

# Comparative advantages of initial firing of brick kilns using LPG



ICIMOD



## High fuel costs and emissions using traditional firing methods

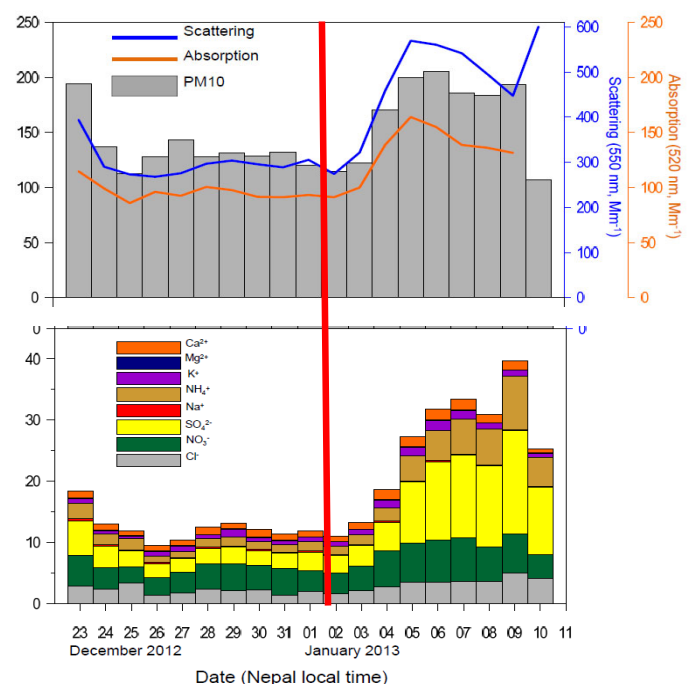
Brick industries in the Kathmandu Valley and many parts of Nepal and South Asia generally operate from October to May. The initial firing of brick kilns has always been a huge challenge since it consumes a substantial amount of ignition fuel and about 10–12 metric tons of firewood. It also releases high levels of pollutants and is time intensive.

The predominant fuel used for baking bricks is coal, which is also mixed with other biomass fuels such as mustard stalk, Nepali hog plum (lapsi seeds), sawdust, and rice husk. Initial firing using only coal is not possible as coal requires much higher temperatures for ignition (500–700 °C), usually attained using firewood or diesel.

## LPG firing as a substitute for firewood firing

Initial firing is done using electricity in advanced kilns, but this is not possible in most kilns in South Asia. Liquefied petroleum gas (LPG) firing is a viable option for initial firing as it helps achieve good combustion and is more cost effective and environment friendly. LPG use also

Fig. 1: The Sustainable Atmosphere for the Kathmandu Valley – atmospheric brown cloud (SusKat-ABC) data indicate the increase in air pollution level once the firing in brick kiln commenced (shown by the red line).



Source: SusKat campaign, 23 Dec 2012–10 Jan 2013

significantly decreases fuel consumption, reducing energy costs along with other savings. When just 50% of firewood is substituted with LPG for initial firing, fuel costs can be

reduced by 60%. With 100% LPG use, savings can reach up to 75%. See Table 1 for details.

Table 1: Comparative costs in initial firing using firewood, 50% LPG substitution, and 100% LPG use

	Traditional firing	LPG firing (100%)	LPG firing (50%)
Unit cost of coal	NPR. 30/kg	NPR. 30/kg	NPR. 30/kg
Total coal consumption	2,000 kg	1064.24 kg	120 kg
Total coal cost	NPR. 60,000	NPR. 31,927.20	NPR. 3600
Unit cost of firewood	NPR. 14/kg	-	NPR. 14/kg
Total fuelwood consumption	10,000 kg	-	5,000 kg
Total firewood cost	NPR. 140,000	-	NPR. 70,000
Unit cost of sawdust	-	NPR. 5/kg	NPR. 5/kg
Total sawdust consumption	-	462.62 kg	~300 kg
Total sawdust cost	-	NPR. 2,313.10	NPR. 1,500
Unit cost of LPG	-	NPR. 1400/cylinder	NPR. 1400/cylinder
Total LPG consumption	-	65.25 kg	~40 kg
Cylinder equivalent	-	4.5 cylinders	~3 cylinders
Total LPG cost	-	NPR. 6,300.58	NPR. 4,200
Unit diesel cost	NPR. 97 /litres	-	-
Total diesel consumption	50 litres	-	-
Total diesel cost	NPR. 4,850	-	-
Time	~8 h	~2 h	~3 h
Operation	Arduous	Easy	Easy
<b>Total</b>	<b>NPR. 204,850</b>	<b>NPR. 40,540.88</b>	<b>NPR. 79,300</b>

(Source: ICIMOD pilots 2018 and 2019)

Notes: NPR = Nepali rupee

The traditional firing costs indicated in the table are as per discussions with numerous brick entrepreneurs.

The LPG initial firing demonstration was piloted by ICIMOD in collaboration with the Federation of Nepal Brick Industry (FNBI), MinErgy, and the Technical Research Development Committee (TRDC), with support from DFID Nepal.



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