The Source

by

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Chapter 1

Introduction

The Source is an interactive simulation model where the user is charged with the task of providing energy to a growing population. The purpose of the simulation is to show the benefits and detriments of each type of energy source. Although the game targets young adults, primarily around high school and College/university students; anyone can play and and have a learning experience. Two intended outcomes of the simulation are to demonstrate the ratio of energy output to energy source type, and show the inner workings of each. A third outcome of the simulation is show that each type of energy works in the same way at its most basic level, with the exception of solar power converting kinetic energy into electrical energy.

The user will accomplish the task of providing energy by choosing to invest in different types of energy. The energy types that are at the users' disposal are solar, wind, hydro, coal, oil, gas and nuclear. Users can choose to build any of these power plants, but each type has consequences that others may not have. For example, if a user decided to build a power plant that ran off of coal, environmentalists would be displeased because the burning of coal introduces pollutants into the atmosphere. As well as considering the consequences of their actions, the users must also consider what fuels each power plant and how long each power plant can be sustained for. Fossil fuels and nuclear power are not infinite; the user must find resources to fuel these power plants. Users can choose to invest in renewable resources such as solar, wind and hydro, but the problem the user encounters with these types of resources is that they don't output as much energy as fossil fuels. The users' main objective is to survive for as long as possible and to beat their previous time.

Chapter 2

Energy Today

In our society today almost all electrical energy is converted in the same way, converting kinetic to moving this magnet. In almost all designs the magnet is connected to a turbine,which can be rotated, so that if the turbine obtains kinetic energy it can be transferred to the magnet. How the turbine acquires kinetic energy is different depending on the sours of energy. In the case of Fossil fuels and nuclear power, all that is happening is that water is being turned into steam and then the steam is used like wind to turn the turbine to make power. In the case of hydro power, the flowing water turns the turbine and in the case of wind power the turbine is physically connected to the rotating blades throughout the shaft of the windmill.

The exception, solar power. Solar Power works a little different, the general idea is that when beamsof light hit the solar panels some of the energy from the light doesnt get transferred into heat and is instead transferred into the electrons. With their newly obtained energy the electrons become free and able to move around. This makes a current possible and from here it is just a matter of extracting it.

It could be argued that nuclear power plants, fossil fuel plants and big hydro dams are these big complex systems that generate our power for us but they all work off the one basic idea of moving a magnet through a copper coil. This centuries old idea has fundamentally redirected the evolutionary direction of our society today.

Chapter 3

The Sourse

The design of the system, as illustrated in figure 3.1 below, is straightforward. The user interacts with the system by purchasing power plants. This is done on a designated screen when there is land for the user to build on. Once the user has picked a type of power he/she must then provide the resources necessary for the power plant to function. The user can obtain fossil fuels by mining for them on the screen designated to represent the land that is currently available for the user to excavate. Once resources have been obtained and a power plant is built, energy can then be created and supplied to the population.

Another option that the user has is that he/she can purchase advertisements or public services to help him/her flourish in the simulation. For example, a user could purchase an advertisement that educates the population to not waste power. This advertisement would reduce the usage of power and allow the user to more easily meet the demand. Users can also buy public services. An example would be a geologist that would survey the land and tell the user where to mine for a specific resource. Both of these purchases can influence groups within the game, such as environmentalists or public opinion.

Users choices in the game affect groups as well, for example if a user invested in coal fueled power plants then the environmentalists group would not be displeased. Groups provide small perks or punishments to the user, usually in the form of grants or fines, which are dependent on the users play style and choices within the simulation.

3.1 Screen Layout

The Source is composed of 8 different screen. The first five mentioned below are know as the five core screens. You can get to any of these screens from any other screen in the game.

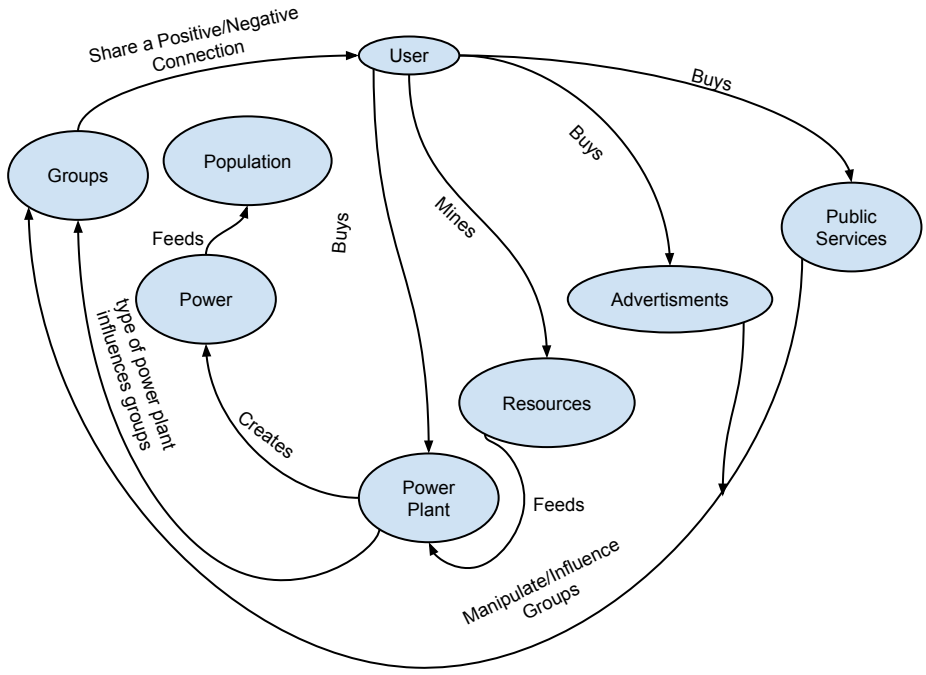

Figure 3.1:

The Business Screen (one of the five core screens):

In this screen the user is able to purchase advertisements and pubic services to help him/her progress through the simulation. Here the user is also able to see their progress throughout the game. The user will be able to see data like, money and energy made over time.

The City Screen (one of the five core screens):

Here the user is able to see how the population is doing, the amount of power currently demanded and the amount supplied. This screens purpose is to purely display information.

The Power Plant Screen (one of the five core screens):

This screen, possibly the most education screen shows the workings of each type of energy as well as the inner workings of a generator. As well as seeing this information this screen allows the user to see specifics on the current power plants that he/she has built. Specifics

being information such as amount of power produced, cost to maintain, resources required to maintain and more.

The Land Screen (one of the five core screens):

From this screen the user can build power power plants that run off of fossil fuels and uranium. The user will have some designated land to start but he/she also has the option to buy more land to build on if the starting land is all used up.

The Resource Screen (one of the five core screens):

The purpose of this screen is to act like a map for the resources at the users disposal. From this screen the user can see all the resource that will be needed and the user can get at the three resource screens that will allow the user to extract the resources.

The Hydro Screen:

From here the user can view numerous rives that could be damned in order to generate power. Once a river is damned it will be shown on the screen. Rivers can only be damed once.

Solar/wind Power Screen:

This screen shows land in the form of a grid that the user has at his/her to build windmills on or solar canals. Building will have a cost. Once something is built it can be dismantled to open the land to have something else built.

The Fossil Fuels Screen:

Here land that the user can mine will be shown. This will be one large grid that will hold all the fossil fuels and uranium. The user can mine a section by selecting it and he or she will have a chance of discovering any one of the four resources. The resource discovered will go towards fueling the built power plants. Once a section is mined it can not be reused.

The Static Screen:

The static screen is not really a screen at all but a combination of static images that remain on top of all other screens for the entire duration of the game. This serves as the means of navigation between the five core screens. As well as displaying some information such as money and time.

Chapter 4

Sample Content Using Mathematical Notations

4.1 Facts and theorems

If we use a well established fact or theorem

Fact 4.1. *[HUL93, Theorem IV.2.4.2] Define the* marginal function γ *associated with* $g : \mathbb{R}^n \times \mathbb{R}^m \to \mathbb{R} \cup \{+\infty\}$ *by* $z \mapsto \gamma(z) := \inf_x g(x, z)$*. If* g *is a proper convex function and is bounded below on the set* $\mathbb{R}^n \times \{z\}$ *for all* z*, then* γ *is convex.*

4.2 Propositions and lemmas

Here is a lemma followed by its proof.

$$D = \left\{ (x, \lambda) \in \mathbb{R}^d \times \mathbb{R}^+ : \frac{x}{\lambda} \in C \right\}.$$

Lemma 4.2. *Assume* C *is a nonempty closed convex set. Then the set* D *is a nonempty closed convex cone.*

Proof. The fact that D is nonempty and closed follows from C being nonempty and closed. One can check directly that D is a cone....

Hence D is convex. □

Make sure that the qed symbol is always on the last line of the proof. If the last line is an equation, you can enforce the qed on the same line with the `qedhere` command.

For citations, please use BibTex. A sample article to verify formatting and style is [BGLW08]. Use the bibliography style `ubco`, which is basic `alphaurl` style with inline links enabled. Please compile multiple times when generating the references. The last entry in a reference

are the back references to the pages with the citation. They need an additional compilation, once the bibtex entries are generated.

Note that the bibliography style is discipline dependent so feel free to use the style adopted by your discipline, for example siam for mathematics.

Chapter 5

Landscape Mode

The landscape mode allows you to rotate a page through 90 degrees. It is generally not a good idea to make the chapter heading landscape, but it can be useful for long tables etc.

This text should appear rotated, allowing for formatting of very wide tables etc. Note that this might only work after you convert the `dvi` file to a postscript (`ps`) or `pdf` file using `dvips` or `dvipdf` etc.

Chapter 6

Conclusion

Here comes the conclusion.

Table 6.1: A publication quality table. Very very very very very very very very very very long title.

Item		
Animal	Description	Price ($)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

Your conclusion can go on for several pages.

Bibliography

[BGLW08] Heinz H. Bauschke, Rafal Goebel, Yves Lucet, and Xianfu Wang. The proximal average: Basic theory. *SIAM J. Optim.*, 19(2):768–785, 2008. → pages 6

[Fea05] Simon Fear. Publication quality tables in LaTeX [online]. 2005 [cited April 18, 2010]. → pages 14

[HUL93] Jean-Baptiste Hiriart-Urruty and Claude Lemaréchal. *Convex Analysis and Minimization Algorithms*, volume 305–306 of *Grundlehren der Mathematischen Wissenschaften*. Springer-Verlag, Berlin, 1993. → pages 6

Appendix

Appendix A

Tables

Here you can have additional tables. Table captions are always on top.

In order to use publication quality tables, one should use the guidelines in [Fea05]. In short, do not use vertical rules or double rules, units in the column heading (not in the body of the table), precede decimals with a digit, and do not use ditto signs. Table A.1 is according to the guidelines.

For tables, the caption goes on top, for figures, the caption goes on the bottom. If possible, always position tables and figures at the top of a page.[1] Use the option `tbph` for the placement.

Table A.1: A publication quality table. Very very very very very very very very very very long title.

Item		
Animal	Description	Price ($)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

[1] In this case, the chapter heading prevents the table from being at the top.

Table A.2: Another table

Table A.3: Another table

And other table materials (I needed to generate two pages for that appendix to test the formatting of the table of content).

Table A.4: Another table

Table A.5: Another table

Table A.6: Another table

Table A.7: Another table

Table A.8: Another table

Table A.9: Another table

Table A.10: Another table

Table A.11: Another table

Appendix B

Figures

Here you can have additional figures. Figure captions are always at the bottom.

And other additional figures (again I needed to generate two pages :-).