Development of Extended SnapShot Tool and Application to Local LCS

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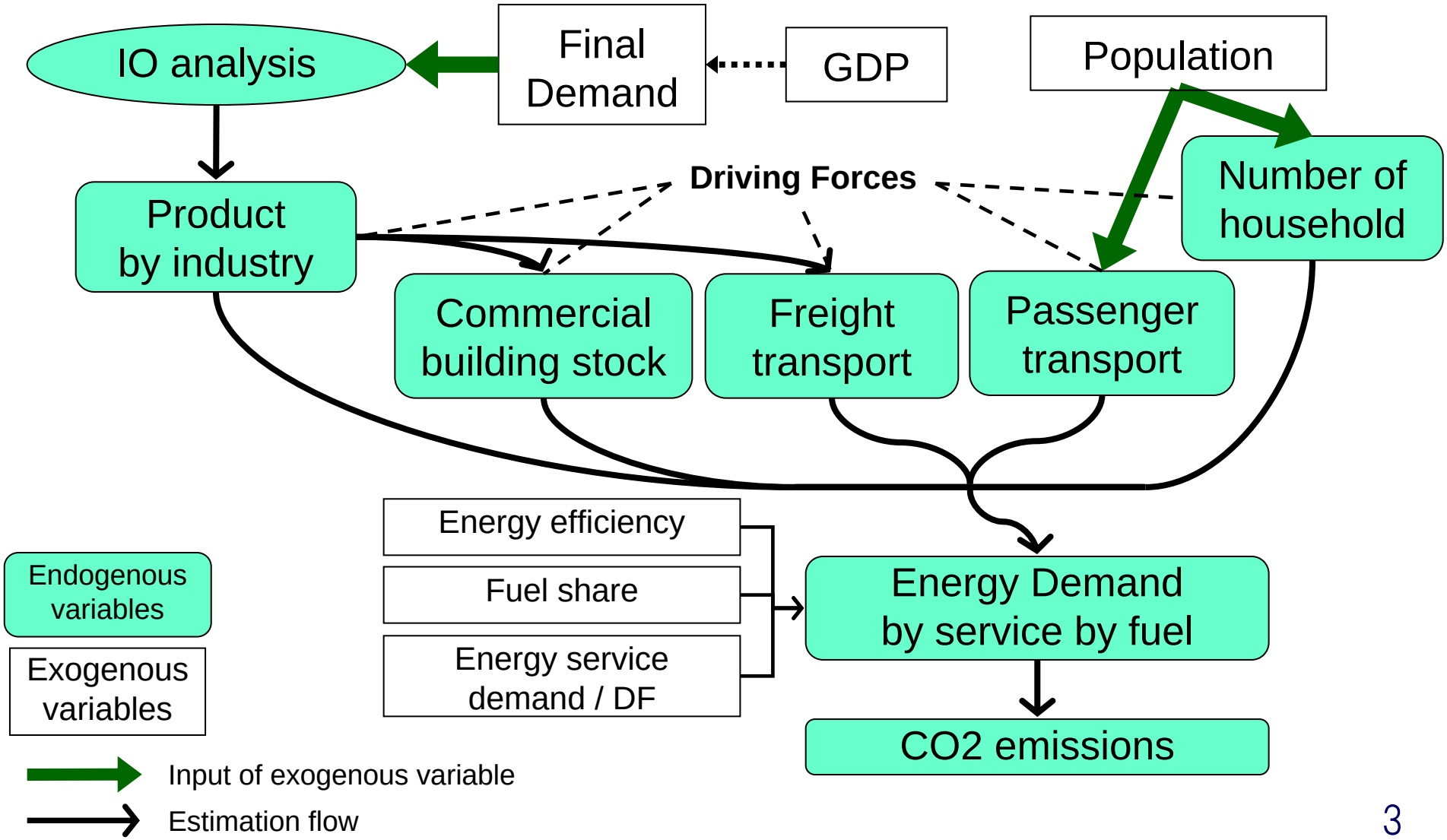
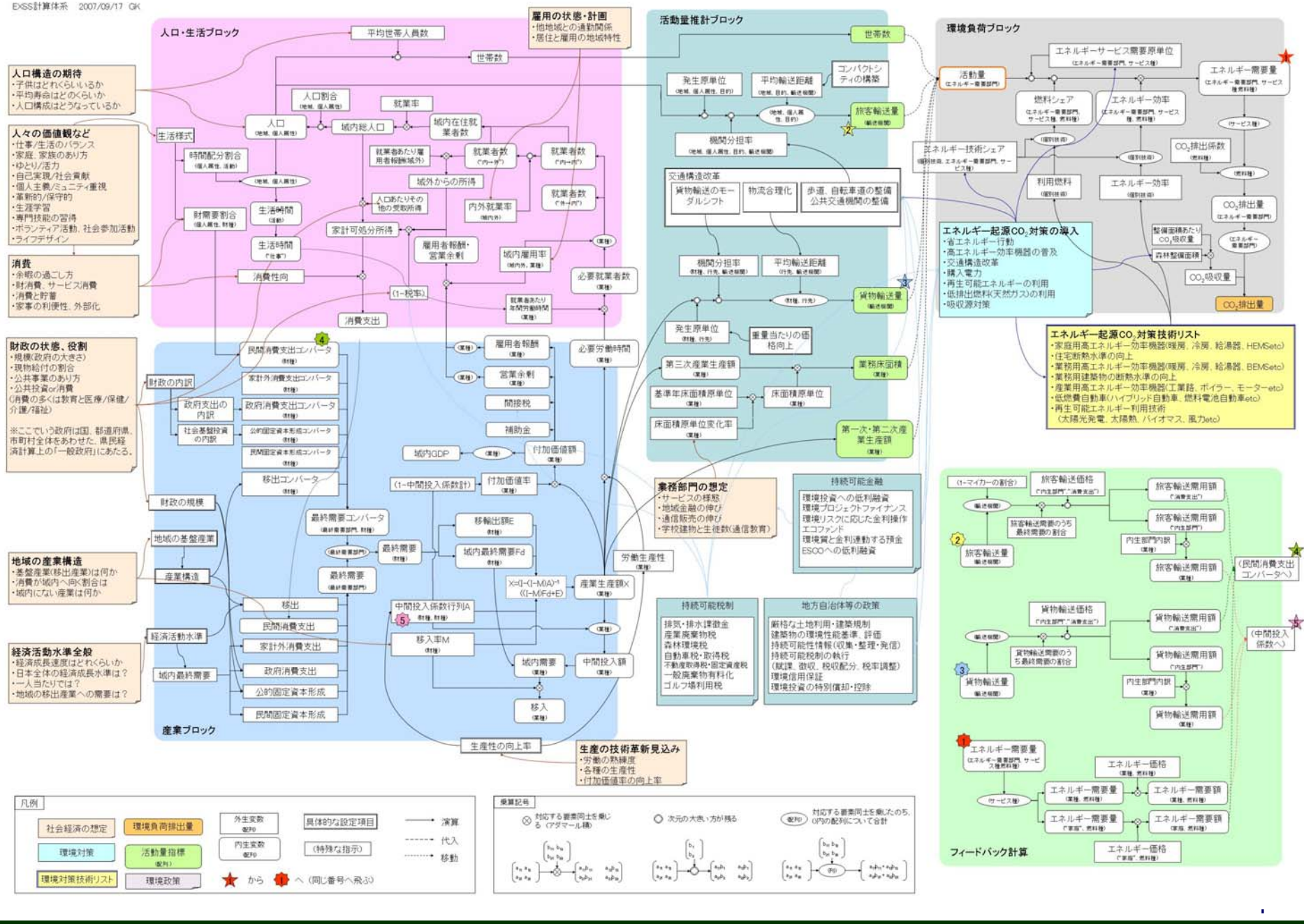
Abstract

- We have developed ExSS and used for LCS scenarios. (Japan[2050], Shiga prefecture[2030])
- We improved ExSS to apply to OPEN structure of local scale economy.
- It can also answer questions from interest of LOCAL DEVELOPMENT
- We applied the tool to Kyoto city, and showed a future snapshot as a LCS (GHG:-50% related to 1990 level).
- Sensitivity analysis was also conducted.

Structure of EXSS

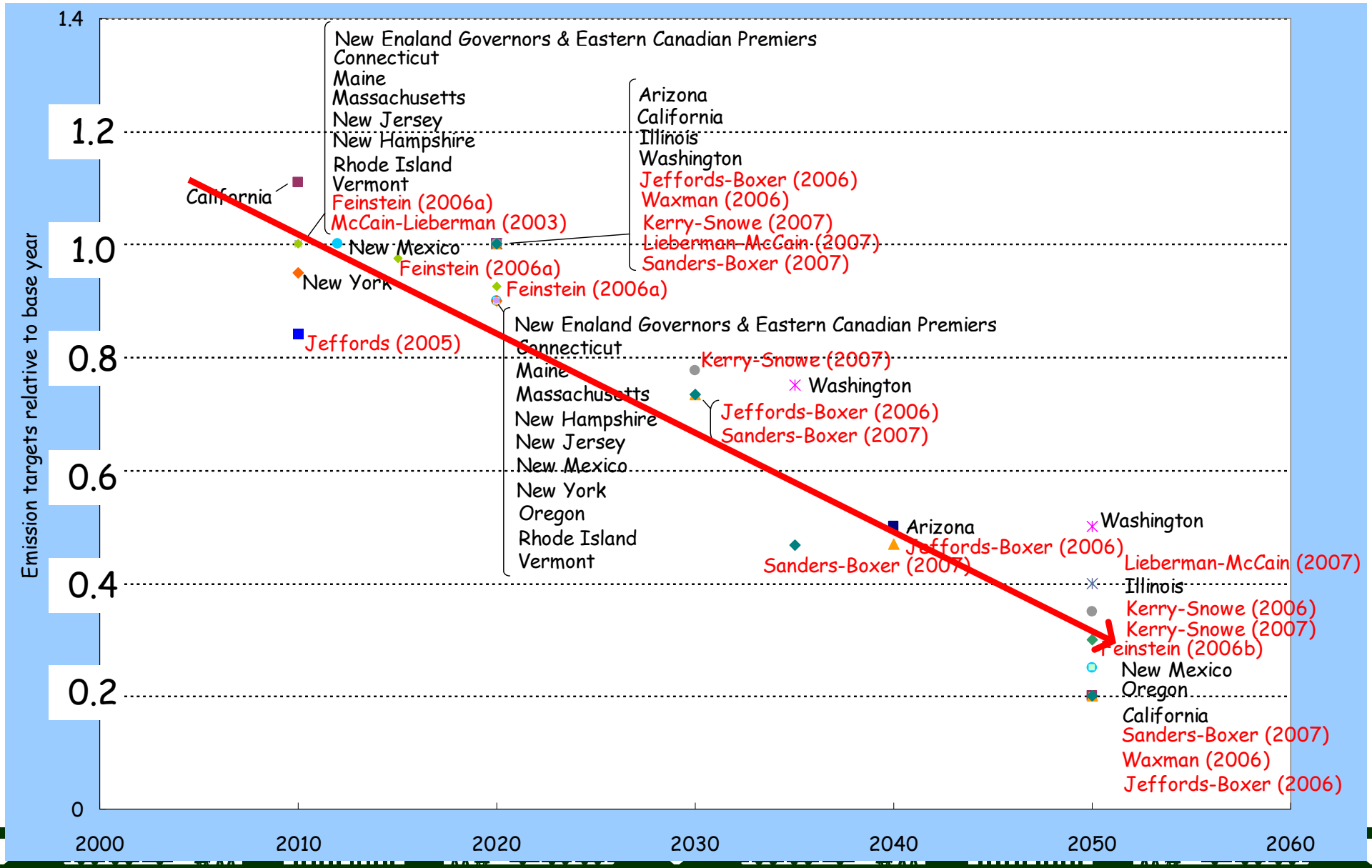



ExSS計算体系　2007/09/17 GK
人口・生活ブロック
雇用の状態・計画
・他地域との通勤関係
・居住と雇用の地域特性
活動量推計ブロック
環境負荷ブロック
人口構造の期待
・子供はどれくらいいるか
・平均寿命はどのくらいか
・人口構成はどうなっているか
人々の価値観など
・仕事/生活のバランス
・家庭、家族のあり方
・ゆとり/活力
・自己実現/社会貢献
・個人主義/ミュニティ重視
・革新的/保守的
・生涯学習
・専門技能の習得
・ボランティア活動、社会参加活動
・ライフデザイン
消費
・余暇の過ごし方
・財消費、サービス消費
・消費と貯蓄
・家事の利便性、外部化
財政の状態、役割
・規模(政府の大きさ)
・現物給付の割合
・公共事業のあり方
・公共投資or消費
(消費の多くは教育と医療/保健/介護/福祉)
※ここでいう政府は国、都道府県、市町村全体をあわせた、県民経済計算上の「一般政府」にあたる。
地域の産業構造
・基盤産業(移出産業)は何か
・消費が域内へ向く割合は
・域内にない産業は何か
経済活動水準全般
・経済成長速度はどれくらいか
・日本全体の経済成長水準は？
・一人当たりでは？
・地域の移出産業への需要は？
業務部門の想定
・サービスの様態
・地域金融の伸び
・通信販売の伸び
・学校建物と生徒数(通信教育)
持続可能金融
環境投資への低利融資
環境プロジェクトファイナンス
環境リスクに応じた金利操作
エコファンド
環境質と金利連動する預金
ESCOへの低利融資
持続可能税制
排気・排水課徴金
産業廃棄物税
森林環境税
自動車税・取得税
不動産取得税・固定資産税
一般廃棄物有料化
ゴルフ場利用税
地方自治体等の政策
厳格な土地利用・建築規制
建築物の環境性能基準、評価
持続可能性情報(収集・整理・発信)
持続可能税制の執行
(賦課、徴収、税収配分、税率調整)
環境信用保証
環境投資の特別償却・控除
エネルギー起源CO2対策の導入
・省エネルギー行動
・高エネルギー効率機器の普及
・交通構造改革
・購入電力
・再生可能エネルギーの利用
・低排出燃料(天然ガス)の利用
・吸収源対策
エネルギー起源CO2対策技術リスト
・家庭用高エネルギー効率機器(暖房、冷房、給湯器、HEMSetc)
・住宅断熱水準の向上
・業務用高エネルギー効率機器(暖房、冷房、給湯器、BEMSetc)
・業務用建築物の断熱水準の向上
・産業用高エネルギー効率機器(工業路、ボイラー、モーターetc)
・低燃費自動車(ハイブリッド自動車、燃料電池自動車etc)
・再生可能エネルギー利用技術
(太陽光発電、太陽熱、バイオマス、風力etc)
生産の技術革新見込み
・労働の熟練度
・各種の生産性
・付加価値率の向上率
フィードバック計算
凡例
社会経済の想定
環境対策
環境対策技術リスト
環境負荷排出量
活動量指標
環境政策
外生変数
内生変数
具体的な設定項目
(特殊な指示)
演算
代入
移動
から
へ (同じ番号へ飛ぶ)
乗算記号
対応する要素同士を乗じる (アダマール積)
次元の大きい方が残る
対応する要素同士を乗じたのち、0円の配列について合計

Role of municipalities for LCS

- Diffusion of measures
- Land-use and Transport management
- Local targets and agendas
  - London (-60% in 2025), California (-80% in 2050), Berlin (-50% in 1990) , Shiga(-50% in 2030), Stockholm (fossil fuel free in 2050), etc.
- "Local LCS Scenario"
  - Too simple estimation → inconsistent driving force?
  - However EXSS is a candidate and we used for Shiga prefecture, there were some problems for Local-scale use.

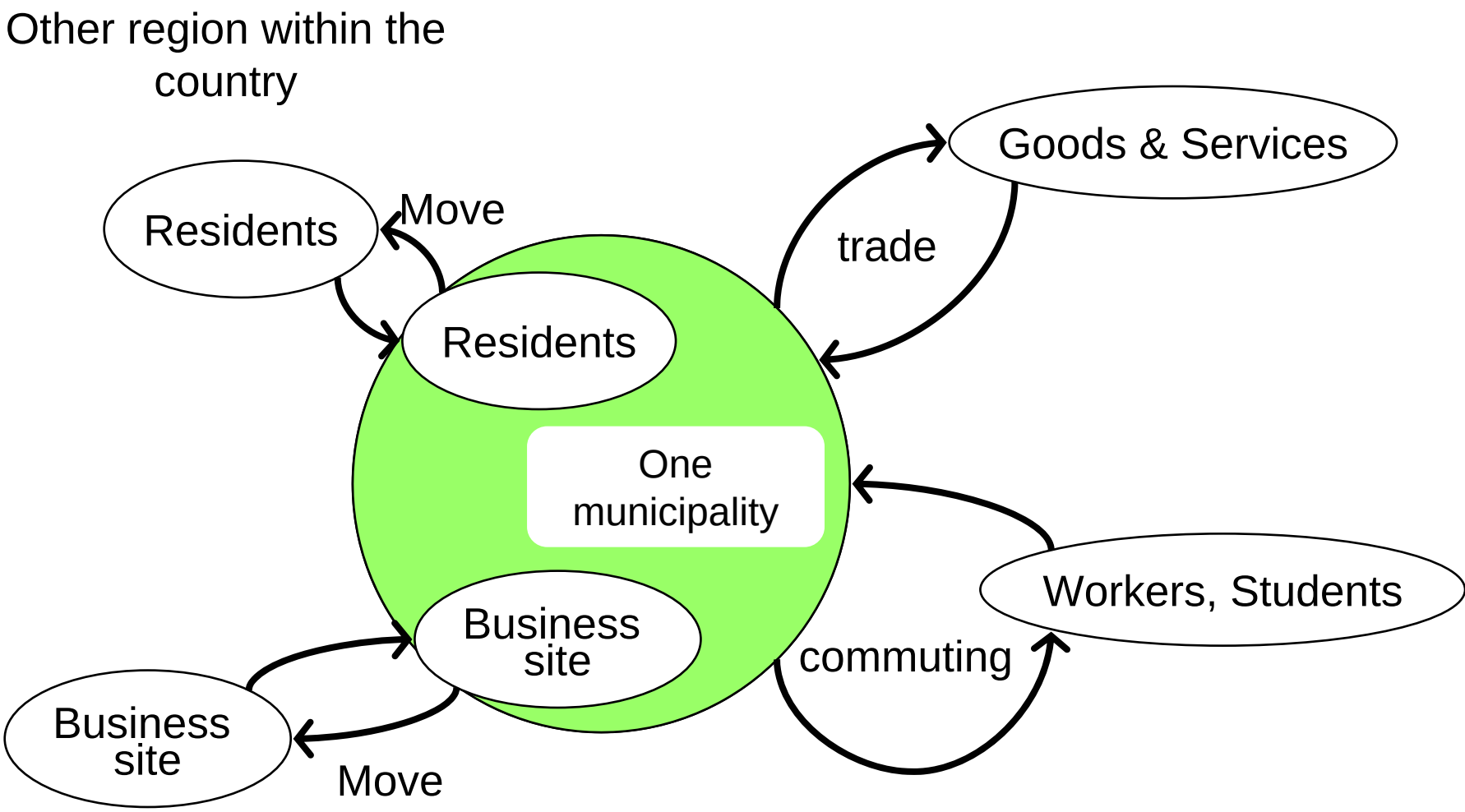
Long term climate target in the US



Local LCS scenario

- Goals and measures to achieve it
- Advantages
  - Mayors/governors have strong governing power to ALL SECTIONS in local government office.
  - Residents and businesses can get together easily because of attachment to their hometown.
- Weakness in quantitative assessment
  - Too simple estimation → inconsistent driving force?
- However EXSS is a candidate and we used for Shiga prefecture, there were some problems for Local-scale use.

Openness of local economy/society



Instability in Local economy/society

- People move, businesses move, relatively easily.
- Even when a nation is an AGED society, a city can be YOUNG.
- How can LCS scenario quantification method tackle with this openness in local scale?

"Basic industry" in a region

- Basic industry

  Industries whose products/services are sold mainly OUTSIDE of the region.

  E.g. Agriculture, manufacturing , sightseeing-related industries.

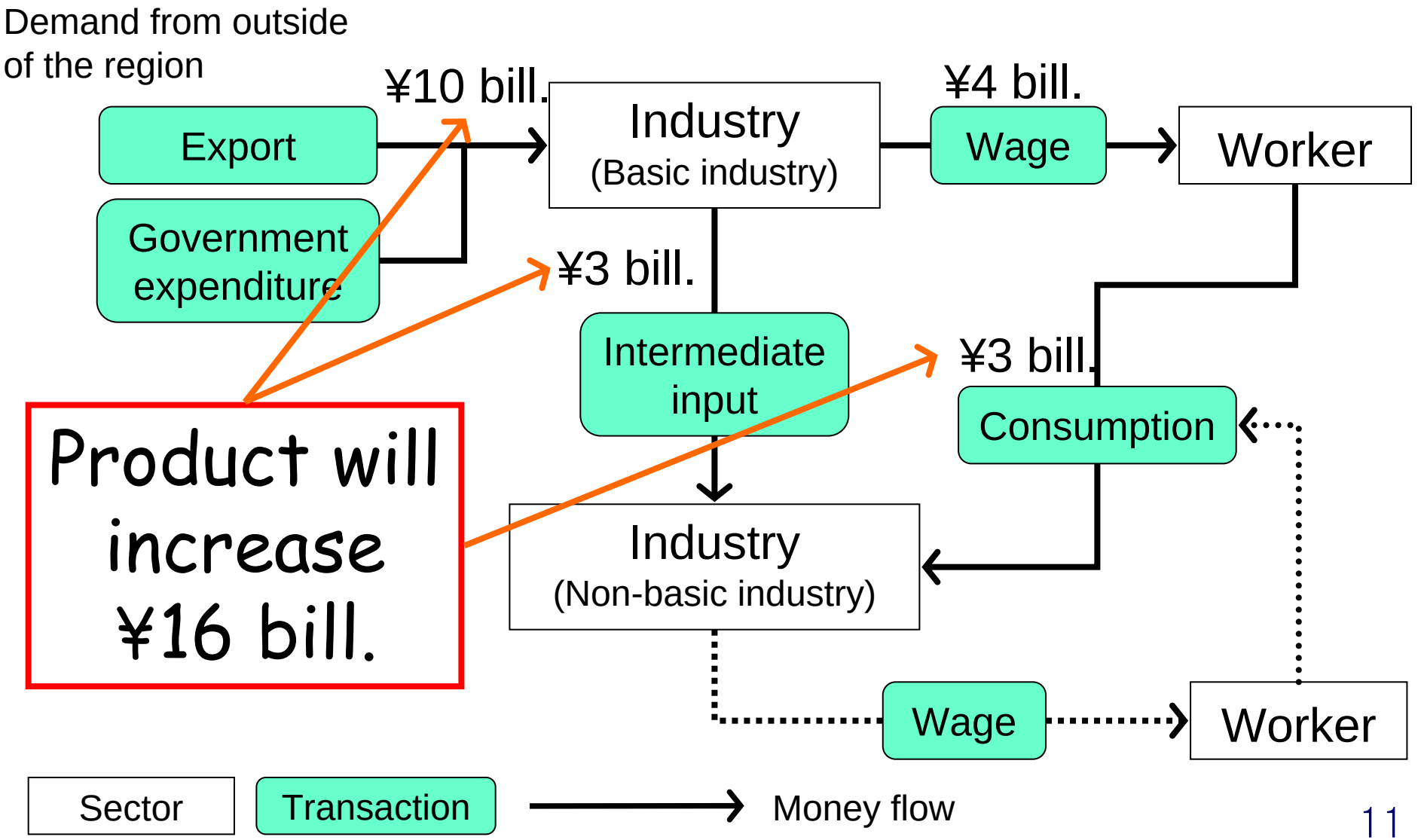
Basic industry leads development of regional economy.

- Non-basic industry

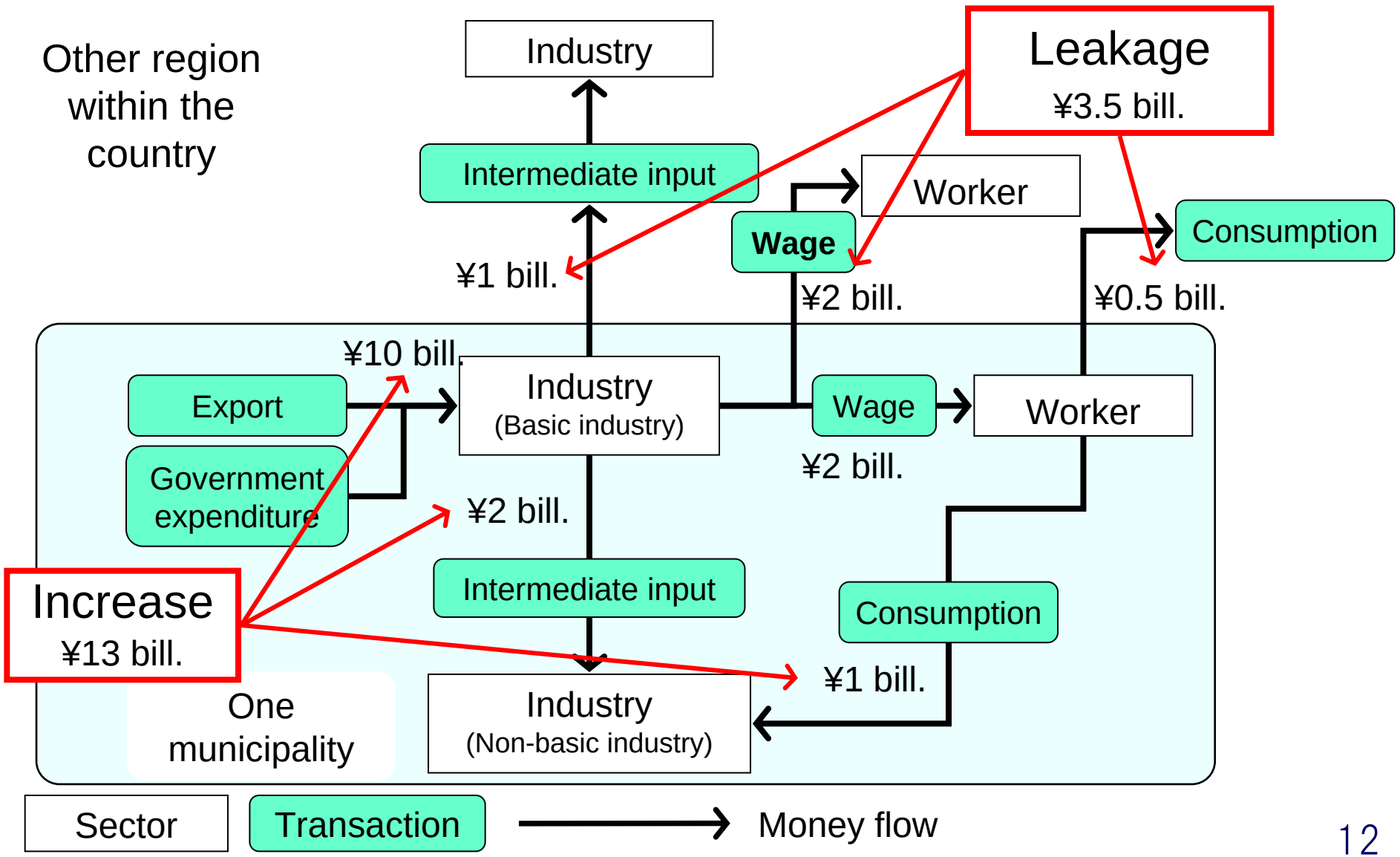
  Industries whose products/services are sold mainly INSIDE of the region.

  E.g. commerce, restaurant, services.

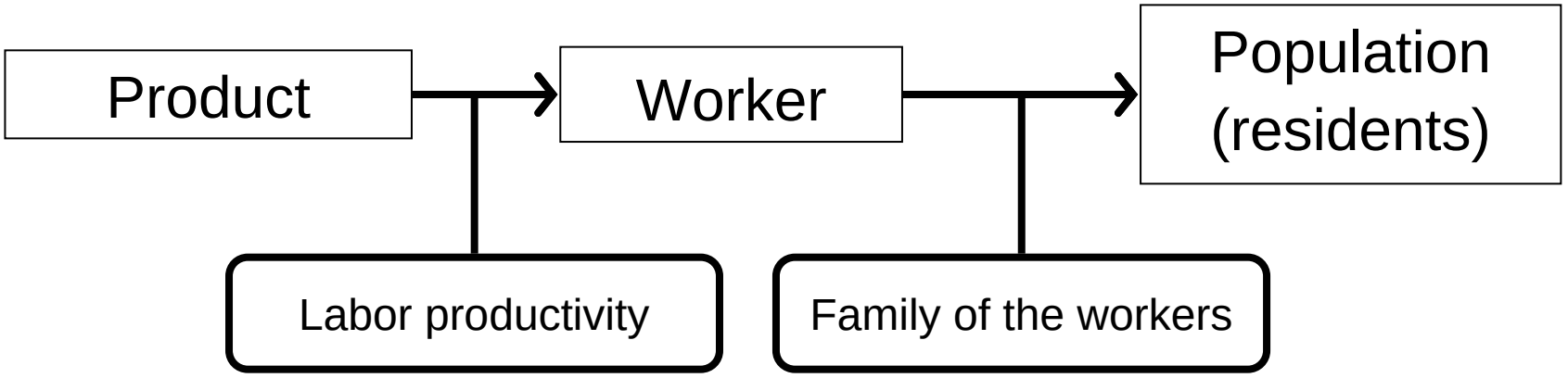
"Basic industry and multiplier" theory



"Leakage" of regional income



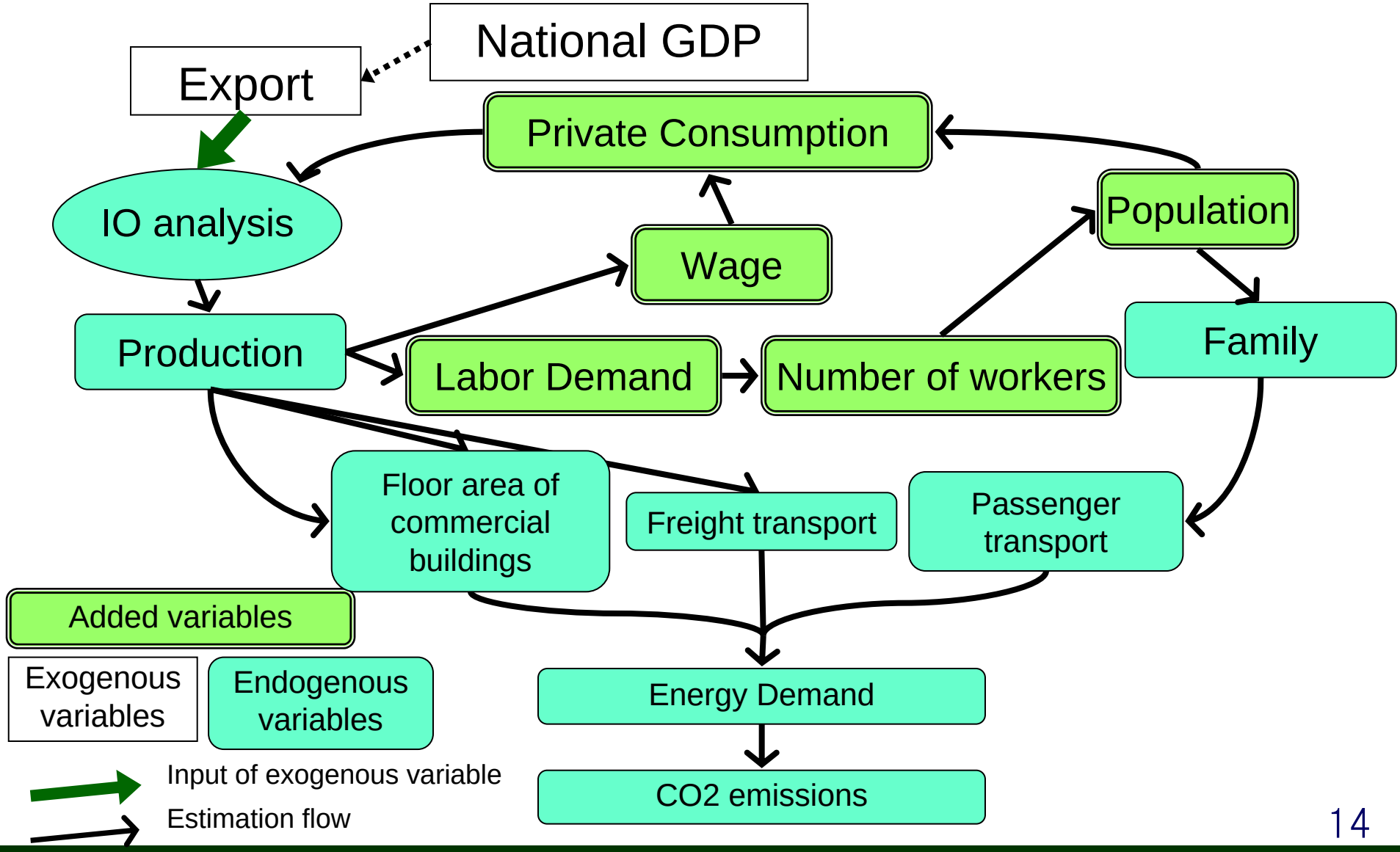
People lives near Job



Some worker may commute FROM outside of the region.

Some residents may commute TO outside of the region.

Improved EXSS for Local LCS



Application to Kyoto City

Kyoto city (in the year 2000)

- Population : 1.45 million
- Gross City Product: 6299 bill.¥, 4.3 mill.¥/capita
- CO2 emissions: 2137kt-C (7836kt-CO_2) ,
  5.31t-CO_2/capita

Industry

- Service industries
- Sightseeing (world heritage)
- Silk products ("Nishijin-ori")
- Many universities (36)

General framework

- Base year: 2000
- Target year: 2030

- Target activity: Residential, Commerce, Industry, Passenger and Freight transport (whose origin is in the city area)

- GHG target : -50% (related to 1990)
  Fossil fuel oriented CO_2

Scenarios

- Reference scenario
  - BaU: without counter measures.
    (no change in energy technology)
  - CM: with counter measures

- Sensitivity analysis
  - Growth ratio (Export: -30 ~ +30%)
  - Land-use (Population share of City center: 6 ~ 40%)
  - Self-sufficiency (import ratio: -30 ~ +30%)

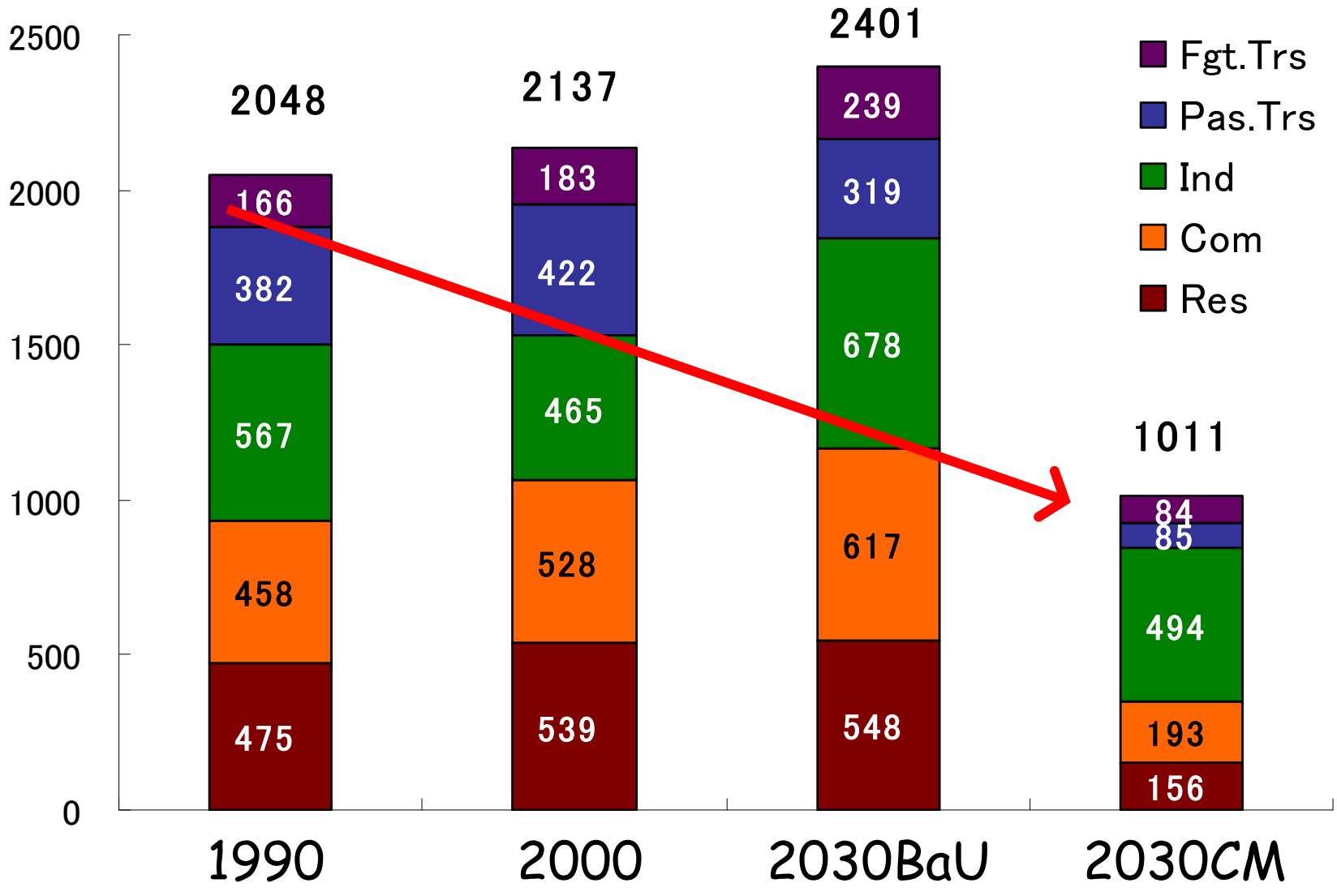
2. Assumption of Socio-economic conditions

	2000	2030
Export (bill.¥)	3727	5825
(per year growth)	-	1.50%
Family size (person/family)	2.37	2.20
Demographic composition		
0-14	12.8%	9.8%
15-64	69.8%	56.1%
65-	17.5%	26.1%
Labor participation ratio	47.1%	59.0%
Land use		
Population share of City centre	20%	18%

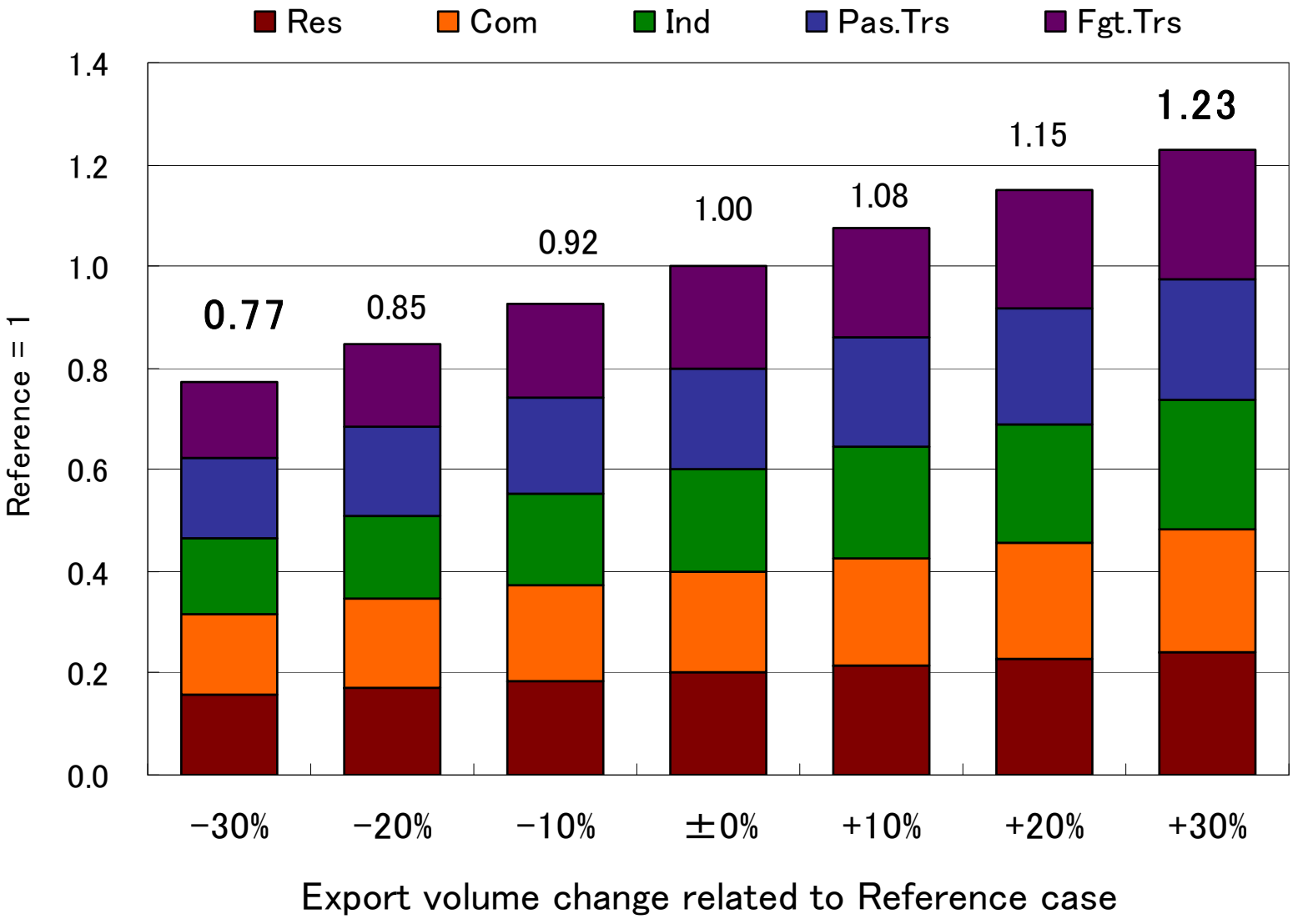
Result of Reference scenario (1)

	2000	2030	2030/2000	
Population	1474	1383	0.94	1000 person
Household	622	628	1.01	1000 household
GDP	6299	9160	1.45	bill.¥
PCGDP	4272	6625	1.55	1000¥
Production	10556	15388	1.46	bill.¥
primaly	16	10	0.61	bill.¥
secondaly	3551	5111	1.44	bill.¥
tertialy	6729	9901	1.47	bill.¥
Passenger_Trs	7821	6791	0.87	M p-km
Freight_Trs	2613	3820	1.46	M t-km

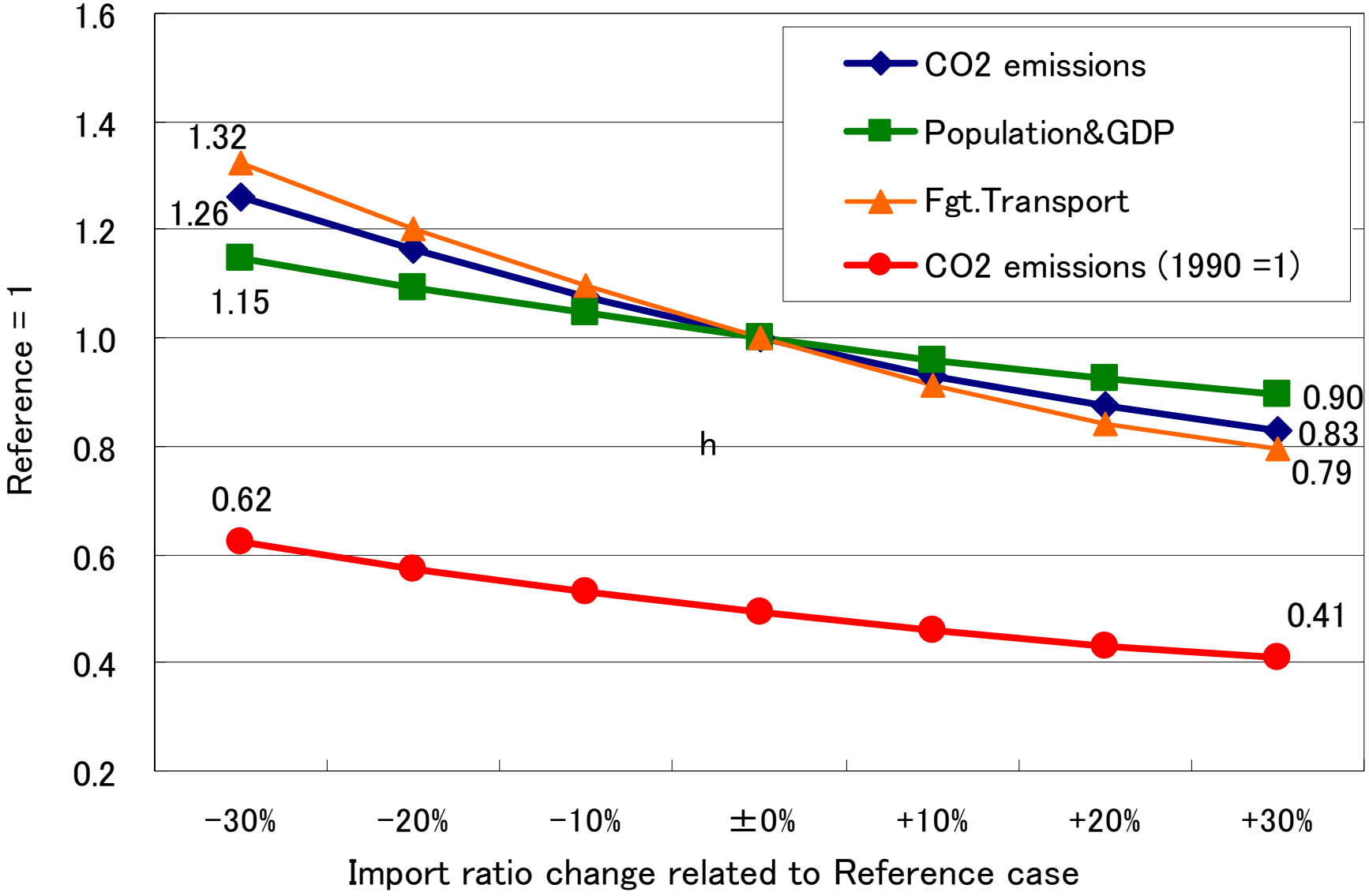
CO2 emissions by sector (ktC)



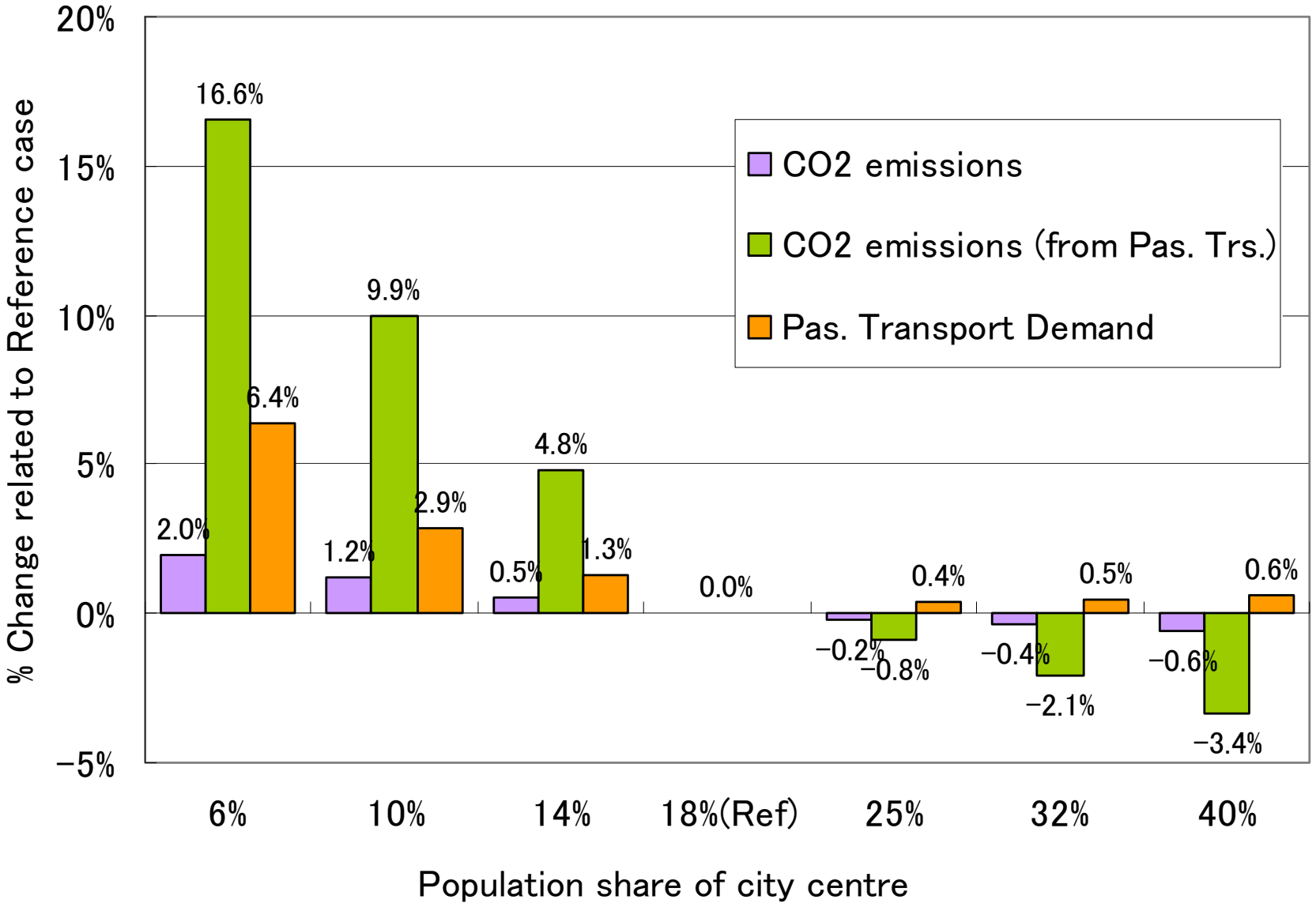
Result of sensitivity analysis (1) Export



Result of sensitivity analysis (2) Import ratio



Result of sensitivity analysis (3) Land-use



Conclusion

- We had developed Extended SnapShot tool, and this time, improved it by adding viewpoint of openness of local economy.
- We applied the tool to Kyoto city, and showed a snapshot as Low Carbon City.
- In sensitivity analysis, ±30% change in export leads ±23% change in CO_2 emissions.
- Father theme is;
  - development of user-friendly interface (tool)
  - co-operation with Kyoto city officials and help them with setting LCS goal and agenda, using this tool (application)

Special Thanks to Masatomo NAKAZA, Kyoto university.