



UNITED NATIONS  
UNIVERSITY  
CRIS

Institute on Comparative Regional Integration Studies

GR:REEN

Global Re-ordering:  
Evolution through European Networks

## Future Trends Series - GR:REEN Project

### Title of the report

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**Global demographic trends and future carbon emissions**

### Area

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Demography

### Reporter

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Proceedings of the National Academy of Sciences of the United States of America (PNAS)

### Type of the Reporter

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Think tank

### Periodically updated?

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No

### First issued year

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2013

### Latest update

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### Official website

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<http://www.pnas.org/>

### Language available

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English

### Short summary

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The paper addresses the relationship between demographic change and global emissions of carbon dioxide, greenhouse gas and energy use. Emissions scenarios should include a range of demographic dynamics such as global trends in population size, age structure and urbanisation changes. The conclusion shows that global aging and urbanisation are demographic factors that could influence (mainly by decreasing) carbon dioxide emissions. The slowdown of population growth could allow the reduction of 16-29per cent of the total emissions necessary by 2050 to avoid the harsh effects of climate change.

### Key trends

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- Modelling results show that the transformation in population composition can influence (by decreasing) significantly carbon dioxide emissions in particular regions.
- Population aging in industrialised regions tends to decrease emissions by 20per cent in a long-term prospect. Ageing of population influences carbon dioxide emissions mainly through the implications it holds on labour supplies as population ageing implies lower labour participation, productivity and lower economic growth.
- Future trends in urbanisation and their impact on labour supplies are expected to increase emissions by more than 25per cent. In developing countries, urbanisation is the main factor affecting emissions. Future growth in urban labour is forecasted to increase economic growth. This observation will be

particularly present in developing countries.

- Global changes in household size have a limited but existing impact on emissions. Those projections capture the consequences of behavioural change relating to carbon dioxide emissions on household size in China and the United States. In China, a future reduction of the household size could lead to less carbon dioxide emissions as ageing combined with a decrease in household size reduce labour supplies.

## Suggestions

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- Greater attention should be given to global emissions of carbon dioxide and their implications on the future of demographic trends, with a particular focus on urbanisation and population aging.
- Improving modelling of these trends would allow a better understanding of potential speed in growth of future demands in energy which is essential in order to develop mitigation strategies.
- Comparative analysis of these trends between regions should be further studied; in particular key regions and countries such as China, India, Russia, the United States and the European Union.

## Methodology

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Research from primary and secondary sources

### Reference to other trends reports? If yes, which reports?

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- Grübler, et al., Regional, national, and spatially explicit scenarios of demographic and economic change based on SRES, Technological Forecast Social Change 74:980–1020, 2007.
- K. Riahi, A. Grübler, N. Nakicenovic, Scenarios of long-term socio-economic and environmental development under climate stabilization, Technological Forecast Social Change 74:887–935, 2007.
- BC O'Neill, Conditional probabilistic population projections: An application to climate change, Int Stat Rev 72:167–184, 2004.
- S. Pacala, R. Socolow, Stabilization wedges: Solving the climate problem for the next 50 years with current technologies, Science 305:968–972, 2004.