



# **RETHINKING PRINT DESIGN**

The impact of sustainability on the future  
of print

Camille Romano

Bachelor's thesis  
April 2014  
Degree Programme in Media

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## ABSTRACT

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Bachelor's thesis 69 pages, appendices 2 pages

April 2014

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Sustainability is a current design topic of both interest and concern. After decades of scientific research, the environmental impact of human activity on nature is now widely recognized. Print, when it involves paper, is a discipline of design that is especially demanding on these resources. Print has been the primary target of action of the green revolution. This explains partially its steady decline and why print design needs to reinvent itself to continue to be a relevant means of communication.

The thesis aims to show that sustainability, instead of being the downfall of print design, is actually a phenomenon that has the potential to reinvent this discipline. The theory part gives an overview of the conceptual, technical and economical innovations sustainability brings to the print industry. The background research has been performed in order to develop the hypothesis that sustainability is redefining print design and providing it with a credible and relevant future among digital supports.

The practical part of this thesis consists of conducting a qualitative research in form of focused interviews of four professionals in the field of sustainable print design. The aim was to collect empirical data in order to gain a deeper understanding on what is sustainable print design. Eventually, this data confirmed my above-mentioned hypothesis. Moreover, I had the intention to carry the thesis question further by approaching the subject from a more concrete standpoint. I took the opportunity to collect empirical data in order to understand the factors and approach that led to developing a successful sustainable print business.

The results suggest that education on sustainability is an essential power for awareness to environmental issues that can translate later on, on the successful implementation of sustainable practices in a professional workplace. Personal motives showed to be necessary to develop thoughtful and innovative creative frameworks. Finally, the respondents unanimously agreed that sustainability will redefine print design and give it a relevant status among digital technologies.

The findings indicate that sustainability is an inclusive phenomenon that other areas of design need to take into account to continue to be relevant in the future. This is the case of web and digital design which environmental impact, though little-known, represent a new, colossal threat for the environment.

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Key words: print design, sustainability, environment

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## ABBREVIATIONS AND TERMS

Digital/ Digital design	A term used to describe a wide variety of computer related skills, includes work in fields such as web design, digital imaging and 3D modeling. The term can further be expanded to any digitally created visual media.
Sustainability/sustainable	Any action that does not degrade the systems supporting it, and therefore can persist indefinitely. (Dougherty 2008, 28)
Sustainable design	The aim behind sustainable design is to avoid negative environmental impact completely through skillful and thoughtful design. Manifestations of sustainable design require no non-renewable resources, impact the environment minimally, and connect people with the natural environment. Beyond the "elimination of negative environmental impact", sustainable design must create projects that are meaningful innovations that can shift behavior. A dynamic balance between economy and society, intended to generate long-term relationships between user and object/service and finally to be respectful and mindful of the environmental and social differences. (EngageByDesign, 2011)
Greenwashing	When a company or organization spends more time and money claiming to be “green” through advertising and marketing than actually implementing business practices that minimize environmental impact. (Greenwashing Index, 2013)
Print/ Print Design	As used in this thesis, the word refers to any area of design whose final product will end up as a physical printed item. It includes packaging, advertising, corporate identity, publishing, logo design, illustration and so forth. This thesis will cover mainly paper printed items.

## 1 INTRODUCTION

The idea of this thesis came when, after personal research, I began to familiarize myself with the principles behind sustainable design. I had little to no knowledge on the matter but I found this phenomenon fascinating due to the various innovations and creative revamping it brings to the print industry.

The adjective *sustainable* defines any action that does not harm the systems enabling it and can thus, in theory, carry on indefinitely (Dougherty, 2008, 28). Undoubtedly, sustainability is an inclusive phenomenon that raises the question of responsibility to all industries and ultimately each individual. After decades of scientific research, the environmental impact of human activity on nature is a widely recognized fact. Print—including packaging, edition, brochure, and all physical, printed items— is a discipline of design that is especially demanding on these resources. Print has been the main target of the *green revolution* which partially explains its steady decline. Print design needs to reinvent itself to continue to be a relevant means of communication.

In this thesis, my aim is to explore the topic of sustainability in direct relation to the necessary rethinking of print design. This includes an overview of the impact of sustainability on conceptual design ideals, such as what is *good design*, the role of the designer and education. I will also approach the subject on a technical standpoint— material innovations and engineering—and economically speaking by going through business related matters such as the value of sustainability in branding. This background research was performed in order to develop the hypothesis that sustainability will redefine print design and provide it with a credible and relevant future among digital supports.

I chose to perform a qualitative research by the means of focused interviews of four professionals of sustainable print design in order to collect data confirming my thesis hypothesis. Also, my aim was to gather empirical knowledge on the circumstances and means that led these professionals to developing successful print businesses that follow sustainable standards.

## 2 PRINT DESIGN AND SUSTAINABILITY

### 2.1 Background

#### 2.1.1 Print Design Now

Print design has never gone under such transformative process than during the introduction of computer in the 1980's and the digital technologies that would follow. Prior to that, the process of creating printed materials was very lengthy. Graphic designers were using scalpels, drawing boards, darkrooms and typesetting machines, and a wide arsenal of tools that have become now obsolete. Typically, a creative team was composed of many individuals, each with a strength in a particular technique:

There used to be a designer that was very good with the rapidograph for instance, so they were almost an artist in the sense of the lines they would draw, where the rule was and whether it was a certain size. And there might be somebody else that was very good with a photostat camera, and they would make position stats to indicate the exact cropping, and the size and position of the images on a page. Maybe somebody else was very good with the mechanical boards in terms of paste up and using rubber cement and getting photostats pasted down onto the page layout exactly where they needed to be. (PsPrint 2010.)

The advent of the computer did make all these techniques unnecessary and speeded the creative process up fourfold (Perez 2010). Nowadays, our everyday lives are deeply intertwined with digital technologies. Smartphones, tablets, laptops and such provide instant and open access to information and communication. Will the digital technologies replace print? Since the rapid growth of the Internet, this is a question that has been popping around the marketing world.

There is no way to deny that print industry has been affected by digital devices. For instance, in the USA, the print industry's revenues are declining at an average of 6.2% every year and the projections show that this decline will continue in the next five years, though at a slower pace (piworld.com, 2012), at a time digital devices are becoming more and more popular. However, it would be wrong to conclude that print design is disappearing. Time has shown that print is holding its stance rather strongly among

digital medias, and even benefit from their apparent success. The reason is that print design still—and will—carry out classic values that web is struggling to attain.

Credibility is one of them. Over the years, the web has been victim of its own success. While it is true that the web provides us with handy, instant access to an overwhelming amount of data, it has grown into a saturated host for ads, information, news and resources of all kinds. In certain cases, digital supports are even striving to look like print to attract audience, for instance with e-books. The fact that anyone can publish and express themselves on Internet has taken a toll on the quality of the content. It has also become harder for businesses to get their voice heard among the digital cacophony. Nowadays, anyone can put up an internet website or digital campaign with little means. In contrast, print always carries a sense of legitimacy for a brand, business or publication. An impression of quality and reliability is carried through the printed support, attesting of a real effort to impact and connect with the audience.

Print publications that consistently deliver high-quality, reliable content develop credibility with their readers. Businesses capitalize on something called the "halo effect" to use the credibility of publications to their own advantage. In essence, the "halo effect" means that a person takes a positive thought or feeling associated with one thing and applies it, appropriately or inappropriately, to something related. In the case of print publications, the readers take the credibility generated by the quality of content and apply it to the advertisements, making the readers more likely to purchase a product or service. (Dontigney 2014.)

This is especially true when the layout of the printed material is well executed. It is a feeling of substance, tangibility, *authenticity*, missing from the ephemeral and desensitizing media world of digital communications (Kaye 2013) that appeal to our senses. The physical and emotional reaction from touching paper and holding the object is the key to leaving a lasting impression in our minds. All good printed publications give a feeling of substance and stimulate the senses as it has been crafted carefully by experts in their field (printpower.eu 2014).

This last part is crucial to establish a qualitative hierarchy between digital and printed content. As well as being accessible and practical, printed materials have the power to *engage* the people reading (in the case of publications), more than websites which are often swept as fast as a 15 second visit (Forbes 2012). Martin Pecina, professional book designer and brilliant typograph, proclaims during his interview with *Novum Magazine*



*World of Graphic Design* that “No flat screen can take the place of well-designed magazines with fine typography; printed on fabulous paper.– –Print is by no means dead. I personally hope that e-books will simply just kill off poor-quality literature, increasing demand for good typography and beautifully designed books.– – Anything else can be downloaded from the Internet” (2013, 28).

Finally, print is still one of the most *influential* supports for a successful advertising campaign when it is combined with other medias.

An effective marketing campaign works best when print is used with other medias as one element of an integrated solution. Adding magazines to a mix of TV and internet increases brand favorability by 44% and purchase intention by 15%. (PrintPower, Dynamic Logic 2009.)

Print persists as a relevant support which offers unique benefits to its users. Numbers might show it is declining globally but its influence remains. Rather, print is repositioning itself to be a relevant answer to the needs of publishers, advertisers, consumers and businesses in the digital age. Such transformation calls for a new and unique angle to redefine what print is and that it will be. The best way to do so is to evaluate what needs to be changed and improved to provide the industry with new guidelines, ethics, technical innovations and therefore a viable future. Currently, there is only one solution that could benefit the print industry with such conversion: sustainability.

### **2.1.2 Sustainability: a *wave* phenomenon**

Even though sustainability is a very current subject of discussion and action, this concept is not new. In her 1962 book called *Silent Spring*, Rachel Carson, an American marine biologist who would become later a full time writer, was the first one to connect human impact, particularly in the use of pesticides, to environmental problems. It is widely agreed that *Silent Spring* triggered a revision of the American pesticide policy which led to a ban on some of the worst chemicals used in agriculture at that time. Carson also generated interest in environmental concerns to an unprecedented proportion of American people. Along with Carson, two other visionaries, perhaps less known, widely inspired designers to reflect on their responsibility towards the

environment's degradation and social injustice: Buckminster Fuller (1895-1983) and Victor Papanek (1923-1998) (Sherin 2008, 16).

As an inventor, scientist and environmental activist, Buckminster Fuller's concerns were related to the unsustainable use of natural resources and the ability for humans to survive with such production system. Aware of the finite resources that Earth can provide, he believed and promoted the concept of doing more with less. He was convinced that the level of technological advances, proper knowledge the amount of natural resources that had already been extracted from the ground by the mid-20th century would eliminate the need of competing for necessities. He thought that resources and raw material waste could be recycled in order to make new products and therefore increase the efficiency of the whole industrial process.

Initially trained as an industrial designer, Victor Papanek was opposed to the manufacturing of poorly designed, purely aesthetical, useless objects. In his iconic book *Design for the Real World*, he wrote "One of my first jobs after leaving school was to design a table radio— It was my first, and I hope my last, encounter with appearance design, styling, or design 'cosmetics" (Papanek 1972). He believed that only a small part of the responsibility of a designer lies in the area of aesthetics and that "design has become the most powerful tool with which man shapes his tools and environments" (Papanek 1972). His statement clearly shows his belief that designers have a significant impact towards the environment's well-being, or its demise. In his second book called *The Green Imperative*, Victor Papanek stated that one of the mandatory skills of a designer included "the wisdom to anticipate the environmental, ecological, economic, and political consequences of design intervention" (Papanek, 1995). He went further on to raise the question "whether designers, architects, and engineers can be held personally responsible and legally liable for creating tools, objects, appliances and buildings that bring about environmental deterioration" (Papanek 1995), At first, voicing such bold opinions outcast him from his colleagues. By the mid 1990's, with the help of his second book *The Green Imperative* and the positive evolution of the public opinion about sustainability, many of Papanek's contemporaries who had originally been doubtful changed their minds and went on supporting his ideas.

Along with early environmental visionaries, several historical facts helped to bring environmental issues to light. As a result of several millennia of technological

innovations, humanity got a hold over the environment. Particularly during the industrial revolution of the 18th and 19th centuries, we realized the immense potential behind the fossil fuels, such as coal, natural gas and petroleum. Electricity along with modern sanitation systems (and consequently the eradication of diseases related to poor hygiene) and advances of medicine provided the humanity with the best conditions for economic, social, technological expansion. From 1650 to 1850, the global population doubled from around 500 million to 1 billion (Goudie 2005, 8). At the time, only few people expressed their worry about the environmental impact of human expansion such as Reverend Thomas Malthus (behind the criticized theories of overpopulation), or Eugenius Warming, who, in the late 19th century, was the first scientist to study the physiological relations between plants and their environment, establishing the discipline of ecology (Goodland 1975, 240-245).

As a result, the human consumption of resources increased exponentially by the 20th century, with a population always growing, up to this day. The energy crises of 1973 and 1979 showed how dependent on non-renewable resources societies had become and marked a certain turning point for the future of sustainability. Important regulations on energy conservation and environment protection would emerge during the following 1980's. American President Carter made 1980 a "year of energy conservation". In the same year, the International Union for Conservation of Nature pointed up the deterioration of the world's ecosystems in its influential *World Conservation Strategy* followed by *World Charter for Nature* (1982).

Starting from the 1970's to 1990's, the first alternative sustainable sources of energy, namely wind turbines, photovoltaics and hydroelectricity appeared as an alternative to the use of nuclear energy or fossil fuels. The first large-scale solar power plants appeared during the 1980's (southface.org 2009), and many governments began to carry out small sustainability policies on a local or broader scale.

### **2.1.3 The "Green Consumer Bandwagon"**

According to sustainability consultant and author John Grant, such initiatives made the public jump on what he calls "The Green Consumer Bandwagon" (2007, 24). Grant goes on to explain that the sudden public interest towards the adoption of sustainable

practices were triggered by irrational emotion responses to a series of natural disasters and man-made events around the globe that took place in the late 1980's (2007, 24). Floods in Bangladesh, earthquakes in Armenia, famine in Eritrea and the coming down of the Berlin Wall (2007, 24-25) created a momentum favorable to hope, togetherness and desire for change. As a result, brands made haste to declare their green credentials in order to boost their sales while individuals followed the trend mostly as a result of their *herd* instinct (Grant 2007, 24) just to do as others do. Such initiatives had a significant impact on the public awareness. Sustainable behaviors emerged, such as recycling and the shift to renewable energies but did not last in the long term. According to Grant, the fundamental issue with the *green consumer bandwagon* was that substance did not justify the hype (2007, 24). Businesses failed to make meaningful, long term contributions to the movement and the technical innovations did not back up the green ideals of the time.

“Many of those [environmentally-friendly] products were outright failures: biodegradable trash bags that degraded too quickly; clunky fluorescent bulbs that emitted horrible hues; recycled paper products with the softness of sandpaper; greener cleaners that couldn't do their job. Much of it was expensive to find, to boot.” (Makower 2006.)

Partly because of the rush to exploit green agendas for commercial ends (Grant 2007, 26), the environmental hype slowed down, at least for a while.

#### **2.1.4 The 21<sup>st</sup> century wave**

The resurgence of sustainable concerns since the past decade or so gave a certain hope for real changes. But what makes this *wave* different than the one that failed at the beginning of the 1990's?

First of all, environmental degradation is still a very current reality. According to the latest report on Climate Change, *The Physical Science Basis* by the Intergovernmental Panel on Climate Change (IPCC), published in 2013 states that “science now shows with 95% certainty that human activity is the dominant cause of observed warming since the mid-20th century – warming in the climate system is unequivocal with many of the observed changes unprecedented over decades to millennia” (IPCC 2013,V).

Secondly, businesses cannot anymore mislead consumers with unsubstantial products or empty actions towards the environment (called *greenwashing*). *Consumer literacy* has improved greatly, partly because of the failure of the past attempt in the 1980's, making consumers more skeptical and demanding towards brands in general. Also, businesses are starting to seriously consider the fact that green, meaningful marketing can go along with profit, and the real benefit to invest in environmental actions in terms of brand value.

Certifications are also a very important element for the credibility of the sustainable movement. Despite the fact that they have multiplied over the years, causing a certain confusion and lack of transparency for the consumer, they are setting standards for industries and businesses, as the small to big-scale intergovernmental actions taken worldwide. In *The Green Marketing Manifesto*, Grant argues that individual lifestyles need to change at the same pace as intergovernmental agreements (2007, 30). This can be applied to print designers as well. Grant goes on explaining:

“Can't we [individuals] leave it all up to big businesses and governments? They could take care of things at an infrastructure level. Some people find that a tempting line of argument; make consumers incapable of doing damage by changing the processes behind the products they buy. The problem is that, ultimately, we drive the cars, take the flights, vote for governments and create pressure on industries. Not as individuals but as mass average” (2007, 30.)

Up to a certain point, shifting responsibilities will not be an option. “A feeling of futility haunts the bustling shopping centers” writes Eric Eriksson. Consumers are starting to understand their responsibility along with the power they represent, the pressure they can put on businesses or governments to take significant measures in regards to the environment.

This fact also applies to print designers. An ever increasing number of them understand that they are a part (as small as it is) of the global environmental issues but also a part of the solution. The technical innovations in terms printing techniques and materials have been remarkable. They provide now the capability to back up ecological ideals and reinvent print design. Graphic designers are grasping the benefits—competitive,

economical, moral, and ethical—to make sustainable practices an integrated part of their work practices.

The next part of the thesis will deal with the impact of sustainability for print designers on a conceptual level, precisely on the designer's ideals and the necessary shifts of values it will imply. I will show that sustainability will define our era and shape the future of print design. The process has already started as an increasing number of designers are questioning the way they have been taught to design, the aim of their work, their position in the manufacturing process and the responsibilities that come about. These conceptual preoccupations will be the subject of the following part of my thesis.

## **2.2 The shift of designers' ideals**

### **2.2.1 Redefining the concept of *Good Design***

The concept of *good design* has been a controversial subject of discussion among professionals, partially because of the ever-changing world we live in. *Good design* has been forged and molded by social and economic circumstances, artistic values and technological advances, since its conception in the middle of the 20th century.

From 1949 to 1955, the influential MoMA<sup>1</sup>, under the direction of Edgar Kaufmann Jr., took upon itself to arbitrate upon the subject of “What is Good design?” through numerous exhibitions of the same name. They were aiming at “focusing the public and corporate attention on the quality of products, affecting consumer perception and encouraging manufacturers to improve the quality of their products through wider use of professional designers (Buchanan, Aiga 2000, 1)”. Despite the success of the exhibitions, their content and message created a heated debate that still persists today. The main issue concerned the dogmatic tone of the exhibitions. The shows restricted the concept of *good design* down to specific products that Kaufmann and his fellow designers had selected. All the objects presented demonstrated aesthetic qualities along

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<sup>1</sup> Museum of Modern Art, New York.

with functional clarity and efficiency (Buchanan, Aiga 2000, 2) which were criticized for solely representing the taste of a small, elitist group. These standards were already, over six decades ago, too narrow compared to the undergoing explosive technological, social and cultural change that most western countries undergone at the time.

Nevertheless, the modernist values promoted by *good design*— an alliance of beauty and function— have been and still are an accurate basis on which to assess the certain success of a design. These values also gave credibility and acknowledgement to the newborn designer profession. They were relevant and sufficient at a time where societies experienced an economic and social boom that translated into an increased need for manufactured goods. Before the 1960's, neither consumers nor industries acknowledged the impact of their activities on the environment, willingly or not. As Julie Kerr Casper, Ph.D. and Earth scientist at the U.S. Bureau of Land management explains:

Even worse was what— the [industrial] revolution did to the human mind-set. It changed the way people thought about themselves in relation to nature. Unfortunately, for many, it promoted the idea that humanity has finally mastered nature and was now apart from and above it (Casper 2010, 65-66.)

The idea was also shared by most modernist designers. Subsequently, the impact of a design on the environment was not a criterion for judging of its quality. The shortcomings of the modernist concept of *good design* are even more apparent nowadays, as the visible environmental issues have been widely studied and recognized.

### **2.2.2 The lack of context**

Back in the 1950, the other issue with the “What is good design?” exhibitions was that the objects presented could not be judged for their performance in their situation of use. As a matter of fact, the MoMA intentionally emphasized the contextual disconnection of the designs exhibited. As Buchanan recalls “they were typically displayed on pedestals against neutral backgrounds signaling a cultural statement with symbolic meaning.” (2000, 2). The concrete products’ performance in the daily life of the people was left to the imagination of the visitors.

We can transpose this blatant lack of contextuality in today's lack of awareness in sustainable print design techniques. In fact, it is more an issue of context of production than context of use. While a lot is done to achieve aesthetic beauty through a well-thought combination of typography, paper, colors and graphic elements and the usability through targeted marketing, *good graphic design* barely relies on the hidden, backstage manufacturing process. A printed product will be deemed good if it fulfils aesthetical and functional goals, leaving out its ethical qualities. Whether it is because of the ruling status quo or a real absence of knowledge in the matter, the concept of *good design* needs to follow the changing context and correspond to the contemporary values for print design as a whole to stay relevant.

Print design would benefit from the addition of a sustainable criterion in the sense that it would raise expectations and allow a place for even greater design and designers. This is a viewpoint shared by many designers, such as Janice Antley, founder of MightyMouse Productions:

We need to be very selective in what we print. But in that one piece, we move those who see it to act, to buy to feel something more than a passing glance.”(Antley 2013.)

Print design would greatly gain value if we considered the higher standards that sustainability demands and the reduced amount of available printed products. Print design has the potential to create its own niche by symbolizing luxury and refinement while still being relevant among digitised medias. No flat screen can take the place of well-designed print, anything else can be downloaded from the internet (Pecina 2013 ). Sustainable print designers do possess many advanced skills in problem solving and broader specialties—material engineering, ecology, biology, chemistry...— due to the additional challenges they have to face compared to the “regular” print designers. This is a great advantage on the competitive marketplace as sustainability as a whole movement is gaining an ever-increasing influence among corporations and consumers.

Sustainability has also the power to unify the concept of *good design* that designers, for decades, have been debating about. Subjective views on aesthetic qualities or functional performance have been at the center of those arguments. Thereby, the concept of *good design* became an obsolete set of guidelines that probably allowed “mediocre design” spread under the deceptive cover of taste subjectivity. To this regard, sustainability



could provide a common ground on which all designers, whatever their tastes, could agree on for this simple reason: how can a design be *good* if it harms the system that created it?

### 2.2.3 The role of the designer

Similarly to the concept of *good design*, the role of the graphic designer is changing at a fast pace. Influenced by the technological and contemporary cultural and social concerns, graphic designers are bound to face the issues concerning sustainability in and of their work. Graphic design is essentially a world of stuff (Dougherty 2008, 10). Indeed, print design depends heavily on natural resources and produces physical products. This is perhaps the main reason why the responsibility of a graphic designer on adopting sustainable practices so often comes up.

Graphic designers occupy a particular place in the whole manufacturing chain. They are the intermediate between all sorts of entities—corporations, businesses, associations and such— and the mass audience such as consumers. As communication professionals, they craft messages and build brand identities that can have impacts far beyond the paper they print on (Dougherty 2008, 10). Exercising such influence and pivotal role within industries gives an idea of the potential power for change at graphic designers grasp.

It should be deeply ingrained in our minds that visual creators have a great power that they are not probably even yet fully conscious of. We, graphic designers have to use that power wisely (Aalto University, Ciechanowicz 2013, 14.)

With power come responsibilities. Graphic designers can offer the sustainable revolution the power and visibility it needs. There are many ways designers can do it because sustainability provides with a broad range of actions.

In *Green Graphic Design*, Brian Dougherty defines three specific roles that a graphic designer could embody that could determine the type of sustainable actions one could perform (Figure 1). They are: designer as a manipulator of stuff, designer as a message maker and designer as an agent of change (2008, 8-13).

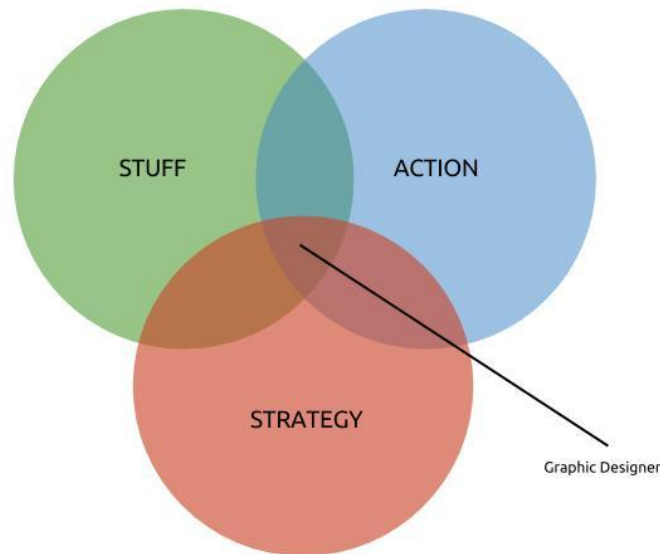


FIGURE 1. Graphic designers' three focus points and roles, according to Brian Dougherty.

The manipulator of stuff focuses on the traditional and technical part of graphic design: word, images, typography and materials. Such a designer tends to be into the conception of state-of-the-art physical artifacts. Their efforts towards sustainability would target the use and finding of innovative eco-friendly materials and printing techniques.

The strategy maker believes rather in the impact of ideas. He deals with another level of graphic design: brand building and communication strategy. Such individuals would find an interest in crafting and delivering messages that would impact the environment positively. One way is to work for non-profit organizations or sustainable businesses to shift the competitive landscape towards more sustainable practices. Another way is to work within big organizations and be responsible for their design management decisions.

Finally, the agent of change believes in action. Out of dissatisfaction for established system or situations, a designer can convince clients and audiences through his work to shift their priority towards sustainability. Green design at this level is about being a force for positive change (Dougherty 2008, 13).

These three roles mostly depend on an individual's personality and aspiration as a designer even though we could consider the level of freedom at work as another criterion. This approach just shows the wide range of possibilities for a designer aspiring to sustainable practices. However, as much flexible and "customizable" the process can be, it is necessary to implement sustainable practices meaningfully within the creative process. This part can prove to be difficult which is why, during the past decade or so, a fair number for visionary designers came up with theoretical framework to make the transition smoother for the designers who want to integrate sustainability as a part of their work ethics. The next part of the thesis will give an overview of these new sustainable actions.

### **2.3 Emerging creative frameworks**

The reality is that indeed, designing with sustainability in mind is harder than omitting it. Print designers will have to learn more, struggle against the status quo, and possibly try things that no one has tried before (Dougherty 2008, 18). However, it is the very nature of designers' (print designers included) task to overcome challenges and experiment to improve upon the past (Dougherty 2008, 19).

The extent of the challenges equally shows the extent of the possibilities and improvements that can be reached. It's a sign that environment-friendly design is enthralling for the print design discipline and has the power to reshape it to make it relevant for the future. According to Grant "It [sustainability] is the most exciting thing to happen in our profession- and business in general- since the internet" (2007, 31). This statement echoes Brian Dougherty's opinion on the prominence of sustainability, as "one of those waves, like the rise of modernism in the 1930s and the personal computer revolution in the 1980s, that change nearly every aspect of our society—and every design industry, including graphic design" (2008, 21).

Nowadays, it is pretty easy to find books about eco-design in libraries, book stores or museums' shops. While some of these books focus on giving anecdotal advices, inspiring eco-ideas or showcasing sustainable designs, only a very few of them offer deep insights on how to relevantly implement sustainability into a designer's creative work process. The reason is that it requires knowledge in an array of domains to write

such books— materials, ecology, sustainable development, laws and regulations, chemistry, biology— which go beyond the scope of a conventional print designer’s knowledge and education. It also requires the ability to rethink the way we create and produce, which is probably the hardest skill to acquire.

Fortunately, during the past decade, a fair number for visionary designers came up with theoretical frameworks to make the transition smoother for the designers who want to integrate sustainability as a part of their work ethics. In the following part, I will introduce three of these methods.

### **2.3.1 Designing backwards**

Designing backwards (or backward design) is a method that has been primarily applied to educational curriculum design. This method consists of focusing on the desired learning from which appropriate teaching and assessment will logically follow (Wiggins, Grant 2005, 14). In *Green Graphic Design*, Brian Dougherty, acclaimed graphic designer and founder of Celery Design Collaborative, demonstrates how this method can be implemented in order for a graphic designer to overcome the usual obstacles encountered when proposing ecological alternatives in a creative project. According to Dougherty, those obstacles in question usually arise whenever designers attempt to break the status quo and try to do anything out of the ordinary (2008, 44). Unsuitable for customer demand, budget, schedule and material unavailability are among some of the most common excuses that a graphic designer will receive when suggesting green alternatives to a client. However, they can be overcome by conceiving a whole project ahead of time, before it reaches the production phase (Dougherty 2008, 47). The method of designing backwards is a creative brainstorming process that will start from a project’s final destination all the way to the design studio (Dougherty 2008, 48). Throughout the backward journey, the designer will be able to know what difficulties to expect for each step of the project’s making and imagine the best solution to it, illustrated in Table 1.

TABLE 1. Overview of the *Designing backwards* process within the print design production method. The issues and sustainable solutions are according to Dougherty.

<i>Designing backwards STEPS</i>	<b>6 Waste</b>	<b>5 User</b>	<b>4 Delivery &amp; packaging</b>	<b>3 Warehouse</b>	<b>2 Bindery</b>	<b>1 Printing</b>
Issues	End destiny in perpetual litter or landfill	Inefficient marketing Negative customer experience	Inefficient transport Unsuitable packaging	Material waste Inefficient printing press and process	Material waste	Toxic Chemicals Deforestation Greenhouse Gases Water contamination High energy consumption
Creative and sustainable solutions	Recyclability Reuse Compostability	User scenario planning Added value through design Educate Enable action	Design for distribution Efficient packing Stripping away layers Alternative distribution	Print on demand Usage audit Press sheet design	Mechanical binding Eliminate trim waste	Design for green printing Recycled paper Design press sheet Digital printing UV/Low VOC printing

While the table above shows that there is room for improvement in each step of the print production process, it is mainly left to the graphic designer or creative team to make sure that appropriate sustainable decisions are taken along the way. Sustainable print production differs significantly from a “regular” one and the way to measure its success will depend, in many ways, on how effectively graphic designers learn to get past the issues they encounter (Dougherty 2008, 45). The designing backwards method leads to rethinking the role that graphic designers play in the communications landscape and refining the traditional range of activities dealing with paper print, type, image, story (Dougherty 2008, 46).

### 2.3.2 Biomimicry

Biomimicry is another conceptual framework for designers who want to shift their conventional creative processes into sustainable ones. Biomimicry consists of studying nature's systems and models to solve complex human problems.

The term *biomimicry* (from the Greek *bios*, life and *mimesis*, to imitate) was popularized in 1997 by the author and scientist Janine Benyus in her book *Biomimicry: Innovation Inspired by Nature*. Benyus suggests that nature should be the standard from which to access the rightness of innovations (biomimicryinstitute.org 2007-2014).

The core idea behind this method comes from the acknowledgment that nature, during the 3.8 billion years it has spent engineering, refining and testing systems and processes, solved most of the problems that we, humans are struggling with (Biomimicry Institute 2007-2014). Nature holds the principles of what works indefinitely on Earth and studying these principles are one of the most hopeful solutions to live and produce more sustainably (Sherin 2008, 20).

Benyus uses her scientific background to put into perspective the human way of life and its relation to surrounding environments. Humanity (and everything it creates) is part of nature, but a very young species that has not yet found a sustainable way to live, in contrast to older life forms (Benyus, biomimicryinstitute.org 2007-2014). The finding of a sustainable way of living by going through a process of trial and fail, shift and refining is a process that every organism goes through during its evolution. Benyus explains:

Creating conditions conducive to life is not optional; it's a rite of passage for any organism that manages to fit in here over the long haul. – – Right now, we humans are filling a pioneering niche. We are acting like the weeds in a newly turned farmer's field. These weeds move into a sun-filled space and use nutrients and water as quickly as they can, turning them into plant bodies and plenty of seeds. They are annuals; they don't bother to put down winter roots or recycle because their moment in the sun is short. Within a few years, they'll be shaded out by the more efficient, long-lasting perennial bushes and shrubs. (Benyus, biomimicryintitute.org 2007-2014.)

By suggesting that humanity does not have the best chances of long-term survival on the long term, Benyus shows that we need to see ourselves as simply one species among

30 million other ones instead of one on top of the pyramid. Accepting this fact would make us understand that what is good for Earth is good for Humanity as well. (Benyus, [biomimicryintitute.org](http://biomimicryintitute.org) 2007-2014). Biomimicry's principles have been adopted by many design disciplines, such as architecture, industrial design or textile design. Biomimicry would have a benefit on print design, given its substantial dependence on natural resources. Table 2 below summarizes the way such principles impact on our way to design for print.

TABLE 2. Overview of the biomimicry process in a print design perspective (<http://www.naturefactor.com/>)

Natural Principles	Application to print design
<b>Nature recycles all materials</b>	Recycling, composting, and using biodegradable materials.
<b>Nature operates within a closed loop system</b>	Reducing packaging, promoting reuse.
<b>Nature operates in cycles</b>	Thinking of the life cycle of a design (ephemeral vs durable) and How long is the message needed.
<b>Nature optimizes rather than maximizes</b>	Optimizing the size, number of copies and materials of a print project.
<b>Nature adapts to changing conditions</b>	Design a piece to adapt to changes during its lifespan.
<b>Nature fits form to function</b>	Think content and function first.
<b>Nature replicates strategies that work</b>	Measuring the success of a printed piece.
<b>Natural systems grow through self-organization</b>	Organizing well thought-out, viral marketing campaigns
<b>Nature combines modular and nested components</b>	Effective and simple design promoting modularity
<b>Nature uses multifunctional design</b>	Designing for multiple uses
<b>Nature integrates the unexpected</b>	Open-minded brainstorming
<b>Nature uses low-energy processes</b>	Eco-proofing office-space, using local resources and choose sustainable print professionals

Moreover, biomimicry's principles can be applied on more or less deeper levels. Janine Benyus defines three of them, from shallow (Level 1), benign (Level 2) to deep (Level 3).

TABLE 3. Detail of biomimicry levels and their principles according to Janine Benyus.

<b>Biomimicry Levels</b>	<b>1</b>	<b>2</b>	<b>3</b>
Principles	Mimicking the natural <b>form</b>	Mimicking the natural <b>process</b>	Mimicking the natural <b>ecosystem</b>

The higher the level of biomimicry, the more sustainable a product will be because of its deeper integration to an extended surrounding that would bear the same rules. In contrast, the level 1 illustrates a shallow level of biomimicry that consist of a mere copy of a natural existing design and does not necessarily yield something sustainable by itself.

### 2.3.3 Cradle-to-cradle

The Cradle-to-Cradle framework has been developed by architect William McDonough and chemist Michael Braungart in their 2002 manifesto called *Cradle-to-Cradle, Remaking the Way We Make Things*. It is opposed to our current, one-way manufacturing model that they call “cradle-to-grave”, inherited from the Industrial Revolution. The concept of Cradle-to-Cradle has been trademarked and turned into an independent and non-profit organization called Cradle to Cradle Products Innovation Institute.

In their controversial manifesto, McDonough and Braungart take a stance against the linear “cradle-to-grave” model in which designs are created with the use of natural and biodegradable resources, used and finally disposed in a landfill, where their value is wasted (McDonough, Braungart 2002, 27). They also criticize the environmental ideals of “Reduce, Reuse, Recycle” which, instead of stopping the depletion process of our ecosystems, only slows it down allowing it to take place in smaller scale over a more extended period of time (McDonough, Braungart 2002, 54).

Ecologically-praised processes of *reduction* such as incineration, the limitation of toxic emissions are not safe and efficient enough to protect biological systems from pending disastrous consequences (McDonough, Braungart 2002, 54-55). Moreover, according to the two authors, the principles behind *reusing* (composting) give the wrong impression



to industries and consumers—making them think that waste is going away— whereas it is ”transferred to another place” (2002, 55). Finally, *recycling* which they consider as actual *downcycling*, does not offer the possibility to separate the valuable components from the mix which is going to be recycled. It results in a loss of value and materials altogether (2002, 57). Recycling, despite good intentions, can even require the use of chemicals in order to compensate for the loss of quality of the recycled materials. A fundamental shortcoming of recycling is also the fact that “it tries to force materials into more lifetimes than they were originally designed for” (2002, 59), increasing operating cost for businesses.

Neither McDonough nor Braungart regard the current environmental regulations and innovations as being a successful strategy in the long term because they promote “less bad” solutions instead of aiming to be “100% good” (2002, 67). Cradle-to-cradle framework was created with the aim to take nature itself as a model for production and break the presumption that human industry must damage the environment to be successful. The method consists in new ways of manufacturing healthy and sustainable products (c2ccertified.com 2011) within a five-levels-certification process that McDonough and Braungart came up with while writing their manifesto. The Cradle to Cradle Certified™ Product Standard awards products that perform material Health, Material Reutilization, renewable energy and Carbon Management, Water Stewardship and Social Fairness with five quality awards—basic, silver, bronze, gold and platinum (C2ccertification 2011).

Cradle-to-Cradle Certification itself applies only to materials, sub-assemblies, and finished products (C2ccertified 2011), the model in its broadest presents an extensive questioning of the current environmental regulations and processes that a print designer can get deep knowledge about. These three main design methods promote radically new ways to think about print products, materials and the basic manufacturing cycle that currently dominates the design production process. Such frameworks provide a strong theoretical support for sustainable actions in design.

The next part of this thesis will be about the technical innovations that sustainability is generating in the realm of print design. These innovations are essential to the revamping of print design as they are the substance behind its ideological transformations.

### 3 SUSTAINABILITY AND TECHNICAL INNOVATIONS

Technical innovations are the substance behind the ideological transformations of print design. They give credibility and aspiration to the sustainable movement, showing that sustainability is not only a theoretical concept but a real process involving creatives, print professionals, non-profit organizations and countries' governments working in collaboration to improve the printing industry practices. Such a process should be the sign of the print industry's healthy condition. A healthy industry can look and question itself, its traditions and ways of operating despite its flaws. The will to improve and break the status quo is a long and delicate process but will be decisive to shape print's future.

In this regard, the position of a graphic designer is complex. Thinking of designers as mere visual stylists is underestimating both their power and responsibility towards their audience, their message and creations. Up until now, the educational background of most graphic designers consisted mainly in aesthetical culture and computer programs' literacy. Such curriculum offers little to no knowledge in the technicalities related to the printing of creative projects and therefore the issues they arise, especially in terms of sustainability. It comes as no surprise that current school education produces graphic designers who have no idea nor care of what they are really doing, what the impact of their work means. This is mostly because they do not know better. As Stephen Heller, co-chair of the Designer as Author MFA and co-founder of the MFA in Design Criticism at School of Visual Arts, New York, rightly stated:

I believe my students should not be herded into a pen where all they do is follow the golden rule, but I believe—we—have an obligation to teach them to design in a responsible manner for a realistic goal. I also believe that they must be taught to convince others of the rightness of what they are doing. (aiga.org 2009.)

A graphic designer keen on adopting sustainable practices as a part of his work ethics needs to be educated on the environmental repercussions of the paper industry to be able to identify the issues and make informed sustainable choices. Currently, it is a personal process to go through, as most graphic design schools curriculums do not cover the subject of sustainability, as aberrant as it may sound. A proper education in sustainable graphic design would greatly benefit the professional designers to-be in that they would

be extensively aware of the environmental issues they will have to face, and of their remedies.

If communication design schools could add sustainable design thinking to their curriculum, not only would it create that needed baseline for our industry, but it would also produce an army of young, motivated designers equipped with this new (and much needed) set of tools – ready to offer great value to any design firm / business. (gdusa.com, september 2012). However, projects like the Designers Accord, founded in 2007 with the aim to transform the way creatives do business is a great tool to know where to start:

While some design firms were making advances, most designers did not know where and how to start transforming their practices. The Designers Accord offered a strategy and platform for designers in firms, corporations, and schools to declare their sustainability goal, and work together to define a plan to address environmental and social issues in their work. (designersaccord.org)

A skillful designer with knowledge in sustainability will have more chance to be hired on complex and large printing projects. Sustainable graphic designers with a much broader knowledge, therefore skills, will increasingly be more valuable in a very competitive marketplace and the ones unwilling to change will consequently become irrelevant.

The following part of the thesis will describe each step of the printing process, its issues and sustainable innovations to solve them. My point is to show that print has dramatically changed in the past two decades not only thanks to advanced technologies but also to the combined will of professionals, consumers and governmental regulations to make print industry more sustainable. I also want to demonstrate that, as a graphic designer, simple decisions can significantly affect a printed project at any stage of the creation process. I willingly decided to omit the delivery phase of the printing process as I am strictly focusing on the summarizing the innovations directly connected to in-house print production. However, delivery methods should be taken into account in the whole design process, in order to minimize a printed object's impact on the environment.

### 3.1 Inks

Throughout history, printing has earned the reputation of being a dirty and even unhealthy business (Sherin 2008, 66). This is mostly due to the inking process that traditionally used heavy metals and toxic substances.

Offset inks are made up of liquid dyes or powdered pigments from which it gets its color, binders which help the pigment to adhere to paper and a vehicle that holds and carry the pigment (Sherin 2008, 70). Pigments remain on the surface of the substrate while dye-based inks tend to be absorbed into the paper, leading to uncontrollable bleeds and lesser quality image reproduction if such thing happens, especially on porous surfaces like uncoated paper. Pigments are commonly composed of heavy metals such as barium, copper, zinc as well as the *CAMALS*, a highly toxic group of heavy metals: cadmium, arsenic, mercury, antimony, lead and selenium. The paper waste from the print houses and the landfills where most printed paper ends up, have caused groundwater contamination. Dye based inks can be tricky to get rid of in recycling, during a process called de-inking, depending on the level of saturation in the substrate. The vehicle consists of resins and other liquids that make the ink fluid and allow the pigment or dye to be imposed on the substrate. Inks can contain additives to modify the ink for optimum press performance, such as defoamers and wax. Most additives and vehicles in offset inks are petroleum based.

After the ink has been applied onto the surface, it must be dried before the paper can be trimmed for binding. Usually, the inks need to be dried through a process called *heatsetting*, which involves the use of gas or electric drying ovens that dry off the solvents in the ink, leaving behind only the pigments or dyes. (Carver 2011, 52). As a result, heatset inks add up a considerable extra amount of energy for a print run. Plus, they can release 35% to 45% of their Volatile Organic Compounds, known as VOCs. These are carbon-based substances that immediately vaporize at room temperature. These VOCs have harmful effects on both nature—as they react with the nitrous oxide in the air to form ozone—and human health as they contain carcinogens<sup>2</sup>. (Carver 2011, 132)

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<sup>2</sup> Substances and exposures that can lead to cancer (cancer.org).

Establishing sustainable guidelines has proven to be a complex task because of the wide array of environmental issues described above. However, research and governmental regulations have helped to remove ink from some of its most toxic components and come up with more healthy alternatives. Being informed and self-involved in the printing process is also essential to make better choices in this regard.

### **3.1.1 UV inks**

They are made up of pigments suspended in a liquid that hardens when exposed to ultraviolet light. Big ultraviolet lamps are put next to each paper rollers in print presses and dry the inks instantly as the paper rolls through. The printing presses can run faster and therefore cut down on energy waste. Also, it eliminates the need for solvent in the ink and the VOCs. However, UV ink technology is expensive and requires a special training for the staff to properly operate the machines. (Carver 2011, 53)

### **3.1.2 Vegetable-, soy- and water-based inks**

The advantage of vegetable-based ink is that it does not require additional equipment or training to be used instead of the regular ink. It is supported by regular offset presses and has become increasingly available. Vegetable based inks replace a certain amount of the petroleum base with bio-derived oil that can greatly diminish the Volatile Organic Compounds emissions. This bio- derived oil can be canola, sunflower, linseed, tall or soy oil.

However, vegetable-based inks take more time to dry and may require longer heat-setting, therefore increasing the energy consumption of a printer. Also, ink labels are not always what they seem. The “Soy Ink” label that was promoted in the 1990’s by the American Soybean Association means that an ink contains a designated minimum percentage of soybean oil, as little as 7%. So, an ink could be more than 90% petroleum oil and still qualify for the “soy ink” label. (Dougherty 2008, 112-113)

### 3.1.3 BRC Label

The Bio-derived Renewable Content label was founded by the National Association of Printing Ink Manufacturers. This label measures the content of natural renewable resources in inks and comes up with an index number that shows the bio-content of elements in inks, such as pigments, oils or waxes. The institution of a universal label for sustainably produced ink is an important step in providing transparency of the ink production process. (Carver 2011, 55)

### 3.1.4 Ink choices

Most of the work of graphic designers will end up in a recycling facility, if not in a landfill. Nevertheless, it is still possible for graphic designers to decrease their environmental impact by carefully choosing inks, whether their project will be recycled, de-inked or buried. As Brian Dougherty from Celeri Collaborative explains in his book *Green Graphic Design*:

The most toxic “CAMALS” substances (cadmium, arsenic, mercury, antimony, lead, selenium) have been phased out of the conventional printing inks in North America. As far as we know, the remaining metals are not harmful to people in the concentrations normally used on printed materials. However, those metals can concentrate in the ash from incinerators or sludge from de-inking facilities (creating hazardous waste issues) and can potentially leach from landfills into water supplies. (Dougherty 2008, 113.)

Metals can still be found in certain type of colors, especially in the metallic and fluorescent spot colors, with high levels of copper and zinc. Shades of blue and green can also contain copper. Carefully selecting the inks depending on their levels of harmful substances is a sound choice. Minimizing the ink coverage and avoiding long bleeds off the printed area is another one.

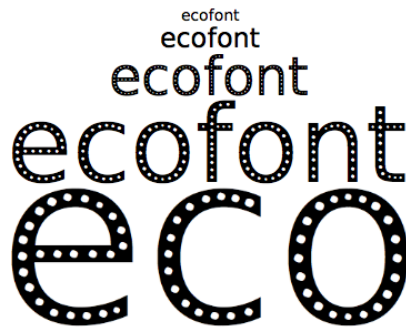
### **3.1.5 Alternatives**

The technique of die-cutting consists of trimming areas of the paper with a shaped metal blade mounted to a backer board, rather than a straight blade (Dougherty 2008, 116). Die-cutting has the advantage to be able to replace parts of the artwork that would require ink, whether these are simple shapes, text or more intricate figures. On a big printing project, using die-cut instead of inks can be a significant sustainable choice. Well thought die-cuts can make a design really stand out from others and it is possible to achieve a very elegant and unique look with fewer means. However, this technique generates paper and trims waste too and should be thought out carefully.

### **3.1.6 Note on typefaces**

Text usually counts for a substantial part of a printed product and therefore of the quantity of ink needed to print it. Aside of the efforts to produce cleaner inks, thoughts have been put into reducing the volume of ink itself. In 2010, a study conducted at the University of Wisconsin- Green Bay demonstrated that using Century Gothic as their standard font saved about 1,5 % of ink consumption compared to their previous one, Arial. This percentage may seem very little but this definitely affects their budget on a large printing scale such as the one of a university. Furthermore, it makes a difference in the de-inking process if the ink coverage is diminished during printing. To a more general extent, the use of specific fonts does have environmental impact. As Jessica Carver points out, thicker and larger fonts like Book Antiqua or Franklin Gothic will not only increase ink consumption but also paper, as they require more leading to increase their readability (Carver 2011, 65).

Following the same thought process, the Dutch firm Spranq created in 2008 a breakthrough ink saving font named Ecofont.



PICTURE 3. Ecofont, created by the Netherlands- based studio Spranq.  
(Lewebpedagogique.com, 2013)

Ecofont is based on the Vera Sans font. It is available as a TrueType font to download for free on Internet. The eco version of the Vera Sans reduces by approximately 28% the amount of ink use compared to its regular version (Ecofont 2011).

Also, the Ecofont software, available for purchase on Internet works as an application on Windows. The program inserts small holes in the most common printed fonts such as Calibri, Arial, Times New Roman, Trebuchet MS and Verdana and also other customized fonts. The holes are created during the printing, otherwise invisible on screen. According to Spranq, the holes have been designed intelligently so that they do not alter the readability of a document and actually can save up to 50% in ink or toner while printing text (Ecofont 2011). The Ecofont and software might not be suited for all printed projects but offer a great opportunity for companies who are looking for cutting down their money and environmental costs. For instance, an organization with 1000 workplaces can reduce their greenhouse gas emission up to 10 tons of CO<sub>2</sub> per year (Ecofont 2011).

### 3.2 Paper

It is impossible to dissociate paper apart from print design. The fact that paper is at the center of graphic design is both a bad and good thing. The disadvantage is that the printing industry uses paper in massive proportions that are always increasing, producing disastrous damages on the environment. There have been many reports about the devastating effects of our hunger for paper. There are three main issues that can be summed up by this easy addition:



tree + energy + water = paper

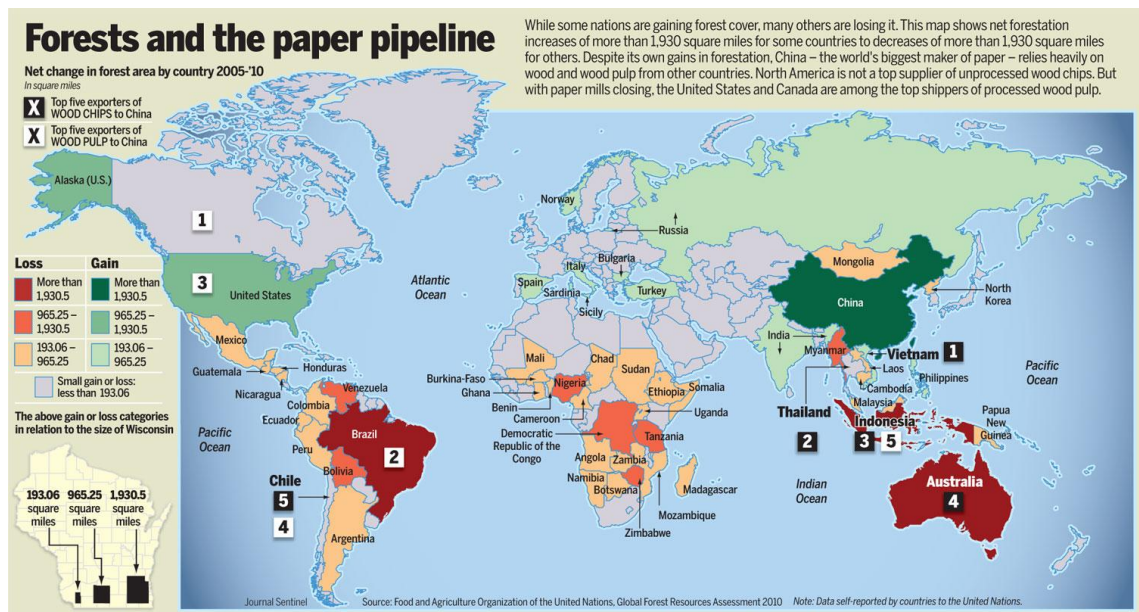
### 3.2.1 Tree

To make regular paper, the first thing needed are trees and particularly, virgin fibers<sup>3</sup>. These are woods that have been grown for the sole purpose of paper production. Despite the fact that the western paper industry is progressively shifting towards a more regenerative agricultural model, independent on virgin ecosystems, the virgin fibers still account for about two thirds of the pulp going to American paper mills (Carver 2011, 25).

According to Dougherty, we had stripped much of the world's old forests bare in an attempt to feed this appetite for paper. Paper production is responsible for 40% of all industrial deforestation worldwide (Dougherty 2008, 130). Deforestation does not only concern pristine forests, but local ones as well. According to a report of the World Resource Institute in 1997, "seventy-six countries have already lost all of their original forest cover and a further eleven countries have less than 5% left". Also, in its 1999 report, Environmental Defense identified pulp and paper manufacturing as the step in the lifecycle of paper that is responsible for the majority of the material's negative environmental impact (Sherin 2008, 59).

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<sup>3</sup> Virgin wood fiber paper is manufactured without the use of any recycled or alternative fibers (Mohawkconnects.com)



PICTURE 4: Net change in Forest area by Country 2005-2010. (journalsentinel.com, pulitzercenter.org 2012) Source: Food and Agriculture Organization of the United Nations. Global Forest Resource Assessment, 2010)

Furthermore, the destruction of ecosystems implies a whole set of other issues such as the loss of natural habitat for indigenous tribes, the disruption of their hunting and harvesting customs, animal species endangering and limited biodiversity.

### 3.2.2 Energy

The energy issue caused by the paper industry concerns mainly the release of carbon dioxide into the atmosphere creating greenhouse effects that impact on the earth's climate. The carbon dioxide emissions come from the burning of huge amounts of fossil fuels in order to breakdown the surrounding lignin and resins that bind the fibers of the wood together. Then, this slush has to be quickly transformed into dry paper. Worldwide, the paper industry is an enormous emitter of greenhouse gases, rivaling the steel and chemical industries (Dougherty 2008, 136). As a matter of fact, the paper industry is the fourth largest industrial producer of carbon dioxide which is 9% of our greenhouse gas emission total (Dougherty 2008, 124).

### 3.2.3 Water

Most paper and pulp mills are located near fresh water sources (such as rivers or lakes) and it comes as no surprise that it is because they need large amounts of it. The primary sludge that will be our future paper sheets is made of 98% water. The water issue of the paper industry is both quantitative and qualitative: quantitative, because of the amount of water used and qualitative, because of the poor quality of paper factories' effluent that is released back in the rivers. The pulp and paper industry is the number one industrial user of water worldwide (Dougherty 2008, 135). The toxic effluent released in the rivers has created environmental problems as the fresh water supply is becoming a worldwide crisis. This is largely caused by a paper pulp bleaching chemical called chlorine, which produces traces of dioxin when mixed with wood and water. Dioxin is a very toxic chemical that remains and bio-accumulates in ecosystems, contaminating the fauna and flora. This means that it does follow through the food chain to us, humans. Dioxin can be found in breast milk and body fat and will persist for many generations.

Because of new regulations and public pressure, the paper industry has found new ways to reduce its chlorine emissions, at least in the western countries. In North America, chlorine derivatives are used instead of chlorine gas, such as chlorine dioxide that has reduces chlorine emissions by 90% or more. There is a label that certifies the paper made with such process, Elemental Chlorine Free or ECF. In Europe, the pulp mills have come up with a more advanced strategy that consists of eliminating completely chlorine with the help of ozone or oxygen. The chlorine free paper is then labeled as TCF, Totally Chlorine Free when used on virgin fiber and PCF when used on recycled fiber. However, in many developing countries in South America and Asia, regular chlorine-bleached pulp is still the norm and is produced in enormous quantities.

The good thing about paper being the center of the graphic design is due the very nature of this industry. Modern professional graphic designers are to solve problems for a living, and not only aesthetical ones. Creativity in all its cutting edge, singularity and open mindedness is what is going to remodel print and therefore its main component, paper. Graphic designers are among the ones who have the responsibility to pave the road because of their privileged position. Paper is the point of focus for graphic designers who want to shift towards sustainability even if their range of action is limited.

“Specifying “green” paper is one of the simplest things a green graphic designer can do. It only requires knowledge and the will to break from the status quo.” (Dougherty 2008, 141.)

Nevertheless, it can be very hard for a graphic designer, even a well-informed one, to choose the right kind of paper. Due to the numerous labels, paper companies and marketing strategies, the sustainable messages that are carried can be biased or even misleading, making it difficult to compare all competing products. In order to make an informed paper choice, Dougherty suggests looking at this complex situation the same way we isolated the paper’s ecological issues: taking into account fiber, energy and water consumptions.

Globally, there have been a lot of changes in the paper industry during the past few years. Several leading manufacturers have taken action to lower all around their environmental impact, such as Neenah, Monarch Paper, Mohawk Paper, Dalum Paper or Papyrus Australia.

Over the past couple of decades, post-consumer recycled fiber (PCR) has become increasingly available as a substitute to virgin fiber-based paper. PCR does not rely on forest ecosystems as it is a result of paper collection programs. A range of top quality papers made from 100% post-consumer recycled fibers are already on the market. Initially produced for uncoated offset printing, it is now possible to find them for coated sheets and web presses. However, it is important to be aware of the difference between the recycled content and the post-consumer waste (PCW) when choosing a recycled paper stock (Carver 2011, 31). As Jessicah Carver explains:

Post-consumer waste is paper that has reached its end user— the reader— and has since been reclaimed for recycling purposes. Paper stocks can be 100% recycled without containing 100% PCW content by using fiber sourced from **pre**-consumer waste, such as a printer’s make ready. The repurposing of **post**-consumer waste is a more sustainable option since there is no direct deforestation tied to its fiber sourcing. (Carver 2011, 32.)

Using post-consumer waste instead of pre-consumer waste also contributes to remove the fibers that disintegrate and emit methane in the landfills. According to Carver, there are five times the amounts of post-consumer waste available for recycling than pre-consumer waste (Carver 2011, 32).

Apart from slowing the deforestation process down, it is important to know that using recycled paper requires less energy, less water, fewer trees and proves to be more efficient than the use of virgin fiber-based paper, as shown below (Table 4).

TABLE 4. The environmental benefits of using recycled copy paper rather than virgin copy paper (conservatree.org 2012). The units have been converted from English units to International System of Units (SI).

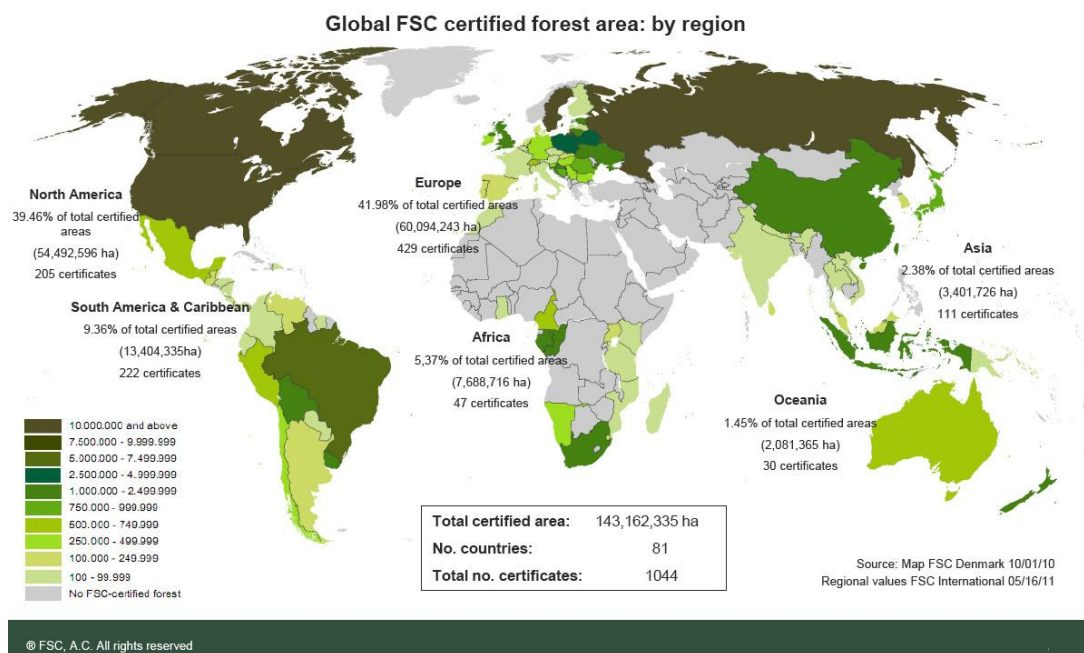
	<b><i>1 ton of virgin fiber paper</i></b>	<b><i>1 ton of 100% recycled paper</i></b>
<b>Trees</b>	24	0
<b>Energy</b> <i>(in watts)</i>	9 671 345,31	6 447 563, 54
<b>Greenhouse Gases Released - CO<sub>2</sub> equivalent</b> <i>(in kg)</i>	2540,57 kg	1602,54 kg
<b>Waste water</b> <i>(in liters)</i>	103 891,83	52 893,77
<b>Solid waste</b> <i>(in kg)</i>	871,80	531,15

The table shows that recycled paper mills reduce total energy consumption by 33%, net greenhouse gas emissions by 37%, wastewater by 49%, solid waste by 39% and wood use by 100%. This shows that recycled paper a clearly better sustainable option than the virgin fiber- based paper, valid on all paper grades. Another ecological option is to use paper made out of **sustainably harvested fiber**, from responsibly managed forests. To make sure of the authenticity of the process, the Forest Stewardship Council has been the first one to create guidelines to assess the sustainability of such ecosystems.



PICTURE 5. FSC labels (welcome.fsc.org)

The FSC label has been adopted by a wide range of countries since its creation, as seen on picture 6 below.



PICTURE 6: Global FSC certified forest area by region (FSC 2010-2011)

The Ancient Forest Friendly™ certification, created by the non-profit organization for the protection of worldwide forests Canopy, is another quality designation that represents the one of the most respected ecological qualities in the paper industry.

“To be Ancient Forest Friendly, a paper must be manufactured with a high percentage of recycled fiber or agricultural residue. Any virgin fiber used in the paper must be Forest Stewardship Council (FSC) certified and must not originate from endangered forests. Bleaching must be chlorine free. Ancient Forest Friendly papers conserve intact forest ecosystems and their functions – such as climate stabilization, water regulation and species habitat.” (Canopyplanet.org)



PICTURE 7. Ancient Forest Friendly Logo. ([newleafpaper.com](http://newleafpaper.com))

### 3.2.4 Alternative fibers

As the demand for sustainable paper constantly increases, alternative tree-free fibers are becoming more available. Actually, the idea is not new: until the 1800's, paper was traditionally made out of cotton and other sorts of plants. Nowadays, however, cotton linters have been used in luxurious papers only. Even though cotton-based paper can be qualified as recycled because it makes use of the left over linters of the textile industry, huge amounts of fertilizers and pesticides are sprayed onto the conventional cotton crops. This fact outweighs the other benefits of cotton, except in the case of organic cotton crops. The paper industry has opted for wood fiber only since the last two centuries to respond to the high demand for paper. Then, the wood resources were easy to access and very abundant. In Asia, wood-free paper still makes up for almost half of the paper production, due to the limited hardwood forests area. As a matter of fact, according to the 2008 report from Canopy Planet called "A Brighter Shade of Green", Asia produces nearly 86% of the world's non-wood pulp for paper production, while Europe and North America combined produce only 4%. Countries like China and India harvest wheat straw, rice straw and sugar cane bagasse for paper production, as they are more viable crops than wood.

There are a vast number of hardwood-free alternatives available. Bamboo is one of them. The advantages of bamboo are that it grows extremely fast and does not need to be replanted after being cut. It re-grows from its roots and therefore does not impact on the top layer of soil. While bamboo can be a great alternative for wood in Asia where it is sourced, the emissions from shipping and handling to Europe and America would counterbalance its benefits. The same thing applies for hemp, cultivated mainly in China and Canada because of its illegal status in many other countries.

As far as natural fibers are concerned, kenaf and flax have also been used for paper making, but without great success up until now. According to Dougherty, the most promising alternative fiber source comes from the agricultural residue, also known as “agri-pulp”. The idea is to use the leftover parts of any crop that would not have any purpose otherwise. The benefit is that agri-pulp saves land area, because the fibers are not harvested for the sole purpose of making paper, and makes the most of an agricultural crop. For instance, sugar cane bagasse, wheat straw, banana fiber and rice straw are included in paper across the world. In North America, though, only sugar cane bagasse has made its way to several paper manufacturers so far. According to Tom Pollock, Senior Program Manager at GreenBlue’s Forest Product program, opponents to the use of alternative fibers argue that there is no infrastructure that can support alternative fibers on a commercial scale. Other challenges cited include the potential harmful effects of converting forest land to other uses, as well as converting farmland to non-food uses. (Pollock 2011).

### **3.2.5 Synthetic fibers**

In the endless search for the perfect sustainable fiber, no fiber at all might be the solution. Polymeric paper, made from plastic resins and inorganic fillers as well as mineral-based paper belong to this category. Mineral paper uses almost no water during production, releases little emissions and requires only half of the energy of regular paper production. The paper created is water resistant and very durable. This is a fairly new and limited invention that still requires special facilities to be recycled, even though these materials hold the future possibility of indefinite upcycling.

## **3.3 Printing**

The most widespread printing method up until now remains the offset lithography. Newspapers, magazines, books, brochures, stationery are traditionally printed by offset lithography.

The process in offset is based on the repulsion of oil and water. Ink is applied to a printing plate to form the image of what needs to be printed and then transferred to a



rubber blanket. The image on the blanket is then transferred to the paper (or any other substrate) to produce the final product. Offset lithography is thought to offer the best value for money when it comes to image quality, speed and maintenance costs, especially for very large printing projects. However, the method generates waste and pollution. There are three stages of printing during which waste reduction needs to be planned: the set-up, the run-time and the clean-up (Dougherty 2008, 106). The set-up refers to the preliminary phase, called also “make-ready”, during which everything is done on a press to make it ready to print. This includes the color selection, printing plate set-up, image placement and paper adjustments. During the set-up, big amounts of ink and paper can occur. Then, during the run-time (when the printing is done), emissions of Volatile Organic Compounds (VOCs) from the fountain solution based on alcohol occur. Also, the energy used to print is usually based on fossil fuels, which emit greenhouse gases. Finally, the last phase during which the machines are cleaned up counts as a heavy use of toxic solvents, as the rollers and conventional offset ink wells need powerful chemicals to be left clean.

Before thinking about the type of printing or the kind of paper to use, it is necessary to define clearly the size of the whole project. This is the sound advice that Brian Dougherty gives in his book *Green Graphic Design*. The reason is that a printing project of a million copies will require a completely different approach to printing than only a thousand or a few. This makes even more sense knowing that the printing process is the biggest contributor to the environmental impact of most printed materials—more than the effects of paper and ink together (Dougherty 2008, 106).

TABLE 5. Environmental Impact of offset printing (mst.dk 2006)

Paper	<b>31%</b>	
Ink	<b>17%</b>	
Printing	<b>52%</b>	<b>Of which:</b> Printing:24% Cleaning:18% Energy to print:6% Repro:2% Platemaking:2% Finishing:0,4%

It makes even more sense due the many folds of the environmental impacts caused by the printing process. It is easier to look at the size of the project rather than to choose one method over another.

Competing technologies may improve particular environmental attributes under particular circumstances, but no single solution resolves every aspect of the problem. (Dougherty 2008, 108.)

In the following part, I will go through three sizes of project—small, medium and large— and review the overall best sustainable option in each case.

### **3.3.1 Small run (typically 1-1 000 impressions)**

According to Dougherty, the clear ecological winner in such projects is digital printing (Dougherty 2008, 108). Digital printing uses either a toner or inkjet technique. With a toner, the dry pigments are set on the paper by heating, which virtually removes the use of alcohol solvents, eliminating Volatile Organic Compounds emissions. Plus, digital presses such Hewlett Packard's Indigo or Kodak's NextPress do get rid of make-ready paper, ink and clean up solvents during the set-up and cleaning phases (Dougherty 2008, 108). This is a great benefit on small print runs. The only setback is the limited amount of paper qualities supported by digital presses, as they demand specific surfaces to allow the ink to set properly.

Digital printing is overall a much more sustainable option than traditional lithographic printing. However, it seems that the peak of the environmental benefits of digital printing is during short runs rather than large ones (Kadam, Evans & Rothenberg 2005).

### **3.3.2 Medium run (typically 1 000 to 50 000 impressions)**

Despite its limited environmental benefits, offset lithography seems to be the technique that offers the best price, flexibility and quality for its environmental effect (Dougherty 2008, 109). Apart from the traditional technique, two major innovations are making offset a competing printing technique in terms of sustainability: UV and waterless printing. Both methods are an attempt to remove the worst flaw of traditional offset: Volatile Organic Compounds or VOCs.

UV printing uses inks that are made of pigments suspended in a liquid mix that sets up when exposed to the ultraviolet light (Dougherty 2008, 110). Such a quick drying process significantly speeds up a print press efficiency. Also, UV printing eliminates the need for the VOC- emitting fountain solution on press and cleaning chemicals, as the inks do not need the conventional rollers or ink wells to dry up (Dougherty 2008, 110).

In the waterless printing, silicone-coated plates are used on a print press roller to transfer ink directly onto the paper (or any other substrate) without the need of fountain solutions that are a responsible for a lot of the Vocs and wastewater emissions and make- ready waste (Carver 2011, 49).

Both of these innovative techniques greatly diminish the environmental impact of printing and improve the efficiency of a print press. However, they still remain expensive to implement on conventional machines and demand the operators to be trained in order to use them. It is worth noting that the countries that have the most restrictive laws in terms of VOC emissions are generally the ones where waterless and UV printing is the most common. This is the case of many EU countries (United Kingdom, Germany, Poland among others) and Japan, where waterless printing is becoming increasingly available.

### **3.3.3 Large run (over 50 000 impressions)**

Generally, large projects are printed on web offset or rotogravure presses that use huge high-speed running rolls of paper rather than sheets (Dougherty 2008, 111). In order to achieve such speed, the ink is heatset onto the paper which requires a considerable amount of electricity to run the drying ovens. Currently, there are no alternative, more

sustainable methods that would provide the same overall benefits as these two. Nevertheless, some large printing companies are switching to UV systems to cut the VOC emissions and their energy consumption.

### 3.4 Trimming

Brian Dougherty's book *Green Graphic Design* covers quite extensively the part of trimming and its importance to prevent unnecessary paper waste. From a graphic designer's point of view, it is essential to have knowledge in printing production and especially the press sheet size.

It is a fundamental part of being a professional graphic designer to visualize a project further than the computer's screen. This makes even more sense when we take into account sustainability as an integrated part of the creative process. In order to make the wisest choices, a graphic designer should be able to think about a project as a whole from the moment the abstract is given to the time the product is delivered to the end user, because resources can be spared during each and every step of the design process. Concerning trimming, a graphic designer needs to be aware about the paper used for his/her project in order to make an informed and waste-less choice. The graphic designer has an especially big part to play in this case because this will impact the whole layout of the project that should be designed accordingly. The constant dialogue between a printer and the designer here is the key; all the questions asked turn out into knowledge that will greatly affect on a graphic designer skill level, socially and technically.

Dougherty's advice is to know about the paper press sheet size and design according to it. The best way to do so is to ask directly the print house because the size of the press sheet can vary depending on such as the type of paper, number of impressions of the project and the size of the printer's press. Then, he suggests:

“The next step is to calculate how many impressions will fit on each press sheet. Start with the sheet size and subtract a half inch margin on all sides for the color density bars and gripper (where the press grabs the paper). What's left is your maximum live area on the sheet. If you start with a 26''x40'' sheet, for instance, then subtract the margins, you end up with a live area of 25''x39''.”

**GETTING THE MOST FROM A SHEET**

Minimizing wasted trim involves understanding how many trimmed pages will fit on a standard paper size. Use the following chart to determine how many pages will fit on North American standard paper sizes. (Note: Trim size does not include bleed allowances.)

Trimmed Page Size of Finished Piece Inches (and millimeters)	Number of Pages in Finished Piece	Number of Finished Pieces from Each Sheet	Paper Size Inches (and millimeters)
9 × 12 (228.6 × 304.8 mm)	16	2	38 × 50 (965 × 1269 mm)
	8	2	25 × 38 (635 × 965 mm)
	4	4	25 × 38 (635 × 965 mm)
8 1/2 × 11 (215.9 × 279.4 mm)	16	2	35 × 45 (888 × 1142 mm)
	8	2	23 × 35 (584 × 888 mm)
	4	4	23 × 35 (584 × 888 mm)
8 × 10 (203.2 × 254 mm)	4	8	35 × 45 (888 × 1142 mm)
	8	4	35 × 45 (888 × 1142 mm)
	16	2	35 × 45 (888 × 1142 mm)
6 × 9 (152.4 × 228.6 mm)	32	2	38 × 50 (965 × 1269 mm)
	16	2	25 × 38 (635 × 965 mm)
	8	4	25 × 38 (635 × 965 mm)
	4	8	25 × 38 (635 × 965 mm)
6 × 4 1/2 (152.4 × 114.3 mm)	32	2	25 × 38 (635 × 965 mm)
	16	4	25 × 38 (635 × 965 mm)
	8	8	25 × 38 (635 × 965 mm)
	4	16	25 × 38 (635 × 965 mm)
5 × 8 (127 × 203.2 mm)	4	16	35 × 45 (888 × 1142 mm)
	8	8	35 × 45 (888 × 1142 mm)
	32	2	35 × 45 (888 × 1142 mm)
4 1/4 × 5 3/8 (107.95 × 136.53 mm)	32	4	35 × 45 (888 × 1142 mm)
	16	8	35 × 45 (888 × 1142 mm)
	8	16	35 × 45 (888 × 1142 mm)
	4	32	35 × 45 (888 × 1142 mm)
4 × 9 (101.6 × 228.6 mm)	24	2	25 × 38 (635 × 965 mm)
	16	6	38 × 50 (965 × 1269 mm)
	12	4	25 × 38 (635 × 965 mm)
	8	12	38 × 50 (965 × 1269 mm)
	4	12	25 × 38 (635 × 965 mm)

Picture 8. Poppy Evans' table "Getting the most from a sheet". (2004, 69)

Poppy Evans, in her technical book *Form, Folds, Sizes* also recommends using this method to avoid trim waste. She came up with a handy table to get the most out of a press sheet (Picture 8).

### 3.5 Coating and binding

During its lifespan, a printed product such as a book will undergo many trips from printer to publisher, distributor and store before finally landing into the consumer's

hands. It is the role of the coating to protect the product and provide durability. Otherwise, the potential damage could make a book unsellable and never reach the end user it was destined for, which is in a way, the worst possible scenario from a sustainable point of view.

### 3.5.1 Coatings

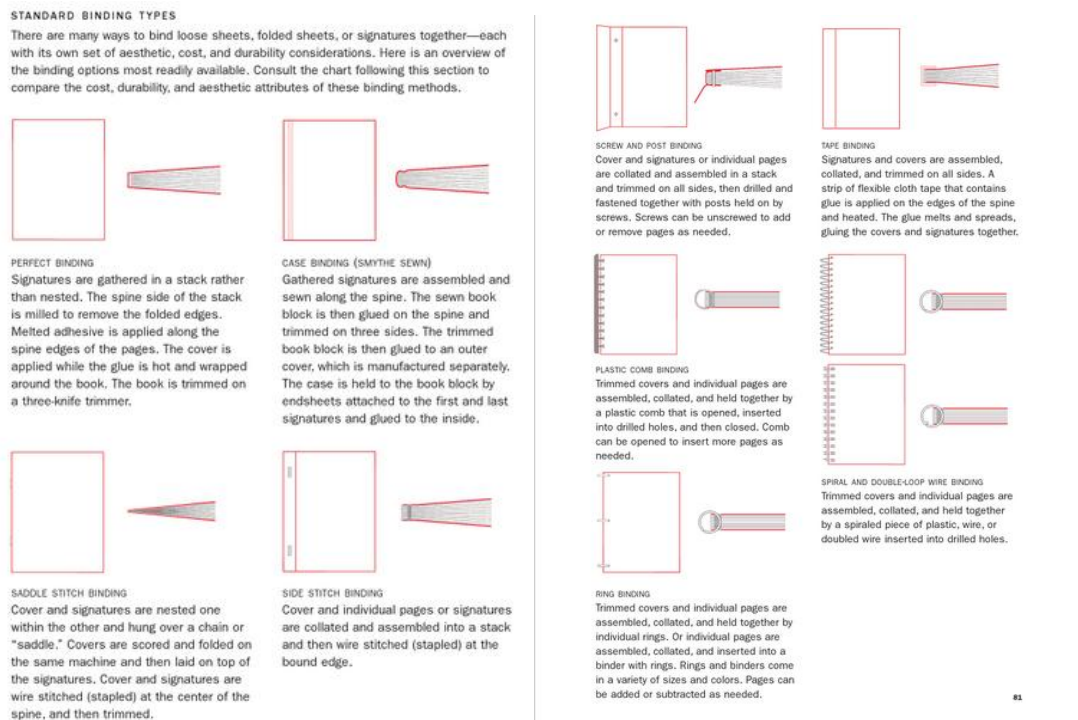
Currently, there are mainly two types of coatings used. The first one is called *varnish* and is made up of many of the similar petroleum-based substances found in inks. Therefore, it emits Volatile Organic Compounds in the air. The second type of coating is a *laminate*. Laminates are made out of nylon, polyester or polypropylene and typically increase durability of a printed product. They consist of a transparent film applied to the surface of the printed product or as a liquid spread like a varnish. Both coatings share the same harmful consequences on the environment as they are non-recyclable. The biggest issue is that they are very difficult to be removed during the recycling process.

There are just a handful of more ecological options available. Even then, they are only a limited improvement to the current situation. They are not widespread and do not yet offer the same durability as the regular laminates (Carver 2011, 56). While there is still room for improvement, **aqueous coatings** offer the protection of a regular coating without the need to be heated to set, reducing the VOCs emissions and saving energy usage. They are applied in-line on press after the ink has dried. They are polymeric resin, wax, silicone surfactants, defoamers or brighteners. The coating dries by removal of water and ammonia from coating solids through evaporation and absorption (Carver 2011, 55). They are water-based instead of oil-based. The other choice is to opt for **UV coatings**, 100% water-based that are also energy savers because of their instant cure by UV exposure. They are harder and therefore better in protecting the colors than the aqueous coating but are quite missing the mark sustainability-wise because of the difficulty to de-ink them during the recycling process.

### 3.5.2 Bindings

There are many kinds of bindings available and choosing the most sustainable option will depend on few aspects: the size of the project, the easiness to remove the binding for recycling, its durability and the level of emissions during its application onto the material.

According to Brian Dougherty, bindings can be divided in two groups; the mechanical and the adhesive bindings. The first type includes saddle stitching, side stitch, wire-o, side stapling and spiral binding. They are usually the most recyclable bindery available because they are fairly easy to remove from the paper while being recycled. The binding itself can be made out of recycled steel and most ring-binders have the benefit of being reusable (Dougherty 2008, 118)



Pictures 9-10. Overview of the different types of bindery (Evans 2009, 80-81)

The adhesive bindery consists of glue being applied to the spine edge of the pages to hold them together. Three main types of adhesives are used for this purpose, and they each have advantages and inconveniences (Dougherty 2008, 119). Polyvinyl acetate (**PVA**) can be applied at room temperature and therefore do not need any heating. They

are non-toxic and do not emit VOCs. Even though they are suitable for recycling, they are primarily made of non-recyclable petroleum substances. Also, it does not offer the same level of protection and durability as other options. PUR (Polyurethane) adhesive, according to Jessicah Carver, are a slightly better option even though they are also hot glue melts. Their advantage is that they are not water-soluble and therefore can be filtered out during the recycling process. Finally, EVA (ethylene vinyl acetate) adhesive, found in hot glue guns, are another type of adhesive. It is inexpensive, easy to apply, low VOC, and low toxicity. However, this type of adhesive softens when reheated, which can cause problems in some recycling processes. (Dougherty 2008, 120)

If we look at the environmental issues caused by printing, bindery does not seem to be the most substantial one. However, combined with other smart efforts towards improving printing practices, they can create a whole coherent dynamic towards sustainability. According to Carver, “while the availability of many of these options may seem out of a publisher’s hands, it is important to remember that significant demand will drive paper producers and printers to offer these services and products to their clientele”. (2008, 58).

In the following chapter of this thesis, the economic side of sustainable design will be explored. I will argue that, along with conceptual and technical developments, sustainability will also bring a deep transformation in the business side of print. Instead of tackling the current market, environmental ethics and economic profits can be both achieved by creating a new, more effective market.



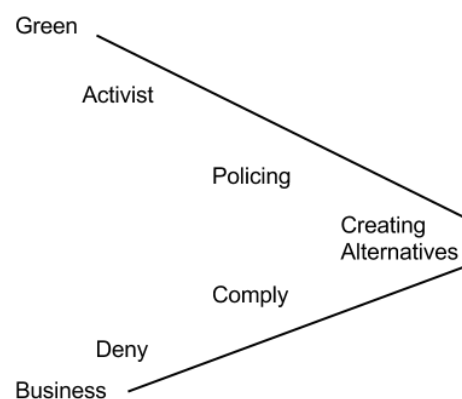
## 4 THE VALUE BEHIND SUSTAINABILITY

### 4.1 The cost of waste

Now that the seriousness of the environmental crisis is a well-known reality, businesses including print design companies, have been thinking about ways to implement sustainable practices into their work ethics. The process is long and actions seems to be taken only when issues get bad enough but yesterday's belief that environmentally friendly practices and the competitiveness and profitability of a business are like oil and water, is slowly fading away.

The conflict between the "green" side and "business" side has reached a dead end. The anger from the green side and the defensiveness from the business side have probably been convenient for a certain time to avoid real action. Scapegoating and casting blame has just made both parties reach the point where it is all the same, like a blank space (Grant 2007, 7). What is left is the need to combine forces in order to create alternatives.

FIGURE 2. Levels of involvement within typical "green" and "business" sides according to Grant (2007, 7)



From a design standpoint, the "communications systems have so much waste that designers could choose almost any part of that system and quickly imagine ways to make the system more effective" (Dougherty 2009, 44). The reality is that the situation is so bad that improving on the current wasteful system is not hard and can actually be

very profitable. Businesses, including print houses are starting to realize the opportunity and value behind sustainability; instead of tackling an existing market, it is possible to effectively create a new one.

One of the main obstacles when proposing sustainable alternatives to clients, such as the ones we went through in the last chapter, is the assumption that green costs more. As Brian Dougherty explains in his book *Green Graphic Design*:

There are two problems with that presumption.— First, it is often false. In many cases, it is possible to use environmentally improved materials at the same or lower cost. It may require some research and experimentation, but green design does not necessarily add cost. Second, if designers focus only on cost, we may implicitly accept a broken system— identifying and fixing major problems with the existing system is often more effective and ultimately lead to a cheaper solution. (Grant 2009, 34-35.)

After all, it is designers' task to excel at solving problems and finding effective solutions to a design problem. When facing such obstacle, designers and ultimately clients also need to question the meaning of *cost*. Is it only the monetary cost that is to take into account?

In order to measure a cost, we need to put it in perspective with what needs to be achieved and the efficacy of the creative solution. As Dougherty explains, "Managing costs is an important part of everyone's job- designers included. If the cost of something outweighs the value, then we decide that thing is too expensive. -- And sometimes, added value makes more expensive options the best choice of a situation" (2009, 36). The same reasoning applies if a designer's sustainable framework consists of concentrating solely on replacing conventional materials with recycled ones. In this situation, the greener option might be more expensive because the idea itself behind the project, even sustainable, does not provide with the right communication strategy.

Alternative options are where sustainable design truly shows its power. The communication strategy needs to be questioned to profit a client's business. Is this support the right way to communicate to possible clients? Is this brochure project really needed? If not, even a low cost printed item can seem overpriced in regards to the results. "The current system presumes enormous amounts of waste and is often not very effective" (Dougherty 2009, 38). Further than material cost, alternative solutions born

from the creative minds of designers are what is needed to change the system based on the wasteful status quo and create what Dougherty calls “project value” (2009, 40).

## 4.2 Washing away the green

Project value can show in various business models, openly sustainable or not. In any case, project value bear progress and hope for the adoption of environmentally friendly practices by companies.

This progress, in order to continue and spread, needs to appeal to a wider range of people. The mistake in the past sustainable wave was that these products were specifically targeting the audience that was already sensible to environmental issues. Consequently, the target audience and ultimately the message did not attract more people, on the contrary. The promotion of a simplistic image (Grant 2007, 39) and condescending clichés created by marketing creatives has been an obstacle for a larger audience to adhere to sustainable values. The rest of the audience that did not recognize itself on these values came to dislike them even more because “green marketing” had enlarged the moral and ethical gap between people.

As a remedy to this situation, John Grant advocates that “for the most part, we need to leave green cultural themes, imagery (and even the color green) to NGOs<sup>4</sup> and similar.” (2007, 56). Environmentally-friendly symbols are not anymore a proof of the real commitment of a company to tackle these issues; they have been used and reused until they became overrated. Plus, there are other unnoticed ways to choose more sustainable options than going for the openly green ones. In *Green Marketing Manifesto*, Grant gives a few examples to illustrate this point such as eating local foods instead of fair-trade bananas or buying a smaller car instead of a hybrid. On the other side of the spectrum, there are markets such as fridges or baby food where ethical goods are the norm and count for 60% of sales. (Grant 2007, 34-35). Moreover, we need to “make green stuff look normal rather than making (breakthrough) normal stuff seem green” (Grant 2007, 56). Here, Grant points another fundamental problem about how sustainable practices have been wrongfully applied; greenwashing.

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<sup>4</sup> Non- Governmental Organizations

Over-promoting while underperforming on environmentally-friendly values has been the downfall and humiliating for some companies, when their real motive to be greener—profit—had been uncovered. The consumer is increasingly aware of this possible contradiction between a company's brand and action over the years because of consumer literacy and the contemporary meaning of consumption. Over half a century ago, astute economist and retail analyst Victor Lebow had already understood the place that consumption would take in our lives:

“Our enormously productive economy demands that we make consumption our way of life, that we convert the buying and use of goods into rituals, that we seek our spiritual satisfaction, our ego satisfaction, in consumption.” (Lebow, 1955)

This idea has pushed the consumers to be more considered with what they put in their baskets.

The position of graphic designers as message shapers and intermediates between businesses and audience is crucial in order to eradicate greenwashing. Brian Dougherty explains that “we [graphic designers] act as brand stewards, and we can call attention to contradictions—in the name of protecting the brand—before damaging messages get published” (2009, 165). Graphic designers are also partly responsible of the audience reaction to a message and the possible loss of trust towards brands if this message is deceitful compared to the tangible actions taken.

The power given to the graphic designer in terms of branding and planning has, however, its limits. For a green business to succeed, “you have to believe that it really is possible simultaneously to learn to live sustainably on earth and for economies and companies to remain both profitable and competitive.” (Porritt 2007, xii)

The old “selling an image” model has hit a brick wall of marketing resistance, literacy and cynicism (Grant 2007, 11). Nowadays, brands need to appeal to consumers on a more deeper level, by highlighting their values and establishing a *real* connection to their audiences. Sustainability is one of these strong points that brands would benefit in exploring in all genuinity and honesty. Bonding over values has the effect of appealing

to customers offering their loyalty in exchange, which is what businesses are seeking after.

### **4.3 Transparency and creativity**

Sustainable businesses need to differentiate themselves both from conventional competitors and their fellow green-businesses in order to succeed. The important point is that in order to do so, focus should be put not in “scammy greenwash” (Porritt 2007, xi) tendencies but into real, impacting and long lasting efforts to rethink the very principle of a business’s existence; from the business ideals to the way it is operating—nearly all aspects of a business need to be handled differently.

If it [green agenda] is just for profit it is almost bound to be questioned. In the future, we need to work with dual agendas—marketing and green-finding coincidences of interest that are authentic on both counts. (Grant 2007, 26.)

The sole goal of making profit does not suffice anymore to satisfy the green ideals of the modern, informed customers. Even the whole principle of consumption and our economic model would need to be questioned but this is another topic. Along with expert knowledge in the field of sustainability, a “green” print business has to be creative and bold—from the office management to communication strategies and frameworks.

We need to be really bold to get anywhere near the 70% reduction in carbon footprints needed. (Grant 2007, 15.)

Such initiatives have proven to be the way to find the right clients and get the confidence to stand for sustainable ideals against more skeptical ones, as the professionals I have interviewed in the following practical part of this thesis have acknowledged.

## **5 PRACTICALLY SPEAKING**

### **5.1 Methodology**

Up to this point, the text has given a theoretical overview of the phenomenon of sustainability in the print design industry. My aim was to show how sustainability came about and what conceptual, technical and economical innovations it brings to the print industry. This background research highlighted the hypothesis that all these changes could play a pivotal role for the need to redefine print design in the future.

For this practical part, a qualitative research has been conducted in the form of individual focused interviews of experts in the field of sustainable print design. There are couple of reasons behind this choice. Firstly, the qualitative research was made in order to gain a deeper understanding of what sustainable print design is, in order to eventually get data confirming my above-mentioned hypothesis. Secondly, I had the intention to carry my thesis question further by approaching my thesis subject from a more concrete angle. I took the opportunity to collect empirical data in order to understand the factors and approach that lead to developing a successful sustainable business. In this regard, qualitative research is the only way to create new theories that can be regarded as understanding a phenomenon (Kananen, 42). Furthermore, the qualitative method was the adequate way to conduct my research because of the flexibility and open responses it allows.

### **5.2 Profiles**

As stated above, the interviewees were chosen in regards to their experience and expertise in sustainable print design. All have valuable input as they specialize in offering exclusively sustainable products to their clients. The following is a overview of the four interviewees.

### 5.2.1 Ooligan Press/ Abbey Gaterud

Ooligan Press is a non-profit trade press affiliated with Portland State University, USA. Founded in 2001, Ooligan is dedicated to the art and craft of publishing. Its staff consists of educators, publishing professionals, and students within the graduate publishing program at Portland State University. From their own words, Ooligan is a press committed to providing education, publishing sustainably, and producing quality books that represent the unique landscapes, communities, and people of the Pacific Northwest. (Ooligan, 2014.)

Ooligan has launched recently a series of sustainably-made books dealing with environmental matters in order to highlight their commitment to transparency towards sustainable publishing, called the OpenBook series. It includes *Rethinking Paper and Ink: The Sustainable Publishing Revolution* that I have used as a source for this thesis. They focused on choosing the right paper and ink sources, developing design strategies and efficient and safe production processes. Also, they develop support towards local and regional companies and their corporate responsibility.

### 5.2.2 Papercut Design/ Claire Connelly

Based in Canberra, Australia, Papercut is an environmental graphic design studio with several years of experience. Their services extend to branding, web and marketing. Papercut has developed the *Green Tick of Approval*, their very own logo that applies to their clients' products.



PICTURE 11: Papercut Tick of Approval logo (papercut.net.au 2014)

In addition, the company promotes sustainable practices in their studio such as recycling, using green energy sources and minimizing energy and supply consumption or composting. They also make sure that their overall sustainable framework is in accordance with environmental standards in effect.

### **5.2.3 Calverts Cooperative/ Arthur Stitt**

Calverts is a communications design and printing company, based in Bethnal Green, United Kingdom that has been in the market for over 30 years. They have earned their reputation of “green printers” by investing, learning and sharing their knowledge about every aspect of low environmental impact communications (Calverts, 2014). Calverts studio specializes in visual identity, outdoor visuals, exhibition material, marketing, web and print design. They have an extended knowledge of sustainable materials such as FSC® or recycled paper, vegetable-based inks or the most cost effective formats (Calverts, 2014).

### **5.2.4 Viola Design/ Anna Carlile**

Since 1999, the Australian studio has been one of the first sustainable graphic design agencies to provide visual communication services, both in print and online. Viola has also partnered with other agencies to create an online resource at [www.designbynature.org](http://www.designbynature.org) that’s dedicated to inspiring others to adopt sustainable graphic-design practices (Viola, 2014). Their work has been featured in *SustainABLE, a handbook of materials and applications for graphic designers and their clients*, a compilation of projects and advices to put sustainable design in practice.

## **5.3 Data collection and sources of information**

The individual focused interviews were conducted via an online questionnaire sent to all interviewees (Appendix 1). The general interview was made using Google Forms. The form was connected to a spreadsheet so that the responses were automatically sent to this spreadsheet, improving the data collection and analysis processes.



Additionally, I also used other sources of information such as the companies' mission statements and relevant content from taken from their respective websites.

## 5.4 Results

### 5.4.1 Education and self-learning

Just half of the professionals I interviewed state to have received an education on sustainability. However, all agree about the fact that education holds an essential power of sensibilisation to environmental issues that can translate, later on, on the successful implementation of sustainable practices in a professional environment. Such education, if not provided at school, can be achieved in various ways.

All the interviewees felt a social responsibility to educate and spread awareness of the impact that print design has on the environment. For instance, Viola Design partnered with other agencies to create the first online sustainable guide, *Design by Nature*, which is a broad tool that guides designers through the key areas of consideration, providing practical tips and ideas for everyday use (Viola, 2014). Viola design's founder, Anna Carlile, has expanded her professional skills by completing a Masters degree in Sustainability, allowing her to offer research, consultation, public speaking and education in addition to design services.

Arthur Stitt of Calverts Cooperative told me about the strategic importance of investing in education— particularly sustainable training— in the development of a sustainable company: “As an employee-owned company, we could address and explore these issues directly”. This way they were able to “improve continuously, by putting our money into state-of-the art repro and printing hardware, software and training - instead of paying dividends to outside owners and shareholders” (Calverts, 2014).

All believe in a transparent design framework and open dialogue with clients as a means of education. In the case of Ooligan Press, an environmental audit chart that details the printing decisions and their environmental impact is featured inside each book of their

OpenBook series. “Because we record each choice made during the production process, Ooligan Press is able to track the outcome of our own decisions as well as offer sustainability education to others seeking similar green publishing options.” (Ooligan, 2014). The publishing company takes the opportunity of publishing green books to “educate those who are unfamiliar with the choices available to printers and publishers.” (Ooligan, 2014).

Finally, all rely heavily on self-teaching to be up-to-date with new materials, processes and sustainable industry standards. “We educate ourselves about the availability and eco content of material we specify for products” explains Claire Connelly at Papercut. This is the only way to keep up the pace of this fast-growing movement.

#### **5.4.2 Personal motives and common values**

While education certainly influences the implementation of sustainable practices professionally, there are other factors to consider. All business ideas start with a personal motive, an inner conviction. During my research, it became clear that this is even more true in the case of a sustainable business: the lack of personal interest in these issues have been the downfall of many companies that jumped on the initial *Green Bandwagon* at the end of the 1980’s for the sole purpose of making profit. Accused of *greenwashing*, they lost their credibility and the trust of their customers that were increasingly concerned with environmental issues.

Viola Design started out of “love for nature” as funding director Anna Carlile told me. Claire Connelly, founder of Papercut describes her principal motives to start her sustainable business as “standing apart from the crowd while doing something positive that resonates with my personal values”. Caring for the environment also means being aware of the impact of print design activity on nature. “Printing is material intensive” admits Arthur Stitt of Calverts cooperative, “we were concerned about health and safety of the chemicals and processes available in the print industry”.

All the professionals I interviewed built up their businesses on the awareness of their activity’s environmental effects and developed a transparent framework that meets with ecological standards. It is at this point that knowledge of print production technicalities

becomes indispensable. It provides support for the personal values that helped building their company. Sustainability, according to Viola Designs is “a hands-on approach to better design practices based on sound knowledge and expertise”. The process consists of “several small steps” as Abbey Gaterud of Ooligan Press explains, but all agree that sustainability gives them an edge over their “conventional” competitors.

The specific expertise that comes with practicing creative sustainability gives them the advantage to know every step of the print production—something that conventional design studios seldom know about. Consequently, transparency and expertise play a crucial role into gaining credibility and earning the trust of their clients. Moreover, sustainability seems to have brought to creative studios a certain confidence to stand up for their values and educate their prospective clients. In the form of discussions and open creative frameworks, they were able to develop their own sustainable standards and policies. For instance, Papercut Design created their own *Tick of Approval* “for clients to use on their web and print products designed by us” (Claire Connelly, Papercut Design). Calverts Cooperative opted for an ISO 14001 certification that shows their engagement towards environmental management and the constant improvement of their environmental performance (iso.org 2014).

In the publishing area of print design, however, it is important to state that sustainable printing is not enough, on its own, to attract buyers. Content is what the customer is primarily after. Abbey Gaterud of Ooligan Press acknowledges that “Our OpenBook initiative has some positive effect when talking to other businesses/stakeholders who are already interested in sustainability but in the normal publishing world I do not think that it makes customers more likely to buy a book-- Customers are much more interested in content than in production methods.” Finally, the most valuable aspect of developing a sustainable business is to “connect with clients over common values” (Anna Carlile, Viola Design). Attracting clients over shared personal values can make a significant difference in terms of customer loyalty and provide an additional advantage over conventional creative studios. As Claire Connelly (Papercut) explains “I know that many of our clients seek us out for our values alone, which is a huge advantage”.

### 5.4.3 The future of the print design industry

The final part of my interview aimed at asking for the professionals' opinion on the connection between sustainability and the future of print design, in regard to my thesis question. I wanted to know if they would share my views and agree on my hypothesis that sustainability is and will continue to play a pivotal role in redefining print design.

To my question "to what extent do you think sustainability will influence the future of print design?" all respondents unanimously answered "to a large extent", which is a first conclusive point. But what can sustainable practices provide to the printing industry? The digital technologies and internet have become a source of information in the form of publications and documents that once were printed, explains Claire Connelly at Papercut. To her, "the print industry needs to become more innovative-- to cope with this changing world". Green technologies have the power to remedy to the general and ongoing decrease in printed materials.

As I have shown in the theory part of my thesis, sustainability is the current center point of innovations in the print design industry. From creative design frameworks to technical advances in greener production systems, sustainability is redefining the way to print and communicate through physical materials. A new set of expertise is making its way into creative studios, from chemistry, biology, ecology to material engineering which will give a higher value to the print design profession and also to the printed materials.

If printing becomes more expensive and more of a luxury product--I think each printed product will become more exclusive in its production. The sustainable design of a product can be one of those exclusivity elements that customers will be looking for. (Abbey Gaterud, Ooligan Press). A rebranding of print design through sustainable practices will allow the industry to find its niche, which will be essential to keep being relevant in an increasingly digitized world.

## 6 CONCLUSION

Undeniably, the print design industry is in a transitive state. As a natural-resources-dependent industry, print has to face complex issues to develop cleaner production processes in a time of environmental struggle. Moreover, the advent of digital technologies has challenged print's position as a relevant and contemporary communication tool.

More than ever, digital media has taken over as a primary means of communication. It is true that print is on a slow and steady decline but by no means has it implied that print is disappearing. It is and will remain as an important part of our lifestyle, culture and communication habits. Because of the oversaturated flows of information in the digital world, print is gaining back some appreciation as a way to stand out among the crowd. Credibility, reliability, authenticity and physicality are among the values that print design has been conveying and that the digital supports have failed to outdo. This is the strength of print, its niche on which to focus to stay relevant among virtual communication means.

From the results of my research and focused interviews, it is clear that sustainability is going to play a crucial role in print design's transition and future. The sustainable movement fits perfectly in this context of print's necessary revamping. At first, the rise of sustainability significantly threatened the industry. Print had been the main target of early efforts towards environmental protection. Nowadays, though, it is no longer true. Digital is not anymore the greenest option and in the meantime, paper has become one of the few fully sustainable and renewable products.

Currently, there is little known about the impact of digital technologies on the environment. General public opinion has been formed when digital devices became widely available and presented as a way to save materials and protect the environment. Paper and printing became the symbol of environmental unfriendliness, as a cause of deforestation, water pollution and massive energy consumption. This was probably true before personal computers and other digital devices became popular. Currently, there is growing recognition that digital media technology uses significant amounts of energy, from coal fired power plants which are making a serious contribution to global warming

(Carli, pbs.org, 2010). In its 2010 report *Cloud Computing and its contribution to Climate Change*, Greenpeace estimates that by 2020, data centers will demand more electricity than is currently demanded by France, Brazil, Canada, and Germany combined (Carli, pbs.org 2010). The threats that digital devices are representing for the environment seem to be far worse than print and need to be truthfully addressed in this sustainable context.

With time, awareness about environmental issues has spread. We are just starting to question the assumption that nature had to be tamed in order for humanity to prosper, that came up during the Industrial Revolution. Little by little, we are realizing that we are part of nature and that we do benefit living in balance with it. Deliberately looking away did not make environmental issues disappear. Scapegoating, blaming and cynicism have not brought up any solution. As Arthur Stitt from Calverts Cooperative stated during the interview, “It behoves our industry to show that printing can be a sustainable alternative to online communications”.

Through education, open dialogue and transparent relations to clients and audience, graphic designers need to learn the faculty to integrate sustainable practices as an elementary part of their work ethics and creative problem-solving abilities. It is also important that the shift to sustainable practices takes its roots from a personal conviction, to change the status quo and build a cleaner and more efficient alternative system. Due to the unique position that graphic designers occupy in the print production process—the centerpiece between businesses of all sorts and their audience—they have their part to play in the message they craft and therefore a certain power to influence the end user.

It is obvious that the problems arising from environmental concerns are very complex and all-encompassing. It questions our values and lifestyles, particularly our unbridled consuming habits. In his book *The Green Marketing Manifesto*, John Grant (2007, 10) precisely sums up our ambition for probably decades to come: “Instead of focusing on the problems—which can seem hopeless at times—we need to see the *opportunity* in creating alternatives.” We need to overcome any obstacles and focus on solutions and actions that will benefit the whole humankind.

## REFERENCES

Aalto University. 2013. REsolutions. Responsibility in Graphic Design. Helsinki: Aalto University.

Ambrose, G., Harris, P. 2009. The Fundamentals of Graphic Design. Lausanne: AVA Publishing SA.

Antley, J., MightyMouse Production. 2013. Print is not dead, she's just been standing on a street corner. Blog post. Read 22.02.2014.

<http://www.smallyetmighty.com/blog/2013/5/14/print-is-not-dead>

American Institute of Graphic Arts AIGA. 2009. To design or not to design: A conversation with Allan Chochinov. Released 17.02.2009. Interview by Steven Heller. Read 11.11.2013. <http://www.aiga.org/to-design-or-not-to-design-a-conversation-with-allan-chochinov/>

Benson, E., Stephens, S. M. W., Stephens, A. B. 2009. The Big Book of Green Design. New York: Harper Collins.

Benyus, J.M. 1997. Biomimicry: Innovation inspired by Nature. New York: William Morrow.

Biomimicry Institute. 2007-2014. What is Biomimicry? Website. Read 24.02.2014. <http://biomimicryinstitute.org/about-us/what-is-biomimicry.html>

Biomimicry Institute. 2007-2014. What Do You Mean by the Term Biomimicry? A Conversation with Janine Benyus, author of Biomimicry: Innovation Inspired by Nature. Interview. Read 24.02.2014. <http://www.biomimicryinstitute.org/about-us/what-do-you-mean-by-the-term-biomimicry.html>

Buchanan, R., AIGA. 2000. Good Design in the Digital Age. Read 21.02.2014. [http://www.aiga.org/uploadedFiles/AIGA/Content/Tools\\_and\\_Resources/Gain\\_journal/good\\_design\\_in\\_the\\_digital\\_age.pdf](http://www.aiga.org/uploadedFiles/AIGA/Content/Tools_and_Resources/Gain_journal/good_design_in_the_digital_age.pdf)

Calverts Cooperative. 2014. Website. Read 26.03.2014. <http://www.calverts.coop/co-operative>

American Cancer Society. 2014. Known and Probable Human Carcinogens. Webpage <http://www.cancer.org/cancer/cancercauses/othercarcinogens/generalinformationaboutcarcinogens/known-and-probable-human-carcinogens>. Read 27.04.2014.

Casper, J., K. 2010. Fossil Fuels and Pollution: The Future of Air Quality. New York: Infobase Publishing.

C2ccertified. 2011. Product Certification. Website. Read 24.02.2014 [http://www.c2ccertified.org/product\\_certification/c2ccertified\\_product\\_standard](http://www.c2ccertified.org/product_certification/c2ccertified_product_standard)

Canopy Planet. A Brighter Shade of Green. Opportunities for Newspapers in the New Era of Consumer Environmentalism. 2008. Report. Read 09.02.2014  
<http://canopyplanet.org/uploads/BrighterShadeFull%20Report.pdf>

Carli, D., pbs.org. 31.03.2010. Is Digital Media Worse for the Environment than Print? Article. Read 06.04.2014. <http://www.pbs.org/mediashift/2010/03/is-digital-media-worse-for-the-environment-than-print090/>

Carter, J. 1980. State of the Union Address. Jimmy Carter Library & Museum, Georgia State University, and the Board of Regents of the University System of Georgia. Retrieved on: 2009-04-05.

Carver, J., Guidry, N., 2011. Rethinking Paper and Ink. The Sustainable Publishing Revolution. Portland: Ooligan Press.

Center for Biomimetics, University of Reading. 2007. What is biomimetics? Website. Read 23.02.2014. <http://www.reading.ac.uk/biomimetics/about.htm>

Designers Accord. 2007-2012. Website. Read 13.02.2014.  
<http://www.designersaccord.org/archive/about/>

Dontigney, E., Demand Media, 2014. The Advantages of Print Advertisements. Article. Read 16.02.2014. <http://smallbusiness.chron.com/advantages-print-advertisements-17857.html>

Dougherty, B., Celery Design Collaborative. 2008. Green Graphic Design. New York: Allworth Press.

Ecofont. Save printing costs and the environment. Pdf Brochure. Read 08.02.2014.  
<http://www.ecofont.com/assets/files/ecofontsans/EcofontSans-Example.pdf>

Engage By Design. 2001. Values. Web page. <http://engagebydesign.org/values/>

Environmental Defense Fund. 2011-2012. Paper calculator.  
<http://c.environmentalpaper.org/home>. Accessed 09.02.2014

Evans, P.2004. Forms, folds and sizes, Second Edition. All the Details Graphic Designers Need to Know But Can Never Find. Gloucester: Rockport Publishers Inc.

Examiner. 2009. Downcycling: reusing or recycling a product for an alternative lesser-quality purpose. Website. Read 24.02.2014.  
<http://www.examiner.com/article/downcycling-reusing-or-recycling-a-product-for-an-alternative-lesser-quality-purpose>

Fairs, M. 2009. Green Design. Creative sustainable designs for the twenty-first century. London: Carlton Books Limited.



Forbes. 2012. Print is Dead. Not so Fast. Article. Released 28.06.2012. Read 17.02.2014. <http://www.forbes.com/sites/thesba/2012/06/28/print-is-dead-not-so-fast/>

Goodland, R.1975. The tropical origin of ecology: Eugen Warming's jubilee. *Oikos* 26: 240–245. Retrieved on: 2009-03-14. <http://www.jstor.org/discover/10.2307/3543715?uid=3737976&uid=2129&uid=2&uid=70&uid=4&sid=21103422628271>

Goudie, A. 2005. *The Human Impact on the Natural Environment*. 6th ed. Oxford: Blackwell Publishing.

Grant, J. 2007. *The Green Marketing Manifesto*. Chichester: Wiley.

Greenwashing Index. Help keep advertising honest. 2013. What is greenwashing? Article. Read 27.11.2013. [http://www.greenwashingindex.com/about\\_greenwashing/#what](http://www.greenwashingindex.com/about_greenwashing/#what)

International Organization for Standardisation ISO. ISO 1400 Environmental Management. Web page. Read 26.03.2014. <http://www.iso.org/iso/fr/home/standards/management-standards/iso14000.htm>

IPCC. 2013. *The Physical Science Basis*. Report. Read 19.02.2014 [http://www.climatechange2013.org/images/report/WG1AR5\\_ALL\\_FINAL.pdf](http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf)

IUCN/UNEP/WWF.1991. *Caring for the Earth: A Strategy for Sustainable Living*. Gland: Switzerland. Retrieved on: 2009-03-29. <http://data.iucn.org/dbtw-wpd/edocs/WCS-004.pdf>

Johnsen, N., Bøg K., *The graphic association of Denmark*, 2006. Danish Ministry of the Environment. Ecolabelling of printed matter - part I. Report. Read 13.02.2014. <http://www2.mst.dk/Udgiv/publications/2006/87-7052-169-7/pdf/87-7052-170-0.pdf>

Journal Sentinel, Pulitzer Center. 9.12 2012. Paper Cuts: Wisconsin's place in Paper Industry Under Siege. Online article. Read 27.04.2014. [http://media.jsonline.com/images/deforestation\\_embed.jpg](http://media.jsonline.com/images/deforestation_embed.jpg)

Kadam, S., Evans, M., Rothenberg, S. 2005-12. A Comparative study of the environmental aspects of lithographic and digital printing processes. Report. Read 13.02.2014. <https://ritdml.rit.edu/handle/1850/1321>

Kananen, J., 2011. *Rafting Through the Thesis Process. Step by Step Guide to Thesis Research*. Jyväskylä: Jamk Jyväskylä University of Applied Sciences.

Kinsella, S. 2012. Paperwork: Comparing Recycled to Virgin Paper. Why recycled content is crucial for print & writing paper. Accessed on 09.02.2014 <http://conservatree.org/learn/WhitePaper%20Why%20Recycled.pdf>.

Lebow, V. 1955. "The Real Meaning of Consumer Demand". *Journal of Retailing*.

Makower, J., Worldchanging.com, 2006. Where are all the good, green products? Online article. Read 17.02.2014. <http://worldchanging.com/archives//005031.html>

Mason, D. 2007. Materials, Process, Print. Creative Solutions for Graphic Design. London: Laurence King Publishing Ltd.

McDonough, W., Braungart, M. 2002. Cradle to Cradle, Remaking the Way We Make Things. New York: North Point Press.

Michael, B., Kaye, G., Xerox, 2013. What is the Future of Print and Design? Panel of Experts Weigh In. Released 02.05.2013. Read 15.02.2014. [http://digitalprinting.blogs.xerox.com/2013/05/02/what-is-the-future-of-print-and-design-panel-of-experts-weigh-in/#.UoH\\_sPIHB28](http://digitalprinting.blogs.xerox.com/2013/05/02/what-is-the-future-of-print-and-design-panel-of-experts-weigh-in/#.UoH_sPIHB28)

Nature Factor. A Graphic Designer's Guide to Biomimicry. Nature's factors. Website. Read 23.02.2014. <http://www.naturefactor.com/natures-factors>

Ooligan Press. 2014. Website. Read 26.03.2014. <http://ooligan.pdx.edu/about/>

Papanek, V. 1972. Design for the real world; human ecology and social change. Read 19.02.2014. [http://playpen.icomtek.csir.co.za/~acdc/education/Dr\\_Anvind\\_Gupa/Learners\\_Library\\_7\\_March\\_2007/Resources/books/designvictor.pdf](http://playpen.icomtek.csir.co.za/~acdc/education/Dr_Anvind_Gupa/Learners_Library_7_March_2007/Resources/books/designvictor.pdf)

Papanek, V. 1995. The Green Imperative: Natural Design for the Real World. New York: Thames and Hudson.

Papercut. 2014. Website. Read 27.03.2014. <http://www.papercut.net.au/index.html>

Pecina, M., Novum, World of graphic design. 11.13 Interview 29.09.2013. Interviewer Schulz, B.

Perez, W. Breezy Creative Design. 27.09.2010. Graphic Design Before the Computer. Blog Article. Read 16.02.2014. <http://breezycreativedesign.com/2010/09/27/graphic-design-before-the-computer/>

Piworld.com. 2012. U.S. Printing Industry to Continue to Decline at Slower Pace Says IBISWorld Report. Article. Read 16.02.2014. <http://www.piworld.com/article/us-printing-industry-continue-decline-slower-pace-says-ibisworld-report/1>

Pollock, T., GreenBlue. 2.12.2012. What's the Future for Alternative Fibers? Online article. Read 27.04.2014. <http://www.greenblue.org/2011/12/whats-the-future-for-alternative-fibers/>

Porritt, J. 2007. The Green Marketing Manifesto. Introduction. Chichester: Wiley.

PrintPower. 2014. Why Should Print Media Be Part of your Media Strategy? Article. Read 17.02.2014. <http://www.printpower.eu/en/why-print-media/why-print-media/why-should-sprint-media-be-part-of-your-media-strategy>

PsPrint. 24.09.2014. Interview: Print and design before Computers. Online Interview. Read 14.02.2014. <http://blog.psprint.com/printing/print-design-before-computers/>

Public Relations Society of America. 2011. What is Public Relations? Article. Read 27.11.2013. [http://www.prsa.org/aboutprsa/publicrelationsdefined/#.UpXB\\_MRHB28](http://www.prsa.org/aboutprsa/publicrelationsdefined/#.UpXB_MRHB28)

Sherin, A. 2008. SustainAble. A handbook of materials and applications for graphic designers and their clients. Beverly: Rockport Publishers, Inc.

Southface Energy and Environmental Resource Center. The history of solar power. Retrieved on: 2009-04-07.

UN General Assembly.1982. World Charter for Nature. 48th plenary meeting, A/RES/37/7. Retrieved on: 2009-03-30.

Wiggins, G.P., McTighe, J. 2005. Understanding by design. Alexandria: ASCD.

World Resource Institute. 1997. Last Frontier Forests: ecosystems and economies on the edge. <http://www.wri.org/publication/content/8563>

## APPENDICES

### Appendix 1. Interview Questions

**Note:** This is the text version of the interview. To access the live form, click the link below.

[https://docs.google.com/forms/d/1UXzFQBwczKrdRZx26DQ9KkQ4Xitno3Chrosf\\_ys7IG8/viewform](https://docs.google.com/forms/d/1UXzFQBwczKrdRZx26DQ9KkQ4Xitno3Chrosf_ys7IG8/viewform)

- ❖ **Please state your name/ your company \***
- ❖ **Type of activity \***
- ❖ **Country \*** The country you are operating from
- ❖ **Years of activity \***
  - Less than 1 year
  - 1 to 3 years
  - 4 to 7 years
  - 8 to 12 years
  - More than 13 years
- ❖ **Have you ever been taught about sustainability during your professional studies?\***
  - Yes
  - No
- ❖ **If no, do you think that this would have been beneficial for your career? Choose one option**
  - Necessary
  - Beneficial
  - A bit beneficial
  - Not at all beneficial
  - I don't know
  - Other:
- ❖ **If yes, how satisfied are you with the amount of teaching you received? Choose one option**
  - Extremely satisfied
  - Very satisfied
  - Satisfied
  - Somewhat satisfied
  - Unsatisfied
  - I don't know
- ❖ **What about the quality of the teaching? Choose one option**
  - Extremely satisfied
  - Very satisfied
  - Satisfied
  - Somewhat satisfied
  - Unsatisfied
  - I don't know
- ❖ **To what extent do you think that teaching sustainability at school can encourage sustainable practices at work? \***

- To a large extent
- To a moderate extent
- To some extent
- To little extent
- Not at all
- I don't know

- ❖ **What were your motives on providing sustainable services? \***
- ❖ **How did you implement sustainability in your business? \* Do/did you encounter problems doing so?**
- ❖ **Do you think that your sustainable practices give you any advantages and/or disadvantages compared to your conventional competitors? \* Please explain.**
- ❖ **To what extent do you think that sustainability can influence the future of print design? \* Please choose one option**
  - To a large extent
  - To a moderate extent
  - To some extent
  - To little extent
  - Not at all
  - I don't know
- ❖ **Please explain your view below. \***
- ❖ **How do you see the future of sustainability in your field? \***
- ❖ **Is there anything you would like to add?**