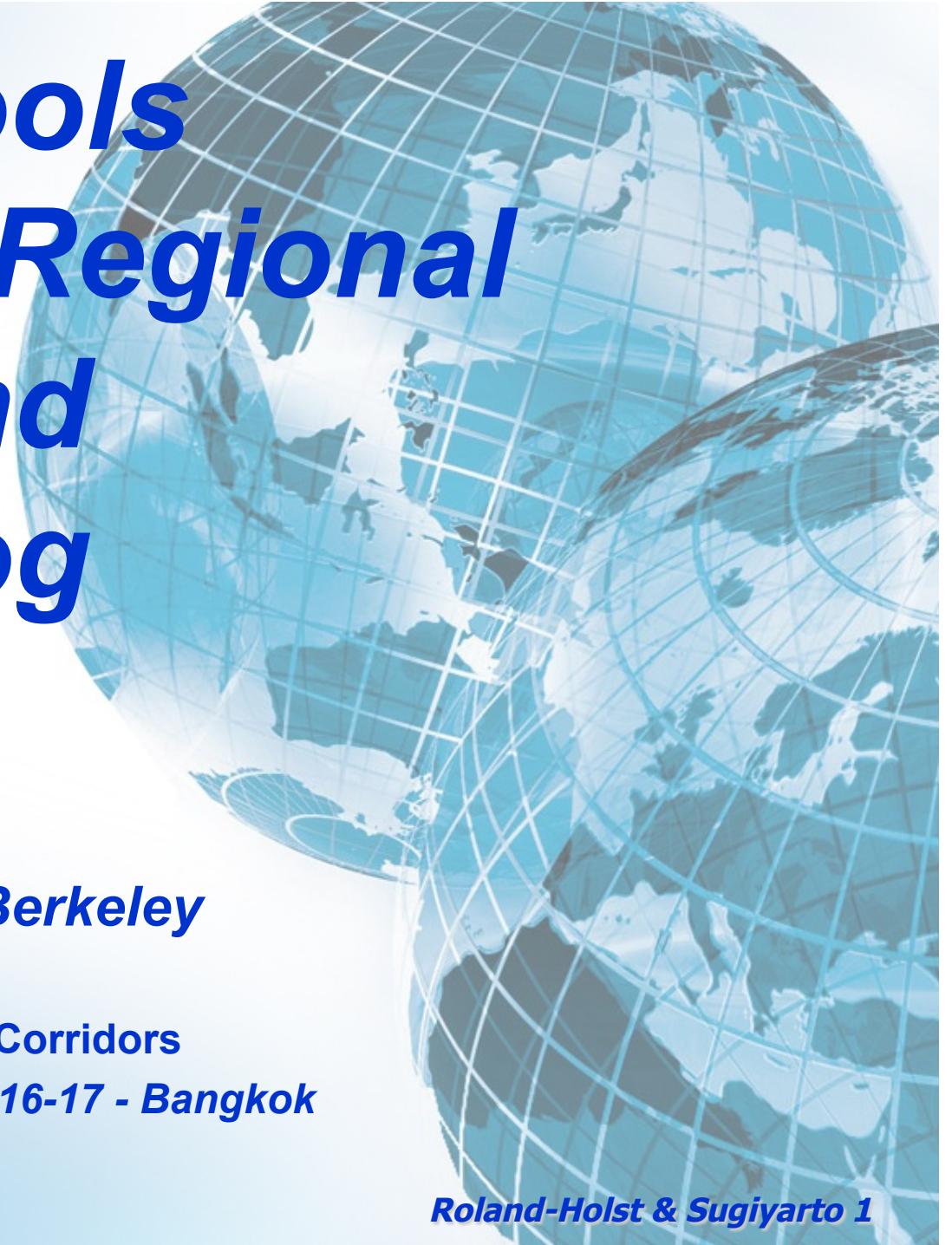


Decision Tools for CAREC Regional Planning and Policy Dialog

*David Roland-Holst, UC Berkeley
Guntur Sugiyarto, ADB*

*Modeling Approach to Economic Corridors
International Expert Meeting May 16-17 - Bangkok
dwrh@berkeley.edu*

Roland-Holst & Sugiyarto 1



Overview

- Regional economic integration is accelerating in Central Asia, thanks in significant part to determined national and international commitments to infrastructure and other investments.
- This has been complimented by substantial progress on the institutional side, promoting a more open multilateral trade and investment environment.
- In a rapidly evolving regional economy, however, decision makers need support for more evidence-based strategic planning and engagement.
- This project will develop a new generation of decision tools for forward-looking economic analysis and policy dialog, nationally, regionally and with international development partners.

How visibility can help policy

- Identify/quantify impacts:
 - Reduced costs (TTT, VOC, time, etc.)
 - Expanded investment horizons
 - Larger markets
- Transport vs. Development – model integrated economic activities
- Trade creation vs. trade diversion
- Second-generation infrastructure
- Adjustment assistance
- Support dialog generally
 - Public: local, national, regional coherence/coordination
 - Private: arouse private stakeholders to complete the Commitment Game

Traditional Methods: Multiplier decomposition analysis



Still good if you can get the data.

Consider the following schematic transactions table, an extension of input-output analysis represented by a social accounting matrix of the form

$$S = \begin{bmatrix} T & F \\ V & X \end{bmatrix}$$

where the component matrices denote transaction flows for activities/commodities (T), final demand (F), value added (V), and other domestic accounts (X).

Multiplier decomposition

Now partition the SAM with two sets of economic activities, within corridor (1) and without (2), compiled into a partitioned transactions table

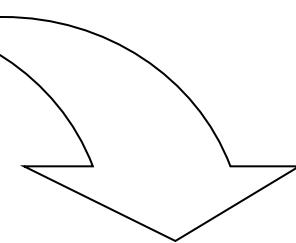
T_{11}	T_{12}	F_1
T_{21}	T_{22}	F_2
V_1	V_2	X

where the off-diagonal T matrices are transactions flows across the two groups of activities.

Block Decomposition I

To elucidate **multi-lateral** trade linkages, we carry out the following block multiplier decomposition:

T_{11}	T_{12}	F_1
T_{21}	T_{22}	F_2
V_1	V_2	X



$$M = M_3M_2M_1$$

Block Decomposition II

$$M_1 = \begin{array}{|c|c|} \hline (I-A_{11})^{-1} & 0 \\ \hline 0 & (I-A_{22})^{-1} \\ \hline \end{array}$$

Linkages

$$M_2 = \begin{array}{|c|c|} \hline I & (I-A_{11})^{-1}A_{12} \\ \hline (I-A_{22})^{-1}A_{21} & I \\ \hline \end{array}$$

Intra-group

Inter-group

$$M_3 = \begin{array}{|c|c|} \hline I-D_{12}D_{21} & D_{21}D_{12} \\ \hline D_{12}D_{21} & I-D_{21}D_{12} \\ \hline \end{array}$$

Equilibrium

Indirect

Note: $D_{ij} = (I-A_{ii})^{-1}A_{ij}$

Additive Multipliers

All three multiplier forms are related by

$$M = M_3 M_2 M_1 = I + W + B + E$$

where

- I = Identity multiplier
- $W = (M_1 - I)$ = Within group transfer multiplier
- $B = (M_2 - I)M_1 = (M_2 M_1 - M_1)$ = Inter-group bilateral
- $E = (M_3 - I)M_2 M_1 = (M_3 M_2 M_1 - M_2 M_1)$ = Equilibrium

More Advanced: Central Asian Policy Simulation Model (CAPSIM)



- The basic architecture of this regional modeling facility will be based on a global prototype designed at the University of California, Berkeley.
- This combines a multi-country Calibrated General Equilibrium (CGE) forecasting model with a state-of-the-art, browser-based, GIS user interface.
- To protect confidentiality of official data, these tools would be implemented on local computers rather than the Internet.
- Local policy researchers can then manipulate input data and scenario assumptions and assess their long term regional impacts and implications.

Regional CGE Model:

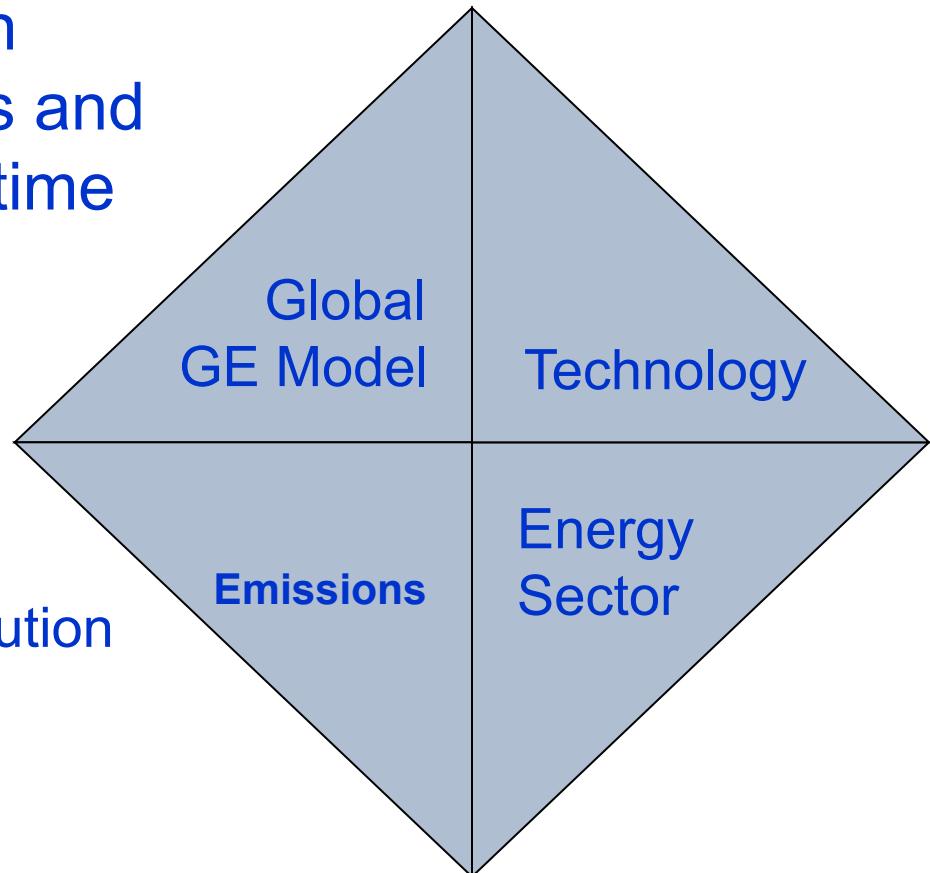
- A global database for assessing economic linkages, policy and market outcomes, energy flows, and environmental impacts
- A state-of-the-art, forward looking economic scenario tool
- Information capacity:
 - Calibrated to GTAP-8, CAREC economies and up to 124 other countries/regions (99% of CAREC GDP without Tajikistan, Turkmenistan, Uzbekistan)
 - Up to 57 sectors/commodities
 - Annual projections to 2030

How we Forecast

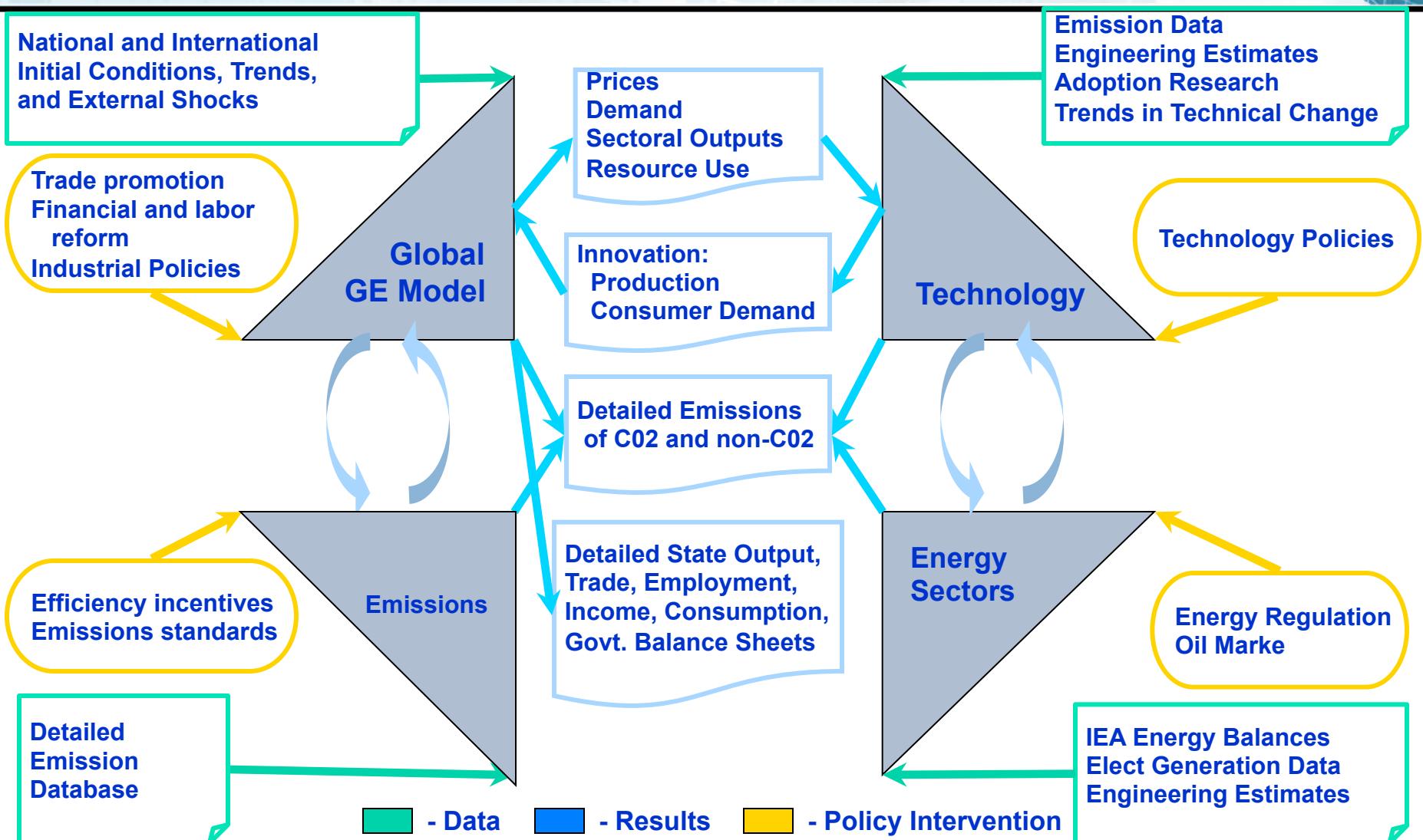
The CGE model has been developed in four areas and implemented over two time horizons.

Components:

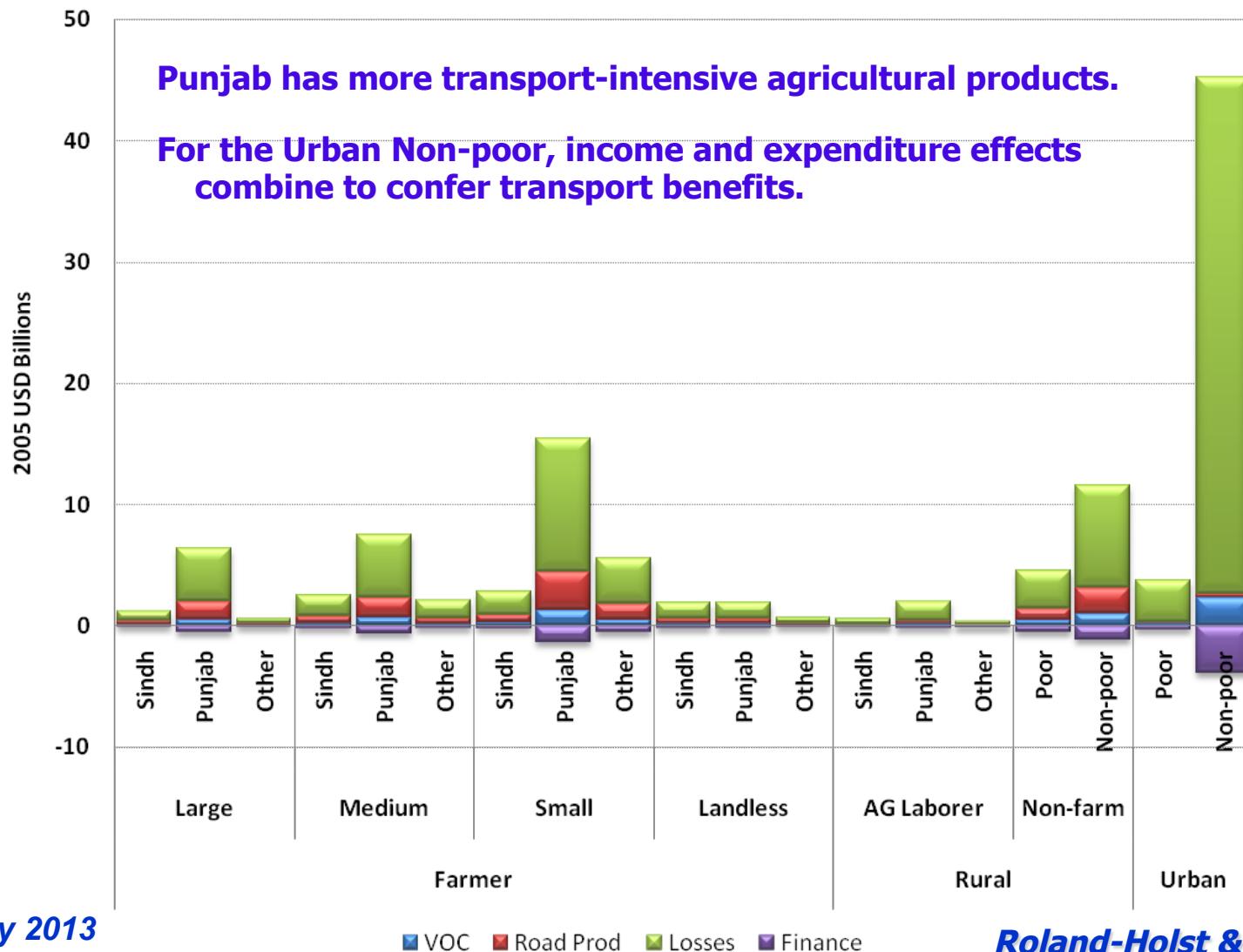
1. Core GE model
2. Technology module
3. Energy production/distribution
4. Emissions module



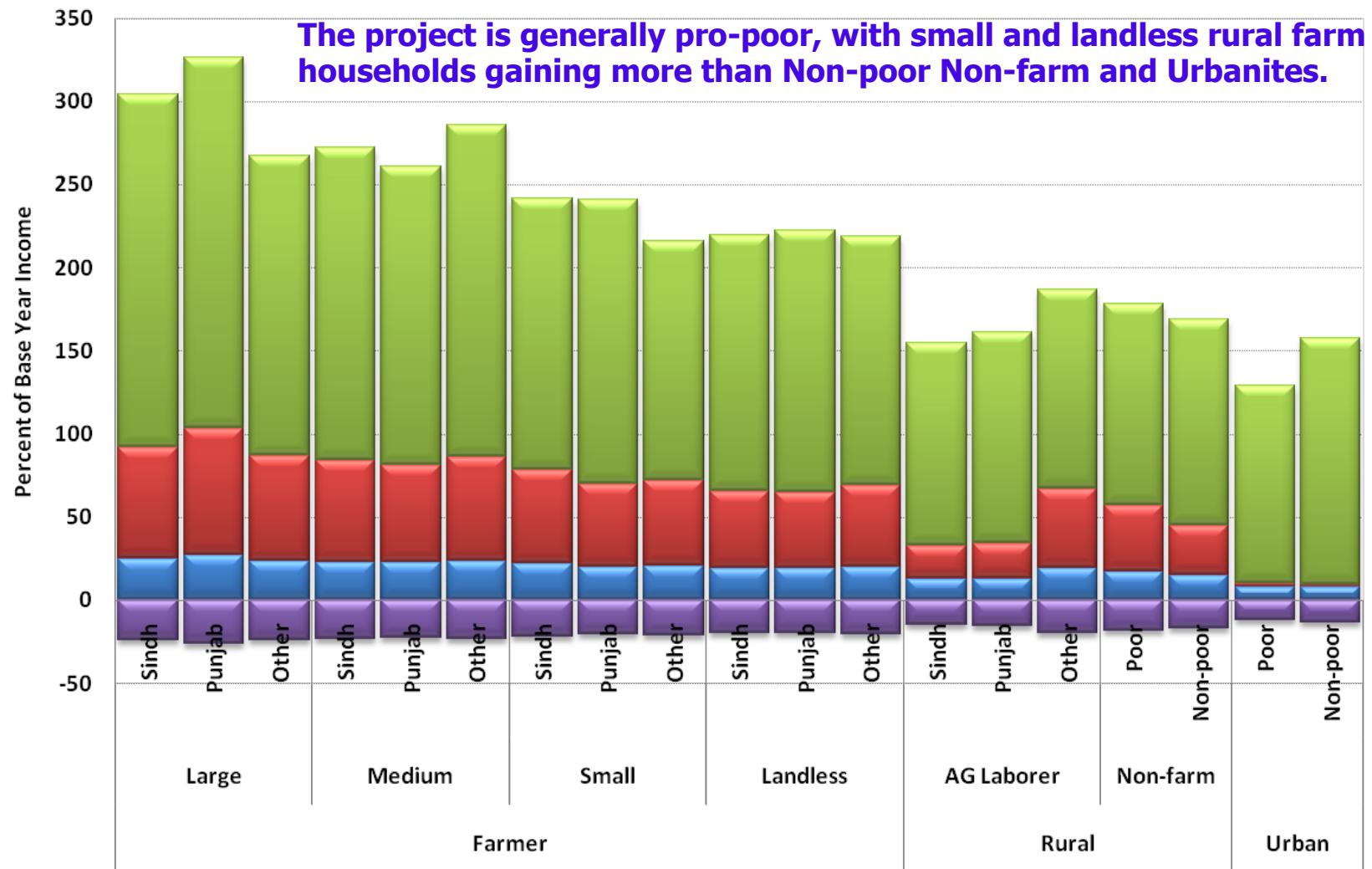
Detailed CGE Framework



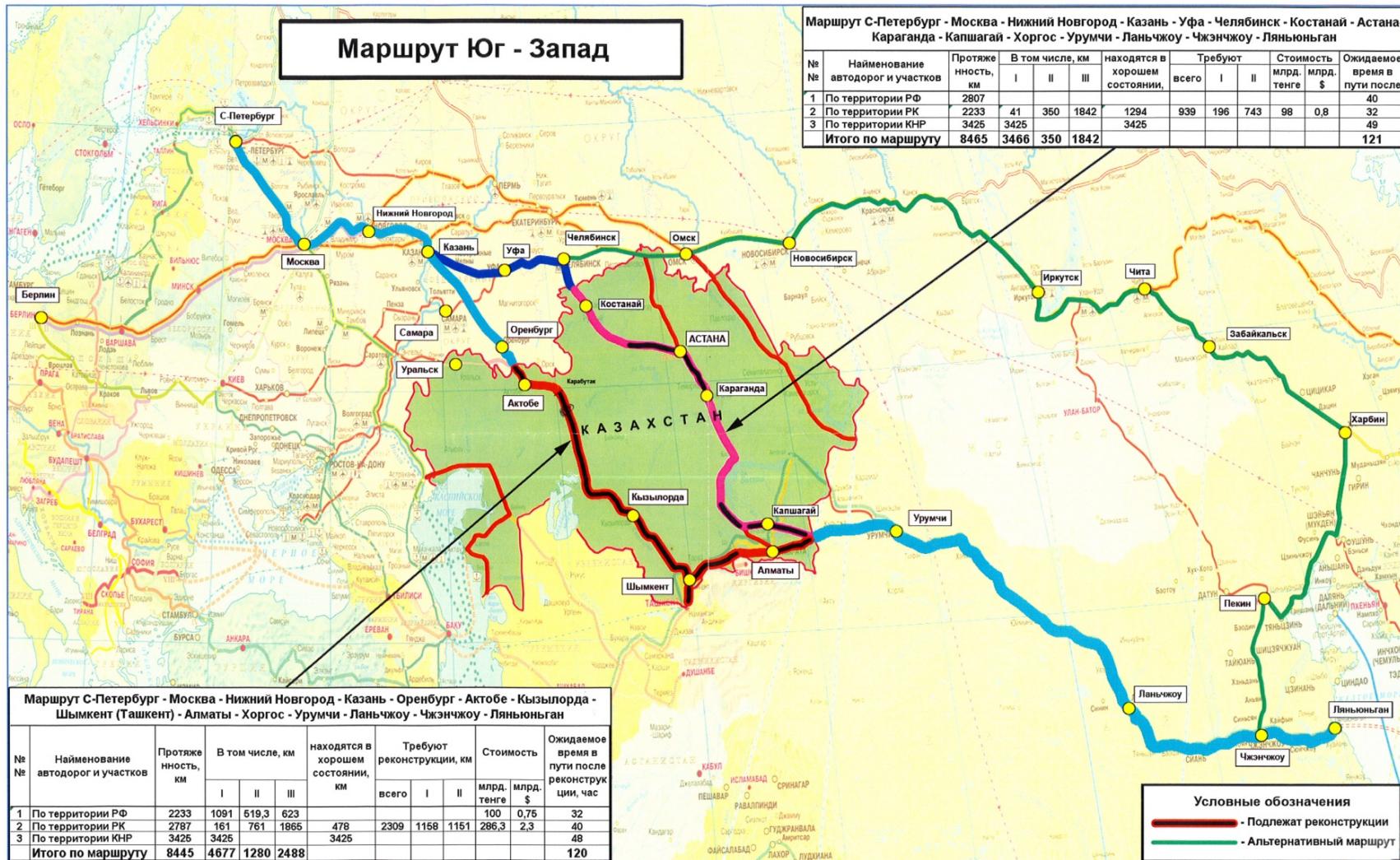
Example 1: Pakistan Northern Corridor Household Real Income Growth Cumulative Over Baseline, Pakistan 2006-2030



Household Income Growth as a Percent of 2006 Pakistan Income



Example 2: Kazakhstan Corridor



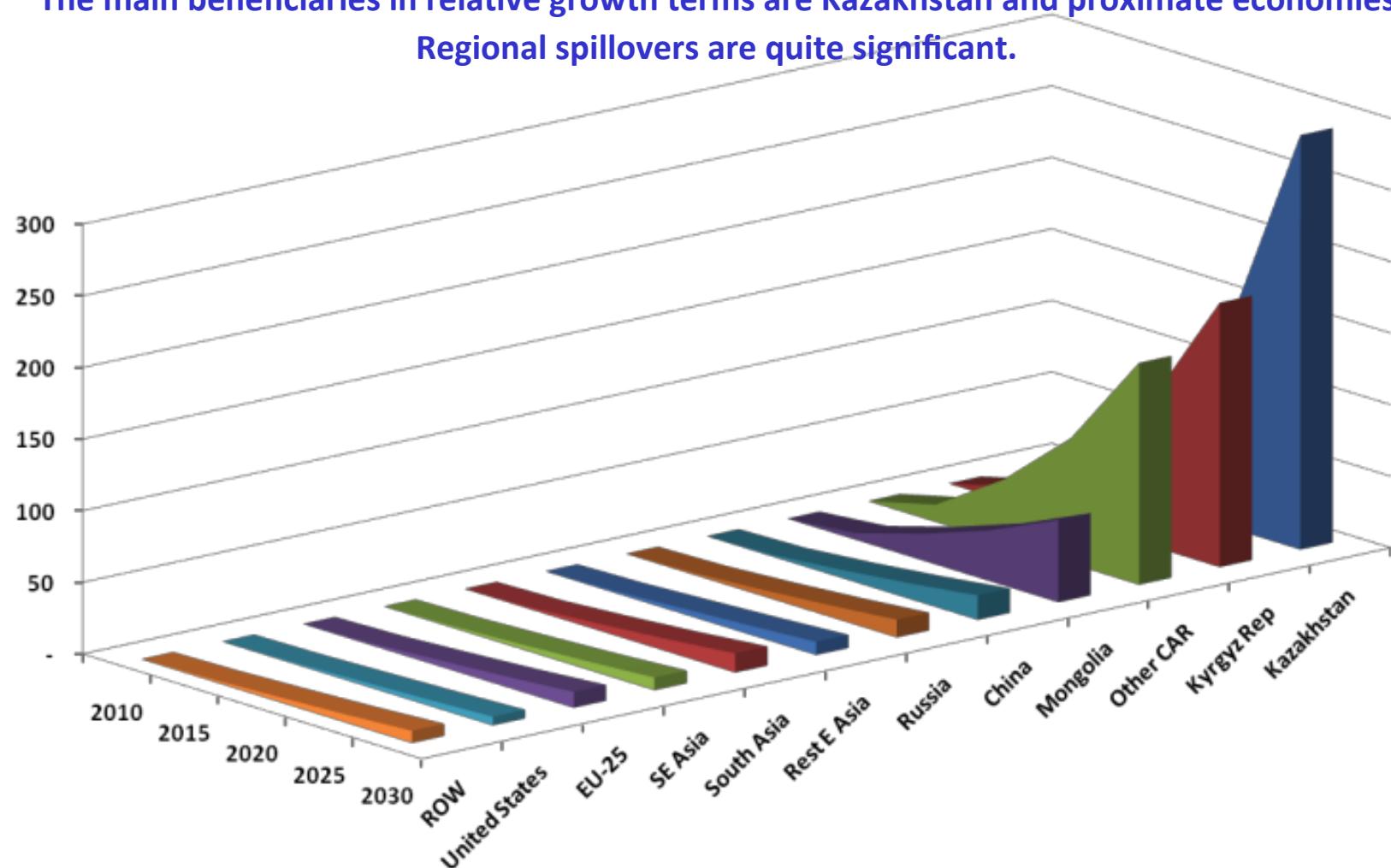
Real GDP Growth

(Percent of 2010, annual with respect to Baseline)



The main beneficiaries in relative growth terms are Kazakhstan and proximate economies.

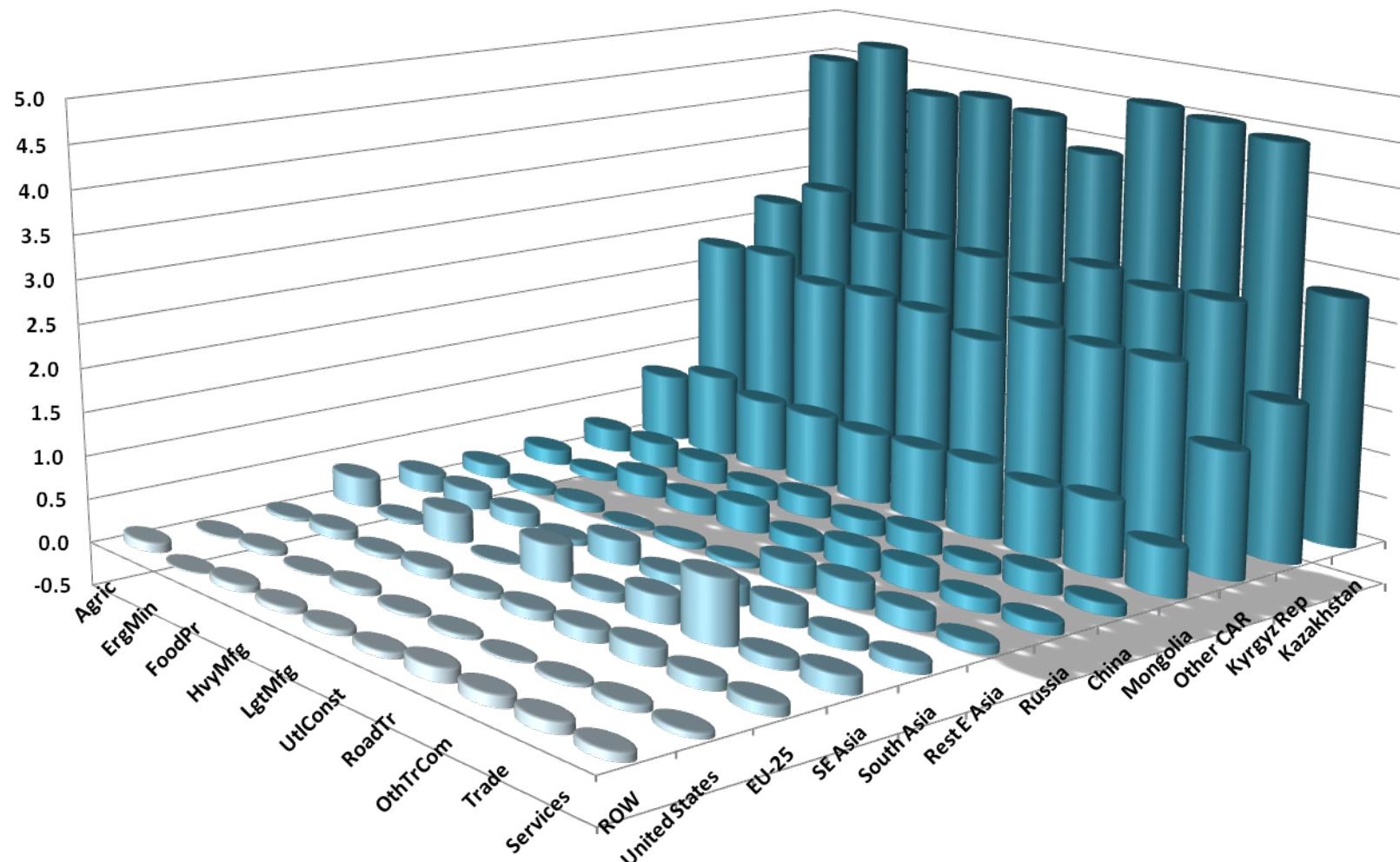
Regional spillovers are quite significant.



Sectoral Output Growth (Multiple of Baseline in 2030)



Sectoral benefits are relative uniform for local economies, more varied for trading partners.

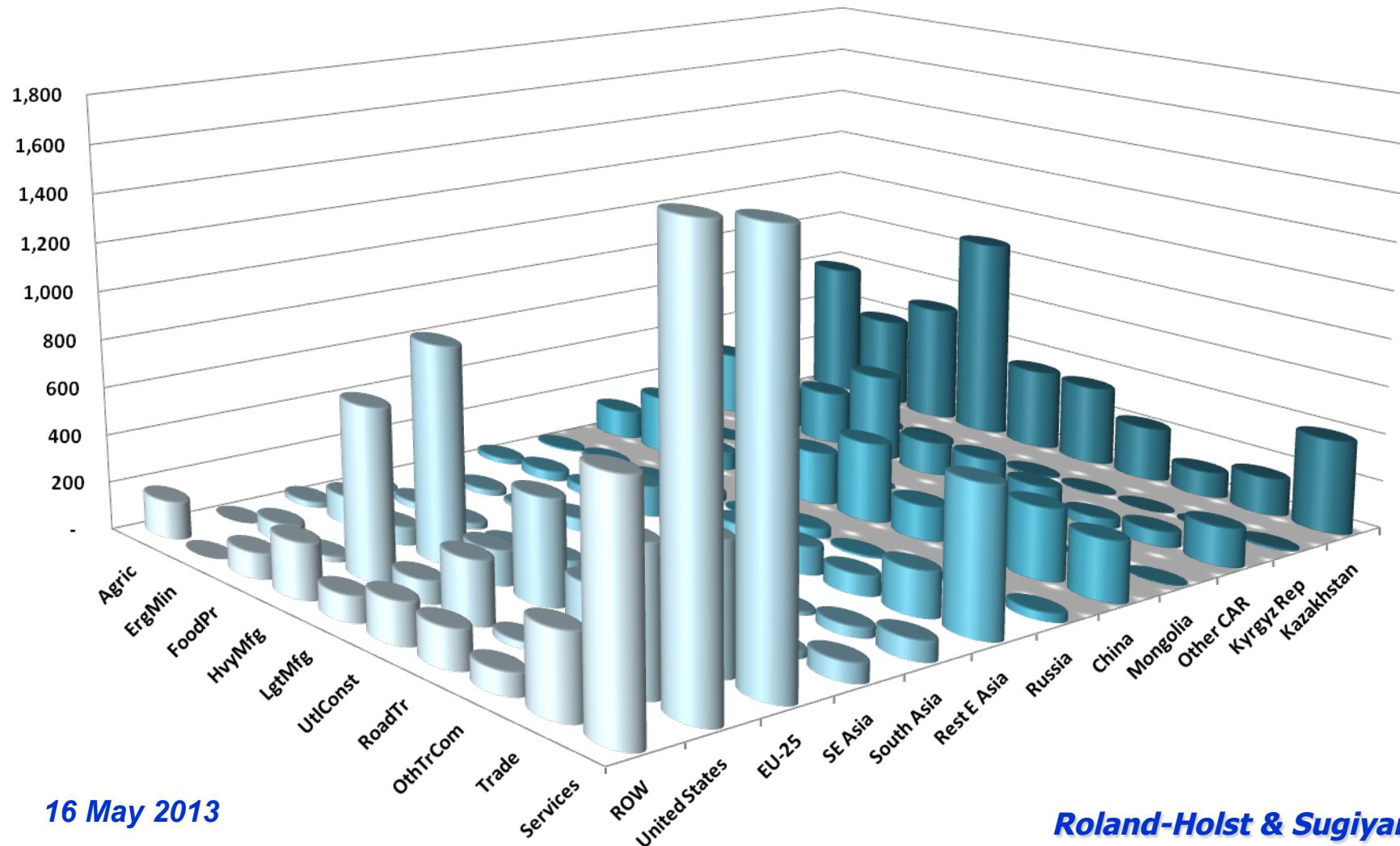


Sectoral Output Growth

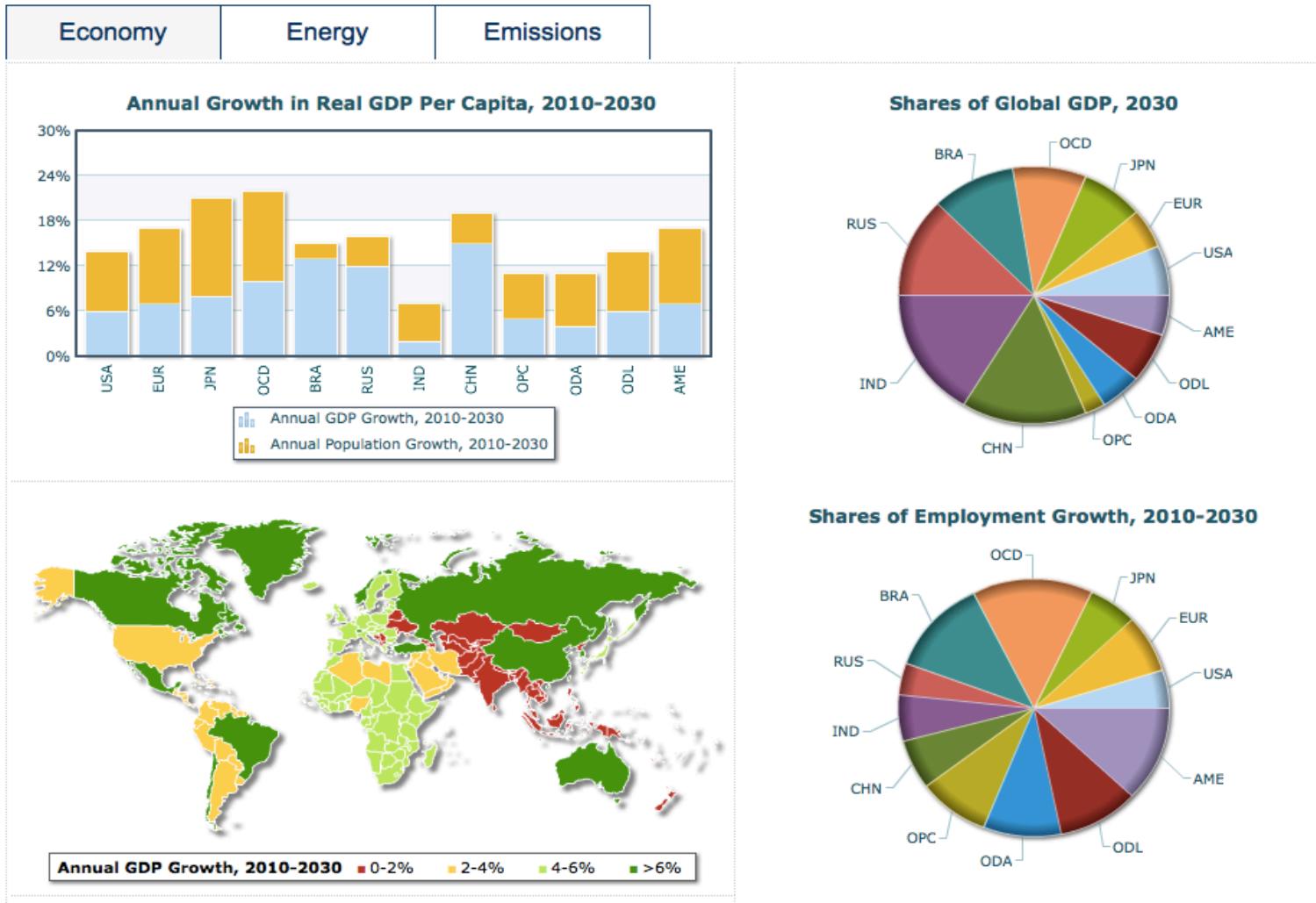
(USD 2010 Millions wrt Baseline in 2030)



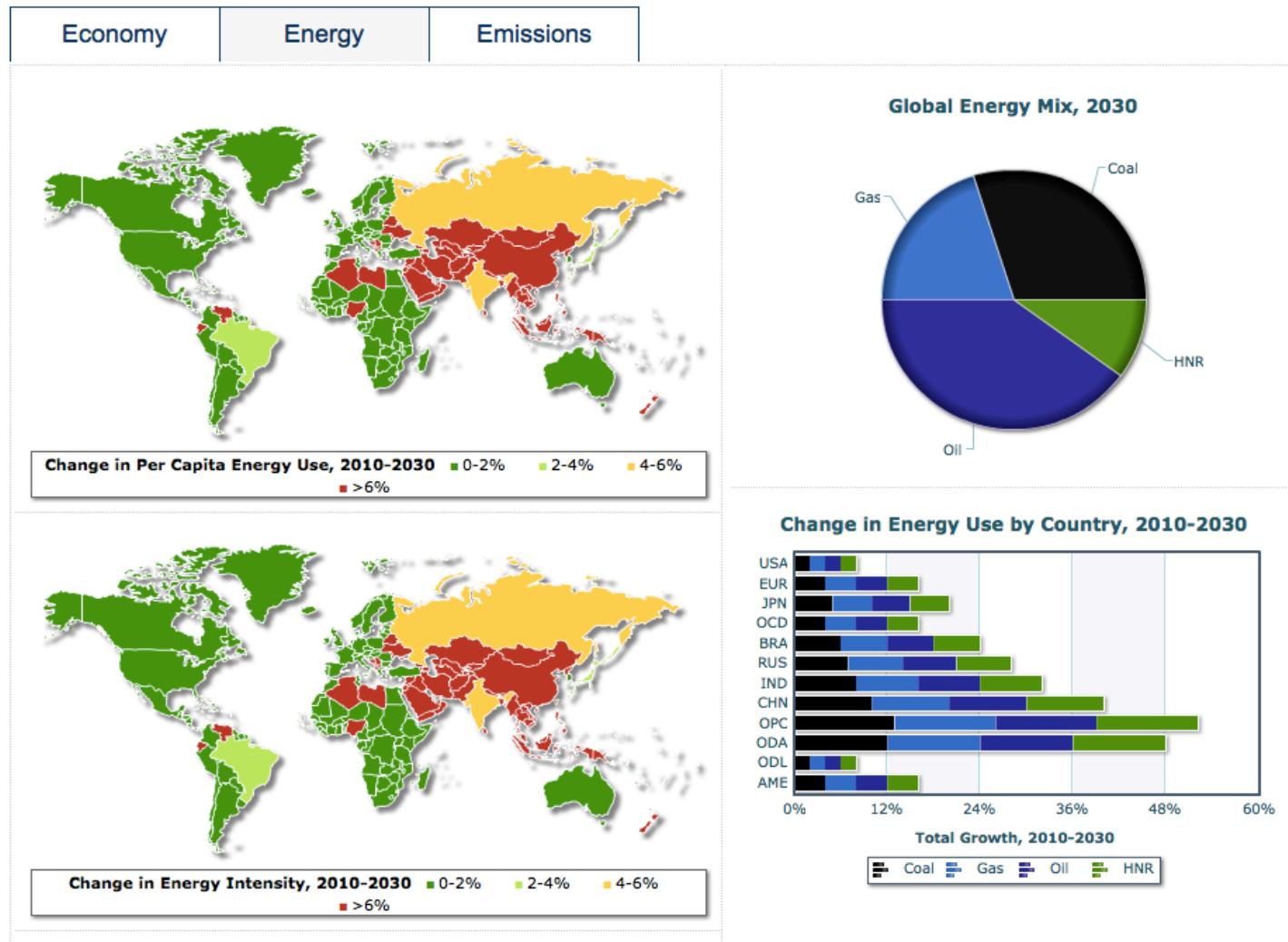
Nominal gains are much more varied, depending on initial scale and trade shares.



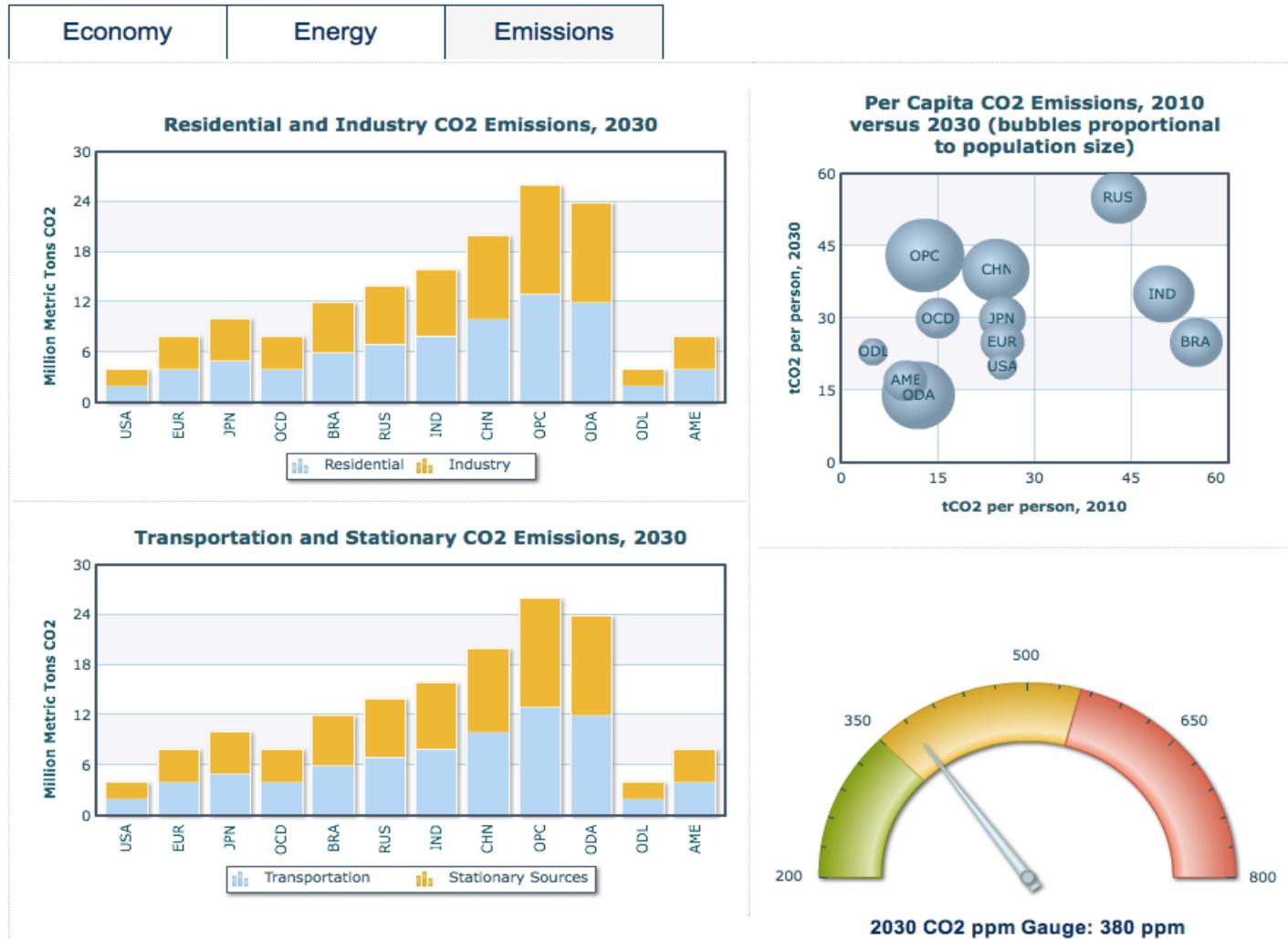
Sample User Interface: Economy



Sample User Interface: Energy



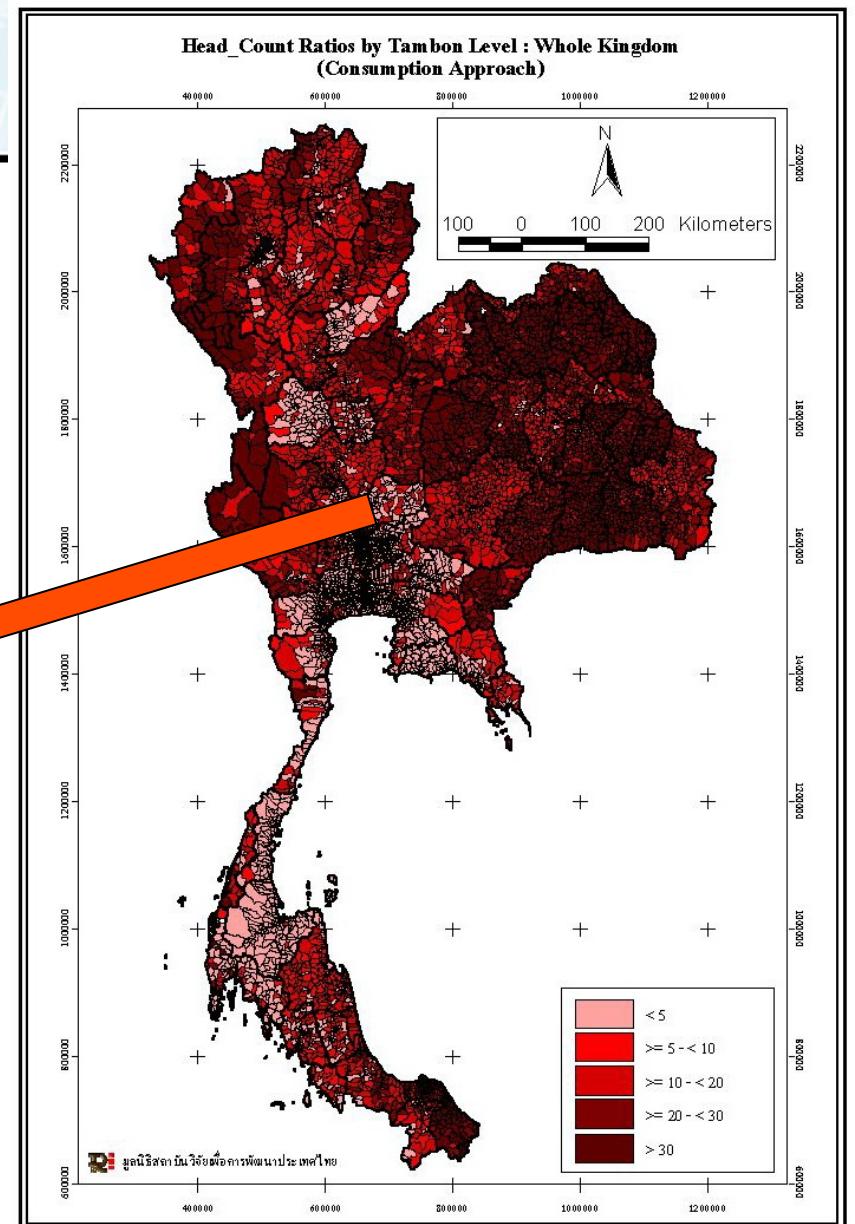
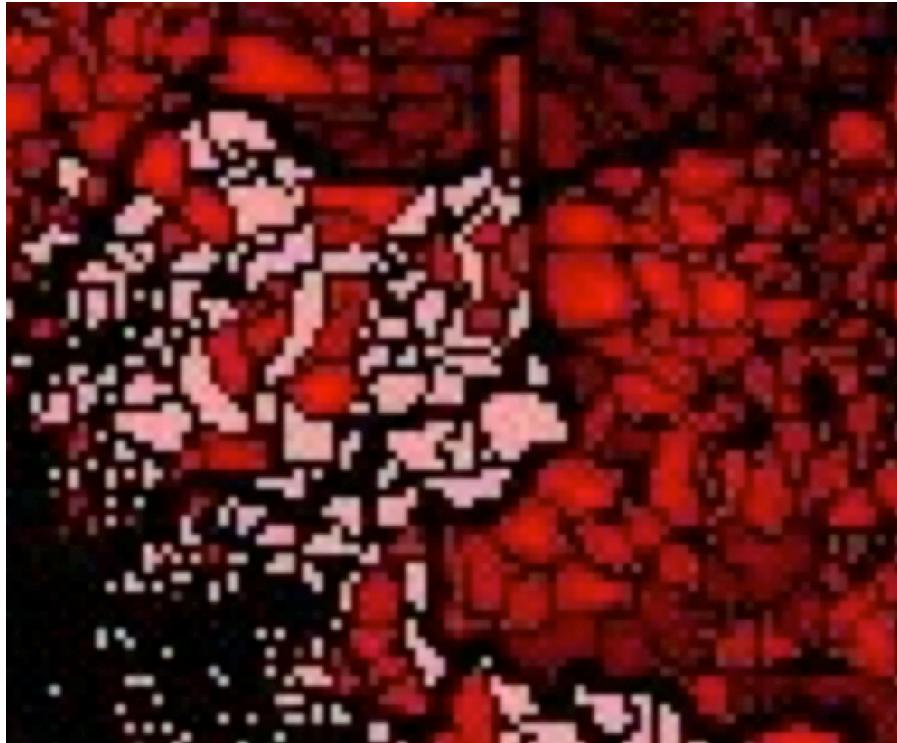
Sample User Interface: Emissions



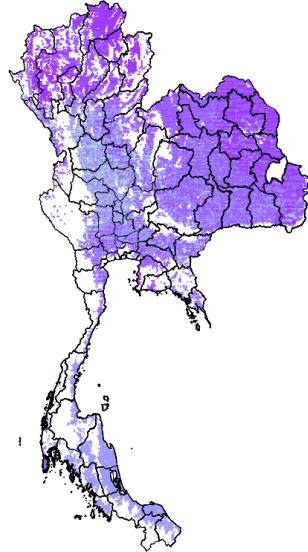
Extensions

1. Regional assessment of trade and investment potential and trends.
2. Transport pathways: Detailed regional and national impact analysis.
3. Energy pathways: Detailed regional and national impact analysis.
4. Dynamics of regional growth and poverty reduction.
5. Trends in urbanization and rural development.
6. Resource development, public investment, and fiscal sustainability.
7. Demographic assessment, including impacts of migration, labor force development and employment patterns, and other socioeconomic trends.
8. Corridor project and other public policy impacts on development indicators, MDG's, etc., nationally and regionally.
9. Coordination with agent-based GIS modeling to improve policy targeting and impact evaluation.

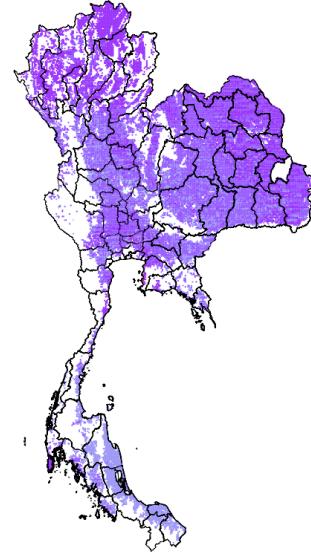
Income Distribution, Thailand, World Bank - 2003



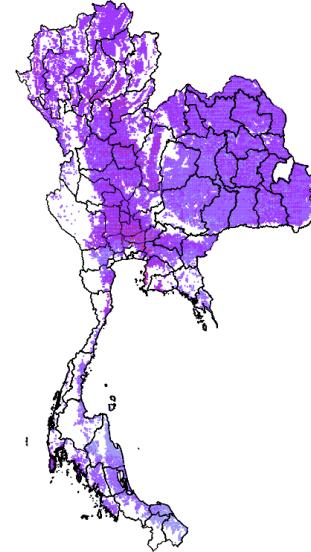
2020



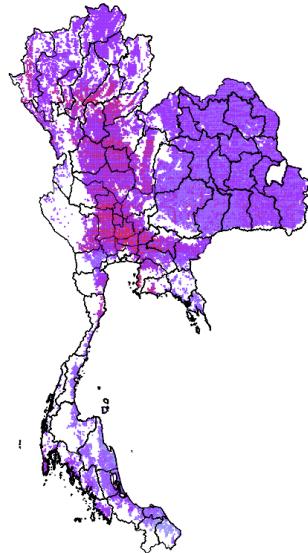
2030



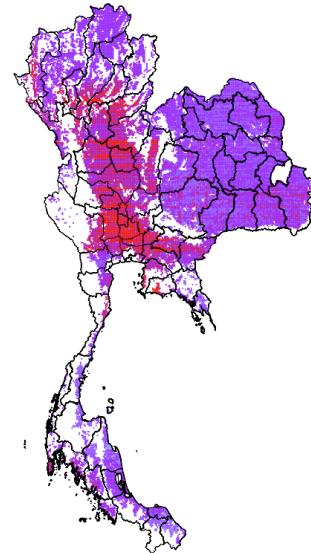
2040



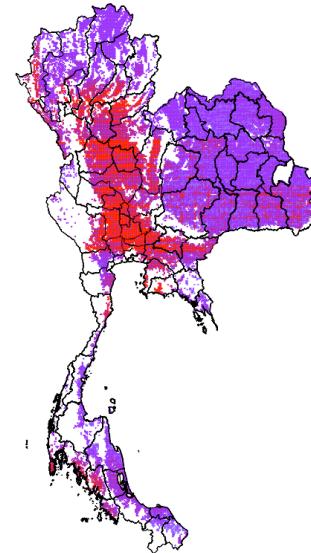
2050



2060

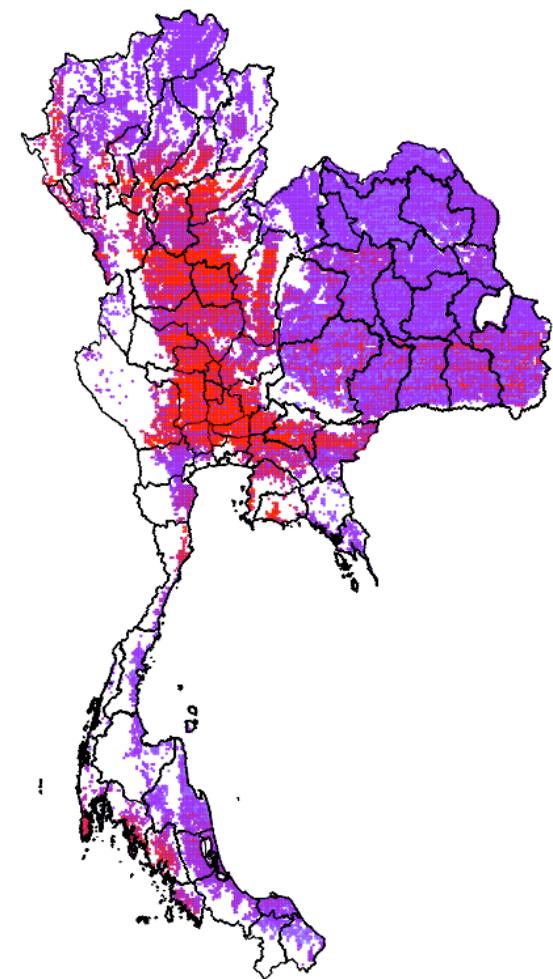


2070

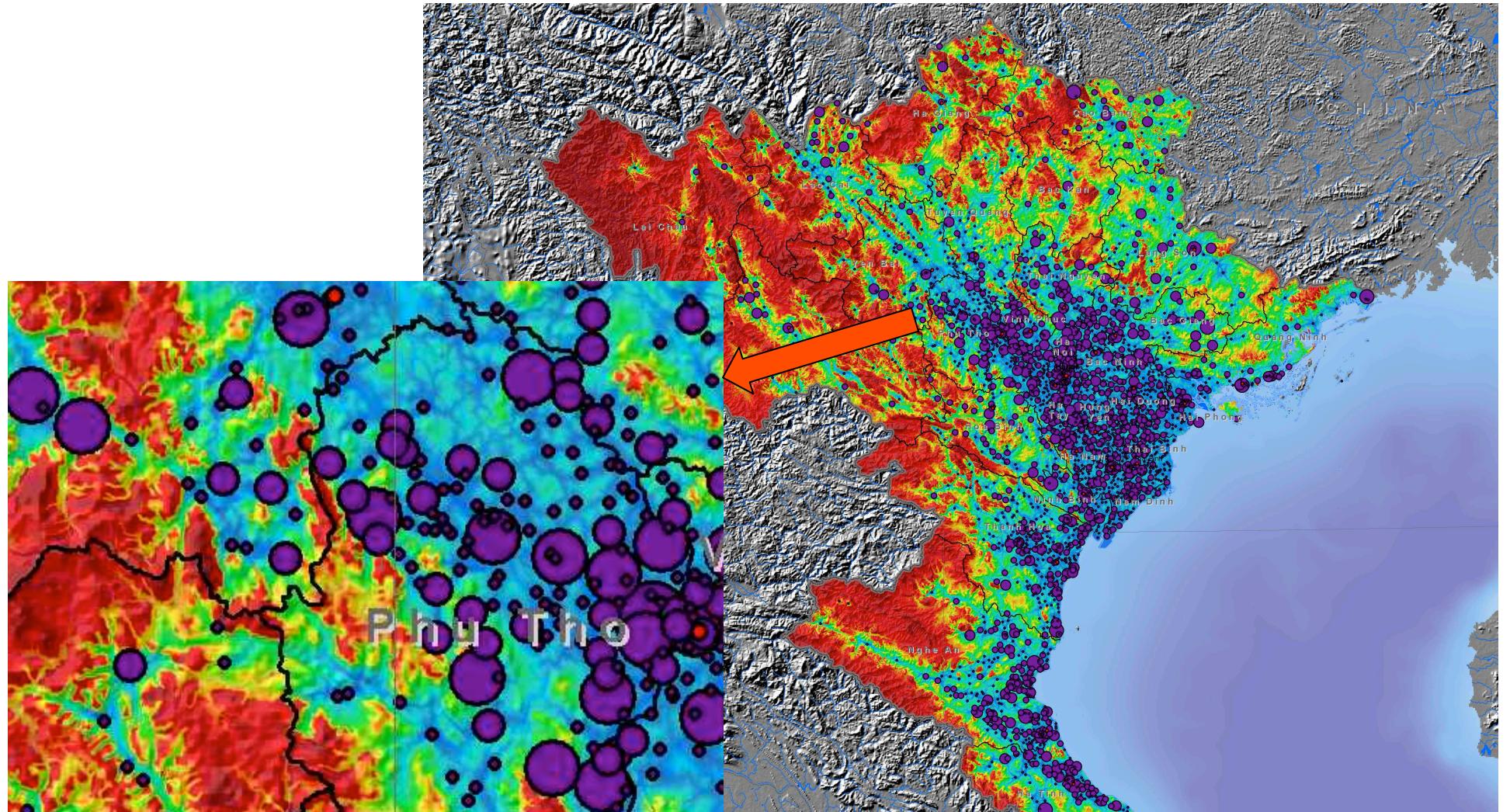


Rice Yield Changes: A1B Scenario

2070



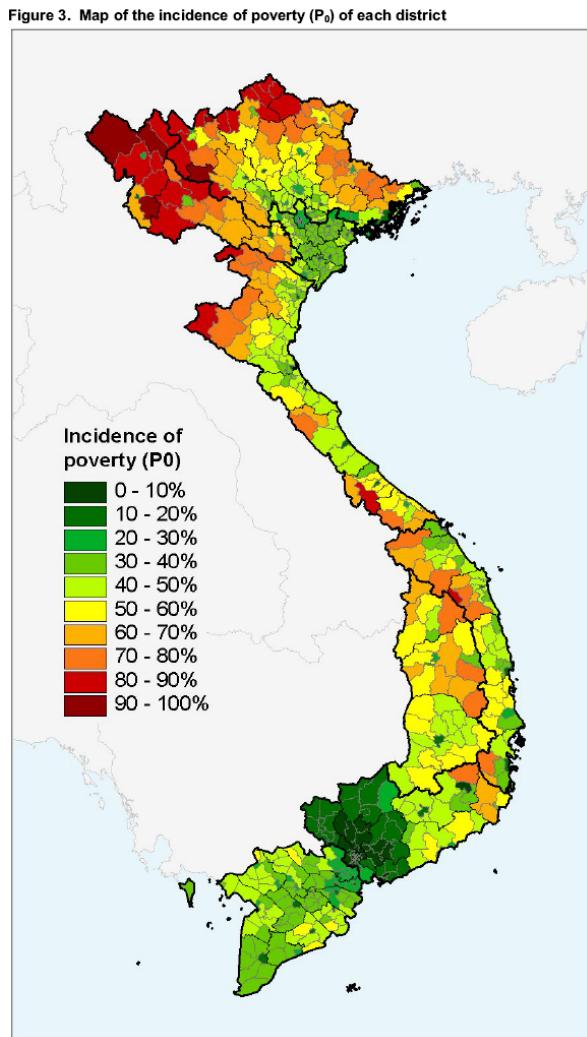
Vietnam: Poverty headcount, market size and access, 2004



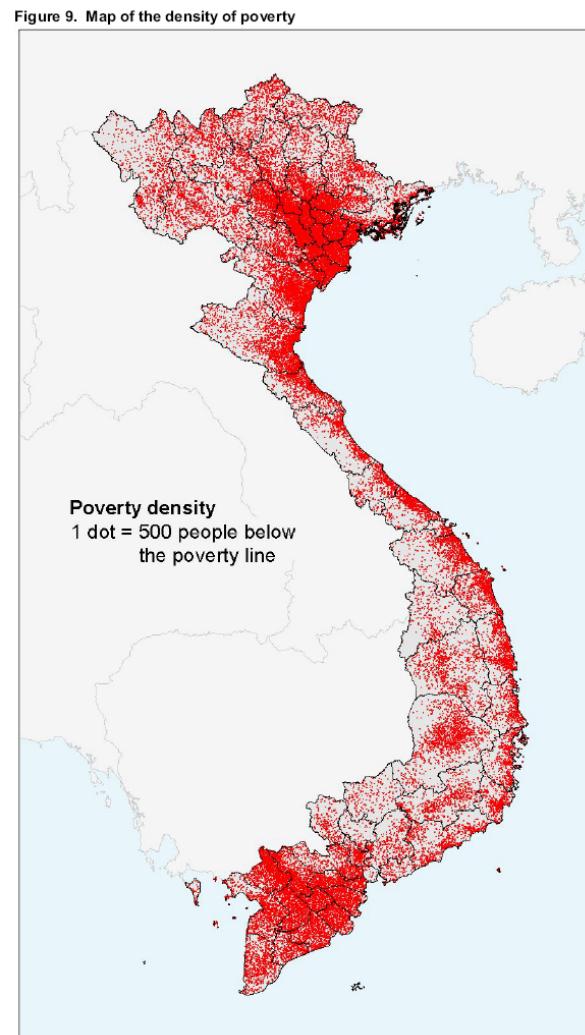
Most of the Poor Live in Proximity to Large Markets



Poverty Incidence



Poverty Density





Thank you