3.3.4. Stove type

There are numbers of stove types that are available at household kitchens. During the surveys, the following stove types were identified:

Iron bar stove: The simplest stove type is the iron bar which is also similar to the three stone. This stove type has open combustion chamber and open ventilation space, where fuel or air can be fed from any direction. This stove type is often used with agricultural wastes or fuelwood. Therefore it requires a continuous batch fuel feeding. Efficiency: 12% [IE, 2001]



Figure 7. Iron bars cookstove. The left photo was taken in Thai Thuy, Thai Binh. The right photo was taken in Quang Trach, Quang Binh. A mixture of fuels like rice straw, rice husk, and fuel wood is used with this stove type.

Sawdust stove: The stove is cylindrical, about 300 mm tall. It is made by ceramic, cement or metal. As with ceramic or cement and sand, the stove wall is about 60-80mm thick and the stove diameter is up to 400mm. In case the stove is made of metal sheets, it has only 1mm thickness wall and 270mm length diameter. This stove uses compressed sawdust. To prepare firing, a wooden bar (or a glass bottle) is vertically placed in the center of the stove. Sawdust is filled into the stove around the vertical wooden bar before being compressed manually. Before firing, the wooden bar is removed, leaving space for combustion chamber with a diameter of about 70mm. Another wooden bar (about 30-50mm in diameter) is used to start firing and maintain the flame. The compression of rice husk or saw dust was found useful by providing a longer burning time (more than 2 hours) and better combustion efficiency. No fan is required for air supply. Thanks to a well focused nature of flame at exit, the stove efficiency can be in the range of 30-40% [Bhaskar, 2006]



Figure 8. portable packed stove using sawdust or rice husk. On the left, a photo taken in Quang Binh shows compressed sawdust with a small combustion chamber in the center. On the right, another photo taken in Quang Binh shows the fire of the stove under cooking.

Portable wood stove: The stove is made from ceramic. Unlike the sawdust stove, this stove wall is not fully closed. About one fourth of the wall is opened for fuel feeding. Towards this side, a cone shaped ceramic table is attached to hold the wood. Under it, a door is opened for air supply and ash removal. The pot sits on three supports about 50-50mm above the stove wall.



Figure 9. Portable improved wood stove. Photos were taken at 2 different households. in Can Tho.

Portable coal stove: The stove is made by iron, with a cone shape. the stove uses a small electric fan to supply air. It has a relatively small size and easily removable. Little agricultural waste is used to start the fire. After firing the stove burns only coal for about 30 minutes before a new coal batch is fed. Although this stove type offers a high burning temperature, its ignition often causes a lot of smoke and dust. According to [IE, 2001], this stove type has an efficiency of about 22%.



Figure 10. Portable coal stove. Photos were taken in Thai Binh. A small fan with 3-5V voltage is attached to this stove type, enabling a continuous air supply and a powerful firing.

Fixed biomass stove: The stove is made by cement or brick-cement with a cuboidal shape. This stove type often has two pots. An electric fan is placed in the centre bottom, supplying air for both pots. For the one which does not use fan, the air entrance is relatively large. Both rice husk and fuel wood can be used with this stove type. Ash is removed from

the room underneath of the combustion chamber. This stove type offers a better air circulation and lower heat waste than the iron-bar stove. Efficiency therefore could get 20-25% [Nguyen Duc Cuong, 2012].



Figure 11. Fixed biomass stove. On the left, a photo taken in Le Thuy, Quang Binh shows the combustion chamber of the stove, with a metal cover and an iron grate. On the right, another photo taken in Quang Trach, Quang Binh, shows a stove under cooking, with air supplied from a small fan. The stove uses a mixture of fuel wood and rice husk.

Portable rice husk stove: The stove has a traditional name "Lo Trau", which was promoted by FAO to some African countries, and adapted in Philippine by REAP. This stove is made of sheet metal and is lightweight (about 2.5kg). In some cases, it is also made by concrete or clay with thicker walls but a similar design. Rice husk is filled in the main drum and ignited by a piece of paper or straw from the bottom. Ash can be collected by a holder at the base of the stove. Unlike the portable coal stove, this one does not require a fan for air supply. It was reported that this stove gives little smoke, high combustion efficiency. The thermal efficiency is about 13% [REAP, 2003]

Figure 12. Portable rice husk stove. The stove has outer and inner drums made by metal sheet, with 3 standing ports and 3 pot holders. Ash is removed from the bottom of the stove. Photos were taken in Le Thuy, Quang Binh.

Fixed rice husk stove: The stove is another so-called "Lo Trau" type. The stove has two pot holes into which concentric iron rings for different pot sizes are placed. The stove is made by concrete, but in some cases it can be also covered by stainless steel or metal for easier cleaning. Rice husk is filled into a husk supply holder before flowing into the grates in combustion chamber under the first pot hole. Heat is transferred from the combustion chamber through the first pot hole to the next pot hole, while smoke and dust fly through the chimney into the atmosphere. Ash can be removed from the bottom of the combustion chamber. Efficiency ???

Figure 13. Fixed rice husk stove. This stove consists of two pot holes, rice husk supply holder, a chimney and some iron strings for placing the pots. Thanks to the fitted pot rings and the functional chimney, all pollution can be taken out of the kitchen. Photos were taken in Can Tho.

LPG stove: Although there are different designs for this stove type, a common LPG stove has two pots, placing about 3cm higher than the burner. Each pot has its own regulation valve which can electrically ignite the fire and manually adjust gas flow. Offering high combustion efficiency and almost no smoke, this stove type is considered as the most "clean" stove in the market. Efficiency of the stove type is about 60% [IE, 2001]

Figure. 14. LPG stove. A typical LGP stove has two burners with adjusting valves. Fuel is supplied from a 12kg gas cylinder. The stove stands on a table and hence it is comfortable to cook. In addition, a smokeless cooking leaves the kitchen in a relatively clean condition.

Reference:

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