



Federation of Printing, Packaging,  
Signage & Visual Communication

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22 September 2020

The Director-General: Department of Environment, Forestry and Fisheries

Attention: Mr. Olebogeng Matshediso/ Dr Vincent Gololo

Private Bag X447

Pretoria

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**Comments: The Notice of intention to declare certain printing industry activities as controlled emitters in terms of Section 23 of the National Environmental Management: Air Quality Act, 2004**

Dear Mr Matshediso/ Dr Vincent Gololo

Submission to the Minister by Printing SA (Printing Industries Federation of South Africa NPC)

We would like to thank the Department for the extension granted us to respond to the Notice. We attach Printing SA (Printing Industries Federation of South Africa NPC) formal submission to the Minister regarding the proposed Declaration of Certain Printing Industry Activities as Controlled Emitters and Establishment of Emission Standards under section 23 of the National Environmental Management: Air Quality Act 39 of 2004.

Regards

Dr Abdool Majid Mahomed

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for We confer, consult,  
campaign and train.

## Introduction

Printing Industries Federation of South Africa NPC (Printing SA) is a representative Industry Body. We confer, consult, campaign and train for the well-being of the industry to ensure that it remains sustainable and that all stakeholders prosper.

Printing SA represent most of the large, medium and small companies, but there are a significant number of small companies who are not members of Printing SA. While Printing SA provides services to members, we are concerned about the whole industry sector and therefore do not exclude non-members when dealing with issues that affect the printing sector.

The economic conditions had adverse impact in the Sector and the Covid-19 has exacerbated the already dire conditions. The membership has decreased drastically from 2010 as we had around 1100 membership, in 2016 the number was reduced to 810 and now we are sitting with 629 membership. The adverse economic conditions had resulted in companies cutting back on advertising expenditure, as well as food manufacturers cutting back on packaging costs. This has had negative impact on the printing industry, resulting in fewer orders, and more basic work. Also, the import of printed/ finished products is increasing day by day due to lower costs from other countries.

Based on market research, consultation with the printing industry, technical studies, legal analysis and information available to date, it is submitted that the Proposed Declaration of Certain Printing Activities as Controlled Emitters (Draft Regulations), in its current form, will impose excessive economic impacts on the printing industry, without achieving significant improvements in air quality, human health and well-being.

### **The submission is set out as follows:**

1. Annexure A – Background to the Printing Industry
2. Annexure B – Detailed amended memorandum which includes the results of market research, consultation with the printing industry, technical studies legal analysis conducted in 2015
3. Annexure C – General Comments/ questions and concerns of the printing industry that require DEFF's consideration.

Printing SA once again thanks the Department for the opportunity to comment on the Notice and looks forward to engaging with the Department further on this work.

## ANNEXURE A

### Background to the printing industry

#### A. Printing processes

Printing processes may be divided into the following categories based on the type of plate used:

- (1) Digital printing:
  - (a) Digital printing uses very little to no VOC emitting solvents.
  - (b) It is especially suited to 'on demand, just in time and variable data' printing.
  - (c) Many plants using other processes have installed and will install digital presses to provide a faster and more comprehensive service to their clients.
  - (d) This process is suitable for entrepreneurial start-ups as the skills required are more easily acquired and it is possible to integrate both prepress and post press operations.
- (2) Lithography:
  - (a) Lithographic offset printing use planographic plates and oil-based lithographic inks. A rubber blanket transfers the image from the plate to the substrate, and image / non-image areas are on the same plane. The plate (commonly made of zinc, aluminium, plastic, or paper) is coated with a light-sensitive chemical that becomes ink-receptive when exposed to light. The negative is exposed to light, chemically altering the exposed areas and making the image area ink-wettable (and water repellent), while the non-image areas become water-wettable chemically repellent to ink). An aqueous solution of isopropyl alcohol (generally 15 percent alcohol, but potentially up to 30 percent), called fountain or dampening solution, is used to dampen the non-image area on the plate.
  - (b) Offset printing requires cleaning solutions to clean the press and other parts. Traditionally, these are solvent-based solutions. In general, the main lithography products include books, brochures, artwork, and magazine printing, as well as packaging applications.
  - (c) A distinction is made between the drying processes used in lithographic offset printing:
    - (i) Heatset:
      - a. Requires the use of a heater to evaporate solvents from solvent based inks.
      - b. VOCs are released from the drying of solvents from the inks used.
      - c. This process is commonly used for the printing of quality magazines, catalogues and packaging.
    - (ii) Coldset:

- a. Ink and the solvent are absorbed into the printing material rather than the solvents being evaporated using a heater.
- b. Uses far less solvent and inks dry more by absorption and oxidation.
- c. This process is commonly used for the printing of newspapers.

(iii) Two different processes are used to feed the printing substrate into the press:

(iv) Rotary or web offset:

- a. Paper is printed from a roll.
- b. Most web offset operations are run by upper medium or large companies.
- c. Both web offset coldset and -heatset are suitable for medium- to high-quality runs from 20,000 to 1 million copies with a mechanical velocity up to 100,000 revolutions / hour.

(v) Sheetfed offset:

- a. the substrate is fed one sheet at a time, and is mainly used for printing books, brochures, artworks, magazines, and catalogues.
- b. It is suitable for higher-quality runs from 1,000 to 100,000 copies with a mechanical velocity up to 15,000 revolutions / hour.
- c. It is reasonably versatile in the kinds of substrate it can use and very versatile in the products it produces. It is generally used on paper and paper board substrates but can be used on metal.
- d. Operation sizes can range from small to large, but this is the process used by the bulk of small companies.
- e. This is the most popular of the printing processes, used by 49% of all PIFSA members.
- f. Most solvent usage is related to cleaning materials and the alcohol content of the dampening fluid. There is significant reduction in the use of alcohol (IPA) in new presses being manufactured.

(3) Flexography:

- (a) Flexography printing is sheet fed or, more frequently, web fed, and uses exposed flexible plates that are processed in an acid bath with raised images coming in contact with the substrate during printing. The plates can be used directly for letterpress or to mould a flexible rubber / plastic master.
- (b) Alcohol-based inks are generally used, although certain products can be run with water-based inks.

- (c) Where the substrate is fed into the press from a roll, it travels through a series of steps, each one printing a single colour. Overhead dryers dry the inks and a final overhead tunnel, close to the rewind station, removes the solvents.
  - (d) The use of specific inks allows for applications on impervious non-absorbent substrates (e.g. plastics, films, and metallic surfaces) and on absorbent compressible substrates (e.g. paper and cardboard).
  - (e) Flexography is used to print flexible packaging, cardboard packaging, food cartons, paper cups, plates, and gift wraps. It is suitable for runs from 10,000 to 150,000 copies with a machine velocity of 100 meters / minute.
  - (f) Flexography is used for medium or long multicolour runs on a variety of substrates (e.g. plastics, heavy paper, fibreboard, and metal and plastic foil).
  - (g) The narrow web label printing sector is characterised by a number of small companies, many black owned companies, especially in the Cape provinces and KwaZulu-Natal.
  - (h) This process/product mix is considered a good entry level into the printing sector for small businesses.
- (4) Screen printing:
- (a) Screen-printing technology uses a porous polyester mesh with a stencil that defines the image to be printed. It can be operated with either sheetfed or web offset presses.
  - (b) The inks used depend on the substrate to be printed (e.g. textiles, plastics, metals, or paper). Inks can be solvent-based, water-based, and ultraviolet (UV) cured.
  - (c) In recent years' screen printing has moved away from the use of solvent based inks to UV cured inks, which has little impact on VOC emissions.
  - (d) This sector represents a number of small printers as the capital costs are less expensive. It can provide a livelihood for young entrepreneurs and micro enterprises.
  - (e) However, the use of solvent based inks will be higher in the smaller companies and operations where the cost of UV systems is not affordable.
  - (f) The product range extends from signs to fabric decoration.
- (5) Gravure:
- (a) Gravure (or rotogravure) is a printing process in which an image is etched or (more commonly) electromechanically engraved into a cylinder surface.
  - (b) It is generally operated with web-fed presses and uses cylinders plated with copper.
  - (c) Normally organic solvent-based inks are used in South Africa. Inks usually are fluid and applied to the cylinder, and the excess is scraped using a doctor blade.
  - (d) Hot-air dryers are used to dry inks and solvents.

- (e) This technology is typically used for medium-quality printing jobs (e.g. large distribution catalogues and magazines, newspaper supplements, packaging items, and wallpapers).
- (f) The gravure / rotogravure process is suitable for runs from 300,000 to 5 million copies with a velocity of 55,000 copies / hour.

**B Usage of printing processes in the industry**

- 1) Based on the BMi Research Commissioned Study, 2015 (Bmi Study), the most common printing processes are:
  - (a) digital printing is offered by 60.4% of all printing companies. Digital printing contributes to 44.5% of the revenue of all printing companies and is expected to increase to 47.7% over the next two years. Small companies dominate the supply of digital printing services (offered by 66% of small companies). Of the companies that do not offer digital printing services, 28% have indicated that they intend to introduce digital printing within the next two years;
  - (b) lithography (using a combination of heat set and cold set drying processes) is offered by 57.5% of all printing companies, regardless of their size, offering lithography printing services; and
  - (c) flexography is offered by 24.5% of all companies and mostly offered by large companies (45.8%), but 24.4% of medium companies and 19.1% of small companies also offer flexography services;
  - (d) screen printing is offered by 21.8% of all printing companies; and
  - (e) gravure is offered by 3.9% of all printing companies.
- (2) The table below summarises the percentage usage of printing processes:

<b>Printing process</b>	<b>Usage Percentage*</b>
Digital Printing	60.4%
Lithography	57.5%
Flexography	24.5%
Screen printing	21.8%
Gravure	3.9%

\* More than one printing process may be implemented per printing facility and therefore the total usage percentage exceeds 100%

- (3) Other services offered by printing companies include prepress design, artwork, layout and plate making, as well as post press finishing, binding, cutting and creasing.

**C Employment**

- (1) Printing companies:

There were more than 2000 printing companies in the printing sector around 2010, of which 1100 were Printing SA members. This number has declined repeatedly, now Printing SA has around 629 membership.

We have been advised that the number of printing companies have declined from approximately 1100 in 2012, to 760 in 2016 and 629 in 2020 (email correspondence with Khanyi Ntanzu (Printing SA) dated 8 September 2020).

- (b) Based on the BMi Study, 48.4% of printing companies are “small companies” employing up to 25 staff (small companies); 40.1% of printing companies are “medium companies” employing from 26 to 150 staff (medium companies); and 11.5% of printing companies are “large companies” employing more than 150 staff (large companies).
- (c) The table below summarises the categories of printing companies based on employment figures:

Category	Staff complement	Percentage of industry
Small	< 26	48.4%
Medium	26 – 150	40.1%
Large	> 150	11.5%

**2 Employees:**

- (a) Approximately 45,000 employees are directly employed in the printing industry. These employees have as many as 500,000 dependents.
- (b) Through pre-press and post-press services as well as employment by suppliers to the industry, the printing industry indirectly creates work for an estimated 8,000 employees. A further incidence of indirect employment from the printing industry arises seasonally, when up to 5,000 – 6,000 casual employees can be employed, for example when diaries are printed at year end.
- (c) Also not represented in this figure are other indirect services such as accounting, fleet requirements, legal consultation, production facility maintenance, newspaper vendors, pamphlet distributors, recyclers and waste pickers.
- (d) Based on the above, an estimated total figure of 60,000 direct and indirect employees is a probable total employment figure for the printing industry.

**D Turnover**

- (1) Based on the BMi Study, the average company in the printing sector has an annual turnover of R53.8 million. With 1100 printing companies in South Africa, the industry contributes an estimated R56 billion to the South African economy per year.
- (2) 36.9% of all printing companies and 63.6% of small printing companies have a turnover of between R1 million and R10 million per year.
- (3) 49.1% of companies nationally operate on gross profit margins of 30% or less.

**E Demographics**

- (1) In terms of regional distribution, the largest portion of printing companies are located in the Eastern Cape (39%), followed by Gauteng (32.5%) and the Free State (28.6%).<sup>14</sup>

## **F B-BBEE**

- (1) All large printing companies are B-BBEE certified; 92.1% of medium companies are B-BBEE certified; 82.4% of small companies are B-BBEE certified; and overall 88.2% of all printing companies are B-BBEE certified.
- (2) 28.4% of companies have a level 4 B-BBEE certification; 14.6% of companies have a level 3 B-BBEE certification; 19.2% of companies have a level 2 B-BBEE certification; and 18.5% of companies have a level 1 B-BBEE certification.

## **G Industry trends**

- (1) There have been a number of closures, mergers and liquidations in the printing industry over the period 2011 to 28 February 2016, with more than 69% of Printing SA member companies ceasing operations, more than 18% members being party to mergers and more than 13% of Printing SA members being liquidated. Further pressure on the industry may increase this trend due to Covid-19.
- (2) Capital investment:
- (a) 81% of printing companies have spent R10 million or less in plant capital investments in the last 5 years. 88.3% of companies plan to spend R10 million or less in plant capital investment during the next 12 months.
  - (b) 44.7% of printing companies have increased their capacity and 13.2% of printing companies have decreased their capacity in the last 12 months. 58.5% of the companies that increased their capacity did so by installing new equipment and 22.6% did so by increasing their labour. However, 40% of companies that reduced capacity experienced labour cuts.
  - (c) While 27.4% of all printing companies expect to grow their business in the next 12 months, 38% of all printing companies intend to grow their business over the next 3 years.

## ANNEXURE B

### MEMORANDUM

22 September 2020

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**Submission to the Department of Forestry, Fisheries and Environment on the *Declaration of Certain Printing Industry Activities as Controlled Remitters and Establishment of Emission Standards* in terms of section 23 of the National Environmental Management: Air Quality Act, 2004 (issued in terms of Notice 855, GG 43591 dated 7 August 2020)**

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#### Summary

- Section 23 of NEM:AQA provides that the Minister or MEC may declare any activity, or any appliance or activity falling within a specified category, as a controlled emitter if such appliance or activity results in atmospheric emissions which through ambient concentrations, bioaccumulation, deposition or in any other way, present a threat to health or the environment or which the Minister or MEC reasonably believes presents such a threat. It is our submission that the Department has failed to provide any evidence that the printing industry is causing a measurable deterioration of air quality and presents a threat to health or the environment.
- The only scientific evidence specific to the direct impact of the South African printing sector was prepared by WKC Group in 2012 using methods approved by the Department. The technical study concluded that the printing sector is highly unlikely to generate direct impacts on community health, nuisance form odour or environmental harm. The Department has never disputed the findings of the WKC Group, or provided scientific evidence to refute the findings of the technical study. Results of technical studies undertaken in a number of Test Case Facilities found that organic solvents detected in vents were not considered to be toxic and the air dispersion modelling indicted a negligible health risk to communities (due to low toxicity of solvents used). In addition (with the exception of the largest facility –using over 3,000 tonnes of solvent per year) no other Test Case Facility contributed to secondary ozone formation that would lead to ambient ozone exceeding the statutory air quality standard. Despite this scientific evidence, DEFF appears intent on regulating a sector without evidence that it causes harm or presents a threat to the environment or health.
- The Department appears to be concerned about ozone levels (without providing specific details or evidence to support this concern) and it has not provided any scientific evidence that the printing sector contributes in any way to significant ozone formation that would warrant regulation focused on VOCs. We are not aware nor have been provided evidence by the DEFF of where there are areas of high tropospheric ozone and whether or not causal factors, including the printing activity industry, have been established. Accordingly, there is no evidence that regulation in terms of section 23 of NEM:AQA would offer benefits to alleviating high ozone levels.
- The Second Section 23 Notice is ineffective however it does create indirect environmental impacts in terms of GHG and NOx emissions, it places additional demand on an energy poor economy with electrical demand and propane fuel supply, and it leads to ‘excessively

expensive' controls representing estimates of up to R260, 000 per tonne VOC removed which represents one of the highest costs globally.

- Printing SA therefore submits the following:
  - That the printing sector should not be regulated in terms of section 23 (or section 21) of the NEM:AQA
  - Despite not expected to bring about material improvements to air quality, the sector will make a commitment to use alternative printing materials as these become more affordable and the transition will be conducted over a period which does not place excessive economic burden on operators.
  - The Department could investigate a tax on organic solvent usage (for certain printing processes) and the tax should be used to offset the additional cost of alternative printing material to encourage change.
  - Operators will commit to transitioning to alternative printing materials as the printing equipment reaches the end of its operating lifetime.

## 1. Introduction and brief background

- 1.1. The printing industry is an important part of South Africa's economy, despite a decline in the usage of print media in favour of digital media. The South African printing industry is a major manufacturing sector and the most advanced printing centre in Africa.
- 1.2. The Department of Forestry, Fisheries and Environment (**DEFF or the Department**) has sought to regulate emissions of Volatile Organic Compounds (**VOCs**) from the printing industry since 2009 and has published various draft regulations in terms of section 21 and 23 of NEM: AQA.
- 1.3. The Department of Environmental Affairs (**DEA or the Department**) (as it was then known) included printing as a listed activity in the first draft list of s 21 activities in July 2009 in terms of NEM: AQA. A memorandum was submitted to the DEA objecting to a number of procedural and substantive grounds to the inclusion of the printing industry in the draft notice. As a result of the submissions the printing industry was excluded from the final section 21 notice published on the 31 March 2010
- 1.4. During 2012 the DEA published a draft amendment to the section 21 notice which again sought to include the printing industry as a listed activity. As a result, Printing SA (which is a brand of PIFSA NPC) commissioned air quality and emission experts Wardkarlson Consulting Group (**WKC Group**) and Norton Rose Fulbright South Africa Inc (**NRFSA**) to undertake a technical study and legal review of the draft regulations. The results from the detailed combined study were submitted to the DEA and these results were used to inform certain conclusions regarding the proposed regulation of the printing industry in terms of section 21 of NEM: AQA.
- 1.5. On 4 November 2016 the DEA published a draft notice (GN No.1373 in GG 40402) (**First Section 23 Notice**) which sought to regulate emissions of Volatile Organic Compounds (**VOCs**) from the printing industry as a controlled emitter in terms of section 23 of NEM: AQA as opposed to a listed activity in terms of section 21 of NEM: AQA. In response to the publication of the First Section 23 Notice, Printing SA submitted a detailed memorandum to the DEA on the 30 November 2016 and to the Department of Trade and Industry (**DTI**) based on the findings from the combined technical and legal study.

- 1.6. On 7 August 2020 DEFF published a second draft notice (GN No. 855 in GG 43591) (**Second Section 23 Notice**) which seeks to regulate printing as a controlled emitter in terms of section 23 of NEM: AQA. Other than a few minor amendments there is no substantial difference between the First section 23 Notice and the Second Section 23 Notice
- 1.7. In terms of section 23 of AQA (controlled emitters) the Minister or MEC may declare any activity falling within a specified category, as a controlled emitter if such activity results in atmospheric emissions which through ambient concentrations, bioaccumulation, deposition or in any other way, present a threat to health or the environment or which the Minister or MEC reasonably believes presents such a threat (own emphasis).
- 1.8. Before publishing a notice or any amendment to the notice, the Minister or MEC must *inter alia* consider any sound scientific information and any risk assessments (own emphasis).
- 1.9. It is our submission that the Department (as the DEA and now DEFF) has failed to provide any evidence that printing processes using organic solvents result in 'atmospheric emissions which through ambient concentrations, bioaccumulation, deposition or in any other way, present a threat to health or the environment or which the Minister or MEC reasonably believes presents such a threat'. The DEFF has not at any point disagreed with the conclusions, or provided contrary evidence in respect of the WKC Group technical assessment undertaken in 2012 to 2013, which, using accepted scientific and approved methods, concluded that the printing sector did not pose significant harm to community health or present a threat to the environment.
- 1.10. In addition, it appears that the DEFF has failed to consider the submissions made by Printing SA adequately or at all. Key to this is the WKC Group technical study which reviewed the health effects of the printing sector and environmental impacts and concluded the printing sector of South Africa did not pose significant harm to community health or a threat to the environment. Despite this scientific evidence, DEFF appears intent on regulating a sector without evidence (and contrary to the evidence provided to it to date in the technical study) that the printing industry causes harm or presents a threat to the environment or health. On this basis it is view of Printing SA that printing sector should not be regulated in terms of section 23 of NEM:AQA. In support of this submission we have summarised the previous findings and submission made by Printing SA based on the technical and legal studies undertaken to date. This is detailed below.
- 1.11. This memorandum will collate and highlight the findings and submissions made in respect of the proposed regulation of Printing SA to date. This will include the following:
- a) A summary of the Second Section 23 Notice
  - b) Environmental impacts of solvent emissions
  - c) The 'Solvent Consumption Threshold'
  - d) Solvent emission controls
  - e) Economic considerations
  - f) Other options
  - g) Conclusions
  - h) Annexure A to this memorandum includes a detailed summary of the printing industry.

## 2. How the Second Section 23 Notice will regulate the printing industry

2.1 The notice will apply to a person conducting a printing industry of an existing or new printing industry activity in operation anywhere in the country where organic solvent consumption equals or exceeds 25 tonnes per year.

2.2 A printing industry activity is defined in the notice as ‘an activity using an appliance described in paragraph 9. Paragraph 9 of the Notice provides *inter alia* the following:

- i. “Description: Printing, coating and lamination processes using gravure, flexography, rotary screen printing, heat set lithography, varnishing and printing systems that incorporate elements of these technologies
- ii. Application: Installations with organic solvent consumption threshold equal to more than 25 tonnes per year.”

2.3 New printing industry activities will be required to comply with the requirements of the notice on 1 April 2021, while existing printing industry activities must comply within 5 years from 1 April 2026). It appears that the compliance time frame in terms of section 4 in respect of an existing printing industry activity is 5 years from 1 April 2026 (i.e. 1 April 2031).

2.4 Exemptions are not permitted in terms of s 59 (1) (b) of NEM: AQA and postponement for compliance is also not provided in terms of NEM: AQA or the Second Section 23 Notice.

2.6 The person conducting the printing industry activity will have to:

- a) Comply with the emission limits for VOCs and NO<sub>x</sub>;
- b) Submit a first emissions report within 12 months of the implementation of the notice and thereafter at least one emissions report annually. The report must include information on how measurements were carried out, equipment used, calibration certificates and any other information for validation of the emission results;
- c) Achieve 90% availability of VOC abatement equipment during operations; and
- d) Prepare and submit a solvent consumption plan to record total solvent consumption on an annual basis.
- e) Register as a data provider in the National Atmospheric Emission Inventory System (within 60 days of the promulgation of the notice as an existing printing industry, or within 30 days after commencing with the activity as a new printing industry activity).
- f) Comply with all the requirements stipulated under the National Atmospheric Emission Reporting Regulations, 2015

2.7 The special arrangements include the following:

- a) Replacement of printing appliances by an existing printing activity: An existing printing activity that replaces any of its printing appliances that results in less than 20 % of its production capacity must comply with emission standards for existing printing industry.
- b) Expansion to existing printing activity: An existing printing activity that expands its production capacity by more than 20% through the installation of additional printing appliances must comply with emission standards for new printing industry activity.

## 3. Environmental impacts of solvent emissions

*Is there any evidence in South Africa that solvent emissions from the printing sector cause direct or indirect impact to human health or the wider environment?*

### 3.1 Why are VOCs of concern to the environment?

- a) Organic solvents are frequently used in the printing sector by certain printing processes. Printed materials are heated to remove the organic solvents which are then discharged to the atmosphere by vents typically located on a facility roof. Normally the organic solvents once discharged to the atmosphere, are defined as VOCs.
- b) Solvents used in certain printing processes and consequently the VOCs they generate are often a complex mix of different compounds. Preventing or minimising VOC emissions to the environment (from a wide range of sources, not just the printing sector) is preferable to address one or a combination of deleterious effects they have on the environment:
  - (i) Some VOCs are directly harmful to human health;
  - (ii) Some VOCs may have an offensive odour; and
  - (iii) Most VOCs contribute to the formation of other, 'secondary pollutants' which themselves may be much more toxic than the VOCs directly released. Examples of secondary pollutants include ground level ozone and formaldehyde. However it should be noted that across the printing sector, VOC emission rates, their potential to lead to the formation of ozone, and the consequent impact this may have on communities was not considered a significant in the 2013 technical assessment by WKC for all but the largest facility in South Africa.
- c) The Department has for a number of years expressed a desire to regulate VOC emissions from the printing sector. The Department has not, however, justified their motivation to do so nor provided evidence that the printing sector is causing a measurable deterioration of air quality. In addition, we are not aware that there have been any concerns expressed by non-governmental organisations with regards to the printing sector's impact on ambient air quality.
- d) In the absence of clear motives indicated by the DEA, we can speculate that their perceived need to control VOC emissions may have come about by following the practices adopted in European Union (EU) under the Solvent Emissions Directive (SED)<sup>1</sup>. We do not know if an evaluation has taken place as to whether, in its current form, the EU SED would be appropriate for use without amendment in the context of the South African printing sector.

### 3.2 Evidence of air quality impacts caused by the printing sector

- a) As noted, historically the Department has not stated or inferred to Printing SA, WKC Group or NRFSA that it has reason to believe (and evidence to support this belief) that the printing sector has or is causing significant impact to air quality, health or nuisance from odour, warranting the need for it to be regulated in terms of NEM:AQA.
- b) In order to scientifically determine the level of impact of the sector on ambient air quality, technical studies were conducted on sample of facilities by WKC Group. This cross section of the industry included Test Case Facilities (TCFs) of differing age, scale and types of printing as summarised in the Table below.
- c) Description of TCFs:

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<sup>1</sup> The Council of the European Union, *Council Directive 1999/13/EC of 11 March 1999 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations*, available at <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31999L0013&from=EN>

Test Case Facility (TCF)	Solvent Consumption (Tonnes/Annum)	Printing Processes	Number of Employees
1	3,119	1 Flexographic 6 Rotogravure	>100
2	623	4 Flexographic 1 Rotogravure	>100
3	19	3 Sheet-fed Lithographic	51-100
4	17	3 Sheet-fed Lithographic	51-100
5	36	3 Sheet-fed Lithographic	>100
6	255	2 Heatset Web Offset Lithographic	>100
7	220	5 Flexographic	>100

- d) Each facility was evaluated as follows:
1. Vents linked to printing processes were tested using an approved method for solvent emissions, exhaust temperature, size, location, and flow rates.
  2. The impact of VOC's contained within these vents was evaluated using an approved computational model (known as an atmospheric dispersion model) to establish if the solvents in the vents could potentially cause:
    3. An odour nuisance;
    4. A health impact; and/or
    5. Generate, indirectly, appreciable levels of the 'secondary pollutant', ozone.
- e) Findings from this assessment can be summarised as follows:
1. VOC concentrations in most of the facilities tested exceeded the Second Section 23 Notices' VOC emission limits, inferring that if regulated, VOC abatement would be required in most cases;
  2. In general, organic solvents detected in the vents of the TCFs were not considered to be particularly toxic when compared to other pollutants regulated by the Department in ambient air (e.g. nitrogen dioxide or benzene);
  3. Atmospheric dispersion modelling of VOCs (to determine a corresponding ground level concentration of VOCs downwind of the TCFs) indicated a negligible health risk to local communities in all cases, this being largely due to the low toxicity of solvents in use at the TCFs;
  4. In all facilities assessed, offensive odours were not encountered, even within the facility and near the printing process vents. Dispersion modelling indicated the ground level concentrations of VOC emissions to be below their corresponding odour detection threshold within local communities, indicating the likelihood of nuisance from odour to be very small. This outcome was consistent with owner / operator feedback that odour complaints had never historically been received by any of the TCFs; and

5. With the exception of the largest scale facility (TCF 1) (where it should be noted that photochemistry is extremely complex and that further investigation would have to be undertaken for this facility to validate these initial findings), other TCFs were not expected to contribute to secondary ozone formation that would lead to an ambient concentration that exceeded the statutory air quality standard.
6. Based on the information gathered during the technical study by WKC Group, it is reasonable to conclude that all but the largest facilities pose a risk to community health through an indirect contribution to secondary pollutant formation (ozone in this case). There is limited evidence that smaller facilities (those consuming less than 300 tonnes solvent per annum) constitute a significant risk to community health. The smallest facilities evaluated (having a solvent consumption of less than 50 tonnes per annum) were predicted to have a negligible impact on air quality.

#### 4. The Solvent Consumption Threshold

4.1. The DEFF proposes to regulate printing industry activities with 'installations with organic solvent consumption threshold equal to or more than 25 tonnes per year'.

4.2. What happens if the Solvent Consumption Threshold is exceeded?

4.3. If the organic solvent consumption exceeds 25 tonnes per annum by an installation, then the Second Section 23 Notice applies to a person undertaking the printing industry activity. The Second Section 23 Notice requires that new printing industry activities must comply with the notice by the 1 April 2021 and existing printing industry activities must comply by 2031. This would obligate the person conducting the printing industry activity to undertake the following steps:

- a) Existing Printing Industry Activity:
  - (i) Complete a Solvent Consumption Plan (a template is provided with the Second Section 23 Notice);
  - (ii) Identify which vents are tied into listed appliances;
  - (iii) Undertake sampling at these vents for VOCs using USEPA Method 18 (a relatively simple and inexpensive test method) and other parameters (vent dimensions, flow rate, temperature);
  - (iv) If vent VOC concentration is determined to exceed 150mg/Nm<sup>3</sup> of VOCs, emissions from this vent should be abated to bring the VOC concentration to within the 'Existing Plant' VOC limit of 150mg/Nm<sup>3</sup>;
  - (v) Continue with annual testing for VOCs to confirm compliance with prescribed VOC limit once abatement is installed.
- b) New Printing Industry Activity:
  - (i) Design-in adequate emissions controls for installations to allow the 'New Plant' emission limit of 100mg/Nm<sup>3</sup> to be met immediately upon operation of the listed appliances;
  - (ii) Complete an annual Solvent Consumption Plan;
  - (iii) Continue with annual testing for VOCs to confirm compliance with prescribed VOC limit.

#### 5. VOC emission controls ('Abatement')

5.1. If VOC concentrations in vents tied to installations that exceed the VOC limit prescribed by the Second Section 23 Notice, the person conducting a printing industry activity of an existing facility is obligated to apply whatever means necessary to achieve the limit within five years from 1 April 2026 for existing facilities, and almost immediately (from 1 April 2021) at the point of operations for new facilities.

5.2. There are a number of approaches to reducing VOC emissions in vents. A comprehensive review is provided in the WKC Group Technical Study Report. The main conclusions of this review were as follows:

- a) Replacing organic solvents with water-based printing materials would have the effect of either reducing VOC concentration in the listed appliance exhaust or reducing organic solvent consumption below the Solvent Consumption Threshold. However, this is an unlikely solution for most printing facilities in South Africa due to the differing properties of water based printing materials, including:
  - (i) Viscosity issues;
  - (ii) Drying times;
  - (iii) Print quality;
  - (iv) 'Fitness for purpose' (particularly for food packaging, where contamination of flavour or odour of product could be problematic);
  - (v) Cost (water-based printing materials are significantly more expensive than organic solvent-based printing materials).
- b) Condensation of VOCs as a means of solvent recovery is not economically viable unless a solvent compatible with the printing process can be recovered in very large quantities.
- c) Regenerative carbon adsorption (trapping VOCs on an adsorbent bed) is also not economically viable unless the recovered solvent can be used directly in the printing process in large volumes, which is unlikely to be the case for most printing facilities which apply solvent and additive mixtures.
- d) Non-regenerative carbon adsorption (i.e. using adsorbent and once spent, disposing of the carbon to a landfill). This method is excessively expensive for all but the smallest vent flow streams, and the practice of disposing of spent adsorbent to landfill is unsustainable.
- e) Thermal oxidation, where VOCs are 'burnt off', is very effective in terms of performance. However, it is considered to be 'excessively expensive' for most if not all printing facilities whilst offering little benefit in terms of direct health effects. Thermal oxidation provides good economy of scale for larger facilities where concentrations of VOCs in vent streams are near to or above 2,000-2,500mg/Nm<sup>3</sup>. However again it should be stressed that implementing this technology may not generate tangible improvements to air quality, as most solvents used in the sector are not particularly toxic when compared to, other pollutants regulated.
- f) Biological treatment is an emerging technology that is receiving wider application within the printing sector internationally. Biological treatment appears to be favoured for small printing facilities due to challenges related to space requirements, poorer economy of scale, and VOC removal performance when compared to thermal oxidation. Biological treatment has a marginal operational environmental impact during operations compared to all alternatives and therefore is of interest from a sustainability standpoint. One of the challenges of biological treatment is its inability to achieve the VOC emission limit proposed by the Department, as removal efficiencies are substantially less than thermal oxidation.

5.3 In summary, the Second Section 23 Notice VOC limits (i.e. the concentrations allowed in exhaust vents) imply that the preferred solution to achieving the prescribed VOC emission limits will be thermal oxidation. A key challenge for the printing industry on the implementation is cost, both operational and capital. Consultation with vendors of thermal oxidisers suggests the smallest unit would have a capital cost of between R2 million to R3 million (uninstalled cost) (as at 2012). Additionally, for facilities with VOC concentrations of less than 2,000mg/Nm<sup>3</sup>, supplementary fuel would need to be provided to the system to allow optimum oxidation conditions to be maintained. For most facilities, this would necessitate the installation of an LPG tank, and purchase of a continuous supply of LPG. Other issues for operators also include:

- a) Space constraints;

- b) Thermal oxidisers produce CO<sub>2</sub>, a greenhouse gas and NO<sub>x</sub>, however NO<sub>x</sub> impacts to community health can be controlled through good stack design and using technology from reputable lenders; and
- c) Annual testing costs of the thermal oxidiser emissions.

- 5.4 Clearly, the affordability of this technology demonstrates a degree of scaling with facility size. In other words, for small facilities with proportionately smaller VOC emissions, the cost per tonne VOC destroyed is higher than for larger facilities.
- 5.5 Implementing thermal oxidation generates zero-return on the capital and operational investment. This may be contrary to thermal oxidation in western Europe, where heat generated by thermal oxidation can be capitalised for facility heating. That is, waste solvent from a printing facility can effectively be used as fuel for heating a facility.
- 5.6 Although reliable data is available for capital and operational costs for thermal oxidation, there is only anecdotal evidence that these costs may be 'excessively expensive' for existing small to medium sized printing sector operators. If this technology transpires to be excessively expensive for an existing facility, there is no mechanism within the Second Section 23 Notice to allow for exemption from the prescribed emission limits, even if an operator can demonstrate their facility has negligible environmental impact. Although it is challenging to ascertain how many affected existing facilities could demonstrate VOC abatement to be 'excessively expensive', given small facilities are likely to find the economic burden proportionately greater than larger facilities, the Second Section 23 Notice requirements could lead to significant economic stress to smaller and medium sized facilities (based on the BMI Study, 48% of printing companies are small companies and 41% of printing companies are medium companies). Ironically, closure of small to medium sized facilities brought about by the regulation has been shown, through technical studies conducted by WKC Group, to offer little if any benefit to the environment (i.e. VOC emissions from small to medium sized facilities have been shown to have negligible impacts on air quality).
- 5.7 The BMI Study infers a wide range of trading conditions for small companies, with approximately 60% of small facilities showing no growth or a decline in sales. Approximately 40% of medium sized facilities saw a decline in sales in the year surveyed.
- 5.8 As set out above, significant capital investment and operational costs are associated with the installation, operation and maintenance of abatement equipment. In terms of the BMI Study (refer to Annexure A) it was recorded that 81% of printing companies have spent R10m or less in plant capital investment in the last 5 years. **It is clear that investing in technology that may exceed R10m over a period of 5 years that offers 0% return, may be considered to be excessively expensive by most facility operators.**
- 5.9 Based on the information gathered during the technical study by WKC Group, it is reasonable to conclude that all but the largest facilities pose a risk to community health through an indirect contribution to secondary pollutant formation (ozone in this case). There is limited evidence that smaller facilities (those consuming less than 300 tonnes solvent per annum) constitute a significant risk to community health. The smallest facilities evaluated (having a solvent consumption of less than 50 tonnes per annum) were predicted to have a negligible impact on air quality.

## 6. Economic considerations

- 6.1. There are two bodies of information that could be used to estimate the number of facilities affected by the Second Section 23 Notice:
- a) A solvent consumption survey conducted by WKC Group in its 2012 Technical Study; and
  - b) The BMI Study conducted in 2015.
- 6.2 It is currently problematic to derive an accurate estimate of the number of facilities affected by the Second Section 23 Notice. For example, the solvent consumption survey conducted by WKC Group had

a relatively poor response rate from printing sector members. On the other hand, the BMi Study did not set out to establish organic solvent consumption as a specific goal.

- 6.3 Notwithstanding these challenges, broad estimates suggest the Second Section 23 Notice would affect a minimum of approximately 15% of facilities based on the BMI Study. The number of facilities affected by the regulation using survey data collected by WKC Group in 2012 indicated a higher value (excluding digital printing, around 50% of the remaining facilities). It must be noted that the values presented above are indicative and the actual number of facilities affected by the Second Section 23 Notice may be larger than the range indicated above.

## 7. Other options

- 7.1. One concept that deviates from a conventional section 23 approach to regulating VOC emissions would be to apply a tax to those organic solvents that contribute to secondary pollutant formation. This may have the effect of motivating the industry to move away from organic solvents and generate tax revenue that the South African Government could apply to initiatives focused on improving air quality where most needed and the greatest benefit could be yielded. It should be noted whilst this may support the objective verbally expressed by the DEFF (to reduce tropospheric ozone levels), we currently have no evidence that a material reduction would be achieved through the reduction of 'photochemically active' VOCs released by the solvent industry.
- 7.2. This proposition would alleviate the economic burden on existing facilities to implement costly abatement of VOC emissions but represents a significant deviation from the mechanism of regulation proposed by the Department. Clearly, if this concept were of interest to the Department and the printing sector, there would need to be further consultation within the industry and an evaluation of the economic impacts that this approach would imply.

## 8. Conclusions

- 8.1. Section 23 of NEM: AQA provides that the Minister or MEC may declare any activity, or any appliance or activity falling within a specified category, as a controlled emitter if such appliance or activity results in atmospheric emissions which through ambient concentrations, bioaccumulation, deposition or in any other way, present a threat to health or the environment or which the Minister or MEC reasonably believes presents a threat. It is our submission that the Department has failed to provide any evidence that the printing industry is causing a measurable deterioration of air quality and presents a threat to health or the environment.
- 8.2. The only scientific evidence specific to the direct impact of the South African printing sector was prepared by WKC Group in 2012 using methods approved by the Department. The technical study concluded that the printing sector is highly unlikely to generate direct impacts on community health, nuisance from odour or environmental harm. The Department has never disputed the findings of the WKC Group, or provided scientific evidence to refute the findings of the technical study. Results of technical studies undertaken in a number of Test Case Facilities found that organic solvents detected in vents were not considered to be toxic and the air dispersion modelling indicated a negligible health risk to communities (due to low toxicity of solvents used). In addition (with the exception of the largest facility –using over 3,000 tonnes of solvent per year) no other Test Case Facility contributed to secondary ozone formation that would lead to ambient ozone exceeding the statutory air quality standard. Despite this scientific evidence, DEFF appears intent on regulating a sector without scientific evidence that it causes harm or presents a threat to the environment or health.

8.3. The Department appears to be concerned about ozone levels (without providing specific details or evidence to support this concern) and it has not provided scientific evidence that the printing sector contributes in such a way that would warrant regulation focused on VOCs. We are not aware nor have we been provided evidence by the DEFF of where there are areas of high tropospheric ozone and whether or not causal factors, including the printing activity industry, have been established. Accordingly, there is no evidence that regulation in terms of section 23 of NEM:AQA would offer benefits to alleviating high ozone levels.

8.4. The Second Section 23 Notice is expected to be ineffective, however as it does create indirect environmental impacts in terms of GHG and NOx emissions, it places additional demand on an energy poor economy with electrical demand and propane fuel supply, and it leads to 'excessively expensive' controls representing estimates of up to R260,-000 per tonne VOC removed which represents one of the highest costs globally recorded by the authors of the 2013 study by WKC Group.

8.5. **Printing SA therefore submits the following:**

- a) **That the printing sector should not be regulated in terms of section 23 (or section 21) of the NEM:AQA**
- b) **The sector will make a commitment to use alternative printing materials as these become more affordable and the transition will be conducted over a period which does not place excessive economic burden on operators. It should be noted whilst this may support the objective verbally expressed by the DEFF (to reduce tropospheric ozone levels), we currently have no evidence that a material reduction would be achieved through the reduction of 'photochemically active' VOCs released by the solvent industry.**
- c) **The Department could investigate a tax on organic solvent usage (for certain printing processes) and the tax should be used to offset the additional cost of alternative printing material to encourage change.**
- d) **Operators will commit to transitioning to alternative printing materials as the printing equipment reaches the end of its operating lifetime.**

## ANNEXURE C

### GENERAL COMMENTS:

**1. Printing definition should be included:**

Printing is a reproduction process in which printing ink is applied to a printing substrate in order to transmit information

**2. Exemptions are not permitted in terms of s 59 (1) (b) of NEM:AQA and postponement for compliance is also not provided in terms of NEM:AQA or the Draft Regulations.**

Under the National Air Quality Framework 2012 (and NEM:AQA), there is no similar process which allows an applicant who has processes regulated as a controlled emitter, to apply for postponement to the compliance time frames. This presents significant challenges to the printing industry. The absence of a mechanism to apply for postponement is one of the printing industry's main grievances in light of the cost and availability of abatement equipment required to meet the proposed prescribed emission limits.

**3. Environmental impacts of solvent emissions: Is there any evidence in South Africa that solvent emissions from the printing sector cause direct or indirect impact to human health or the wider environment? DEFF has not, however, justified their motivation to do so nor provided evidence that the printing sector is causing a measurable deterioration of air quality. In addition, we are not aware that there have been any concerns expressed by non-governmental organisations with regards to the printing sector's impact on ambient air quality.**

In the absence of clear motives indicated by the DEFF, we can speculate that their perceived need to control VOC emissions may have come about by following the practices adopted in European Union (EU) under the Solvent Emissions Directive (SED) 22. We do not know if an evaluation has taken place as to whether, in its current form, the EU SED would be appropriate for use without amendment in the context of the South African printing sector. *Evidence of air quality impacts caused by the printing sector*

- (1) As noted, historically the DEFF has not stated or inferred to Printing SA, WKC Group or NRFSA that it has reason to believe (and evidence to support this belief) that the printing sector has or is causing significant impact to air quality or nuisance from odour, warranting the need for new regulations.
- (2) In order to scientifically determine the level of impact of the sector on ambient air quality, technical studies were conducted on a sample of facilities by WKC Group in 2012-2013.

**4. What is Government doing to financially support this industry on the Capex cost or SRU or RTOs?**

The response from the department is that according to the NEMA "polluter pays" principle is given effect in all environmental regulations published. Government does not incentivise polluters on abatement. The regulations do however consider the socio-economic implications, thus work with stakeholders to ensure that an effective regulatory tool that meets the objects of sustainable development is put in place.

*Printing SA therefore request the department to relook at the regulations and find other best mechanism to regulate the sector.*

*According to A JUST IN TRANSITION –a vision-led, unifying and place-based set of principles, processes, and practices that build economic and political power to shift from an extractive economy to a regenerative economy.*

*This must be done incognisant that companies must not be in dire situation without alternative measures put in place*

**5. Has Dept considered a tax specifically targeting organic solvents that contribute to secondary pollutant formation. This will motivate companies to move away voluntarily from using VoCs, and Government will be able to raise some revenue in the process. May be a win-win solution.**

The response from the department is that according to S23-25 of the NEM: Air Quality Act limits the Minister to establishing emission standards for activities declared as Controlled Emitters.

*Printing SA again call up the Minister to find other alternative ways as the currently published Notice in its current form will have much dire consequences. If Minister can repeal or amend the problematic sections in the Act so that she can regulate the sector appropriately, that will be welcomed.*

**6. What are the requirements if the equipment is sold?**

The response from the department: According to AQA S25. (1) No person may manufacture, sell or use any appliance or conduct an activity declared as a controlled emitter unless that appliance or activity complies with the standards established in terms of section 24.

*Printing SA would like to know if manufactures and sellers of these equipment's consulted to familiarise themselves with standards they need to comply with.*