MicroGrid Agent System Using ESS

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▣ Introduction

· The electricity tariff system of the Republic of Korea
  - Residential, general, educational, and industrial applications
· **Three level of Electricity rates for residential [Table 1]**

<u>Purpose of This Study></u>

· Build MG-Agent System to reduce energy costs
· Operate and demonstrate an efficient Micro Grid with ESS

(Date : 2016/12/01)

	(KOREAN) WON	USD
1 ~ 200kWh	910	0.83
201 ~ 400kWh	1,600	1.46
400kWh ~	7,300	6.65

[Table. 1] Residential Service (Low-Voltage)

▣ Proposal

KEPCO Power System

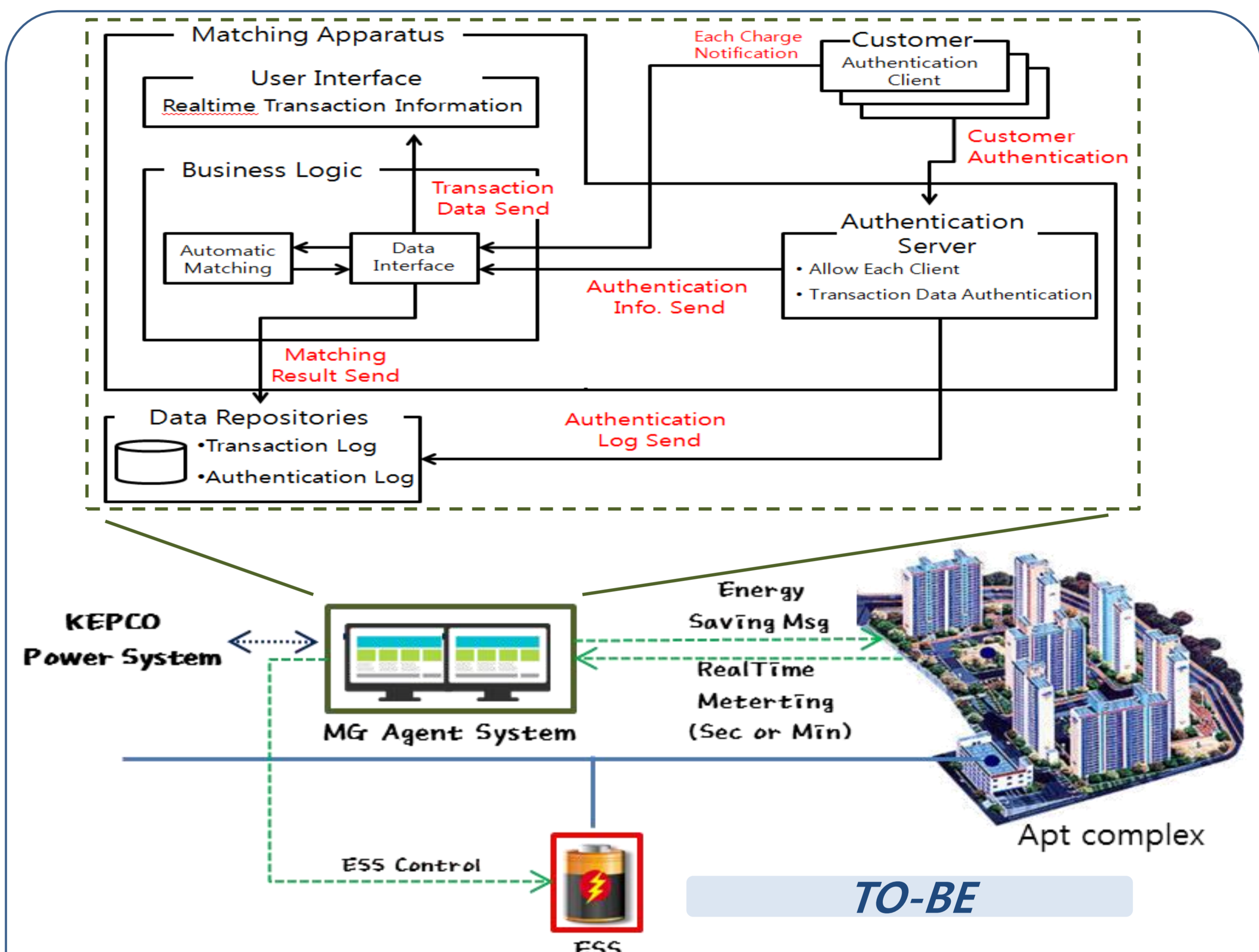**Electricity charge by individual watt hour meter**

Apt complex
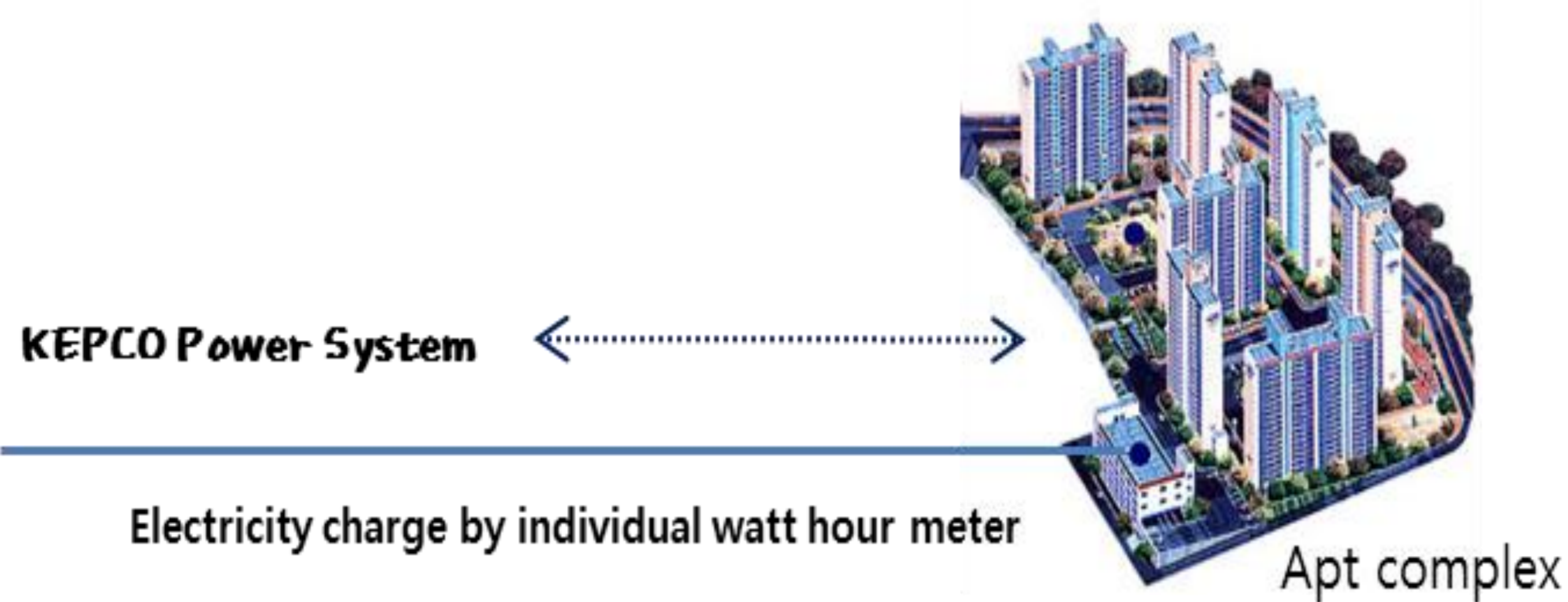
AS-IS

[Figure. 1] Conventional Apartment customers

· Each customer receives power directly from the current KEPCO(Korea Electric Power Corporation) system
· Installed a separate watt-hour meter to measure and charge the electricity bill

[Figure.2] Installation of MG-Agent System & Real-Time Metering

· Charges the ESS when electricity rates are low
· The power operation by KEPCO and the contract for the use of electricity by the customer management service provider is carried out directly by the customer
· The MG-Agent system perform the power supply operation of the ESS filled in the customer complex by real-time metering, electricity charge settlement, and the electric power operating company's instructions.
· Using by the cell phone app or the wall-pad of the current usage status (seconds or minutes) of the consumer, it is possible to use the power in a consumption pattern that saves energy.

Providing a variety of benefits to the APT customers
by applying own electricity bill system.

▣ Benefit
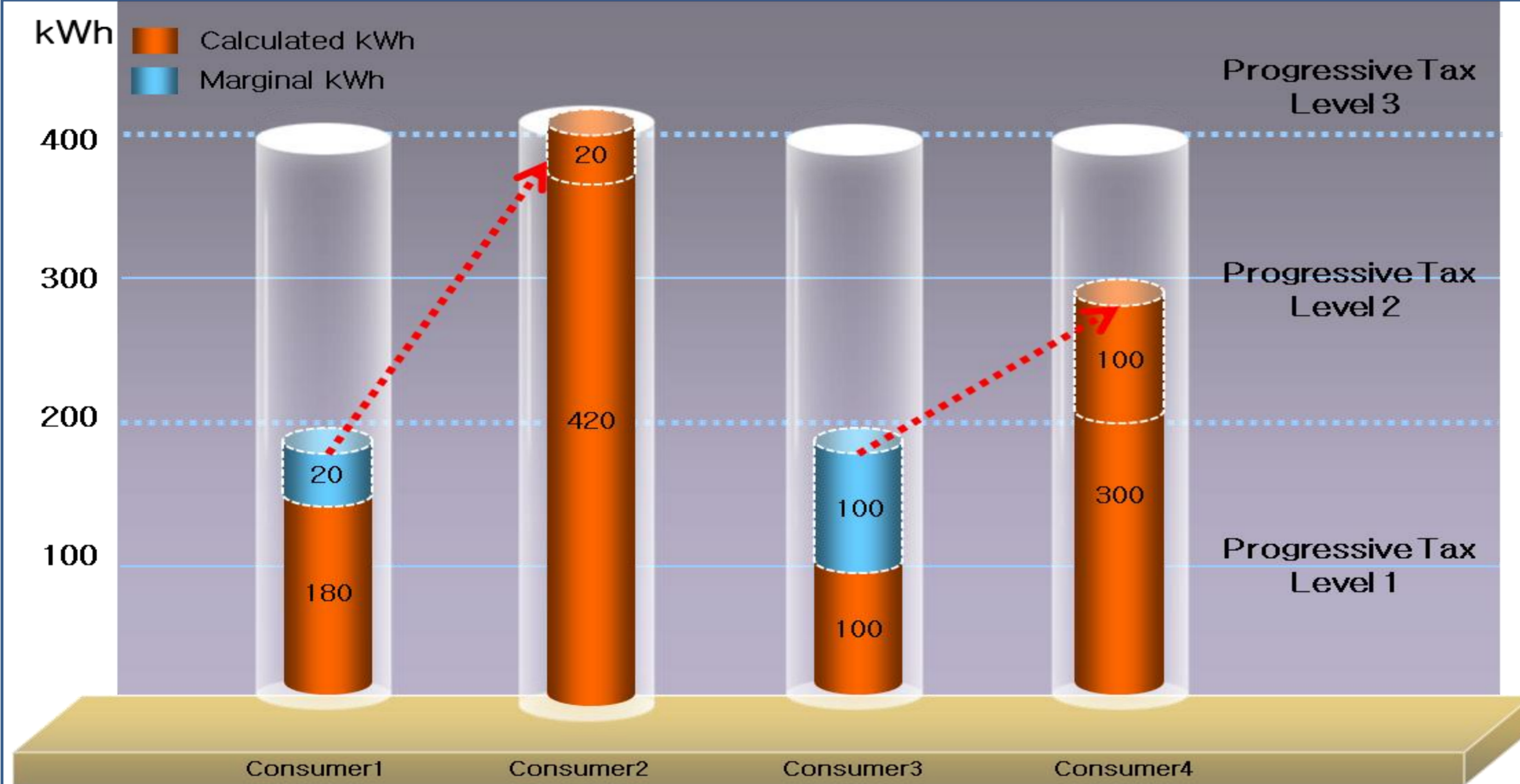
[Figure. 3] Virtual Shifting calculation Method using Progressive Tax
Reducing overall electricity Rates

Customer	Conventional				Applying MG-Agent				Benefit			
	1	2	3	4	1	2	3	4	1	2	3	4
Monthly kWh	180	420	100	400	200	400	200	300	20	-20	100	-100
Charges (Won)	15,570	8,610	7,090	65,760	17,690	65,760	17,690	44,390	2,120	- 12,850	10,600	- 21,370
Charges (USD)	13.8	9.6	6.3	58.2	15.7	58.2	15.7	39.3	1.9	-11.4	9.4	-18.9
Total Charges (Won)	₩ 167,030				₩ 145,530				- ₩ 21,500			
Total Charges (USD)	$ 147.9				$ 128.9				- $ 19.0			

[Table. 2] Benefit of Applying MG-Agent

· Possible to operate the settlement to reduce the electricity charge of the entire customer.
· **Effect of reducing the total electricity price of the customer through virtual shifting by using the progressive tax period.**
· Reducing the cost of constructing facilities, reducing electricity costs for individual consumers, and reducing electricity bills for low-income brackets.

▣ Conclusion

☐ **Proposed Method**

· **Enable** system operation through real-time ESS control such as Peak-Cut, Peak-Shift, and Peak-Shaving
· **Reduce** the energy cost of customers at peak times

☐ **By the electric power management company**

· Operate electricity usage by daytime and night-time evenly
· Utilize to develop various energy services after securing big data on the energy usage patterns of individual consumers

☐ **Consideration**

· **Policy issues** for contracting power users between the consumer manager and the electric power company
· **ESS** should be installed at customer site. And then operating system and terminal equipment will be developed and demonstrated

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