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МЕТОДИЧЕСКИЕ УКАЗАНИЯ по составлению и оформлению научного доклада на профессиональную тему на английском языке

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Данные методические рекомендации содержат учебные материалы для овладения умениями письменной речи.

Методические рекомендации предназначены для студентов, аспирантов и служат для оказания им помощи в подготовке научных докладов и выступлений на английском языке, связанных с профессиональной тематикой.

Методические рекомендации рассмотрены и рекомендованы к изданию методическим семинаром кафедры английского языка и технической коммуникации «4» октября 2010 г.

Зав. кафедрой АЯТК Л.В. Малетина

CONTENT

SUMMARY

What are technical reports and why would you write one?

To become successful in writing scientific papers you should follow some rules and guidelines Business and industry, as well as universities, often demand writing scientific papers. Engineers, scientists, and managers usually write research reports to communicate the results of their research work, field work, or experiments. Technical report writing is one of the best vehicles through which you can share the results of your research with others. A technical report is a formal report designed to convey technical information in a clear and easily accessible format. Technical paper describes and evaluates technical products, processes or services.

If you are looking for a comprehensive coverage in the subject, you will find How to Write a Technical Report quite useful. Organized as six self-contained parts, this course, this course has some guidelines for writing a technical report.

Technical reports present facts and conclusions about your designs and other projects. Typically, a technical report includes research about technical concepts as well as graphical depictions of designs and data. A technical report also follows a strict organization. This way, when other engineers read what you write, they can quickly locate the information that interests them the most.

Technical reports are diverse in their aim and focus, and differ greatly in their structure.

They are ***proposals, progress reports, trip reports, completion reports, investigation reports, feasibility studies, evaluation reports, recommendation reports*** or ***primary research reports.***

No matter how diverse are ***technical reports*** in their forms and objectives, they share one feature in common: they communicate to the audience.

A ***good technical report*** should

- clearly motivate and define the problem;
- describe the approach and compare it to other approaches;
- present and discuss the results.

1. FORMATING

1.1. Page Layout

Your document should be single sided, single column with a text area of approximately **170x240mm**, centered on an **A4** page. Use single or **1.5** line spacing.

1.2. Text Formatting

1.2.1 Main Text

It is suggested to use a serif font for all your text, **11** or **12 pt. Times Roman** is a frequent choice for technical writers. Please, try to avoid using italic or bold face in the body of your text. Rather use paragraphs to structure your ideas.

As a rule of thumb: each thought should be dedicated to one paragraph. Try to use short and precise sentences. Split longer sentences into multiple shorter ones.

1.2.2. Headings

Your headings should be clearly identified (slightly larger font, bold face) and numbered as shown in this document. It is suggested to use up to three levels of numbering for documents of **20** pages or less and to use up to **4** levels for all other documents.

1.3. Figures and Tables

In figures and tables, a smaller font size can be used if needed. It looks also neat if figures use a san-serif font. If you use a san-serif font in tables, tables may have a less technical appearance but readability could be improved.

Tables and Figures must have a caption and must be numbered. For shorter papers, use consecutive numbering, for long documents (with a chapter structure) use a 2-level numbering scheme of chapter number and consecutive numbering, e.g. Figure 2.1 denotes the first figure in chapter 2.

1.3.1. Incorporating figures, tables, and equations

There are conventions for using figures and tables in a report. Usually only these two categories are used; anything other than tables (maps, charts, diagrams, drawings, graphs) is called a figure. Figures and tables should be placed as close as possible to the point at which they are referred to in the text. Give all figures and tables a number and title. Refer to each figure and table in the text of the report.

Example 1.

Table 1 Existing communication channels

Example 2.

The communication channels in the organization are shown in Table 1.
The title of a table goes above the table, while the title of a figure goes below the figure.

Example 3.

Table 1 Turning volume of pedal cycles

	(1)	(2)	(3)	(4)	(5)	(6)
8:00 - 8:15am	**0**	**0**	**1**	**0**	**1**	**0**
8:15 - 8:30am	**0**	**0**	**1**	**1**	**0**	**0**
8:30 - 8:45am	**0**	**0**	**3**	**1**	**0**	**0**
8:45 - 9:00am	**0**	**0**	**2**	**3**	**1**	**0**
Total Volume	**0**	**0**	**7**	**5**	**2**	**0**

Figures that are copied from someone else's work, published or unpublished, must be correctly referenced. Give the source of the diagram or the data if you have taken them from published sources. The citation should be placed in brackets after the figure or table title, and the source included in the References list.

Example 4.

The relationship of the speed of propagation and the volumetric tissue fraction is given by:

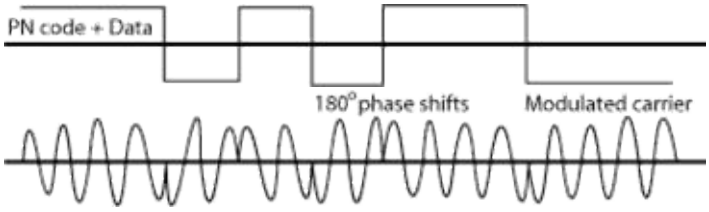

Figure 1 Phase shift keying modulation (source: Mercator GPS Systems, 1998)

1.3.2. Equations

You will often have to include equations in your reports. The conventional style for presenting equations is as follows:

- Centre the equation on the page
- Place the equation number in round brackets at the right-hand margin
- In the text of your report, refer to the equations as either Eq. (1) or equation (1). Use whichever format you choose consistently throughout your report.

The relationship of the speed of propagation and the volumetric tissue fraction is given by:

$$v = \frac{1}{\sqrt{((1-h)K_r^{-1} + hK_t^{-1})((1-h)\rho_r + h\rho_t)}} \qquad \textbf{(1)}$$

We can see from Eq. (1) that...

1.4. Abbreviations.

In technical writing, we expect to see abbreviations. Use them in your description freely. Remember the rule on punctuating abbreviations--punctuate them only if they spell a word (for example, ‘in.’). Remember too that abbreviations do *not* go up against the number they are used with (for example, make that ‘8 mm tape’ or ‘8-mm tape’ but *not* ‘8mm tape’).

2. STRUCTURE & SECTIONS' ARRANGEMENT

All technical reports usually have a defined final organization and divided up into sections. Each section has a specific purpose, and often there are specific guidelines for formatting each section. It's always best to look at similar reports that have been published in order to more fully understand the expectations for reports in your field.

Generally, a report will include the following sections: ***title page; abstract, table of contents; abstract or summary; introduction; main body: methodology, analysis of results; conclusions, recommendations; reference or bibliographyand appendices.***

Table 1: Typical sections of a technical report.

Sections	**Volume in pages**
Title, Author	on cover page
Table of contents	0.5-1
Abstract	1-2 paragraphs
Introduction	0.5-1
Main body: – Methodology – Analysis of Results	6-7
Conclusions	0.5
Recomendations	0,5
References or Bibliography	0.5 -1
Appendices	
Figures and Tables	

Each section has a specific purpose, and there are peculiar guidelines for formatting each section. Though, there is a standard model of structure, style, and sections' arrangement, which we will refer to.

2.1 Headings in the body of the report

Provide informative headings.As for the title, section headings should tell the reader exactly what type of information is contained in the section. They should be specific and content-focused rather than just labels. Devising informative headings as opposed to label headings right from the planning stage will help you to clarify exactly what you want to achieve in each section and subsection.

Compare these pairs of headings:

Consumption patterns vs. Changes in water consumption patterns 1995-2005

Survey results vs. Results of peak hour turning movement survey

Example 1. Uninformative headings

The Organization
Management

Example 2. Informative headings

Overview of the Organization
Communication in the Organization
Groups in the Organization
Management Style and Methods

Make all headings consistent and parallel in structure.This means that headings should follow *a similar grammatical form*. In the following example, each heading is structured differently:

Example 3. Inconsistent headings

The Company Structure	[*noun phrase*]
Do the Communication Channels Work?	[*question*]
Participating in Groups	[*gerund phrase*]
How to Develop an Effective Management Style	[*instruction heading*]

Usually, it is not difficult to convert such headings to a common form. In this example, all have been changed to *noun phrases*. This is the most commonly used format for section headings in an informational report.

Example 4. Consistent headings

Company Structure
Communication Channels
Group Participation
Development of an Effective Management Style

2.2. Title page

The **title page** of the report usually contains four main parts of the information:

1. The report title.
2. The name of the author and the company or university which originated the report.
3. Organization, or company for whom this report has been prepared.
4. The date the report was completed.

This is the essential information that should be included to the title page of your report.

The title should be informative, but reasonably short.
Indeed, there are four basic approaches that writers use in writing the title of their technical reports. You can:

1. Make the title the restatement of the investigated subject.
2. Incorporate one of the major research methods into the title of the report.
3. Include the name of the hypothesis, theory, or problem that was researched in the title of your research report.
4. Provide a concise description of the obtained results in your report title.

2.3. Abstract

'An Abstract is an accurate representation of the contents of a document in an abbreviated form'. The Abstract states the report in miniature. In fact, it summarizes the whole report in one, and has a form of the concise paragraph that incorporates **100-250 words**.

As soon as it condenses and summarizes the whole report, it should be written after the report has been completed. It is written after the report is completed, although it is intended to be read first.

In a technical report, the Abstract appears on a separate page after the table of contents.

You should include the objective, research methods used in the investigation, results of your research and recommendations that you give to the readers. Pay special attention to describing the objective of your report that states the problem, and the analysis of the results that incorporates your recommendations.

There are four fields which are obligatory: objective; design/methodology/approach; findings and originality/value; the other two: research limitations/implications and practical implications may be omitted if they are not applicable to your paper.

There are two distinct types of Abstracts:

- a Descriptive Abstract merely identifies the areas to be covered in the report. It is an extended statement of purpose or scope. Such an Abstract is only useful for a very long report, because it demonstrates only the paper's organization, not its content.
- an Informative Abstract summarizes the entire report and gives the reader an overview of the facts that will be laid out in detail in the paper itself. It is rarely longer than one page and should never exceed more than 10% of the length of the entire report.

2.3.1. Summary

A summary is restating someone else's words in your words. There are many different kinds of summaries, and they vary accoding to the degree to which you interpret or analyze the source. Some are pages long, others just one or two sentences. However, for all types of summary, the writer is responsible for generally stating, in his or her own words, the main information or argument of another writer.

The goal of writing a summary of a technical report is to offer as accurately as possible the full sense of the original, but in a more condensed form. A summary restates the author's main point, purpose, intent, and supporting details in your own words.

2.4. Table of Contents

Most reports contain the Table of Contents section, where you list the contents of your report and show how the report is organized. You can label each section with descriptive headings and subheadings to explain the readers what each section is all about. A good Table of Contents makes it easy for the readers to locate each section of your report.

Table 2: Number the sections by the decimal point numbering system:

1.0	Title of first main section (usually Introduction)
1.1	First subheading
1.2	Second subheading
2.0	Title of second main section
2.1	First subheading
2.2	Second subheading
2.2.1	First division in the second subheading
2.2.2	Second division in the second subheading
3.0	Title of third main section

Number all the preliminary pages in lower-case Roman numerals (i, ii, iii, iv, ...). You don't have to place the number *i* on the title page. Just count it and put *ii* on the second page of your report. Preliminary pages are any which come before the introduction, including the summary and, where applicable, acknowledgements.

Number all the remaining pages of your report with Arabic numerals (1, 2, 3, 4, ...). Thus the report proper begins on page 1 with your introduction, which is usually Section 1.
Provide a title in your table of contents to describe the contents of each appendix (Note: one *appendix*, two or more *appendices*). Don't just call them Appendix 1 or Appendix 2.

Example contents page
This contents page is from a report entitled Preliminary Design of a Bridge.

Contents

Appendix 1 Design 1 scale drawings
Appendix 2 Design 2 scale drawings

2.5. Introduction

The Introduction of a technical report represents ***the subject, the purpose, and the plan of the development*** of your report. Writing the Introduction, you should keep in mind that your main aim is to introduce your readers to the problem that you are setting out to solve in the course of your technical report. You can also include some background information into the Introduction to get your readers acquainted with the history and background of the subject that you have chosen and thoroughly researched. Background information includes a description of the history behind that particular problem. It may cover previous works on the area and previous attempts to solve the problem. Remember that stating the objectives and the problem of the carried research are the main functions of this section.

Plan the Introduction to your description carefully. Make sure it does all of the following things (but not necessarily in this order) that apply to your particular description:

- Indicate the specific object/process/technique about to be described (why is it important?).
- Indicate what the audience needs in terms of knowledge and background to understand the description (what is the history of this issue?).
- Give a general description of the object/process/technique and its function, cause, or effect (what are you trying to accomplish and what is the focus of your analyses?).
- Give an overview of the contents of the description (what is in the report and how the report is organized?).

Now remember: you may not need all of the elements, and some of them can combine neatly into single sentences. The Introduction ought to be brisk and to the point and not feel as though it is trudging laboriously through each of these elements.

Example introduction Introduction from a report entitled "A Review of Greenhouse Gas Reduction Actions and Opportunities: the Current Status of the Kyoto Protocol".

1. Introduction
The greenhouse effect is a natural phenomenon that keeps the earth's surface warm. Greenhouse gases trap heat from solar radiation, analogous to the way glass panes trap heat in a greenhouse. Due to increasing greenhouse gas emissions from human activities, the greenhouse effect has been significantly augmented, causing a rise in the earth's surface temperature. This temperature rise has led to climate change, causing frequent natural disasters. This has generated increasing awareness of the importance of reducing greenhouse gas emissions through international and domestic initiatives.

Comments
Contextual background
The aims of this project are to examine the Kyoto Protocol and the effect it would have on participating countries. Another aim is to investigate actions already taken by three industrialized countries, namely Australia, the United States, and Canada.

2.6. Main Body of the report

The Main Body of the report is the part where you present your work.
The Body of the report:

- presents the information from your research, both real world and theoretical, or your design;
- organises information logically under appropriate headings;
- conveys information in the most effective way for communication;
- uses figures and tables;
- can use bulleted or numbered lists;
- can use formatting to break up large slabs of text.

The Introduction and Conclusions act as a frame for the body only: therefore all the details of your work (including a summarised version of material in the appendices) must be included here in the appropriate section. It is also essential that you choose concise but informative headings and subheadings so that the reader knows exactly what type of information to expect in each section.

2.6.1. Methodology

A description of the methodological framework you have used in the project, or investigation. It focuses on the theoretical side of the methods.

2.6.2. Analyses of Results

'All the preceding sections of the report lead in to the results section and all the subsequent sections will consider what the results section means'.

Results are usually the longest and most important part of your report, where you have to report the results of the carried research. Literally you have to discuss here what you have invented, discovered, confirmed through your research, and to present this information in the form of calculated values, visual observations, plots, illustrations, graphs, or tables.

You should focus on facts of your research in the results section. As stated above, you'll extensively use tables and figures in this section. They are the indispensable part of presenting the results of your research work, because they help you to convey the data to the readers more efficiently, in addition, to simplify and to visualize presented information. With the help of figures and tables you will convey numerical data and measurements taken during your experiment in your report.

Remember that the results of your research should be presented as plainly as possible.

2.7. Conclusions

The Conclusions section provides an effective ending to your report. The content should relate directly to the aims of the project as stated in the introduction, and sum up the essential features of your work. This section:

- states whether you have achieved your aims
- gives a brief summary of the key findings or information in your report
- highlights the major outcomes of your investigation and their significance.

It is a very short section, where you summarize your findings and generalize their importance. As you draw conclusions, you should explain them in terms of the preceding results section, and give your opinions based on the evidence and data presented in the results section. You don't have to introduce any new ideas in this section; though, you can raise unanswered and ambiguous questions in the Conclusions.

It is also common to give an outlook on future work. The Conclusion of a research report is usually a very short section that introduces no new ideas. It is also a place to raise questions that remain unanswered and to discuss ambiguous data.

The Conclusions should relate to the aims of the work:

Example 1:

Aim .The aim of this project is to design a mobile phone tower.

Conclusions

In this report, a design for a mobile phone tower has been presented. The key features of the tower are... It was found that...

Example 2:

Aim.The aim of this investigation is to analyse the bus delays at the intersection of the bus loop and Wellington Road at Monash University.

Conclusions

In this report, bus delays were analysed. It was found that... Based on these findings, it is recommended that...

2.8. Recommendations

In this section you have to provide suggestions based on the results and conclusions of your work. Recommendations section indicates that you are completely versed in the importance and implication of your research, as you give some piece of advice to your readers. This must be supported by the analysis and conclusions section of the report.

2.9. References

The main objective of citing references is to give the readers an opportunity to follow up your work. References show the readers that the materials and data you have used in your research are credible. Don't forget to include references that you directly cited in the text

Be sure to include enough references, because the reader may want to follow up your references for further research on the topic, or simply to get to know more on the topic. You have to incorporate the authors, year, edition, publisher's name and publisher's location for books that you have used in your research; for articles in journals give the authors, year, and name of the publication, volume and page numbers. Don't include secondary sources that are slightly related to your research, just to make a list of references longer.

Now remember: There are two parts to referencing: **citations** in the text of the report and a **list of references** in the final section.

A **citation** shows that information comes from another source. The **reference list** gives the details of these sources. You need to use in-text citations and provide details in the references section when you incorporate information from other sources, e.g.:

- factual material;
- graphs and tables of data;
- pictures and diagrams.

You quote word-for-word from another work (when you do this the page number must be given in the in-text citation)

In Engineering, the most common referencing style is the author-date (Harvard) system.

Example of in-text citation and reference list entry using the Harvard referencing style:

In-text citation

In the traditional experiment with iron and sulphur relating to mixtures and compounds, Ralph Zindel (Dennis & Clarke, 1902, p. 13) writes: When the mixture is heated the substances [iron

and sulphur] unite and form a metal. A chemical [change] takes place… (Ralph Zindel)

Reference list entry

- Hibbert, D. (2005), Interlaboratory Studies, *Encyclopedia of Analytical Science*, eds. P. J. Worsfold, A. Townshend and C. F. Poole, Oxford, Elsevier **7:** 449-57.
- ISO (2005), *International vocabulary of basic and general terms inmetrology*, Geneva, Switzerland, ISO.
- Glendinning, E.H. 1973 *English in mechanical engineering,* , Oxford, Oxford University Press.

2.10. Appendices

These contain material that is too detailed to include in the main report, such as raw data or detailed drawings.
The conventions for appendices are as follows:

- each appendix must be given a number (or letter) and title;
- each appendix must be referred to by number (or letter) at the relevant point in the text.

Example:
The data obtained are summarised below. The detailed data are given in Appendix 3.

- Appendices are not dump places and they must be classified and organized. They are though important, but may not be directly relevant to the main body. It is intended for interested readers only

3. LEARNING ACTIVITIES

Now that you have put your knowledge of writing technical report to the test, try your hand at these learning activities.

A1 — Select a scientific paper and analyze its. For each sentence (or perhaps each clause within a sentence), determine what it conveys: context, need, task, object of the document, findings, conclusions, and/or perspectives. Check whether these components are presented in a logical order, and note which components (if any) are missing.

A2 — Each time you read a scientific paper from your field, look for the verbs that express a research action and create a list of them. Be critical, however: Only add specific verbs such as *measure*, *compare,* or *simulate,* not generic verbs such as *do*, *perform*, or *carry out.*

A3 — Each time a scientific paper frustrates you by not including information you wish to have (for example, by not explaining an abbreviation or by failing to clarify the motivation for the work), ask yourself what, exactly, is missing and why it is important to you as a reader.

Remember these frustrations: They will give you a better idea of what readers wish to find in a paper. Then, when you are writing a paper of your own, remember to provide this type of information to your readers.

A4 — Look at the following reference lists (A-B) and select the best one for the technical report.

Reference list A
References

1. Anderson, B. & Renstrom, L. (1982). *Oxidation of steel wool: EKNA Report No 7*. Molndal, Sweden: Gotenburg University.
2. http://www.sae.org/fuelcells/fuelcells.htm
3. Jay Pukrushpan, Stefanopoulou, A.G., Peng Huei. (2004) *Control of fuel cell power systems: principles, modeling, analysis and feedback design*, Call number at Hargrave-Andrew Library: 621.312429 P979C2004
4. *Understanding of elementary Ideas in Chemistry*. Leeds: University of Leeds. (in Griffiths, A. K. 1994.) (in Driver, Squires, A., Rushworth, P. and Wood-Robinson, V., 1994, p.86).

Reference list B
References

1. Pukrushpan, J.T., Stefanopoulou, A.G. & Peng, H. 2004 *Control of fuel cell power systems: principles, modeling, analysis and feedback design*, New York, Springer.
2. Society of Automotive Engineers 1999 *Electric and hybrid electric vehicles and fuel cell technology*, Warrndale, PA, Society of Automotive Engineers.
3. Society of Automotive Engineers 2005 *How fuel cells work*, Society of Automotive Engineers, viewed 26 August 2005, http://www.sae.org/fuelcells/fuelcells.htm.

A5 — Sample title page.This section contains the framework sections of a first-year Civil Engineering concept design report. A good and a weak example of each section are given, along with explanatory notes or exercises to check your understanding of the requirements. To begin, choose the most informative title for the report yourself.

Engineering Context ENG1601
Engineering Faculty
Monash University
[Option A]
ALTERNATIVE DESIGNS REPORT
THE FUEL CELL CAR

[Option B]
TWO ALTERNATIVE
CONSEPTUAL DESIGNS
Lee Binks (12647892), Penny Jinks (12993456) and Hong Links (13504733)
Date submitted: June 5, 2005

Select the best title for this report

[Option A] Alternative Designs Report: The Fuel Cell Car
[Option B] Two Alternative Conceptual Designs

A6 — Sample introduction. Read the following introductions and select the best one for this report. Explain your choise.

Introduction A
The purpose of this project is to introduce our group's two conceptual designs. We have included the following sketches for each car: 3 dimensional view, elevation, plan, front, rear and interior view. Also, we have included a discussion of how the designs meet the criteria given in the project outline. The cars could be suitable for short trips in busy areas.

Introduction B
With the rise in global warming and increasing pollution levels, it is becoming essential to find a viable alternative to the internal combustion engine petrol powered car.
The aim of this project was to create two designs for a fuel cell powered car, the main criteria being environmental friendliness in terms of both emissions and materials.
This report presents the designs for two such cars, each of which includes the following components: engine, fuel, wheels, accessories, safety features and materials. Car A is aimed at the upper end of the market, while Car B is a mid-range vehicle suitable for family use.
A description of the design and an analysis of operational efficiency for each car are followed by a comparison of the two designs. Finally, the most cost efficient design is recommended.

A7 — Sample headings. **Which of the following section headings are grammatically consistent?**

Option 1
2.0 Car A
2.1 The Materials we selected
2.2 Emissions
2.3 How the safety features Work
2.4 What Accessories are included?

Option 2
2.0 Car A
2.1 Materials selection
2.2 Emissions
2.3 Safety features
2.4 Accessories

Option 3
2.0 Car A
2.1 The Materials Selected
2.2 Emissions
2.3 safety features of the car
2.4 Accessories included

A8 — Read the following conclusions and select the best one for the report.

Example A
Conclusions

This report introduced two environmentally-friendly designs for a car. We presented information about the engine and fuel, materials, safety and accessories and provided sketches for each car. These cars would be more expensive than normal family cars, but it is important to develop cleaner technology for the future.

Example B
Conclusions

Two alternative designs for an emission-free fuel cell powered car have been presented: Car A, a luxury sedan which runs on hydrogen, and Car B, a medium-sized family hatch which uses hydrogen and oxygen. Each car features recyclable materials and conforms to Australian design standards in terms of performance and safety features. However, Car B is recommended as it was found to be more economical in terms of both manufacturing and running costs.
Sourse: http://www.monash.edu.au/lls/llonline/writing/engineering/technical-report/6.1.xml

4. KEY

A4 Reference list B is better. Reference list A is weak. The heading is incorrect and the References section should be given a section number. The entries are neither listed alphabetically (author-date system) nor numbered (numbering system). The information in the entries is presented in random order; one referencing style should be chosen and the correct format applied consistently. Library call numbers are not given in any referencing style. The URL alone is not sufficient for online sources. The author's name (where available), the name of the site or page, the copyright date, and the date you accessed the page should all be given.	**A5** Option A is best. Option B does not give any indication of what the designs are for. Some titles need both the assignment name and the topic of the work done
A6 Introduction A is weak. It confuses the project with the report (the project is the work you did, while the report is the document which presents the work). There is no background information to set the topic in context, and the topic itself is not clearly stated. The design criteria and key features of the designs are not mentioned, and no structure outline is given. Also, the section number is not given in the heading.	**A7 <u>Option 2</u>**

A8
Example B is better.
Example A is weak because it does not restate the key features of the two designs. It does attempt to give a conclusion by pointing out that the cars are more expensive than cars based on current technology, but does not mention which aspects of the designs cause the extra expense. Moreover, it does not make any recommendation about which is the better design. The comment about the importance of developing cleaner technology belongs in the introduction, as it is establishes the need for the work done. Furthermore, the writer does not use impersonal language.

5. LANGUAGE IN CONTEXT PASSAGES

Executive summary

The purpose of this report is to assess the impact of globalisation on management accounting and to outline changes which *need to be implemented* as a response to globalisation. The report suggests that management accounting needs to focus on a range of information apart from the financial, to make more informed decisions.

The ***passive voice*** is used here because it is unimportant to mention or because it is not known yet who might implement the changes.

Note the passive form be implemented after the modal verb *'need to'*, which has the meaning ***should.***

It is argued that, in the past, management accounting involved supplying figures to organisations. However, in the global marketplace, management accountants are expected to actively facilitate decision-making and to assist in the management of transnational corporations. It is further argued that traditional management accounting techniques are no longer relevant. Rather, concentration *needs to be given* to providing additional benefits to organisations such as timely, quality and focused information which can initiate effective management action.

The passive voice is used here to emphasise *what* needs to happen rather than *who* should do it.

Note the passive form be implemented after the modal verb *'need to'*, which has the meaning ***should.***

The passive voice is used in the phrase 'It is further argued' to avoid using the informal personal pronoun 'I'. Reports typically adopt a formal impersonal tone.
Note that the form of the verb 'to be' always agrees in number and person with its subject, unless preceded by a modal.

The passive voice is used here to emphasise *which people* are expected to perform rather than *who* expects them to perform.

Note that the form of the verb 'to be' always agrees in number and person with its subject, unless preceded by a modal.

With rapid market changes, constant cost control and quality improvement, as well as meeting customers' needs, are essential requirements of a management accountant's portfolio. For this to

occur, it is recommended that all accountants familiarise themselves with these changes and the subsequent effects on management accounting. Furthermore, consideration should also be given to how these changes *could be most efficiently implemented* in accounting workplaces.

The passive voice is used here to emphasise *what* could be done and *how* it could be done rather than *who* might do it.

Note the passive form ' be most efficiently implemented' after the modal verb 'could'.
Also note the insertion of the qualifying words 'most efficiently' *between* the two parts of the passive verb form.
(Adapted from: P.V.Cotesta, G.M.Crosling and H.M. Murphy, *Writing for Accounting Students*, 1998, Butterworths, Australia. p. 26.)

6. LEXICAL CHUNKS IN TECHNICAL REPORT

6.1. Introduction

Examples:

"In recent times the concept of... has gained wide acceptance in...";
"Based mainly on...";
"SMITH (1969) and JAMES (1969) documented a...";
"SULE (1988) pointed out that different factors control ... and proposed a...";
"EMER & ZEYER (1996) summarised the main points which specifically apply to...";
"most of the above summarised concepts and models were derived from...";
"this is due to various circumstances including...";
"continued investigations are needed in order to produce...";
"the cause of others however, remains unknown...";
"recognition of the consequences of changes...";
"analysis has opened new avenues for research on many facets of....";
"differing from the... ";
"by correlation with other areas where similar studies have been carried out..."

6.2. Key Objectives of the Technical report

Examples:

"As much controversy surrounds...";
"it is proposed to apply the concepts above to the....";
"in order to correlate the changes determined with those established in other areas...";
"The project aims at...";
"obtaining a detailed..." ;
"unravelling local ... for determining global..." ;
"Interregional and intercontinental comparisons of numerous local ... placed within a refined framework are essential for obtaining a more accurate picture of ...";
"the need for improved temporal resolution in order to provide a sound database for testing models has lead to the recognition of...";
"A preliminary study by HAHN (1999) demonstrated that a detailed investigation is feasible ...".

6.2.1. Background

Points to include: previous research

Examples:
"lt has been famous since 1894 when Smith first described the...";
"it was presented to the 9th annual meeting which was held in...";
"A combination of data sets derived from...";
"the concept originally defined by...";
"They attributed the origin of these...";
"This contrasted with...";
"The importance of these studies was emphasised by...";
"A special volume dedicated to the use of these methods in North America includes mainly studies on...".

6.3. Methodology

Examples:
"This study will be based on and add to the studies by...";
"Recent work done by HUGO (2000) on the problem in question will help in the determination of...";
"The proposed investigation will also complement the study presently being done on the..."; "In interpreting the sequences it will be attempted to first establish the key...";
"Detailed measurements will be carried out and where necessary, samples will be taken for determination...";
"The clear identification of ... is quite difficult as is the distinction of the relative significance of...";
"Hence, any conclusions...";
"are ideal for this study as they represent...";
"therefore the possibility of being able to determine a precise ... is quite high...";
"samples for analysis will be taken to verify...";
"Data from previous studies of these areas will also be incorporated into the proposed investigation for elaborating a precise sequence...".

7. Model Document: Technical Report

For longer reports, separate title page and table of contents should be given.

Report
on

THE EFFECTS OF INCREASED ATMOSPHERIC CARBON DIOXIDE

Submitted
to
Mr. David McMurrey, Chairman
Coastal Real-Estate Developers Association
Corpus Christi, Texas

by

Environmental Research Associates, Inc.
December 9, 1982

Summary indicates the purpose and the contents of the report.

The report examines the effects of increased CO2 concentrations in the earth's atmosphere. The shifting of local weather patterns, the mechanisms of the greenhouse effect, and the sources and sinks of CO2 are also discussed. A list of possible remedies to the problem concludes the report.

The table of contents page sets out the sections and subsections of the report and their corresponding page numbers. It should clearly show the structural relationship between the sections and subsections. A reader looking for specific information should be able to locate the appropriate section easily from the table of contents.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

LIST OF TABLES

.

Report begins with two paragraph-length abstract.

Abstract of paper in present tense.

Abstract does not cite sources.

ABSTRACT

Since the Industrial Revolution, man has introduced tremendous amounts of carbon dioxide into the earth's atmosphere. While some of this CO2 is assimilated into natural reservoirs, approximately 50% remains airborne. This increase in CO2 concentration causes what is commonly known as the greenhouse effect. The greenhouse effect is a result of the absorption of infrared radiation by the surface of the earth. This absorption causes an increase in the atmospheric temperature. Increasing the earth's temperature in turn increases the amount of water vapor in the atmosphere. Since water vapor is also a strong absorber of infrared radiation, a positive feedback mechanism is created, leading to further infrared-radiation absorption. As temperatures increase, atmospheric circulation patterns are altered which will change local weather patterns.

These changes could have an enormous impact on agricultural production. Attendant to a rise in the mean global temperature is a melting of small but significant portion of the polar ice caps. This will result in a rise in sea level which would flood coastal areas including major population centers. The problem of the greenhouse effect might be remedied by a reduction in the use of fossil fuel, large scale reforestation to increase the capacity of the biotic sink, and development of alternate energy sources such as solar and nuclear fusion. However, not much hope is held out for these remedies.

Section titles are centered.

Introduction provides background information and reason for report.

Report on
THE EFFECTS OF INCREASED ATMOSPHERIC CARBON DIOXIDE

I. INTRODUCTION

Before the year 2020, the climate of the earth may be warmer than any time in the past thousand years. This change, which is incredibly fast by geological time scales, will be brought about by increased levels of carbon dioxide in the earth's atmosphere. The most important source of excessive CO2 is the burning of carbon-based fossil fuels for energy production. Carbon dioxide is a by-product of all living systems and is normally considered harmless. It is a minor element in the earth's atmosphere comprising only about 0.03% of the total atmosphere. However, this small amount of CO2, along with water vapor, is responsible for what is commonly known as the greenhouse effect.

The fact that changes in CO2 concentrations in the atmosphere could cause changes in the earth's climate has been known for over one hundred years. However, only in the last 5 to 10 years has significant research been done in this field. The most ominous of the effects of a warmer climate will be the shifting of local weather patterns. This shifting will have profound effects on agricultural production in a world that is already unable to adequately feed its citizens today. There will also be an accompanying redistribution of wealth which will likely lead to dangerous social conflicts. It is obvious that the continued introduction of CO2 into the atmosphere will have consequences far worse than producing a slightly balmier climate.

The purpose of this report is to examine the climatic changes caused by increased carbon dioxide in the atmosphere and their implications for society. Also discussed will be the mechanisms of the greenhouse effect, the sources and reservoirs of carbon dioxide, and some possible methods to reduce the magnitude of the problem. Note, however, that the most we can do at this point is lessen the severity of the situation. That the mean global temperature will increase in the next few decades is certain. The only questions are how much and how fast.

II. NATURAL WEATHER PATTERNS

The earth's climate naturally changes over extended periods of time. Temperatures have been much warmer for 80 to 90 percent of the last 500 million years than they are today. The polar ice caps, for example, are actually a relatively new phenomenon. They were formed 15 to 20 million years ago in the Antarctic and perhaps as recently as 3 to 5 million years in the Arctic.

The climate is still dominated by natural cycles of warming and cooling. The most influential of these natural weather patterns is the 180-year cycle. The 180-year cycle predicts that temperatures in the Northern Hemisphere reach a minimum every 180 years. (Climate records for the Southern Hemisphere are incomplete.) The bottom of the last cycle was in the early 1800s, which suggests that we may now be in a period of peak coldness. The winters of 1976 through 1979, which were unusually bitter, seem to reinforce the theory behind the 180-year cycle. This current cooling trend would mask any warming caused by an increased greenhouse effect.

However, the 180-year cycle predicts a natural warming trend will

Main part provides methodology. Explains how data was gathered and analyzed.

Visual representation of results: graphs, tables, charts, diagrams. They are supported by explanatory text.

In report concrete numbers are used.

begin shortly before the end of this century. At the same time, the effects of elevated CO2 levels on atmospheric temperatures will have increased to new high levels. Figure 1 shows the combined effects of these warming trends.

Therefore, temperatures could reach their highest level in several hundred years shortly after the year 2000, and they will reach their highest level in the last 125,000 years by mid-century [1:7-11].

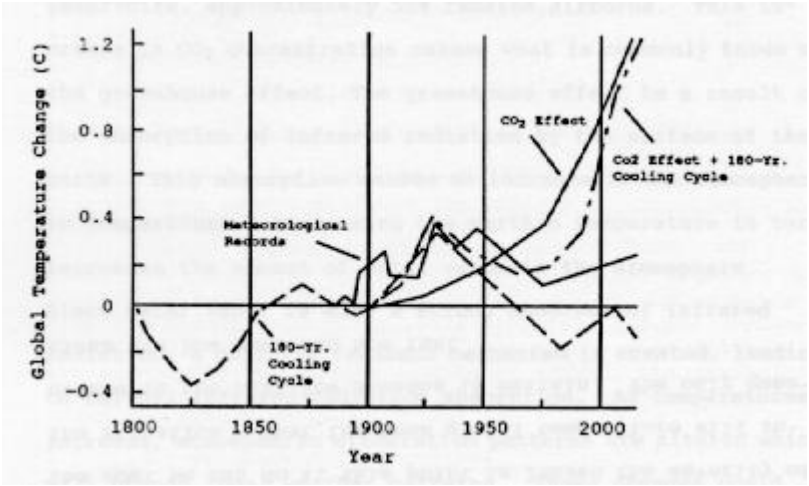

Figure 1. Combined Effect of the 180-Year Cycle and Increased CO2 Concentrations. Source: Harold W. Bernard. *The Greenhouse Effect* (Cambridge: Ballinger, 1980), 10.

III. MECHANISMS OF THE GREENHOUSE EFFECT

For the mean global temperature to stay constant, the earth-atmosphere system must be in radiative equilibrium with the sun. In other words, the incoming solar radiation must match the outgoing thermal radiation from the earth. Of the incoming solar radiation, 35% is reflected back into space. The reflectivity of the earth is its albedo. The albedo is taken into consideration when the total energy flux of the earth-atmosphere system is calculated. Of the remaining 65% of solar radiation that is not reflected back, 47% is absorbed by the surface and 18% is absorbed by the atmosphere. For the temperature of our system to remain constant, this energy that is absorbed by the atmosphere must be radiated back out. This radiation primarily takes place in the 5-micron to 30-micron range of wave lengths, which is in the infrared portion of the electromagnetic spectrum. A micron is one millionth of a meter [2:755].

Natural Greenhouse Effect

The effective radiating temperature is the temperature the earth should have for the amount of solar radiation it absorbs. Calculation of the effective radiating temperature gives a value of -200° C. However, the observed mean global temperature is 140° C. The difference of 340° C is caused by a natural greenhouse effect that takes place in the atmosphere [11] . As the earth tries to lose heat into space, the atmosphere absorbs infrared radiation emitted by the surface. Specifically, the atmosphere allows 50% of the incoming solar radiation to reach the surface but only 10% of the longwave radiation from the surface to escape. This causes the temperature of the earth-atmosphere system to increase. The magnitude of the greenhouse effect is defined as the difference between the upward infrared radiation from the surface and the

Discussion of greenhouse effect problems.	upward infrared radiation from the top of the atmosphere [2:755]. **Radiation Absorption by Carbon Dioxide and Water Vapor** The greenhouse effect is caused by minor constituents in the atmosphere, mainly carbon dioxide and water vapor. The earth must radiate in the 5-micron to 30-micron region. However, water vapor is a strong absorber of radiation over the entire thermal spectrum except in the 8-micron to 18-micron interval. The 12-micron to 18-micron interval is largely blocked by CO2 absorption. In fact, current CO2 levels are sufficient to make the 15-micron band virtually opaque to infrared radiation. The earth is, therefore, constrained to radiate its excess thermal energy in a nearly transparent window from 8 microns to 12 microns. As anthropogenic carbon dioxide is introduced into the atmosphere, mostly by combustion of fossil fuels, absorption of infrared radiation in the 10-micron band and in the wings of the 15- micron band is increased. This increased absorption results in an overall warming of the earth-atmosphere system. **Positive Feedback Mechanisms** As the climate becomes warmer, positive feedback mechanisms tend to exacerbate the problem. Elevations in temperature decrease the solubility of CO2 in the oceans. Therefore, as temperature increases, the oceans release more CO2 into the atmosphere, which causes another increase in temperature. Even more threatening is the greenhouse water vapor coupling. The atmosphere tends to attain a definite distribution of relative humidity in response to a change in temperature. If the temperature is increased, the relative humidity, which is a measure of the amount of water vapor in the atmosphere, is also increased. At the same time, the vapor pressure of water is raised. The result is more water vapor in the atmosphere, which causes more greenhouse effect, which raises temperatures even higher, which again increases the water vapor in the atmosphere. This positive feedback mechanism approximately doubles the sensitivity of surface temperature to a change in the amount of energy absorbed by the earth [1:19]. **IV. THE CARBON CYCLE** The annual increase of carbon dioxide in the atmosphere is dependent on several factors. First is the amount of carbon dioxide produced by consumption of carbon-based fuels. Subtracted from this amount is the carbon dioxide that is removed from the atmosphere and stored in reservoirs, or sinks. The most prominent sinks of carbon dioxide are the atmosphere, the oceans, and the biosphere. Also contributing to a net increase in CO2 is the deforestation of large land areas each year. The amount of carbon dioxide produced from fossil fuels and the annual increase in atmospheric concentrations are both well known. Approximately 50% of the CO2 produced from fossil fuel remains in the atmosphere. The rest is absorbed into sinks. The proportion of CO2 that goes into each sink and the mechanisms of CO2 removal are poorly understood. **CO2 From Fossil Fuel** Since the advent of the Industrial Revolution, about 154.4 gigatons (G ton) of carbon have been added to the atmosphere. One gigaton is equal to one billion tons. Even more alarming is the fact that of this 154.4 G tons, about 27%, or 45 G tons, were produced from 1970 to 1978. Overall, the use of carbon-

based fuels has increased at an exponential rate of 4.3% per year from 1860 to the mid-1970s. (See Table 1.) High energy costs should help to slow the use of fuels, although no significant reductions in demand have yet been observed.

Table 1. Estimated Carbon Added to the Atmosphere by the Burning of Fuels (G tons per year)

Year	Carbon Added (G tons)
1950	1.63
1960	2.16
1970	3.96
1975	4.87
1978	5.62

Source: Gordon J. MacDonald. *The Long-Term Impacts of Increasing Atmospheric Carbon Dioxide Levels* (Cambridge: Ballinger, 1982), 152.

It is expected that industrialized countries will be able to significantly reduce the use of fossil fuels for energy production by using clean energy sources such as solar and nuclear. However, a growing world population will place heavy pressure for increased energy use, especially in developing countries. The percentage of CO2 produced by geographical regions in 1974 and the projected contribution expected in 2025 is listed in Table 2. Even though the United States will reduce its contribution from 27% to 8%, the amount produced by developing regions in the same time will more than triple[4].

Carbon Dioxide Produced by Different Fuels

The amount of carbon added to the atmosphere depends on the type of fuel being burned. Fuels with a high hydrogen- to-carbon ratio produce the most energy for each unit of carbon released. The dirtiest fuels, in terms of carbon dioxide, are the various synthetic fuels that are produced from coal. Synfuels release large amounts of CO2 because energy must be expended to extract them from coal. Therefore, the carbon dioxide generated from producing the synfuel must be added to that released by combustion. Because the world has very large coal reserves, research into synfuel production has increased greatly. Although synfuels could significantly reduce the dependence of the United States on petroleum, they would tend to accelerate the buildup of carbon dioxide in the atmosphere. Table 3 lists the amount of CO2 released by each type of fuel.

Table 2. Percent of Atmospheric CO2 Contribution by Nation and Continent		
Nation or Continent	**1974**	**2025**
USA	27	8
USSR & Eastern Europe	25	17
Western Europe	18	10
Central Asia	8	19
Japan, Australia, N. Zealand	7	4
Developing Asia	--	4
Developing America	4	40
Developing Middle East	--	3
Developing Africa	--	2
Source: Committee on Governmental Affairs, U. S. Senate. *Carbon Dioxide Accumulation in the Atmosphere, Synthetic Fuels and Energy Policy* (1979), 451.		

Table 3. CO2 Contribution by Fuel Type. Carbon released per 100 quads of energy produced (1 quad=1015 Btu).	
Fuel	**Carbon in 10[-15] Grams**
Oil	2.00
Gas	1.45
Coal	2.50
Synfuels	3.40
Source: Committee on Governmental Affairs, U. S. Senate. *Carbon Dioxide Accumulation in the Atmosphere, Synthetic Fuels and Energy Policy* (1979), 451.	

Future Levels of Carbon Dioxide

Future inputs of carbon from fossil fuels are dependent upon world energy consumption and on the mix of fuels used. Two models have been devised to estimate the world consumption of carbon-based fuels in the future. The first model is based on the historical growth rate of 4.3% per year.

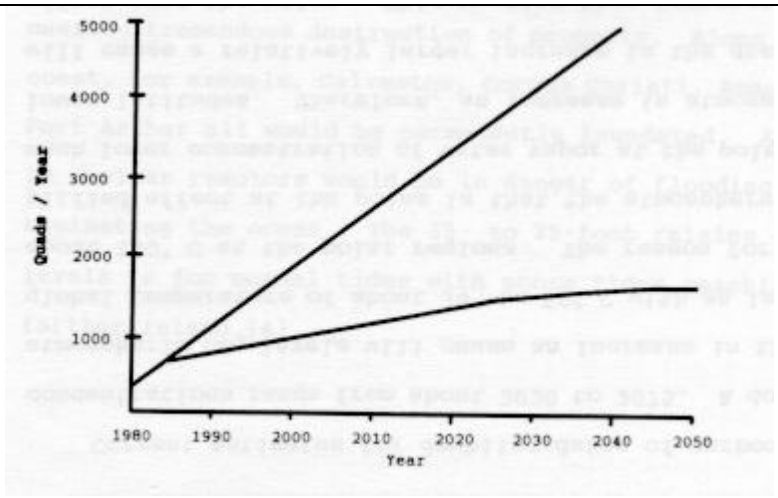

Figure 2. Growth Rate of Fuel Use Computed With Two Different Models. Source: Gordon J. MacDonald. The Long-Term Impacts of Increasing Atmospheric Carbon Dioxide Levels (Cambridge: Ballinger, 1982), 34.

greater than the proven reserves. Obviously, these estimates are greatly simplified, since they were devised to give minimum times to exhaustion of energy reserves.

As conventional fossil fuels become more expensive, it is likely that world fuel usage will shift to a different combination of fuels than used today. Changes in this fuel mix causes more uncertainty in estimates of future CO2 inputs into the atmosphere. Table 4 gives the dates for doubling of CO2 concentrations for various fuel use combinations [9].

Table 4. Doubling-Dates for Carbon Dioxide Concentrations for Different Fuel Use Combinations.

Fuel	**4.3% Exponential Growth**	**Tapered Growth**
Current Fuel Mix	2035	2055
All Coal After 1990	2030	2045
All Synthetics After 1990	2022	2030
All Natural Gas After 1990	2043	2075

Source: Gordon J. MacDonald. *The Long-Term Impacts*, 84.

If the world use of fossil fuels is maintained at that level, the proven energy reserves would be exhausted by 2010 to 2015. The second model, and probably the more accurate one, postulates that the current growth rate will continue until 1990, and then the rate of growth will decline to zero over a fifty-year period. Figure 2 graphically compares growth rates from both models. This tapered growth scenario would postpone the exhaustion of proven reserves by ten to fifteen years. However, actual use of carbon-based fuels could continue for some time after this, since the total amount of recoverable reserves is much

V. CLIMATIC EFFECTS OF INCREASED CO2 CONCENTRATIONS

Current estimates for doubling-dates of carbon dioxide concentrations range from about 2020 to 2075. A doubling of atmospheric CO2 levels will cause an increase in the mean global temperature of about 30° to 50° C with an increase of about 120° C at the polar regions. The reason for the amplified effect at the poles is that the atmosphere has a much lower concentration of water vapor at the poles than at lower latitudes. Therefore, an increase in atmospheric CO2 will cause a relatively larger increase in the greenhouse effect over the poles. This warming then increases the water vapor present by melting ice, which causes the process to be self-enhancing.

Changes in Local Weather Patterns

As the temperature of the atmosphere is increased, the global circulation patterns will be shifted. This will cause widespread changes in local weather patterns. Although mathematical models devised by meteorologists can describe overall climatic changes, they are not able to predict these small-scale variations in local conditions. One method that can be used is to examine weather records for a period when the temperature was higher than it is today.

The 1930s As Climate Analog

The most recent global peaked in the 1930s. The 1930s averaged about 10° C warmer than recent decades have. In the United States, a greater number of state records for high temperatures were set in the 1930s than in any decade since the 1870s. The 1° C increase is analogous to the initial decade of CO2-induced warming which should occur shortly after the turn of the century.

Drought

The most significant feature of a warmer climate is the absence of adequate precipitation. The drought of the 1930s has been called the greatest disaster caused by meteorological factors. Research into climate records by studying tree rings has determined that 1934 was the driest year in the western United States since 1700. If the atmospheric circulation patterns of the 1930s return early next century because of warmer temperatures, agricultural production and water supplies could be seriously affected. Even though food production would decline, modern agricultural practices would probably prevent a catastrophe like the dust bowl of the 1930s. Water supply, however, is a different situation. Particularly hard hit will be the region of the West that draws water off the Colorado River basin. This region, which is already plagued by water shortages, could be devastated by a drought that lasts several years.

Increased Tropical Storm Activity

The warming of the atmosphere will cause the sea temperature to rise as well. This will result in more tropical storms being generated. The 1930s were a period of increased tropical storm activity. Twenty-one tropical storms blew up in 1933, seventeen in 1936; the current average is nine per year. These storms will also be able to reach higher latitudes because of warmer seas [1:35-50].

Sea Level Increase

Researchers have suggested that conditions similar to those of the 1930s could persist for as long as 25 years. During this time the earth's temperature will still be increasing and a longer range problem will become evident. The polar ice caps would begin to melt, raising the sea level. This will be a slow process, but one that will be irreversible once the greenhouse threat is fully realized. A rise in ocean levels of between 15 to 25 feet is possible in as little as 100 years. Coastal regions would be flooded causing tremendous destruction of property. Along the Texas coast, for example, Galveston, Corpus Christi, Beaumont, and Port Arthur all would be permanently inundated. As many as 10 nuclear reactors would be in danger of flooding and contaminating the ocean. The 15- to 25-foot raising of sea levels is for normal tides with storm tides reaching even farther inland [4].

VI. WAYS TO REDUCE GREENHOUSE EFFECT

The severity of the consequences of this major climatic change requires that action be taken to lessen man's input of carbon dioxide into the atmosphere. The greenhouse threat is a global problem that calls for global action. Unfortunately, the political structure of the world tends to impede cooperation on a global scale. Even with these difficulties, it is imperative that the use of carbon-based fuels be reduced significantly. The United States, as the world's leading consumer of energy, could influence world opinion and stimulate action by taking decisive measures. Some of the steps that need to be taken are:

Suggested solutions to problem.

1. A concerted effort must be made to conserve fuel with a goal of reducing global consumption 20% worldwide by the year 2000. Public knowledge of the effects of CO2 on the climate is needed. A tax on fossil fuel would provide an extra incentive to conserve. The revenue from such a tax could be used to further development of alternate energy sources.
2. The use of a combination of fossil fuels that will minimize the input of CO2 into the atmosphere must be emphasized. Natural gas is the cleanest of the fossil fuels and large reserves of gas have been found. Coal is also found in abundance in the United States and is therefore likely to be increasingly used for energy production. However, coal releases 75% more CO2 into the atmosphere per unit of energy produced than does natural gas. Because of this, use of coal should be de-emphasized and use of natural gas emphasized.
3. Alternate energy sources, such as solar and nuclear, should be developed. There is a substantial amount of emotional opposition to nuclear power, which will impede the expansion of its use. Solar power, as are wind and wave power, is ideal in that it is constant and non-polluting. The technology is not quite at a stage where solar power is economically feasible. A strong effort must be made to develop this highly attractive source of energy.
4. Reforestation on a massive global scale is needed to provide a large biotic sink in the next few decades. The total respiration of CO2 should be less than the total photosynthesis on a regional and worldwide basis. Fast- growing trees, such as the American Sycamore, can absorb as much as 750 tons of carbon per square kilometer per year. Water hyacinths can absorb 6000 tons of carbon per square kilometer per year. The growth of biomass for energy production could serve as an additional method of reducing CO2

accumulation because it would only involve recycling between carbon pools of the biosphere and the atmosphere.

5. Research into the carbon cycle is needed to reduce the uncertainties surrounding predictions of climatic changes. Although the amount of carbon dioxide that is released and the amount that remains airborne is well known, the method by which CO2 is assimilated into sinks, such as the ocean and the biosphere, is poorly understood. Typical estimates of the amounts of CO2 absorbed annually by the ocean and the biosphere are 2 G tons and 1 ton, respectively [4].

VII. CONCLUSION

Conclusion summarises problem and solution.

Carbon dioxide accumulation in the atmosphere is the most dangerous pollution problem today. This excess of CO2 will cause an increase in the mean global temperature which should be detectable shortly before the end of this century. This warming is caused by the greenhouse effect. CO2 allows incoming radiation from the sun to enter the atmosphere. The heat from the earth's surface, which must radiate in the infrared region of the spectrum, is absorbed by CO2 and water vapor, thereby raising the atmospheric temperature. The greenhouse water-vapor coupling provides a strong positive feedback mechanism. Fossil-fuel use increases at an exponential rate of 4.3% annually. This should cause a doubling of CO2 concentrations by between the year 2020 and the year 2075. This doubling of atmospheric CO2 will cause an increase in the mean global temperature of about 30° to 50° C. Warmer temperatures will cause a shift in atmospheric circulation patterns. This will cause local weather patterns to change. The results for the United States could be intensive drought, increased tropical storm activity, and a rise in the sea level caused by melting of the polar ice caps. To lessen the severity of the problem, fossil fuel consumption must be curtailed and alternate energy sources developed. Also, a global reforestation program should be undertaken to provide a large biotic sink for CO2 in the new few decades

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APPENDIX 1.

There are some tips how to start writing your own Technical Report:

1) Describe the purpose of your research. Are you presenting the results of research, outlining a new theory or method, and/or offering a new interpretation of old data?

2) Describe the most important feature of your research.

3) Compile a list of works by other researchers that you used in your own research or that is related to your research.

4) Describe the ways in which your research proves or disproves other researchers' work.

5) Describe the background of this subject.

6) Describe what you expected to find before you began your research. How did your project change over time? How did your results differ from your expectations?

7) Describe your results. How did you check your results? How can you best represent them: with text, in a table, with a figure, etc?

8) Describe the consequences of your research. What does it mean for the subject? How will it affect future research on this subject?

9) Describe the ideal audience for your report. Who would be most impacted by your research? Who would best understand the consequences of your research?

10) If you are seeking to publish your report, describe the journals in which you would like to see your research appear. What are the specific requirements for these journals? Additionally, what type of language should you use in writing your report? Look carefully at journals to which you are interested in submitting; how do writers describe their experimental data?

11) Consider the specific guidelines under which you are working. If relevant, make a list of the sections you are required to include in your report. If you have freedom in choosing sections to include, make a list of the sections you think will be necessary to include.

So good luck with your work!