Title	Socio-personal energy management system : Socio-personal energy management system
Sub Title	社会と市民の係りの中でのエネルギーマネジメントシステム
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Abstract	Introduction to our project Since the Great East Japan Earthquake, a lot of companies and families are efforts to power-saving. By their efforts, a lot of power has been saved, and we succeed to avoid the massive blackout. But sometimes the electricity saving is not necessary, and a lot of place use electricity saving as an excuse to cut the electricity cost. The customers hate it. They don't like the low quality services as they are paying the same fee as before. On the other side, the efficiency of the companies has been reduced because the deterioration of working conditions. But the companies can't deny it because the power-saving is a must-be-done thing for the companies. In conclusion, the unnecessary power-saving have a big influence to the daily life and can even lead to a recession. Our objective is using the money which saves from the equalization of the electricity to promote economics. We will make a system considering about both society and every individual person, a system which will both save energy and promote the economics. We will not force anyone to do the things that they don't want, we want to let the customer and the shops and the electricity companies are both being happy during the energy saving. We will rank the shops according to their efforts to the power-saving at the peak time. The user will get more points when go shopping at a shop with a higher rank. So the shops will try to save all the energy they can to get more attractive to the customer, and the action will being controlled in a reasonable range or the customer will not come. Our system can be used in a large scope. From a micro perspective, we will offer a system that manages every individual person's energy. From a macro perspective, we want to cooperate with the existing location-oriented energy management system, in order to evaluating the rank, which is already covered almost all the Kanto Area, and even all the Japan. So theoretically, we can cover every people and every shop which use electricity as energy. Methods and results used to address the problem We used CVCA and WCA to analysis the link between stakeholders and guess what they want. From this, we got some information that the customers don't want to save energy just for the social contribution. The shops don't want to save energy because it will cause no customer to come. We concluded that if we offer them some profits, they may help or even make effort to save energy. We interviewed the stakeholders and get a positive response. We used Brainstorming and Scenario Graph to decide using point system to solve the problem. By confirmation other tools like Value Graph and Pugh Selection, we believe that point system will work. Conclusions and recommendations With our system, the shops get happy because they can improve their competitiveness, the shops get happy because they can buy cheaper things go shopping, the electricity companies get happy because they can now achieve a stable electricity supply. So it's a win-win-win model. In order to avoid the risk that the shops stop saving energy after get a high rank, we recommend giving the shops a new rank periodically. When the system is not been acceptance widely, we recommend cooperating with some chain shops to promote our system. We can get profit by if we have over 1000 shops join us by our business model for managing the system.
Notes	Student final reports Group K
Genre	Research Paper
URL	https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=KO40002003-00002011-0723

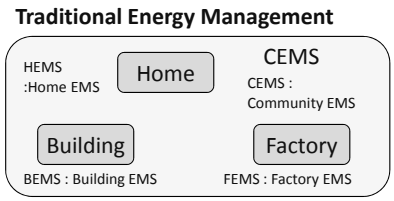
Group K

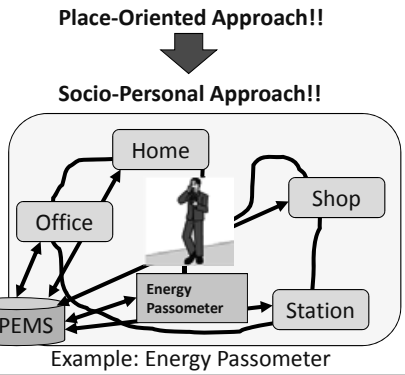
Group K's Theme Proposed by Toshiba Corporation

ALPS "Symbiosis and Synergy" theme title: Socio-Personal Energy Management System

Proposer Organization's Name: Toshiba Corporation
Contact Person's Name: Naoshi Uchihira Contact Person's email: naoshi.uchihira@toshiba.co.jp

Abstract of your project theme :
After the Great Higashi-Nihon Earthquake, energy management system (EMS) is one of the highest priority issues. Since HEMS, FEMS, and CEMS have been developed previously, these systems are place-oriented and not person-oriented. We need symbiosis energy management focusing persons living in society, called **Socio-Personal Energy Management System (S-PEMS),** utilizing smart phones and cloud computing.
Example: Energy Passometer(エネルギー万歩計)
All persons in the society calculate energy they use in their daily life with the energy passometer (smart phone). The S-PEMS server analyzes these data and makes feedback to persons and facilities (home, office, shop, station, etc.) to cause a behavioral changes for energy conservation.





Example: Energy Passometer

ALPS Final Report 2011

Group K

Project Title:
Socio-Personal Energy Management System

Theme:
Socio-Personal Energy Management System

Proposer Organization: Toshiba Corporation

Proposer Organization's Supporter: Naoshi UCHIHIRA

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YU WAN

Final Report

2011/12/4

1 Executive Summary

Introduction to our project

Since the Great East Japan Earthquake, a lot of companies and families are efforts to power-saving. By their efforts, a lot of power has been saved, and we succeed to avoid the massive blackout. But sometimes the electricity saving is not necessary, and a lot of place use electricity saving as an excuse to cut the electricity cost. The customers hate it. They don't like the low quality services as they are paying the same fee as before. On the other side, the efficiency of the companies has been reduced because the deterioration of working conditions. But the companies can't deny it because the power-saving is a must-be-done thing for the companies. In conclusion, the unnecessary power-saving have a big influence to the daily life and can even lead to a recession.

Our objective is using the money which saves from the equalization of the electricity to promote economics. We will make a system considering about both society and every individual person, a system which will both save energy and promote the economics. We will not force anyone to do the things that they don't want, we want to let the customer and the shops and the electricity companies are both being happy during the energy saving. We will rank the shops according to their efforts to the power-saving at the peak time. The user will get more points when go shopping at a shop with a higher rank. So the shops will try to save all the energy they can to get more attractive to the customer, and the action will being controlled in a reasonable range or the customer will not come.

Our system can be used in a large scope. From a micro perspective, we will offer a system that manages every individual person's energy. From a macro perspective, we want to cooperate with the existing location-oriented energy management system, in order to evaluating the rank, which is already covered almost all the Kanto Area, and even all the Japan. So theoretically, we can cover every people and every shop which use electricity as energy.

Methods and results used to address the problem

We used CVCA and WCA to analysis the link between stakeholders and guess what they want. From this, we got some information that the customers don't want to save energy just for the social contribution. The shops don't want to save energy because it will cause no customer to come. We concluded that if we offer them some profits, they may help or even make effort to save energy. We interviewed the stakeholders and get a positive response.

We used Brainstorming and Scenario Graph to decide using point system to solve the problem. By confirmation other tools like Value Graph and Pugh Selection, we believe that point system will work.

Conclusions and recommendations

With our system, the shops get happy because they can improve their competitiveness, the shops get happy because they can buy cheaper things go shopping, the electricity companies get happy because they can now achieve a stable electricity supply. So it's a win-win-win model.

In order to avoid the risk that the shops stop saving energy after get a high rank, we recommend giving the shops a new rank periodically. When the system is not been acceptance widely, we recommend cooperating with some chain shops to promote our system. We can get profit by if we have over 1000 shops join us by our business model for managing the system.

2 Table of Contents

3 Problem Statement

3.1 PROBLEM

In Japan, saving electricity was becoming a very big problem this year since the Great East Japan Earthquake on March 11th. The shut-down of the Fukushima nuclear plant causes a very severe energy crisis. The government asked us to cut down our electricity usage. So this summer, Japanese were trying hard to save electricity. We lowered the brightness of lights in houses, shops and offices and everywhere. We walked all the way, because no elevator was working. Thanks to these actions, we could overcome electric power shortage this summer.

But did we like it?

The answer is no. No one wants a rush-hour train with no light and air conditioner in summer. But we had to do this because the government asked us to do that.

Was it Necessary?

The answer is also no. The electricity is not always not enough, only at the peak time, electricity saving is necessary.

Then what we want?

We want to save electricity when the electricity is not enough and we really need to saving, we want to save electricity in our own way by our own choice. We are human not machine, we don't want to be constraint by some energy saving program.

3.2 BACKGROUND

3.2.1 Existing Product

Until today, there is also a lot of so called energy management system are working. Like Home Energy Management System (H-EMS), Place Energy Management System (P-EMS), Building Energy Management System (B-EMS) and Factory Energy Management System (F-EMS).

Different to the total electricity control like set all the air conditioner more than 28 degree. These systems are based on some location, they log the usage data of such locations, and analysis them.

Then doing some electricity saving methods like shut-down the elevators, turn-off some lights if the usage rate is not very high to save the energy more smartly.

But all of these have a problem. They are focusing on every location not every person. So also they analysis a lot of data, one or some user are going to complain about it because it cannot fit every people's demand

3.2.2 Market/Competition

As we will use point system as our method to saving energy, our main Market will be in 2 sections. One is our customer, who we focusing on. The other one is the shops, stores and restaurants which the customers can consume in.

Our project is going to focusing on every person not locations, so the existing energy management system is our competitors but not the main ones. Our main competitors will be the existing point system in Japan, T-Point and Ponta. The other energy management systems which are focusing on person are also our competitors.

3.2.3 Project Requirements

We need to equalize electricity usage of the shops instead of just electricity saving. But unlike the existing management system which forces them to turn-off something. We will let them do it themselves. No one is more familiar to their place than themselves. So the best electricity saving method is let themselves find which part is using a lot of electricity in the peak time and also can be turn-off because it is not very necessary.

And in order to rank the shops who helps to save energy. We must use smart meters to calculate the electricity they use in the peak time, and let a public authority organization to evaluate them and give them a rank.

3.2.4 Project Constraint

Not every shop can find something to turn-off to save the electricity, and there are also some shops who don't want to save electricity. Our influence is not that strong enough to let them change their mind.

Also, our influence is not very strong if we cannot be imported in an amount of shops, if we didn't cover most of the shops that the customers always go, the customer may not have a strong will to join our system.

4 Analysis and Discussion of ALPS Methods

There are a lot of methods or tools that we have learnt in ALPS, but some of them may not fit our project. There are also some differences in the importance or priority between these methods. We tried a lot of them, testing the methods in the real. We will include the analysis method and analysis result like usability or efficiency in this chapter.

4.1 USED METHODS

4.1.1 Scenario Graph

By using the Scenario Graph, we found the best daily scenario to problem is “The users can also have a discount or benefit if they use a place which imported the energy saving system”. This is because nowadays, the users would get no reward when they helped saving energy in a place. They pay the same money but get an electricity-saved services, which is either hotter or darker or even both of them. We didn’t think about let the users also get some benefit because they helped saving energy but when this sentence comes out from the Scenario Graph, we choose it with no doubt.

In our opinion, the scenario graph is very good way of finding ideas, especially the “Response” in the “How” section, when we thought about the response of customer, we will think what we would feel if we were in that situation. So we could find a way that the customer may like. This helped us a lot to our future work because the solution “point system” is our most important thing in our system.

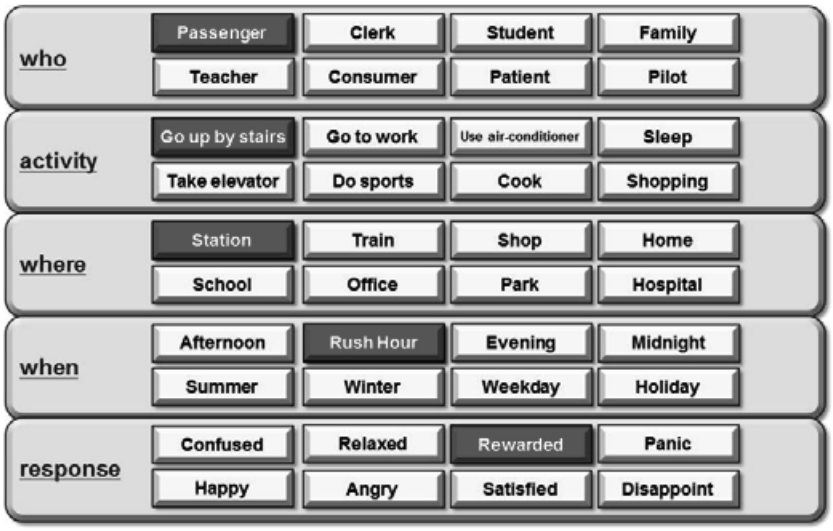

Figure 4.1 Scenario Graph

4.1.2 CVCA

When we get this project, we were thinking about making a CVCA of a brand new system which can fit the society. Then we find it difficult to use the information flow and cash flow between customer and electricity companies to describe what is the advantages and why our system is new. But afterwards when we take a lesson from Prof. Yasui, we finally knew that we need to make 2 CVCAs, one is “AS-IS”, one is “TO-BE”. By these, we can find out what the important stakeholders are and what the advantages for our system are.

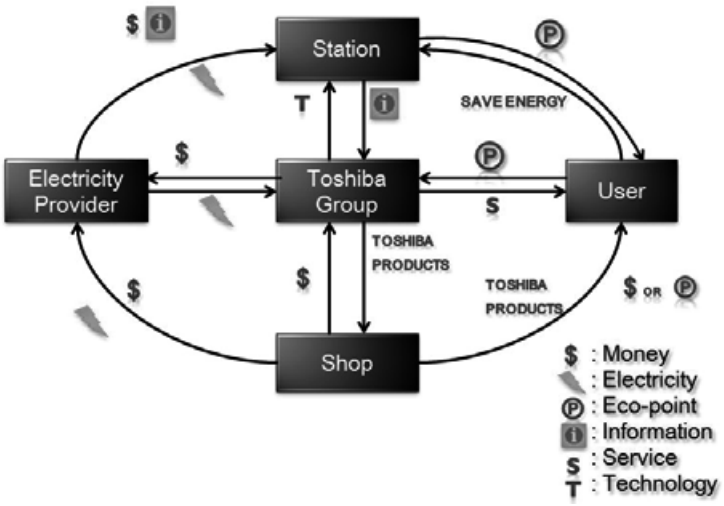

Figure 4.2 CVCA Ver.1

By comparing of the 2 CVCAs, we can clarify the relationship which is not enough in the existing energy management system. And we surprising found out there is some relationship between the electricity companies and government, it is the happiness. And we found out that TOSHIBA which is the stakeholder that connects with user and electricity companies and government is very important in the CVCA.

The most important thing we found in the CVCA is that there is no relationship between the user and the electricity saving action by the shops except the low-quality service. These prove our observation during the Scenario Graph. This help us a lot when we are a making the WCA because we already considered about the response and feeling of the customers.

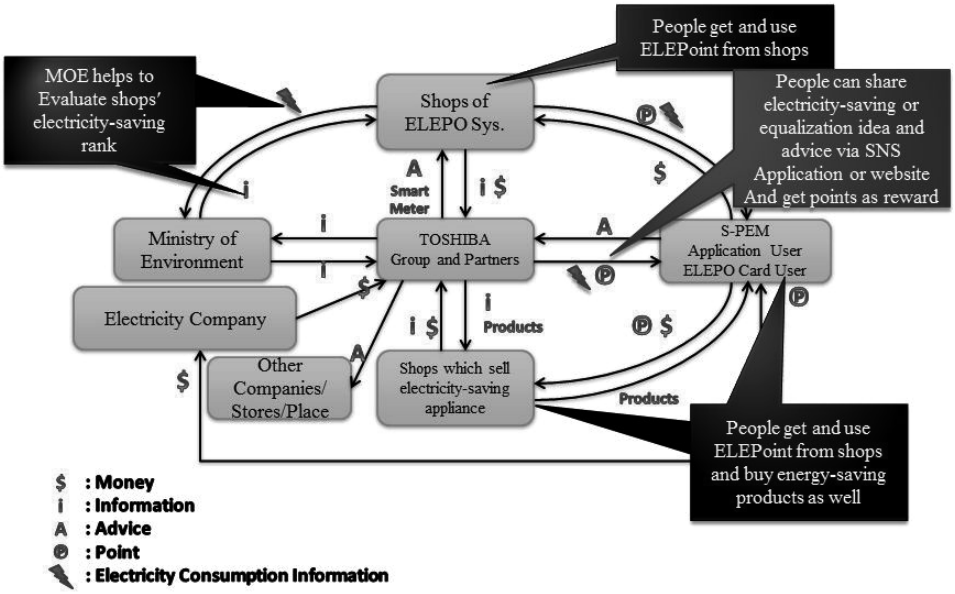

Figure 4.3 CVCA Ver.2

4.1.3 WCA

Although we had already known the relationship between the CVCA, we surprising find that the relationship is not that easy since we start to make WCA. The want of stakeholders in the WCA can be very difficult to determine. So we remake it several times until we thought the relationship is reasonable. And from the WCA, we can see the "service" in general. This cycle of wants between stakeholders helped us a lot when we design our system afterwards.

4.1.4 Interview, Observation

We went to interviewed several local store and passenger near our school, asked what electricity saving action they are doing now. Because of this is our first interview, we didn't prepare a very easy-to-know question so we can't get a lot of information. But one thing we knew is that the people are interesting in electricity saving since the Great East Japan Earthquake. From this, we began to have an idea of building an electricity saving community online to connect with the people who want to save electricity.

Also we found because of there isn't any reward to stimulate electricity saving action, people who are interesting in saving electricity may not really do it themselves. From this, we started to think

about build a system that allows the user to get something that can prove he helped saving energy. We make an assumption of point system.

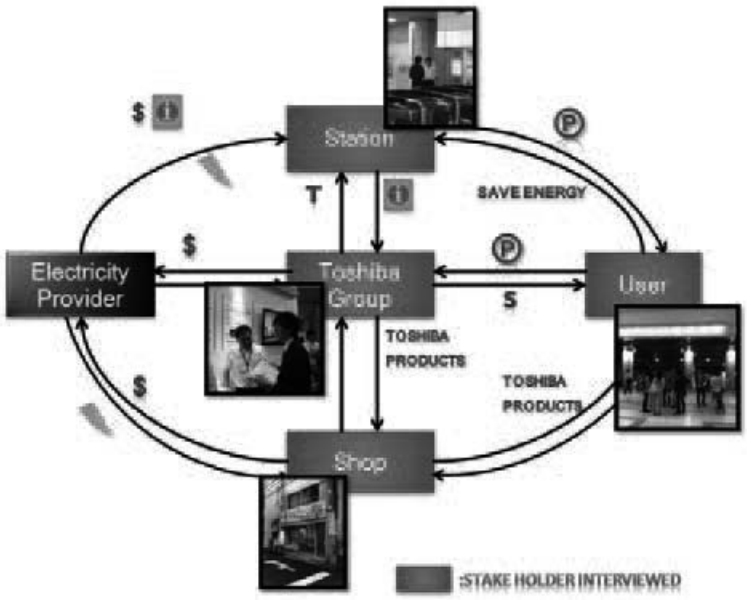

Figure 4.4 Interview

Then we went to Shibuya Station to interview some big stores to ask if there is a point system for rewarding electricity saving, will they participate. We got a lot of positive answer. Please check Chap 11.1 to see the interview answer in detail.

We also discussed about our system with Mr. Murakami, the former president of Google Japan, Mr. Nakagawa, Chief Specialist of Smart Community Division, TOSHIBA Cooperation, about our system. It was very helpful to hear from some experienced veteran in this field. From their saying, the most important for a system that can be used in the real world is not the idea. It is the business model, in other words, money. They recommend us to separate the customers' mind and money, and build a business model only to considering only about money to see if the system can work. This helped us a lot when we were building our prototype.

Mr. Murakami really changed our ideas, because he mentioned us that, the electricity saving is not very good idea, the better idea is equalization of electricity usage. So we change our system after ALPS #4. But it was a bad news that the teachers felt surprised when they see our new idea in ALPS #5. We consider this as why our good system weren't the top 3 when rewarded. And we felt regret that we didn't interview Mr. Murakami early.

4.1.5 Scenario Prototyping Rapidly

We want to overview the society after importing our system, so we make our 1st prototype. Comparing with the world nowadays, we are trying to find the difference. Unfortunately, although we can definitely know that the world after is better when we are seeing the prototype, but we can't find the reason why.

After discussing with Mr. Murakami, we build a new prototype only considering about the money. We make a monopoly game of go buy things in the electricity saving shops and get points. From the prototype, we believe that our system can be imported into the society because the cash can flow reasonable.

4.1.6 Morphological Analysis

The description of the how to build a service system is not very much, and some of them are even mistakenly used. So we have to use our own head to think about the solutions. We take a lot of time as we redo it a lot of time but finally we make the Solution Elements. From this we decided to use the Internet to share the electricity saving ideas and information. We also found that the images of the solutions have some relations to the CVCA. And also the results we get from the Morphological Analysis make us can do the next step – Pugh Concept Selection.

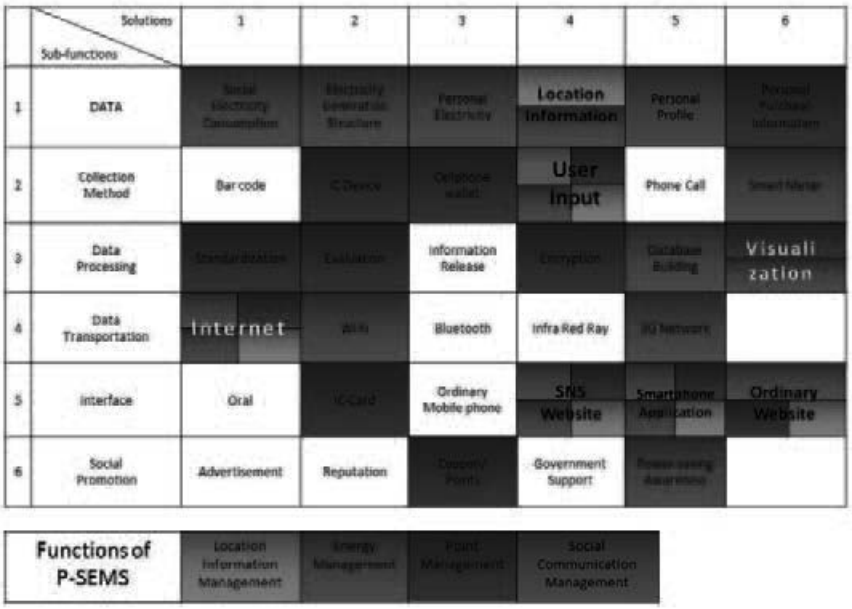

Figure 4.5 Morphological Analysis

4.1.7 Pugh Concept Selection

We thought the Pugh Concept Selection is a very good tool to decide a solution in the teamwork. With visualize the solutions with some data, we can compare them easily and the result is more convincible.

Criteria	Smartphone	Ordinary Mobile phone	Oral	SNS Website	Ordinary Website	IC-Card
Mobility	+	+	+	0	-	+
Data Transportation Speed	0	0	-	+	0	0
Data Propagation				0		
Communication	0			0		
Visualization	0			0	0	
Capacity					0	
Cost		0	+		0	+
Technical Potential	+					
Future User Growth	+					
Σ of +	3	1	2		0	2
Σ of	1	0	1		4	0
Σ of 0	3	2	0		3	1
Overall	0	-1	-1		-4	-4

Figure 4.6 Pugh Concept Selection #1

But when there is a very strong solution to this system. We may get the answer even without this tool. Well, in our case, we want to pick up some media which is link to person's daily life and easy to find information. It is very clear that the mobile phone, especially the smart one, is an answer. And when we tried it with the Pugh Concept Selection, this solution won with no doubt. So we don't think this tool can make some creative ideas.

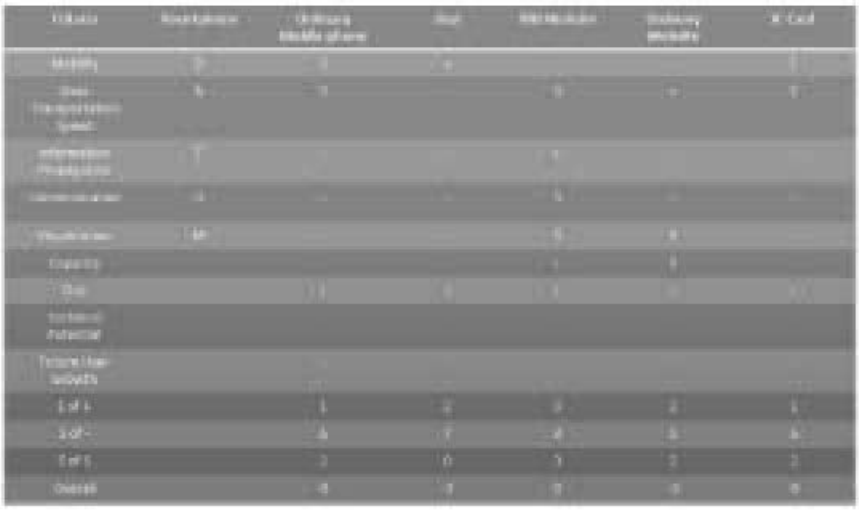

Figure 4.7 Pugh Concept Selection #2

Criteria	Smartphone	Smartphone With SNS Application	Smartphone & IC CARD
Mobility	0	1	1
Data Transportation Speed	A	1	1
Information Propagation	+	+	1
Communication	U	+	1
Visualization	M	+	-
Capacity		1	1
Cost			-
Technical Potential		+	1
Future User Growth		+	+
1 of +		5	1
1 of -		1	2
1 of S		3	6
Overall		4	-1

Figure 4.8 Pugh Concept Selection #3

4.1.8 Object-Process Methodology

We only use the OPM Level 0 in our system. The OPM Level 0 based on the basic format of our system. By showing the object and process in the graph, we think that the OPM can show our project structure very well, and normal people can also know our system by seeing the OPM. The OPM also help us a lot when we set up our use case. We think the OPM is a very useful tool and very easy to use.

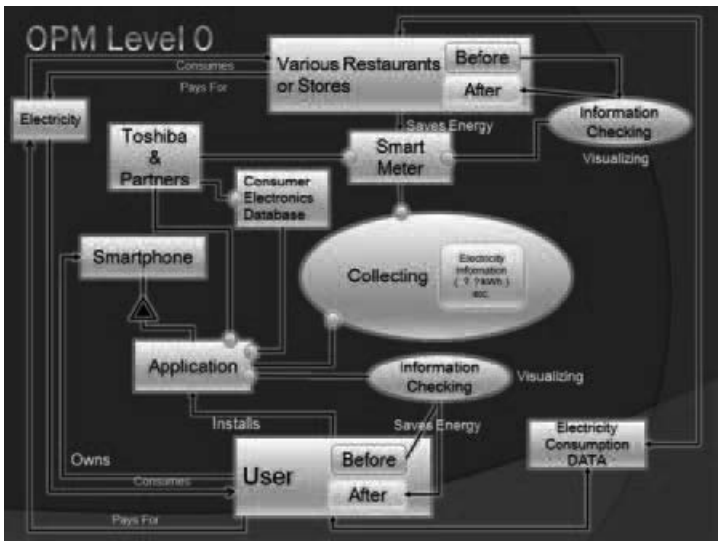

Figure 4.9 OPM Level 0

4.1.9 Value Graph

We think this tool is very useful to analysis the system with the customers, project members and the third party stakeholders. And because the things we get from the Value Graph will be used in the QFD, the Value Graph becomes a verification tool. We can evaluate the QFD easily by using is.

But there were also something that we were confusing. Because our system is a service system not a product, we find it difficult to find the Engineering Metrics. Although we decided some abstract ones. We thought Value Graph is a very good tool but maybe hard to be used in a large scale.

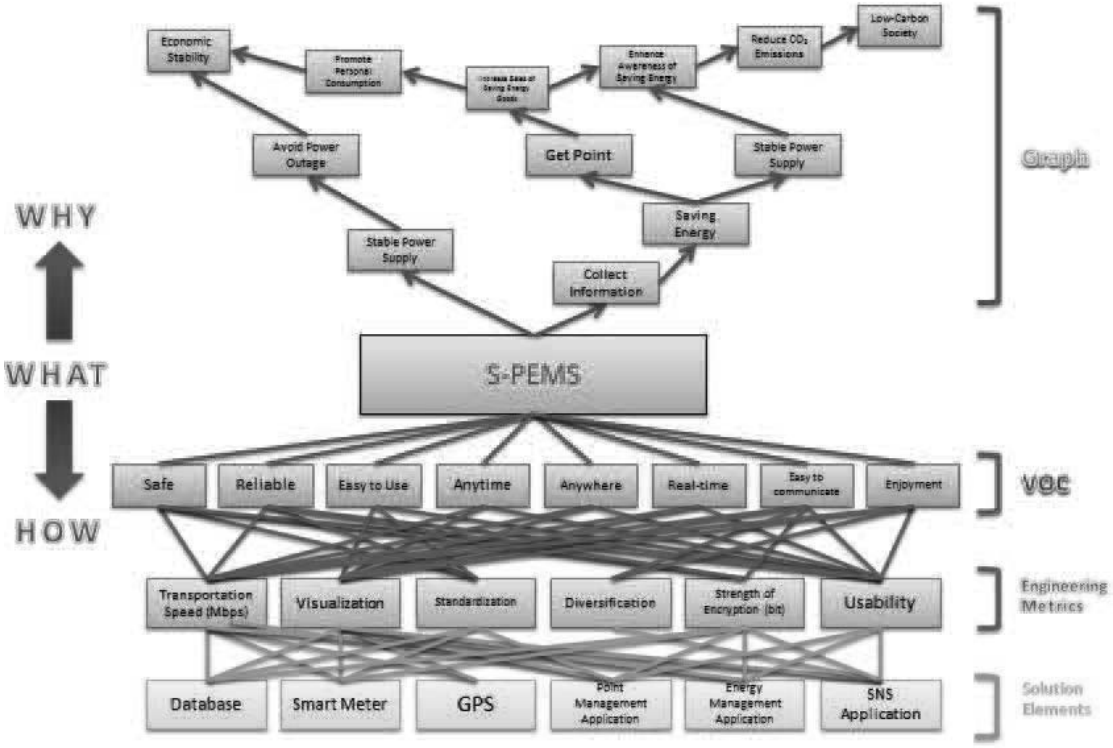

Figure 4.10 Value Graph

4.1.10 QFD

As we say, we were confusing when we find the Engineering Metrics. But the EM is really a necessary thing that can measure a system in a social or economic range, while the VOC can measure a system in the personal range.

We think the most important thing of VOC is reliable, easy to use and real-time. And we set it as 9 in the QFD. And we use some performance indicators which are commonly being used for the technical targets. But there are also a lot that we can't find.

	Engineering Metrics						
Customer Requirements	**Customer Weights**	Transportation Speed (Mbps)	Visualization	Standardization	Diversification	Strength of Encryption (bit)	Usability
Safe	3	3		3		9	1
Reliable	9	3		3		9	1
Easy to Use	9		9	3			9
Anytime	3	3	3				3
Anywhere	3	3	3				3
Real-time	9	9	3			1	3
Easy to Communicate	1	9	1		3	1	3
Enjoyment	3	3	1		9		1
Technical Targets		3.6 Mbps	Meets (True / False)	Meets (True / False)	Meets (True / False)	128 bit	Meets (True / False)
	Raw score	153	130	63	30	118	144
	Relative Weight	24%	20%	10%	5%	18%	23%

Figure 4.11 QFD Phase I

After the benchmark by the QFD, we proved the point management system is a good selection for our system.

	Solution Elements						
Engineering Metrics	**Phase I Relative Weights**	Database	Smart Meter	GPS	Point Management Application	Energy Management Application	SNS Application
Transportation Speed (Mbps)	24%	1	9	9	1	3	3
Visualization	20%	1	9	9	9	9	3
Standardization	10%	9	9		9		
Diversification	5%						9
Strength of Encryption (bit)	18%	9	3		9	3	3
Usability	23%				3	1	9
	Raw score	3.0	5.4	4.0	5.3	3.3	4.3
	Relative Weight	12%	21%	16%	21%	13%	17%

Figure 4.12 QFD Phase II

4.1.11 Complexity/Cost Worth Analysis

We expected our cost and do the cost worth analysis. We use the result of the QFD to decide how much we will invest on every part of our system. And we surprisingly find that the smart meter is too much to pay in our case (Cost/Worth rate is too high). So we change our business plan to let the shop buy smart meter themselves.

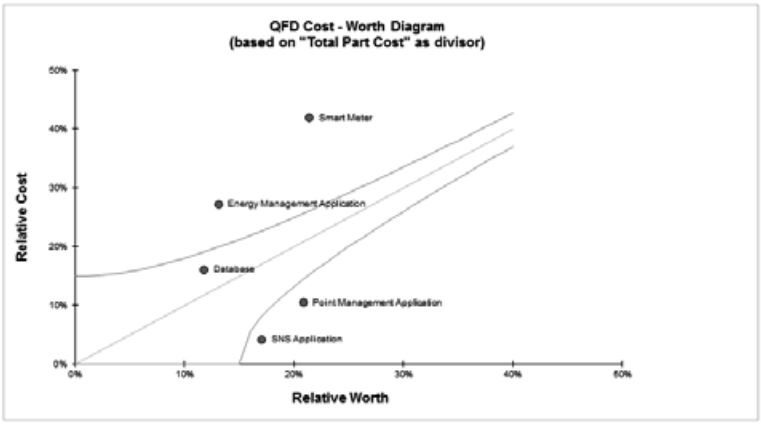

Figure 4.13 Cost Worth Analysis

4.1.12 Quality Scorescarding

We are confusing in this tool. Like the EM is hardly to be decided in our system, we can hardly find some criteria to evaluate our quality other than the abstract ones. Like usability, reliable or something like that. But we find it lucky that we finally get the work done because we combine the abstract criteria with people, like happiness per people. We get the equalization work because the only unit appears on the both side of the system is: people.

The same word, we think these tools which are using the numeric data other than money is difficult to use in a service system.

4.1.13 Net Present Value Analysis

Thank to Mr. Murakami, we did a very good business model of our system. After Mr. Murakami told us to build a business model considering only about the money, we plan it well and finally make a good business model with good cash flow. You can see our detail NPV in Chap. 6.3.

We agree with Mr. Murakam's word, the most important thing for a system to be used in a real world is money.

4.2 UNUSED METHODS

4.2.1 Mind Map

We don't think this will work. We are doing the brainstorming a lot because we have to make brand new idea and brand new system. We did use some tools to help us find good idea, but we thought the KJ Method was much better than the Mind Map. Maybe it was our prejudice but we don't think a tool will "win" if it doesn't have any special advantages with a lot of other tools that can replace it.

4.2.2 Project Priority Matrix

We didn't use the tool in our project. Not because the tool is bad. The tool seems good and helpful. We didn't use it because at the first half of time, we don't even have an idea of what the system of us will look like, so we had no idea about the feature and the cost and the time. So we can't decide the priority because we can evaluate it. And when we went to the last half of time, the priority is not that enough than before.

4.2.3 Environmental Complexity/Recyclability

This tool might be good if we were making some products, but we don't think that a service have any link with the environment complexity or recyclability.

4.2.4 Function-Structure Map

We thought this tool as something that can allow us to make the manual of a product. But as we are making a service, it is hardly to find some link between function and structure. On the contrary, we think the Value Graph is good structure for a service instead. Because in the case of a service, the function and structure is not linked with each other directly, it is the service which link the function and structure together.

4.2.5 FMEA

Well, we didn't use this. We may need this if our service is not been accepted by the society. We think this as a very good tool to treat the risk. But unlike the product, which is been decided after design it and can hardly be changed so we have to consider about the risk and make a plan before. A service can be changed easily when public to the word. A risk management may important but we decided to take our time into something more important.

4.3 TOP 5 METHOD

1. **CVCA**

   We can overview the system at a glance if we've done the CVCA. And we can make our system under control.

2. **Value Graph**

   This graph is a combination of solution and composition. Actually, when we discussed about something, we often use this graph as a reference.

3. **OPM**

   This gave us the physical structure of our system which is hard to decide because a service is abstract.

4. **WCA**

   By doing WCA, we thought a lot of user's psychological state. By this, we can finally end up with a system which fit the users' wants.

5. **Pugh Concept Selection + Morphological Analysis**

   Helped a lot, because our service can use a lot of solution to solve the problem, we have to decide to best one for our system, and these tools got it done.

5 Design Recommendation

The Ministry of Environment will evaluate the contribution of peak time cut, and give rank the member shops from A to C. Customers of these shops can get point payback, and the rate is according to the rank of shops. For example, People shopping in Rank-A shops will get 1% of their purchase as point payback, while Rank-B is 0.67% and Rank-C is 0.5%. Consumers can use our partners' cards such as T-Point card or Ponta card to get points, which means ELEPO is already available for who owns these partner cards in the beginning. As member shops target on higher ranks, they will be willing to try harder to equalize their electricity usage. This will help them to realize sales expansion, brand image up and social contribution (electricity supply equalization) as the same time.

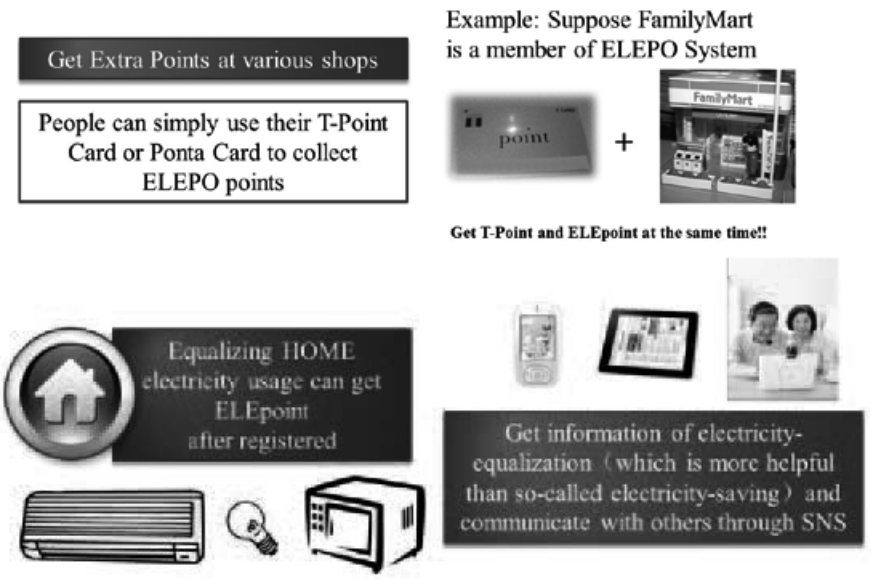

Figure 5.1 ELEPO System Overview

As our system ELEPO services, we have SNS and smart phone app

Figure 5.2 Smart Phone Applications (Prototype)

SNS can provide a place-of-connection for people, by create a SNS using smart phone application and website, which can help to build a new community and improve people's electricity-saving awareness. Functions like "ELEPO membership search", "electricity-saving rank" and "electricity usage map", will help users to get detail information of ELEPO member shops and other information, in order to help realizing electricity supply equalization and economic activation.

6 Competitive Analysis

6.1 OVERVIEW OF OUR BUSINESS MODEL

As the management department of ELEPO, our purpose is to expand the scale of the ELEPO membership. More members and more point card user mean not only a better effect of electricity usage equalization, but also more revenue for our department.

Social contribution concept combined with economic benefit is expected to attract more consumers to use ELEPO card. We designed the rules of ELEPO to attract shops to join our system in order to make ELEPO point a wildly available electronic currency, which is a key to attracting consumers. We will make effort on expanding amount of member shops thus to make ELEPO point more valuable and will assure us a sustainable business model.

In our business model, we conservatively estimated that we have 1000 member shops in the first year and increases by 40%/year within the first 5 years[1]. And the calculation of revenue and cost in the sections below is based on this assumption.

6.2 DEVELOPMENT TIME AND RISK

It will not cost us so long to develop the ELEPO management system if there is enough resource for us[2]. The actual difficult thing is to convince all stakeholders and try our best to balance the benefit of electricity companies, member shops, end users, and the government.

As we want T-Point and/or Ponta point system to be our partner. They will probably ask more benefit for themselves and affect our system in the development phase. We plan to propose a win-win business model for them. It's very important for us to get their partnership. Otherwise, they would turn to be our great competitors rather than partners.

---

[1] Because of the rapid change of science technic and electricity/energy situation which may change the needs of Japanese society, we limit our current business model in 5 years. Actually, the current model needs to be adjusted anytime when it is needed.

[2] A 10 man team for two month is enough for us in the development phase. We calculate this part of initial cost as 6million yen.

6.3 REVENUE AND COST STRUCTURE, NPV

Our revenue mainly comes from system usage fee, dividends of smart meter sales, advertisement and investment income. The picture below shows the detail information of revenue, cost, profit and the result of NPV calculation.

ELEPO member shops must pay system usage fee for around ¥5,000/Month and we shares 20% of smart meter sales. Also, because people will not always use their points, we conservatively assume that there are always over 60% point stay unused. The capital of unused point will stay in our account, which can be used for investment. We assume that our investment return is 10%, which equals to the discount rate. This part of revenue will bring us a income of ¥13,687,500 in the second year.

Over 90% of our cost is labor cost and advertisement. This part of cost will be increased to meet the needs of more and more member shops and relative new business.

We calculate the NPV and Internal rate of return of our business model. The result is over 164million yen (2.1million dollar) NPV and 137% internal rate of return. If the project is supported by Japan government, the NPV and internal rate of return will be much higher.

Business Model of ELEPO System						
Project Period	t	5 years				
Discount Rate	r	10%				
Initial Investment	I_0	¥9,000,000				
SNS Application Development		¥3,000,000				
Point System Development		¥3,000,000				
Office Equipment		¥3,000,000				
Market Growth	r_G	40%				
	Year0	1	2	3	4	5
Revenue		¥67,500,000	¥108,187,500	¥151,462,500	¥212,047,500	¥296,866,500
Dividends of Smart Meter	30,000/shop * 1000shops * 20%	¥6,000,000	¥8,400,000	¥11,760,000	¥16,464,000	¥23,049,600
System Usage Fee	5,000/month.shop * 12months * 1000shops	¥60,000,000	¥84,000,000	¥117,600,000	¥164,640,000	¥230,496,000
Advertisement (SNS)	5*100k + 1*1M	¥1,500,000	¥2,100,000	¥2,940,000	¥4,116,000	¥5,762,400
Investment	750/shop.day * 1000shops * 365days * 50% * 10%	¥0	¥13,687,500	¥19,162,500	¥26,827,500	¥37,558,500
Cost		¥64,400,000	¥77,000,000	¥91,616,000	¥108,770,900	¥129,175,970
Server Rental Fee		¥2,000,000	¥2,000,000	¥2,000,000	¥2,000,000	¥2,000,000
Advertisement (Print)	900/shop * 1000shops * 8 + 2M	¥9,200,000	¥12,080,000	¥16,112,000	¥21,756,800	¥29,659,520
Advertisement (Train)		¥10,000,000	¥10,000,000	¥10,000,000	¥10,000,000	¥10,000,000
Labor Cost	300k/person.month * 10person * 12months	¥43,200,000	¥52,920,000	¥63,504,000	¥75,014,100	¥87,516,450
Office Rental Fee	500k/month * 12months	¥3,000,000	¥3,000,000	¥6,000,000	¥6,000,000	¥6,000,000
Profit		¥3,100,000	¥31,187,500	¥59,846,500	¥103,276,600	¥167,690,530
Tax		30%	30%	30%	30%	30%
Depreciation		0	0	0	0	0
Investment	¥9,000,000	0	0	0	0	0
Working Capital		0	0	0	0	0
Free Cash Flow		¥2,170,000	¥21,831,250	¥41,892,550	¥72,293,620	¥117,383,371
Discount Factor		0.909090909	0.826446281	0.751314801	0.683013455	0.620921323
Present Value	-¥9,000,000	¥1,972,727	¥18,042,355	¥31,474,493	¥49,377,515	¥72,885,838
Net Present Value	NPV	¥164,752,929				
Internal Rate of Return	IRR	137%				
Payback Period	PBP	1				

Table 6.1 The Business Model of ELEPO Management System

6.4 PROTECTION'S STRATEGY AGAINST COMPETITORS

Our plan is to build partnership with other point system like T-Point and Ponta Point which will turn our biggest potential competitors into our partners.

Since our point system targets on social contribution, this differentiate us to most of other point system. We will take advantage of this strengthen, increase our partners, gain help from the society and to guarantee more contribution to the society.

In conclusion, our strategy is to emphasis our social contribution concept and differentiates to other point systems. This will also lead to a partnership with other point system for we can benefit them by make themselves social contributors. We can then expand our system more rapidly and easily.

7 ALPS Roadmap and Reflections

We brainstormed on the concept of saving electricity at the very first of time. According to that we made our Scenario Graph. But unfortunately, we can't get the perfect answer so we did it several times to make it perfect. Then we find our stakeholders from that. We decided to choose the key insight for our project and made CVCA and WCA according to that. Then, we interviewed some stakeholders. And then we build our first prototype. Unfortunately, it was an "Oops" since our idea was good but very difficult to achieve.

After ALPS #2, we used a lot of tools to find out what solution is better and which media should we base on. We felt "Aha" when we get the Value Graph done, by finding using smart phone app and SNS are the best selection because they are very suitable for our system.

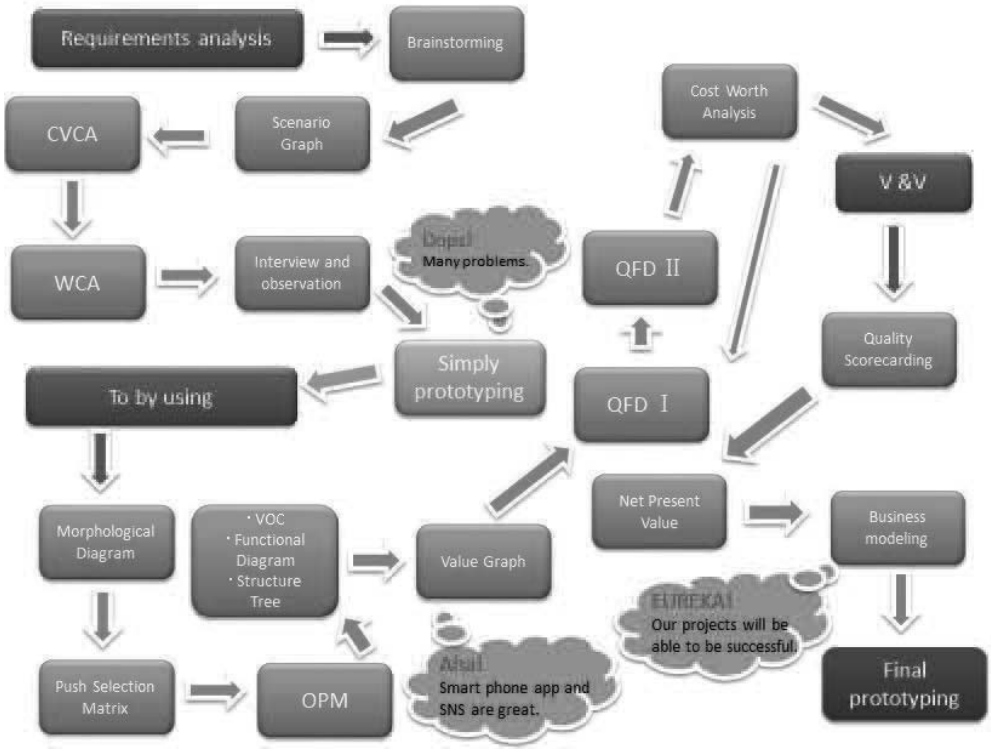

Figure 7.1 Roadmap

We interviewed Mr. Murakami-san, the former president of Google Japan, before the ALPS #4. This interview really changed our minds. We were forcing on saving electricity, but he mentioned that equalization of electricity is the most important for Japan.

During ALPS #4, we made business modeling and we thought this as our “Eureka”. Since we found out our projects will be very successful because our IRR is very high.

All these tools are great, and we will use it again if there is a chance to let us do the project again. The only regret is that we didn’t interview Mr. Murakami at an early time.

8 Conclusion and Future Work

8.1 ACHIEVEMENT OF OUR PROJECT

We designed an attractive system which allows the equalization of electricity usage using conventional energy management system. This system can both benefits every people and the local economics. It is a ground-breaking attempt without parallel in history, which can both achieve the equalization of electricity usage and promotion of the local economics.

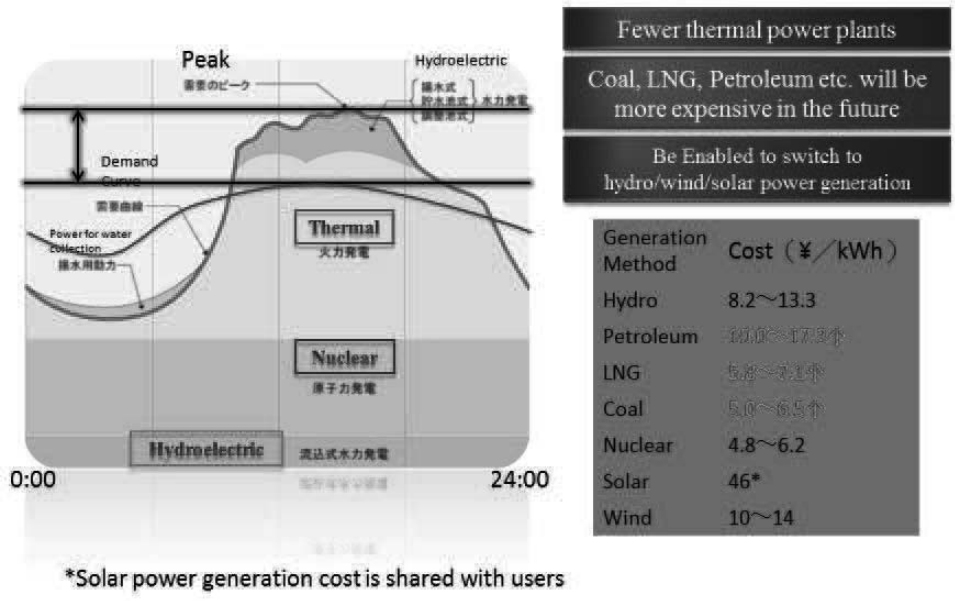

Figure 8.1 Equalization of Electricity Usage

One of the most vital aspects of our system is a point system, called “ELEPO system”. This point system is unlike the traditional one; it can be used together with a Social Networking Service (SNS). We considered the SNS as the most appropriate method for giving people the information about points and importance of equalization of electricity usage. The users can also share their ideas and information with each other to make a community to equalize the electricity usage. By using ELEPO, people will make a continuous effort for equalization of electricity usage.

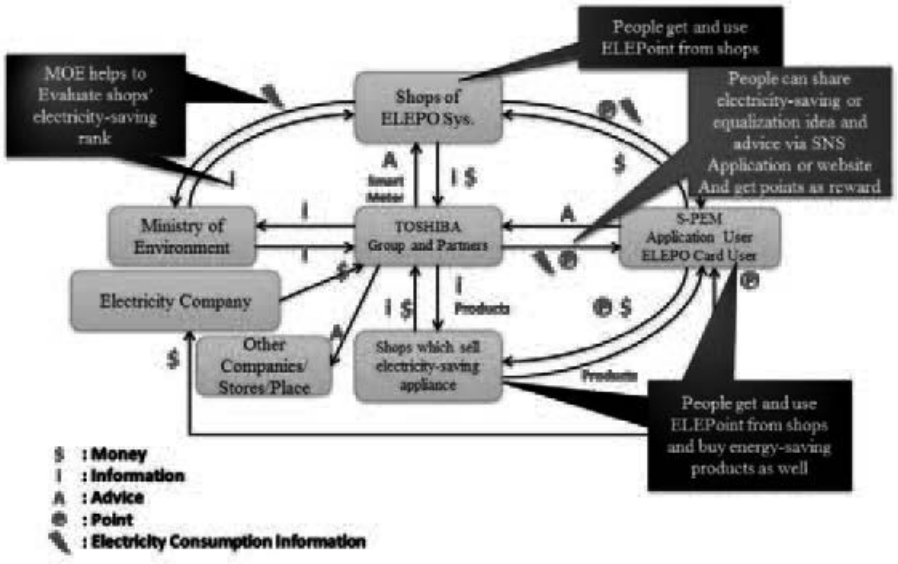

Figure 8.2 ELEPO System Overview

With our system, the shops get happy because they can improve their competitiveness by attracting the users, the shops get happy because they can buy cheaper things by almost doing nothing other than choose somewhere to go and go shopping, the electricity companies get happy because they can now achieve a stable electricity supply. So it's a win-win-win model.

The energy crisis will become more and more severe since the energy on the earth is limited, but our development may be infinite. Let's make our effort to the energy saving and leave our children a better earth. The future is ours.

8.2 FUTURE WORKS

There are something called "Smart Grid" which will give a technical support to the Personal EMS (Energy Management System) and Community EMS. But it will take several decades to apply that into the whole country. So before that happens, there will be no completely Personal EMS at all (Our system is a mixed system instead). We want to help equalizing the electricity usage during the transition period. If it is possible to spread some devices which can support the future Personal EMS like solar power generator and battery, electric vehicle etc., we can meet the new generation smoothly.

In this project, we didn't discuss about how to get the customer and how to promote our system. This may be a difficult work in the future. We recommend that cooperate with some chain shop or

existing point system to ensure a certain market share at the first time. By our business model, we can see that if we got 1000 shop join our system, we can make profit from that and we can develop our system by that money step by step.

We cannot say our system can really achieve the equalization of electricity or can achieve an xx% of market share until we make a lot of verifications and validations. We need to discuss more about our project with the Proposer Company and Electricity Company.

9 Acknowledgments

Thanks to these peoples who helped us a lot with our project.

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11 Appendix

11.1 A PART OF INTERVIEW WITH STAKEHOLDERS

Question (Q): Are you interesting in saving energy?

Everyone said…..YES.

11.1.1 Student

Q: What are you doing for saving energy?

Answer (A): I'm not using air-conditioner at home.

11.1.2 Housewife

Q: We have a plan about……What's your opinion to our plan?

A: Great idea. If I can see my electricity consumption, I will be able to save energy. I will consider our max electricity consumption. Because if we save energy under a limit. We can get POINT like eco-point.

11.1.3 Station - Staff form Hiyoshi Station

No Comment (His answer may refer to the opinion from the train company instead of his own opinion, so he can't say anything)

11.1.4 TOSHIBA Group - Spokesman

Q: We have a plan about……What's your opinion to our plan?

A: It is difficult to know what the service provider should do in these graphs.

11.1.5 Shop - Staff from Drug Store

Q: Are you interested in Saving Energy?

A: Yes, we must save energy after the Great Earthquake because of the energy crisis. So we changed the light of our store to LEDs, which use less electricity.

Q: If there is a socially event for saving energy, will you participate it?

A: I think the store near us should dark their poster because it's use too much money and it is not necessary.

11.2 ENERGY USAGE OF JAPAN

Energy Usage (Energy White Paper 2010*1)							
Department	Share	Field	Energy usage (department)	Energy usage (all)	Electricity usage (department)	Electricity usage (compared with other energy)	Electricity usage (compared with the total electricity usage)
Industry and Agriculture	42.6%	agriculture	2.6%	1.1%	20.0%*2	0.2%	0.9%
		Mining	0.2%	0.1%	20.0%*2	0.0%	0.1%
		Construction	4.3%	1.9%	20.0%*2	0.4%	1.5%
		Manufacturing	92.8%	39.5%	18.9%	7.5%	30.8%
Welfare	33.8%	service	58.7%	19.8%	44.0%	8.7%	**36.0%**
		household	41.3%	14.0%	50.1%	7.0%	**28.8%**
Transmission	23.6%	freight	38.6%	9.1%	2.0%	0.2%	0.8%
		passenger	61.4%	14.5%	2.0%	0.3%	1.2%
Total	100.0%			100.0%		24.3%	100.0%

Our object is let the all the "welfare" part cut 10% of the electricity usage at the peak time.
So, totally $(36\% \times 60\% + 28.8\%) \times 10\% = 5.04\%$ of electricity will be saved.

*1 Energy White Paper 2010.Part2.Chapter1.2
*2 Approximate Data

Figure 11.1 Energy Usage of Japan from "Energy White Paper 2010"

11.3 A PROTOTYPE OF OUR SOCIAL NETWORKING SERVICE

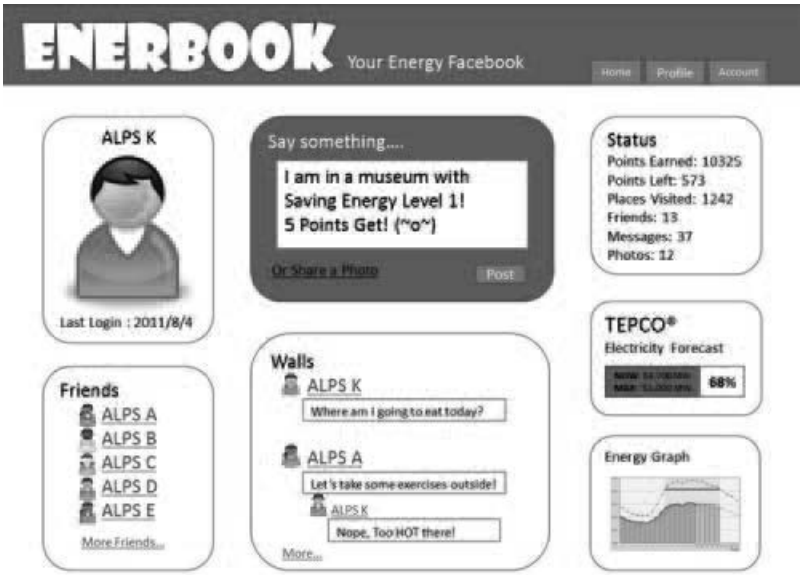


Figure 11.2 Enerbook (Prototype)

Group K's Final Presentation Slides

Socio-Personal Energy Management System

ELEPO SYSTEM

Proposed by TOSHIBA Leading Innovation

Members

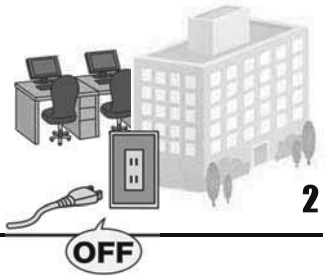
Koichi SAWASHIMA
Kae YOSHIDA
Yosuke KUBOTA
Yu WAN
Hao LU
Toshiaki TAKEMAE

SDM System Design and Management

1

The Present Situation

Saving electricity…

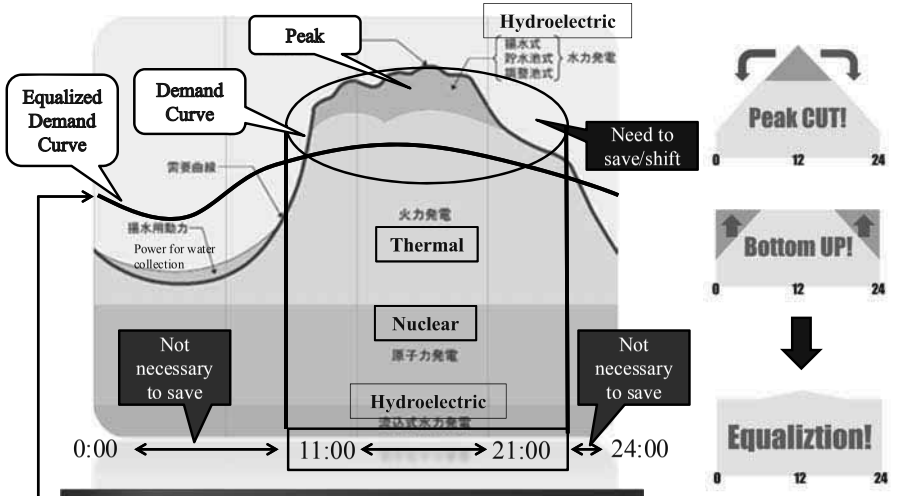


2

After the great earthquake,
People's awareness of electricity
becomes stronger and stronger.

But saving electricity is Not Enough **and sometimes even** Not Necessary!
We need to equalize **the** electricity usage.

3



- Stabilize the electricity supply
- Ecology - Fewer thermal power plants cuts CO_2
- Lower electricity price

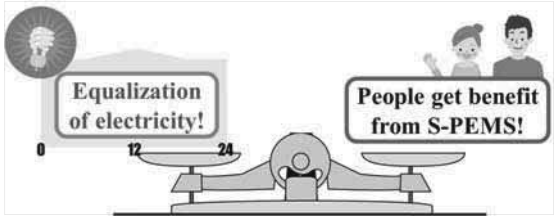
*Picture from 《Nuclear Power・Energy》 Picture Album 2011 1-23

4

we propose

The symbiosis energy management system focusing on persons living in society, called

Socio-Personal Energy Management System 【S-PEMS】



5

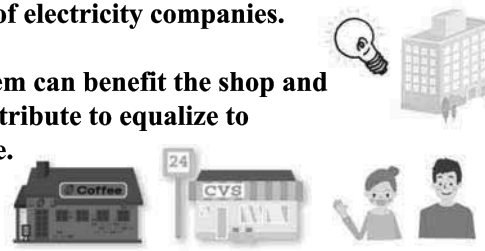
S-PEMS can also Activate the local economy!

6

Our S-PEMS Introduction

ELEPO System
Electricity Point

- **ELEPO System is a Point System launched by TOSHIBA Group under support of electricity companies.**
- **ELEPO System can benefit the shop and people who contribute to equalize to electricity usage.**

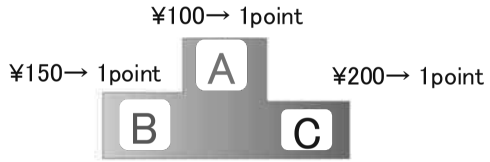


7

Our S-PEMS Introduction

〈 Rank of member shops 〉

1. **Shops joined in the ELEPO System will receive an evaluation of electricity saving and usage balance, which decide the RANK(A,B,C) of the store.**
2. **Customers shopping in these shops can get ELEPO point according to the purchase and the RANK of the shop(0.50% for Rank C, 0.67% for Rank B, 1% for Rank A) if they own ELEPO Card.**
3. **People who use electricity at home with good balance, can get ELEPO point from electricity company if he owns an ELEPO Card.**



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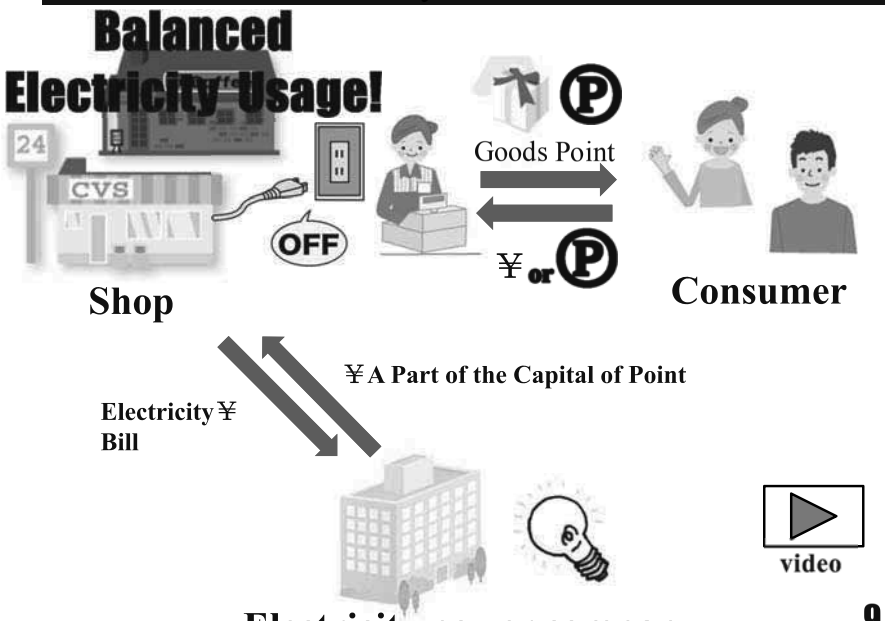
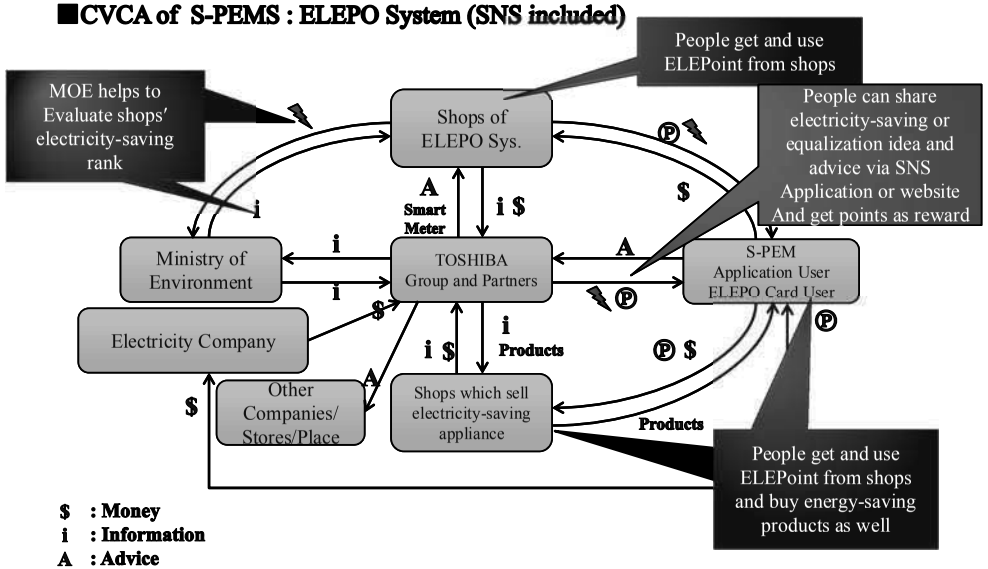
2.Our S-PEMS Solution: ELEPO System



9

2.Our S-PEMS Solution: ELEPO System

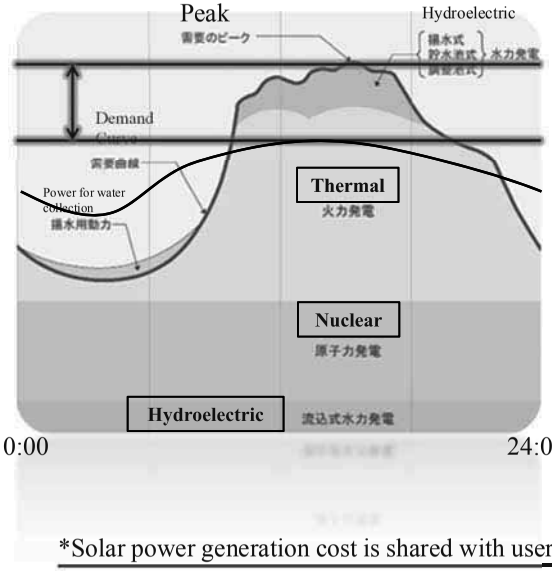
■CVCA of S-PEMS : ELEPO System (SNS included)



$: Money
i : Information
A : Advice
Ⓟ : Point
: Electricity Consumption Information

10

3.Why Electricity companies want ELEPO System



Fewer thermal power plants

Coal, LNG, Petroleum etc. will be more expensive in the future

Be Enabled to switch to hydro/wind/solar power generation

Generation Method	Cost（￥／kWh）
Hydro	8.2～13.3
Petroleum	10.0～17.3↑
LNG	5.8～7.1↑
Coal	5.0～6.5↑
Nuclear	4.8～6.2
Solar	46*
Wind	10～14

*Solar power generation cost is shared with users

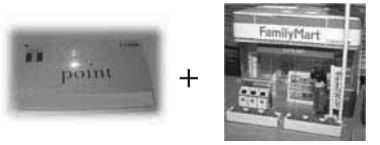
11

3.Why people want ELEPO System

Get Extra Points at various shops

People can simply use their T-Point Card or Ponta Card to collect ELEPO points

Example: Suppose FamilyMart is a member of ELEPO System



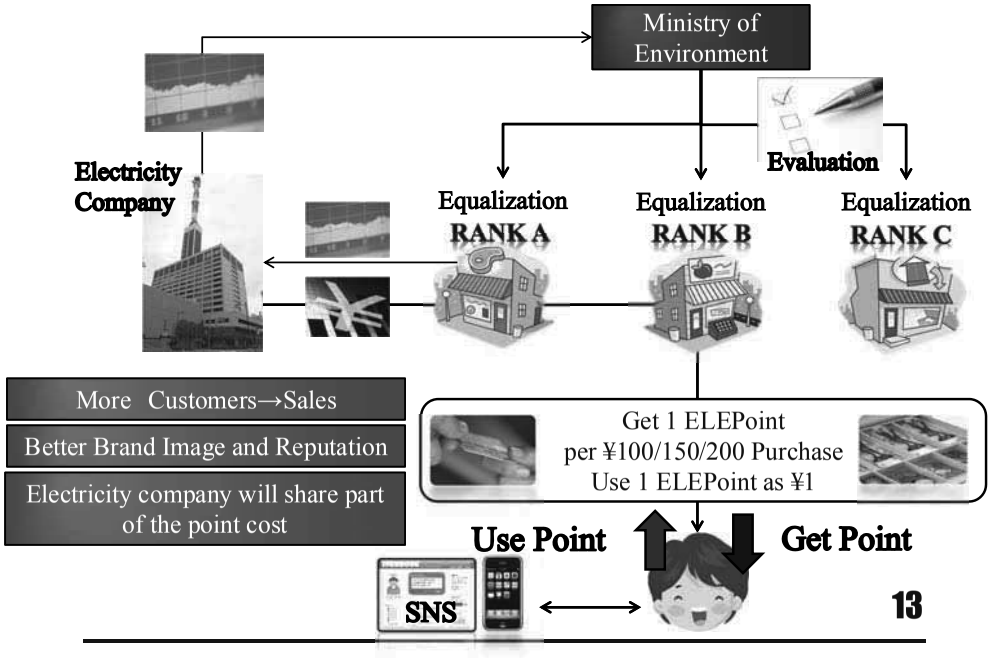
Get T-Point and ELEpoint at the same time!!

Equalizing HOME electricity usage can get ELEpoint after registered

Get information of electricity-equalization（which is more helpful than so-called electricity-saving）and communicate with others through SNS

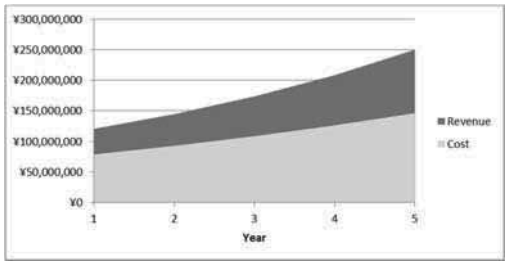
12

3.Why Shops want ELEPO System



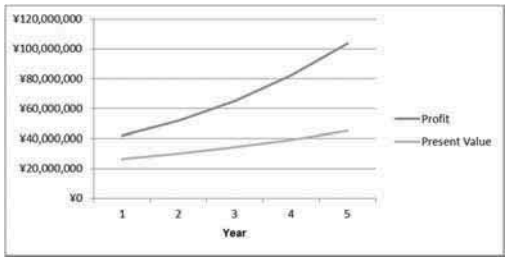
Business Model of ELEPO management

The ELEPO System is managed by a team from TOSHIBA Group.



¥750/shop/day * 3000shops * 365days * 50% * 10%

These graphs are calculated with 3000 member shops in the first year, Market growth rate is 20% per year.



1000 member shops = The Black !

Business Model of ELEPO management

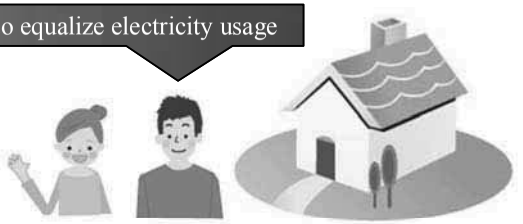
ALPS Group-K Business Model of S-PEMS Point System

Project Period	t	5 years					
Discount Rate	r	10%					
Initial Investment	I_0	¥9,000,000					
SNS Application Development		¥3,000,000					
Point System Development		¥3,000,000					
Office Equipment		¥3,000,000					
Market Growth	r_g	20%					
	Year0	1	2	3	4	5	
Revenue		¥120,562,500	¥144,675,000	¥173,610,000	¥208,332,000	¥249,998,400	
Dividends of Smart Meter	30k/shop * 3000shops * 20%	¥18,000,000	¥21,600,000	¥25,920,000	¥31,104,000	¥37,324,800	
System Usage Fee	5k/month.shop * 12months * 1000shops	¥60,000,000	¥72,000,000	¥86,400,000	¥103,680,000	¥124,416,000	
Advertisement (SNS)	5*100k + 1*1M	¥1,500,000	¥1,800,000	¥2,160,000	¥2,592,000	¥3,110,400	
Investment	750/shop.day * 3000shops * 365days * 50% * 10%	¥41,062,500	¥49,275,000	¥59,130,000	¥70,956,000	¥85,147,200	
Cost		¥28,800,000	¥92,640,000	¥108,508,800	¥126,338,900	¥146,306,210	
Server Rental Fee		¥2,000,000	¥2,000,000	¥2,000,000	¥2,000,000	¥2,000,000	
Advertisement (Print)	900/shop * 3000shops * 8 + 2M	¥23,600,000	¥27,920,000	¥33,104,000	¥39,324,800	¥46,789,760	
Advertisement (Train)		¥10,000,000	¥10,000,000	¥10,000,000	¥10,000,000	¥10,000,000	
Labor Cost	300k/person.month * 10person * 12months	¥43,200,000	¥52,920,000	¥63,504,000	¥75,014,100	¥87,516,450	
Office Rental Fee	500k/month * 12months	¥3,000,000	¥3,000,000	¥6,000,000	¥6,000,000	¥6,000,000	
Profit		¥41,762,500	¥51,835,000	¥65,002,000	¥81,993,100	¥103,692,190	
Tax		30%	30%	30%	30%	30%	
Depreciation		0	0	0	0	0	
Investment	¥9,000,000	0	0	0	0	0	
Working Capital		0	0	0	0	0	
Free Cash Flow		¥29,233,750	¥36,284,500	¥45,501,400	¥57,395,170	¥72,584,533	
Discount Factor		0.909090909	0.826446281	0.751314801	0.683013455	0.620921323	
Present Value	-¥9,000,000	¥26,576,136	¥29,987,190	¥34,185,875	¥39,201,673	¥45,069,284	
Net Present Value	NPV	¥166,020,159					
Internal Rate of Return	IRR	308%					
Payback Period	PBP	1					

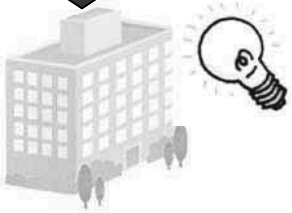
Conclusion

We help to equalize electricity usage

And get points☺

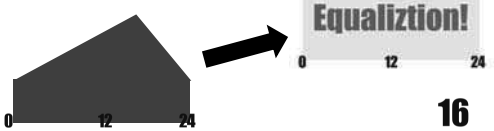


We can achieve stable electricity supply Thank you for your contribution



We help to equalize electricity usage

More Customers !



The future is **OURS**.

Do you want an ELEPO card?

Thank you very much!
ご清聴ありがとうございました

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Supplement data

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Energy Usage and Electricity Usage of Japan

Energy Usage（Energy White book 2010[*1]）

Department	Share	Field	Energy usage (department)	Energy usage (all)	Electricity usage (department)	Electricity usage (compared with other energy)	Electricity usage (compared with the total electricity usage)
Industry and Agriculture	42.6%	agriculture	2.6%	1.1%	20.0%[*2]	0.2%	0.9%
		Mining	0.2%	0.1%	20.0%[*2]	0.0%	0.1%
		Construction	4.3%	1.9%	20.0%[*2]	0.4%	1.5%
		Manufacturing	92.8%	39.5%	18.9%	7.5%	30.8%
Welfare	33.8%	service	58.7%	19.8%	44.0%	8.7%	**36.0%**
		household	41.3%	14.0%	50.1%	7.0%	**28.8%**
Transmission	23.6%	freight	38.6%	9.1%	2.0%	0.2%	0.8%
		passenger	61.4%	14.5%	2.0%	0.3%	1.2%
Total	100.0%			100.0%		24.3%	100.0%

Our object is let the all the "welfare" part cut **10%** of the electricity usage at the peak time.
So, totally (**36**% × **60**% + **28.8**%) × **10**% = **5.04**% of electricity will be saved.

*1 Energy white book 2010.Part2.Chapter1.2「部門別エネルギー消費の動向」
*2 Approximate Data

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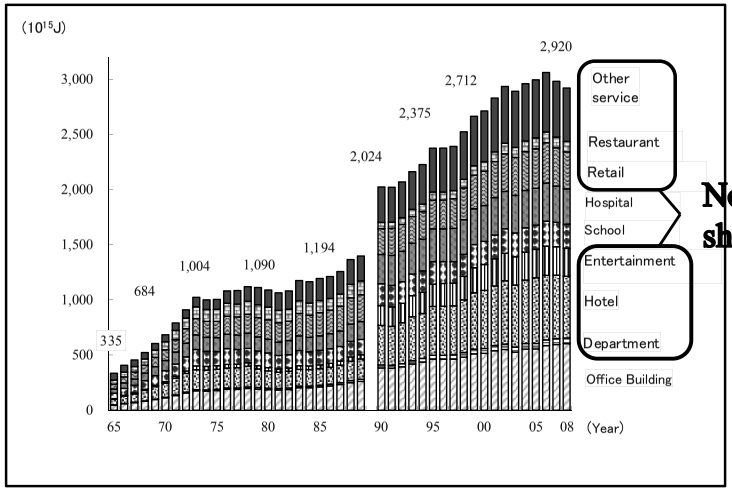

(Energy white book 2010.212-2-5)

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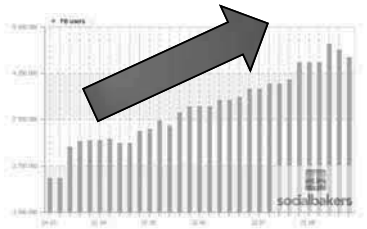
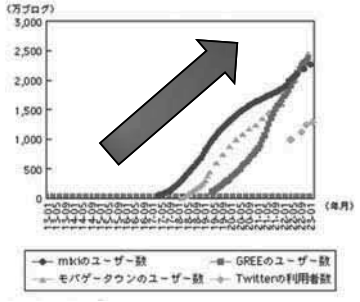
Existing SNS

	Facebook	mixi	GREE	MOBAGE town
Inaugural year	2008	2004	2004	2006
The number of users (in millions)	4,63	22,65	23,83	24,48



facebook



Others

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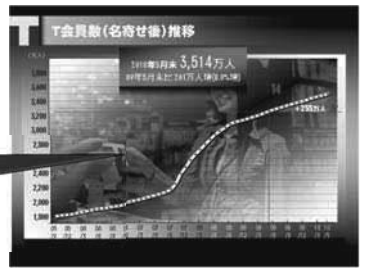
Existing Point System

	T-Point	Ponta
Service Start Year	2003	2010
Personal Member (2011 September)	38,000,000	36,000,000
Corporate Member (2011September)	70	39

Personal Member is increasing



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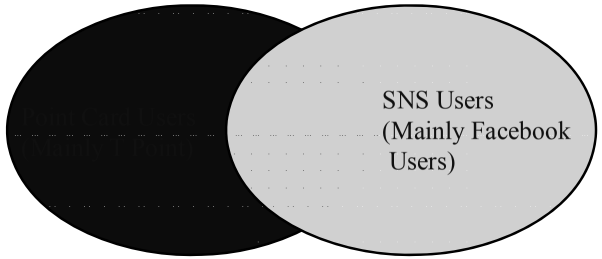
Potential Users

Potential Users for S-PEMS



New Users

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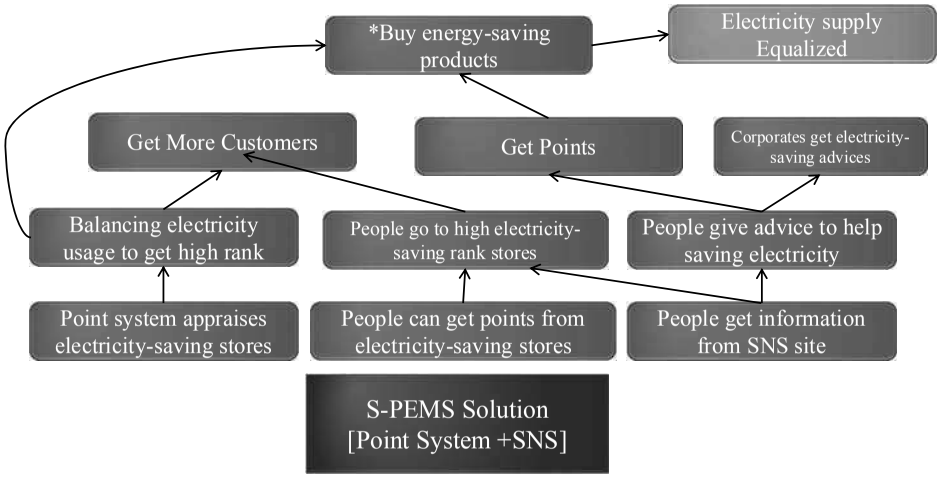
Value Graph



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*Points can be use to buy energy-saving products in a lower cost.

吉野家
日吉駅前店

ELEPO Rank A

〒223-0062 神奈川県横浜市港北区
日吉本町１丁目２２－１０

吉野家は牛丼を主力商品とする、大手外食チェーンストア。

Popular Menu
牛丼(Regular) 380円

Recommended User
久保田 曜丞 ★★★★★
澤嶋 光一 ★★★