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## 04.01: Report Design

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## Report Document Overview

David McMurrey and Jonathan Arnett

### Chapter Objectives

Upon completion of this chapter, readers will be able to do the following:

1. Explain the importance of effective report design.
2. Explain the purpose of a letter of transmittal.
3. Define when covers and labels are appropriate for reports.
4. Explain the purposes of and write a descriptive abstract and executive summary for a report.
5. Apply design principles of tables of contents and figures.
6. Apply basic design considerations on the body of a report.
7. Define the appropriateness of a conclusion, appendix, and information sources.

## Report Design

Technical reports (including handbooks and guides) have various designs depending on the industry, profession, or organization. This chapter shows you one traditional design. If you are taking a technical writing course, make sure the design presented in this chapter is acceptable. The same is true if you are writing a technical report in a science, business, or government context.

Technical reports have specifications as do any other kind of project. Specifications for reports involve layout, organization and content, format of headings and lists, the design of the graphics, and so on. The advantage of a required structure and format for reports is that you or anyone else can expect them to be designed in a familiar way—you know what to look for and where to look for it. Reports are usually read in a hurry—people are in a hurry to get to the information they need, the key facts, the conclusions, and other essentials. A standard report format is like a familiar neighborhood.

When you analyze the design of a technical report, notice how repetitive some sections are. This duplication has to do with how people read reports. They don't read reports straight through: they may start with the executive summary, skip around, and probably do not read every page. Your challenge is to design reports so that these readers encounter your key facts and conclusions, no matter how much of the report they read or in what order they read it.

The standard components of the typical technical report are discussed in this chapter. The following sections guide you through each of these components, pointing out the key features. As you read and use these guidelines, remember that these are guidelines, not commandments. Different companies, professions, and organizations have their own varied guidelines for reports—you'll need to adapt your practice to those as well as the ones presented here.

## Letter of Transmittal

The transmittal letter is a cover letter. It is usually attached to the outside of the report with a paper clip, but it can be bound within the report, as a kind of author's preface. It is a communication from you—the report writer—to the recipient, the person who requested the report and who may even be paying you for your expert consultation. Essentially, it says "Okay, here's the report that we agreed I'd complete by such-and-such date. Briefly, it contains this and that, but does not cover this or that. Let me know if it meets your needs." The transmittal letter explains the context—the events that brought the report about. It contains information about the report that does not belong in the report.

Use the standard business-letter format for cover letters. If you write an internal report, use the memorandum format instead; in either case, the contents and organization are the same:

- **First paragraph.** Cites the name of the report, putting it in italics. It also mentions the date of the agreement to write the report.
- **Middle paragraph(s).** Focuses on the purpose of the report and gives a brief overview of the report's contents.
- **Final paragraph.** Encourages the reader to get in touch if there are questions, comments, or concerns. It closes with a gesture of good will, expressing hope that the reader finds the report satisfactory.

As with any other element in a report, you may have to modify the contents of this letter (or memo) for specific situations. For example, you might want to add a paragraph that lists questions you'd like readers to consider as they review the

report.

## Cover and Label

If your report is over ten pages, bind it in some way and create a label for the cover.

### Covers

Covers give reports a solid, professional look as well as protection. You can choose from many types of covers. Keep these tips in mind:

- The best covers use either a spiral (best) or plastic "comb" (second-best) binding and thick, card-stock paper for the covers. These bindings allow reports to lie open by themselves, are inexpensive, and add to the professionalism of your work. Any copy shop can make one for you.
- Three-ring binders (also called loose-leaf notebooks) are a decent second choice. They allow your report to lie flat, but they are often too bulky for short reports, and the page holes tend to tear. However, if the audience will want to remove or replace pages, then a three-ring binder is an appropriate choice.
- Three-hole binders that use brads to hold the pages together are a distant third choice. They are less bulky than three-ring binders, but they prevent the pages from lying flat, and readers must either weigh down or crease the pages. If you do use one of these, add an extra half-inch to the left margin to account for the "gutter" between pages.
- Clear (or colored) plastic slip cases with the plastic sleeve on the left edge are never appropriate for a professional report. These are like something out of grade school, and they are aggravating to use. They won't lay flat, so readers must struggle to keep them open, and they generate static electricity, which makes pages stick together.

### Labels

Be sure to devise a label for the cover of your report. It's a step that some report writers forget. Without a label, a report is anonymous; it gets ignored.

The best way to create a label is to use your word-processing software to design one on a standard page with a graphic box around the label information. Print it out, then go to a copy shop and have it photocopied directly onto the report cover.

There are no standard requirements for the label, although your company or organization should have its own requirements. Common elements to include are

- the report's formal title
- the intended recipient
- the authors (or, often, the author's organization)
- a report tracking number
- the date of submission

*Report binding and cover  
with label*

**Energy-Efficiency Guide:**

**Employing Energy-Efficient Building  
Strategies in a Residential Home**

**Environmental Building Associates**  
100 East 38th Street  
Austin, Texas 78705



June 25, 2015

Dr. David McMurrey, Chairman  
Energy Experts of Austin  
2000 W. 39th Street  
Austin, TX 78705

Dear Dr. McMurrey:

I am submitting the attached report entitled *Energy-Efficiency Guide:  
Employing Energy-Efficient Building Strategies in a Residential Home*.

This report is an analysis of a recent study conducted in Ann Arbor, Michigan, on the effectiveness of employing energy-efficient building strategies to minimize energy consumption and costs in a residential home. Using software technologies, the home was modeled to create two scenarios: an energy-efficient home and a standard home. This report details how the study found the energy-efficient home to be both cost efficient and effective at decreasing energy consumption. Such advances might prove to be the catalyst that the housing market needs to spur builders into a new era of home construction.

I would like to give special thanks to our solar engineer, Thorson James, for carefully checking all the technical details in the report. Also, our technical editor, Cherie Sorenson, was of great help in putting the final report together.

I hope this report meets your needs, generates future studies, and educates the public about the environmentally friendly options available in home building today. If you have any further questions, please feel free to contact me at x 563 or at [RLMiller@EBA.com](mailto:RLMiller@EBA.com).

Sincerely yours,

Gwen L. Miller, Vice-President  
Environmental Building Associates, Inc.

End.: Energy-Efficiency Guide: Employing Energy-Efficient Building  
Strategies in a Residential Home

*Transmittal letter*

## Abstract and Executive Summary

Most technical reports contain a descriptive abstract or an executive summary, and sometimes both. Each element summarizes a report's contents, but they do so in different ways and for different purposes.

### Descriptive Abstract

This brief paragraph provides a capsule overview of the report's purpose and contents. It's usually a single paragraph. In many report designs, the descriptive abstract appears at the bottom of the title page (not the cover page), as shown in the following example.

**LIGHT WATER NUCLEAR REACTORS**

submitted to

Mr. David A. McMurrey

Energy Research Consultants, Inc.

Austin, Texas

April 27, 19XX

by Jeffrey D. Lacruz

This report examines light water reactors as a possible alternative source of energy for Luckenbach, Texas. Both types of light water reactors are described, and an explanation of how each reactor produces electricity is presented. Safety systems and economic aspects conclude the main discussion of the report.

*Descriptive abstract*

## Executive Summary

Another common element in a report's front matter is an executive summary, which also summarizes the key facts and conclusions contained in the report. Its purpose is to allow a busy executive to absorb the report's major findings without having to wade through pages of details. A typical executive summary runs from a half-page to two pages, but it can be longer if the report is very long.

## Table of Contents and Table of Figures

### Table of Contents

Any technical document of more than a few pages that includes distinct major sections should include a table of contents (ToC), and each major section should start on a new page.

The ToC should not include the title page or the cover letter/memo. If the proposal includes an abstract and/or executive summary, those sections should appear in the ToC, and it is customary to paginate them with lower-case roman numerals. The ToC should not include itself. Treat it as page zero.

Always include at least the top two levels of headings, but how many subheading levels you include in a ToC is up to you. A long, complex report with multiple subheadings may need a ToC entry for each subheading, but this approach may result in an extremely long and confusing ToC. A potential solution is to create two ToCs, one listing just the top two levels of headings and one listing all levels of headings.

One final note: Make sure the words in the ToC are the same as they are in the text. As you write and revise, you might change some of the headings—don't forget to update the ToC accordingly. See Figure 3 for an example of a ToC and executive summary:

**TABLE OF CONTENTS**

EXECUTIVE SUMMARY.....	ii
LIST OF FIGURES AND TABLES.....	iv
1.0 INTRODUCTION.....	1
2.0 TECHNICAL BACKGROUND.....	2
2.1 Functional Units of the House.....	2
2.2 Standard Home (SH).....	
2.2.1 Modeling.....	
2.2.2 Materials.....	
2.3 Energy Efficient Home (EEH).....	
2.3.1 Modeling.....	
2.3.2 Energy-efficient strategies.....	
2.4 Energy Consumption Determination.....	
2.4.1 Heating and cooling systems.....	
2.4.2 Electrical systems.....	
3.0 CONSUMPTION COMPARISONS.....	
3.1 Gas Consumption.....	
3.2 Electricity Consumption.....	
4.0 COST ANALYSIS.....	
4.1 Determination of Cost.....	
4.1.1 Construction.....	
4.1.2 Energy costs.....	
4.2 Accumulated Cost Analysis.....	
5.0 RANKING OF ENERGY-EFFICIENT STRATEGIES.....	
6.0 CONCLUSIONS.....	
REFERENCES.....	

*Page-numbering style used in traditional report design: lowercase roman numerals for everything up to the body of the report; arabic numerals thereafter.*

**EXECUTIVE SUMMARY**

This feasibility report analyzes a recent study conducted on a 2,450 ft<sup>2</sup> residential home (referred to as SH or Standard Home) built in Ann Arbor, Michigan. The goal of the study was to determine the effectiveness of employing energy-efficient building strategies to minimize energy consumption and costs in a residential home. The study was done on a 2,450 ft<sup>2</sup> residential home (referred to as SH or standard home) built in Ann Arbor, Michigan.

The home was modeled using Energy-10, a software package capable of calculating the energy consumed during the use of the home over a 50-year period. While keeping the basic functional units (such as floor plan, occupancy, type and number of appliances, and internal volume) of the home consistent, SH was then modeled to reduce the energy consumption by employing various energy-efficient strategies (referred to as EEH or energy efficient home).

The total life-cycle energy consumption of SH was found to be 15,455 GJ, which consisted of space and water heating and cooling, lighting, ventilation, and appliances. The total life-cycle energy consumption of EEH was reduced to 5653 GJ. The purchase price of SH was \$240,000 (actual market value) and was determined to be \$22,801 more for EEH. The cost analysis performed found that despite a 9.5% increase in the purchase price of an energy-efficient home, lower annual energy expenditures make the present value nearly equal to the more energy-consuming version. The accumulated life cycle costs are higher in EEH until year 48 and are \$1,054 (or 0.1%) less at year 50.

It was found that the most effective strategy for reducing overall annual energy costs is installation of a high-efficiency HVAC system. However, for reducing overall energy consumption, insulation was the most effective strategy followed by high-efficiency HVAC and air leakage control.

ii

Downloadable example of executive summary

## Table of Figures

The table of figures (ToF), sometimes called the "list of figures," has many of the same design considerations as the table of contents. Readers use the ToF to find the illustrations, diagrams, tables, and charts in your report.

Please note that tables and figures are different things. Strictly speaking, figures are illustrations, drawings, photographs, graphs, and charts. Tables are rows and columns of words and numbers; they are not considered figures.

For longer reports that contain multiple figures and tables, create separate lists of figures and tables. Put them on a separate page from the ToC, but put them together on the same page if they fit. You can identify the lists separately, as Table of Figures and Table of Tables.

# Introduction

In a technical report, the introduction prepares the reader to read the main body of the report. It introduces the report's purpose, specifies the report's intended audience, provides a limited description of the report's context and background, forecasts the report's scope, and previews the report's contents and/or organization.

**LIST OF FIGURES**

Figure 1. Natural Gas Use by SH and EEH ..... 7

Figure 2. Annual Electricity Use by SH and EEH..... 8

**LIST OF TABLE**

Table 1. EEH and SH Systems.....

Table 2. Energy-10 Simulation.....

Table 3. Energy Efficient Strategies.....

Table 4. Cost Comparisons for SH and E

iv

*Topic overview: Always provide a brief idea of the contents of the report in the introduction.*

**1.0 INTRODUCTION**

**1.1 Purpose of the Report**

This report analyzes the results of using various energy-efficient strategies to determine if such practices actually make a difference in the amount of energy consumed by an average house. Additionally, it analyzes which home system improvements provide the greatest reductions in energy and whether such improvements are cost-efficient in the long run.

**1.2 Background of the Report**

Annually, 24% of the natural gas and 35% of the electricity in the US is consumed by the residential housing sector. Consequently, 1.3 metric tons of greenhouse gases are emitted annually [6,7]. Understanding energy consumption and taking measures to reduce it is essential if a systematic and comprehensive reduction of environmental impacts is desired. Reductions in home energy consumption will not only reduce utility costs but also reduce the impact on the environment.

**1.3 Scope of the Report**

This report provides technical background on the construction of the standard and the energy-efficient house, the energy-efficient strategies used in the latter, energy-consumption rates, construction costs, and other relevant details. Not included in this report are discussions of the receptiveness of the American home-building industry or American home buyers to energy-efficient housing design or of pending legislative to promote energy-efficient housing design.

*Note: A basic understanding of terminology for housing constructing, HVAC, and cost analyses is assumed.*

*Audience: Introductions must alert readers about the technical background they must possess to understand the report.*

Downloadable example of introduction

If the introduction, executive summary, and letter of transmittal strike you as repetitive, remember that readers don't necessarily start at the beginning of a report and read page by page to the end. They skip around: they may scan the table of contents; they usually skim the executive summary for key facts and conclusions. They may read carefully only a section or two from the body of the report, and then skip the rest. For these reasons, reports are designed with massive duplication so that readers will be sure to see the important information no matter where they dip into the report.

# Major Design Considerations

This part of the chapter describes several design-related issues that you will likely need to consider when creating a report.

**Headings.** In all but the shortest reports (two pages or less), use headings to mark off the different topics and subtopics covered. Headings enable readers to skim your report and dip down at those points where you present information that they want.

**Bulleted and numbered lists.** In the body of a report, also use bulleted, numbered, and two-column lists where appropriate. Lists help by emphasizing key points, by making information easier to follow, and by breaking up solid walls of text.

**Symbols, numbers, and abbreviations.** Technical discussions ordinarily contain lots of symbols, numbers, and abbreviations. Remember that the rules for using numerals as opposed to words are different in the technical world. The old rule of thumb about writing out all numbers below 10 does not always apply in technical reports.

**Graphics and figure titles.** In a technical report, you're likely to need drawings, diagrams, tables, and charts. These not only convey certain kinds of information more efficiently but also give your report an added look of professionalism and authority. If you've never put these kinds of graphics into a report, there are some relatively easy ways to do so—you don't need to be a professional graphic artist.



Wall design was given particularly careful consideration. Pierquet, et al., compares the annual energy savings of 12 different wall systems based on varying R-values [5]. Using a standard 2 x 4 stud wall with fiberglass insulation as the base case, Pierquet, et al., compared it with wall sections made of strawbale, structural insulated panels (SIPs), I-beam studs, autoclaved cellular concrete, and varying combinations of 2 x 4 construction and rigid foam insulation. Both the strawbale and the double 2 x 4 walls had very high R-values. Appliances were selected that conserve energy by being more efficient. The range and clothes dryer were switched to run on natural gas [1].

**2.4 Energy Consumption Determination**

For the purposes of the study, energy consumption was divided into two main home systems: heating and cooling, and electrical.

**2.4.1 Heating and cooling systems.** Heating and cooling energy were determined with Energy-10 for SH as well as for EEH. The program calculates the heat required to maintain the internal temperature based on the following factors:

- Average conductivity of the thermal envelope (walls, ceiling, floor, foundation)
- Internal temperature (includes adjustment for seasonal/daily temperature change)
- Outside air infiltration through gaps and forced-air ventilation systems
- Furnace and A/C efficiencies were used
- Solar heat gains through windows

**2.4.2 Electrical systems.** Electrical energy consumption was determined independently from Energy-10. The electrical energy in the house was determined, which could be used for:

IEEE citation using brackets: The borrowed information comes from source 5 listed in References.

Acronym: On this first use, it is spelled out with the acronym shown in parentheses. The spelled-out version does not use initial caps because it is not a proper noun.

Second- and third-level headings: Notice how the system adds a decimal number to each lower-level section heading.

**3.0 CONSUMPTION COMPARISONS**

For energy consumption comparison, resources were broken down into total annual gas and electricity consumption, and then compared for the two homes.

**3.1 Gas Consumption**

Figure 1 shows annual natural gas use for both SH and EEH. The dramatic decrease in natural gas consumption is due to the greatly improved thermal envelope and a much more efficient HVAC system, causing a decrease in heating natural gas consumption of 91.8%.

While EEH uses natural gas for the stove and dryer (which is not the case for SH), EEH total annual natural gas use is only 21% that of SH [1].

Informal overview of the contents of this section: gas consumption; electricity consumption.

Chart depicting comparative natural gas usage. Notice this chart is treated as a figure and that the figure title appears below the chart.

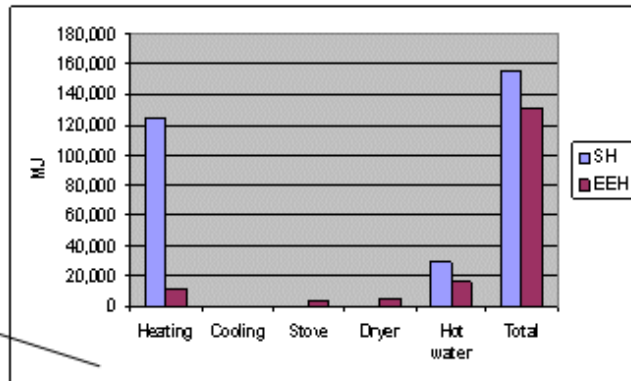


Figure 1: Comparison of Annual Natural Gas Use by SH and EEH. [1, p. 8-9]

**Cross-references.** You may need to point readers to closely related information within your report, or to other books and reports that have useful information. These are called cross-references. For example, you can point readers from the discussion of a mechanism to an illustration of it. You can point readers to an appendix where background on a topic appears (background that just does not fit in the text). And you can point readers outside your report to other information—to articles, reports, and books that contain information related to yours.

**Page numbering.** All pages in the report (excluding the front and back covers, title page, and ToC) are numbered. Use lower-case roman numerals to paginate material that appears before the ToC. Don't number the ToC; it's page zero. Use arabic numerals to paginate material that appears after the ToC.

Longer reports often use the page-numbering style known as folio-by-chapter or double-enumeration (for example, pages in Chapter 2 would be numbered 2-1, 2-2, 2-3, and so on, and pages in Appendix B would be numbered B-1, B-2, and so on). Similarly, tables and figures would use this numbering style. This style eases the process of adding and deleting pages.

If page numbers appear in a running header, don't display numbers on pages where a heading or title is at the top of the page (such as chapter or section openers).

## Conclusions

For most reports, you'll need to include a final section in which you sum up the report's contents and provide a "takeaway" for the reader. When you plan this final section of your report, think about the functions it can perform in relation to the rest of the report.

## Appendices

An appendix is an "extra" section that appears after the proposal's main body. Any useful content that you feel is too large for the main part of the proposal or that you think would be distracting and interrupt the flow of the proposal should go into an appendix. Common examples of appendix-appropriate material are large tables of data, big chunks of sample code, fold-out maps, background that is too basic or too advanced for the body of the report, or large illustrations that just do not fit in the main body.

Use separate appendices for each item or category of items, and label each one alphabetically, as "Appendix A: (descriptive title of contents)" and so on. If you've got only one appendix, continue the proposal's page numbering scheme. If you have multiple appendices, you can number each appendix's pages separately, as A-1, A-2, and so on.

## Information Sources

If your proposal quotes, paraphrases, or summarizes information that came from outside sources, cite the sources appropriately in the main text and include bibliographic information in a separate section at the proposal's end. Use whatever citation format is appropriate for your audience's profession and field. Common formats include IEEE, MLA, APA, CSE, Chicago, and Turabian.