consumption flexibility key to future power system operation



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

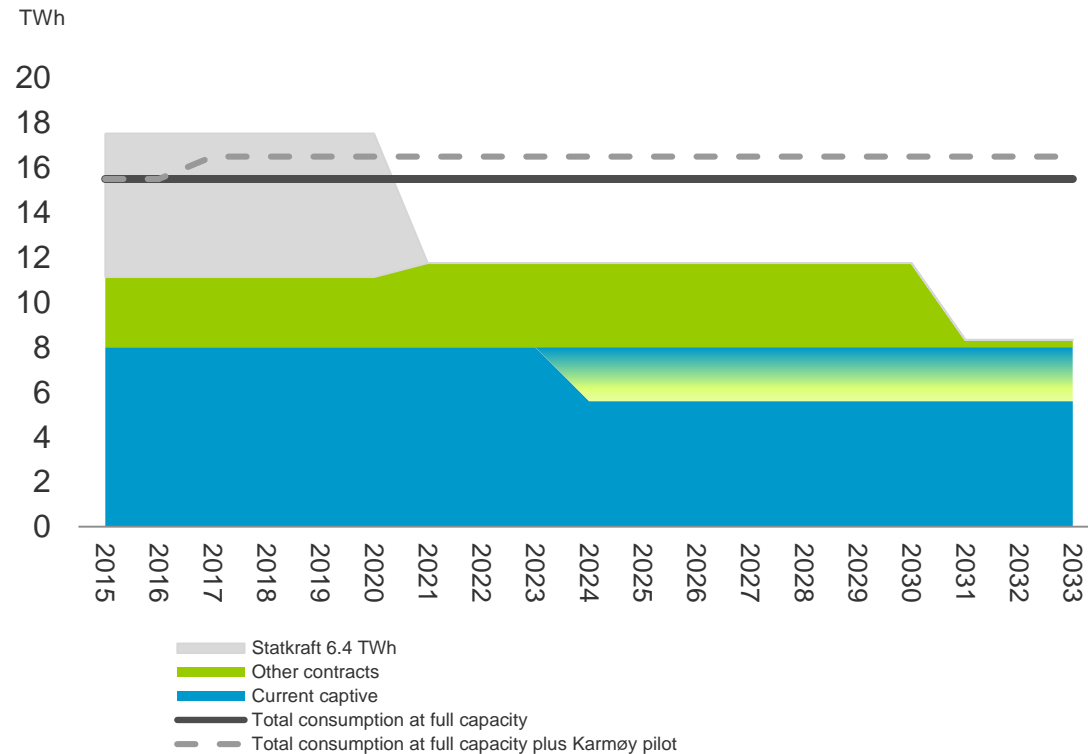
Commercial competence, analytical capability and market insight

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">• Fuel switch evaluations• New power contracts for B&A operations• Overall energy matrix optimization• Increased Energy presence in Brazil to lead the sourcing processes and explore commercial opportunities• Norsk Hydro Energia Ltda established as a vehicle for the power market operations	<ul style="list-style-type: none">• 3.75 TWh power sourcing secured for the Norwegian smelter portfolio 2021-30• 330 GWh power sourcing for the Norwegian smelter portfolio 2031-40	<ul style="list-style-type: none">• Execution of hedging strategy• New power contract secured for 2018-25 for Rheinwerk smelter• Gas/power sourcing for rolling mills

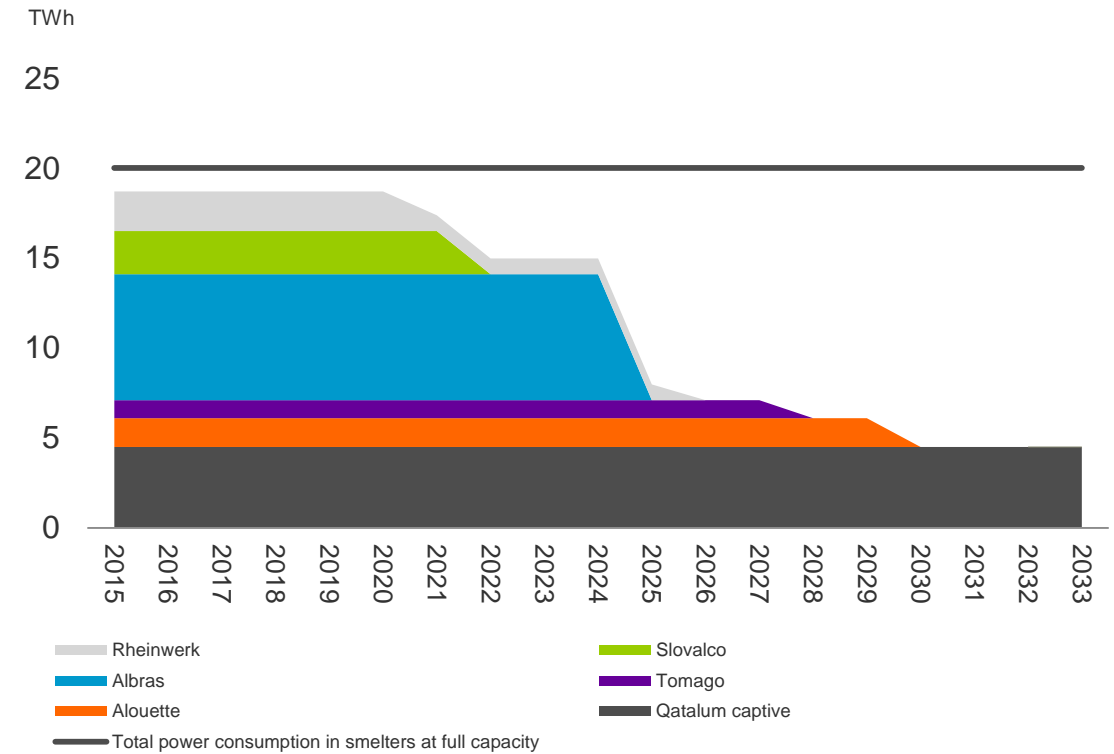
Improving smelter cost position with competitive power sourcing

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

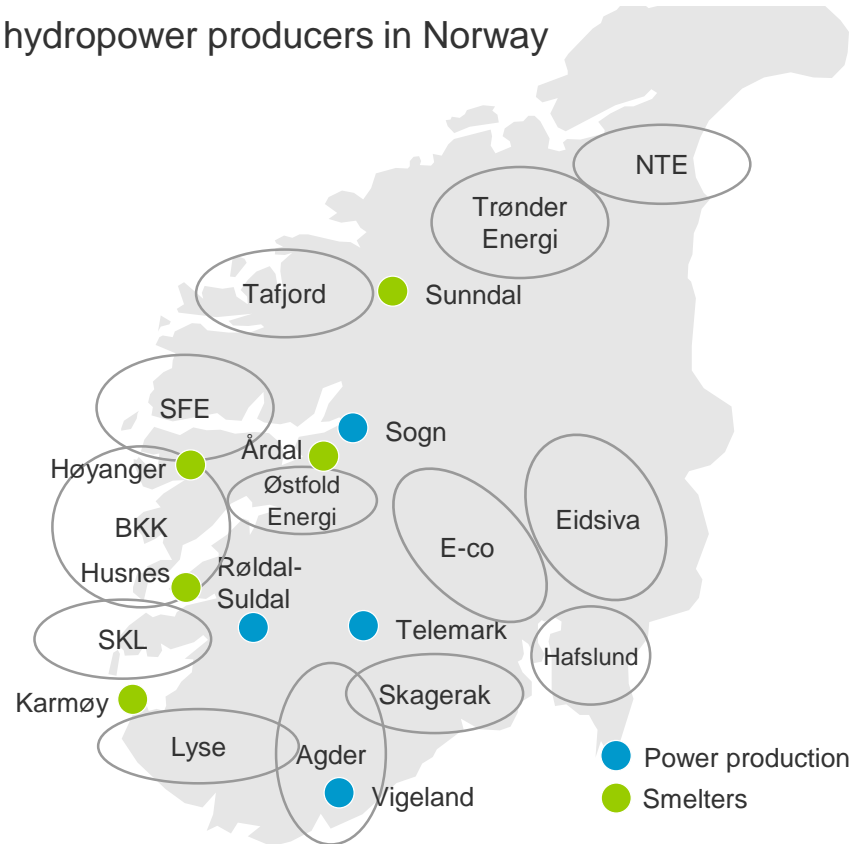
03

Industrial ownership
framework for RSK
assets

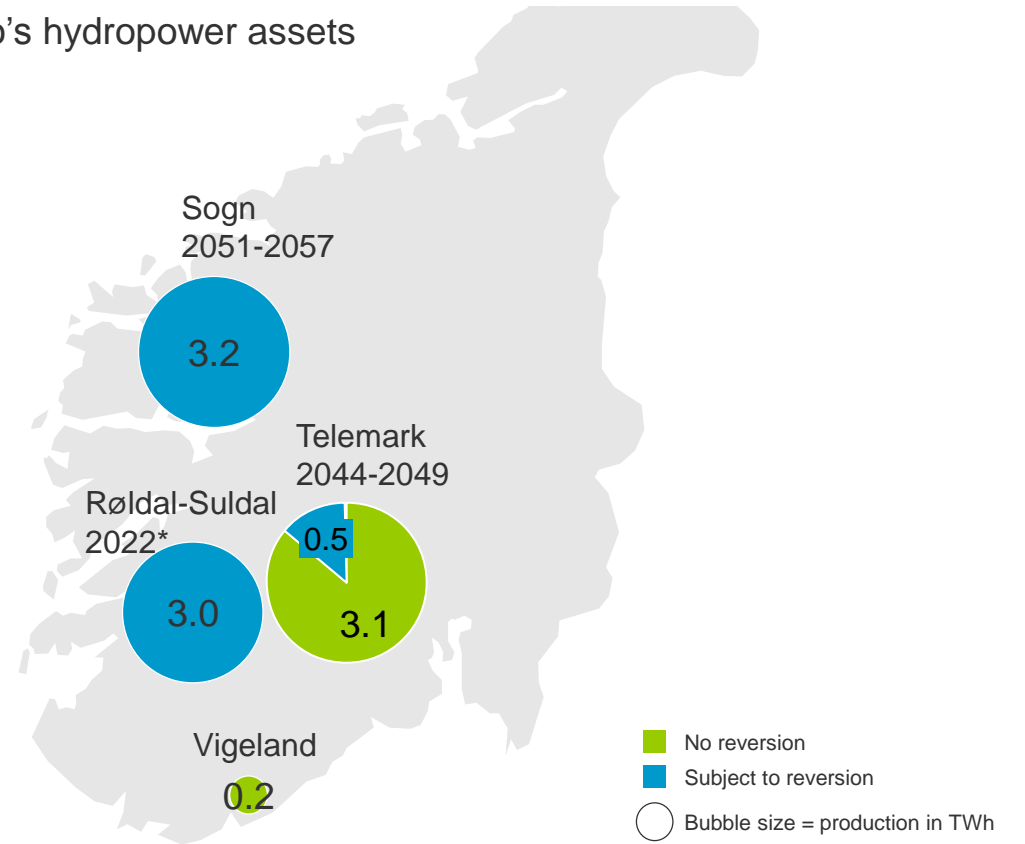
Norwegian reversion regime

Private ownership not to exceed 1/3 in Norwegian waterfalls

Regional hydropower producers in Norway



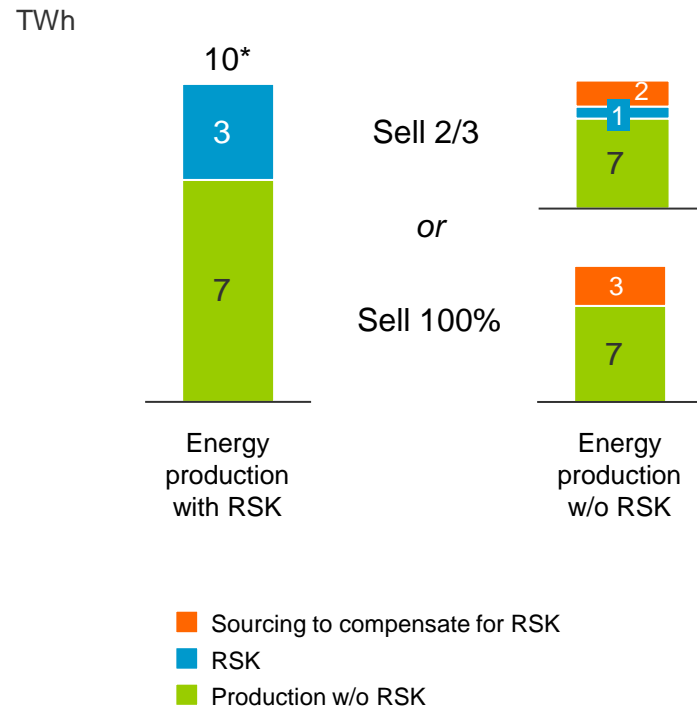
Hydro's hydropower assets



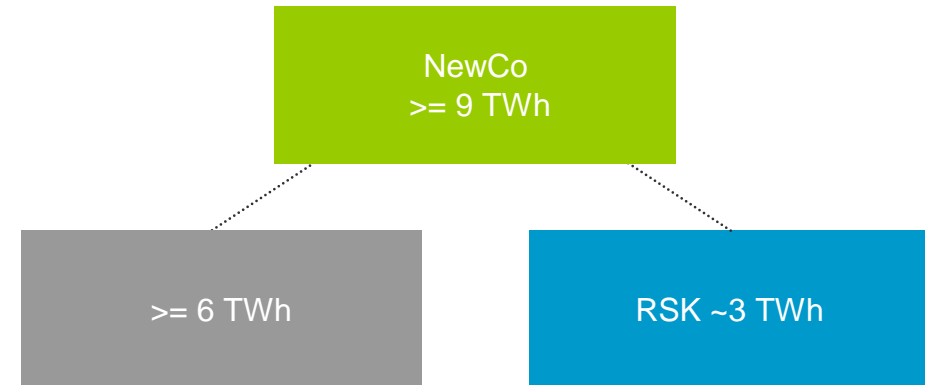
* Reversion year

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

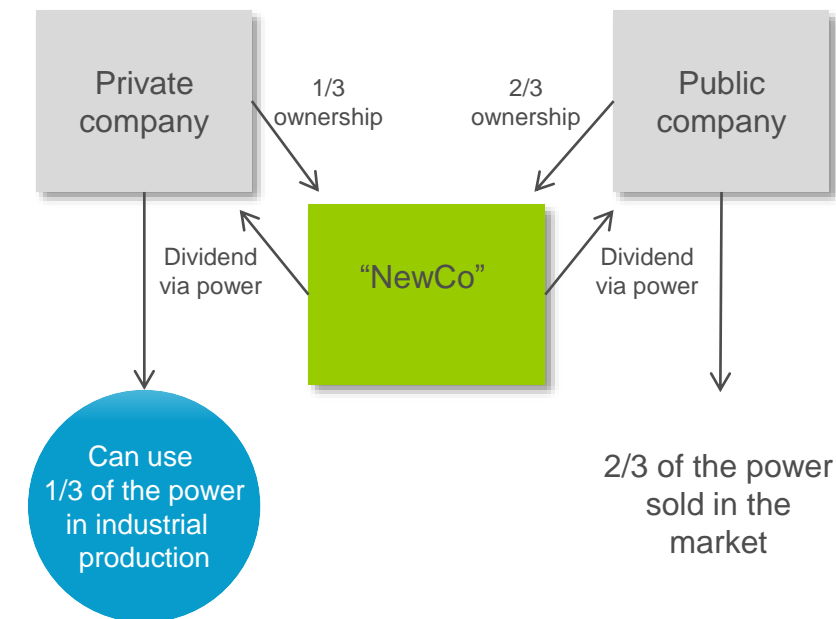
The diagrams on this slide are simplified for illustration purposes
 * Normal production

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

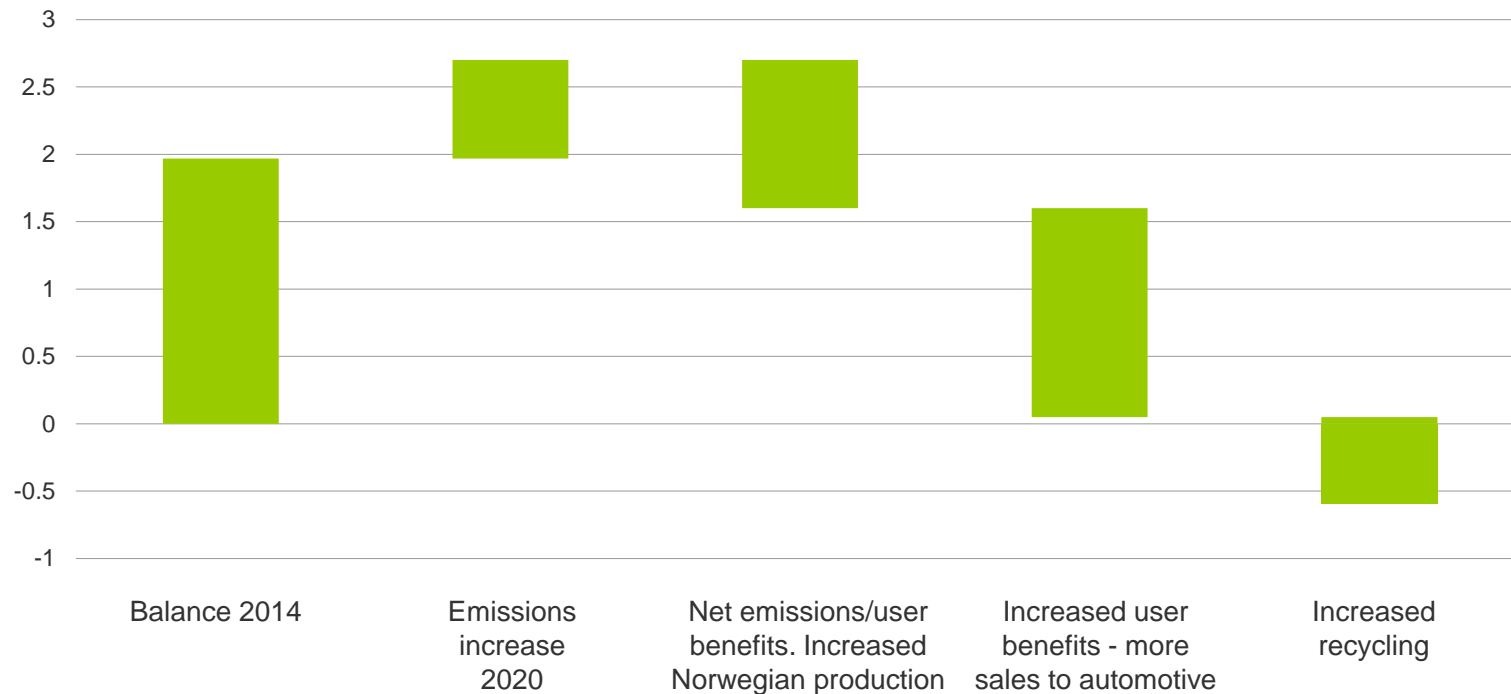
- Increasing energy-efficiency and reducing emissions in production processes in aluminium plants, rolling mills, and alumina refinery
- Increasing production of renewable hydropower, evaluating potential of switching to renewable energy sources or natural gas in production processes
- Developing products 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

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