



ADB Working Paper Series

**How Low-Carbon Green Growth
Can Reduce Inequalities**

Venkatachalam Anbumozhi
and Armin Bauer

No. 420
May 2013

Asian Development Bank Institute

Venkatachalam Anbumozhi is capacity building economist at the Asian Development Bank Institute (ADBI). Armin Bauer is economist at the Asian Development Bank (ADB).

An earlier version of this paper was presented at the ADBI conference, The Environments of the Poor: Responding to Climate Change and the Green Economy, held in New Delhi on 24–26 November 2010. Thanks are gratefully extended to the many individuals and organizations who gave generously of their time and expertise to inform these efforts, and particularly to Arianto Putanru, Joana Portugal, and Dharish David.

The views expressed in this paper are the views of the author and do not necessarily reflect the views or policies of ADBI, the ADB, its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.

The Working Paper series is a continuation of the formerly named Discussion Paper series; the numbering of the papers continued without interruption or change. ADBI's working papers reflect initial ideas on a topic and are posted online for discussion. ADBI encourages readers to post their comments on the main page for each working paper (given in the citation below). Some working papers may develop into other forms of publication.

Suggested citation:

Anbumozhi, V. and A. Bauer. 2013. How Low-Carbon Green Growth Can Reduce Inequalities. ADBI Working Paper 420. Tokyo: Asian Development Bank Institute. Available: <http://www.adbi.org/working-paper/2013/05/15/5668.low.carbon.green.growth.reduce.inequalities/>

Please contact the authors for information about this paper.

Email: vanbumozhi@adbi.org

Asian Development Bank Institute
Kasumigaseki Building 8F
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

© 2013 Asian Development Bank Institute

Abstract

Half of the world's population—3 billion people—lives below the poverty line, and Asia has the largest share. In pursuit of sustainable economic development and poverty alleviation, there is great potential among low-income households for green consumption, production, innovation, and entrepreneurial activity. This paper shows how an inclusive green growth model can uplift the poor through entrepreneurship and fiscal policy reforms. To make the case, this paper cites examples of institutions and policies in Asia that have successfully generated and tapped into the potentials of low-income households. Low-income households are recognized as resilient, value-conscious consumers and creative entrepreneurs in the inclusive and green growth paradigm. Low-income households can be the engine of a new development strategy; they can be a source of innovation for providing basic services in a green way. Evidence suggests that, without effective financial systems, not all market actors can sustain their businesses. Therefore, policy interventions are necessary to encourage and financially support enterprises to adopt best available technologies and incorporate innovative practices that are environmentally beneficial. The paper recommends flexible redistributive and transformative public expenditure schemes and finance sector development to surmount the bottlenecks towards achieving inclusive and green growth.

JEL Classification: E62, H61, Q2, Q3, Q4

Contents

1.	Introduction.....	3
2.	Redefining Economic Growth, Sustainability Concerns, and Poverty Reduction	3
2.1	Development Constraints for Low-Income Households.....	4
2.2	Low-Carbon Green Growth in the Context of Low-Income Households.....	5
2.3	Adoption of Green Products and Services by Low-Income Households.....	6
3.	Green Business Models for Low-Income Households and Local Wealth Creation	8
3.1	Flexible Incentives and Barrier Removal for Business Development.....	10
4.	Policy Framework for Business Development in an Inclusive and Green Growth Paradigm.....	11
4.1	Reduction of Pervasive Subsidies.....	12
4.2	Incentives and Tax Breaks.....	14
4.3	Financing Low-Carbon Green Business Models	14
5.	Financing Inclusive and Green Growth through Fiscal Reforms.....	15
6.	Conclusions and Recommendations.....	18
	References	20

1. INTRODUCTION

The Asian Development Bank (ADB) defines inclusive growth as a process and an outcome (ADB 2010: 5). Growth is inclusive, if it is “based on inputs from a large number of people”, i.e., when it is broad-based and job creating. In terms of outcomes, growth is inclusive if it benefits many people and especially lower-income groups, i.e., when it results in disproportionate increases in income among the poor and when inequality is declining. Inclusive growth therefore characterizes a nondiscretionary and disadvantage-reducing development path generated through economic growth (ADB 2010).¹

Inclusive growth and energy consumption and use are closely linked. One characteristic of poor people is their lack of access to affordable energy, including power- and transport-related energy. And although poor people in low-income countries contribute least to climate change, they are the ones who suffer most acutely from its effects. They are the most exposed to severe air and water pollution and are more dependent on natural resources for energy (including firewood), coastal water resources, and marginal lands. The poor also indirectly exert pressure on natural resources and are a major factor in land degradation, water contamination, and resources depletion.

In pursuit of economic development and poverty alleviation, there is great potential among low-income households for green consumption, production, innovation, and entrepreneurial activity. This paper shows how green growth can be made inclusive by involving low-income households as producers, employees, and business owners. It provides examples of profit-generating firms that are running green businesses with products for the poor and produced by the poor at decent wages. Green business aims at satisfying its customer bases while sustaining economic prosperity, market competitiveness, environmental regeneration, and social equity, i.e., increasing social and environmental responsibility without compromising on economic growth and by meeting the sustainability triple bottom line. Accordingly, it has been argued that the private sector should be more actively involved in promoting inclusive and green business. This can be achieved by encouraging enterprises to adopt strategic corporate social and environmental responsibility practices into their core business.

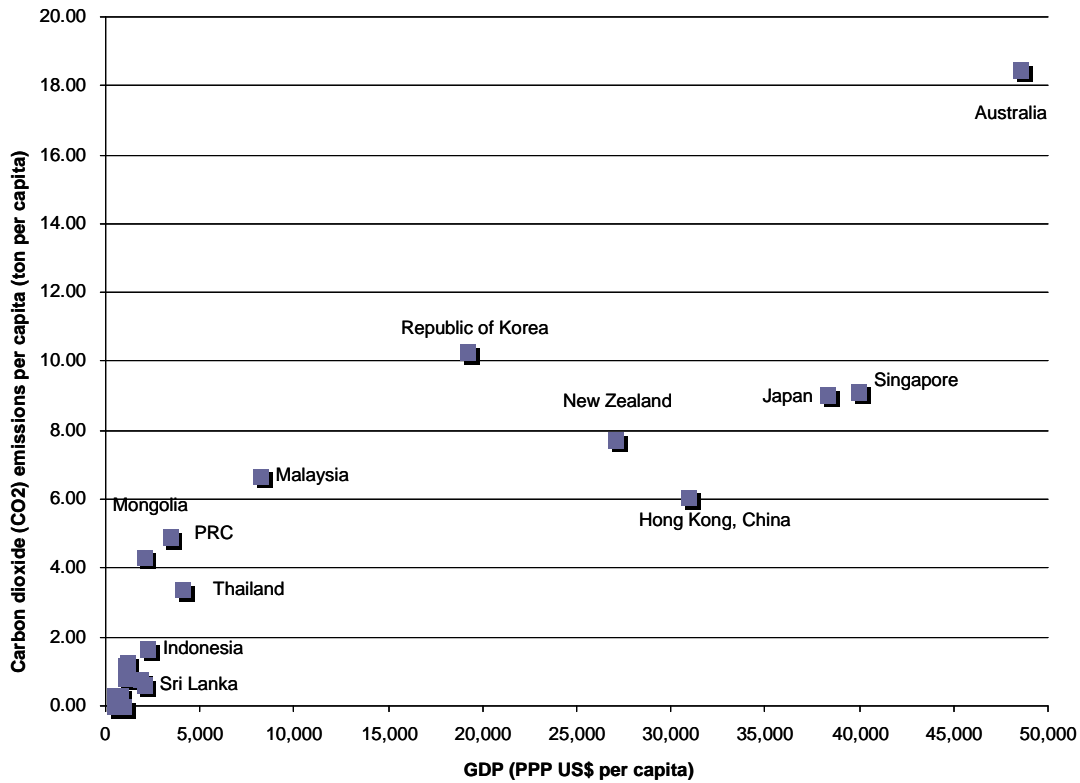
2. REDEFINING ECONOMIC GROWTH, SUSTAINABILITY CONCERNS, AND POVERTY REDUCTION

Economic growth in Asia and the Pacific comes at major environmental and, recently, climate change costs. The economy of Asia and the Pacific today is almost five times the size it was about three decades ago. If it continues to grow at the same rate it will be 80 times that size by 2050 (Wilson and Purushothaman 2003; Pinto 2013). This is totally at odds with the knowledge of the finite energy resource base and the fragile ecosystems

¹ The International Policy Centre for Inclusive Growth’s work on inclusive growth starts from the premise that societies based on equality tend to perform better in development. For instance, countries with more equal income distribution are likely to achieve higher rates of poverty reduction than very unequal countries (United Nations Development Programme [UNDP] 2010). “Poverty is pronounced deprivation in well-being, and comprises many dimensions. It includes low incomes and the inability to acquire the basic goods and services necessary for survival with dignity. Poverty also encompasses low levels of health and education, poor access to clean water and sanitation, inadequate physical security, lack of voice, and insufficient capacity and opportunity to better one’s life.” (World Bank 2010: 11).

on which Asian economies depend for survival. Today, many Asian countries are faced with the imminent end of the era of cheap oil; steadily rising commodity prices; the degradation of forests, water bodies, and land; and the momentous challenge of stabilizing concentrations of carbon in the atmosphere (Figure 1).

Figure 1: Carbon Dioxide Emissions and Gross Domestic Product per Capita in Selected Economies of Asia and the Pacific



Source: The World Bank Development Indicators and IEA electricity access database

Growth is unsustainable when a country is enjoying current consumption of resources such as energy and water at the expense of future generations. Distributional patterns of growth also have deep sustainability implications, as the poor often use products and services with lower energy intake (e.g., in the transport sector). Hence, to better address sustainability and equality issues in Asia and the Pacific, a rebalancing based on the environmental footprint is urgently needed, especially in countries with high and increasing inequalities.

2.1 Development Constraints for Low-Income Households

At the global level, 75 million–100 million households constitute tier 1, which is composed of middle- and upper-income people in developed countries and few high income people from developing Asia (Table 1). In the middle of the pyramid, in tiers 2 and 3, are low-income households in developed countries and middle-income households in developing economies. Tier 4 consists of about 4 billion people, where per capita income is very low. This extreme inequality in wealth distribution reinforces the view that people with low incomes cannot participate in the regional or global economy constructively, even though they constitute the majority of the population. According to

United Nations (UN) projections, the population of low-income households could double, because the bulk of population growth occurs there. So even if all get richer, unless inequality is addressed, the problem of a growth path that excludes the lower half of the population remains. This, however, is politically unacceptable in most countries of the region. Hence, for sustainability reasons, there is a need to address rural and slum poverty and better link this to climate and environmental programs.

Table 1: Tiers of Development Structure

Population and Gross National Income Per Capita (2009)

Income Group	Population (billion)	GNI per Capita, Atlas Methodology (Current US\$)	GDP per Capita, PPP (Constant 2005 International \$)
High Income	1.12	38,220	32,779
Upper Middle Income	1.00	7,471	10,799
Lower Middle Income	3.81	2,298	4,299
Low income	0.85	503	1,053
World	6.78	8,741	9,514
Middle income	4.81	3,375	5,652

Source: World Bank. Data for 2009 (<http://data.worldbank.org/income-level/NOC>, accessed 16 November 2010).

2.2 Low-Carbon Green Growth in the Context of Low-Income Households

Poor people contribute less to carbon dioxide (CO₂) emissions than do the rich. This is true for the conventional argument poorer countries often make with regard to Organisation for Economic Co-operation and Development (OECD) countries. It is even more true with regard to the consumption behavior of the poor versus the rich in poor countries. The recent white paper by the Department for International Development of the United Kingdom (DFID) defines low-carbon development in the following way:

1. using less for growth;
2. using energy more efficiently and sustainably while moving towards low or zero carbon energy sources;
3. protecting and promoting natural resources that store carbon, such as forests and lands;
4. designing, disseminating, and deploying low or zero carbon technologies and business models; and
5. developing policies and incentives that discourage carbon-intensive practices and behaviors.

Low-income households have contributed least to global environmental problems such as climate change and local problems such as traffic, congestion, and water pollution. Low-carbon green growth is not about cutting emissions but about providing the benefits and opportunities that come from higher economic growth that include access to basic energy services and utilities that eventually improve quality of life. In other words, to make growth inclusive, green means are necessary. Key policies and business models can be devised to link low-income households with green products and services, depending upon the community's priorities and plans and the available funding and

technologies. It is important that new services targeting those in poverty should focus both on the supply and consumption side of those households, and also on their ability to develop at the lowest emission and pollution levels.

2.3 Adoption of Green Products and Services by Low-Income Households

The consumption patterns of the urban poor and the rural poor differ. In rural settings, the amount of electricity supplied could only support a floor fan, two compact fluorescent light bulbs (CFLs), and a radio for about 5 hours per day. In urban areas, consumption would also include a television and another household appliance, such as an efficient refrigerator or a computer. At the micro-level, there has been a growing interest in efficient low-cost lighting through the distribution of CFLs in many developing countries. These high-quality CFLs are 4–5 times more efficient than incandescent bulbs, and last longer. The mass distribution of CFLs is expected to reduce peak electricity needs and costs, and presents a business opportunity for the private sector to exploit.

In terms of investments, it has been estimated that a cumulative investment of US\$223 billion would be required between 2010 and 2015 to achieve the Millennium Development Goal of eradicating extreme poverty and hunger by 2015, and another estimated US\$477 billion between 2016 and 2030 to ensure universal access to electricity by 2030 (DESA 2011). The bulk of additional household electrification in this period will be in rural areas through grid and off-grid solutions, as by 2015 (especially in Asia) most urban households are expected to have access to electricity services. High household density is the most important factor in providing electricity access through the grid, as it is cheaper to deliver electricity through an established grid than through mini-grids or off-grid systems. However, the cost of expanding the grid to less-populated areas is very high, and with transmission losses it is usually not profitable. A large share of rural households that are to be connected by off-grid and mini-grid options will use alternative sources of energy including solar photovoltaic, mini-hydro, biomass, wind, diesel, and geothermal. The current total primary energy supply situation among selected countries in Asia can be seen in Table 2. While large Asian countries including India and the People's Republic of China (PRC) are more dependent on coal for their energy supply, low-income countries such as Nepal and Cambodia are dependent on biomass for their energy.

The bulk of investment in electrification in the next five years is expected to be incurred in developing Asian countries, especially due to rapid economic growth. Low-carbon renewable energy as a share of grid extension in rural areas is expected to increase, but at present it is not cost-effective. There are great investment and business opportunities in developing small, stand-alone renewable energy technologies that could meet the electricity needs of rural communities more cheaply. The proliferation of specific green technologies have potential, including solar photovoltaic for lighting and clean drinking water. For greater load demand, other technologies such as mini-hydro or biomass might offer a better solution, though solar could be expected to improve in efficiency and could be used on a mass scale as prices eventually drop. The main challenge with solar and wind technologies is their high upfront cost, which demands new and innovative business models and financial tools to improve dissemination. The mini-grid is also considered to be the best probable approach to rural electrification, as it can combine different sources of energy and ensure stable supply and transmission of electricity.

Table 2: Total Primary Energy Supply, Share of Renewable Energy, Electricity Consumption, and Electrification Rates of Selected Countries in Asia and the Pacific

Country	Total primary energy supply (TPES)									Electricity consumption / Per Capita		Electrication Rate
	Annual Total		Share of fossil fuels in TPES			Share of renewable energy in TPES			kWh	% change	% of population	
	Tons of oil equivalent (millions)		Coal	Natural Gas	Oil	Hydro, solar, wind, and geothermal	Biomass and waste %	Share of nuclear in TPES				
1990	2006	2006	2006	2006	2006	2006	2006	2006	1990–2006a	2000–2006b		
Australia	87.7	122.5	43.9	19.1	31.6	1.3	4.1	0.0	11309.0	34.6	100.0	
Bangladesh	12.8	25.0	1.4	46.6	17.8	0.5	33.7	0.0	146.0	221.2	32.0	
Cambodia	0.0	5.0	0.0	0.0	28.4	0.1	71.3	0.0	88.0	..	20.0	
PRC	863.2	1878.7	64.2	2.5	18.3	2.2	12.0	0.8	2040.0	299.1	99.0	
Hong Kong, China	10.7	18.2	38.6	13.2	44.9	0.0	0.3	0.0	5883.0	40.8	..	
India	319.9	565.8	39.4	5.5	24.1	1.9	28.3	0.9	503.0	82.3	56.0	
Indonesia	102.8	179.1	15.5	18.6	33.0	3.7	29.2	0.0	530.0	228.3	54.0	
Japan	443.9	527.6	21.3	14.7	45.6	2.1	1.3	15.0	8220.0	26.7	100.0	
Lao PDR	-	-	-	-	-	-	-	-	-	-	-	
Malaysia	23.3	68.3	12.0	44.4	38.8	0.9	4.1	0.0	3388.0	187.5	98.0	
Mongolia	3.4	2.8	71.7	0.0	24.0	0.0	3.8	0.0	1297.0	-19.1	65.0	
Myanmar	10.7	14.3	0.8	12.4	12.7	2.0	72.1	0.0	93.0	104.5	11.0	
Nepal	5.8	9.4	2.7	0.0	8.6	2.4	86.2	0.0	80.0	129.2	33.0	
New Zealand	13.8	17.5	11.9	18.7	39.4	24.0	6.0	0.0	9746.0	14.5	100.0	
Pakistan	43.4	79.3	5.4	31.6	23.9	3.5	34.9	0.8	480.0	73.6	54.0	
Philippines	26.2	43.0	13.4	5.8	31.8	22.9	26.1	0.0	578.0	60.7	81.0	
Singapore	13.4	30.7	0.0	20.9	79.0	0.0	0.0	0.0	8363.0	72.1	100.0	
Rep. of Korea	93.4	216.5	24.3	13.3	43.2	0.2	1.1	17.9	8063.0	239.8	100.0	
Sri Lanka	5.5	9.4	0.7	0.0	40.7	4.2	54.3	0.0	400.0	159.5	66.0	
Timor-Leste	-	-	-	-	-	-	-	-	-	-	-	
Thailand	43.9	103.4	12.1	25.8	44.4	0.7	16.6	0.0	2080.0	181.4	99.0	
Viet Nam	24.3	52.3	16.8	9.5	23.4	3.9	46.4	0.0	598.0	511.2	84.0	

a. Denotes percent change in value of the variable within the given period. b. Data are for the most recent year available.

Source: World Development Report, World Bank 2010.

3. GREEN BUSINESS MODELS FOR LOW-INCOME HOUSEHOLDS AND LOCAL WEALTH CREATION

Low-income households could be recognized as resilient value-conscious consumers and creative entrepreneurs in the inclusive and green growth paradigm. Low-income households can be the engine of a new development strategy; they can be a source of innovation for providing basic services in a green way. The strength of those innovative business models is that they tend to create opportunities for low-income households by offering access to energy and other services and encouraging endogenous development.

To begin to understand how all of this is uniquely possible, the following basic assumptions hold:

- (i) Low-income households present a latent market for environmental goods and services. Engaging them actively is a critical element for inclusive and sustainable growth, as entrepreneurship activities for this market create choices for them and foster competition among outside service providers. These characteristics of a green market economy, new to low-income households, can facilitate dramatic change.
- (ii) Low-income households as a market provide new growth opportunities for outside businesses and a forum for innovation in developing green products and clean services in a cost-effective way that old and tried solutions cannot create.
- (iii) The green market for low-income households must become an integral part of the work of the private sector. For big companies, these households must become part of any firm's core business; they cannot merely be relegated to the realm of corporate social responsibility initiatives. Successfully creating green markets with low-income households involves changes in the functioning of large companies as they need sustained resource allocation and senior management attention.

There is significant untapped opportunity for such value creation, and it is happening at different levels and at a varying pace across Asia. Refocus (2001) argues that, most of the time, energy subsidies do not reach the poor as expected in the planning of the subsidy programs due to lack of proper design of subsidy models. Businesses go after the subsidies rather than concentrating on the delivery of energy services to the poor. The energy subsidies must have two specific goals. The first is that they should assist the poor in accessing higher-quality energy services, and the second is that they should provide incentives for business to serve rural and poor consumers. The work (Refocus 2001) suggests three subsidy models: dealer model, concession model, and retailer model (Table 3).

Table 3: The Different Subsidy Models Proposed by Refocus (2001)

Model	Description
Dealer model	The dealer model emphasizes the development of dealers that can sell equipment, usually solar photovoltaic equipment. Subsidies are provided to dealers to lower the cost of products so that the consumer demand for those products will increase. This model is used for the delivery and servicing of solar systems in several countries such as Sri Lanka, Indonesia, and Kenya. This system works well only when there is a strong dealer network. However, the early adopters are mainly more wealthy households, and it means the subsidy will go first to the more wealthy households in the rural areas.
Concession model	The concession model minimizes budgetary subsidies and encourages private sector participation. In Argentina, for example, franchise rights for rural service territories are being granted to concessionaires that offer the lowest subsidy to service rural households and community centers. Concessionaires can select from a wide range of off-grid technologies in a cost-effective way. The “success” of subsidies in the concession model as applied in Argentina is clearly dependent on the level of competition across the various service territories. To improve the sustainability of agricultural projects, it is a priority for national authorities to offer concessions with adequate conditions to the private sector or local cooperatives.
Retailer model	Under this model a community, organization, or entrepreneur develops a business plan to service local demand for electricity. If the plan is approved, depending on the situation a loan or a subsidy is given for the development of the business. The retailer deploys the system through a fee-based service arrangement to recover the costs, repay the loan, and earn a profit. This approach ensures significant local involvement and consumer choice. This model has been successfully implemented in several projects that generate electricity, including in India and Sri Lanka (micro-hydro component), and in a broader context in the Lao People’s Democratic Republic. This model of financing would be focused on aggregating the demand and partially transferring the problems of financing to the capacity of organization of the local communities, which would then assume part of the risk in project financing. The challenge of financing is in terms of aggregating small loans to beneficiaries that may not have a record of risk, a culture of payment, or, in many cases, a capacity to collateralize loans. In this regard the role that intermediaries (energy supply companies, suppliers of equipment, micro-credit organizations) play, and the commitment from beneficiaries (associations, community organizations, cooperatives of credit or companies of local collection) become the basis on which the projects become sustainable in the long term.

3.1 Flexible Incentives and Barrier Removal for Business Development

As discussed, during the last decade a slow but discernable transition has been taking place, from traditional to market-based green business development that serves low-income households. The changing perceptions of business and policy makers are shown in Table 4.

Table 4: Changing Perceptions of Business and Policy Makers in India

From	To
Low-income households are a problem for development	They represent a market. The private sector can and should participate effectively in this process
Low-income households are wards of the state	They are active consumers and entrepreneurs
Low-income households do not appreciate low-carbon green technologies. Old technology solutions are appropriate	Creative bundling of low-carbon products and services with a local flavor
Follow the urban rich model of development	Selectively leap-frog
Carbon efficiency in a known model	Innovation to develop a low or zero carbon model
Focus on resource constraints	Focus on creativity and entrepreneurship

Source: Authors.

The much needed and desirable green business development for low-income household is in its infancy in most countries. This is mainly because it is not easy to give up traditional practices, and so businesses and policymakers need to see them as markets that exist, and demand for green products and services needs to be stimulated through public policy. It is also difficult for a whole generation of low-income households to give up their dependence on pervasive government oil subsidies. On the other hand, subsidies targeted at specific niche populations can advance the penetration of modern energy services to the poor, especially for those in rural areas (Modi, McDade, Lallement, and Saghir 2005; Woodward and Abdallah 2012). Table 5 presents such a strategy as adapted in the US. Governments therefore need to address a multitude of factors while designing specific subsidies to guarantee that the poorest fringe of the population is benefiting, rather than indirectly providing advantages to higher-income households that already consume more.

Table 5: Summary of the Benefits of the Clean Energy Investment Program for Low-Income Households in the United States

Moving from unemployment to employment	<ul style="list-style-type: none"> • 1.7 million new jobs overall • 870,000 jobs for workers with low education levels • Newly employed low-income workers can lift themselves and family out of poverty
Falling unemployment produces rising wages	<ul style="list-style-type: none"> • Average low-income worker could see a rise in earnings of about 2% as unemployment rate falls 1%
Building retrofits lower home heating and utility bills	<ul style="list-style-type: none"> • Retrofits could reduce living costs by up to 4%, depending on the climate and quality of current housing stock. • Requires well-designed policies to create market for retrofits for homeowners and renters so benefits of retrofits are shared by renters
Improved public transportation	<ul style="list-style-type: none"> • Accessibility of public transportation could improve considerably through targeted investments • Increasing public transportation use in urban centers to around 25%–50% of total could reduce living costs by about 1%–4% • Households able to replace a car through increased public transport use could save roughly 10% of total living costs

Source: Pollin, Wicks-Lim, and Garrett-Peltier 2009.

4. POLICY FRAMEWORK FOR BUSINESS DEVELOPMENT IN AN INCLUSIVE AND GREEN GROWTH PARADIGM

The key economic policy issues aimed at inclusive and green growth include market-based instruments, carbon pricing, and financing.

Market-based instruments impose fees and provide incentives to achieve the same objective as regulatory policies. There are two challenges to effectively implementing market-based instrument policies: (i) supporting sustainable consumption and guaranteeing that it reaches the households at the bottom of the pyramid, rather than local elites only; and (ii) subsidizing green technologies and involving local small businesses through financial incentives to promote sustainable production. Normally, private companies seek their own profits and economic benefits rather than providing social benefits, so attracting their investments in energy production and distribution is a major challenge. For this purpose, positive discrimination towards those sectors by means of some market-based instrument could be a viable option. For example, subsidizing social inclusion investments and taxing harmful environmental activities can attract more investment in the promotion of alternative energy in rural areas. A removal of fossil fuel subsidy could also be an incentive to increased use of green energy technologies (Zhang 2008).

These policies can have several positive effects. First, imposing a tax on fossil fuel use incorporates the negative environmental externalities and could be used to pay for the social cost. Also, it motivates consumers to use alternative energy, which results in lower carbon emissions. Second, green energy subsidies lower the cost of production and consumption, which drives investors to invest in those systems of energy production and allows poor people to consume that energy. As a result, poor people will have sustainable and affordable access to energy. Third, these policies help to protect the environment because people replace fuelwood and manure with electricity for lighting, heating, and cooking, which reduces the extraction of fuelwood

form forests, resulting in lower carbon emissions. At the same time, people's health and living standards will be improved due to a marked decrease in air pollution. Fourth, once there is sustainable energy access, many small and medium-sized enterprises and family businesses will evolve, providing job opportunities for the poor.

4.1 Reduction of Pervasive Subsidies

Pervasive subsidies are stimulus packages that distort the price of goods and energy resources and support activities that lead to environmental degradation. In emerging countries, governments commonly control the final consumer price of energy, usually by keeping it below the real market price, to promote economic growth and reduce poverty. In other words, fuel tax rebates and low energy prices stimulate the use of fossil fuels, and subsidies for road transport increase congestion and air pollution, while agriculture subsidies can lead to the overuse of pesticides and fertilizers.

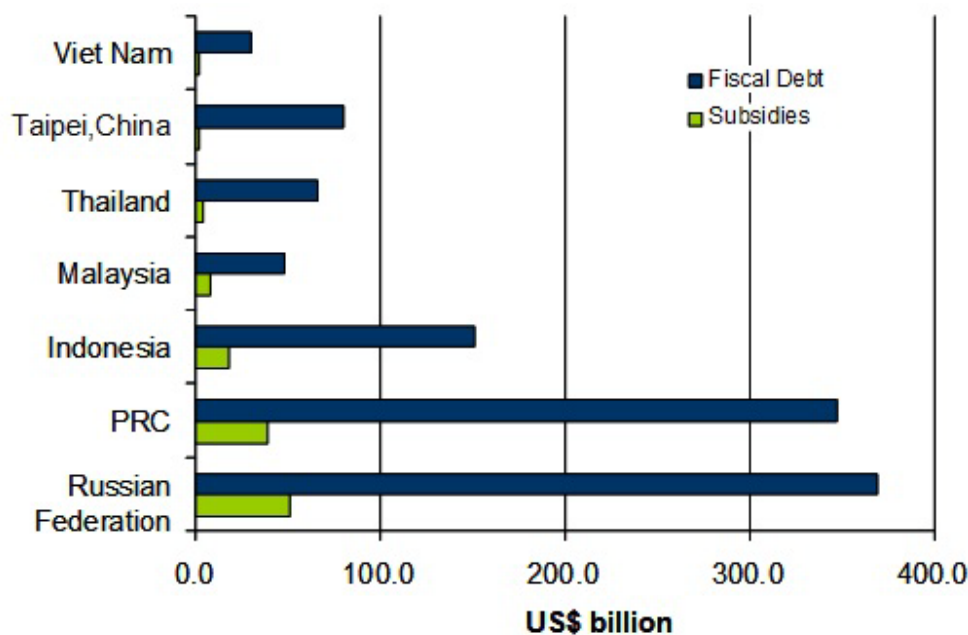
In 2008, non-OECD countries guaranteed US\$400 billion of fossil fuel subsidies that instead could have been pledged to renewable energy technology investments (IEA 2010; IMF 2013). Evidence shows that fuel subsidies also contribute to an expanding fiscal deficit. Nevertheless, experience shows that policies to reform pervasive subsidies must be carefully designed; governments should evaluate the environmental and economic impacts of reforming measures. A sudden rise in oil prices could depress consumption in countries such as the PRC and Malaysia, where additional domestic demand may be needed to compensate for slowing export growth. There is merit in some subsidies, at least in the short term. Many lower-income people cook with kerosene or get to work on motorbikes. Related fertilizer subsidies may also be necessary in the short term to sustain food output.

Figure 2 suggests that countries with higher debt, such as Russian Federation, the PRC, and Indonesia, also allocated larger budgets to energy-related subsidies. Conversely, the governments of Viet Nam and Thailand, which allocated lower budgets to pervasive subsidies, also dealt with less fiscal debt. In fact, reducing pre-tax subsidies by 50% would reduce the average projected deficit by 38% as a result of a more efficient allocation of resources across sectors (Coady et al. 2006).

These policies have direct impacts on resource depletion and CO₂ emissions. Instead of subsidizing environmentally harmful activities, supporting the development of renewable energies and the use of energy saving devices would be more cost-effective in the long term in removing barriers to green growth.

Nevertheless, experience shows that policies to reform pervasive subsidies must be carefully designed; governments should evaluate the environmental and economic impacts of reforming measures. A sudden rise in oil prices could depress consumption in countries such as the PRC and Malaysia, where additional domestic demand may be needed to compensate for slowing export growth. There is merit in some subsidies, at least in the short term. Many lower-income people cook with kerosene or get to work on motorbikes. Related fertilizer subsidies may also be necessary in the short term to sustain food output.

Figure 2: Pervasive Energy Subsidies and Fiscal Debt in Selected Asian Economies



PRC = People's Republic of China.

Source: IEA 2010 and CIA 2009.

Phasing-out fossil fuel subsidies in regions where it is used for cooking and heating could lead to greater pressure on natural biomass resources and deterioration of indoor air quality, even though subsidies are often intended to support poor consumers. The possible social impacts of removing pervasive subsidies increases pressure on the poor, as food and commodity prices rise and those who cannot adjust become economic losers. In practice, subsidies for oil and other energy sources mainly benefit higher-income groups and capital-intensive industries at a time when rising income differentials and job creation are bigger concerns than overall economic growth.

Market-based instruments are most likely to be successful for green business development in the following situations:

- (i) When policymakers are aware of the lobbying symmetry between polluters, low-carbon green technology providers, and taxpayers, so exemptions can be avoided.
- (ii) When the level of tax or charge is high enough to accurately reflect externality costs but not so low that they become incentives for polluters. The revenue could be used to support small green business serving low-income households.
- (iii) There is no way to freely allocate if tradable permits have negative effects on the cost-effectiveness and fairness of the instrument used.
- (iv) Market-based instruments are not introduced to replace direct regulations or other incentives but to supplement them.

As the example of the Laguna Lake Development Authority in the Philippines suggests, fees are levied on effluent discharge into the lake or distributary systems in order to reduce pollution. Further, businesses are rewarded by lower fees and fewer penalties. This approach has contributed to measurable improvements in the quality of Laguna Lake (USAID 1999).

4.2 Incentives and Tax Breaks

Evidence suggests that, without effective financial systems, not all market actors can sustain their businesses. Therefore, policy interventions are necessary to encourage and financially support enterprises to adopt best available technologies and incorporate innovative practices that are environmentally beneficial. Table 7 shows the estimates of relative subsidies available to energy produced. A global survey by Regus (2010) found that 75% of companies worldwide have declared that government tax incentives are required to accelerate green investments. It was revealed that only 37% of companies worldwide actually measure their emissions and only 19% measure their carbon footprint resulting from their activities; 46% of companies globally declared that they will only invest in low-carbon equipment if the running costs are the same or lower than those of conventional equipment. A disappointing 40% have invested in low-carbon equipment and only 38% have a company policy to do so. Finally, a full 100% of companies surveyed declared that, if governments offered tax incentives to invest in energy efficient or low-carbon equipment, businesses were willing to significantly accelerate their green investments. If governments are serious about meeting ambitious carbon reduction targets and promoting green industries, they need to provide incentives for environmentally aligned corporate behavior. At the moment, low-carbon businesses are often limited in range and largely operate on a premium price. Tax breaks will enormously help accelerate take-up and will also help create a mass market where unit prices will fall, as observed in India.

Table 6: Estimates of Relative Subsidies to Energy Sources

Energy type	Subsidy estimate (US\$ billion/year)	Energy produced	OECD share of production (2007) %	Subsidies per energy unit (US\$/kWh)
Nuclear energy	45	2,719 TWh electricity	84	0.017
Renewable energy (excluding hydroelectricity) ⁶⁸	27	534 TWh electricity	82	0.050
Biofuels	20	34 mtoe	68	0.051
Fossil fuels (non-OECD consumers)	400	4,172 mtoe	n.a.	0.008

Source: preliminary estimates based on GSI (2010), available at http://www.globalsubsidies.org/files/assets/relative_energy_subsidies.pdf

4.3 Financing Low-Carbon Green Business Models

Investing in appropriate green businesses targeting low-income households is a new approach for the private sector and financial institutions. Local entrepreneurs are either not familiar with, or lack the capacity to make, cost-benefit analyses or prepare documentation for credit requests. Bankers are unaccustomed to appraising credit request proposals for new innovative businesses. As financial institutions are isolated from policy issues related to green energy and nonpolluting environment, a working partnership between policy makers and financial institutions will be useful for exchanging experiences, purposes, and objectives. Liming (2009) states that, as two of the world's leading countries in the development of rural renewable energy, the experiences of the PRC and India in financing rural renewable energy will be of strategic interest to other developing countries and emerging middle-income countries. To enhance the development of rural renewable energy in the PRC and India, the two countries have used many financing instruments such as grants,

renewable energy service companies, low interest and long-term loans, joint ventures, asset financing, venture capital and private equity, subsidies, import duty reduction, and reduction in value-added tax (VAT). However, financing renewable energy is still challenging. In the PRC, the main subsidies for rural renewable energy are provided by the central government and the local governments usually to support research, development, and demonstration projects for rural renewable energy. In India the subsidies, such as interest subsidy and capital subsidy, are mainly provided by the Ministry of New and Renewable Energy Sources. In the PRC, the imports of renewable energy technologies are exempted from import duty; in India this is the case for renewable energy technologies not produced in India. In the PRC the rate of VAT is 17%, but for biogas it is 3.0%, for wind power 8.5%, and for small hydro 6.0%. VAT for power generation from municipal solid waste is 0% (ESCAP, 2013). In India, the VAT on renewable energy equipment is lower than the normal rate.

Though many financing schemes and institutions designed to assist small businesses are available, their effectiveness in attracting to serve for low-income households in green services is low. The Land Bank of the Philippines, the Small Industrial Development Bank of India (SIDBI), and the National Development Bank of Sri Lanka target small businesses to reach low-income households through provision of concessional loans. The SIDBI was set up as a wholly owned subsidiary of the Industrial Development Bank of India. It is the principal financial institution for promoting, financing, and developing small-scale industries and coordinates the functions of institutions engaged in similar activities.

5. FINANCING INCLUSIVE AND GREEN GROWTH THROUGH FISCAL REFORMS

If the developing countries of Asia are to meet the requirements of inclusive and green growth, they will need to invest considerable sums; many are already doing so. Table 7 summarizes government expenditure that has implications for investment in poverty alleviation and preservation of environmental resources. Countries with higher per capita income are spending more on social infrastructure. One reason why government expenditure on inclusive and green growth might fall short of expectations is concern about fiscal deficits. Countries with high fiscal deficits have usually been advised to cut public expenditure, and the simplest cuts are often those on social and environmental expenditure.

If governments are to spend more on inclusive and green growth, this should be part of a larger environmental fiscal reform program, which will be integrated with other environmental measures to meet environmental objectives in combination with economic and social objectives. The EEA (2006) underlines that, rather than defining the best instrument, policy makers should try to understand which mix of instruments is best applied under certain local and political conditions. The notion behind the concept of an environmental fiscal reform program is the same in developed and developing countries, as the OECD states in a recent report: “Environmental fiscal reform (EFR) refers to a range of taxation and pricing measures which can raise fiscal revenues while furthering environmental goals” (OECD 2005: 12). In other words, environmental fiscal reform describes any policy measures that overlap between environmental and fiscal policy, and implementation is not limited to developed countries but may also be in transition or developing countries as stated in recent reports published by the OECD (2005) and the World Bank (2005).

Governments therefore need to channel revenues from environmental damage activities to create incentives that promote environmentally friendly programs. Inevitably this reform will have negative consequences, as some economic sectors

will be net losers in the sense that their tax burden increases as compared to other economic sectors which will be net winners, i.e., their tax burden reduces. However, apart from the environmental benefit, an economic benefit may be achieved as the reduction of labor taxes may lead to increased employment. Generally, trade-offs between social and environmental considerations need to be carefully analyzed. Reductions in charges, taxes, and pervasive subsidies tend to have benefits on the environmental dimension, whereas they have low or moderate impacts on poverty alleviation and/or economic development strategies. On the other hand, subsidies which enhance environmentally sound programs have positive impacts on the environment, poverty reduction, and economic growth. Nonetheless, governments should keep revenue neutrality and ensure that they only pledge monetary support without distorting the markets. In addition, governments may also wish to provide transparent and timely information about expected impacts of reforms to stakeholders.

One of the strategies to minimize potential negative impacts of market-based instruments encompasses implementing well-targeted redistribution and poverty alleviation policies. Target subsidies, including multiple price systems and lifeline tariffs, usually perform better than universal subsidies. Compared to universal subsidies, targeted monetary subsidies tend to have lower inclusion discriminations as they specifically address low-income households.

Past experience reveals that, in many developing countries, economy and fiscal priorities have been the main drivers behind fiscal policies. Nevertheless, these reforms have also had beneficial environmental impacts. Examples of this include reduction of pervasive subsidies and taxation of natural resources, which contribute to more rational consumption and environmental protection. Malaysia and Indonesia recently sharply increased user taxes on fossil fuels and Sri Lanka reduced tariff schemes for water supply and sanitation. However, commonly instituted fiscal reforms are regressive and result in social costs, especially for people at the bottom of the pyramid. When governments introduce bulk taxes and no compensatory measures, the ramifications include increases in prices of basic goods and services consumed by poor people. Policymakers face the challenges of balancing economic efficiency and political and social acceptability, with environmental effectiveness. When trying to simultaneously address fiscal, environmental, and social dimensions, designing environmental fiscal reform policies seems to be the key to guaranteeing that environmental and poverty reduction benefits go hand in hand. In this view, the design of environmental fiscal reform should explicitly consider revenue neutrality, guarantee a double dividend, avoid distributional and competitiveness effects, and address institutional limitations. The following paragraphs briefly outline these aspects and state recommendations towards full achievement of sustainable environmental fiscal reform.

Table 8 summarizes the practices adopted during the 1990s in Europe to achieve the twin benefits of reducing environmental damage and increasing employment through tax shift programs.

Table 7: Components of Government Spending, Emissions, and Public Debt

Country	GDP Current US\$ Billion (I)	Public Debt (% of GDP) (II)	Population (million) (III)	GDP per capita (Current US\$) (iv)	CO2 emissions per capita (ton / capita) (V)	Education (% of GDP) (VI)	Health (% of GDP) (VII)	Research and Development (% of GDP)(VIII)	Military (% of GDP) (IX)	Debt service (% of GDP) (X)	Tax Revenue (% of GDP) (XI)
Year	2008	2008	2010	2008	2008	2000-2007b	2000-2007b	2000-2007b	2008	2008	2008
Australia	1039.42	14.3	21.50	48,499	18.48	4.7	6.0	2.2	1.8	-	23.1
Bangladesh	79.55	39.4	164.40	497	0.29	2.4	1.1	-	1	1.2	8.8
Cambodia	10.34	-	15.10	710	0.31	1.6	1.7	0	1.1	0.4	8.2
People's Republic of China	4532.79	15.6	1,354.10	3,422	4.92	1.9 ^d	1.9	1.5	2	0.8	9.4
Hong Kong SAR, China	-	13.6	7.10	30,863	6.05	3.3	-	0.8	-	-	-
India	1214.21	54.9	1,214.50	1,065	1.25	3.2	1.1	0.8	2.6	2.7	12.9
Indonesia	510.50	28.3	232.50	2,246	1.69	3.5	1.2	0	1	4.8	12.3
Japan	4886.97	172.1	127.00	38,268	9.02	3.4	6.5	3.4	0.9	-	-
Laos PDR	5.47	-	6.40	882	-	2.3	0.8	0	0.4	3.8	10.1
Malaysia	221.16	41.5	27.90	8,187	6.7	4.5	1.9	0.6	2	4.1	16.6
Mongolia	5.26	-	2.70	1,991	4.33	5.1	3.5	0.2	-	1.4	23.2
Myanmar	-	-	50.50	-	0.24	1.3	0.2	0.2	-	-	3.3
Nepal	12.61	-	29.90	438	0.12	3.8	2.0	-	2	1.3	10.4
New Zealand	115.45	17.4	4.30	27,045	7.74	6.2	7.1	1.3	1.1	-	31.7
Pakistan	165.18	51.0	184.8	994	0.81	2.9	0.8	0.7	2.6	1.8	9.8
Philippines	167.49	56.9	93.60	1,854	0.8	2.6	1.3	0.1	0.8	6.6	14.1
Singapore	193.33	95.9	4.80	39,950	9.16	2.8	1.0	2.6	4.1	-	14.6
South Korea, Republic of	931.40	24.4	48.50	19,162	10.31	4.2	3.5	3.5	2.8	-	16.6
Sri Lanka	40.72	81.1	20.40	2,020	0.61	-	2.0	0.2	3.6	3.1	14.2
Timor-Leste	0.50	-	1.20	453	-	7.1	11.5	-	4.7	-	-
Thailand	272.46	38.0	68.10	4,043	3.41	4.9	2.7	0.2	1.5	6.3	16.5
Viet Nam	90.64	48.8	89.00	1,051	1.19	5.3	2.8	0.2	2.4	1.5	-

b: Data refer to the most recent year available during the period specified.

d: Refers to an earlier year than that specified.

Source:

I: World Bank Database

II: CIA (Central Intelligence Agency). 2010. <https://www.cia.gov> (accessed 15 Nov 2010).

IV: <http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>. WB

V: 2010 Key World Energy Statistics. IEA

The World bank, Where is the wealth of nations? (2006) (data from 2000)

IEA database (2008)

VI to XI: Human Development Report 2010

Table 8: The Double Employment–Environment Dividend: Practice in Europe During the 1990s

Country	Tax shift
Belgium	The revenue of a "special levy on energy" (introduced in 1993) is paid into a special fund to finance social security expenditures.
Denmark	New or increased environment-related taxes will increase revenues by Dkr12.2 billion by 1998, with a simultaneous lowering of income tax. Since 1996, part of the revenue of the newly increased CO ₂ tax on industry has been allocated to reducing employers' social security contributions.
Finland	Starting in 1997, lower taxes on income and labor (Fmk10 billion–Fmk11 billion in cuts announced for 1999–2003), offset in part by new eco-taxes (e.g., a landfill tax, Fmk 300 million per year) and energy taxation.
Germany	From the beginning of 1999 additional taxes have been imposed on fuels with a 0.8% reduction (about DM9 billion) in National Pension contributions.
Italy	Over half of the revenues (about L2,200 billion) raised in the first year from a carbon tax introduced in January 1999 will go towards reducing employment charges.
The Netherlands	A large part of the revenue of the "regulatory tax on energy" introduced in 1996 goes towards reducing employers' social security contributions.
Switzerland	Revenue from new eco-taxes on VOCs and extra-light heating fuels will be redistributed to households in the form of reduced compulsory sickness insurance contributions (1999).
Sweden	Tax reform in 1991 resulted in a kr15 billion tax shift to environment-related taxes, leading to a reduction in marginal income tax rates, among other things. A reduction in employers' social security contributions is being considered.
United Kingdom	Revenue from a landfill tax introduced in October 1996 (£450 million/annum) is to be used to reduce employers' social security contributions by 0.2 percentage points.

Source: Adapted from OECD (1997).

6. CONCLUSIONS AND RECOMMENDATIONS

Poverty is still a problem in Asia and the Pacific, despite the decreasing trend. Recent economic policies to promote growth have lacked the dimensions of environmental sustainability through green growth, and inclusiveness through poverty eradication. A macro-economy that is dependent on a continual expansion of debt is also driven by resource consumption that is environmentally unsustainable, economically unstable, and not socially inclusive. It is time now to promote growth-enhancing policies that are green, employment generating, and inclusive. There is a need to develop a new macro-economic framework that focuses on providing access to basic services to low-income households in a cost-effective and ecologically sustainable way. As result of all these adjustments, poverty eradication will be better addressed using a green inclusive-growth perspective.

International pressure to reduce carbon emissions is growing, encouraging emerging economies to make their growth paths more sustainable; while increasing carbon emissions need to be controlled, uninterrupted ecosystem services also need to be provided. Policies and practices that favour such an inclusive and green growth is discussed in detail elsewhere (ADBI 2013). Such strategies could be beneficial to low-income households if they become a part of the low-carbon, less pollution-oriented production systems and promote local entrepreneurial activities.

What is needed is a better approach to help the poor, an approach that includes them in innovation and developing new products and services to achieve sustainable mutually beneficial scenarios, where the poor are actively engaged and, at the same time, the

enterprises providing services to them are profitable. The penetration of such business models into rural areas is constrained by inherent weaknesses in terms of market responsiveness.

Most of the regulatory frameworks that exist in developing countries were created in the last quarter of the 20th century and are characterized by prioritizing and subsidizing conventional energies and fossil fuel technologies. To move towards a sustainable energy supply requires a fundamental change in regulation—away from the conventional systems (characterized by having few agents and large infrastructure projects) towards a dispersed multi-agent focus (characterized by a higher dispersion of installations and a greater number of participants). These changes will face financial, legal, and institutional barriers which need to be overcome to improve efficiency, especially in addressing rural poverty and disseminating renewable energy technologies. The equitable redistribution of subsidies and incentives to address the needs of the poorest segments of the population and their energy and resource demand would require the realignment of financing models. Financing mechanisms coupled with a revision of fiscal and regulatory policies should enable the elimination of some of the barriers that affect the dispersion of renewable technologies and intermediaries and instruments for financing these projects and overcome the dependence on fossil fuels.

Policy actions can help to reduce these challenges over the short to medium term. There are three important options:

- (i) **Flexible redistributive and transformative public expenditures to surmount the bottlenecks towards inclusive and green growth.** Fiscal policies can redistribute the benefits of growth through pro-poor public expenditure. Through economic growth, governments can effectively use revenue to provide basic developmental amenities such as energy and water, which can be designed to be explicitly pro-poor and green through broad-based expenditure on low-carbon green resources in rural areas. This provides an important opportunity for the benefits of growth to be more inclusive, and in a manner which is not likely to have major disincentive effects now or in the future. On the contrary, increased spending on rural green energy and clean water infrastructure is likely to be an important cornerstone for future growth.
- (ii) **Flexible subsidies and finance sector development for increasing the rate of green enterprises that also provide job creation.** It is also important that green growth is associated with significant job creation to provide opportunities for rural people to innovate and benefit from new entrepreneurial skills to move out of poverty. But the recorded level of employment creation with green growth has been weak in many regions of Asian economies. An increased level of entrepreneurial activity is an important prerequisite that requires substantial finance sector development.
- (iii) **Broad-based fiscal reforms for inclusive and green growth.** The argument for environmental tax reform—a shift in the burden of taxation of economic goods (e.g., income) to ecological “bads” (e.g., pollution)—has been broadly accepted but progress towards this goal is painfully slow. There is an urgent need to change the structure of taxation to achieve environmental and social objectives. A sustained effort by governments is now required to design appropriate mechanisms for shifting the burden of taxation from incomes onto resource consumption and emission reduction for augmenting inclusive and green growth. A further requirement here is to adjust such fiscal policy frameworks to systematically account for socioeconomically disadvantaged groups.

REFERENCES

- ADB.2010. Measuring and Monitoring Inclusive Growth: Multiple Definitions, Open Questions, and Some Constructive Proposals, Asian Development Bank.
- ADBI. 2013 (forthcoming). *Low-Carbon Green Growth in Asia: Policies and Practices*. Manila and Tokyo: Asian Development Bank and Asian Development Bank Institute.
- Agbeibor Jr., W. 2006. Pro-poor economic growth: Role of small and medium sized enterprises. *Journal of Asian Economics* 17: 35–40.
- Agoramoorthy, G., M.J. Hsu, S. Chaudhary, and P.C. Shieh. 2009. Can biofuel crops alleviate tribal poverty in India's drylands? *Applied Energy* 86: 118–124.
- Alternative Energy Promotion Center (AEPC). 2009. Subsidy policy for Renewable (Rural) Energy 2009 (2066 BS). Kathmandu: AEPC.
- Balachandra, B., H.S.K. Nathan, and B.S. Reddy. 2010. Commercialization of sustainable energy technologies. *Renewable Energy* 35: 1,842–51.
- Baranzini, A., J. Goldemberg, and S. Speck. 2000. A future for carbon taxes. *Ecological Economics* 32: 395–412.
- Barnes, D.F., K. Openshaw, K.R. Smith, and R. van der Plas. 1994. What makes people cook with improved biomass stoves? A comparative international review of stove programmes. World Bank technical paper, ISSN 0253–7494; No. 242, Energy Series.
- Coady D., M. El-Said, R. Gillingham, K. Kpodar, P. Medas, and D. Newhouse. 2006. The Magnitude and Distribution of Fuel Subsidies: Evidence from Bolivia, Ghana, Jordan, Mali, and Sri Lanka. International Monetary Fund (IMF) Fiscal Affairs Department, Working Paper WP/06/247. Washington, DC.
- Coase, R. 1960. The problem of social cost. *Journal of Law and Economics* 3: 1–44.
- Carrao, B., and Galeotti.1998. Modeling Sustainable Development. Cheltenham, UK: Edward Elgar Publishing.
- Dhakal, S. 2006. Pioneering Micro Finance for Rural Access to Clean Energy Technologies. Winrock International.
- DESA. 2011. The Great Green Technological Transformation—World Economic and Social Survey 2011. The Department of Economic and Social Affairs of the United Nations Secretariat. http://www.un.org/en/development/desa/policy/wess/wess_current/2012_wess_overview_en.pdf (accessed 9 May 2013).
- Duraiappah, A.K. 1998. Poverty and Environmental Degradation: A Review and Analysis of the Nexus. *World Development* 26(12): 2,169–79.
- Environment Protection Agency. 2001. The United States Experience with Economic Incentives for Protecting the Environment. EPA-240-R-01-001.
- . 2005. International experiences with economic incentives for Protecting the Environment. EPA-236-R-04-001.
- ESCAP. 2013. Regional Cooperation for Energy Access and Energy Security in South and South-West Asia. *Development Papers* 1302, United Nations Economic and Social Commission for Asia and the Pacific –South and South West Asia Office.
- European Environment Agency (EEA). 2006. Market-based instruments for environmental policy in Europe. EEA technical report No 8/2005. ISSN 1725-2237. Copenhagen.

- Fields, G.S., and G. Pfeffermann. 2003. *Pathways Out of Poverty: private firms and economic mobility in developing countries*. Kluwer Academic Publishers. Washington, DC: International Finance Corporation.
- Garnaut, R. 2008. *The Garnaut Climate Change Review: final report*. Melbourne, Australia: Cambridge University Press.
- Goh, C.S., and K.T. Lee. 2010. Will biofuel projects in Southeast Asia become white elephants? *Energy Policy* 38: 3,847–48.
- Goulder, S., and A. Barry. 2000. *Climate Change and European Emission Trading*. Cheltenham, UK: Edward Elgar Publishing.
- Government of Japan. 2005. *Concrete Plan for Environmental Tax (basic outline)*. <http://www.env.go.jp/en/earth/cc/051004.pdf> (September 2010).
- Heady, C.J., A. Markandya, W. Blyth, J. Collingwood, and P.G. Tayler. 2000. Study on the relationship between environment/energy taxation and employment creation. <http://ec.europa.eu/environment/enveco/taxation/index.htm> (accessed 22 December 2010).
- International Energy Agency (IEA). 2010. *World Energy Outlook*. Paris: International Energy Agency.
- . 2010. *Energy Subsidies: Getting the Prices Right*. IEA working paper. Paris.
- IEA, Organization of the Petroleum Exporting Countries (OPEC), OECD, World Bank. 2010. *Analysis of the Scope of Energy Subsidies and Suggestions for the G-20 Initiative. Joint Report Prepared for submission to the G-20 Summit Meeting Toronto, 26–27 June 2010*.
- IMF. 2013. *Energy Subsidy Reform: Lessons and Implications*. Washington, DC: International Monetary Fund.
- Kanungo, P., and M.M. Torres. 2001. *Indonesia's program for pollution control, evaluation, and rating (PROPER)*. Report prepared for the World Bank. Washington, DC: World Bank.
- Keivani, R., J.H.M. Tah, E. Kurul, and H. Abanda. 2010. *Green Jobs Creation Through Sustainable Refurbishment in the Developing Countries*. International Labor Organization WP 275. International Labor Office. Geneva: International Labor Organization (ILO) Sectoral Activities Department.
- Klasen, S. 2010. *Measuring and Monitoring Inclusive Growth: Multiple Definitions, Open Questions, and Some Constructive Proposals*. Asian Development Bank (ADB) Sustainable Development working paper series No. 12. Manila: ADB.
- Legros, G., I. Havet, N. Bruce, S. Bonjour, K. Rijal, M. Takada, and C. Dora. 2009. *The Energy Access Situation in Developing Countries. A Review focusing on the Least Developed Countries and Sub-Saharan Africa*. New York: World Health Organization (WHO)–United Nations Development Programme (UNDP).
- Liming, H. 2009. Financing rural renewable energy: A comparison between China and India. *Renewable and Sustainable Energy Reviews* 13: 1,096–103.
- Mainali, B. and S. Silveira. 2010. Financing off-grid rural electrification: Country case Nepal. *Energy* 30: 1–8.
- Modi, V., S. McDade, D. Lallement, and J. Saghir. 2005. *Energy Services for Millennium Development Goals. Achieving the Millennium Development Goals*. New York, NY: UNDP, UN Millennium Project, and World Bank.

- Monroya, C.R. and H.A. San Segundo. 2007. Strengthening financial innovation in energy supply projects for rural exploitations in developing countries. *Renewable and Sustainable Energy Reviews* 12: 1,928–43.
- Organisation for Economic Co-operation and Development (OECD). 1997. Environmental Taxes and Green Tax Reform. Paris: OECD.
- . 2005. Environmental Fiscal Reform for Poverty Reduction. DAC Reference Document. Paris: OECD.
- . 2010. Investment for Green Growth. Paris: OECD.
- Palmer, K., W. Oates, and P. Portney. 1995. Tightening Environmental Standards: the Benefit-Cost or the No-Cost Paradigm? *Journal of Economic Perspectives* 9 (4): 119–32.
- Paras, S. 1999. A global and multicriteria environmental taxation model for industrial pollution prevention and control. *Sustainable Development* 7: 1–12.
- Pearson, M., and S. Smith. 1990. Taxation and Environmental Policy: Some Initial Evidence. Commentary No. 19. Institute for Fiscal Studies.
- Pigou, A.C. 1920. *The Economics of Welfare*. London: Macmillan.
- Pokharel, S. 2003. Promotional issues on alternative energy technologies in Nepal. *Energy Policy* 31 :307–18.
- Pollin, R., J. Wicks-Lim, and H. Garrett-Peltier. 2009. Green Prosperity: How clean-energy policies can fight poverty and raise living standards in the United States. <http://www.peri.umass.edu/?id=473> (accessed 25 October 2010).
- Poterba, J.M. 1991. Tax Policy to Combat Global warming: on Designing a Carbon Tax. In R. Dornbusch and J.M. Poterba. eds. *Global Warming: Economic Policy Responses to Global Warming*. Cambridge, Mass.: MIT Press.
- Porter, M. 1990. *The Competitive Advantage of Nations*. New York, NY: Macmillan.
- Planning Commission. 2003. Survey of Indian Environment. New Delhi.
- Prabhakar, S.V.R.K and M. Elder. 2009. Biofuels and resource use efficiency in developing Asia: Back to basics. *Applied Energy* 86: 30–36.
- Prahalad, C.K. 2010. The fortune at the bottom of the pyramid: eradicating poverty through profits. 5th edition. New Jersey: Pearson Education.
- Pinto, P.R. 2013. Why Inequalities Matter. In: *Reducing Inequalities A Sustainable Development Challenge*, edited by R. Genevey, R.K. Pachauri, and L. Tubiana. New Delhi: The Energy and Resources Institute Press.
- Refocus. 2001. Reaching the poor: Designing energy subsidies to benefit those that need it. www.re-focus.net (accessed 1 December 2010).
- Regus. 2010. Green Shoots Only? The pace of green business investment and what needs to be done to accelerate it. <http://www.regus.presscentre.com/Resource-Library/Green-Shoots-Only-1bf.aspx>. accessed 27 December 2010.
- REN21. 2010. Renewables 2010—Global Status Report.
- Sinha, B. 2002. Indian stove programme: an insider's view - the role of society, politics, economics and education. *Boiling Point* 48:23–6.
- Stavins, R. 2003. Experience with Market-Based Environmental Policy instruments. In *Handbook of Environmental Economics Vol. 1: Environmental Degradation and Institutional Responses*. ISBN 0-444-50063-4. Amsterdam: Elsevier.

- UNDP. 2010. International Policy Centre for Inclusive Growth (IPC-IG). <http://www.ipc-undp.org/pages/newsite/menu/inclusive/whatisinclusivegrowth.jsp?active=1> (accessed 12 December 2010).
- United Nations Environment Programme (UNEP). 2004. Financing wastewater collection and treatment in relation to the Millennium Development Goals and World Summit on Sustainable Development targets on water and sanitation. Eighth special session of the Governing Council–Global Ministerial Environment Forum. Jeju, Republic of Korea. 29–31 March 2004.
- USAID. 1999. Public Disclosures – using Information to Reduce Pollution. United States Agency for International Development
- Victor, P.A , 2000. *Managing Without Growth*. Cheltenham, UK: Edward Elgar Publishing.
- Wilson, D., and R. Purushothaman. 2003. *Dreaming with BRICS; the path to 2050*. Global Economic Paper 99. Goldman Sachs Global Research Centre.
- Winrock International. 2008. *Energy Investments in India*. Little Rock, AR: Winrock International.
- Woodward D., and S. Abdallah. 2012. *Global Inequality*. Working Paper. Cambridge, MA: National Bureau of Economic Research,. October.
- World Bank. 2005. *Environmental fiscal reform: what should be done and how to achieve it*. Washington, DC: World Bank.
- . 2007. *Poverty and environment: Understanding Linkages at the Household Level*. Washington, DC: World Bank.
- . 2010. *The Poverty Reduction and Equity: Poverty and Inequality Analysis*. <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/0,,contentMDK:22569747~pagePK:148956~piPK:216618~theSitePK:336992,00.html> (accessed 12 December 2010).
- Yusuf, A., and B. Resosudarmo. 2007. *On the Distributional Effect of Carbon Tax in Developing Countries: The Case of Indonesia*. Bandung, Indonesia: Center for Economics and Development Studies.
- Zhang, Z. Xiang. 2008. Asian energy and environmental policy: Promoting growth while preserving the environment. *Energy Policy* 36: 3,905–24.