THE STUDY ON LOW CARBON SOCIETY IN SHIGA TOWARD 2030

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Key Words: Shiga Prefecture, Low Carbon Society, CO_2 emissions, Shiga Macroeconomics and Finance Tool, Service Demand Tool, Activity Estimation Tool, CO_2 Emission Estimation Tool

1. INTRODUCTION

To prevent global warming, the studies on low carbon society have already started in some EU countries and Japan. However, there are few studies on low carbon society undertaken by local governments, which play the leading roles in executing its plan. The purpose of this study is to describe snapshot of maintainable economic growth and drastic CO_2 emission reduction for low carbon society in Shiga Prefecture toward 2030. In this study, I estimate (1) the scale of economic activities and (2) the reduction of CO_2 emissions in the case of implementing environmental countermeasures.

2. TOOL

First, as the sustainable index of economic activities, GDP per capita in Japan grows at an annual rate of 2% per year. Under this assumption, the economic activities of Shiga Prefecture were estimated by using Shiga Macroeconomics and Finance Tool. Next, the service demands for the economic activities were estimated by using both Activities Estimation Tool and Service Demand Estimation Tool. Finally, while considering the service demands, technology innovation and lifestyle change, CO_2 emissions were estimated by using CO_2 Emission Estimation Tool.

Table 1 main assumption

item	assumption
GDP per capita in Japan	2 % per year growth
population in Shiga Prefecture	increase by 13% above 2000 levels
households in Shiga Prefecture	increase by 30% above 2000 levels

3. RESULT

The change of society and economy frame was assumed as shown in Table1. Under this assumption, the GDP of Shiga Prefecture is projected to grow at an annual rate of 1.6 percent from 2002 to 2030. In the case of making few efforts to technology innovation and the reduction of service demands, CO_2 emissions in 2030 are estimated to increase by 19 percent compared to1990 levels. Table2 shows countermeasures in setting up the CO_2 reduction targets in establishment of low carbon society. In this study, I assumed the society where the CO_2 emissions will decrease by 30 percent and by 40 percent compared to1990 levels. To complete 40 percent reduction compared to 1990 levels, we need to make the best of the maximum potential of life style and technology innovation. Therefore, it is important for the establishment of low carbon society to implement environmental countermeasures as soon as possible.

Table 2 the countermeasures for low carbon society

sector	countermeasures	substance	30%	40%
conversion	electrical power consumption rate	CO_2g/kwh	238	238
industry	the replacement of oil by natural gas	shift rate	30%	50%
	electricity share	increase rate	10%	10%
	high-efficiency boiler	penetration rate	33%	50%
	high-efficiency industry furnace	penetration rate	50%	100%
	high-efficiency motor	penetration rate	100%	100%
	inverter control	penetration rate	100%	100%
	efficiency improvement in nonmanufacturer	efficiency(2000=1)	1.05	1.1
residential	cool biz	penetration rate for all households	50%	100%
	warm biz	penetration rate for all households	50%	100%
	adiabatic efficiency	new standards+next standards	87%	100%
	sequential bath	penetration rate for households	50%	100%
	HEMS	penetration rate for households	50%	100%
	replacement of oil by other fuels	shift rate	50%	65%
	standby electricity saving	reduction rate	33%	33%
	high-efficiency air conditioner	COP	5	7
	gas heat pump	thermal efficiency (2000 =80%)	90%	90%
	oil stove	thermal efficiency (2000 =80%)	90%	90%
	high- efficiency oil water heater	thermal efficiency (2000 =80%)	90%	90%
	high-efficiency gas water heater	thermal efficiency (2000 =80%)	95%	95%
	high-efficiency heat pump	COP	5	5
	IH cooking	thermal efficiency (2000 =85%)	90%	90%
	stove burner	thermal efficiency (2000 =40%)	55%	55%
	photovoltaic power generation	penetration rate for new house	50%	100%
	solar thermal utilization	2010 target=1	1.25	2.50
	pellet stove	2010 target=1	2	4
commercial	cool biz	penetration rate for companies	50%	100%
	warm biz	penetration rate for companies	50%	100%

sector	countermeasures	substance	30%	40%
commercial	adiabatic efficiency	new standards+nextstandards	87%	100%
	standby electricity saving	electricity efficiency(2000=1)	1.5	1.5
	BEMS	penetration rate for companies	50%	100%
	replacement of oil by other fuels	shift rate	50%	65%
	high-efficiency air conditioner	COP	5	7
	commercial boiler	thermal efficiency (2000 =85%)	90%	90%
	gas heat pump	thermal efficiency (2000 =80%)	90%	90%
	high- efficiency oil water heater	thermal efficiency (2000 =80%)	90%	90%
	high-efficiency gas water heater	thermal efficiency (2000 =80%)	95%	95%
	high-efficiency heat pump	COP	5	5
	IH cooking	thermal efficiency (2000 =85%)	90%	90%
	stove burner	thermal efficiency (2000 =40%)	55%	55%
	photovoltaic power generation	penetration rate for companies	30%	50%
	solar thermal utilization	2010 target=1	1.25	1.25
transport (passenger)	the improvement of fuel consumption	automobile(2000=1)	1.5	1.5
		train(2000=1)	1.1	1.1
		motorized bicycle(2000=1)	1.5	1.5
		bus(2000=1)	1.5	1.5
	the shift of transportation	to bicycle from automobile	0%	35%
		to train from automobile	0%	30%
	compact city	reduction rate of distance conveyance	50%	50%
transport (freight)	the improvement of fuel consumption	automobile(2000=1)	1.1	1.1
		train(2000=1)	1.1	1.1
		ship	1.1	1.1
		flight	1.2	1.2
	the shift of transportation	to train from truck	0%	20%
		to ship from truck	0%	10%
	compact city	reduction rate of distance conveyance	50%	50%