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MODERN COOKING SOLUTIONS: THE WAY FORWARD

The efforts to provide universal access to modern cooking solutions will include at least three focal points: expansion of LPG, promotion of clean and efficient stoves, and development of biogas energy systems, with the last limited to HH with the requisite number of farm animals. To date, the promotion of LPG probably has been the major approach to advance clean cooking in the Region. The wider dissemination of LPG is dependent primarily on governments' pricing and import policies (chapter 4).

This chapter focuses on promoting clean and efficient cookstoves and biogas systems among the rural and urban poor, who are unlikely to be able to afford LPG in the near term. Since biogas energy systems can serve only a limited number of people, the key to delivering clean cooking systems is the development and dissemination of improved cookstoves that use traditional biomass and coal as fuel.

Even though efforts to promote clean cookstoves have been ongoing for many decades, programs in EAP and worldwide have been limited. China and India have undertaken large-scale programs, but most other countries have not advanced significantly beyond pilots. However, even where the pilot programs have succeeded, the commitment to clean cooking often has been limited and fragmented.

In recent years, new approaches to promoting modern cooking solutions have emerged, along with a growing consensus on the urgency of this effort. Furthermore, there have been some successful programs in EAP from which lessons can be derived for future programs. For instance, China's successful NISP has disseminated over 100 million improved stoves (Sinton and others 2004). This success was achieved through learning by doing and adjusting early unsuccessful methodologies. In Thailand, before LPG became the predominant fuel, the efficient bucket stove became almost universally adopted by people in urban areas (Kammen 1995).

The emerging new approaches and lessons from past programs provide the foundations on which to design future programs in the Region. It is essential to begin now because most EAP countries face a long road ahead to adopt and promote the best policies and strategies for achieving universal access to modern cooking solutions.

WHAT IS DIFFERENT FROM THE PAST?

It is widely accepted that many past cookstove and small-scale renewable energy programs had several shortcomings in their technical designs and distribution strategies. The three major problems were that (1) most products were not well designed; (2) there was little quality control

Box 5.1 New Advanced Biomass Cookstoves Initiative in India

In 2009 India announced a large initiative for advanced biomass cookstoves. This initiative was intended to reach the millions or even hundreds of millions of people who use biomass energy and enable them to meet their daily cooking needs more healthfully. Under development, the program will focus on five key areas:

- Technical issues related to testing and standards, including R&D
- Cookstove delivery procedures
- Potential programs to process and supply fuel
- An innovation contest for next-generation cookstoves
- Exploring what can be accomplished with community cookstoves.

Expected in 2011, a new protocol will be adopted to test and qualify cookstoves based on their energy efficiency and stove emissions. Testing facilities will be set up prior to qualifying the cookstoves. It is expected that new manufacturers will be involved. Subsidy design may include carbon credits.

Source: IIT and ERI 2010.

during installation; and (3) some cookstoves had short working lives because they were built with limited expertise entirely of local materials. Ironically, these problems arose from well-intentioned efforts to use local entrepreneurs to manufacture them, to keep costs low, and to ensure that the stoves were appropriate for local cooking practices. Many of the stoves did work well when new, but their performance quickly degraded, and the stoves began to crack and break down. As a result, most of these past programs, with the notable exception of those in China and India, remained at a small scale and often were evaluated as problematic and unsuccessful.

Today, the situation is quite different. In the last decade, there has been an emergence of new technologies, new ways of producing stoves, better quality control, innovative financing schemes, and new coalitions to support the scaling up of new programs (World Bank 2011a). Some new stoves are being manufactured in factories and workshops and delivered ready to use. Other manufacturers are producing essential stove components such as fireboxes and chimneys in the form of kits that can be assembled onsite.

In 2009 India began a renewed effort to develop a successful stove program to meet the needs of the hundreds of millions of people who use biomass energy for cooking. That year, a new

initiative was started with the goal of getting most people who use solid fuels to begin to use a new stove in the not too distant future (box 5.1).

India's cookstove initiative highlights the necessity to develop innovative stoves that are subject to standards and testing methods that qualify them for the new effort. The concept is that stoves should be certified to be safe, reliable, efficient, and clean burning. The initiative also may have scope for different levels or tiers of certification or stove labeling. Certainly, methods to finance the high costs of stoves are an issue that must be addressed along with the appropriate levels of subsidies for the stove itself. The research on the health benefits of reducing emissions is still an area that policymakers should emphasize. Today, all stakeholders have the opportunity to join together to tackle energy and indoor pollution problems that intensely affect the world's poorest populations.

POLICY AND TECHNICAL SUPPORT FOR NEW APPROACHES

Implementation of new approaches for better stoves requires several different types of support. To achieve the goals for cleaner cooking in the Region requires a new coalition of government, donor, private sector, and nongovernmental entities. Governments can play a supporting role as

catalysts to promote the development of innovations, as opposed to providing heavy subsidies for a particular type of stove. This support will include providing incentives to both private sector and nongovernmental organizations to develop better products through the interaction among the designers, manufacturers, and users of stoves to produce more diverse stove designs that appeal to consumers. To enable this interaction, a technical infrastructure must be put in place to test the claims of new product manufacturers and to ensure that products deliver on performance promises and are safe and reliable. In addition, once satisfactory products become available, governments and other entities will have to launch consumer information campaigns to inform the public of the health and efficiency advantages of the new products.

The requirements to promote small retail products are fairly similar whether the latter are better stoves or more efficient lighting appliances. These requirements include encouraging innovative product designs that are significant improvements over past methods of cooking, lighting, or heating. In all likelihood, the new designs will emerge from small private companies or NGOs. Product development often is very expensive and could be supported through competitive innovation grants or other financial incentives provided by governments or other entities to assist with such expenses. The general requirements are to develop a system of technical support to ensure that (1) stoves perform as expected, and (2) financial and possible subsidy arrangements are put in place to support larger scale program development along with institutional support for implementation (World Bank 2010c).

Technical Support, Performance, and Information Exchange

Technical support certainly is needed to certify stoves to ensure that they perform satisfactorily. Certified stoves could be considered eligible for government financing or partial grants to support dissemination. Certification would require accepted country or international standards for improved stoves. Today, no such generally accepted

standards exist worldwide, but some EAP countries have developed their own standards. Therefore, a Regional review and recommendations concerning acceptable standards for advanced biomass stoves are necessary to complement any existing country-level work in the Region (MacCarty and others 2007; MacCarty and others 2010). This Regional review would have to be coordinated by an entity that is directly involved in, or at least knowledgeable about, new work at the international level.

At present, over 100 different new types of stoves are estimated to be available in developing countries. These products vary substantially in their sophistication, durability, and reliability. As a consequence, suitable codes or standards need to be established to ensure that products meet the needs of consumers and perform satisfactorily. Thus, there is a need to test new products, while making sure that standards are not so stringent that they discourage the products' commercial development.

In the initial stages, technical support will be necessary to encourage better and more diverse products. For such small interventions as clean and efficient stoves, it is best to encourage a diversity of products to enable consumers to choose what best fits their needs. This diversity will require encouraging interaction among stove users, builders, and designers. In addition, governments and other entities should support significant monitoring and evaluation (M&E) of stove performance to ensure that lack of stove durability, a significant issue in past programs, does not remain a problem. Technical issues that should be addressed include stove durability, safety, and performance. To encourage product innovation, it would be a good idea to set up a technical exchange for information sharing on the issue of clean cooking. This exchange could be combined with the commercialization of lighting and other small household-energy related products.

Financial Framework to Encourage Production, Development, and Sales

The financing requirements for initiating any new agenda for clean cooking are fairly similar to

programs that market new products such as solar home systems or microlighting systems. Many past cooking programs have suffered due to their pilot nature or short-term focus. To give them a greater chance to succeed, larger programs will require longer term government and donor commitment.

Subsidies will be necessary to promote the development of new stoves. Generally, the most effective stove programs have financed stove development costs, with minimal or no subsidies for the stove itself. In many countries, high subsidies for stoves themselves have proved problematic (World Bank 2011a). In the early stages of the NISP in China, the government provided significant subsidies for stoves, and stoves were promoted through county rural energy offices. After initial difficulties, China altered its approach to include support to develop and promote the stoves. Their distribution was accomplished without subsidies. This approach resulted in the establishment of factories to produce the stove components, which then were assembled by local entrepreneurs. The success of this program meant that China had no need to continue its past level of support for stove development.

There could be a role for vouchers that provide increasing subsidies based on the smoke removal or energy efficiency of stove products. The necessary balance between loans and grants to promote better stoves in developing countries will need to be evaluated in each situation, taking both cost and affordability into consideration.

The financing and subsidies involved in cookstove promotion programs are complex because the stoves generally are sold by private companies. Programs such as Lighting Africa have addressed such issues for electricity access (Lighting Africa 2011),³² and lessons can be derived from their experience.

32. Lighting Africa, a joint IFC-World Bank program, is helping to develop commercial off-grid lighting markets in Sub-Saharan Africa as part of the World Bank Group's wider efforts to increase access to energy.

Furthermore, efforts should be made to explore the use of climate change funds so that the financing of advanced stoves is broadly mainstreamed. The Global Environment Facility (GEF) has listed clean cookstoves as eligible for grants. Methodologies already are available for voluntary carbon markets and are beginning to be used, although not yet widely (box 5.2).

Specialized funds also have been used successfully to promote better stoves and other technologies. Rural energy funds, which have been used in many countries to support rural electrification, can be used to promote improved cookstoves. Such funds are, by their very nature, open to new types of projects and use both NGOs and the private sector to implement projects. Private sector entities and NGOs could be employed to coordinate efforts to deal with these very important issues. Generally, specialized funds are flexible and also could be used by, or coordinated with, other sectoral programs such as clean water, rural development, and local forest management.

In addition to rural energy funds, many countries have community block grants or social funds that could be used to promote clean cooking and other energy technologies. One very successful program in Guatemala provided communities with many development options, one of which was to use the funds for improved stoves. These stoves had large iron or steel cooking surfaces that were convenient for cooking with pots, making flat breads, and roasting corn (Ahmed and others 2005).

Indonesia's Green PNPM (National Program for Community Empowerment) is an environmental pilot that provides block grants and technical assistance to communities (World Bank 2010b).³³ At present, the main grant products are forest and water resources management, environmental services, waste management, and renewable energy. With the right type of improved

33. PNPM Generasi is an innovative pilot program launched by the Government of Indonesia in July 2007. PNPM aims to accelerate achievement of three Millennium Development Goals: Universal basic education, Reduction in child mortality, and Improvement in maternal health.

Box 5.2 Potential for Financing Efficient Biomass Stove Projects through Climate and Carbon Funding Mechanisms

Several financing mechanisms designed to mitigate climate change can be leveraged to fund biomass energy projects including the development and deployment of efficient cookstoves.

Clean Development Mechanism (CDM). To date, the CDM has approved two methodologies for improved cookstoves and reduction of nonrenewable biomass: (a) AMS (Approved Methodology for Small-Scale) II.G and (b) “Methodology for Improved Cookstoves and Kitchen Regimes” (Gold Standard V.01). The AMS methodology is based primarily on carbon mitigation. The Gold Standard is more onerous. It uses a fossil-fuel baseline to compute the expected fossil-fuel savings from the local fossil alternative to determine the scale of financing. The Gold Standard methodology, used in voluntary carbon markets, also accounts for the inclusion of upstream emissions reductions, that is, emissions from charcoal production, as well as methane and nitrous-oxide emissions reductions.

With the ongoing simplification of the CDM process, it is becoming easier to develop smaller scale biomass energy projects such as with improved cookstoves. Additionally, CDM-certified credits traded on the emissions trading system (ETS) usually carry a premium over voluntary emissions reductions (VERs) credits. The CDM already has approved 26 household energy-efficiency projects and has registered 6 more.

Climate Investment Funds (CIF). Channeled through the multilateral development banks (MDBs), CIFs comprise the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF). SCF, in turn, covers two programs that may be used for scaling up forests and other biomass energy projects. These two programs are the Forest Investment Program (FIP) and the Scaling Up Renewable Energy Program (SREP). FIP supports developing countries’ efforts for REDD (Reducing Emissions from Deforestation and Forest Degradation).

The World Bank Group. The World Bank (IBRD) houses three funds with particular relevance to biomass energy: (a) the BioCarbon Fund (BioCF), (b) the Community Development Carbon Fund (CDCF), and (c) the Forest Carbon Partnership Facility (FCPF). The first two funds focus on land-use-based credits and rural-community-based projects, respectively. FCPF is designed to support the Bank’s efforts to address REDD. The International Finance Corporation (IFC) also has helped to develop a large number of finance products for businesses and consumers that could be used to support biomass energy. IFC recently also agreed to provide financing to support improved cookstoves.

Global Environment Facility (GEF). The GEF has three grant mechanisms to promote better biomass stoves and improve the sustainability of household biomass use: (a) the Earth Fund (and other private sector development funds), (b) the Sustainable Forest Management program, and (c) the Small Grants Program.

Sources: World Bank 2011a; UNEP Risoe Center 2010; www.ifc.org; GIZ 2011.

stoves, this program could be expanded to include the financing of an efficient and durable stove. In addition, a wide variety of global funding sources, especially climate and carbon funding mechanisms, could be harnessed to support clean cooking (box 5.2).

To summarize, cookstove finance can be broken down into components that address different

needs. These divisions are important because methods and strategies need to be tailored to address the varied goals of cookstove programs. The program funding types and objectives include:

- Rapid-deployment financing to successful cookstove project developers to scale up existing projects

- Market development activities to create robust markets for advanced cookstoves in priority countries and regions
- Pilot programs to assess the technical performance and market viability of advanced stoves that deliver the best local (health) and global (climate) benefits
- Support to cookstove entrepreneurs and manufacturers in the form of funding and TA to foster the quality and quantity of advanced cookstoves in the market and to reduce costs
- Policy support to country governments to create enabling policy environments and to direct public sector resources to the problems that advanced cookstoves can address
- Humanitarian assistance in disaster and conflict zones to provide cookstoves to distressed populations, such as residents of refugee camps.

These various needs could be financed by a diverse set of organizations including multilateral and bilateral donors, international carbon funds, country governments, and private foundations.

Possible Global and Institutional Support to Clean Cooking

The promotion of modern cooking solutions has links with the energy, environment, health,

and social sectors. Consequently, responsibility for this work does not fall squarely on any one sector. This multisectoral aspect is similar to the challenge in the water and sanitation sector, in which handwashing, smaller latrines, and toilets cut across the water, health, and environmental sectors. This multisectoral characteristic has been addressed by developing the multisectoral, grant-based Water and Sanitation Program (WSP), which is responsible for promoting projects within countries and creating international consensus for action (box 5.3). A similar arrangement can be considered for dealing with the multisectoral nature of improved cookstoves. In the past, the Energy Strategy Management Assistance Program (ESMAP) has supported a considerable amount of work on biomass energy and could play a significant role in assisting the EAP Region's cookstoves programs.

Several different types of institutions are needed to scale up clean cooking in EAP. One requirement is an institution that supports policy studies and project preparation. The World Bank's Asia Sustainable and Alternative Energy Program (ASTAE) is well suited for this type of work. As an example, much of the project development work for small market energy interventions in both East and South Asia was the result of work financed by ASTAE grants. ASTAE

Box 5.3 Water and Sanitation Program: Potential Model to Promote Modern Cooking Solutions

The challenge for modern cooking solutions is to promote and replicate successful approaches, continue targeted learning efforts, and support reforms that ensure the adoption of sustainable policies and investments across the relevant sectors: energy, environment, health, and social. The Water and Sanitation Program (WSP) presents a useful model. WSP is a multidonor partnership administered by the World Bank to support poor people in obtaining affordable, safe, and sustainable access to water and sanitation services. WSP works directly with client governments at the local and national levels in 25 countries through regional offices in Africa, East and South Asia, Latin America and the Caribbean; and in Washington, DC. Over the last three decades, WSP has led or supported many of the advances made within the water and sanitation sector. It has been able to share best practices across Regions and place a strong focus on capacity building by forming partnerships with academia, civil society organizations (CSOs), donors, governments, media, the private sector, and others. WSP's work helps to effect the regulatory and structural changes needed for broad water and sanitation sector reform.

Source: www.wsp.org

could provide financing for project innovations and policy work on how to scale up clean cooking in EAP. Moreover, because ASTAE also covers the South Asia Region, EAP could provide useful lessons for projects developed for all of Asia. In fact, ASTAE already supports a limited number of project interventions to promote better stoves and clean cooking. In short, ASTAE could be one of the focal points for intervention within EAP.

The promotion of better cookstoves in EAP is a large-scale intervention that will require a *new or existing institution* to take on the challenge of moving the Region's 1 billion people to more modern and clean ways of cooking. Any new institution would have to be supported by the country governments. Its primary role would be the development and exchange of information to promote clean cooking solutions. All of these issues need to be addressed in EAP to support the expansion of efforts to promote clean cooking.

In 2010 the United Nations Foundation launched the Global Alliance for Clean Cookstoves to advocate for the implementation of a variety of programs for better biomass stoves in developing countries (UN Foundation 2010; World Bank 2011a). The issues featured in the Global Alliance are similar to those that are facing EAP countries. The types of activities encompassed by the Global Alliance to scale up and deploy clean cooking solutions include:

- Development of standards and testing methods
- Ways to encourage adoption of advanced stoves
- Ways to spread out the upfront cost of stoves through securing appropriate financing
- Filling in some of the major existing research gaps that will be necessary to promote the program
- Development of effective awareness-raising methods
- Promotion of market-based solutions that include the private sector, and nongovernmental and microfinance organizations.

EAP countries have a variety of institutions that already implement cookstove programs. China's Ministry of Agriculture has been the focal point for improved stoves. Mongolia's new energy institution (Energy Authority) could be adapted to cover clean cooking as part of its work. However, in most EAP countries, the programs for clean cooking are small and sometimes ineffective. It is essential that individual countries commit to promote improved cookstoves, and nominate/develop capable institutions that will take overall responsibility for the successful implementation of improved cookstoves programs.

Fortunately, many effective NGOs already are promoting clean cooking. These and other organizations will be necessary partners in the efforts to promote such new technologies at the local community level. A prominent example outside of the EAP Region is Bangladesh's Grameen Bank, which has made better stoves a focus of its development efforts. In Vietnam, the Institute of Energy long has supported small efforts on improved biomass stoves, and the Women's Union has become involved in new programs as well. Any new institution for knowledge exchange that has ideas for new programs to promote clean cooking can work with such local microfinance organizations and NGOs as partners that can bring in their experience with local issues and problems.

The private sector also is actively involved in the development of technologies to promote clean cooking. At both the international and local levels, private companies are engaged in developing better technologies, participating in the discussions of standards and ratings systems, and setting up distribution and sales campaigns. Although these efforts are at an early stage, this new development should be encouraged through support from international organizations.

PATHWAY TO IMPLEMENTATION

Although some improved stoves are available today, there is still a need for a period of technical assistance to develop locally appropriate options. The basic components that are necessary

to move forward and address the problems facing the adoption of these stoves are:

- Ways to encourage or ensure the participation of governments, NGOs, and the private sector
- Assessment of the best methods for finance or subsidies to lower the higher initial costs of stoves
- Improvements in testing protocols and development of standards for products that are reliable, durable, and efficient
- An organization or combination of organizations to take charge of a development issue that straddles many sectors including energy, environment, health, forests, and gender.

Many lessons can be learned across the Region from small energy programs that have succeeded or experienced problems. EAP countries also are at different levels of both awareness of the problems associated with cooking with traditional stoves and their efforts to promote better models. Large countries such as China have been doing basic research on this issue and implementing programs for many years. Smaller countries such as Cambodia have NGO-run programs for charcoal stoves that have achieved a large scale of operation. The way forward will vary by country.

Overall, the EAP Region needs Region-wide capacity to deal with the issues that are common to the EAP countries. These issues include standards; testing protocols; and ways of financing first cost that encourage market development, effective communication strategies, monitoring and evaluation techniques, and market studies to assess the suitability of various stoves. For instance, it would be essential to identify centers at either the Region or the country level that could test the existing improved stoves in the Region according to guidelines that are agreed by the EAP countries. International donor programs will need assurance that the promotion of stoves actually has development impacts and that the stoves are clean, reliable, and safe. A large country such as China has the resources to accomplish almost all

of the functions necessary for having successful small energy interventions such as better stoves.

The need for additional research and policy development should go hand in hand with the development of projects that deliver better stoves to the target beneficiaries. Such projects already operate in the EAP countries. The goal is to expand them and implement new ones—perhaps initially on a modest scale—while providing feedback on technology development to manufacturers.

During the first 2–3 years of the program, a period of testing and project assessment is anticipated to ensure that the stoves and other interventions deliver on their promises of reduced pollution and greater energy efficiency. Significant experience in the international community already is available. Centers of excellence in product development and promotion could lead the way toward ever larger programs leading to universal access to better stoves, while pursuing synergies with other programs that promote better lighting and heating systems.

The challenges of promoting clean and efficient cooking practices have been addressed in many regions of the world (World Bank 2011a). Successful programs have been developed in Africa, Latin America, South Asia, as well as East Asia and the Pacific. These programs range from promoting charcoal stoves that have minimal costs to promoting fairly expensive and substantial wood stoves. A substantial body of knowledge also exists on how to promote private sector participation in the development, marketing, and sales of products that improve people's lives. This wide range of experience with a variety of different stove types offers lessons that can be the foundation for the development of new projects or programs.

The way forward comprises several key elements (World Bank 2011a). Such a strategy would require cooperation among government, the private sector, and NGOs qualified to support program dissemination.

- Some form of government institutions or agencies would be needed to facilitate the program.

- Incentives would need to be provided for NGOs, the private sector, or other organizations to address demand-side interventions, principally more efficient stoves.
- Technical development of all types of stoves is still necessary. The leading manufacturers of advanced stoves continue to refine and develop new models.
- Monitoring and evaluation for both improved and advanced stoves are necessary under conditions of actual stove use and to link grants or subsidies to program performance.
- Grants and financing would be necessary to encourage the development of businesses or other organizations to sell or retail stoves. The grants can be channeled through retail markets or organizations that can provide both financing and quality assurance for products.

Financing from international organizations to support the development of clean cooking programs is essential to achieve the elements of this strategy. This financing will require the cooperation of many international organizations to ensure that the program focuses on the commercialization and sustainable scaling-up of projects that support clean and efficient cooking. Consideration could be given to the development of an agency based on the experience of the Water and Sanitation Program (box 5.3).

Outlook for Modern Cooking Solutions

For many years, the health and environmental issues arising from burning biomass energy in primitive stoves or open fires have been on development agencies' list of priorities. Many of the early cooking stoves that were promoted under various national programs were untested and of poor quality. In addition, the difficulties of promoting small products that improved energy efficiency for cooking, lighting, and heating through retail markets or rural development programs are well known.

However, the outlook for modern cooking solutions has changed for the better. Despite past problems, during the last decade, new products

have been developed. The model for implementing better stove programs can follow a path similar to that of small, renewable energy systems deployed for those who lack either main grid electricity or modern fuels such as LPG for cooking. The path forward to reach universal access will have to include the promotion of both small appliances provided through retailers or NGOs and the promotion of electricity and LPG by large energy companies that work through network systems or distributors.

The pieces are falling in place for the EAP Region's intensified promotion of clean cooking solutions. New technologies are being developed through the cooperation of private organizations and donors. Climate change funds are increasing their attention, and opening their doors, to financing clean and efficient cooking and ensuring that lack of funding is not an obstacle to the growth of retail businesses that serve the poor. New international alliances have been formed to more actively support and promote clean cookstoves in ways consistent with past successes. The increasing international focus on improving the productivity of rural women and, more generally, on clean and healthier homes is directly related to promoting better cooking practices. The private sector has joined the efforts to develop new products for improving cooking practices and making commitments to focus on the poorest segments of society.

The remaining challenges of scaling up the provision of energy services to the poorest people in the world should not be underestimated. For some time, it will be necessary to support the technical development of products suitable for poor and rural people in EAP. This support will be necessary because the target beneficiaries make up the bottom of the pyramid. They cannot afford to support the technical innovations for the continued development of new products. However, it should be cautioned that many past programs that have focused on the poorest households have promoted low-cost products that were not much better than traditional stoves. With 1 billion people using solid fuels in the Region, better products manufactured on a large scale are

essential to reduce costs enough to reach those in the lowest income groups. There also is a need to support the efforts to promote clean cooking being undertaken by microfinance organizations, private companies, government, and NGOs.

Apart from improved cookstoves, it is important to promote the use of LPG, kerosene, biogas,

and biofuels in ways that are economically and environmentally sustainable. These fuel options are extremely important and should be actively pursued. However, their reach is limited to those who can afford either the monthly costs or the rather high costs to purchase the initial system.