

ADVA Optical Networking SE

Germany / Technology
 Frankfurt
 Bloomberg: ADV GR
 ISIN: DE0005103006

Q2 2020 results

RATING
PRICE TARGET
 Return Potential
 Risk Rating

ADD
€ 8.00
 13.2%
 High

SARS-COV-2 RISK REMAINS, BUT Q2 RESULTS ENCOURAGINGLY STRONG

Q2 results were above expectations: Revenues rose 8.9% y-o-y to €145m (consensus: €141.0m; Q2/19: €133.2m) and were also up 9.3% on the Q1/20 figure of €132.7m. Proforma EBIT came in at €10.1m (consensus €2.9m; Q2/19: €4.3m) and was back in the black after a loss of €17m in Q1/20. Reduced manufacturing capacity at Chinese manufacturing hubs meant that €10m of revenues bookings which would normally have been made in Q1/20 were delayed. Supply to ADVA from China was restored and this €10m of revenue was booked in Q2/20. However, interruptions elsewhere in the company's supply chain delayed the booking of a further €15m in revenues in Q2/20. Underlying revenue growth between Q1/20 and Q2/20 was therefore 5.1% (€132.7m + €10.0m) / (€145.0m - €10.0m + €15.0m). ADVA's communication service provider (CSP) and internet content provider (ICP) clients, who between them account for around 75% of group revenues, were the main drivers of growth. Increasing order activity from these customer groups was prompted by rising demand for bandwidth due to the growing importance of remote working, media streaming and online gaming during the pandemic. The end-June order backlog was up y-o-y and management expect a further rise in sales in the current quarter. While the short-term outlook is good, uncertainty as to the future development of the SARS-CoV-2 crisis has caused ADVA to refrain from giving full year guidance. Our view is that SARS-CoV-2 will continue to accelerate demand for bandwidth. We expect growing spending from CSP and ICP customers to cushion softening investment from private enterprises (which account for ca. 25% of group revenues). We have revised up our forecasts on the strength of better than expected Q2/20 numbers and the prospect of further sequential revenue growth in Q3/20. Our new price target is €8.00 (previously: €7.10). We maintain our Add recommendation.

Q2/20 proforma gross margin above Q1/20 level Q2/20 proforma gross profit was €50.2m (Q2/20: €46.5m) equivalent to a margin of 34.6% (Q2/19: 34.9%). (p.t.o.)

FINANCIAL HISTORY & PROJECTIONS

	2017	2018	2019	2020E	2021E	2022E
Revenue (€m)	514.47	501.98	556.82	581.71	612.02	703.82
Y-o-y growth	-9.2%	-2.4%	10.9%	4.5%	5.2%	15.0%
EBIT (€m)	4.40	14.99	12.00	20.62	19.33	32.78
EBIT margin	0.9%	3.0%	2.2%	3.5%	3.2%	4.7%
Net income (€m)	-4.23	9.68	7.05	14.44	12.61	23.02
EPS (diluted) (€)	-0.09	0.19	0.14	0.28	0.25	0.45
DPS (€)	0.00	0.00	0.00	0.00	0.00	0.00
FCF (€m)	-27.44	12.09	6.42	13.46	11.62	-6.27
Net gearing	19.4%	13.2%	26.9%	20.6%	15.6%	16.7%
Liquid assets (€m)	58.38	62.65	54.26	58.17	55.08	56.31

RISKS

Risks include but are not limited to: the impact of the covid-19-induced recession on customer investment behaviour, currency risk (particularly USD appreciation/GBP depreciation), the US-China trade conflict.

COMPANY PROFILE

ADVA develops, manufactures, and sells optical networking solutions to deliver data, storage, voice, and video services. To date, the company's networking solutions have been deployed in more than 10,000 enterprises and more than 300 carrier networks around the world. Founded in 1994 and headquartered in Munich, Germany, ADVA had 1,892 employees at the end of March 2020.

MARKET DATA

As of 24 Jul 2020

Closing Price	€ 7.07
Shares outstanding	50.18m
Market Capitalisation	€ 354.79m
52-week Range	€ 4.04 / 8.44
Avg. Volume (12 Months)	159,301

Multiples	2019	2020E	2021E
P/E	49.6	24.9	28.5
EV/Sales	0.7	0.7	0.7
EV/EBIT	34.0	19.8	21.1
Div. Yield	0.0%	0.0%	0.0%

STOCK OVERVIEW



COMPANY DATA

As of 30 Jun 2020

Liquid Assets	€ 67.59m
Current Assets	€ 264.54m
Intangible Assets	€ 18.36m
Total Assets	€ 527.99m
Current Liabilities	€ 156.54m
Shareholders' Equity	€ 253.22m

SHAREHOLDERS

Teleios Capital Partners GmbH	20.0%
EGORA Group	15.0%
Dimensional Fund Advisors LP	3.1%
DNB SA	3.0%
Free float and other	58.9%



Figure 1: Q3/20E forecast and Q2/20 results vs. our estimates

€m	Q3/20E	Q3/19A	Δ%	Q2/20A	Q2/20 FBe	Δ%	Q1/20A	Q2/20A vs. Q1/20A Δ	Q2/19A	Q2/20A vs. Q2/19A Δ
Revenue	152.0	144.3	5.3%	145.0	141.0	2.8%	132.7	9.3%	133.2	8.9%
Proforma gross profit	50.2	49.1	2.2%	50.2	46.2	8.8%	42.3	18.7%	46.5	8.0%
% revenue	33.0%	34.0%	-	34.6%	32.7%	-	31.9%	-	34.9%	-
Proforma sales & marketing costs	14.9	15.4	-3.5%	14.1	16.6	-15.1%	16.6	-15.1%	17.4	-19.0%
% revenue	9.8%	10.7%	-	9.7%	11.8%	-	12.5%	-	13.1%	-
Proforma general & admin. costs	8.5	8.5	0.1%	8.4	8.5	-1.2%	8.5	-1.2%	8.7	-3.4%
% revenue	5.6%	5.9%	-	5.8%	6.0%	-	6.4%	-	6.5%	-
Proforma net R&D costs	17.9	18.2	-1.5%	18.0	18.5	-2.7%	18.9	-4.8%	17.9	0.6%
% revenue	11.8%	12.6%	-	12.4%	13.1%	-	14.2%	-	13.4%	-
Other operating result	1.5	0.5	216.7%	0.4	1.4	-71.4%	0.0	n.a.	1.8	-77.8%
Total operating costs	39.8	41.7	-4.4%	40.1	42.2	-5.0%	44.0	-8.9%	42.2	-5.0%
Proforma EBIT	10.3	7.4	39.2%	10.1	4.0	152.5%	-1.7	n.a.	4.3	134.9%
margin (%)	6.8%	5.1%	-	7.0%	2.8%	-	-1.3%	-	3.2%	-

Source: ADVA Optical Networking SE; First Berlin Equity Research estimates

The proforma gross margin narrowed vs. Q2/19 due to a shift in the customer mix from private enterprises to CSPs and ICPs. ADVA stated that the normalised Q2/20 gross margin (i.e. excluding the €10m in revenue held over from Q1/20 but including the €15m in revenue bookings delayed until Q3/20) would have been 33.9%. This further margin reduction reflects the ongoing adverse shift in customer mix. Despite the adverse sequential shift in the product mix, the Q2/20 proforma gross margin was above the Q1/20 level of 31.9%. This was due to operational gearing (Q2/20 sales were 9.3% above the Q1/20 level) and also a reduction in product shipping costs which spiked in the first few weeks of the pandemic. All other operating cost items were lower as a percentage of sales in Q2/20 vs. Q2/19. Proforma sales and marketing costs fell by over €3m largely because of a pandemic-related reduction in travel costs. Proforma G&A costs fell in absolute terms due to cost-cutting measures implemented last year in response to US-China trade tensions. Proforma net R&D was almost unchanged at €18.0m (Q2/19: €17.9m). In consequence proforma EBIT climbed 133% y-o-y to €10.1m (Q2/19: €4.3m).

Net gearing including leasing/pension liabilities 19.3% at end Q2/20 (end Q2/19: 30.0%)

Operating cashflow before changes in working capital climbed 40.8% to €23.8m (Q2/19: €16.9m) due largely to improved profitability. Working capital yielded €14.3m (Q2/19: €6.1m) as trade payables rose €12.1m (Q2/19: €8.4m). Operating cashflow rose 71.8% to €37.8m (Q2/19: €22.0m). Cashflow from investing was stable at €-14.4m (Q2/19: €-15.1m) and so free cashflow climbed 236% to €23.4m (Q2/19: €6.9m) Net debt including leasing and pension liabilities fell €22.8m during Q2/20 to €530m (equivalent to net gearing of 19.3%). During the prior year quarter the same figure fell €5.3m to €74.3m (equivalent to net gearing of 30.0%). Due to ongoing SARS-CoV-2-related risk, both in connection with demand the supply chain, ADVA has concluded a KfW back-up facility of €40m.

We expect the need to maintain service quality to prompt further overall increases in investment from CSP and ICP customers

ADVA gave 2020 revenue guidance of more than €580m in its FY2019 results report released on 20 February. Proforma EBIT guidance was for a margin above 5%. This guidance was based on recovery in Chinese manufacturing capacity in Q2/20 and the containment of SARS-CoV-2 largely within China. While the first assumption has proved to be valid, the second was too optimistic. Indeed, daily new infection numbers are still at peak levels in Brazil, India and the US. In the light of SARS-CoV-2-induced decreases in output and demand outside China, and uncertainty as to how long the pandemic will last, management has refrained from giving any new guidance since February. Although the duration of the pandemic is uncertain, trends are discernible in the Q1 and Q2 results which are likely to shape the next few quarters. First, it is likely that CSP and ICP revenues will continue to outpace private enterprise revenues.



Business from the first two customer groups has been resilient since the onset of the crisis because for these customers the network is the product and network utilisation has been rising. But for private enterprises the network is not the product but only part of IT infrastructure. For this customer group, IT investments are subject to review and delay during recessions. Many CSPs and ICPs have invested more than originally budgeted during H1/20 in order to accommodate higher than expected demand for bandwidth. There is some debate in the industry as to whether they will continue to do this. Our view is that the need to maintain service quality will prompt a further overall increase in investment from ADVA's CSP and ICP customers. With CSP and ICP revenues likely to continue to outpace revenues from private enterprise customers over the next few quarters, the proforma gross margin will remain under pressure. However, it is possible that this will be mitigated in part by euro appreciation against the US dollar. The EURUSD pair traded between 1.10 and 1.12 for most of H1/20 but is currently at 1.16. Europe's superior performance in reducing the number of new SARS-CoV-2 infections is likely to be a contributory factor here. A weakening US dollar will benefit the gross margin as ca. 75% of cost of goods sold and 50% of revenues are denominated in the US currency.

Price target revised up to €8.00 from €7.10. Add recommendation maintained Figure 2 shows changes to our forecasts. Q2/20 results were stronger than expected and management has stated that Q3 will likely see further growth. As figure 1 shows, we expect Q3/20 revenue and proforma EBIT of €152.0m and €10.3m respectively. On this basis we have revised up our FY2020 sales forecast by 2.7% to €582m. While the proforma gross margin is trending downwards, the Q2/20 figure of 34.6% and likely support from the weaker US dollar in the second half suggest that a FY2020 figure of 33.0% is realistic. €10.1m of the €18.7m upward revision in our proforma EBIT margin forecast is attributable to our higher proforma gross margin forecast. Two thirds of the remaining €8.6m is due to a reduction in our sales & marketing costs forecast. We expect this number to remain below normal for as long as the pandemic constrains travel. We have left both our 2021 and 2022 revenue forecasts unchanged. With regard to 2021, we have shaved our proforma gross margin forecast from 33.5% to 33.0%, but our expectation that operating costs are likely to remain lower for longer causes us to revise up our proforma EBIT margin forecast from 3.3% to 4.2%. In our 2022 forecasts we continue to assume a post-SARS-CoV-2 recovery in revenue growth and profitability to normal levels. The upward revision to our forecasts causes us to revise up our price target to €8.00 (previously: €7.10). We maintain our Add recommendation.

Figure 2: Changes to our forecasts

€000's	2020E			2021E			2022E		
	New	Old	Δ%	New	Old	Δ%	New	Old	Δ%
Sales	581,710	566,686	2.7%	612,021	612,021	0.0%	703,824	703,824	0.0%
Proforma gross profit	192,039	181,865	5.6%	201,967	205,027	-1.5%	249,858	249,858	0.0%
margin (%)	33.0%	32.1%		33.0%	33.5%		35.5%	35.5%	
Proforma EBIT	27,588	8,873	210.9%	25,705	20,197	27.3%	40,118	40,118	0.0%
margin (%)	4.7%	1.6%		4.2%	3.3%		5.7%	5.7%	
Reported EBIT	20,621	464	4344.2%	19,327	11,881	62.7%	32,784	30,555	7.3%
margin (%)	3.5%	0.1%		3.2%	1.9%		4.7%	4.3%	
Net profit	14,442	-1,111	n.a.	12,613	6,855	84.0%	23,022	20,851	10.4%
margin (%)	2.5%	-0.2%		2.1%	1.1%		3.3%	3.0%	
EPS (€)	0.28	-0.02	n.a.	0.25	0.13	90.6%	0.45	0.41	10.3%

Source: First Berlin Equity Research estimates



VALUATION MODEL

DCF valuation model								
All figures in EUR '000	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E
Net sales	581,710	612,021	703,824	788,283	852,990	922,585	1,000,135	1,085,784
NOPLAT	17,623	15,607	25,866	44,815	61,415	66,426	72,010	74,007
+ depreciation & amortisation	-54,789	-56,516	-63,344	-64,795	-69,945	-75,652	-82,011	-89,034
Net operating cash flow	72,412	72,122	89,210	109,610	131,360	142,078	154,021	163,041
- total investments (CAPEX and WC)	-64,041	-66,214	-102,641	-87,288	-104,395	-108,564	-118,164	-137,258
Capital expenditures	-60,377	-64,443	-76,641	-83,865	-89,105	-96,284	-104,431	-113,388
Working capital	-3,664	-1,771	-26,000	-3,423	-15,290	-12,280	-13,734	-23,870
Free cash flows (FCF)	8,371	5,908	-13,431	22,322	26,966	33,514	35,857	25,783
PV of FCF's	8,035	5,155	-10,655	16,099	17,680	19,976	19,430	12,701

All figures in thousands	
PV of FCFs in explicit period (2020E-2035E)	206,309
PV of FCFs in terminal period	227,964
Enterprise value (EV)	434,273
+ Net cash / - net debt	-52,989
+ PV cash proceeds of future option exercise	62,330
Shareholder value	443,614
Current shares outstanding	50,182
+ PV no shares issued against future option exercise	5,119
Proforma no shares	55,301
Fair value per share in EUR	8.02

WACC		Terminal growth rate						
		1.5%	2.0%	2.5%	3.0%	3.5%	4.0%	4.5%
6.00%	17.18	18.49	20.17	22.41	25.55	30.27	38.12	
7.00%	13.30	14.02	14.90	16.00	17.41	19.29	21.93	
8.00%	10.68	11.11	11.61	12.22	12.96	13.88	15.07	
9.00%	8.82	9.08	9.39	9.75	10.17	10.68	11.30	
10.00%	7.43	7.60	7.80	8.02	8.28	8.58	8.94	
11.00%	6.37	6.48	6.61	6.76	6.92	7.11	7.33	
12.00%	5.53	5.61	5.70	5.79	5.90	6.02	6.16	
13.00%	4.86	4.91	4.97	5.04	5.11	5.20	5.29	

* for layout purposes the model shows numbers only to 2027, but runs until 2035



INCOME STATEMENT

All figures in EUR '000	2017A	2018A	2019A	2020E	2021E	2022E
Revenues	514,471	501,981	556,821	581,710	612,021	703,824
Cost of goods sold	-348,251	-320,253	-365,908	-392,916	-413,253	-457,645
Gross profit	166,220	181,728	190,913	188,794	198,768	246,179
Sales and marketing expenses	-62,889	-63,569	-72,828	-63,624	-69,630	-91,335
General and administrative expenses	-36,260	-35,024	-35,126	-34,265	-37,024	-44,689
Research and development expenses	-69,037	-76,588	-75,186	-73,738	-78,907	-84,409
Net other operating income	6,369	8,442	4,230	3,454	6,120	7,038
Operating income (EBIT)	4,403	14,989	12,003	20,621	19,327	32,784
Net interest income/(expense)	-785	-1,408	-2,304	-2,217	-2,016	-1,521
Other financial gains and losses, net	-3,809	-1,096	-770	0	0	0
Pre-tax income (EBT)	-191	12,485	8,929	18,404	17,311	31,263
Income taxes	-4,037	-2,807	-1,884	-3,962	-4,698	-8,242
Minority interests	0	0	0	0	0	1
Net income / loss	-4,228	9,678	7,045	14,442	12,613	23,022
Diluted EPS (in €)	-0.09	0.19	0.14	0.28	0.25	0.45
EBITDA	51,267	64,356	73,656	82,274	83,064	104,432
Ratios						
Gross margin	32.3%	36.2%	34.3%	32.5%	32.5%	35.0%
EBITDA margin on revenues	10.0%	12.8%	13.2%	14.1%	13.6%	14.8%
EBIT margin on revenues	0.9%	3.0%	2.2%	3.5%	3.2%	4.7%
Net margin on revenues	-0.8%	1.9%	1.3%	2.5%	2.1%	3.3%
Tax rate	2113.6%	-22.5%	-21.1%	-21.5%	-27.1%	-26.4%
Expenses as % of revenues						
Sales and marketing expenses	12.2%	12.7%	13.1%	10.9%	11.4%	13.0%
General and administrative expenses	7.0%	7.0%	6.3%	5.9%	6.0%	6.3%
Research and development expenses	13.4%	15.3%	13.5%	12.7%	12.9%	12.0%
Y-Y Growth						
Revenues	-9.2%	-2.4%	334.5%	5.3%	5.2%	15.0%
Operating income	-77.3%	240.4%	1282.8%	91.1%	-6.3%	69.6%
Net income/ loss	n.m.	n.m.	580.0%	98.6%	-12.7%	82.5%



BALANCE SHEET

All figures in EUR '000	2017A	2018A	2019A	2020E	2021E	2022E
Assets						
Current assets, total	232,639	257,216	269,240	283,611	289,208	325,551
Cash and cash equivalents	58,376	62,652	54,263	58,171	55,082	56,306
Receivables	81,327	97,936	96,193	101,245	106,520	122,498
Contract assets	0	320	654	291	306	352
Inventories	81,694	85,734	105,355	110,525	113,224	130,207
Tax assets	1,438	1,675	1,857	1,745	1,836	2,111
Other current assets	9,804	8,899	10,918	11,634	12,240	14,076
Non-current assets, total	231,249	229,322	267,122	266,250	267,486	274,082
Right of use assets	0	0	31,985	25,122	17,900	9,596
Property, plant & equipment	26,898	29,052	32,622	34,335	36,124	41,543
Goodwill	68,036	70,400	72,023	72,863	73,703	74,543
Capitalised development projects	85,175	87,926	96,169	106,293	117,921	130,590
Intangible assets from acquisitions	30,505	26,012	20,864	16,045	11,149	5,518
Other intangible assets	6,280	5,512	3,704	1,434	0	0
Deferred tax assets	10,614	7,315	6,336	6,669	7,016	8,069
Other non-current assets	3,741	3,105	3,419	3,490	3,672	4,223
Total assets	463,888	486,538	536,362	549,861	556,694	599,633
Shareholders' equity & debt						
Current liabilities, total	188,985	145,576	159,140	171,727	180,601	197,868
Lease liabilities	0	0	6,082	4,142	2,876	2,632
Financial liabilities	79,061	19,400	19,221	23,268	24,481	29,561
Accounts payable	39,193	63,195	73,398	77,252	81,278	81,644
Advance payments received	93	0	0	0	0	0
Current provisions	21,994	15,005	14,379	16,542	18,812	22,904
Tax liabilities	6,446	5,067	1,686	1,775	1,867	2,147
Contract liabilities	0	14,061	12,448	15,008	15,790	18,159
Other current liabilities	42,198	28,848	31,926	33,739	35,497	40,822
Long-term liabilities, total	47,882	96,321	121,430	109,468	96,027	102,355
Lease liabilities	0	0	28,348	19,305	13,406	12,268
Financial liabilities	17,500	70,084	61,758	58,171	48,962	51,379
Provisions for pensions	5,822	5,531	7,756	8,726	9,180	10,557
Other provisions	1,478	1,453	1,380	1,452	1,528	1,757
Deferred tax liabilities	12,502	10,828	12,307	13,379	14,076	16,188
Other non-current liabilities	10,580	8,425	9,881	8,435	8,874	10,205
Shareholders' equity	227,021	244,641	255,792	268,666	280,066	299,411
Total consolidated equity and debt	463,888	486,538	536,362	549,861	556,694	599,633
Ratios						
Net debt	44,007	32,363	68,902	55,441	43,824	50,091
Net gearing	19.4%	13.2%	26.9%	20.6%	15.6%	16.7%
Book value per share (in €)	4.56	4.90	5.10	5.36	5.58	5.97
Return on equity (ROE)	-1.8%	4.1%	2.9%	5.5%	4.6%	7.9%



CASH FLOW STATEMENT

All figures in EUR '000	2017A	2018A	2019A	2020E	2021E	2022E
Income before tax	-191	12,485	8,929	18,404	17,311	31,263
Depreciation and amortisation	46,864	49,367	62,191	61,653	63,737	71,648
Changes in working capital	-16,551	-2,207	-3,516	-3,664	-1,771	-26,000
Income tax paid	-1,666	-2,351	-1,684	-3,962	-4,698	-8,242
Other adjustments	-1,322	3,066	971	1,408	1,481	1,704
Operating cash flow	27,134	60,360	66,891	73,839	76,060	70,374
Investments in PP&E	-10,559	-14,029	-16,888	-15,674	-16,478	-22,310
Investments in intangibles	-44,014	-34,239	-43,584	-44,703	-47,966	-54,331
Free cash flow	-27,439	12,092	6,419	13,461	11,617	-6,267
Acquisitions & disposals, net	-36,213	0	0	0	0	0
Other	248	207	169	0	0	0
Investment cash flow	-90,538	-48,061	-60,303	-60,377	-64,443	-76,641
Debt financing, net	37,184	-7,083	-8,500	1,430	-7,542	8,874
Lease liabilities	0	0	-4,488	-10,983	-7,164	-1,383
Equity financing, exercise of stock options	1,029	810	1,257	0	0	0
Dividends paid	0	0	0	0	0	0
Other	-1,291	-1,953	-2,801	0	0	0
Financing cash flow	36,922	-8,226	-14,532	-9,553	-14,706	7,491
FOREX & other effects	-13	203	-445	0	0	0
Net cash flows	-26,495	4,276	-8,389	3,908	-3,089	1,224
Cash, start of the year	84,871	58,376	62,652	54,263	58,171	55,082
Cash, end of the year	58,376	62,652	54,263	58,171	55,082	56,306
EBITDA/share (in €)	1.02	1.28	1.43	1.62	1.63	2.05
Y-Y Growth						
Operating cash flow	-55.8%	122.5%	10.8%	10.4%	3.0%	-7.5%
Free cash flow	n.m.	n.m.	-46.9%	109.7%	-13.7%	n.m.
EBITDA/share	-13.2%	25.4%	11.6%	13.0%	1.0%	25.7%

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The recommendations determined in accordance with the share price trend anticipated by First Berlin in the respectively indicated investment period are as follows:

Category		1	2
Current market capitalisation (in €)		0 - 2 billion	> 2 billion
Strong Buy ¹	An expected favourable price trend of:	> 50%	> 30%
Buy	An expected favourable price trend of:	> 25%	> 15%
Add	An expected favourable price trend of:	0% to 25%	0% to 15%
Reduce	An expected negative price trend of:	0% to -15%	0% to -10%
Sell	An expected negative price trend of:	< -15%	< -10%

¹ The expected price trend is in combination with sizable confidence in the quality and forecast security of management.

Our recommendation system places each company into one of two market capitalisation categories. Category 1 companies have a market capitalisation of €0 – €2 billion, and Category 2 companies have a market capitalisation of > €2 billion. The expected return thresholds underlying our recommendation system are lower for Category 2 companies than for Category 1 companies. This reflects the generally lower level of risk associated with higher market capitalisation companies.

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Report No.:	Date of publication	Previous day closing price	Recommendation	Price target
Initial Report	17 September 2019	€6.53	Buy	€8.50
2	5 November 2019	€7.01	Add	€8.60
3	24 February 2020	€7.06	Add	€8.00
4	28 April 2020	€5.79	Add	€7.10
10	Today	€7.07	Add	€8.00

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Legally required information regarding

- key sources of information in the preparation of this research report
- valuation methods and principles
- sensitivity of valuation parameters

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