4basebio AG

Germany / Biotech
Xetra
Bloomberg: 4BSB GR
ISIN: DE000A2YN801

Company update

RATING	**BUY**
PRICE TARGET	**€ 3.30**
Return Potential	69.7%
Risk Rating	High

AIMING TO DISRUPT THE DNA MANUFACTURING MARKET

On 2 January 2020, 4basebio (previously called Expedeon) sold its immunology and proteomics business to its distribution partner Abcam plc for €120m (€106m due at closing and the remaining €14m to be held in escrow for two years). Considering that 4basebio previously paid about €40m to acquire these assets, management achieved an excellent ROI of 200% with the deal. 4basebio retained the genomics business including its core patent-protected TruePrime technology, which will be the base to build up a DNA manufacturing facility. Due to the recent success of new gene therapeutic drugs (e.g. Luxturna, Kymriah Yescarta or Zolgensma), demand for DNA manufacturing capacity is on the rise. The existing production process based on bacteria fermentation in a bioreactor has significant shortcomings (e.g. inefficient, expensive, high contamination risk) and is working at its technological limits. 4basebio's novel TruePrime technology allows for a fast, highly accurate, cost-efficient and reliable synthetic process of copying DNA (amplification) which has the potential to disrupt DNA manufacturing. The company has a very comfortable financial position which allows it to buy the required expertise for engineering and scaling-up production, as well as building up the needed infrastructure. 4basebio is on track to become one of the few companies worldwide capable of offering synthetically produced DNA. Following the Abcam deal and the change in business model, we have updated our DCF model and arrive at a price target of €3.30 (previously: €2.20). We reiterate our Buy rating.

4basebio retained the valuable genomics assets following the disposal of the immunology and proteomics business to Abcam The disposed business chiefly comprised the three subsidiaries Expedeon Holding (proteomics products), Innova Biosciences ("Lightning-Link" labelling technology) and TGR Biosciences ("CaptSure" antibody immobilization technology). p.t.o.

FINANCIAL HISTORY & PROJECTIONS

	2018	2019	2020E	2021E	2022E	2023E
Revenue (€ m)	1.17	1.05	0.90	1.00	2.10	5.21
Y-o-y growth	199.5%	-10.4%	-14.4%	11.1%	21.0%	20.0%
EBIT (€ m)	-3.08	-3.80	-3.60	-4.80	-4.36	-2.11
EBIT margin	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Net income (€ m)	-2.83	-3.79	-4.20	-5.08	-4.43	-2.17
EPS (diluted) (€)	-0.01	-0.04	1.23	-0.10	-0.09	-0.04
DPS (€)	0.00	0.00	0.00	0.00	0.00	0.00
FCF (€m)	-0.77	0.62	-10.21	-13.15	-5.26	-3.26
Net gearing	9.5%	3.8%	-79.8%	-70.3%	-83.7%	-82.1%
Liquid assets (€ m)	6.24	0.99	81.88	68.48	77.42	73.96

RISKS

Risks include but are not limited to intellectual property and patent challenges, establishing and up-scaling the manufacturing process, competition and retaining management.

COMPANY PROFILE

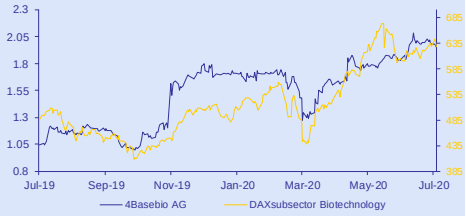
4basebio is a life science specialist aiming to become a leading manufacturer of DNA. The company's patent-protected "TruePrime" technology offers superior features for highly efficient copying DNA (amplification procedure) compared to bacteria-based fermentation solutions existing in the market. 4basebio has R&D and enzyme production facilities in Spain, as well as subsidiaries in the UK and Germany.

MARKET DATA

As of 14 Jul 2020	
Closing Price	€ 1.95
Shares outstanding	48.53m
Market Capitalisation	€ 94.38m
52-week Range	€ 0.99 / 2.08
Avg. Volume (12 Months)	99,784

Multiples	2019	2020E	2021E
P/E	n.a.	1.6	n.a.
EV/Sales	8.9	10.4	9.4
EV/EBIT	n.a.	n.a.	n.a.
Div. Yield	0.0%	0.0%	0.0%

STOCK OVERVIEW



COMPANY DATA

As of 31 Mar 2020	
Liquid Assets	€ 86.91m
Current Assets	€ 88.52m
Intangible Assets	€ 2.07m
Total Assets	€ 106.59m
Current Liabilities	€ 1.43m
Shareholders' Equity	€ 103.70m

SHAREHOLDERS

Deutsche Balaton	21.3%
Fernandez Trust	5.5%
Dr. Lanckriet	3.5%
Franciscus De Busschere	3.8%
Freefloat & others	65.9%

Analyst: Christian Orquera, Tel. +49 (0)30 - 80 93 96 93

The disposed subsidiaries carried out development, manufacturing and sale of reagents and tools (kits) for use in research laboratories of biopharmaceutical, diagnostic and academic institutions focusing on immunology and proteomic applications. 4basebio acquired these three companies in 2016-2018 for a total of about €40m. They generated combined sales of €14.1m which equates to ~90% of the 2019 group revenues (€15.7m). Abcam plc, a leading UK based supplier of protein research tools for life science institutions, had been acting as a distribution partner of 4basebio. Due to the good strategic fit, Abcam paid €120m in cash (€105.6m paid on 2 January 2020 following deal closing and the remaining €14.4m to be held in two year escrow) for the three subsidiaries. The price paid by Abcam represents 7.6x group revenues in 2019 and a 200% ROI based on 4basebio's purchase price, which is an excellent deal for 4basebio. Importantly, 4basebio retained the genomics business, which generated sales of €1.1m or ~10% of group revenues in 2019. These sales are still at a low level and chiefly come from the sale of bulk enzymes for diagnostic purposes and laboratory kits for emerging research applications requiring DNA amplification.

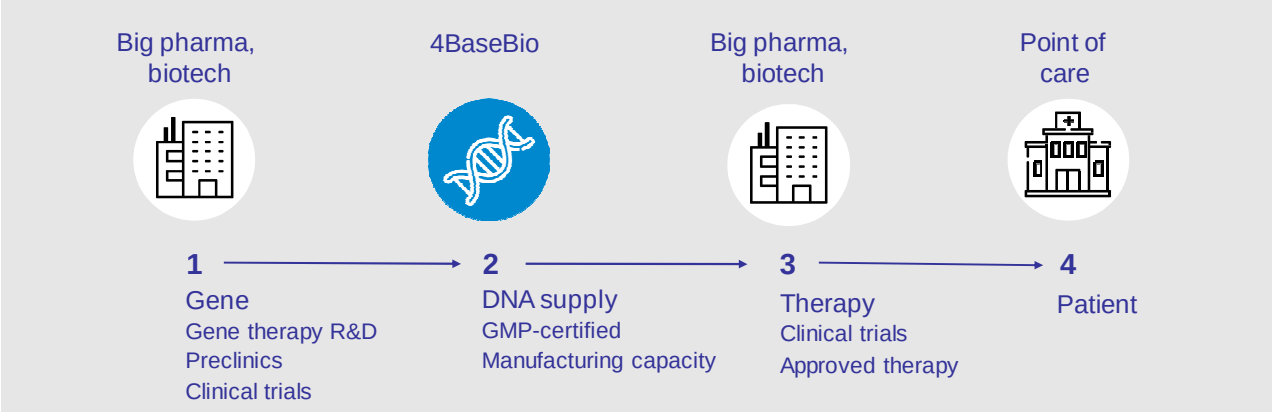
TRANSFORMATION INTO A DNA MANUFACTURER

OVERVIEW OF THE NEW BUSINESS MODEL

4basebio's novel TruePrime technology will be the cornerstone for the new business model Following the deal, the company renamed its organisation formerly run under the Expedeon brand to 4basebio and changed the ticker symbol to 4BSB.

The retained Spanish subsidiary is related to the genomics business and has ownership of the novel patent-protected TruePrime technology which will be the cornerstone of the new group business model. Using TruePrime, the company aims to become a leading manufacturer of GMP-certified (good manufacturing practice) DNA for gene therapy or DNA vaccines.

Figure 1: New business model entails producing DNA for gene therapy applications using a novel approach



Source: First Berlin Equity Research, 4basebio AG

The company already possesses most of the assets and expertise required for its new business model Its core TruePrime technology asset offers a unique DNA-amplification process which can be used for highly efficient DNA production. The company has applied the technology in small-scale DNA manufacturing, but it still needs to be validated and engineered for large-scale. 4basebio will need to buy externally or hire experts with up-scaling and GMP experience. In addition, the company will need to establish a large-scale manufacturing facility with the appropriate equipment. In the context of DNA production, enzymes and nucleotides are the essential raw starting material. Therefore, the firm will need to ramp up in-house production of all necessary enzymes and secure access

to nucleotides for DNA manufacturing. Management intends to either buy nucleotides from a supplier or enter a partnership. Another option would be to acquire a nucleotide-specialist. In gene therapy or vaccines, the vector which delivers the DNA to the cells also plays an essential role in the full product performance. 4basebio may also consider partnering or acquiring a vector specialist to control the entire product manufacturing process. Thanks to the proceeds from the disposal of its remaining business to Abcam, 4basebio has sufficient funds to finance its new strategy. We give an overview of the company's assets and requirements for the new business model in table 1.

Table 1: Overview of the requirements to implement the new business model

Requirements	Status	Comments
1) Technology platform:		
-> Polymerase enzymes	Yes	Patent-protected TruePrime™ enzymes offer superior amplification performance (speed, accuracy, purity) compared to existing methods
2) Manufacturing expertise:		
-> Production and purification	Yes	Established
-> Up-scaling and GMP expertise	No	To be established (use of proceeds)
3) Manufacturing capacity:		
-> Production facilities	No	To be established (use of proceeds)
4) Raw materials:		
-> Oligos, Nucleotides	No	Buy from, partner with or acquire a supplier (use of proceeds)
-> Vector	No	Buy from, partner with or acquire a supplier (use of proceeds)
5) Distribution:		
-> Network and B2B partnering expertise	Yes	Established

Source: First Berlin Equity Research, 4basebio AG

Business model underpinned by an existing international infrastructure The group has an international footprint, with R&D facilities focused on genomics in Spain, as well as branches in Germany, and the UK. 4basebio also owned a US subsidiary which manufactured and sold electrophoresis equipment and products. However, this facility was a poor match with the new business model and was loss-making. Consequently, management shut down operations at the end of June 2020 but kept the company shell. We believe that the new planned facility for large-scale DNA manufacturing will likely be based in either Spain or the UK. The group currently employs a staff of ~25 (down from ~75 pre-disposal).

Figure 2: 4basebio geographic overview

Source: First Berlin Equity Research, 4basebio AG

GENE THERAPY WILL BE THE DRIVING FORCE BEHIND DNA DEMAND

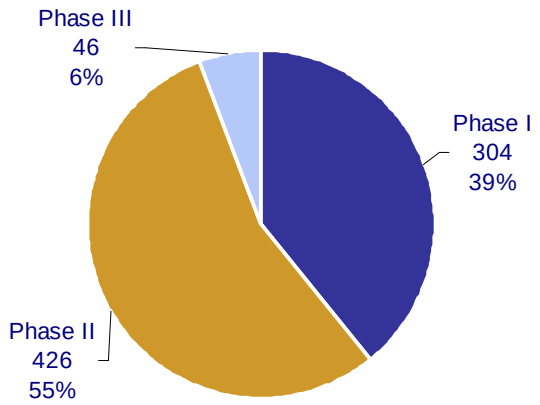
Gene therapy offers the promise of being curative in a single treatment DNA's relevance in clinical research applications primarily comprising gene therapy, genetic vaccination and diagnostics is growing rapidly. The recently approved gene therapies are disrupting treatment of certain diseases as they are achieving curative results in one single step. Gene therapy encompasses the delivery of genetic material (i.e. DNA) to the patient's body through a suitable carrier called vector. A viral vector, which is an engineered virus modified to remove the infecting ability and designed to insert the DNA in the target cells, is by far the most widely used method in therapeutic gene delivery. There are currently two types of gene therapy approaches:

- In-vivo: intravenous administration of a viral vector carrying a gene and delivering DNA directly to the desired cells in the patient.
- Ex-vivo: Works by removing cells from a patient, delivering the genetic material to the cells in the lab using a viral vector, and then re-injecting these modified cells into the patient. Autologous chimeric antigen receptor (CAR) T-cell therapy is an example of this approach. The patient's T-cells (immune cells also known as "killer cells") are modified to recognise specific proteins expressed on the surface of cancer cells and attack them.

Gene therapy field is gaining momentum In the period 1998-2019, 22 gene therapy drugs have been approved worldwide. At the end of 2017, Spark Therapeutics' Luxturna (for an inherited form of vision loss) was the first in-vivo gene therapy approved in the US. The treatment with Luxturna costs USD 850k per patient. Since then, the registration agency FDA approved two CAR T-cell therapies for hematologic cancer conditions, Novartis' Kymriah (priced at USD 475k), and Gilead's Yescarta (priced at USD 373k). In 2019 the FDA also approved Zolgensma (originally developed by AveXis and acquired by Novartis), Novartis' gene therapy for spinal muscular atrophy. The FDA gave the green light for commercialisation at a price of USD 2.1m per patient, which ranks as the most expensive drug worldwide.

Further, three prominent gene therapy drug candidates such as BioMarin's, and Spark's for haemophilia A, and Nightstar's for choroideremia have progressed to late-stage development after showing promising earlier-stage data. According to the research firm Informa (Sep-2019), there are currently 776 gene therapy and gene-modified cell therapy trials in development, thereof 46 in Phase III. The FDA anticipates registration approval to grow from about 6 cell and gene therapy products p.a. in 2020 and 2021 to about 10-20 products p.a. by 2025.

Figure 3: Overview of gene therapy clinical trial pipeline



Source: First Berlin Equity Research, Alliance for Regenerative Medicine

Demand for high-quality DNA for therapeutic use is increasing rapidly Not only the number of gene therapies in development shows a growing trend, but there is also a shift in focus from orphan indications targeting a small population to mass market indications such as cancer, cardiovascular or central nervous system disorders. As a result, interest in the field and the demand for DNA and vector production is on the rise (source: Alliance for regenerative medicine, June 2019).

Gene therapies have unique manufacturing characteristics Therapeutic cells, genes and vaccines are uniquely manufactured products requiring special scale, technical and logistical considerations. The manufacturing steps to make such a drug are so critical, that experts in the industry even affirm that "the process is the product". A gene therapy company will typically initiate drug research using academic protocols where scale and quality still do not play the highest role (the failure risk is still high). It is not until the drug candidate progresses into clinical development and commercialisation, that it becomes relevant to find out if the production process can achieve the required scalability and meet the mandatory manufacturing quality within the required lead-time. Large-scale production needs to meet good manufacturing practices (GMP), which is more demanding than academic protocols. Depending on the characteristics of the drug candidate, up-scaling the process to obtain a product with the required quality and purity may turn out to be very challenging at this stage.

Cell-based fermentation in bioreactors is the state-of-the-art method for large-scale DNA-manufacturing… Biologic production through bacteria fermentation is the widely used method to produce DNA and vectors in biopharmaceutical and biotechnological applications (e.g. gene therapy drugs). The fermentation process usually takes place in a bioreactor using the bacteria *Escherichia coli (E. coli)*. This process finalises with the harvesting, purification, and testing for safety. Manufacturing of gene therapy drugs requires the production of its two relevant components, the DNA and the vector. The final DNA product needs to show a high purity (>95%) and be free of process-related impurities and variants in accordance with GMP.

…but this production method has shortcomings While biologic production is still state-of-the-art, the process is quite old (invented >45 years ago), complex, very expensive and is working at its technological limits. Other shortcomings include lot-to-lot consistency in the fermentation, and large lot-to-lot variability in yield and purity of the resulting product. Plus, many tools and processes used for manufacturing gene therapeutic drugs were taken from academic or monoclonal antibody settings, and they still must be made fit for the new purpose. As a result, up-scaling can turn out to be an enormous and costly challenge for manufacturers.

Manufacturing represents a key concern within the gene therapy space The pioneers in this field currently face enormous challenges in meeting increasing demand and manufacturing these products. Gene transfer into humans requires GMP-grade of both key components, the DNA and the vector. Due to the high complexity of the existing manufacturing process based on fermentation in living organisms (i.e. bacteria), their supply is limited, and production costs are very high. In 2019, the head of the FDA's Center for Biologics Evaluation and Research (gene therapy registration agency in the US) called manufacturing his "top concern for gene therapies moving forward". Players in the field have also called gene therapy manufacturing "a limited resource that everyone is competing for".

Vector production has emerged as the largest challenge Over the last few decades, several types of viral and non-viral vectors have been developed, optimised and standardised for this purpose. The most used viral vectors are based on Adeno-Associated Virus (AAV), adenovirus, lentivirus and retrovirus. Among non-viral vectors, plasmid DNA (circular DNA molecules genetically engineered to carry therapeutic genes into human cells)

is the preferred alternative. Manufacturing the vector is considered the most complex and resource-intensive process in the manufacturing of gene therapies and vaccines products. Existing vector manufacturing methods are capable of meeting demand of the rare diseases with small number of patients being targeted by the drugs approved so far. However, vector manufacturing methods currently available are not suitable for large-scale production. Vector purification is considered the most complicated process accounting for the largest portion of the overall manufacturing cost. Addressing these issues is one of the major challenges faced by players active in this field. As a result, biopharmaceutical manufacturers are conducting considerable efforts to improve the production process (new technologies), increase capacity and reduce manufacturing costs.

Multi-billion deals reflect the growing appetite of large life-science and pharmaceutical companies for manufacturing capacity Production capacity shortfall is reflected in 2019 corporate activity that included multi-billion dollar acquisitions as gene therapy developers aimed to secure access to manufacturing capacity: Thermo Fisher bought Brammer Bio for USD 1.7bn; Catalent acquired Paragon Bioservices for USD 1.2bn; Roche's USD 4.8bn deal for Spark Therapeutics; and Novartis' USD 8.7bn acquisition of AveXis.

4BASEBIO'S PEARL TRUEPRIME IS THE KEY TO DISRUPTION

Enzymathic synthesis (ES) uses enzymes as a catalyst ES is a method widely used to rapidly make millions to billions of copies (amplification) of a specific DNA sample for instance through a process called polymerase chain reaction (PCR). The PCR process uses enzymes as core catalysts driving speed of amplification. The process works exponentially, after twenty PCR cycles, the original amount of DNA will be increased about a million-fold. A central shortcoming of the process is that the amplification of DNA is an extremely sensitive step subject to bias, inaccuracy and contamination. The most likely sources of contamination are the primers (synthetic oligonucleotides) used to prime the reaction. This can lead to off-target amplification products. The process is also usually not applicable to all the genome. Despite its limitations, ES is widely used in modern R&D laboratories for research purposes. ES can either be done manually in the lab, or utilising kits (containing the enzymes) engineered to be compatible with automated PCR equipment capable of delivering high throughput performance.

TruePrime, innovative technology for accurate DNA-amplification TruePrime is an innovative technology-platform developed by 4basebio's Spanish subsidiary (former Sygnis) which enables accurate and reliable copying (amplification) of DNA molecules including the whole genome without the use of synthetic primers**.** This innovative amplification technology is patent protected by 4basebio until 2037. The TruePrime technology is based on the gold standard enzyme Phi29 DNA polymerase plus the DNA primase Thermus thermophilus (Tth) PrimPol, discovered and characterised by 4basebio. Like many other DNA polymerases, Phi29 needs synthetic DNA molecules, called oligonucleotides (oligos) or primers, which "jumpstart" the reaction. The enzyme PrimPol allows reading and copying of DNA to start without the need for synthetic primers. These primers are usually the main source of bias and amplification errors. Importantly, its proprietary phi29 polymerases enable room temperature amplification which is advantageous in a large-scale manufacturing process.

Unprecedented quality of accurate DNA-amplification TruePrime overcomes the shortcomings of existing ES as it enables accurate and highest-quality amplification of the smallest amounts of DNA to large quantities. TruePrime's superior amplification quality is reflected in the absence of contamination in the reaction products, and low nucleotide error rates.

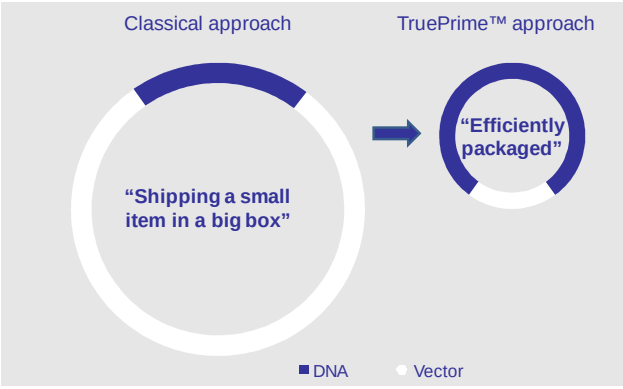
The key advantages of TruePrime, described in the article "TruePrime is a novel method for whole-genome amplification from single cells based on TthPrimPol" published in the renowned scientific journal Nature (Picher. et al., Nature 2016), are:

- superior quality,
- superior sensitivity,
- superior accuracy,
- entire genome coverage.

TruePrime's advantages are at a premium in DNA-manufacturing; the technology has the potential to disrupt this application A main strength of the TruePrime technology is its ability to accurately and reliably amplify DNA in excess of one million times within only three hours. While the company has demonstrated superior performance in small-quantity amplification typically used in research activities, the main challenge will be to scale-up and engineer the process to the large quantities required in clinical testing and commercialisation. Large-scale GMP manufacturing requires meeting the highest quality (e.g. accuracy) and safety standards. However, we believe this task is achievable. The features of the company's technology seem favourable to us for up-scaling. For example, 4basebio's UK peer Touchlight Genetics (see market players chapter), a pioneer in the field, is already capable of utilising the ES amplification methodology for large-scale GMP manufacturing of DNA in therapeutic applications (i.e. gene therapy). Touchlight has also claimed that by using the enzymatic approach, it is possible to produce large scale DNA at about 10% of the time and costs required for traditional cell culture production. Enzymatic amplification has substantial technology advantages compared to cell culture production, and we believe it has the potential to replace to a large extent the older cell culture technology.

Firstly, 4basebio's TruePrime technology facilitates engineering a vector with a smaller size, due to a lower gene-to-vector-ratio requirement. TruePrime produces DNA at higher density and purity and allows reduced use of DNA raw materials for manufacturing. This results in lower COGS and higher gross profit. Traditional manufacturing is highly inefficient, whereby only a fraction of the final product represents fully-functional viruses containing the gene therapy load. According to VigeneBiosiences' experience, ~50% of traditionally manufactured products are empty protein shells containing no DNA. Therefore, 4basebio's production process has the potential to be highly efficient. This feature, accompanied by the technology's high sensitivity and the process inherent high speed, will allow for a shorter amplification time and faster manufacturing (see figure 4).

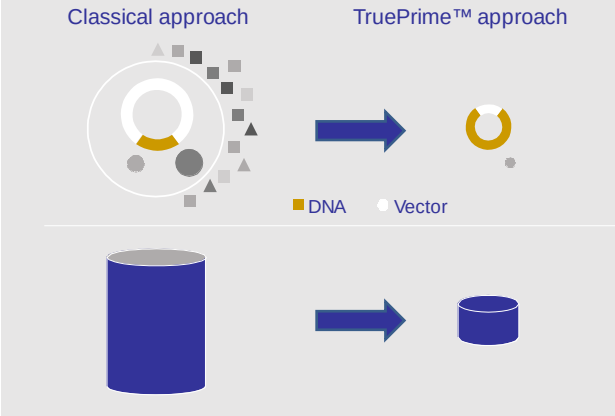
Figure 4: 4basebio's manufacturing approach will have lower COGS and require less time



Source: First Berlin Equity Research, 4basebio AG

Secondly, since 4basebio's manufacturing process is based on enzymatic amplification and not on culturing bacteria, it is endotoxin-free and requires less purification expenses. Gene therapeutic products are largely produced in *E. coli*. These bacteria have endotoxins on their cell membrane, which are recognised by the human immune system and can trigger an adverse immune reaction such as septic shock. Therefore these bacteria must be extensively purified to remove the endotoxins before application, making the process complex and expensive. Further, Trueprime's high amplification efficiency allows generating large DNA quantities with a smaller sized facility, which implies a substantially low CAPEX compared to typical significant investments required for large-scale bioreactors (see figure 5).

Figure 5: Cell-free process leads to higher quality and lower CAPEX investment



Source: First Berlin Equity Research, 4basebio AG

Moderate Investment required to build a DNA manufacturing facility 4basebio's management estimates that the potential investment on a mid-large scale DNA manufacturing facility may be €10-15m. As a reference, Pfizer recently invested USD 600m in a new large-scale manufacturing plant with eight single-use bioreactors of 2,000 litres each.

4basebio may also expand in the production of vectors Considering that the vector represents a key component of every gene therapeutic product, we believe management aims to expand its manufacturing capabilities to this area too. For this purpose, we believe management will try to acquire a non-viral technology. In this way, the company will own the whole product manufacturing value chain.

COMPETITIVE LANDSCAPE

MARKET DYNAMICS

4basebio's synthesis approach to substantially improve the existing production process of DNA for use in gene therapies and molecular diagnostic applications is relatively new and part of a nascent market. We will therefore give an overview of the closest related markets. 4basebio chiefly targets the gene therapy market, offering manufacturing services as a contract manufacturing organisation (CMO). Considering that there is little data on the manufacturing segment, we opted to take a closer look at the viral vector & plasmid DNA manufacturing market, which is closely related. 4basebio will also address the molecular diagnostic market, which also requires DNA for testing. These markets show a good proxy to estimate the dynamics of 4basebio targeted market as well as sales potential of its products.

Multi-billion USD gene therapy market expected to grow at a CAGR close to 28% backed by a strong product pipeline The global emerging gene therapy market is expected to grow at a CAGR of 27.8% from USD 3.8bn in 2019 to USD 13.0bn by 2024 (source: Research and Markets). The approval of the first CAR-T-based gene therapy products has attracted investment in this promising segment. There has been an increasing number of clinical trials for T-cell therapies in the past years. The high incidence of cancer and other target diseases (e.g. inherited disorders, central nervous system, infection diseases) and the availability of reimbursement for these type of treatments have emerged as major factors driving the growth of this market. The industry has a sound product pipeline comprising 776 gene therapy drug candidates which are expected to provide significant growth opportunities in the coming years (source: Alliance for regenerative medicine).

Overall viral vector and plasmid DNA manufacturing markets will continue to grow at double-digit percentage rate The global viral vector & plasmid DNA manufacturing market is projected to grow at a 14.5% CAGR from USD 368m in 2019 to USD 1.1bn in 2027 (source: Grand View Research). The growing demand from gene therapy and mainly CAR-Ts will drive demand for viral vectors and plasmid DNA. Viral and non-viral vectors are proving successful in delivering the DNA to the diseased organs for therapeutic use. In addition, technological progress to overcome the challenges of conventional methods for vector production is expected to support the growth of this market.

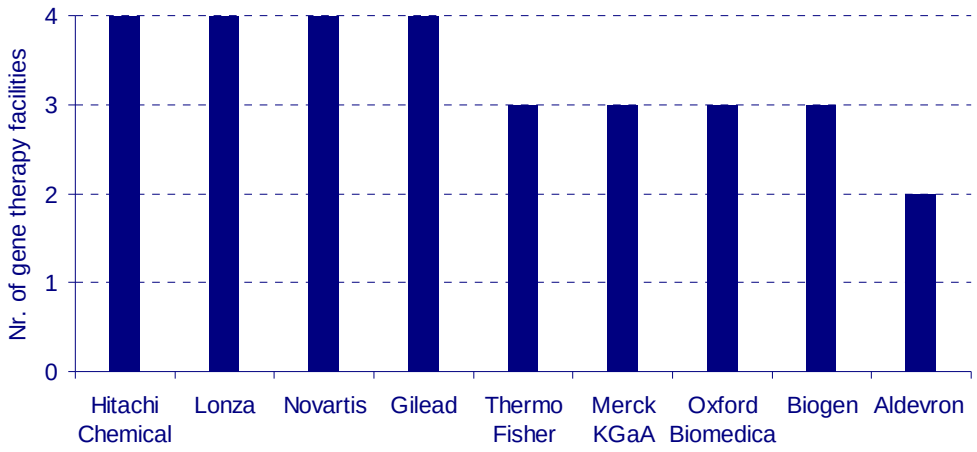
Diagnostics market to achieve high single-digit percentage rate growth The molecular diagnostics market is an attractive sector worth approx. USD 9.2bn in 2019, growing at a CAGR of 9.0% to reach USD 18.2m by 2027 (source: Grand View Research). We anticipate that the use and significance of diagnostic testing will grow in the near future as the population ages and early detection becomes an increasing focus of patients, doctors and healthcare authorities. Increasing prevalence of infectious diseases such as influenza, human papillomavirus or the current pandemic is projected to be a key growth factor in this market.

MARKET PLAYERS USING TRADITIONAL BIOREACTORS

The gene therapy manufacturing industry is still a niche product area. The current market features a mix of pharma/biotech choosing to have the production capabilities of their drugs in-house and contract manufacturing organisations (CMOs) which have pharmaceutical clients who prefer to outsource production. Based on the sound industry's gene therapy pipeline and the limited existing capacity, players are investing heavily to add manufacturing capabilities.

The contract manufacturing industry is dominated by large-cap players The emerging gene therapy manufacturing industry is largely dominated by large-cap contract manufacturing organisations (CMOs) using bioreactor technology which chiefly reflects the large investments required to build up capacity. According to the GlobalData Contract Service Providers database, in 2019 there were 99 manufacturing facilities worldwide, owned by 73 companies. About 75% of the gene therapy CMOs have only one facility, and only nine CMOs have more than two gene therapy facilities worldwide. The leading players Hitachi Chemical Co. and Lonza have four production facilities each, followed by Thermo Fisher (subsidiary Brammer Bio acquired in May 2019) Merck KGaA (subsidiary BioReliance), Oxford BioMedica and Biogen, with three each, and Aldevron with two. In the period 2018-2019 several pharmaceutical companies arrived at the top of the ranking of ownership of facilities through acquisitions. Novartis acquired the CMO, CellforCure, and the gene therapy company, AveXis (developer of the approved drug Zolgensma). Gilead Sciences bought Kite Pharma. Both players own now four production facilities each.

Figure 6: Top gene therapy CMOs by number of gene therapy facilities



Source: GlobalData Contract Service Provider database 2019, First Berlin estimates

In addition, there are about 160 specialised smaller companies globally active in manufacturing services DNA vectors (viral vectors and plasmid DNA) for gene therapy. Key players operating in the market include Cobra Biologics, VGXI Inc., Cell and Gene Therapy Catapult, Creative Biogene, Eurogentec, Delphi Genetics, Kaneka Corporation, Nature Technology Corporation, Novasep, PlasmidFactory GmbH & Co. KG, and Waisman Biomanufacturing.

MARKET PLAYERS PURSUING SYNTHESIS APPROACH

In our view, 4basebio can take a leading role in the race for enzymatic production. At present, we have identified only two direct competitors of 4basebio that use a synthesis approach for DNA manufacturing in gene therapy applications. In our view, the UK-based life-science company Touchlight Genetics has the strongest competitive position with a head start of a few years in the implementation of its GMP facility for the cell-free manufacturing of DNA. Based on its strong financial position, we believe 4basebio has an excellent chance to become the second entrant. However, despite potentially arriving on the market in second place, 4basebio will benefit from the education process and positive experiences that Touchlight may have carried out within the pharmaceutical industry regarding switching from bacterial to enzymatic production. The gene therapy manufacturing market is large enough, and 4basebio should still be able to capture a significant stake. We also believe that large-scale synthetic production technology will require several years to demonstrate its full capability. As a result, we believe big pharma may likely cooperate with both players to spread risks and compare technologies performance and products success. We conduct a quick summary of 4basebio's peers below.

Touchlight Genetics Ltd. is the pioneer in the synthetic DNA manufacturing services race Founded in 2007 in the UK, Touchlight has developed an innovative technology platform which can synthetically manufacture commercial-scale DNA. In March 2018, the company opened its new 50m^2 facility with an annual production capacity of 100s of grams of GMP DNA. Touchlight's enzymatic platform is capable of multi gram-scale amplification within less than 2 weeks. Thus the company claims that its technology can produce DNA for therapeutic applications in 10% of the time, the space, and the cost required by traditional bioreactor approaches. Since October 2018, the company has an extensive research collaboration with Johnson & Johnson Innovation/Janssen Biotech in place for the development of several gene therapies in the fields of infectious disease and oncology. The company also cooperates with the CMO, Cobra Biologics Ltd, on a project to optimise the

production of Adeno-Associated Virus (AAV) vectors used in the delivery of gene therapy treatments. Touchlight has in-house and partnered programmes including non-viral gene therapy, DNA vaccines, viral gene therapy (AAV and lentivirus) and genome editing. According to the intelligence provider Dun & Bradstreet, Touchlight increased sales from USD 1.2m in 2018 to USD 2.5m in 2019. The company's primary investor is Downing Ventures (UK).

OriCiro Genomics, a Japanese start-up seeking to scale-up its synthesis approach for DNA production Founded in 2018, OriCiro has a novel cell-free technology for large DNA amplification which mimics the *E. coli* genome replication mechanism. As a young start-up which raised USD 3.6m in early 2019, the company is currently focusing its funds on scaling-up its reagent manufacturing capabilities and the amplified DNA quantities. Management intends to apply its technology in a variety of sectors besides pharma/biotechnology, including diagnostics, food, agriculture and industrial biotechnology (e.g. environment protection, resource conservation, etc.).

FINANCIAL HISTORY AND OUTLOOK

FY/19 AND Q1/20 RESULTS

In April and May 2020, 4basebio AG respectively published its FY/19 and Q1/20 financial reports in accordance with IFRS standards. Following the successful disposal transaction of the proteomics and immunology business (~90% of group revenues) to Abcam closed in December 2019, 4basebio received the payment on 2 January 2020. The company's FY/19 financial statement classified the accounts by discontinued operations (business sold to Abcam) and the continuing operations (retained business). Our analysis is based solely on continuing operations, which are the backbone of 4basebio's future financial performance. The Q1/20 figures helped us to gain a better understanding of the new company's structure.

Income Statement FY/19 – continuing operations FY/19 group revenues amounted to €1.1m (FY/18: €1.2m) and stemmed chiefly from the sales of enzymes and the recently discontinued, US-based electrophoresis equipment business. Enzymes have not been a core focus of the company, which explains the slight revenue deterioration. Gross profit declined to €0.4m (down from €0.5m in FY/18), which thus implied a gross margin decrease to 35% of sales compared to 44% in the previous year. This figure reflects the fluctuation from the product mix. We believe the company sold a larger proportion of less profitable enzymes in the period.

Sales and marketing expenses dropped to €134k from €227k in FY/18 since the company did not focus on expanding this business. Research and development expenses increased slightly to €220k (FY/18: €206k). However, general and administrative expenses (G&A) increased substantially to €4.0m in FY/19 (FY/18: €3.4m) which largely reflect about €400k in higher costs related to the Abcam transaction (legal consulting and transaction costs). As a result, EBITDA amounted to €-0.9m (FY/18: €-0.7m). 4basebio's reported operating loss (EBIT) widened to €-3.8m in FY/19 from €-3.1m in FY/18. The net financial result amounted to €-308k (FY/18: €229k), mainly due to short and long term debt acquired to finance operations. The reported net result totalled €-3.8m (FY/18: €-2.8m). We show the reported results in table 2.

Table 2: Income Statement (selected items) FY/19 vs FY/18 and Q1/20 vs Q1/19

All figures in EUR '000	FY/19	FY/18	*Delta*	Q1/20	Q1/19	*Delta*
Revenues	**1,052**	**1,174**	***-10%***	**296**	**295**	***0%***
Gross profit	366	511	*-28%*	66	67	*-1%*
OpEx	-4,163	-3,589	*n.a.*	-695	-944	*n.a.*
EBITDA	-902	-733	*23%*	-511	-201	*154%*
Operating Income (EBIT)	**-3,797**	**-3,078**	***n.a.***	**-629**	**-877**	***n.a.***
Net financial result	-308	229	*n.a.*	-173	26	*n.a.*
Tax income (expense)	317	20	*n.a.*	-333	10	*n.a.*
Net income / loss	**-3,787**	**-2,829**	***n.a.***	**-1,135**	**-841**	***n.a.***
Gain from discontinued operations	1,134	2,528	*n.a.*	66,863	378	*n.a.*
Result for the period	**-2,653**	**-301**	***n.a.***	**65,728**	**-464**	***n.a.***
Margins in %						
Gross profit	*34.8%*	*43.5%*		*22.3%*	*22.7%*	
Operating Income (EBIT)	*n.a.*	*n.a.*		*n.a*	*n.a*	

Source: First Berlin Equity Research, 4basebio AG

Company FY/20 guidance 4basebio is guiding towards revenues of €0.5m - €1.0m and operational cash burn excluding Abcam related expenses in the range €2.5m - €3.5m. In accordance with management's focus of developing its DNA production facility, the company will not allocate significant resources on expanding the existing enzyme related sales.

Q1/20 income statement figures – Gain from business disposal of €66.9m led to taxes of only €333k 4basebio's published Q1/20 results reflect well the full-year sales guidance. Group revenues were roughly flat at €296k (Q1/19: €295k). EBITDA came in at €-511k in Q1/20 (Q1/19: €-201k). The operating loss narrowed to €-0.6m (Q1/19: €-0.9m) chiefly due to lower administrative expenses. The Q1/19 figure included a large amortisation and impairment of intangible assets of €599k (Q1/20: 9k). The company reported a net loss of €-1.1m (Q1/19: €-0.8m). Further, 4basebio achieved a €66.9m gain from the disposal of the business to Abcam, leading to a result for the period of €65.7m in Q1/20. Based on the existing tax loss carryforward (TLCF), the company paid taxes of only €333k on the transaction gain.

Balance Sheet FY/19 and Q1/20 The main positions of the FY/19 balance sheet to look at were assets held for sale of €56.1m and liabilities related to the assets held for sale amounting to €10.1m. These two positions were cleared from the balance sheet on 2 January 2020 through Abcam's payment of €120m to acquire 4basebio's business. Thus in Q1/20 4basebio reported a higher cash position of €86.9m (2019: €1.0m) and restricted cash of €14.4m to be held for two years in an escrow account at JP Morgan on a fiduciary basis (see non-current assets on table 3). These two positions totalled €101.3m. The difference to Abcam's €120m payment owes to funds used to buy back shares and clear some outstanding debt. In February, the company purchased 5.2m own shares (approx. 10% of total shares) at an average price of €1.74 p/s leading to the total spending of €9.7m. These shares have been cancelled following the approval which took place on the AGM on 17 June. At the end of Q1/20, total equity increased to €103.7m (FY/19: 48.1m) chiefly due to the profit generated from Abcam through the business disposal. Financial liabilities (ST+LT) declined from €2.8m in FY/19 to €1.7m in Q1/20. The €10.1m liabilities related to the assets held for sale by year-end 2019 was cleared from the balance sheet in Q1/20. The Q1/20 balance sheet total was €106.6m (FY/19: €62.3m).

Table 3: Balance sheet (selected items) FY/19 vs. FY/18 and Q1/20 vs. Q1/19

All figures in EUR '000	FY/19	FY/18	*Delta*	Q1/20	FY/19	*Delta*
Cash and cash equivalents	990	6,238	*-84.1%*	86,911	990	*8679%*
Receivables	581	2,627	*-77.9%*	612	581	*5%*
Inventories	442	1,966	*-77.5%*	421	442	*-5%*
Assets held for sale	56,104	0		0	56,104	
Current assets, total	**58,605**	**12,369**	***373.8%***	**88,523**	**58,605**	***51%***
Goodwill & other intangibles	1,845	49,490	*-96.3%*	2,070	1,845	*12%*
Property, plant & equipment	1,547	1,999	*-22.6%*	1,346	1,547	*-13%*
Escrow facility Abcam transaction	0	0		14,400	0	
Non-current assets, total	**3,646**	**51,808**	***-93.0%***	**18,069**	**3,646**	***396%***
Accounts payable	336	1,498	*-77.6%*	458	336	*36%*
Financial debt (ST+LT)	2,796	10,647	*-73.7%*	1,673	2,796	*-40%*
Liabilities (held for sale)	10,088	0		0	10,088	
Shareholders' equity	48,096	46,502	*3.4%*	103,696	48,096	*116%*
Equity ratio	*77%*	*72%*		*97%*	*77%*	
Balance sheet, total	**62,251**	**64,177**	***-3.0%***	**106,592**	**62,251**	***71%***

Source: First Berlin Equity Research, 4basebio AG

Cash Flow Statement FY/19 In FY/19, cash flow from operating activities came in at €1.1m and was better than the previous period (FY/18: €-158k) chiefly due to an improved operating and working capital performance. Capital expenditures declined to €480k in FY/19 (FY/18: €613k). Free cash flow amounted to €618k (FY/18: €-771k). Other investments were €-3.2m in FY/19 (FY/18: €-6.1m) due to the negative impact of the company's acquisitions. Cash flow from financing activities amounted to €-2.9m (FY/18: €11.1m). While in FY/18 the company raised funds by placing equity and debt, in FY/19 focus was on repaying following the Abcam transaction. Thus, FY/19 net cash flow came in at €-5.2m (FY/18: €4.3 m).

Table 4: Cash flow statement (selected items) FY/19 vs FY/18 and Q1/20 vs Q1/19

All figures in EUR '000	FY/19	FY/18	*Delta*	Q1/20	Q1/19	*Delta*
Operating cash flow	**1,098**	**-158**	***n.a.***	-5,678	**-339**	***n.a.***
CapEx	-480	-613	*n.a.*	-229	-175	*n.a.*
Free cash flow	**618**	**-771**	***n.a.***	**-5,907**	**-514**	***n.a.***
Other investments and disposals	-3,152	-6,094	*n.a.*	105,600	0	*n.a.*
Cash flow from financing	-2,875	11,187	*n.a.*	-16,480	-260	*n.a.*
Exchange differences	161	-39	*n.a.*	0	181	*n.a.*
Net cash flow	**-5,248**	**4,283**	***n.a.***	**83,215**	**-593**	***n.a.***

Source: First Berlin Equity Research, 4basebio AG

Cash Flow Statement Q1/20 In Q1/20, operating cash flow amounted to €-5.7m (Q1/19: €-339k) and included transaction-related expenses of €3.9m. Investment cash flow came in at €105.4m (Q1/19: €-175k), driven by Abcam's €120m payment less the €14.4m held for escrow. Financing cash flow was €-16.5m (Q1/19: €-260k), comprising a share buy-back outflow amounting to €9.7m and debt repayment of €6.5m. The net cash flow came in at €83.2m (Q1/19: €-593k).

FINANCIAL OUTLOOK

Company's TruePrime core technology used to produce DNA has the potential to generate sales of about €13.5m within a few years In the scope of investor's presentations, 4basebio's management has given a rough estimation of the sales potential emerging from the company's synthetic production platform.

Table 5: Mid-term sales potential from enzymatic production

APPLICATION	SALES POTENTIAL IN €MILLION
Gene therapy	€10.0
Diagnostic	€3.5
TOTAL	**€13.5**

Source: 4basebio AG

If the company manages to establish an efficient ES production process for commercial quantities of DNA, we view the sales potential as realistic 4basebio's ability to gain the required upscaling expertise and build the manufacturing facility in accordance to GMP standards is still unproved. If the company manages to successfully establish an efficient production process of synthetic DNA and gain the required GMP certifications, we see large demand for the product. The company intends to distribute the DNA material directly to pharma and biotech companies worldwide.

Sales 4basebio's retained genomic business provides a sales base of approx. €1m per year. We project that the company will require about two years to scale up its production and achieve the GMP permissions. We therefore anticipate first sales from DNA production in 2022. We forecast that DNA sales will increase from €1.0m in FY/22E to €9.0m in FY/24E, growing at a CAGR of 200%. In FY/22E, we assumed an average price per gram DNA of €500k. Over the forecasting period, we projected a slightly declining average price due to quantity discounts, accompanied by increasing order quantities as a result of projects' progress through the R&D value chain. Typically, manufacturing projects start in the research stage and advance towards development, progressively requiring larger DNA quantities for drug testing. We assume that over time the biopharmaceutical industry will become more familiar with the synthetic production approach und appreciate its superior characteristics, leading to a growing number of clients.

Table 6: Overview of sales forecasts

Revenue projections (T€)	2019	2020E	2021E	2022E	2023E	2024E
Total revenue	1,052	900	1,000	2,100	5,210	10,360
Enzymes*	1,052	900	1,000	1,100	1,210	1,331
DNA	0	0	0	1,000	4,000	9,029
DNA assumptions						
Average gram purchase per client p.a.	0	0	0	0.5	0.8	1.2
Average price per DNA gram (T€)	500	500	500	500	500	495
Number of clients	0	0	0	4	10	15
Reveue growth (Y-o-Y)						
Total revenue		*-14%*	*11%*	*110%*	*148%*	*99%*
Enzymes		*-14%*	*11%*	*10%*	*10%*	*10%*
DNA					*300%*	*126%*

**2019 and 2020E Enzyme-sales include electrophoresis equipment revenue until June 2020*

Source: First Berlin Equity Research, 4basebio AG

Income Statement In 2020E, we project a gross profit of €315k (2019: €366k) which implies a gross margin of 35.0% (FY/19: 34.8%). We forecast that 4basebio's gross margin will improve from 2022E driven by the market launch of synthetic DNA. Produced synthetically, DNA will have low production costs and a high gross margin compared to existing biologic production techniques. The production facility represents to a large extent fixed costs. As a result, increasing sales volume will enable further margin improvement due to economies of scale. We forecast an increase in the group gross margin from 35% in 2020E to 70% in 2023E.

We estimate marketing & sales expenses of €250k in 2020E (2019: €134k). We also project higher R&D costs of €1.0m in 2020E (2019: €0.2m). We anticipate lower administrative expenses of €3.0m (2019: €4.0m), considering that 2019 figures included Abcam transaction-related expenses of about €600k. Going forward, we forecast operating expenses to increase but at a slower pace than sales due to economies of scale. We anticipate 4basebio to make loses through 2023E, becoming profitable by 2024E. We expect that the company will achieve EBITDA of €-2.9m and EBIT of €-3.6m in 2020E (2019: €-0.9m; €-3.8m). Due to the €66.9m profit generated from the disposal transaction with Abcam, we forecast a total comprehensive income of €62.7m in 2020E (2019: €-1.5m).

Table 7: Revenue, gross profit, EBIT forecasts

All figures in EUR '000	2018	2019	2020E	2021E	2022E	2023E
Revenues	1,174	1,052	900	1,000	2,100	5,210
Gross profit	511	366	315	350	1,155	3,647
EBITDA	-733	-902	-2,891	-3,919	-3,832	-1,124
Operating income (EBIT)	-3,078	-3,797	-3,595	-4,800	-4,357	-2,114
Net income / loss	-2,829	-3,788	-4,198	-5,075	-4,427	-2,167
Income from disc. operations & FX	2,528	2,287	66,863	0	0	0
Total comprehensive income	-301	-1,501	62,665	-5,075	-4,427	-2,167
Margins in %						
Gross profit	*43.5%*	*34.8%*	*35.0%*	*35.0%*	*55.0%*	*70.0%*
EBITDA	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
Operating income (EBIT)	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
Y-Y Growth						
Revenues	*199.5%*	*-10.4%*	*-14.4%*	*11.1%*	*110.0%*	*148.1%*
Gross profit	*n.a.*	*-28.4%*	*-13.9%*	*11.1%*	*230.0%*	*215.8%*

Source: First Berlin Equity Research, 4basebio AG

Balance Sheet – Well funded to implement the business model We project that 4basebio will have a sound cash position of €81.9m at the end of 2020E. Based on OPEX and CAPEX spending, we project cash to decline over time continuously. At the beginning of 2022E, we anticipate that the company will receive access to the €14.4m from the escrow account, leading to a cash injection. With these funds, the company can comfortably fund operations until the achievement of profitability. Since the company will establish a new DNA production facility, we anticipate that property plant and equipment will grow from €1.5m in 2019 to €10.1m in 2021E when we expect its completion. Going forward, we project roughly stable tangible and intangible assets. Our forecast does not factor in acquisition activity. Nevertheless, an acquisition is likely, considering that the management would like to have own nucleotides and vector production technology. We forecast that receivables will rise slightly in 2020E to €584k (2019: €581k), which we project to grow further to €1.7m in 2023E following sales expansion.

Table 8: Balance sheet KPIs 2018-2023E

All figures in EUR '000	2018	2019	2020E	2021E	2022E	2023E
Cash and cash equivalents	6,238	990	81,882	68,481	77,421	73,964
Receivables	2,627	581	584	521	863	1,713
Inventories	1,966	442	385	392	518	771
Assets held for sale	0	56,104	0	0	0	0
Current assets, total	**12,369**	**58,605**	**83,378**	**69,963**	**79,417**	**77,112**
Goodwill & other intangibles	49,490	1,845	2,391	3,131	3,404	3,456
Property, plant & equipment	1,999	1,547	2,897	10,077	10,224	10,276
Escrow facility Abcam transaction	0	0	14,400	14,400	0	0
Non-current assets, total	**51,808**	**3,646**	**19,942**	**27,864**	**13,887**	**13,994**
Accounts payable	1,498	336	353	285	388	557
Financial debt (ST+LT)	10,647	2,796	1,450	1,200	1,000	800
Liabilities (held for sale)	0	10,088	0	0	0	0
Shareholders' equity	46,502	48,096	100,817	95,742	91,315	89,149
Equity ratio	72%	77%	98%	98%	98%	98%
Balance sheet, total	**64,177**	**62,251**	**103,320**	**97,827**	**93,304**	**91,106**

Source: First Berlin Equity Research, 4basebio AG

Cash Flow Statement We expect increasing revenues to result in continuous improvement in operating cash flow in the period 2020E-2023E. We forecast operating cash flow of €-7.6m in 2020E (2019: €-1.1m) and expect this figure to improve substantially to €-2.2m in 2023E. Capital expenditures should amount to €-2.6m in 2020E (2019: €-0.5m) and €-8,8m in 2021E due to investment in establishing the production facility of synthetic DNA. Later on, we project maintenance or minor additional investment of about €1m p.a. in the period 2022E-2023E. We expect free cash flow of €-10.2m in 2020E (2019: €0.6m) and €-13.2m in 2021E. Following the completion of the production facility, we anticipate this figure will improve to €-3.3m in 2023E. Our forecast of cash inflows from disposals of €105.6m in 2020E and €14.4m in 2022E are attributable to the Abcam transaction including clearance of the escrow account. We estimate cash flow from financing amounting to €-14.5m in 2020E chiefly reflecting debt repayment and the €9.7m share buy-back measure conducted in February. We anticipate net cash flow to total €80.9m in 2020E. Going forward, we estimate that the positive trend of strengthening operating performance and cash flow will continue having a positive impact on the company's free cash flow and net cash flow.

Table 9: Cash Flow Statement (selected items) 2018 – 2023E

All figures in EUR '000	2018	2019	2020E	2021E	2022E	2023E
Operating cash flow	**-158**	**1,098**	**-7,611**	**-4,350**	**-4,315**	**-2,163**
CapEx	-613	-480	-2,600	-8,800	-945	-1,094
Free cash flow	**-771**	**618**	**-10,211**	**-13,150**	**-5,260**	**-3,257**
Other investments and disposals	-6,094	-3,152	105,600	0	14,400	0
Cash flow from financing	11,187	-2,875	-14,497	-250	-200	-200
Exchange differences	-39	161	0	0	0	0
Net cash flow	**4,283**	**-5,248**	**80,892**	**-13,400**	**8,940**	**-3,457**

Source: First Berlin Equity Research, 4basebio AG

VALUATION MODEL

The company's value is a function of the predictability of cash flows and the risk associated with achieving those cash flows. Following 4basebio's disposal of its largest business (approx. 90% of sales), and management's decision to change its business model entering a new market, forecasting of potential cash flows becomes a challenging task. Nevertheless, we decided to stick to our discounted-cash-flow approach. We believe that a DCF valuation methodology is best suited to capture the value of 4basebio's new operations. We have applied a two-stage growth model, which includes detailed projections of future sales, operating profit and free cash flows for the planning period 2020E-2030E. We have assumed a terminal free cash flow growth rate of 2.0%.

Using First Berlin methodology, which accounts for company-specific risk factors, we derived a new cost of equity (COE) of 11.5% (old: 10.5%) for 4basebio AG. Our calculation is based on a risk-free rate of 0.5%, a market risk premium of 5.0% and a company-specific risk factor. Based on the very strong cash position following the Abcam deal, we assumed that 4basebio will operate without debt in the long run leading to a 100% long-term share of equity (old: 80%). Thus we estimate a WACC of 11.5% (old: 9.7%), which we use to discount the projected cash flows. Including proforma net cash of €103.8m, we value 4basebio at €171.6m. Based on 51.9m fully diluted shares outstanding, we calculate a fair value per share of €3.30.

DCF MODEL

All figures in EUR '000	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E
Net sales	**900**	**1,000**	**2,100**	**5,210**	**10,360**	**18,745**	**36,083**	**75,095**
NOPLAT	**-3,595**	**-4,800**	**-4,357**	**-2,114**	**855**	**3,318**	**9,235**	**19,077**
+ depreciation & amortisation	704	880	525	990	1,575	1,893	2,887	2,403
Net operating cash flow	-2,891	-3,920	-3,832	-1,124	2,429	5,211	12,122	21,480
- total investments (CAPEX and WC)	-2,529	-8,811	-1,310	-2,029	-2,684	-3,510	-4,739	-4,950
Capital expenditures	-2,600	-8,800	-945	-1,094	-1,347	-1,818	-1,985	-2,103
Working capital	71	-11	-365	-935	-1,337	-1,692	-2,755	-2,848
Free cash flows (FCF)	-5,420	-12,731	-5,142	-3,152	-254	1,701	7,382	16,530
PV of FCF's	**-5,156**	**-10,860**	**-3,934**	**-2,163**	**-157**	**939**	**3,654**	**7,338**

All figures in EUR '000	
PV of FCFs in explicit period	11,036
PV of FCFs in terminal period	56,800
Enterprise value (EV)	67,836
+ Net cash / - net debt	103,792
Shareholder value	171,629
Diluted number of shares	51.939
Fair value per share in EUR	**3.30**

Cost of equity	11.5%
Pre-tax cost of debt	5.0%
Tax rate	22.0%
After-tax cost of debt	3.9%
Share of equity capital	100.0%
Share of debt capital	0.0%
WACC	**11.5%**

Fair value per share

WACC \ Terminal growth rate	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%
8.5%	4.06	4.18	4.32	4.48	4.67	4.89	5.16
9.5%	3.68	3.77	3.87	3.98	4.11	4.25	4.43
10.5%	3.38	3.45	3.52	3.60	3.69	3.79	3.91
11.5%	3.14	3.19	3.24	**3.30**	3.37	3.45	3.53
12.5%	2.95	2.98	3.03	3.07	3.12	3.18	3.24
13.5%	2.78	2.81	2.85	2.88	2.92	2.96	3.01
14.5%	2.65	2.67	2.70	2.73	2.76	2.79	2.82

*Please note our model runs through 2030 and we have only shown the abbreviated version for formatting purposes

Source: First Berlin Equity Research

Using our ten-factor risk analysis, our High-risk rating for 4basebio AG remains unchanged. The main risk factors we identify are patent challenge, engineering risk for upscaling the production process and obtaining GMP approval, ability to retain management and key staff, and competition risks.

4basebio's shares appear significantly undervalued. We reiterate our Buy rating at a higher price target Our valuation of 4basebio considers the very high net cash position, as well as the attractive potential arising from further development of the proprietary TruePrime technology based on enzymatic synthesis for mid-large scale GMP manufacturing of DNA. We note that the technology has already proved its superiority in small scale DNA production for research applications (e.g. commercialised research kits based on TruePrime). Also, management has deep life science expertise and a strong network, as well as a proven track record of achieving business targets and closing attractive deals. However, the current share price chiefly reflects the net cash position. We believe investors do not yet appreciate the potential of the new production process under development since the shift in focus towards this area in early 2020. Hence, during the next 12-24 months, we see relevant milestones which will act as drivers for value enhancement. These include validation of the process for mid-large scale DNA production, the launch of a GMP certified product, and closing partnerships with pharma/biotech companies who run pilots to optimise the manufacturing process for gene therapy/vaccine R&D applications or who place the first DNA orders. This news flow, as well as positive financial results, should trigger the appreciation of 4basebios's share price. Based on our updated DCF model, we increase our price target to €3.30 (old: €2.20) and reiterate our Buy rating.

NEWSFLOW

Financial Schedule

13 August 2020	H1 2020 results and investor conference call
12 November 2020	Q3 2020 results

SHAREHOLDERS & STOCK INFORMATION

Stock Information	
ISIN	DE000A2YN801
WKN	A2YN80
Bloomberg ticker	4BSB GR (previously EXN GR)
No. of issued shares	48.53 m
Transparency Standard	Prime Standard
Country	Germany
Sector	Healthcare
Industry	Biotechnology

Source: Börse Frankfurt, First Berlin Equity Research

Shareholder Structure	
Deutsche Balaton	21.3%
Fernandez Trust	5.5%
Dr. Lanckriet	3.5%
Franciscus De Busschere	3.8%
Freefloat & others	65.9%
Total	100.0%

Source: 4basebio AG

INCOME STATEMENT

All figures in EUR '000	2018	2019	2020E	2021E	2022E	2023E
Continuing operations						
Revenues	**1,174**	**1,052**	**900**	**1,000**	**2,100**	**5,210**
Enzymes	1,174	1,052	900	1,000	1,100	1,210
DNA	0	0	0	0	1,000	4,000
Cost of goods sold	-663	-686	-585	-650	-945	-1,563
Gross profit	**511**	**366**	**315**	**350**	**1,155**	**3,647**
Marketing & sales expenses	-227	-134	-250	-500	-600	-875
Administration expenses	-3,377	-3,954	-3,000	-3,100	-3,162	-3,225
Research & development	-206	-220	-1,000	-1,800	-1,900	-1,800
Other operating income (expenses)	221	145	340	250	150	140
EBITDA	**-733**	**-902**	**-2,891**	**-3,919**	**-3,832**	**-1,124**
Operating income (EBIT)	**-3,078**	**-3,797**	**-3,595**	**-4,800**	**-4,357**	**-2,114**
Net financial result	229	-308	-270	-275	-70	-53
Pre-tax income (EBT)	**-2,849**	**-4,105**	**-3,865**	**-5,075**	**-4,427**	**-2,167**
Tax result	20	317	-333	0	0	0
Minority interests	0	0	0	0	0	0
Net income / loss continuing operations	**-2,829**	**-3,788**	**-4,198**	**-5,075**	**-4,427**	**-2,167**
Net income from discontinued operations		1,135	66,863			
Exchange rate adjustments	2,528	1,152	0	0	0	0
Total comprehensive income	**-301**	**-1,501**	**62,665**	**-5,075**	**-4,427**	**-2,167**
Diluted EPS (in €)	**-0.01**	**-0.04**	**1.23**	**-0.10**	**-0.09**	**-0.04**
Ratios						
Gross margin	43.5%	34.8%	35.0%	35.0%	55.0%	70.0%
EBITDA margin on revenues	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EBIT margin on revenues	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Net margin on revenues	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tax rate	n.a.	n.a.	8.6%	0.0%	1.0%	12.0%
Expenses as % of revenues						
Marketing & sales expenses	19.3%	12.7%	27.8%	50.0%	28.6%	16.8%
Administration expenses	287.6%	375.9%	333.3%	310.0%	150.6%	61.9%
Research & development	17.5%	20.9%	111.1%	180.0%	90.5%	34.5%
Y-Y Growth						
Revenues	199.5%	-10.4%	-14.4%	11.1%	110.0%	148.1%
Operating income (EBIT)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Net income/ loss	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

BALANCE SHEET

All figures in EUR '000	2018	2019	2020E	2021E	2022E	2023E
Assets						
Current assets, total	**12,369**	**58,605**	**83,378**	**69,963**	**79,417**	**77,112**
Cash and cash equivalents	6,238	990	81,882	68,481	77,421	73,964
Receivables	2,627	581	584	521	863	1,713
Inventories	1,966	442	385	392	518	771
Assets held for sale	0	56,104	0	0	0	0
Other current assets	1,538	488	527	569	615	664
Non-current assets, total	**51,808**	**3,646**	**19,942**	**27,864**	**13,887**	**13,994**
Property, plant & equipment	1,999	1,547	2,897	10,077	10,224	10,276
Goodwill	33,906	0	0	0	0	0
Intangible assets	15,584	1,845	2,391	3,131	3,404	3,456
Escrow facility Abcam transaction	0	0	14,400	14,400	0	0
Other assets	319	254	254	257	259	262
Total assets	**64,177**	**62,251**	**103,320**	**97,827**	**93,304**	**91,106**
Shareholders' equity & debt						
Current liabilities, total	**7,759**	**12,623**	**1,253**	**1,085**	**1,189**	**1,357**
Short-term debt	3,171	1,264	200	200	200	200
Accounts payable	1,498	336	353	285	388	557
Liabilities (held for sale)	0	10,088	0	0	0	0
Other current liabilities	3,090	935	700	600	600	600
Long-term liabilities, total	**9,916**	**1,532**	**1,250**	**1,000**	**800**	**600**
Long-term debt	7,476	1,532	1,250	1,000	800	600
Other liabilities and provisions	2,440	0	0	0	0	0
Shareholders' equity	**46,502**	**48,096**	**100,817**	**95,742**	**91,315**	**89,149**
Total consolidated equity and debt	**64,177**	**62,251**	**103,320**	**97,827**	**93,304**	**91,106**

Ratios						
Current ratio (x)	1.6	4.6	66.6	64.5	66.8	56.8
Quick ratio (x)	1.3	4.6	66.2	64.1	66.4	56.3
Net debt/(net cash)	4,409	1,806	-80,432	-67,281	-76,421	-73,164
Net gearing	9.5%	3.8%	-79.8%	-70.3%	-83.7%	-82.1%
Book value per share (in €)	0.84	0.80	1.98	1.86	1.76	1.70
Return on equity (ROE)	-6.1%	-7.9%	-4.2%	-5.3%	-4.8%	-2.4%

CASH FLOW STATEMENT

All figures in EUR '000	2018	2019	2020E	2021E	2022E	2023E
Net income	**-301**	**-2,653**	**62,665**	**-5,075**	**-4,427**	**-2,167**
Depreciation and amortisation	2,345	2,895	704	880	525	990
Changes in working capital	-658	-590	-203	-153	-411	-984
Other adjustments	-862	2,442	-70,777	-3	-3	-3
Operating cash flow	**92**	**2,031**	**-7,611**	**-4,350**	**-4,315**	**-2,163**
Interest expense	-250	-514	0	0	0	0
Net operating cash flow	**-158**	**1,098**	**-7,611**	**-4,350**	**-4,315**	**-2,163**
CapEx	-613	-480	-2,600	-8,800	-945	-1,094
Free cash flow	**-771**	**618**	**-10,211**	**-13,150**	**-5,260**	**-3,257**
Other investments and disposals	-6,094	-3,152	105,600	0	14,400	0
Cash flow from investing	**-6,707**	**-3,632**	**103,000**	**-8,800**	**13,455**	**-1,094**
Debt financing, net	6,465	-2,458	-4,553	-250	-200	-200
Equity financing, net	4,722	-33	-219	0	0	0
Paid dividend / share buy back	0	0	-9,725	0	0	0
Interest expense	0	-384	0	0	0	0
Cash flow from financing	**11,187**	**-2,875**	**-14,497**	**-250**	**-200**	**-200**
Exchange differences	-39	161	0	0	0	0
Net cash flow	**4,283**	**-5,248**	**80,892**	**-13,400**	**8,940**	**-3,457**
Cash, start of the year	1,954	6,238	990	81,882	68,481	77,421
Cash, end of the year	**6,238**	**990**	**81,882**	**68,481**	**77,421**	**73,964**
EBITDA/share (in €)	**-0.01**	**-0.01**	**-0.06**	**-0.08**	**-0.07**	**-0.02**
Y-Y Growth						
Operating cash flow	n.a.	2107.6%	n.a.	n.a.	n.a.	n.a.
Free cash flow	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
EBITDA/share	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

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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.

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Report No.:	Date of publication	Previous day closing price	Recommendation	Price target
Initial Report	13 August 2018	€1.43	BUY	€2.65
...	↓	↓	↓	↓
2	5 December 2018	€1.00	BUY	€2.55
3	29 May 2019	€0.90	BUY	€2.20
4	14 October 2019	€1.01	BUY	€2.20
5	Today	€1.95	BUY	€3.30

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