

# Opportunities and Challenges in Establishing Tree Plantations for Biomass Fuel as an Alternative to Coal

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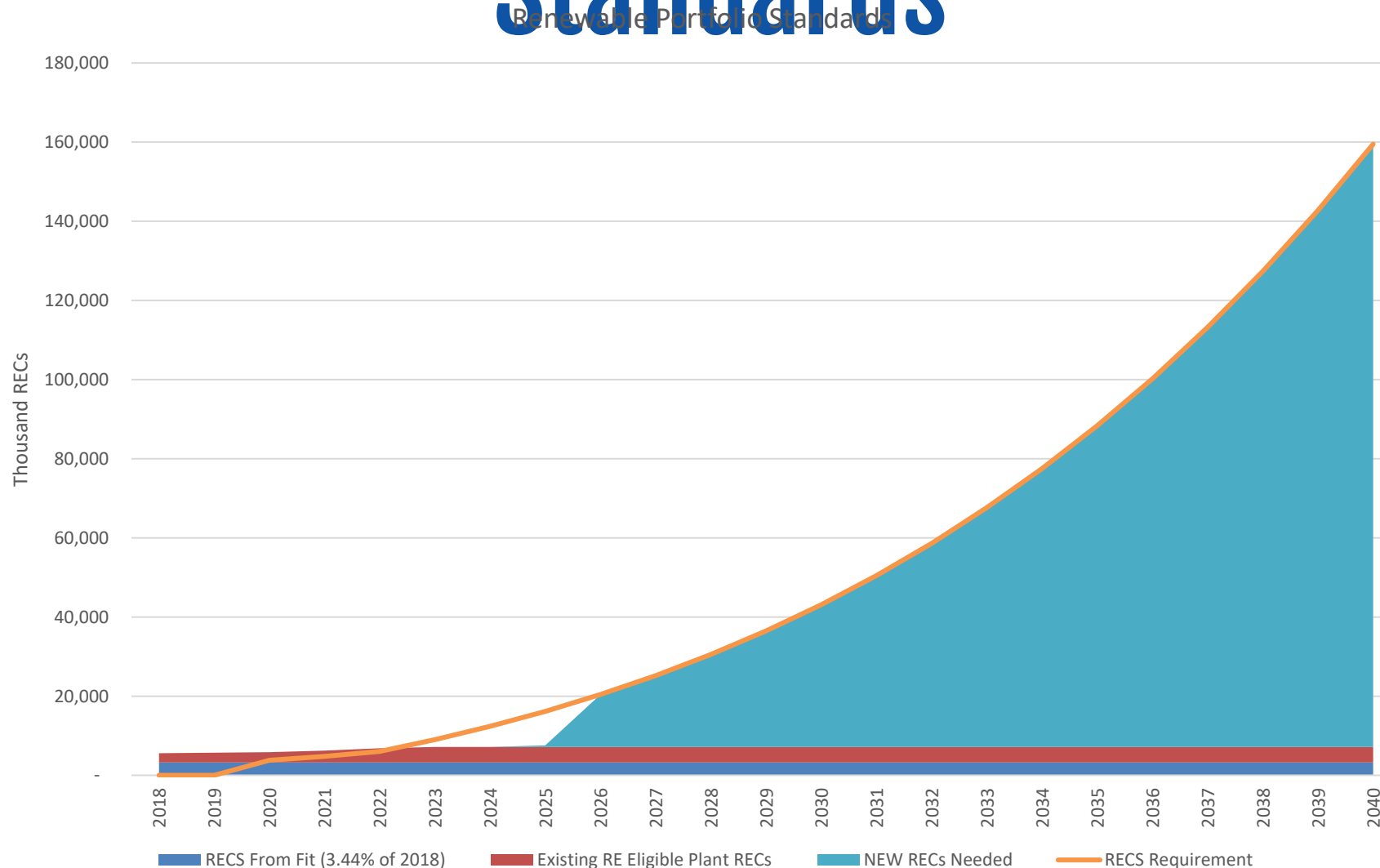
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**Alsons Energy  
Development Corporation**

**RPS and PCF**

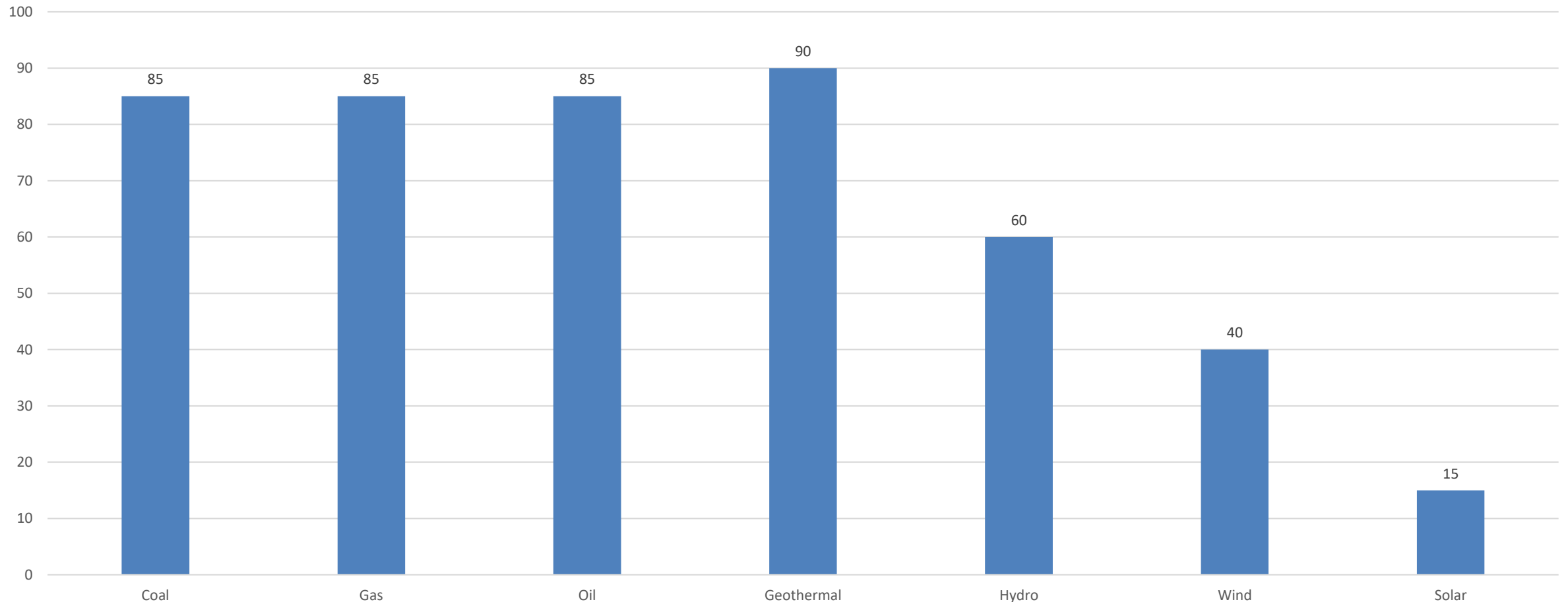
# Philippines Renewable Portfolio Standards



- The Renewable Energy Act of 2008, (Republic Act No. 9513) requires power utilities to procure a percentage of their power supply from renewable energy sources built after 2008
- DOE Projected Consumption (GWh)
- Considering only Fit (3.44% and Non-fit eligible RE facilities built 2008 to present) for RECs
- 1 REC = 1 MWh, 1000 RECs = 1 GWh
- **12.3 GW of Hydro capacity** will be needed to achieve 50% RE by 2040

# Typical Plant Capacity Factor

Typical Plant Capacity Factor according to Technology



# Typical Energy Applications of Forestry Products

- Biomass power plants in the Philippines
  - 200 hectares/MW
  - 0.2 hectare/MW harvested every day
- Export market
  - USD120/MT current market price
- Main ingredient for production of sustainable aviation fuel
  - Required in Europe and Australia



## **The Philippine Power Outlook and Why Biomass – In a nutshell**

# INTRODUCTION



As the Philippines grapples with the pressing need to transition to sustainable energy sources, biomass fuel has emerged as a promising alternative to traditional fossil fuels like coal.

# INTRODUCTION



One of the most viable sources of biomass fuel is tree plantations, which can be strategically established to produce a steady supply of biomass while also providing environmental and economic benefits.



# INTRODUCTION



The establishment of tree plantations for biomass fuel presents a unique set of opportunities and challenges. On one hand, these plantations can contribute significantly to reducing greenhouse gas emissions, enhancing energy security, and fostering rural economic development. On the other hand, they must be carefully managed to avoid potential pitfalls such as land use conflicts, high initial costs, and environmental concerns like deforestation and habitat loss.

# INTRODUCTION



This presentation aims to explore the multifaceted aspects of establishing tree plantations for biomass fuel, highlighting the potential benefits and addressing the challenges that need to be overcome to ensure sustainable and effective implementation.

# INTRODUCTION



By examining successful case studies and proposing strategic approaches, we can better understand how to harness the full potential of biomass fuel as a sustainable energy source.

# DEFINITION OF BIOMASS FUEL



- Biomass fuel is a type of renewable energy derived from organic materials, such as plants and animal waste.

These materials can be burned directly to produce heat or converted into liquid and gaseous fuels through various processes

# KEY POINT ABOUT BIOMASS



## Sources:

- **Wood and Wood Waste:** Includes firewood, wood pellets, and sawdust.
- **Agricultural Residues:** Such as corn stalks, sugarcane bagasse, and rice husks.
- **Animal Manure:** Used to produce biogas through anaerobic digestion.
- **Municipal Solid Waste:** Organic components like food scraps and yard waste

# KEY POINT ABOUT BIOMASS



## Conversion Methods:

- **Direct Combustion:** Burning biomass directly to produce heat.
- **Thermochemical Conversion:** Processes like pyrolysis and gasification to produce bio-oil, syngas, and other fuels.
- **Biochemical Conversion:** Using microorganisms to convert biomass into biofuels like ethanol and biogas
- Other methods: by Lumino Energy Plantations, Inc.

# KEY POINT ABOUT BIOMASS



## Benefits:

- **Renewable:** Biomass is a renewable resource, as it can be replenished through natural processes.
- **Carbon Neutral:** The carbon dioxide released during biomass combustion is offset by the carbon dioxide absorbed during the growth of the biomass, making it a more sustainable option compared to fossil fuels

Biomass fuel plays a significant role in reducing reliance on fossil fuels and contributing to sustainable energy solutions.

# OPPORTUNITIES



## ENVIRONMENTAL BENEFITS:

- **Carbon Sequestration:** Forest plantations absorb CO<sub>2</sub>, helping mitigate climate change.
- **Biodiversity Enhancement:** Properly managed plantations can support diverse ecosystems.
- **Soil Conservation:** Tree roots help prevent soil erosion and improve soil health.



# OPPORTUNITIES



## ECONOMIC BENEFITS

- **Job Creation:** Employment opportunities in rural and forested areas:
- Case of Lumino Energy Plantations, Inc, (LEPI) with energy plantations covering 34,000 has.
  - Total employment during operations is 4,000 with 90 foresters, once the operations started
  - Total employment during project development is 100, with 30 foresters currently employed. Of these, 5 are attending the SFFI Congress 😊

**Source: Mr. Joel Lubguban, President and CEO, LEPI**

# OPPORTUNITIES



## ECONOMIC BENEFITS

- **Sustainable Economic Development:** Long-term income from biomass production (harvesting every three years, 11,000 hectares per 50 MW of Coal-fired Power Plant, 3-year rotation period, Acacia Mangium. Source: Mr. Joel Lubguban, President and CEO, LEPI).
- **Energy Independence:** Reducing reliance on fossil fuels.
- Cost of wood chips = USD120/Metric Ton – in Japan
- wood chips = ingredients for sustainable aviation fuel – Europe, Australia and other developed countries are now requiring aviation fuel from wood chips
- Nature-based eco-solutions – with Shell

# OPPORTUNITIES



- Available Areas for Development:
  - Operable areas: 50%-70% of 2.47 M hectares?

Brushland/Open barren/Grassland within Production Forest				
Region	Area (ha)			
	Brush/Shrub	Open barren	Grassland	Total
CAR	94,663.96	620.57	55,441.94	150,726.47
Region 1	100,486.81	1,266.61	45,252.46	147,005.88
Region 2	104,818.42	1,621.70	61,315.15	167,755.26
Region 3	90,911.11	1,927.91	56,776.56	149,615.58
CALABARZON	39,728.58	514.94	7,032.06	47,275.58
MIMAROPA	102,169.69	859.32	24,225.33	127,254.34
NCR	1.84	-	0.48	2.31
Region 5	74,070.62	451.67	54,406.11	128,928.40
Region 6	127,216.72	965.99	35,275.38	163,458.08
Region 7	130,974.65	812.85	22,552.63	154,340.13
Region 8	132,890.81	1,836.38	18,013.37	152,740.56
Region 9	167,989.94	231.82	57,177.49	225,399.25
Region 10	95,806.35	285.73	53,198.88	149,290.96
Region 11	152,516.68	561.95	49,126.44	202,205.07
Region 12	97,327.10	237.04	67,381.78	164,945.92
Region 13	219,969.35	7,515.20	23,856.28	251,340.83
BARMM	62,352.50	1,278.55	26,557.92	90,188.97
<b>Total</b>	<b>1,793,895.13</b>	<b>20,988.21</b>	<b>657,590.27</b>	<b>2,472,473.61</b>
<b>Source : FMB, 2020 Vegetative Cover</b>				

# CHALLENGES



## A. Land Use and Availability

- **Competition with Natural Forests:** Balancing plantation establishment with conservation.
- **Land Tenure Issues:** Legal and “ownership” challenges in forest lands.



## B. Initial Investment and Costs

- **High Upfront Costs:** Significant investment required for plantation establishment.
- **Gestation Period:** Time required before plantations become productive (reduced to 3 years).



## C. Environmental Concerns

- **Deforestation Risks:** Potential for converting natural forests into plantations.
- **Monoculture:** favoring the use of only one species



## D. Policy and Regulatory Issues

- **Supportive Policies:** Need for government incentives and supportive regulations (replication of Caraga model).
- **Compliance and Monitoring:** Ensuring adherence to environmental standards.



## E. Market and Supply Chain

- **Supply Chain Development:** Establishing reliable supply chains for biomass.
- **Market Demand:** Fluctuations in market demand and price stability.





## F. Poverty

- **Livelihood & Enterprise Development:** Initial need to establish alternative non-forest based livelihood



## F. Cultural

- **Practice of burning in upland farms:** For upland farmers, using a matchstick for site preparation and clearing upland farms is easier and more cost-efficient compared to hiring laborers for clearing.

# STRATEGIES FOR SUCCESS



- **A. Integrated Land Use Planning**
  - Balancing biomass plantations with forest conservation (FLUP: Protection & Production Forest)
- **B. Financial Incentives and Support**
  - Government subsidies and grants, LGU's Annual Investm.
  - Public-Private-People Partnerships (4Ps).



## C. Adoption of Sustainable Forestry Practices

- **Rehabilitation of Degraded Forest Lands:** Establish plantations on degraded or abandoned upland agricultural lands rather than converting natural forests. This helps restore land productivity and avoids deforestation.
  - **Example:** In India, initiatives have been taken to plant trees on degraded lands to improve soil quality and provide biomass for energy.

# STRATEGIES FOR SUCCESS



- **Agroforestry Systems / Integration with Agriculture:** Combine tree planting with agricultural crops to create a diverse and sustainable land-use system. This can enhance biodiversity and provide multiple benefits, such as food, fuel, and income.
  - **Example:** Agroforestry practices in Africa have shown success in improving soil fertility and providing biomass for local energy needs.

# STRATEGIES FOR SUCCESS



- **Biodiversity Enhancement / Mixed-Species Plantations:**  
Plant a variety of tree species instead of monocultures to support a wider range of wildlife and improve ecosystem resilience.
  - **Example:** Mixed-species plantations in Brazil have been used to restore biodiversity and provide sustainable biomass.

# STRATEGIES FOR SUCCESS



- **Community Involvement and benefits sharing/Local Engagement:**  
Involve local communities in the planning and management of plantations to ensure that their needs and knowledge are incorporated. This can lead to more sustainable and accepted practices.
  - **Examples:**
    - Community forestry projects in Nepal have successfully engaged local populations in sustainable forest management.
    - Successful projects within Community-based forest management Agreement (CBFMA) areas / Protected Areas in the Philippines

# STRATEGIES FOR SUCCESS



- **Policy and Regulation / Supportive Frameworks:**  
Implement policies that promote sustainable plantation practices and prevent the conversion of natural forests. This includes incentives for using degraded lands and penalties for illegal deforestation.
  - **Example:** The European Union's policies on sustainable biomass production emphasize the use of degraded lands and the protection of natural forests.



# STRATEGIES FOR SUCCESS

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## **D. Research and Development**

- Investment in R&D for improved biomass technologies.
- Collaboration with academic and research institutions.

# CONCLUSION



By focusing on these sustainable practices, we can establish tree plantations for biomass fuel without compromising natural forests. This approach not only helps in meeting energy needs but also supports environmental conservation and community development.

# CALL TO ACTION: for RFP



- **R – REHABILITATION OF DEGRADED FOREST LANDS**

- Regeneration will take place if the following factors will be addressed:

- **P – POVERTY ALLEVIATION**

- Poor upland farmers will continue to cut trees if they are struggling to feed themselves

- **F - FIRE PREVENTION AND CONTROL**

- Recurring fires prevent regeneration and destroy existing plantations

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# END OF PRESENTATION



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