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Retrofitting the Brazilian Biodiesel Programme: Implications for Policy Design

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In the context of oil price volatility and the need to reduce carbon emissions, biofuels are an emerging area of interest for many developing nations as alternative energy sources that, in some instances, can also enhance livelihoods in deprived agricultural areas. There are, however, a number of questions on this front: is it economically and environmentally feasible to incorporate small-scale family farmers into biofuel value chains? Can the production of biofuel feedstocks complement rather than compete with food crops? The experience of Brazil, a pioneer in the adoption of a socially inclusive approach to the production of feedstocks for biodiesel, has elicited much interest. This Policy Research Brief seeks to take stock of recent institutional developments and draw lessons as part of an ongoing learning process in an area where there are still no obvious sustainable business models or easy pathways to foster the inclusion of small-scale farmers.

The Brief suggests that incorporation into the biodiesel value chain is both feasible and productive for family farmers. But the extent of the engagement required of intermediaries can be significant in the early stages of the programme in underserved areas, particularly where farmers are dispersed and have not been extensively involved with market processes. Those embarking on these programmes thus have to consider such a production-support role. Further, the Brief suggests that intercropping (castor and beans, for example) can mitigate the food-fuel tradeoffs. However, the choice of optimal feedstocks from the point of view of equity and sustainability remains an open question.



Photo by Clovis Zapata, S. R. Nonato, Piauí.

The Brazilian Biodiesel Programme

Brazil's National Programme for the Production and Use of Biodiesel (PNPB) appears to have four main objectives: (i) to structure the supply chain of biodiesel in Brazil; (ii) to produce biodiesel from different oil seeds (such as castor beans, cotton, peanuts, dendê oil, sunflower seeds and soybeans) from the diverse regions of the country; (iii) to promote social inclusion and regional development in underdeveloped areas; and (iv) to support the production of a new source of oil supply at competitive prices and with appropriate quality. Unlike previous biofuel programmes of the 1970s (ProAlcool for the production of Ethanol and Pró-Oleo for the biodiesel production), PNPB has been pioneering the adoption of explicit policy goals to incorporate family farmers into the biodiesel value chain. This is particularly true in the Northeast region of Brazil, which was expected to be responsible for 15 per cent of the total production of biodiesel through the use of castor oil seeds produced by family farmers. This crop was regarded as having the potential to promote social inclusion by enhancing the livelihood opportunities of poor family farmers. Historically, many of the farmers had planted castor oil seed, a drought-tolerant plant that can complement the production of subsistence food crops such as beans.

The key policy instrument to facilitate social inclusion is the *Selo Social* (Social Label) certification, which helps bring family farmers into the value chain by mandating purchases from them in exchange for various economic incentives provided to the purchasers/refineries. According to Brazil's Presidential Decree No. 5.297 (later modified by Presidential Decrees Nos. 5.457-2005, 6.458-2008, and 6.606-2008), only those certified as meeting *minimum* specified procurement targets for purchases of indicated feedstocks from family farmers are awarded the Social Label and are eligible to participate in the biodiesel auctions organised by the National Petroleum, Natural Gas and Biofuel Agency (ANP), as well as to benefit from a reduction in the payment of two federal taxes (PIS/PASEP and COFINS). Those purchasing from family farmers in the less developed Northeast region were to enjoy full tax exemption.

One of challenges faced by the programme, however, relates to the effective insertion of small-scale family farmers into the supply chain of biodiesel, especially in the Northeast region, where the farmers are dispersed across the territory and thus far have not had a long-term engagement with market processes. To facilitate this type of engagement, the Brazilian government established a comprehensive policy and a set of economic incentives to foster stakeholder involvement in the biodiesel supply chain. The aim was to facilitate the provision of technical and financial support to family farmers, and to provide them with an assurance of price stability through formal contracts (Zapata and Nieuwenhuis, 2008). To date, despite immense political will, the programme has not integrated small-scale family farmers to the extent anticipated. Several authors have identified the programme as a policy failure, because the initiative did not live up to the initial expectations (Aldara and Batalha, 2010). It is argued here, however, that the programme needs to be interpreted in a more complex fashion. The analysis has to take into account not only the *number* of small-scale farmers incorporated into the programme, but also *how* the programme has affected the livelihoods of those who have taken part. Some previous research, for example, as well as research conducted for this Policy Brief, indicates that in a short period of time, the participation of family farmers in the PNPB has led to a significant (20 per cent in

the current context) increase in their median yearly income.¹ More systematic impacts, including those on poverty, are harder to track because these types of impact evaluations were not built into the programme design, and also because institutional modalities are still being refined.

Institutional Challenges and Recent Developments

The programme's implementation in the first few years faced several problems related to planning and execution, circumstances that became evident in *ex-post* evaluations. In short, the economic-incentive instruments used did not successfully incorporate the anticipated number of small-scale family farmers, particularly in the poorer and more underserved areas of the Northeast.² Several explanations were identified for this, including: the lack of adequate technical assistance; the distribution of low-quality seeds; low productivity that compromised family farmers' profitability; and difficulties caused by climatic, logistical and other factors related to small-scale farming in Brazil (Zapata, forthcoming).

The requirements of the Social Seal certification stipulate that technical support was to be provided by the biodiesel refineries. Brasil EcoDiesel, the main producer in the Northeast until 2009, operated by hiring technical workers. The technical assistance provided, however, was less than adequate. What also appears to have been underestimated was the amount of time and commitment required to provide the type of stable and predictable engagement needed to help small-scale farmers make a transition from mostly subsistence production to engaging in a market process.

Recently, the programme has been transformed by a quiet but profound rearrangement of roles on the part of major stakeholders with the small-scale family farmers. This evolved through the process, suggesting some flexibility in the initial policy implementation framework. In this context, it is important to estimate whether these changes have been effective. The changes include the matters addressed below.

The New Role of Petrobras

One of the most crucial changes observed in the structure of the biodiesel programme has been the emergence of a new central stakeholder in the biodiesel supply chain: Petrobras Biofuels (PBio). Petrobras, Brazil's state-owned oil company, is emerging as the dominant player in petrol-derived fuels and bio-ethanol, as a subsidiary company has been created to focus on the biofuels market and the firm has also made significant investments in the construction of biofuels refineries in the Northeast. It is also likely to become the largest producer of biofuels in the Brazilian market in the next few years.

The company has begun to establish itself in the market by addressing some of the inefficiencies of small-scale family farming, and by helping to ensure that the participation of farmers in the market takes place on a firmer footing than in the previous period. The firm has hired dedicated technical staff (35,000 contracted workers), distributed seeds, and signed medium-term contracts with small-scale farmers, which provide for the payment of a minimum market price for castor beans. The firm is also fostering the creation of local farmers' associations and the use of several sources of biodiesel feedstock, including soy, sunflower and castor beans, to include more farmers in the programme and thereby diversify the source of fuel.

One of the firm's main objectives is to become a central player in the international market. The company sees its support to family farmers' participation in production for

the domestic market as an opportunity to enhance its own participation in large international markets. In other words, the investment in small-scale family farmers aims to reduce the risk of relying solely on large-scale soy producers. This engagement also enhances the firm's image by demonstrating well-structured and effective "corporate social responsibility". In the context of the negative social and environmental externalities related to the production of biofuels, especially in Asia, which has created a negative image of biofuels in European markets (Transport and Environment, 2010), a demonstration of the potential for incorporating small-scale farmers may help diffuse such criticisms, while enhancing the corporate social and environmental image of the Petrobras Group.

Petrobras has also played a special historical role in the development of new technologies and productive structures in Brazil. The firm's involvement is helping to correct some of the problems that surfaced earlier in the relationship between small-scale family farmers and large-scale refineries, especially in the Northeast region. Only time will tell if Petrobras can effectively incorporate small-scale family farmers into the supply chain of biodiesel. In other countries facing similar challenges, a public entity such as a marketing board or a public-private partnership may be able to play this role.

In addition, two important technical issues need to be acknowledged with regard to the choice of feedstock to be produced by small family farmers. First, at the moment the castor bean bought by the firm is not turned into biodiesel because the product can command a higher price in the cosmetics and pharmaceutical industries. This makes the development of the value chain of castor for biodiesel sensitive to trends in these other markets. The investment in several sources of biodiesel—including soy, sunflower and castor beans—may help mitigate the risks of relying on a single type of feedstock and source of supply, and also provide additional options for family farmers. Second, Petrobras has become a monopsonist, posing long-term risks for small-scale family farmers—especially in the Northeast. It should be noted, however, that in the short run the participation of PBio has enhanced the participation of family farmers (Zapata, forthcoming).

This experience points to a potential short-term win-win outcome because of a unique set of circumstances typical of Brazil. Even in Brazil, however, it is not clear whether it will be possible to establish a balance between fostering a competitive industry and supporting social inclusion through the production of biofuel feedstocks, particularly in underserved regions.

The Biodiesel Production Centres: "Polos do Biodiesel"

One of the PNPB's main challenges has been the geographically scattered distribution of family farmers in the Northeast. Small-scale family farmers were unable to interact with their peers, and could not gain from economies of scale. The wide spatial dispersion of farmers also has a direct impact on the logistics of technical support, seed distribution and commercialisation. This was especially challenging in regions where farmers' organisations were weak or non-existent.

The "polos do biodiesel" serve to overcome these challenges by creating local centres of production. The Ministry of Agrarian Development (MDA) has invited two institutions to implement the poles: Obra Kolping for the northeastern regions and Plural Consultoria for the centre-west, southeast, south and north regions. Currently, 37 poles have been established across the country (Portal da Cidadania, 2010).

The biodiesel production centres are important because they can help small farmers overcome some of their difficulties in producing and trading in their production, and can help them develop their entrepreneurial skills.

Small-scale farmers' ability to organise themselves could lead to more profitable solutions for them. Farmers' associations and/or cooperatives are important in enhancing the knowledge base of small-scale farmers, as well as their market participation through awareness-raising programmes and more cost-effective delivery of technical support. The associations also have the potential to increase farmers' bargaining power, and to move into more value-added activities such as processing—rather than having farmers integrated only into the lowest rung of the value chain. Cooperatives can build oil-producing plants that will improve the income of small-scale farmers, since significant value-added is to be gained from processing oil. To date, very few associations have had the entrepreneurial drive to invest resources and build oil-producing plants. The association in Irecê, Bahia, is an exception in this regard, as it is now building the first cooperative-owned plant in the country.

Consideration of a Broader Range of Biodiesel Feedstocks

The sources of biodiesel are crucial to structuring its supply, and to how small-scale farmers can be incorporated. The current feedstock supply for biodiesel production is dominated by soy oil because of its availability and scale advantages. In 2009, soybean accounted for 80 per cent of biodiesel production, followed by beef tallow (which accounted for 15 per cent). The rest came from other oilseeds such as palm, peanut, wild radish, sunflower and castor bean. Castor was produced by 51,047 small-scale farmers.³

Additionally, with the demand created by the accelerated blending targets (a shift from a 2 per cent to a 5 per cent biodiesel/diesel blend since January 2010), the federal government has increased its total investment funding for small-scale agriculture with a view to enhancing the inclusion of family agriculture into the biodiesel chain. The aim is to expand the share of biodiesel production from alternative oleaginous crops to 8 per cent, as opposed to the present share of less than 1 per cent.

It should be noted that PBio is currently promoting a production model that fosters a fuel-food integration (castor and beans). According to the technical assistance provided in the Northeast region, small-scale farmers are instructed to use an intercropping technique to plant castor and beans together. This improves the productivity of castor, and might provide the farmers with an additional source of income and additional food supply. Given these recent developments, however, it is important to understand that in the absence of technological advancement, feedstock diversification is still very much a work in progress. Several projects have been fostered by local governments to look at other sources of biodiesel. These include sunflower, cotton and soy, and might make more farmers take part.

Changes in the Use of the Social Label Certification Scheme

The Social Label scheme is a regulatory instrument to promote social inclusion and to foster the participation of small farmers in the biodiesel chain by giving a tax break to firms that buy at least the minimum stipulated amount from small-scale family farmers (PNPB, 2009). Recently, adjustments have been made to the minimum percentage of feedstock that has to be bought from family agriculture in

order to secure certification. Arguably, this change can be accounted for by a better grasp of the real production capabilities of family agriculture, including its capacity to meet the targets set, as well as by regional social inequalities and the geographically-specific agro-ecological potential for biodiesel feedstock production.

The contracts consisting of purchase-price criteria and adjustment of contract price have been negotiated, and there is now provision of quality and timely technical assistance, fertilisers and quality seeds. On the basis of interviews with government officials, it seems that the MDA is seeking to ensure that the requirements of the Social Label are adhered to by tightening the industry-monitoring processes. For example, on 5 March 2010, MDA indicated that it had suspended the right to use the social fuel label for six biodiesel-producing units because the companies had failed to comply with the minimum amount of purchases from small-scale family farmers. This suspension prevents their involvement in 80 per cent of biodiesel auctions overseen by ANP.

Change in the Programme's Political Salience and Adjustment of Aggregate Targets

The programme was initially launched with much fanfare by the Brazilian federal government. In the media, the new policy instruments were proclaimed to be a great policy initiative for Brazil's rural poor, and were portrayed as a potential model for other developing countries to follow.

After the early years, however, the programme's political visibility appears to have been diluted, and the targets and institutional modalities are being revised in light of the experience gained. It is also important to point out that, despite the decline in the political salience of Brazil's biodiesel programme, the government has pushed forward the timeframe for meeting several of the programme's overall mandatory blending. In this respect, the programme fosters the increased participation of large-scale farmers, with a view to enhancing the industry's competitiveness and its potential to produce at scale. Small-scale farmers lack a longstanding tradition of producing commercial crops, and they do not have the production infrastructure to match the mode and rate of production (blending targets) set by the PNPB.

Policy Implications

The following policy lessons can be drawn from the recent institutional developments in Brazil's biodiesel programme.

- *Policies geared to including small-scale family farmers in internationally driven markets should take account of the structural weaknesses and the needs of those farmers.* In the case of Brazil's biodiesel programme, economic incentives such as the distribution of seeds, technical assistance and credit were used to insert small-scale farmers into the biodiesel supply chain. The Social Label scheme was used to ensure their integration, and to guarantee a steady demand for their production. Initially, however, the policy seemed to overlook the characteristics of small-scale farming, including family farmers' lack of experience in taking credit, which led to credit defaults in the programme's early years and the difficulties they faced in achieving reasonable levels of productivity. The small quantities of biodiesel produced, and logistical issues involved in securing the output, suggest that a different type of strategy was needed in the initial phase.
- *Small-scale projects might be a better start for nationwide policies that seek to include small-scale farmers in internationally driven markets.* This would provide

the space for the programme approach to be tested, and to be adapted to local realities and dynamics. The programme has been implemented without sufficient consideration of the challenges involved in integrating subsistence farmers. Most of the small-scale family farmers in question were distributed in sparsely populated areas of the country, areas that lacked proper transport and related infrastructure. Aside from that, few of them had experience with enhanced entrepreneurial activities. The longer-term engagement and participation of PBio has the potential to overcome some of these problems in the underserved regions, though it poses challenges of its own.

- *The Social Label certification scheme is a policy instrument that can guarantee demand for family farmers, but it needs further refinement.* Without this instrument, no small-scale family farmers would be involved in the production of biodiesel because the costs of a small-scale farmer producing castor beans are not competitive with those of large-scale soy producers. The recent adjustments in the percentage of feedstock to be bought from family agriculture takes into account the characteristics of small-scale agriculture, but the Social Label certification scheme has been shown to lack the disciplining power necessary to ensure widespread participation, as well as the flexibility to be adapted to different areas of the country.
- *For the programme to serve as an instrument of economic and social inclusion, there should be a focus on integrating farmers into more value-added components through an enhanced role for producer organisations.* The associations of farmers also has the potential to increase the organisation of farmers so that they can move to activities that will provide higher value-added (such as processing), rather having farmers integrated only into the lowest rung of the value chain. Forming cooperatives that foster oil-producing plants can improve the income of small-scale farmers because there is significant value-added to be gained from processing oil. It is also

important to have a monitoring and evaluation framework that can track the economic impacts for the farmers, and to assess how participating in biodiesel production compares to other economic activities and the production of food crops, as well as the matter of food security.

Conclusions

The approach taken in the programme's current stage sought to overcome some of the problems encountered in the initial phase. More attention has been paid to solving pressing technical-support issues by setting up local biodiesel production centres. Petrobras's greater role can also be seen as addressing some of the challenges in commercialisation, as well as providing better management of logistical delivery systems. The programme has evolved, but the adequacy of castor and other alternative crops for the production systems of family agriculture is still open to question. A number of other important issues must also be addressed, including the development of refinery technology, the potential to combine several different types of biodiesel feedstocks (such as soy and castor), and technologies to improve soil fertility in areas with poor soils, such as in the Northeast. This would allow small-scale farmers to produce at costs that are more competitive with those of other oilseed producers in the biodiesel chain.

A more comprehensive mechanism to enhance stakeholder participation is also needed, aside from the Social Label scheme. Ideally, this should be put in place at the start and not midway, as is the case of the biodiesel production centres, and should consider the needs and constraints of small producers. ■

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1. Data collected in the region of São Raimundo Nonato, Piauí indicated that the average income of a small-scale farmer ranged from R\$4,500 to R\$6,000. The production of castor beans for biodiesel could lead to an increase of R\$900–1,200, depending on weather conditions and local productivity levels. This figure does not take into account the value of additional beans that are produced when the farmers rely on intercropping between beans and castor beans. Some are vulnerable because they are just above the poverty line, and others are under the poverty line (IPEA, IBGE).
2. Some 51,047 small-scale farmers took part in 2008.
3. A total of 31,990 family farmers produce soy; 17,535 castor; 1,215 sunflower; 178 palm; 47 canola; 44 sesame; 25 soy-oil; 11 peanut; and two produce wild radish, from all the regions of Brazil.

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