6. IMPAIRMENT OF ASSETS

A summary of impairment losses recognition and reversals is presented below.

Year ended 31 December 2019

US$ million	Goodwill and intangible assets	Property, plant and equipment	Taxes receivable	Total
EVRAZ Inc. NA Canada	$ (300)	$ (1)	$ –	$ (301)
Raspadskaya		(92)	–	(92)
EVRAZ Consolidated West-Siberian Metallurgical Plant	–	(18)	–	(18)
Yuzhkuzbassugol	–	(15)	–	(15)
EVRAZ Nizhny Tagil Metallurgical Plant	–	(11)	–	(11)
EVRAZ Inc. NA	–	(8)	–	(8)
Others, net	–	3	–	3
	$ (300)	$ (142)	$ –	$ (442)
Recognised in profit or loss	(300)	(142)	–	(442)

Year ended 31 December 2018

US$ million	Goodwill and intangible assets	Property, plant and equipment	Taxes receivable	Total
EVRAZ Stratcor Inc.	$ –	$ (12)	$ –	$ (12)
Yuzhkuzbassugol	–	(6)	–	(6)
Evrazruda	–	(4)	–	(4)
Others, net	–	(8)	–	(8)
	$ –	$ (30)	$ –	$ (30)
Recognised in profit or loss	–	(30)	–	(30)

Year ended 31 December 2017

US$ million	Goodwill and intangible assets	Property, plant and equipment	Taxes receivable	Total
EVRAZ Inc. NA	$ (13)	$ 6	$ –	$ (7)
EVRAZ Inc. NA Canada	–	(12)	–	(12)
Raspadskaya	–	9	–	9
EVRAZ Palini e Bertoli	–	20	–	20
Yuzhkuzbassugol	–	(9)	–	(9)
Evrazruda	–	8	–	8
Others, net	–	(2)	5	3
	$ (13)	$ 20	$ 5	$ 12
Recognised in profit or loss	(13)	20	5	12

In 2017-2019, the Group recognised impairment losses as a result of impairment testing at the level of cash-generating units.

In addition, the Group made a write-off of certain functionally obsolete items of property, plant and equipment and recorded an impairment relating to VAT with a long-term recovery. In 2019, the Group decided to postpone reopening of a coal mine MUK-96, a subsidiary of Raspadskaya. In connection with this decision the recoverable amount of mining assets relating to this mine ($84 million) was reassessed and fully impaired.

For the purpose of the impairment testing the Group assessed the recoverable amount of each cash-generating unit to which goodwill was allocated or where indicators of impairment were identified. In 2017-2019, the impairment tests were performed as of 30 September, the conclusions were reassessed at 31 December and no further impairment triggers were identified.

The recoverable amounts for all cash-generating units, except for Large diameter pipes in 2019, have been determined based on the calculation of value-in-use. This valuation technique uses cash flow projections based on the actual operating results and business plans approved by management and appropriate discount rates reflecting the time value of money and risks associated with respective cash-generating units. For the periods not covered by management business plans, cash flow projections have been estimated by extrapolating the results of the respective business plans using a zero real growth rate.

In 2019, the recoverable amount of Large diameter pipes has been determined based on the calculation of fair value less costs of disposal as it was deemed to produce a more reliable result. This valuation method was based on unobservable inputs (discounted cash flows), which represent Level 3 of the fair value hierarchy.

6. IMPAIRMENT OF ASSETS (CONTINUED)

The key assumptions used by management in the impairment tests with respect to the cash-generating units to which the goodwill was allocated or units containing intangible assets with indefinite useful lives are presented in the table below.

	Commodity	Period of forecast, years		Pre-tax discount rate, %		Average price of commodity per tonne in the next reporting year		Recoverable amount of CGU, US$ million		Carrying amount of CGU before impairment, US$ million	
		2019	2018	2019	2018	2019	2018	2019	2018	2019	2018
Steel North America											
Large diameter pipes	steel products	5	5	9.32	9.37	$1,112	$1,129	567	903	867	900
Oil Country Tubular Goods	steel products	5	5	9.65	9.96	$1,127	$1,245	464	441	356	365
Long products	steel products	5	5	9.90	9.26	$720	$745	623	582	528	501
EVRAZ Vanady-Tula	vanadium products	5	5	12.55	12.74	$21,452	$46,494	712	1,140	55	57
EVRAZ Nikom, a.s.	ferrovanadium products	5	5	10.48	10.45	$21,371	$48,991	56	40	35	36

In addition, the Group determined that there were indicators of impairment in other cash generating units, which do not contain goodwill or intangible assets with indefinite useful lives, and tested them for impairment using the following assumptions.

	Period of forecast, years	Pre-tax discount rate, %	Commodity	Average price of commodity per tonne in the next reporting year
Steel North America				
Flat-rolled products	5	9.37	steel products	$ 607
Seamless pipes	5	9.82	steel products	$ 1,224

The impairment test models take into account the impact of Section 232 tariffs imposed on imports to the US and anti-dumping duties imposed by the US against Canada on large-diameter pipes (Note 30). The effect of the anti-dumping duties is expected to last until 2024 when it will be subject to a five-year (sunset) review by the US Department of Commerce. The Section 232 tariffs are expected to last until 2023.

As a result of impairment testing, in 2019, the Group recognised a $300 million impairment loss with respect to goodwill allocated to the Large diameter pipes cash-generating unit. The impairment was caused by the use of a more conservative valuation model due to the increased current market volatility.

The estimations of recoverable amounts are most sensitive to the following assumptions:

Discount Rates

Discount rates reflect the current market assessment of the risks specific to each cash-generating unit. The discount rates have been determined using the Capital Asset Pricing Model and analysis of industry peers. Reasonably possible changes in discount rates could lead to an additional impairment at Large diameter pipes. If discount rates were 10% higher, this would lead to an additional impairment of $88 million.

Sales and Purchases Prices

The price assumptions for the products sold and purchased by the Group were estimated based on industry research using analysts' views published by Goldman Sachs, J.P. Morgan, Renaissance Capital, UBS, CRU, Sberbank, Morgan Stanley, Bank of America, Citi, Deutsche Bank, HSBC, VTB Capital, KPMG during the period from July to November 2019. The Group expects that the nominal prices will fluctuate with a compound annual growth rate of (7.7)%-4.3% in 2020 – 2024 and 2% in 2025 and thereafter. Reasonably possible changes in sales and purchases prices could lead to an additional impairment at Large diameter pipes. If the prices assumed for 2020 and 2021 in the impairment test were 10% lower, this would lead to an additional impairment of $50 million.

Sales Volumes

Management assumed that the sales volumes of steel products in 2020 will change by (4)-21% and future dynamics will be driven by a gradual market recovery and removal of anti-dumping duties allowing the Group to utilise assets' capacities to a greater extent. Reasonably possible changes in sales volumes could lead to an additional impairment at Large diameter pipes. If the sales volumes were 10% lower than those assumed for 2020 and 2021 in the impairment test, this would lead to an additional impairment of $22 million.

6. IMPAIRMENT OF ASSETS (CONTINUED)

Cost Control Measures

The recoverable amounts of cash-generating units are based on the business plans approved by management. A reasonably possible deviation in cost from these plans could lead to an additional impairment at Large diameter pipes. If the actual costs were 10% higher than those assumed for 2020 and 2021 in the impairment test, this would lead to an additional impairment of $127 million.

Sensitivity Analysis

There were no cash-generating units, which were not impaired in the reporting period and for which the reasonably possible changes could lead to impairment. Consequently, information on changes in the assumptions used to measure the recoverable amounts that could lead that the recoverable amounts would become equal to their carrying amounts is not disclosed.

7. INCOME AND EXPENSES

Cost of revenues, selling and distribution costs, general and administrative expenses include the following for the years ended 31 December:

US$ million	2019	2018	2017
Cost of inventories recognised as expense	**$ (4,595)**	$ (4,580)	$ (4,181)
Staff costs, including social security taxes	**(1,464)**	(1,326)	(1,364)
Depreciation, depletion and amortisation	**(578)**	(542)	(561)

In 2019, 2018 and 2017, the Group recognised expense on allowance for net realisable value in the amount of $(4) million, $Nil and $(4) million, respectively.

Staff costs include the following:

US$ million	2019	2018	2017
Wages and salaries	**$ 1,047**	$ 968	$ 1,000
Social security costs	**274**	245	246
Net benefit expense	**42**	38	42
Share-based awards	**13**	15	17
Other compensations	**88**	60	59
	$ 1,464	$ 1,326	$ 1,364