AMBIENTA Sgr
Environmental Assets

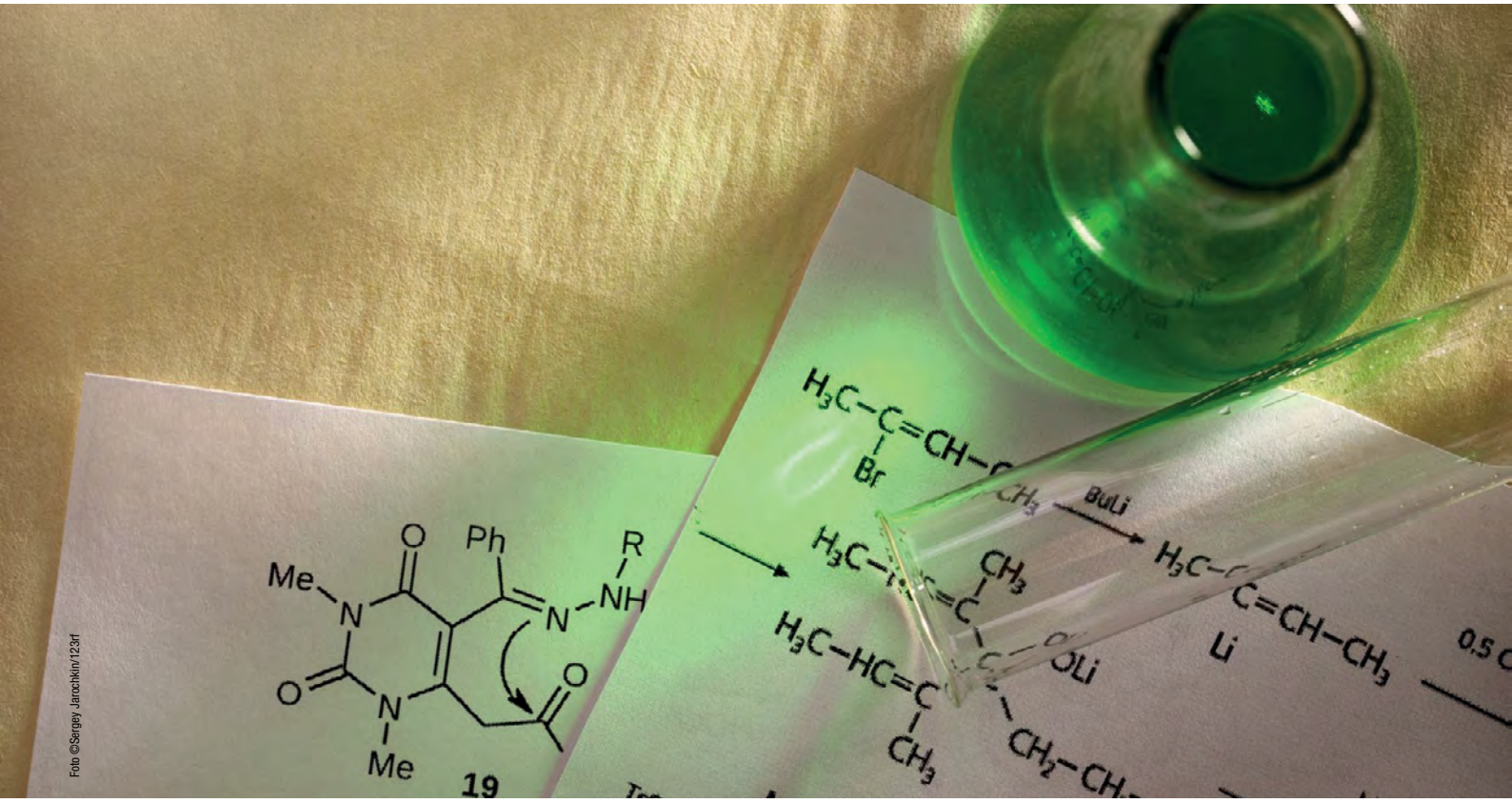


Foto ©Sergey Jarochkin/123rf

Fabio Ranghino

The environmental side of chemistry: competitive advantage and investment opportunity

At first sight environment and chemical industry appear as polar opposites. The simple mention of chemicals bring to mind images of Seveso and Bhopal revived this summer by the spectacular and dramatic Tianjin explosions. Chemical products are flammable, dangerous, they pollute rivers and air, they cause death and illness. In 1984 the gas leak off the pesticide plant at Bhopal alone exposed half a million people to methyl isocyanate, which ultimately killed tens of thousands. Surely nothing could be further from "environmental".

And yet…

And yet, this is a highly superficial view. The chemical industry with its estimated 5% of GDP contribution in most advanced countries is an irreplaceable cornerstone of the economy. In reality its very problems have led to the search for solutions which have created a wealth of opportunities for an environmentally-minded investor. Let's look at few facts.

Growth of the chemical industry: splendor and catastrophe

Traité Élémentaire de Chimie, Antoine de Lavoisier (Elementary Treatise on Chemistry, 1789)

Since Antoine de Lavoisier (1743-1794) established the law of conservation of mass, developed chemical nomenclature and named oxygen and nitrogen as major components of the air, chemistry has grown exponentially. For example from 1850 to 2000 the industry has grown in the US at an estimated 8% per year: an unmatchable record for a large industry and certainly the Holy Grail of investment funds across the world. Growth has been fueled by the continuous search for new compounds able to deliver performances in a ever growing number of applications.

In 150 years the offering broadened from heavy chemicals, like alkalis and acids, to specialty and fine chemicals, from antiseptic to advanced antibiotics or contraceptives, from spices to food additives.

The chemical industry has always been and will always be defined by a continuous stream of process and product innovations, making it a pillar of global economic development much beyond its strictly defined borders. A few examples:

1. Fertilizers, an almost $200 billion industry, enabled towards the middle of the 20th century an incredible increase of crop and vegetable yields which eventually allowed feeding the world's growing population at an affordable price.
2. The development by Thomas Midgley Jr. (also the inventor of the antiknock lead additive for petrol) and Albert Henne in the Frigidaire division of General Electric of fluorine based compounds, fluorocarbons, made it possible to overcome issues like flammability and fast deterioration of the first refrigerants (e.g. ammonia or ether) paving the way to domestic refrigeration. Unfortunately we later discovered that besides this great contribution to our life style we owe them the Ozone Hole. Though, this has now been addressed and refrigeration stays as a permanent feature.
3. Last but not least, we all recognize the extent to which chemical research improved our life through the pharmaceutical industry. In the middle of the 19th century we couldn't prevent surgery spread infections. 40% of people undergoing surgery were killed by infections: 70% in military hospitals. This improved when Joseph Lister, a surgeon at Glasgow Royal Infirmary, discovered the antiseptic properties of phenol. It wasn't a perfect antiseptic, as it is toxic for the doctors, but it led to a drastic drop in infection rates in hospitals between 1867 and 1878. In the early decades of the 20th century chemistry eventually delivered antibiotics. First Sulphonamides, then penicillins. Life

1922 Frigidaire "iceless" refrigerator newspaper ad. The Morning Tulsa daily world. (Tulsa, Okla.), 30 July 1922.

expectancy, which had been for about 5 thousands years in the 30-40 years range, since then rose (in Europe) from 43 years in 1900 to 81 years today. Secondary infections, like pneumonia during the 1918 pandemic flu, caused more victims that the whole World War One. Pneumonia, tuberculosis and diphtheria, the primary causes of death before the antibiotics era, have now been defeated. To some extent we all, citizens of the industrialized world, underestimate the contribution of the chemical industry to the ending of the long lasting claim that "the life of man is solitary, poor, nasty, brutish, and short" (Thomas Hobbes, 1588–1679, "The Leviathan")!

1912 Bakelite pool balls from the Hyatt-Burroughs Billard Ball Company. Source: www.britannica.com

The extent chemistry has changed people, individuals and economies is incredible, with clearly positive environmental impact. For example, few people are aware that chemistry probably saved elephants from extinction long before Greenpeace and WWF even existed. The growing popularity of pool game as a leisure activity in the 19th century was threatening elephant extinction as it required an increasing and not sustainable quantity of high quality elephant tusks to produce perfectly rolling pool balls. We could now be probably either out of elephants and/or pool balls if Leo Baekeland, a Belgian chemist, hadn't synthetized Bakelite: the first synthetic plastic in 1907. The material, originally developed for the electric industry, eventually turned out to be the perfect substitute for elephant tusks for pool balls.

Unfortunately, these 150 years of incredible results have also been characterized by increasing consciousness of the hazardous nature of the chemical industry. The explosion of the toxic chemical warehouse in Tianjin in August reminded us why the "chemical" adjective has grown its notoriety to being almost synonymous with health threatening, dangerous or hazardous (see "Chemical Ali" in Iraq). The Seveso's dioxin spill in 1976 in Italy, the Bhopal's pesticides contaminations in 1984 in India or the 1986 accident at Sandoz warehouse that turned the Rhine red are well

Men look at a contaminated river in Cangnan county of Wenzhou, Zhejiang province, July 24, 2014

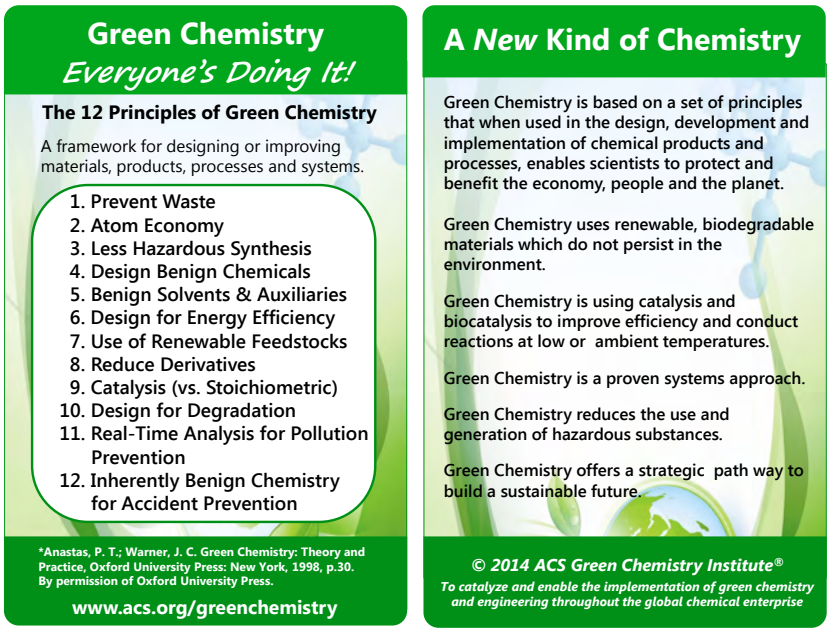
known examples of the badwill the chemical industry has built for itself.
Fast industrialization of emerging economies has made pollution from the chemicals industry a manifest and sensitive problem in Asia, South America and most evidently in China. The list of citations can be long. In 2014, in the city of Lanzhou, water was declared not potable anymore because of benzene contamination. In 2013, the long time "white" river in the Yunnan province was heavy metal contaminated at a level of 50 times higher than limits because of improper waste water discharge. As a result of these recent events, the environmental consciousness once only the preserve of Europeans or Americans is now spreading globally.

Industry regulation and derived investment opportunities

www.reach24h.com, Website of a leading China based consulting firm focusing on diffusion of REACH standards

It took several decades for the environmental and health externalities to be reflected in regulatory frameworks and even more for the chemicals industry to agree on a code of conduct, but it ultimately happened. As a result, environmental spending rose from 3% of total operational investments in the '40s to 20% in the '90s. In the US alone, from 1970 till early 2000 chemical companies have spent more than $36 billion for pollution abatement and control: an interesting investment opportunity well before the solar industry even existed. And effective as well: air emissions went down 65% and industry output grew 30%. EU obtained similar results from 1990 to 2010: emissions went down 49% and output grew 21%. The above mentioned disasters have been instrumental in shaping the chemical industry as it is today. The Seveso accident forced the European Union to act and it produced in 1982 the Directive 82/501/EC, a European Union law aimed at improving the safety of sites containing large quantities of dangerous substances; also known as the Seveso Directive. On the same line but even more important from Ambienta's perspective is the EU REACH regulation (Registration, Evaluation, Authorisation and Restriction of Chemicals) first entered into force in June 2007. This regulation addresses the production, usage and import of almost any chemical substance which has an impact on human health or the environment. Since chemical substances are used in all industries, it affects almost any aspect of life in the broad chemical industry. With a planned execution timeline of ten years, a continuous update cycle and specific phase out timelines for substances progressively deemed undesirable, REACH is a never ending promoter of product and process innovation within the chemicals industry and in all industries where chemicals are used. A number of countries in the world outside the EU are now adopting REACH or using it as a reference for example Switzerland, Turkey and even China.

Seveso disaster, 10 July 1976



12 Principles of Green Chemistry. Developed by Paul Anastas and John Warner

Today, especially in the last decade, the term "Green Chemistry" has become widely adopted and it is associated with compounds or products that originated from vegetal sources instead of oil. Green Chemistry has been used to identify a shift in raw materials from fossils to renewables. Reports forecast that $3 billion of Green Chemistry investment opportunities in 2011 will grow to $200 billions in 2020; from less than 0,1% of the chemical industry to about 4%. Nonetheless, it should be now clear that environmental investors in chemistry are by no means limited to Green Chemistry only, but rather see a much broader opportunity.

Indeed the term "Green Chemistry" was coined in 1991, much earlier than its recent adoption and it was used not to identify a specific subsector but rather to define a philosophy to apply to the whole chemical world to encourage the design of products and processes which minimize the use and generation of hazardous substances. Paul Anastas, a chemist, now a director at Yale University, defined the "12 Principles of Green Chemistry" which includes simple concepts that redefine the approach to the world of chemistry from research to production: minimization of waste, removal of pollutants (e.g. solvents) where possible, minimal energy consumption, preference for renewable feedstocks,... This "Green Chemistry" is in line with the lens Ambienta uses to identify environmental investments in the broader chemistry value chain.
We can group environmental investments in chemistry in 3 groups:

- Chemical products from renewables feedstock (the "classical Green Chemistry"): e.g. biomaterials in general
- Equipment (both hardware and software), services and solution enabling resource efficiency and pollution control in the chemical industry: e.g. desulphurization equipment, filtering solutions, waste treatment solutions, more advanced handling processes
- Advanced chemical products characterized by a reduced environmental footprint (i.e. paints, glues, food additives,…) or products beneficial to resource efficiency and pollution control in their application scope: e.g. catalyzer for pollutant removal in refineries

System for air pollution abetement. Source: PEI

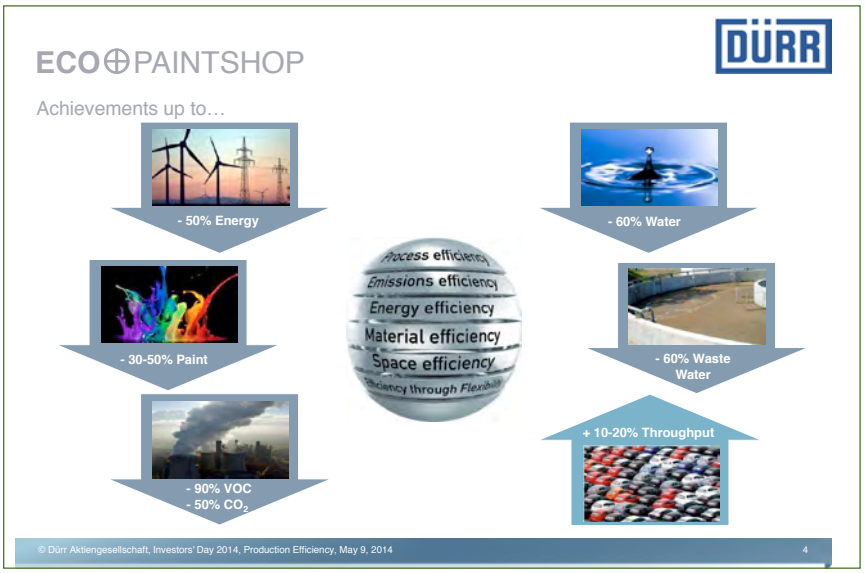
Ambienta's approach is very consistent with the focus of emerging economies, which China will lead, in the next years. In fact the most recent China's Five Year Plan puts pollution very high on the agenda and sets high investment targets to start to cope with deteriorated air, water and soil. This will mean more business for the many European companies who master relevant product and services for the purpose.

Spig's, Ambienta's portfolio company that designs and manufactures cooling towers which reduce water consumption and pollution in heavy industry like chemicals, is a clear epitome of this growing global awareness of pollution control and resource efficiency. It grew in the last decade from a tenths of millions Euro turnover European business into an almost 200 millions Euro global yearly order book.

Environmental investing in the chemical industry: latest examples

For all these reasons we believe that environmental investing in the chemical industry value chain has a much broader scope than people imagine and will have a bright future. If pollution control was once considered a financial and economic burden now it is a competitive advantage i.e. business.

Oskar Nolte GmbH, the coating solution provider to the furniture industry Ambienta invested into in April 2015, is a clear example of this trend. Oskar Nolte decided to focus exclusively on waterborne coating solutions in the '90s after a solvent related fire accident at its plant. Solvents, beside being toxic and pollutant, are also volatile and flammable. This decision to significantly decrease solvent content in all its paints eventually allowed Oskar Nolte to reduce its plant complexity, streamline operations, reduce environmental compliance costs, save 6000 tonnes of solvents per annum and ultimately turn Oskar Nolte into the cost and quality leader in its industry.



© Dürr Aktiengesellschaft, Investors' Day 2014, Production Efficiency, May 9, 2014

In the same way the largest manufacturer of paint shops for the automotive industry in the world, Dürr AG, claims its new shops are materially more resource efficient and less pollutant that they were 10 years ago (Picture 2). The reduction in energy, paint and water consumption and solvent emissions Dürr achieved in the last years are now the key selling point of their equipment. These features are recognized by customers as competitive advantages.

Opportunities can be found in the safe handling of harmful or polluting chemicals. Safe handling processes will increasingly be required by chemical companies and by users of harmful chemical. Companies which provide safe handling or disposal services of hazardous chemical are very likely to be a growing breed with potentially interesting returns on invested capital.

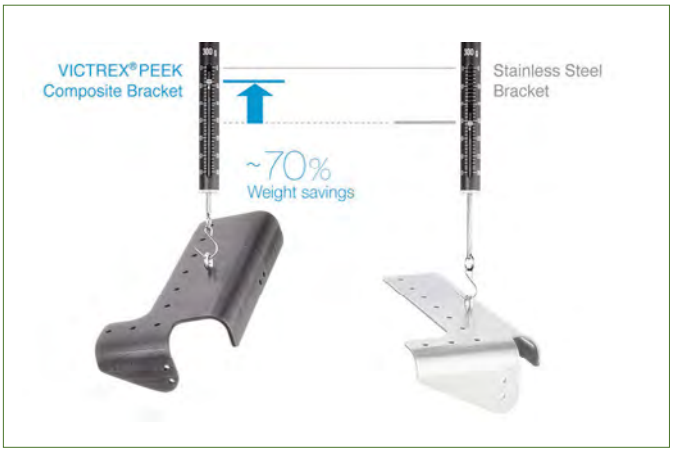
In 2011 Süd Chemie, a large German producer of catalysts and adsorbers, was acquired by

Foto ©silverphin/123rf

Clariant at a 10.5x EBITDA multiple. Why such high valuation? Besides evaluation of synergies often crucial in M&A, Clariant would have weighted the nature of Süd Chemie product offering which typically enable "sparing use of energy and water, enhance quality of life and environment, are essential for efficient chemical processes and for enabling emission control" (from Süd Chemie's website). At that time Süd Chemie had also entered lithium iron phosphate batteries, a key pillar of the case for electric vehicle development. Most of Süd Chemie products play a crucial role in sustainable development and are set on a long term growth path.

In our collective imagination chemical businesses are large billion dollar businesses while, in reality there are thousands of small mid-sized firms in the industry. For example Victrex, a UK based producer of advanced polymers (PAEK and PEEK mainly), grew from a start up in early 80's into a 50 million pounds company in early 2000's and then into a 250 millions pounds company in 2014 with an annual CAGR of more than 10% and an average EBITDA in excess of 30%. Victrex is yet another example of how product innovation in chemistry can shape industries. Its polymers are able to deliver outstanding mechanical performances with a much reduced weight in comparison to standard metal components. Thus, many industries as aerospace and automotive, which are increasingly looking for fuel efficiency, have adopted its products for components that are up to 80% lighter than equivalent metal based ones.

Carbon Fiber Composite Brackets Made from Victrex® Peek Reduce Aircraft Fuel Costs



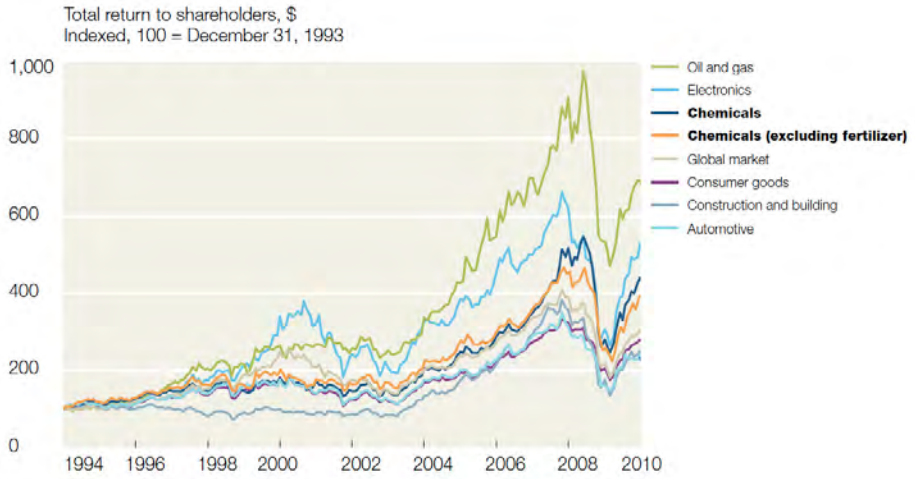
The fertilizers industry, for example, is characterized by large businesses like Yara or Potash Corp, but there are also many smaller specialist players in the 10-100 million turnover range focusing either on emerging niches like bio-stimulants or on specific market segments like fertirrigation products. These companies very often rely on specific natural raw materials like algae that advanced chemical techniques transform into molecules which enhance cultivation yields by improving crop resistance to diseases. This industry, as part of the agriculture revolution towards precision agriculture, is undergoing a great transformation driven by the search for increasing yields, for reduction of pesticides and of traditional fertilizers. Applied

chemistry and bio-chemistry will represent an important bit of this transformation through product innovation and, at the same time, an attractive investment opportunity that can be captured through mid sized European companies in Italy, Spain or France.

These specific examples of potential opportunities are just single bits of an industry that has proven to deliver above average returns. Listed chemical companies showed in the last 20 years above market average total shareholder returns. M&A across the broad chemical industry and value chain is poised to continue, with Private Equity playing a crucial role in company reorganizations and margin improvement. Private Equity firms carried out 18% of the 916 large chemical acquisitions in the period 2000-2012.

In conclusion we believe that the chemical industry, as many other industries, has been shaped in the last decades by environmental trends despite it being very often associated with pollution and hazard. However, pollution and hazard turned out to be the beginning of many environmental investment opportunities. With our lens we recognize that the continuous research, regulatory drive and investment have made the chemical industry much cleaner, safer and properly handled than it was in the past. As consumers we can only reinforce this message and push the industry along an even greener path. As investors, as Ambienta, we support companies whose products and services contribute to the efficiency and pollution control trends which shape this industry and make a contribution to a more enjoyable, cleaner and healthier environment for our generation and the ones to come.

McKinsey on Chemicals, Number 3, Winter 2011. Source: Datastream McKinsey chemicals capital-marks perspective. Update 2010



The author wishes to thank Giorgio Clarizia and Rolando Polli for their contribution to this article.