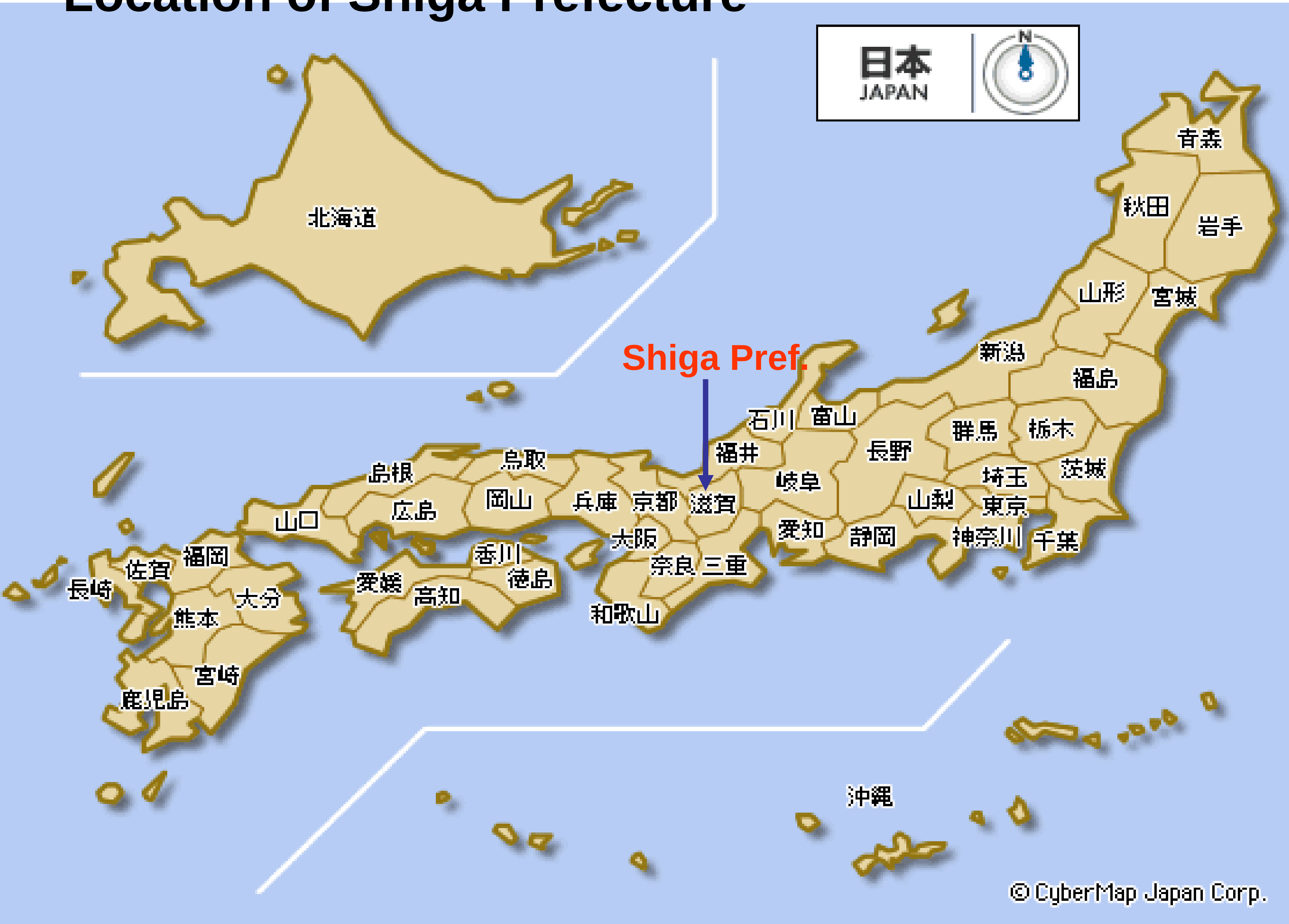
The 11th AIM Workshop
(NIES)

A Research Project on Sustainable Society in Shiga 2030

Shiga SD 2030 Research Team

20 February 2006

Location of Shiga Prefecture


日本
JAPAN
N
北海道
青森
秋田
岩手
山形
宮城
新潟
福島
Shiga Pref.
石川
富山
群馬
栃木
福井
長野
茨城
鳥取
島根
岐阜
埼玉
岡山
広島
兵庫
京都
滋賀
山梨
東京
山口
愛知
静岡
神奈川
千葉
大阪
福岡
香川
佐賀
奈良
三重
徳島
愛媛
長崎
大分
高知
熊本
和歌山
宮崎
鹿児島
沖縄

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Overview of Shiga Prefecture

Area: 4,017 km²

- Lake Biwa: 670 km² (17%)

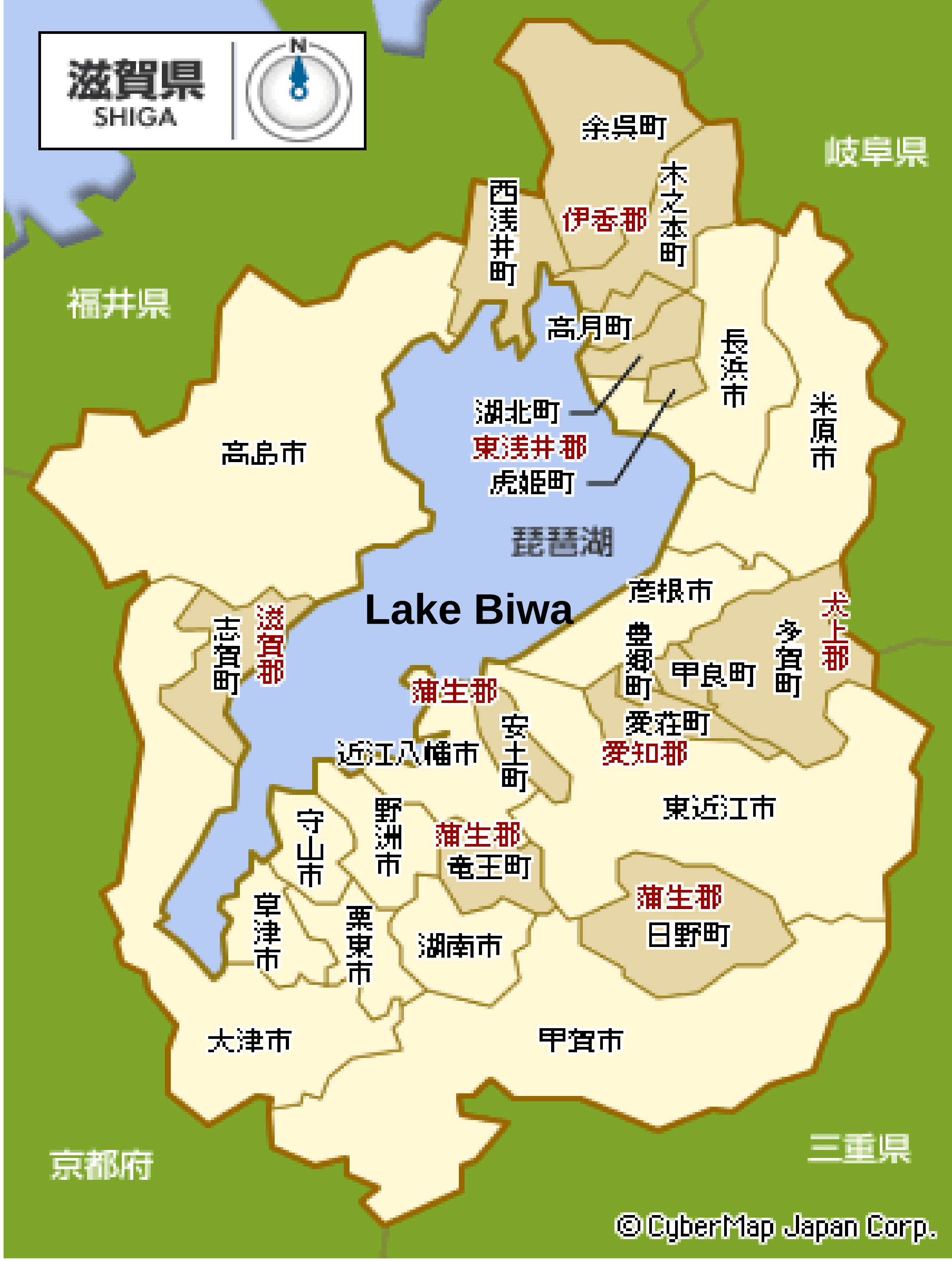
Population: 1,366,415 ('03)

- Only one pref. where the population would increase until 2030

Households: 474,435 ('03)

Share of Secondary Ind. (GDP): 46.7% ('02)

- Largest share in Japan.


滋賀県
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余呉町
木之本町
伊香郡
西浅井町
岐阜県
福井県
高月町
長浜市
湖北町
東浅井郡
虎姫町
米原市
高島市
琵琶湖
Lake Biwa
彦根市
犬上郡
多賀町
豊郷町
甲良町
志賀町
滋賀郡
蒲生郡
安土町
愛荘町
愛知郡
近江八幡市
東近江市
守山市
野洲市
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竜王町
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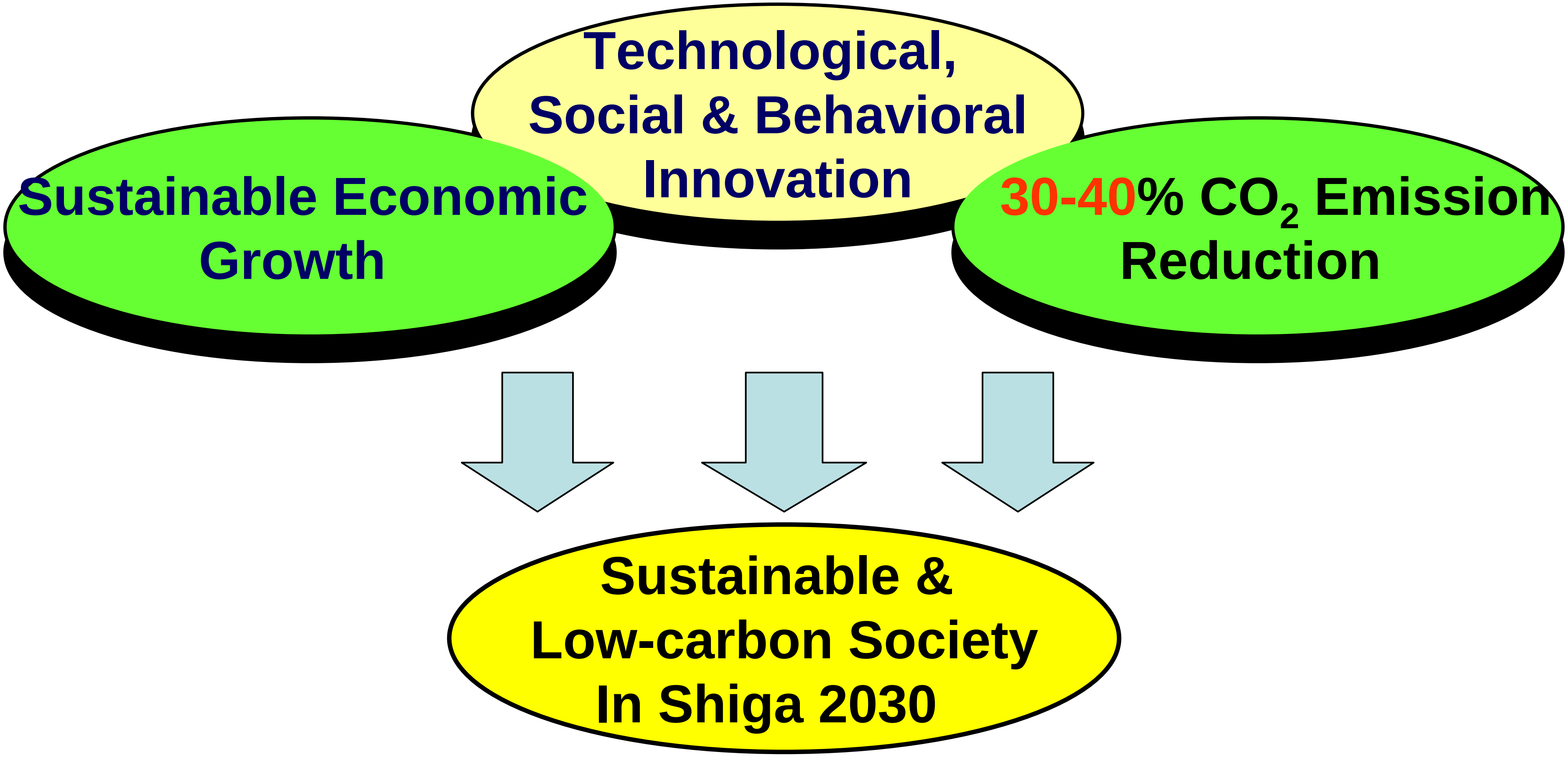
Objective of Research Project

Formulation of Low-Carbon Society in Shiga toward 2030
(30–40% CO_2 Emission Reduction in 2030 from 1990 Level)



Technological,
Social & Behavioral
Innovation

Sustainable Economic
Growth

30-40% CO_2 Emission
Reduction

Sustainable &
Low-carbon Society
In Shiga 2030

Estimation Tool Used in the Research

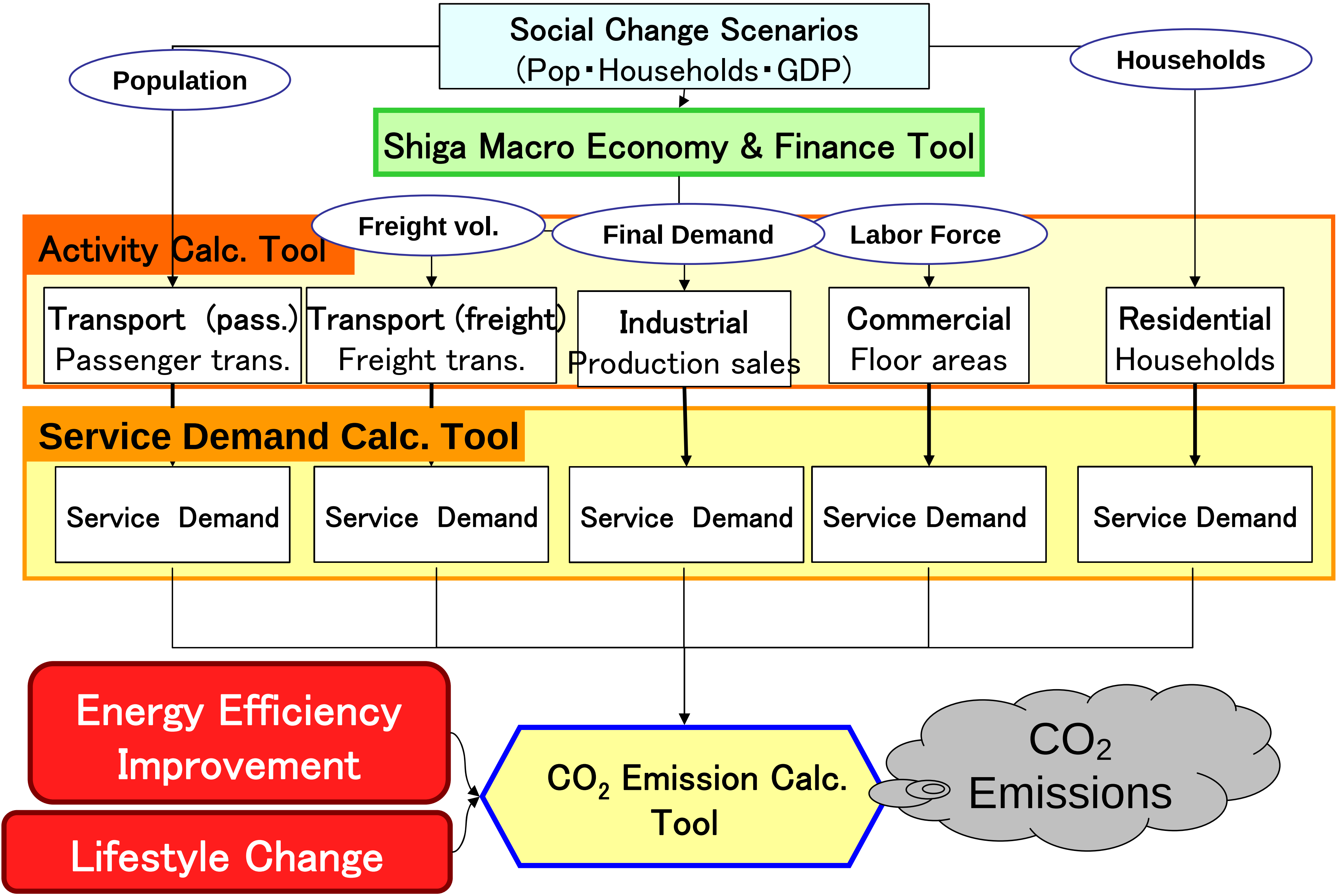
Shiga Macro Economy & Finance Tool:
To estimate economic activities based upon social change scenarios

Activity Calculation Tool :
To estimate driving forces of energy consumption accompanied with economic activities

Service Demand Calculation Tool:
To estimate energy service demand based upon driving forces

CO_2 Emission Calculation Tool:
To estimate CO_2 emission based upon energy service demand

Estimation Process



Social Change Scenarios
(Pop・Households・GDP)

Population

Households

Shiga Macro Economy & Finance Tool

Activity Calc. Tool

Freight vol.

Final Demand

Labor Force

Transport (pass.)
Passenger trans.

Transport (freight)
Freight trans.

Industrial
Production sales

Commercial
Floor areas

Residential
Households

Service Demand Calc. Tool

Service Demand

Service Demand

Service Demand

Service Demand

Service Demand

Energy Efficiency Improvement

Lifestyle Change

CO_2 Emission Calc. Tool

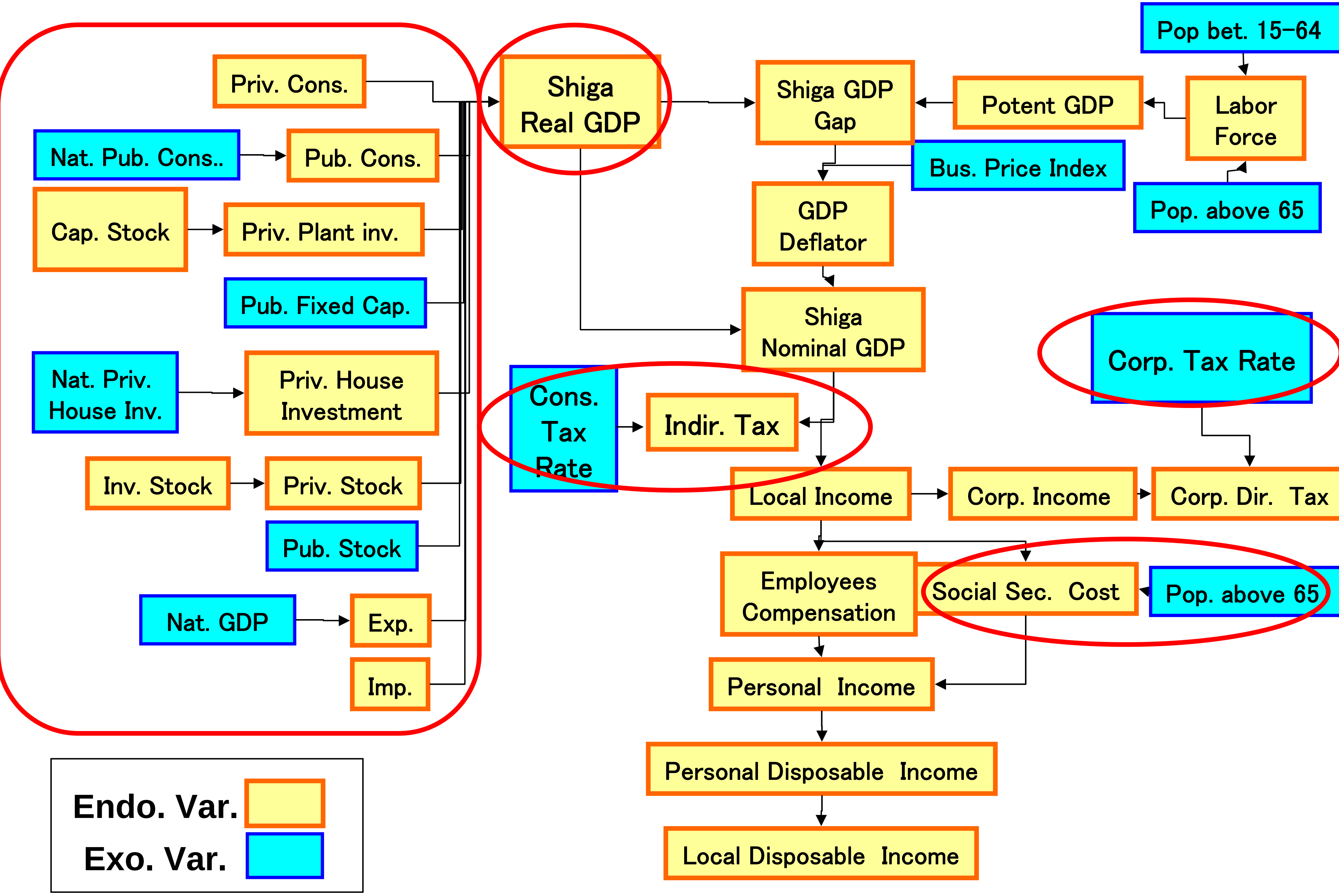
CO_2 Emissions

Estimation Conditions

Conditions of Social & Economic Framework in 2030

Social & Economic var.	Conditions
GDP per capita	Increase by approx. 2% annually
Population in Shiga	Increase by 14% from 2000 level
Households in Shiga	Increase by 30% from 2000 level

Shiga Macro Economy & Finance Tool



Priv. Cons.

Nat. Pub. Cons..

Pub. Cons.

Cap. Stock

Priv. Plant inv.

Pub. Fixed Cap.

Nat. Priv. House Inv.

Priv. House Investment

Inv. Stock

Priv. Stock

Pub. Stock

Nat. GDP

Exp.

Imp.

Shiga Real GDP

Shiga GDP Gap

Potent GDP

Labor Force

Pop bet. 15−64

Pop. above 65

Bus. Price Index

GDP Deflator

Shiga Nominal GDP

Corp. Tax Rate

Cons. Tax Rate

Indir. Tax

Local Income

Corp. Income

Corp. Dir. Tax

Employees Compensation

Social Sec. Cost

Pop. above 65

Personal Income

Personal Disposable Income

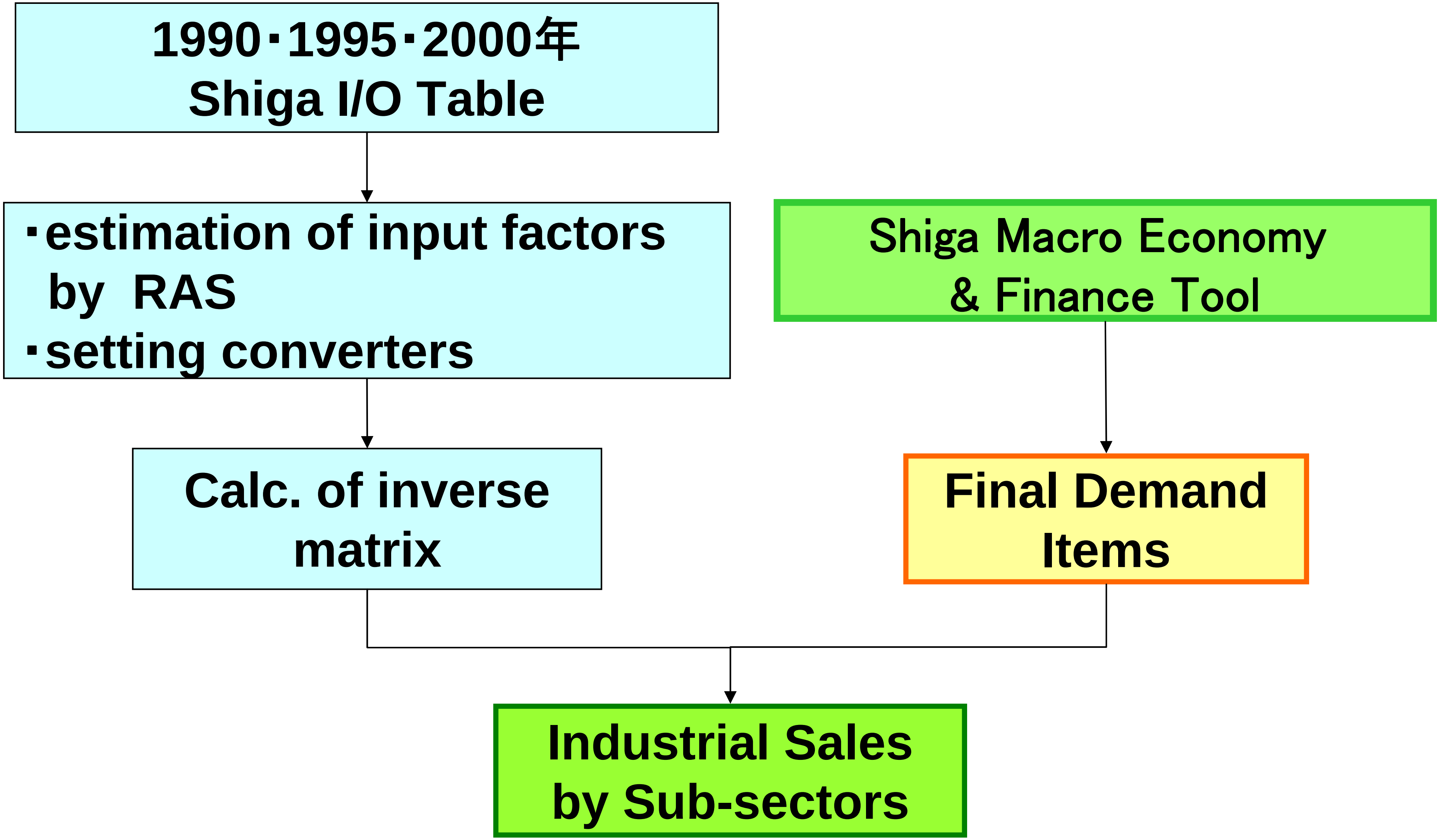
Local Disposable Income

Endo. Var. 🟨

Exo. Var. 🟦

Activity Calc. Tool –Industrial

I/O Analysis



1990･1995･2000年
Shiga I/O Table

- **･estimation of input factors by RAS**
- **･setting converters**

Calc. of inverse matrix

Shiga Macro Economy
& Finance Tool

Final Demand Items

Industrial Sales by Sub-sectors

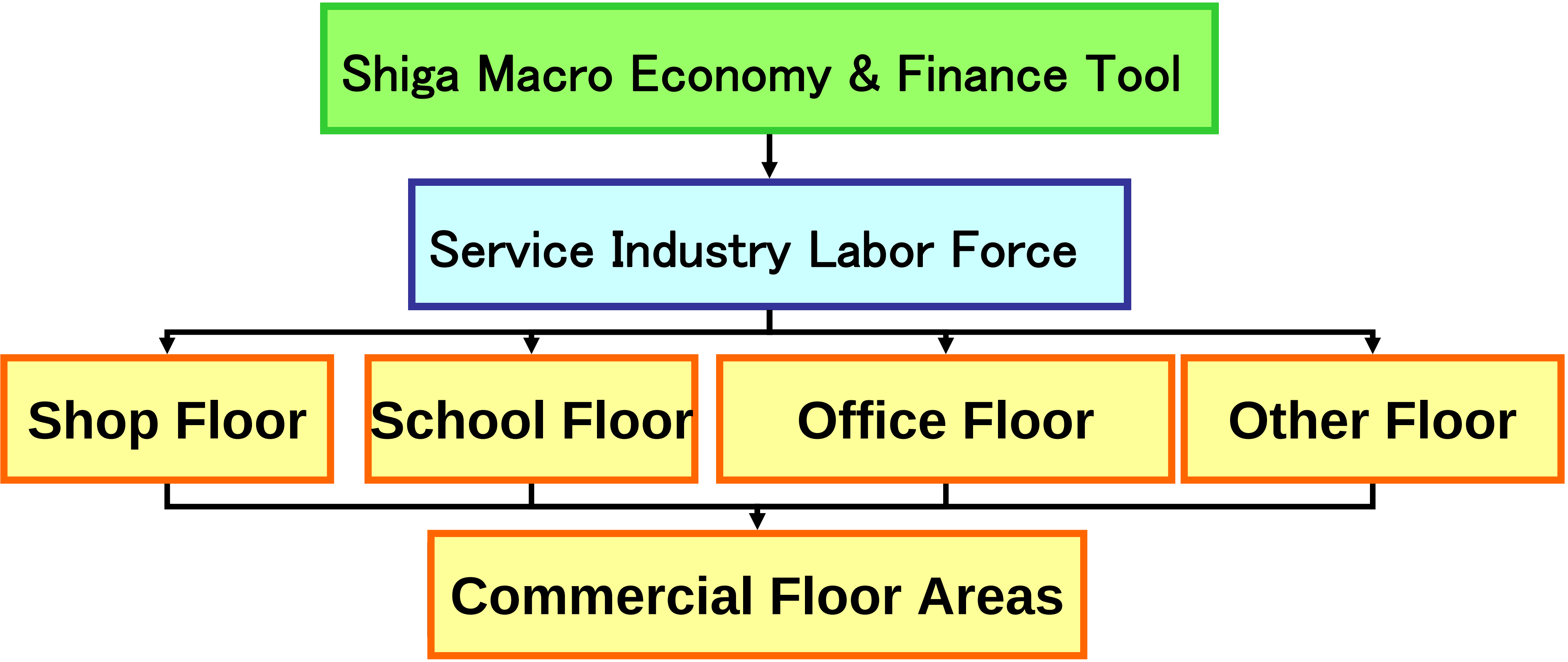
Activity Calc. Tool – Residential/Commercial

Residential

Households

Based upon an estimation
by National Institute of Social Security
and Population

Commercial



Shiga Macro Economy & Finance Tool

Service Industry Labor Force

Shop Floor

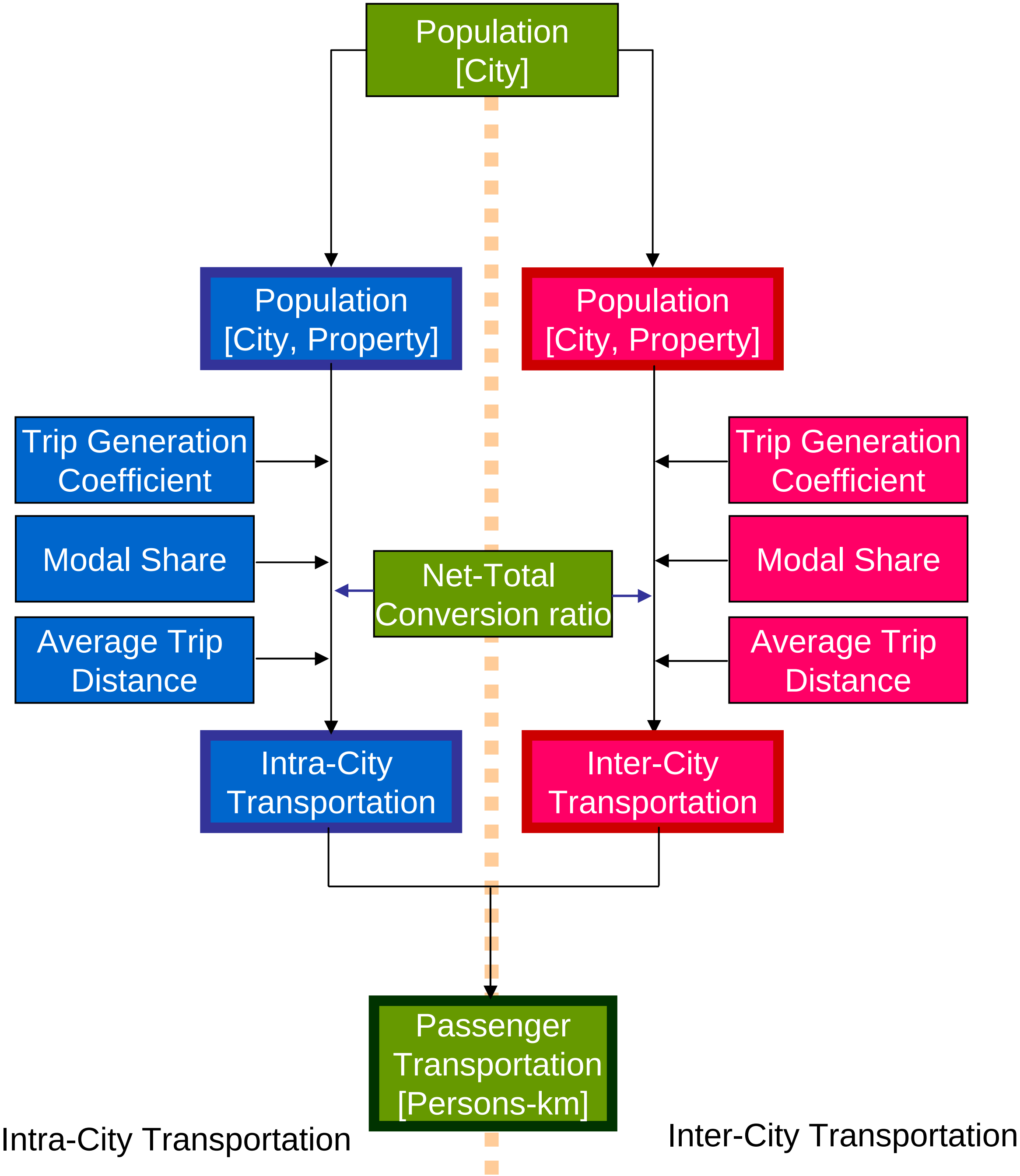
School Floor

Office Floor

Other Floor

Commercial Floor Areas

Activity Calc. Tool - Passenger Transport



Population
[City]

Population
[City, Property]

Population
[City, Property]

Trip Generation Coefficient

Modal Share

Average Trip Distance

Net-Total Conversion ratio

Trip Generation Coefficient

Modal Share

Average Trip Distance

Intra-City Transportation

Inter-City Transportation

Passenger Transportation
[Persons-km]

Intra-City Transportation

Inter-City Transportation

[Passenger Transportation Model]

・Calculate future passenger transport demand change associated with population distribution

・Exogenous Variables;
- Trip Generation Coefficient,
- Service Share by Facilities,
- Average Trip Distance

based upon "the 4th PT Survey in Keihanshin Area (2000)"

●Purpose of Trip:
- Work: Commute to office
- School: Commute to school
- Return: Return home
- Business：Trip for Business
- Private：Shopping & Others

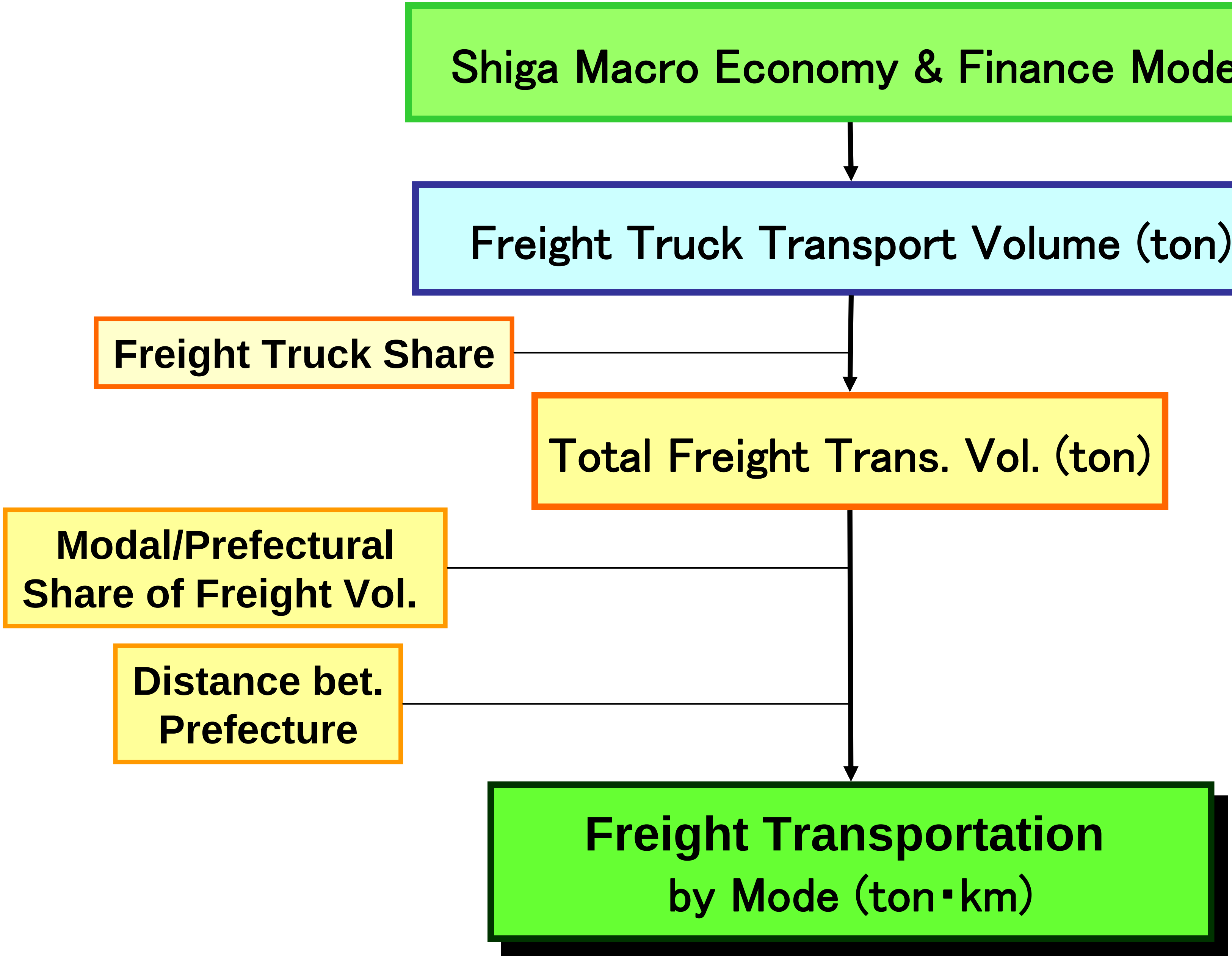
●City Block:
Ohtsu/Konan, Kouga, HigashiOhmi
Kotou, Kosei, Kohoku

●Personal Property:
male/female, age: 0-14/15-64/65-

●Transport mode:
automobile, rail, bus, motorbike, bicycle
walk

→ ：Data Flow
●----● ：Consistency assurance

Activity Calc. Tool – Freight Transport



Shiga Macro Economy & Finance Model

Freight Truck Transport Volume (ton)

Freight Truck Share

Total Freight Trans. Vol. (ton)

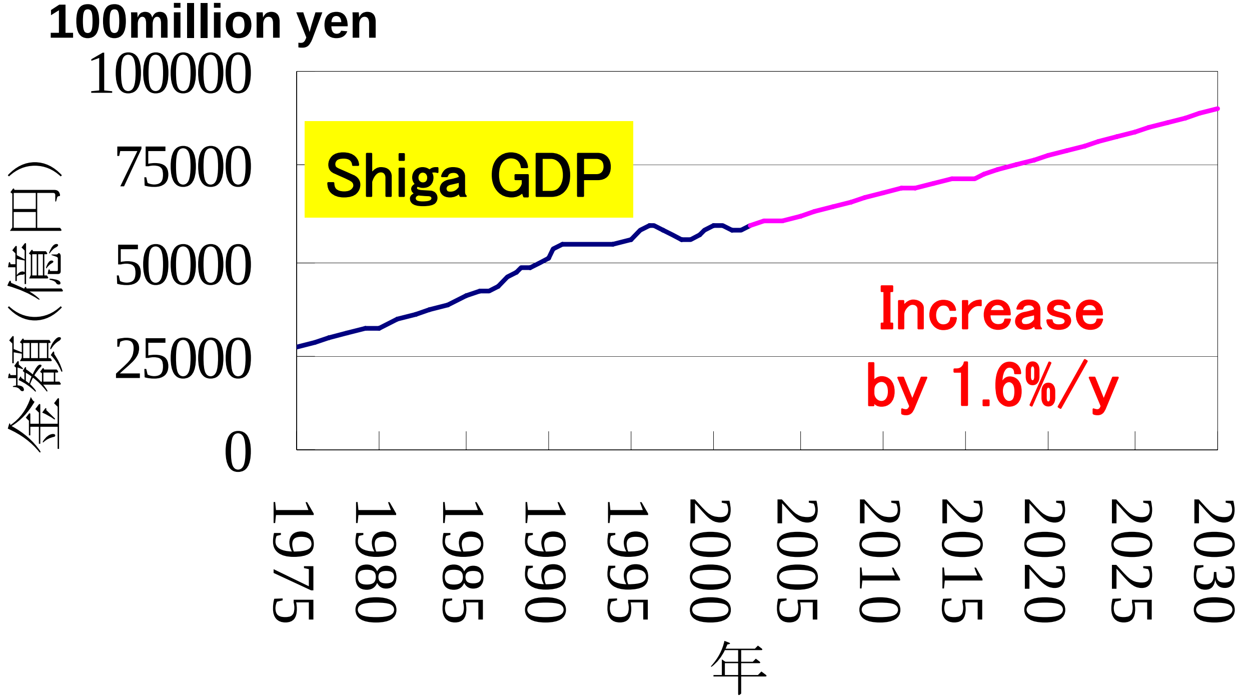
Modal/Prefectural Share of Freight Vol.

Distance bet. Prefecture

Freight Transportation by Mode (ton･km)

Preliminary Results

Transition of Social & Economic Framework



Sustainable Economic Growth toward 2030

(%) from 2000 level

Primary/Secondary Industrial Sales：increase by 34%
Commercial Floor Area: increase by 22%
Households Numbers：increase by 30%
Passenger Transportation： increase by 7%
Freight Transportation: increase by 36%

Transition of Main Indicators

Indicator	1990年	2000年	2030年
Popolation (thousand)	1,222	1,343	1,530
Household No. (thousand)	348	430	561
Commercial Floor Area (million m^2)	-	20.0	24.4
Primary/Secondary Industrial Sales (billion yen)	6,458	7,315	9,763
National GDP (billion yen)	467,913	536,806	857,094
Shiga GDP (billion yen)	5,093	5,935	9,040

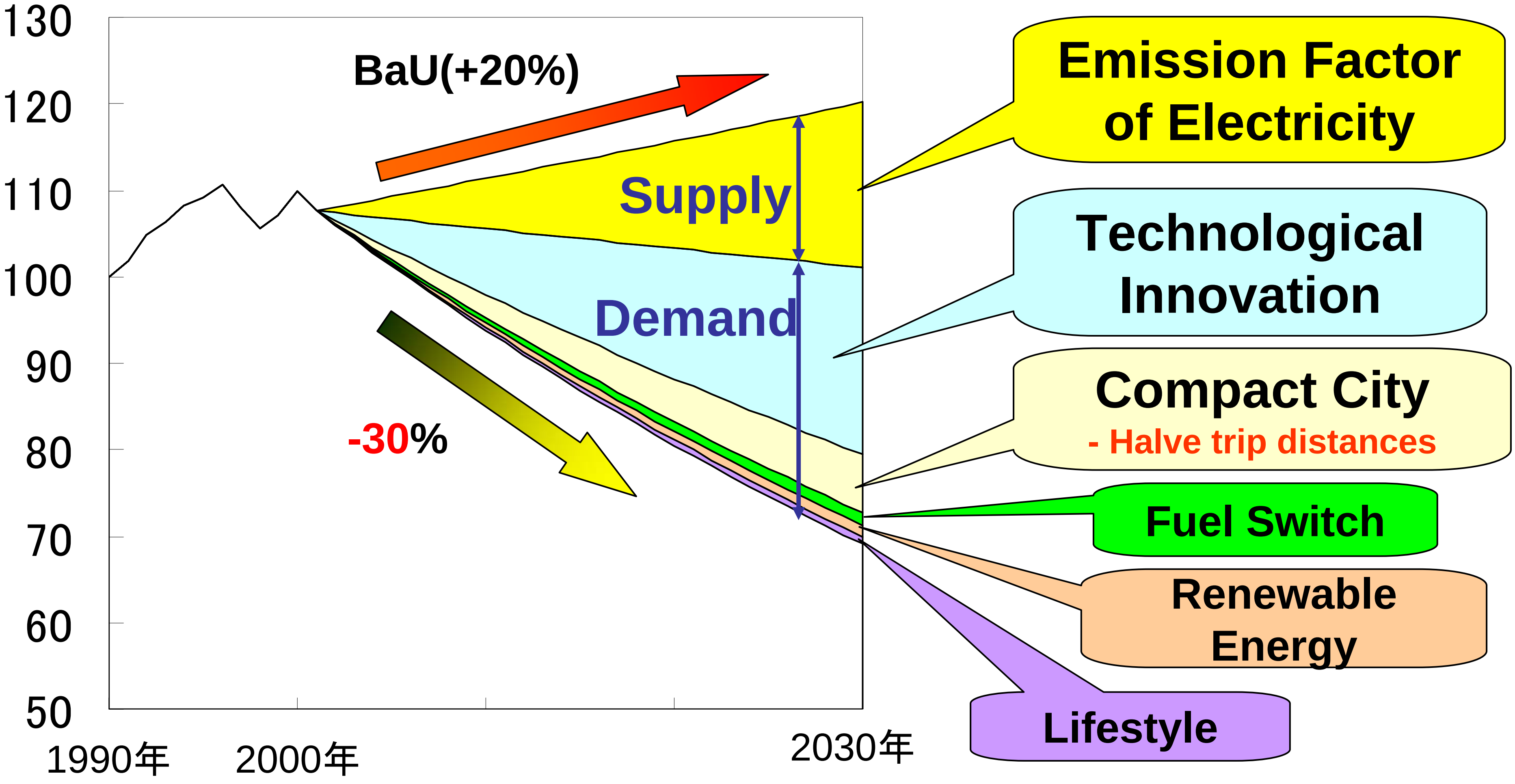
Setting Mitigation Cases

Set two type of low-carbon society
based upon economic activities

Case	BaU	Case A	Case B
CO_2 Reduction Goal	-	-30%	-40%
Technological Innovation	-	Relatively progress	Maximum progress
Environmental Awareness	Low	High	Extremely high
Feasibility of Policy & Measures	-	Medium	Low

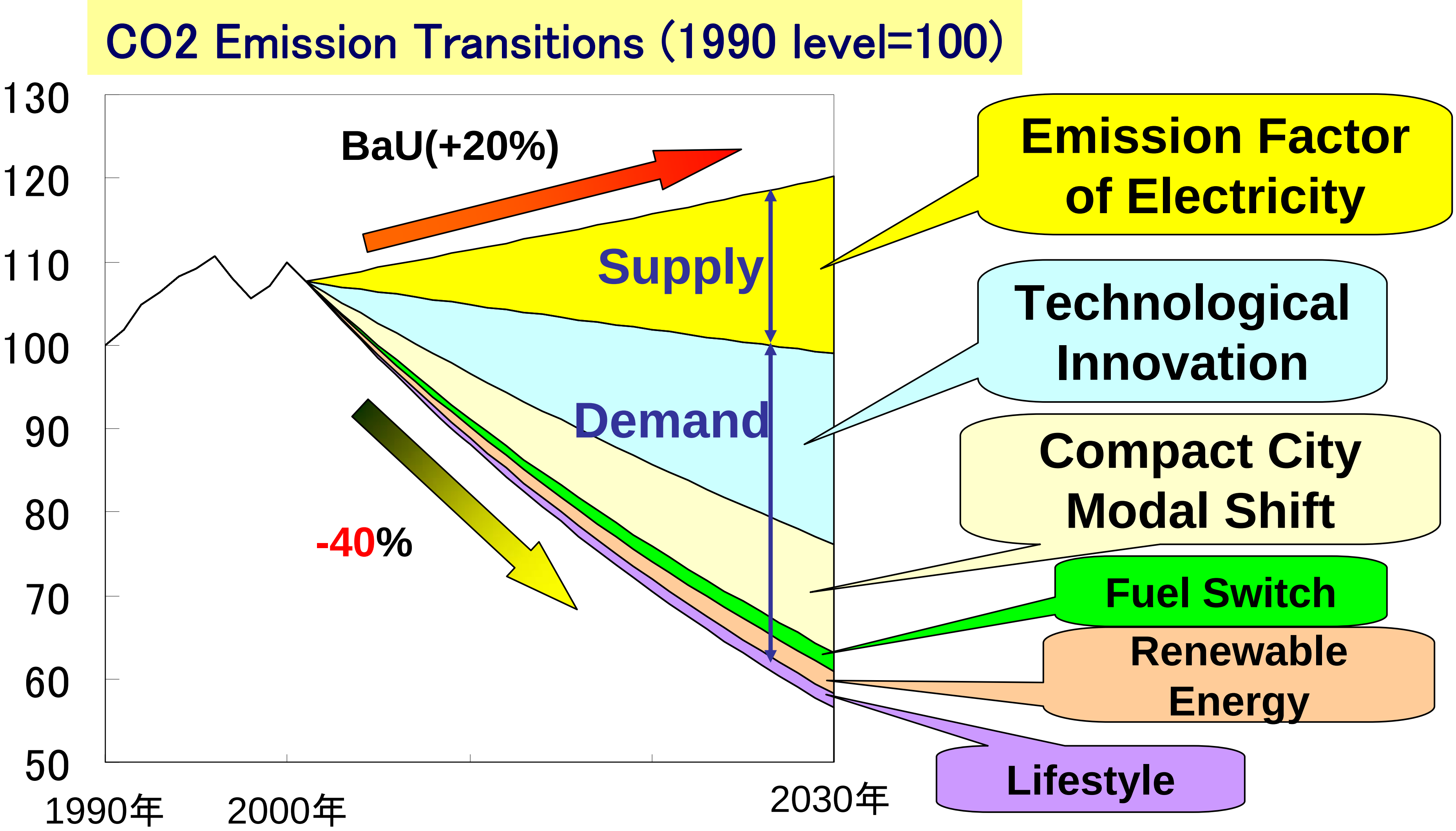
Case A

CO2 Emission Transitions (1990 level=100)



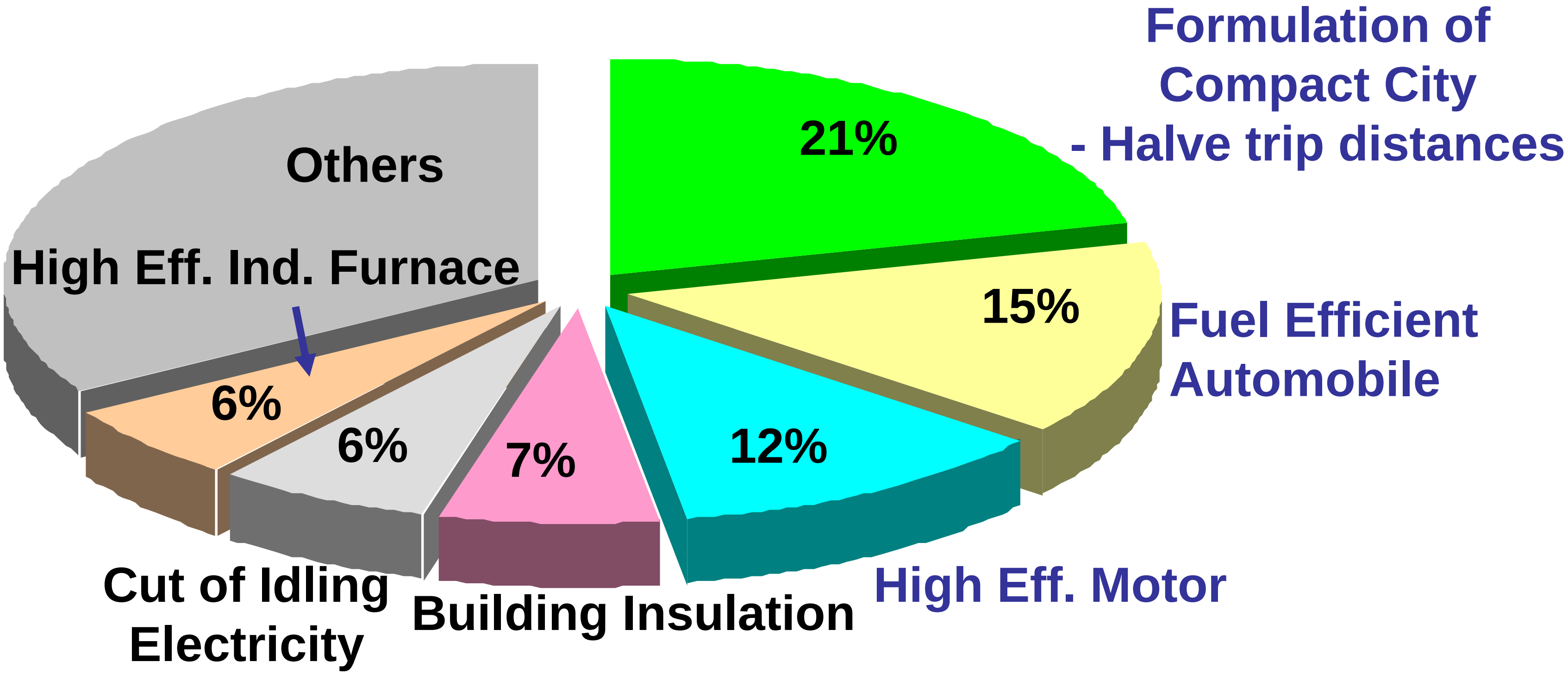
1. Both supply & demand measures necessary to reduce CO_2 emission by 30%
2. Substantial contribution of compact city

Case B



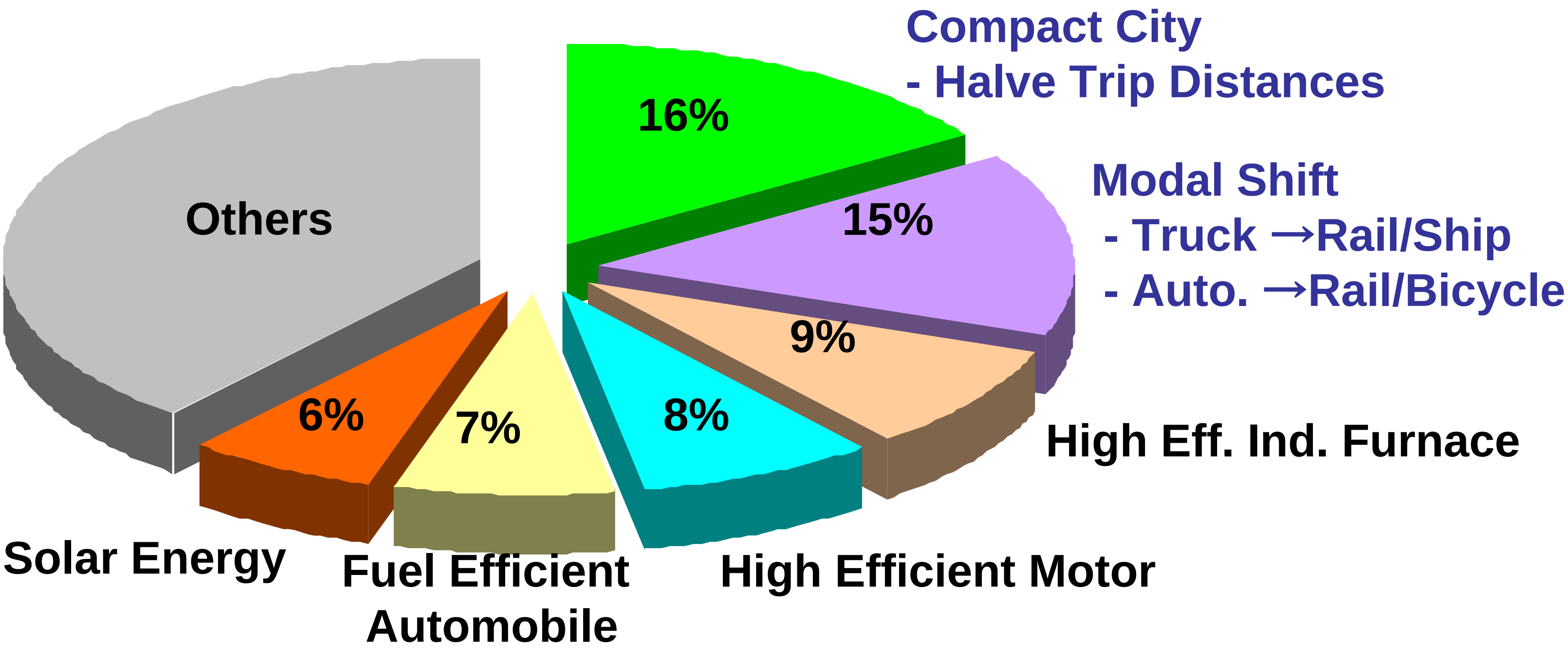
1. Both supply & demand measures necessary to reduce CO_2 emission by 40%
2. Substantial contribution of modal shift as well as compact city

Reduction Contribution by Demand Measures (Case A)



Large contribution by
- Compact City
- Fuel Efficient Automobile
- High Efficient Motor

Reduction Contribution by Demand Measures (Case B)

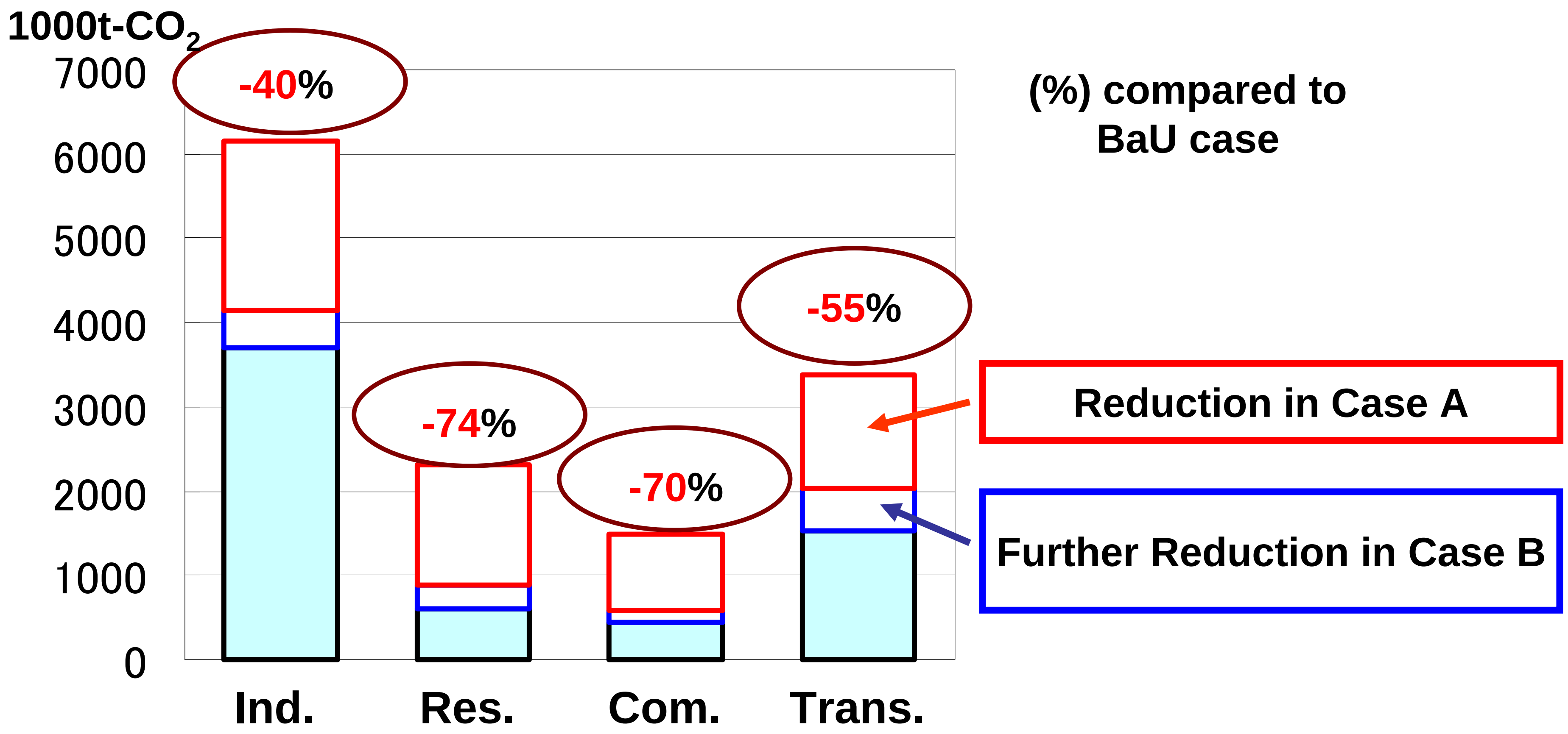


Strengthening measures in all sectors

+

Compact City & Modal Shift in transport sector

Reductions by Sectors



Large Reduction Rates in Residential/Commercial Sectors

Conclusion

Propose some low-carbon societies aiming at Sustainable Shiga

-30% low-carbon society image

- **-Formulation of compact city (halve trip distances)**
- **-Promotion of Technological Innovation**
- **-Solar panel introduction to 50% of newly-built houses**

-40% low-carbon society image

- **- Formulation of compact city (halve trip distances)**
- **- Modal shifts to rails and bicycles**
- **- Maximum progress of technological innovation**
- **- Solar panel introduction to 100% of newly-built houses**