Chapter 6

Conclusion and Policy Implications

August 2019

This chapter should be cited as

ERIA (2019), 'Conclusions and Policy Implications', in Han, P., S. Kimura, W. Wongsapai and Y. Achawangku (eds.), *Study on Biomass Supply Chain for Power Generation in Southern Part of Thailand.* ERIA Research Project Report FY2018 no.9, Jakarta: ERIA, pp.57–60.

Chapter 6

Conclusions and Policy Implications

The southern part of Thailand is rich with biomass, such as rubberwood, and is thus attractive for entrepreneurs to invest in biomass power plant projects in this area. Likewise, due to the special privilege that government provided in the southern provinces, both small power producers (SPPs) and very small power producers (VSPPs) had constructed and supplied electricity to national transmission lines.

The biomass from rubberwood is classified as (i) logs; (ii) offcuts; and (iii) stumps, roots, and branches. These types of biomass are traded commercially like the conventional fuels such as petroleum products and coal. This study focuses on two sources of rubberwood biomass: (i) stumps, roots, and branches at the felling area; and (ii) rubberwood slabs, sawdust, and wood residues at the rubberwood manufacturing factory, furniture factory, and particleboard factory.

In 2017, the plantation area of rubber trees in three border provinces is more than 2.6 million *rai* (1 *rai* = 0.16 hectares). Assuming 2% of the plantation area is felling area, biomass can be produced from 52,000-rai felling areas. The felling area in Yala is the largest, about 25,000 rai, followed by Narathiwat and Pattani, respectively (Table 6.1).

Table 6.1 Biomass Potential of Rubberwood (ton)

Share Types	**Biomass Potential of Rubberwood (ton)**				
	Root	**Sawdust**	**Slab**	**Wood tip**	**Total**
Southern region	1,369,931	821,959	3,287,835	3,287,835	8,767,561
3 provinces + provinces within a 200 km radius	892,609	535,565	2,142,260	2,142,260	5,712,694
Provinces within a 200 km radius	630,076	378,045	1,512,181	1,512,181	4,032,484
Provinces with radius exceeding 200 km	477,323	286,394	1,145,575	1,145,575	3,054,867
3 border provinces	**262,533**	**157,520**	**630,079**	**630,079**	**1,680,211**

Summary	**Root**	**Sawdust**	**Slab**	**Wood tip**	**Total**
(1) Total biomass available in 3 border provinces (ton/year)	262,533	157,520	630,079	630,079	1,680,211
(2) Total biomass for industry (ton/year)	-	1,975	-	33,982	35,957
• Used by particle board	Surat Thani and Songkhla				
• Used by industry	-	1,975	-	33,982	35,957
• Other consumption	Other provinces excluding the 3 border provinces				
(3) Available Potential (3) = (1) – (2)	**262,533**	**155,545**	**630,079**	**596,097**	**1,644,254 ↓ 142.4 MW**
If consider the area outside the 3 border provinces, we can have more biomass potential.					
Total biomass available in provinces within 200 km radius (ton/year)	**630,076**	**378,045**	**1,512,181**	**1,512,181**	**4,032,484 ↓ 349.13 MW**

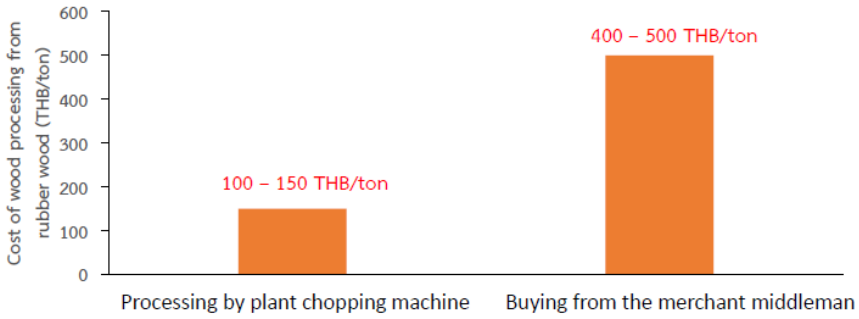
Source: Authors' calculations.

Based on the 2017 data on rubber tree plantation and felling areas, about 1.68 million tons of biomass from rubberwood is produced annually in the three border provinces. The remaining amount of biomass for electricity generation is about 1.64 million tons/year; therefore, electricity generation using biomass from rubberwood is about 142.4 MW. The existing capacity of nine operational biomass power plants is about 102.2 MW (commercial operation date [COD] = 40.4 MW and scheduled commercial operation date [SCOD] = 61.8 MW). Therefore, the remaining potential of biomass from rubberwood in the three border provinces for electricity generation is approximately 40.2 MW.

The supply chain of biomass for power generation comprises four components in general: (i) plantation and harvesting, (ii) fabrication and stocking, (iii) logistic, and (iv) power plant and industrial plant. On the cost of raw material, based on the field survey, in general, the highest acceptable price of rubberwood for the power plant to be operational is B1,500 /ton, though at this price the factory needs to absorb a loss of as much as B1,200 /ton.

On the cost of wood processing (chopping), there are currently two practices in acquiring biomass from rubberwood: (i) processing rubberwood into woodchips, and (ii) buying woodchips from middlemen.

Figure 6.1 Cost of Wood Processing from Rubberwood (B/ton)



Source: Authors' field survey data, 2018.

The logistic cost is estimated from the rate of fuel consumption, capacity of vehicles, and distance. There are two types of vehicles in this assessment: small trucks with 1.2-ton capacity and trucks with 10-ton capacity. Also, the transportation distance ranges from 50 km to 200 km.

Table 6.2 Assessment of Labour through Supply Chain

Biomass Production	Collection	Processing	Logistics	Storage	Usage
Slab					
Root					
Sawdust					
Wood tip					

Source: Authors' field survey, 2018

Table 6.3 Cost of Biomass through Supply Chain

Biomass Production	Raw Material	Processing [a]	Logistic [b]		Storage	Consumption [c]
Slab	365	150	50–200	130–530	-	565–1,045
Root	450	150			-	650–1,130
Sawdust	600	-			-	650–1,130
Wood tip	450	150			-	650–1,130

Notes: [a] Processing cost for rubberwood: B100–150 /ton

[b] Cost of logistic

- Fuel consumption rate from Truck Data Service Center
  - Truck: 3.3 km/litre (capacity 10 tons)
  - Small truck: 10.5 km/litre (capacity 1.2 tons)
- Diesel retail prices in Yala on 31 October 2018 = B30.34/litre
- Transportation distance: 50–200 km

[c] Cost of biomass consumption from the survey of power plants

Source: Authors' field survey data, 2018.

Due to low potential land is available for producing fast-growing feedstocks. Therefore, since only 40.2 MW remaining potential for new power plant in three border provinces from rubberwood, more rubberwood needs to be imported from other provinces. Other biomass crops in the three border provinces are very few. Due to the significant potential from rubberwood in the future, improving the collection efficiency of rubberwood roots is required.

The rubberwood price frequently increases during the rainy season due to limited access to rubberwood areas. Likewise, the cost in the three border provinces is higher than that in other southern provinces for many reasons, such as higher insurance payment and no night-time construction. The significant particle board manufacturing business, located in Songkhla province, is the case of rising selling price of rubberwood in the market. Businessmen can pay more due to higher value added of their products.

The biomass price in southern Thailand is very competitive and suitable for biomass power generation. The local biomass price is at least five times cheaper than the international biomass spot market. Thus, biomass price for power generation is attractive.

The potential of biomass supply for power generation in the three southern provinces of Pattani, Yala, and Narathiwat could be made available for an additional new capacity of about 250 MW. Considering the whole biomass in the southern provinces and the rest of Thailand if infrastructure and transportation facilities with port/receiving terminal of biomass in the southern part is made available, the potential of biomass power generation is huge, and it is not subjected to any constraint.

The study of biomass for power generation in southern Thailand using three price scenarios (US$25/ton, US$32/ton, and US$37/ton) generates very interesting results:

- At the fuel price of US$25/ton, the LCOE is estimated at US$8.2 cents/kWh
- At the fuel price of US$32/ton, the LCOE is estimated at US$8.84 cents/kWh
- At the fuel price of US$37/ton, the LCOE is estimated at US$9.69 cents/kWh

These LCOE results are appealing and, if combined with the current FiT in the three southern provinces, the investment in biomass power plants in these provinces become attractive to investors. Thus, the appropriate policy and mechanism are needed to attract investors.