

Green Growth in the Agro-food Chain: What Role for the Private Sector?

BIAC Discussion Paper

Key Messages

- The private sector has a crucial role to play in greening the agro-food chain, but it can only realise its full potential if appropriate business-enabling policies are put in place. The key drivers of green growth – namely investment and innovation – require the creation of enabling policy frameworks in which private sector-led and collaborative investment and innovation initiatives can thrive. This requires an approach in which policy coherence and greater dialogue and co-operation with the private sector are key aspects.
- Public-private partnerships also play an important role, though these require enabling conditions of their own, such as realistic timelines, clear definition of partner roles, trust and transparency.
- Food security and environmental protection are not mutually exclusive goals and “win-win” solutions should be actively sought.
- Greater awareness-raising and knowledge sharing for all parts of the agro-food chain should be encouraged, particularly including training and extension services for farmers.
- It is important to avoid arbitrary “green” and “non-green” classifications of specific technologies, bearing in mind that so-called “green” technologies rely on materials and manufacturing processes developed by so-called “non-green” industries.
- Industry-led voluntary and collaborative programmes can help to encourage an accelerated adoption of green growth innovations. These voluntary initiatives should be encouraged, but greater coordination may be needed between different parts of the agro-food chain and between different countries/regions.
- For policymakers to make the right policy decisions and for private sector actors to make the right investment decisions, it is vital that accurate and timely data is available to track green growth performance in the agro-food sector. At the same time, however, approaches for tracking performance should be as cost-effective and coordinated as possible.
- The OECD can play an essential role in helping to green the agro-food chain by generating data, sharing best practices, and encouraging international and whole-economy policy co-operation and dialogue with the private sector.

1. Setting the Scene

A green growth strategy aims to ensure that enough food is provided, efficiently and sustainably, for a growing population. This means increasing output while managing scarce natural resources; reducing the carbon intensity and adverse environmental impacts throughout the food chain; enhancing the provision of environmental services such as carbon sequestration, flood and drought control; and conserving biodiversity.

OECD (2011) OECD Green Growth Studies: Food and Agriculture, p7.

Agriculture has enormous potential for green growth, as it is in the business of growing living organisms, biomass and food and supports natural ecosystems. However, not only must agriculture meet growing demand for food, feed, fibre and bioenergy, but it must do so while minimising its environmental footprint and while creating sustainable livelihoods for farmers and others along the supply chain. Meanwhile, the system is faced with other challenges, such as increasing volatility in food and agricultural commodity prices, trade and investment barriers coupled with policy uncertainty in many countries, as well as changing consumer diets and behaviours.

Meeting the growing challenges of the future will require an increase of agricultural production by 70% in the next 50 years¹, as well as an increase in efficiency across the entire agro-food chain.

BIAC underlines that increasing productivity and efficiency can be done sustainably. Food security and environmental protection are not mutually exclusive goals and “win-win” solutions should be actively sought. Win-win green growth solutions for the food and agricultural sector essentially consist of three main aspects: [1] disseminating practices for sustainable intensification and investing in R&D; [2] supporting farmers in the transition towards improved agricultural practices; and [3] designing coherent policies that recognise the complexities of the food and agricultural sector.

For instance, sustainable agricultural practices can help to ensure a reliable, environmentally-friendly source of food, while at the same time opening up new opportunities such as enhancing brands and meeting new market demands. In this effort, OECD economies must co-operate closely with emerging and developing economies to create a policy environment that will increase productivity, boost innovation, and stimulate trade and investment.

In order for green growth to realise its full potential, **the private sector has a crucial role to play**. This means that green growth efforts need to go hand in hand with creating business opportunities. BIAC is pleased that the OECD/BIAC Workshop on “Green Growth in the Agro-Food Chain: What Role for the Private Sector?” held on 24 April 2013 brings the challenges and opportunities facing the private sector to the fore of green growth discussions.

¹ OECD-FAO Agricultural Outlook 2010-2019

It is important to consider the potential of *all* business sectors for bringing about investment, innovation and competitiveness in greening the agro-food chain. It is therefore essential to avoid characterizing sectors as “green” or “brown/traditional”, as all industries have the potential to become “greener”. Similarly, it is important to avoid arbitrary “green” and “non-green” classifications of specific technologies, bearing in mind that so-called “green” technologies rely on materials and manufacturing processes developed by so-called “non-green” industries.

This BIAC paper sets out private sector perspectives for two key pillars of greening the agro-food chain – investment and innovation – before then presenting views from different parts of the chain and discussing approaches for tracking performance. Finally, this paper proposes BIAC views for policymakers in order to improve and step-up green growth efforts.

2. Harnessing investment and innovation

Greening the food and agriculture sector requires significant investment and innovation. Huge investments will be needed to make green growth a reality, while fostering innovation-led growth is essential for green growth, requiring high-level political commitment and policy coordination. Investing in agriculture, and particularly in agricultural R&D, has also been demonstrated to be one of the best strategies for promoting overall poverty alleviation and economic development, through increases in agricultural productivity, rural incomes and improved livelihoods.

Massive investments in input and output infrastructure needs to be made, including in irrigation, port facilities, regional rail/road development and storage facilities, in a concerted manner to serve agricultural and food markets on both national and regional levels. For example, it is estimated that between 2008 and 2016, the fertilizer industry alone will have invested over 120 billion USD to meet the world’s needs for more nutrients and increased food production.

Meanwhile, both public and private R&D is essential to ensure that farmers have the tools they need to meet a number of objectives, including reaching productivity targets, providing quality food, and ensuring sustainable stewardship of their land, water and other natural resources. Innovation is crucial for delivering sustainable solutions, particularly in strategic areas such as seed, pest and water management, extreme weather resistance, nutrient use efficiency and emissions reduction. Conservation agriculture, precision farming, integrated pest and crop management, and fertilizer best management practices are some of the strategies that have proven their effectiveness and are increasingly being adopted. While breakthrough technologies are important, due consideration should also be given to achieving efficiency improvements across all parts of the agro-food chain.

However, the potential of the private sector to deliver necessary investment and innovation over the long-term crucially depends on building the **overall enabling business environment**. While not an exhaustive list by any means, business needs the following:

- long-term, fact-based, risk-based, predictable and interpretable regulatory processes;

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- good governance and well-functioning institutions (notably to protect intellectual property and land rights);
 - mechanisms to fight anti-bribery;
 - international and cross-discipline collaborations in the area of R&D and opportunities for international cooperation in basic research;
 - improving human resources, including specialist studies at higher education levels (as many countries lack expertise in agronomy, agricultural engineering and agribusiness management);
 - closer cooperation between the public and private sector;
 - fostering trade and investment liberalisation to facilitate the development and diffusion of technology;
 - increasing access to financial services in rural areas and for farmers in order to increase capital investment; and
 - an overall enabling policy framework that provides adequate incentives to create and adopt new technologies in all areas, including implementation and enforcement to enable investment in new tools and technologies in line with the WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).

Recognising the challenges facing investment and innovation in the food and agriculture sector that still persist in many countries, and considering cases where available public funds and private financing are not sufficient to meet demand on their own, the combination of public and private funds in a sustainable manner via **public-private partnerships** (PPPs) can prove a very effective approach. This can prove particularly useful for research, extension services and infrastructure. Certain types of innovations can best be achieved through co-operation between the public sector, international organisations and private firms. Partnerships can address complex issues, combining research with product development and marketing, engaging research organisations, private companies and farmers. For its part, the private sector can contribute technology, manufacturing skills, training and entrepreneurial spirit.

While PPPs have a crucial role to play in greening the agro-food chain, they also require appropriate institutional and legal framework conditions to be in place. They need to be based on realistic timelines, precise objectives, clear definition of partner roles, trust, transparency, and the understanding of shared reward. In order to provide for successful PPPs, public authorities need to ensure that private partners can deliver their services according to sound commercial principles. These include transparent and predictable legislation, the opening of infrastructure sectors to domestic and foreign private investment, effective co-ordination of preparatory measures between the different public authorities involved, and a fair allocation of risk.

Farmers also need access to **training and extension services**, as well as reliable local networks of professional agro-dealers, to be able to adopt new practices and technologies. Investing in making farmers knowledgeable is good not only for productivity, but also for the environment. Providing education to rural communities in a systematic, participatory manner is essential to improving their production, income and quality of life. Training programmes should specifically involve female farmers in developing countries as essential "gatekeepers" for household nutrition and welfare. Extension is also an essential pillar for rural community

progress, including support for the organisational capacity of farmers' groups and the formation of cooperatives.

Private Sector Example:

In 2002, DSCL (an Indian company with a specialisation in agri-rural business) launched the Hariyali Kisaan Bazaar chain of rural agricultural supermarkets, which offer quality inputs, agronomic services with teams of extension workers and agronomists, financial products (such as insurance, banking, credit and money transfers), commodity trading, and information (such as weather forecasts and market prices).

Raising awareness and sharing knowledge among all parts of the agro-food chain, including consumers, is also important. Mobilisation of the scientific, donor, business, NGO and farmer communities are needed to improve knowledge sharing, as well as local and reliable SMEs such as agro-dealers to adopt new practices and technologies. Objective and fact-based information will provide all actors with a clear understanding of the challenges to be addresses and the changes that will be needed, leading to alterations in consumer and market behaviour.

It is important to also consider that there is a great diversity of **pro-active business initiatives** (“voluntary approaches”), many of which have a number of positive effects. While it is not always easy to quantify such effects, these bottom-up approaches can be crucially important in leading to improvements in green growth and a change in business culture. For example, they can help promote consultation and partnership in achieving environmental policy objectives; they promote awareness of existing and new technical management practices; and they encourage the dissemination of existing effective technologies and the development of innovative approaches.

In order to build an enabling environment for business, it is essential to **foster dialogue, consultation and cooperation between public and private sectors** across all parts of the agro-food chain for introducing and implementing effective policy reforms. In this effort, BIAC encourages national governments to draw upon many of the best practices and evidence-based recommendations developed by international policy organisations such as the OECD, and to engage in discussions with representative business and industry organisations.

Finally, ensuring **policy coherence** is important, recognising that green growth strategies cut across many of the traditional categories that governments use to organise their actions. Because of the complexity of the agricultural sector (through its interactions with ecosystems and the lack of certainty of some of the scientific information available), policies will need to be cross-cutting and designed using a life-cycle approach, taking into consideration possible short- and long-term improvements.

3. Improving Productivity and Resource Efficiency

Within the context of the overall business enabling environment described above, the paragraphs below provide private sector perspectives from different parts of the agro-food chain.

Crops:

- Yield-increasing technologies, management practices and approaches can provide a significant contribution to environmental performance by boosting the productivity of existing land under cultivation, thus foregoing the need to bring more land into production.
- Technological solutions are part of the solution to increasing sustainable intensification of agriculture. For instance, the development of **improved plant varieties** has contributed to a significant yield increase, derived through conventional hybrid as well as biotech breeding techniques, including but not limited to biotechnology, and we can expect further advances through increased use of nanotechnology in the future. Genetically engineered crops have enabled further progress in terms of yield increases as well as resistance to disease and pests. New improved seed varieties show important potential for adapting to climate change, such as through the breeding of stress- and drought-tolerant crops. In this respect, the plant biotechnology sector can play a major role in helping to generate new strains of crops – such as genetically modified rice and canola plants, which use nitrogen more efficiently, and which are already available.
- **Extension programmes** are crucial in farmers to adopt practices that maximise the efficiency of the inputs they use and help protect the natural resources they depend on. Extension services disseminate practical information related to agriculture, including correct use of seeds, fertilizers, tools, tillage practices, crop rotations, restoration of degraded or desertified soils, water management, and also prediction tool models and on-site diagnostics which can optimise farm practices. For instance, a key focus of plant science industry stewardship activities is the training of farmers in Integrated Pest Management and the responsible use of pesticides, conducted in partnership with industry, governments and other stakeholders.

Private Sector Examples:

Unilever Brazil has carried out visits to farms to advise growers to minimize tilling or to avoid any ploughing for tomato production which limits soil degradation and reduces the need for fertilizers and irrigation. Combined with other land use practices the result is a lower cost of inputs and a bigger tomato harvest.²

² Source: SAI/SLF (2009) “Short Guide to Sustainable Agriculture”.

Bayer Tabela is an initiative developed by Bayer CropScience Indonesia, which combines direct seeded rice cultivation together with a specific agronomic programme and training on growing rice with optimised resources. The approach reduces labour at planting time, improves yields and benefits the environment. Water consumption is reduced by up to 20% and methane emissions by up to 30% compared to traditional transplanted rice cultivation. Farmers benefit from yield increases of up to 10% and can cope better with labour shortages. Consumers benefit from continued supply of affordable quality rice.

- **Crop protection** (i.e. protecting yields from weeds, pests and diseases) is crucial to maintaining and potentially increasing agricultural productivity. The production of fruit and vegetable crops, vital for healthier diets, is especially threatened by pest pressure. Pest outbreaks can be prevented or limited by developing and using mechanical, biological, chemical and other controls as needed. The responsible use of crop protection products as well as properly implemented integrated pest management strategies are important instruments for combating pests, conserving harvests and thus increasing efficiencies for green growth in agricultural production.
- Appropriate and responsible use of **fertilizers and sustainable nutrients** make an important contribution to helping plants capture more carbon, fostering higher yields and slowing the decline of soil organic matters. Fertilisers contribute to conserving biodiversity by increasing yields on existing arable land, thus avoiding the need to further encroach on wild habitats. Thus when considering the emissions originating from fertilizer use by farmers, it is important to take into account the net benefits that can be derived from using fertilizers to increase agricultural productivity on the same area of land. In addition, nutrients provide the replenishment needed by soils, helping to restore degraded land and maintain soil fertility.

Private Sector Example:

Project “Unnati” is a partnership between The Coca-Cola Company and Jain Irrigation, Coca-Cola India’s largest mango supplier. The initiative provides field-based training to Indian mango farmers on modern, sustainable agriculture and the adoption of the Ultra-High Density Plantation (UHDP) technique.

Using special techniques for pruning, fertigation (the application of fertilizer through an irrigation system), drip irrigation, nutrition management and pest control, these techniques can double mango yields and allow nearly 600 trees per acre compared to conventional planting of 40 trees, while decreasing the quantity of water used per kilo of mango production. Moreover, UHDP enables farmers to begin commercial harvests in 3 to 4 years as opposed to the 7 to 9 years required for traditional farming.

The project also includes a module to train farmers on UHDP and other modern methods of agriculture under Coca-Cola India’s ‘Parivartan’ program. Parivartan means “change” and it is a classroom and mobile training programme.

- However, it is clear that improper use of nutrients can also result in losses to the environment that can negatively impact biodiversity, water quality, climate change and air quality. Indeed, the fertilizer industry’s greatest challenges have to do with reducing greenhouse gas emissions in fertilizer production (especially that of nitrogen fertilizers) and reducing nutrient losses to the environment. To address these improper uses, the global fertilizer industry has developed the “4R Nutrient Stewardship Programme”, which advocates the right nutrient source at the right rate, right time and right place. There are several promising technologies and practices for improving nutrient use efficiency while maintaining the potential to increase agricultural production, including genetic improvement, site-specific nutrient management, computer-based decision support systems, or simple field assessment tools.
- Recognising that agriculture uses 70% of global freshwater withdrawals (as much as 80-90% in developing countries), most of which is for irrigation; the private sector is therefore encouraging the use of **improved water management**. This entails more efficient irrigation systems (such as drip irrigation), more precision agriculture, boosting rain-fed agriculture as well as better waste and rainwater management, use of conservation agriculture, use of more water-efficient crops and better assessment of soil type, maintaining year-round vegetative cover of soils, and use of intercropping to maximize uptake of water and crop productivity. Re-use of urban wastewater and alternative water supplies (e.g. industrial wastewater recycling) for agricultural production can also help to reduce water waste.

Private Sector Example:

McCain Foods has been performing irrigation trials in the Gujarat region of India to improve potato production rather than the flood irrigation techniques which tended to be used by local farmers. With support from the state government, the programme has resulted in the adoption of solid set and drip irrigation methods which require at least 30% less water consumption and potato yield per acre and quality has also risen significantly³.

Livestock:

- While the livestock sector provides high value food and many other economic and social advantages, its resource use implications are significant. The livestock sector is the world's largest user of agricultural land, directly through grazing and indirectly through the use of feed crops. It plays a major role in climate change, management of land and water, and biodiversity.
- For extensive livestock systems, policies need to address access to land and water resources, as well as **good management of grazing land** which can improve carbon sequestration and biodiversity protection. Meanwhile, for intensive systems, policies should look to the efficient use and pricing of inputs (e.g. water, feed, energy) through transfer and adaptation of improved practices.
- As large amounts of nutrients and energy are discharged to the environment by animals, leading to nutrient overloads and emissions, efforts need to be made to **reduce discharge**. For example, recycled nutrients (through good management of manure) help to raise soil fertility and plant productivity.
- Methane emissions generated through livestock production (a waste product of digestion by ruminants) contribute to a large extent of the agricultural sector's overall greenhouse gas emissions. There are a number of examples of how better practices can help reduce emissions. For example, research to reduce emissions from livestock is exploring selective breeding and biological means of reducing emissions (e.g. biogas production from animal waste by using co-digestion).

Private Sector Examples:

Danone Dairy Product business in France adopted an approach developed by Bleu Blanc Coeur to reintroduce omega 3-rich flaxseeds into cows' diets, supplemented by grass, hemp and alfalfa. This led to a reduction in greenhouse gas emissions of between 20-30% and an increase in milk yield by 8-10% during the trial stages. Moreover, the milk contained the same level of proteins as before, but less fat overall, thus bringing healthier products to consumers.⁴

³ Source: SAI/SLF (2009) "Short Guide to Sustainable Agriculture".

⁴ Source: SAI/SLF (2009) "Short Guide to Sustainable Agriculture".

The International Meat Secretariat (IMS) together with other international livestock associations are participating in an FAO-led partnership to improve measurement and performance of the environmental impacts of the livestock industry. Launched in July 2012, the three-year project plans to:

- establish science-based methods and guidelines on how to quantify livestock's carbon footprint;
- create a database of greenhouse gas emission factors generated for the production of different kinds of animal feed
- develop a methodology for measuring other important environmental criteria, such as water consumption and nutrient losses, and biodiversity

Food processing:

- The number of **enzyme applications** in foods has been growing, whereby enzyme technologies can improve the quality and quantity of food products as well as their environmental impacts. For instance, enzyme applications which slow the staling of baked goods can help to reduce food waste, thereby increasing efficiency in the agro-food chain and lowering negative environmental impacts.

Consumers and certification/labeling schemes:

- The consumers being served by the private sector are increasingly concerned about where their food comes from and are paying more attention as to whether it is produced in an environmentally responsible way. Sustainable sourcing has therefore become a point of differentiation in the marketplace. The use of **eco-labeling and certification schemes** to distinguish products and services by their social and environmental performance is now increasingly commonplace.
- However, many of these labeling systems only focus on one specific aspect of production, such as biodiversity conservation or greenhouse gas emissions reductions. Looking to the future, an important challenge will be to develop a more holistic approach for labeling that addresses all aspects of greening the agro-food chain for a particular product.
- For example, it is important for such labeling schemes to consider not just the way in which a product is farmed, but also what happens to such a product post-harvest. In 2010, the FAO estimated that poorly developed systems for handling, storage, packaging, transportation and marketing of agricultural products in developing countries results in post-harvest losses ranging from 15% to 50%. Meanwhile, developed countries also face losses due to food waste from harvest, through to delivery to food services and in households. This highlights the need to invest in food

infrastructure and handling in order to reduce losses and improve food safety. For example, it is important to encourage investment in developing relatively small-scale and low-cost drying, packing, bottling and canning machineries and processing plants that can be operated in rural areas where electricity supplies and other infrastructure are not always reliable. BIAAC therefore welcomes the initiative for new OECD work underway looking into food waste along the food chain.

- However, it is important to address complex and/or competing certification schemes that may result in confusing signals in different parts of the agro-food chain and in different markets. It is therefore essential to ensure co-operation among all actors along the agro-food chain and across different jurisdictions to build effective and comprehensive certification and labeling programmes.

4. Tracking Performance

Indicators for tracking green growth performance in the food and agriculture sector need to be well balanced and non-biased, as well as fit for purpose and reliable. Measuring subjective data is necessarily difficult, and it is challenging to think about the right headline indicators which are often focused only on specific aspects (general environmental aspects) with often too little focus on the growth element. Moreover, systems to acquire, report and validate data can be expensive, particularly for SMEs which face capacity constraints, meaning that procedures should be efficient and cost-effective. Where possible, indicators should therefore rely on existing information and experience, and should not needlessly require changes to existing systems, or duplication of efforts. Building clarity around the objectives of proposed indicators, and how these indicators will be used, is of central importance.

Monitoring green growth in the agro-food sector may require further coordination of voluntary certification schemes (as indicated in the previous section above). Diverse methods and competing schemes can undermine environmental impact, increase costs and create consumer confusion.

Synergies for building public confidence might be achieved by information sharing by policy-makers to help businesses' practical understanding of efforts required. All actors should work together in order to communicate objective information to the general public.

Private Sector Examples:

AgBalance™ is an expert, scientific methodology developed by BASF to measure progress in sustainable agriculture. AgBalance™ assesses the sustainability of solutions and processes in agricultural production systems. It holistically analyses indicators from all of the three dimensions within sustainability, namely environment, society and economy. Results of this holistic assessment provide a scientific basis for informed, fact-based decisions on how to best improve the sustainability of any given production system.

In practice, AgBalance™ combines Life Cycle Assessment with environmental, economic and social impact indicators, generalised to varying spatial scales. The methodology comprises up to 70 sustainability indicators, based on a significantly larger number of input data and parameters. Both, detailed in-depth results of individual impact indicators, as well as aggregated results are outputs of AgBalance™ studies.

Sensitivity and scenario analyses can be employed to study the robustness of the model results, and to investigate trade-offs or the response to external influences. Scenario analysis provides a guardrail for the continuous improvement efforts, thus helping to advance sustainability in agriculture.

www.agbalance.agro.basf.com/

Field to Market, The Keystone Alliance for Sustainable Agriculture is a platform for producers, agribusinesses, food companies and conservation organisations seeking to create sustainable outcomes for agriculture. Field to Market is developing indicators to estimate the environmental, economic, social and health outcomes of agriculture in the United States. In its first report, released in January 2009, Field to Market evaluated indicators for estimating land use, soil loss, irrigation water use, energy use, and greenhouse gas emissions for agriculture. The initiative is organised and facilitated as non-profit by the Keystone Center, a non-profit dedicated to developing collaborative solutions to societal issues (<http://www.fieldtomarket.org/>)

The Sustainability Consortium represents over 100 of the world's largest organisations working together to create pre-competitive, cross-sector solutions for the benefit of consumers and the environment. The Sustainability Consortium is currently working on a standardised method to evaluate and report product life cycle information for food, beverage and agriculture products, as well as biodiversity metrics (<http://www.sustainabilityconsortium.org/>).

5. Policy Directions and Conclusions

This BIAC paper argues that the private sector has a crucial role to play in greening the agro-food chain, but this can only realise its full potential if the appropriate policies are put in place. BIAC believes that the key drivers of green growth – namely investment and innovation – require the creation of enabling policy frameworks in which private sector-led and collaborative investment and innovation initiatives can thrive. This requires a whole-of-government approach in which policy coherence and greater dialogue and co-operation with the private sector are key aspects.

At the same time, BIAC emphasises the importance of public-private partnerships, though again these require enabling conditions of their own, such as realistic timelines, clear definition of partner roles, trust, transparency and so on.

In addition, BIAC urges greater awareness raising and knowledge sharing for all parts of the agro-food chain, particularly including training and extension services for farmers.

We also highlight the importance of industry-led voluntary and collaborative programmes that help to encourage an accelerated adoption of green growth innovations. These voluntary initiatives should be encouraged, but greater coordination may be needed between different parts of the agro-food chain and between different countries/regions. Long-term technology road-mapping and strategic policy planning will provide greater confidence for investment.

For policymakers to make the right policy decisions and for private sector actors to make the right investment decisions, it is vital that accurate and timely data is available to track green growth performance in the agro-food sector. At the same time, however, BIAC points to the importance of considering the possible costs of acquiring, reporting and validating data, as well as the importance of avoiding duplication of measuring efforts through greater coordination of approaches where possible.

The OECD can play an essential role in greening the agro-food chain by generating data, sharing best practices, and encouraging international and whole-economy policy co-operation and dialogue with the private sector.

Sustainable agriculture is at the core of the green economy, and the private sector is eager to be a key partner in making it happen.