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### Subsector Analysis: Vietnam

Sustainable feedstock supply through certification of wood substrates for biomass combined heat and power (CHP) systems in Vietnam

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## I. Background and focus of the subsector analysis

### Background

- Worldwide, bioenergy is increasingly being used as a source of renewable energy and an effective way to mitigate climate change;
- Rapid expansion of bioenergy in Europe and US has raised concern on sustainability of bioenergy – Food vs Fuel, i.e. corn, palm oil, etc.
- Wooden biomass is major feedstock source for CHP in Europe
- Vietnam has vast wood resources from forest plantation and wood processing industry which can contribute to the country's energy mix and climate targets
- Vietnam's wood industry including wood chips is highly competitive and demand for wood products is growing
- Sustainability challenges for wooden biomass feedstock high and need to be addressed







## I. Background and focus of the subsector analysis (cont.)

### Focus

- Directed towards private sector actors such as investors and project developers who plan to engage in the Vietnamese bioenergy sector;
- Wooden biomass including wood chips from plantations and wood residues from processing as a potential feedstock for CHP conversion;
- Provide guidance to analyze risks along the wooden biomass supply chain;
- Assess which certification scheme best addresses those risks;
- Contribute to better understanding of both the costs and benefits of sustainability certification;



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### **Forest Sector**

- Forest categories
  - protection forest,
  - special-use forest
  - production forest
- Total forest area now 14 M ha covering 43% of total land area
  - 9-10 M ha (75%) natural forest
  - 3.5-4.0 M ha (25.5%) plantation forest
- Forest area increasing gradually, mainly due to:
  - afforestation and rehabilitation of natural forest for conservation purposes
  - Expansion of plantation forest for timber, wood chips and fiber;
  - Change of ownership rights from state owned to increased private sector





### Wood production and utilization

- Total amount of timber harvested domestically: 17 M m3 RWE
- 12 M m3 (70%) of timber processed for wood chips, mainly for export;
- 5 M m3 (30%) for MDF, plywood, etc.
- 4 M m3 (30%) of total wood processed imported mainly for furniture
- Total export turnover from timber products 6.3 Billion USD (in 2014)
- Export turnover from wood chips 950 M USD



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### Legal and regulatory settings:

- Governed by the Forest Protection and Development Law
- Vietnam Forestry Development Strategy 2006-2020
- Key strategies and policies
  - restrict illegal timber exploitation by imposing a logging ban on natural forests
  - increase forest area to 16.2–16.5 M ha by 2020
  - improve the quality of natural forest
  - Increase productivity of plantation forest to 15 m3/ha/year;
  - by 2020, plantation forests shall account for about 3.84 M ha with a growth cycle of 12 years for large timber forest 7-years for small timber forests;
  - Value added of domestically produced timber for furniture production,
  - limit the utilization of plantation forest for woodchips production
  - Enhance sustainable forest management and forest certification





#### **Bioenergy from solid biomass**

- Part of the overall national RE promotion scheme
- RE Policies and electricity targets outlined in the revised National Power Development Master Plan No. 7 (PDP VII) for 2011-2020
- Revised targets: share of electricity from RE 10.7% in 2030
- Share of biomass power targeted for 2.1%
- CHP from biomass



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Biomass CHP regulated by Decision No. 24 "Support Mechanism for the Development of Biomass Power Projects in Vietnam"

- Key provisions are:
  - Implementation guided by national master plan for biomass energy utilization and development for 2016-2020 and national and provincial biomass power development plan
  - Contractual arrangements are subject to the standard power purchase and connection agreement
  - Tariff incentive set at USD 0.058 per kWh for CHP and single power plants according to avoided cost of power generated from imported coal set at USD 0.065 per kWh

Sustainability issues for feedstock supply are addressed during planning and approval for each project and are subject to EIA and public hearing



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#### General structure and elements of sustainability certification

- **Sustainability certifications** defined by standards relating to environmental, social, ethical issues;
- Voluntarily and market based, usually third party-verified
- Adopted by companies to demonstrate their performance of products in specific areas;
- Certification schemes a specific set of standards applied at different levels
  of product development and handling
  - Forest Management certification (FM) certify management activities at the production forests
  - Chain of Custody certification (CoC) certifies the subsequent steps along the supply chain
- Certification Body independent third part auditor to verify compliance with defined standards
- Accreditation body approves certification bodies







Elements of a certification scheme and relations







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Certification process







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**Status of certification in Vietnam** 

- Forest Stewardship Council (FSC) is dominant for SFM and CoC certification;
- Programme for the Endorsement of Forest Certification (PEFC) recently started cooperation with the Vietnamese Government to develop the "Vietnam Forest Certification Scheme" (VFCS);
- **VFCS** directed towards strengthening the wood-processing sector by producing certified wood products for export from locally grown timber;
- Target of VFCS is 500,000 ha under SFM by 2020

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#### FSC FM-CoC certified area in Vietnam (ha)

- Currently 15 FMU FM-CoC certified covering 158,400 ha forest land (around 1%);
- 78,500 ha are plantation forests
- 13,000 ha serve for protection purposes
- Smallholder groups manage about 2,245 ha, i.e. less than 15% of the total certified forest area
- Since 2015 mainly certification mainly for plantations for round-wood and fuel wood production, including wood chips and wood pellets;
- 481 FSC CoC certificates mainly in wood processing industry, including wood chips, pellets, pulp and paper, printing, NTFPs and furniture

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### Potential supply chain options, and sustainability risks

#### Potential wooden biomass available for CHP feedstock in Vietnam

- Wood material harvested from natural and plantation forest
  - In 2014 approx. 12 M m3 harvested for wood chips production mainly for export
  - If used for power generation nearly 900 MW could potentially be installed;
- Residue material from wood processing
  - 60% of sawn timber left over as residues in furniture production
  - 30% is utilized for wood drying and 20% for material use

- Remaining 50% mainly used for pellet production
- Wood pellets
  - in 2015 approx. 1.5 M tons mainly for export to Korea, China and Japan;





# Potential supply chain options, and sustainability risks (cont.)

#### Critical factors of a wooden biomass supply chain:

- Availability and quality of feedstock
- Constant and reliable supply
- Price and contractual arrangments
- Distance to CHP plant,
- Legal implications
- Environmental and social sustainability







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## Potential supply chain options, and sustainability risks (cont.)

#### Potential sustainability risks of a wooden biomass supply chain

- · Land use change leading to increased GHG emissions;
- Plantation management with mono-culture and short rotation causing adverse impact on soil, water and biodiversity;
- Illegal logging and import of illegal wood material
- Allocation of land use rights for plantation and forest management causing disadvantages for minority groups and communities
- Legal employment and safety precautions for workers in plantation and wood processing factories
- Fossil fuel consumption for handling and transportation of biomass resulting in increased GHG emissions
- Red tape and lack of transparency on granting permits, licenses, approvals





## Potential supply chain options, and sustainability risks (cont.)

### Supply chain models

- **Producer based supply chain** production, harvesting, collection, preprocessing and delivery organized by plantation owner, material further conditioned and stored for subsequent conversion at CHP plant
- Contractor based supply chain centralized structure, contractor organizes and manages most of the tasks along the supply chain from production site to conversion facility



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### Costs and benefits concerning sustainability certification of solid biomass

#### **Overview of costs incurred for FSC Forest Management Certification**





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### Costs and benefits concerning sustainability certification of solid biomass (cont.)

**Overview of potential benefit from FSC Forest Management Certification** 







### PROLIGNIS Case Study

#### The CHP system

- Designed with an overall installed capacity of 2.8 MW for direct supply of heat and power to manufacturing plant
- Meet electricity demand of about 19,000 MWh @ 8000 hrs per year
- Thermal energy to be utilized as process steam for sterilization and absorption chiller for cooling purposes
- Overall efficiency: 53%
- Fuel demand: 104,000 MWh per year
- Reliable and uninterruptible supply of energy is a key functional requirement;



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### PROLIGNIS Case Study (cont.)

#### Feedstock supply chain

- Feedstock: Wood chips from plantation wood sourced from plantations within 80-100 km radius of CHP
- Total feedstock demand: 31,500 tons per year
- Size of plantation @ 7-year rotation cycle and 100%, 60%, 40% harvesting • rate: 1200 ha, 2000 ha, 3000 ha
- Feedstock supply outsourced to experienced German Forest Consultancy ٠ to ensure high level of sustainability;
- Cost of feedstock: USD 40-60/ton fresh (50 % moisture) to plant based on ٠ sustainable forest management practices complying with FSC or PEFC FM standards; w/o auditing cost and certification fees
- Additional cost for auditing and certification fees ca. 25000 USD per year or ٠ about 0.4 - 1 USD per to of wood chips







### PROLIGNIS Case Study (cont.)

#### **Expected Benefits from certified feedstock**

- No monetary benefits from FM/CoC certification
- If combined FM-CoC and GHG emission certified e.g Gold Standard Potential additional revenues from sale of CERs under voluntary emission trading scheme depending on sale price of CERs
- Qualified for carbon financing (GCF);
- Market positioning for German technology enhanced;
- Clean & Green image appreciated (Public Relation);



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### Conclusions

- Wooden biomass material is a valuable resource for CHP conversion with a large potential for the expansion of the bioenergy sector in Vietnam
- Wooden biomass is currently not being utilized systematically and efficiently as feedstock for energy purposes, including for CHP conversion
- Legal framework conditions and incentive policies insufficient to stimulate investment into solid biomass based CHP systems
- Strong competition with the largely export-oriented wood chips industry
- Lack of regulation and control in the plantation sector entails high sustainability risks
- Policies and support mechanisms directed towards developing a forestry sector that is economically, socially and environmentally more sustainable;
- FM and CoC certification addresses assures a high standard of sustainability both on forest and on supply chain level







### Conclusions (cont.)

- FM certification in Vietnam not widely applied mainly due to complexity, lack of capacity and uncertain return on investments in certification;
- Wood fuel supply chain for CHP in Vietnam is challenging and bears risks all along the chain
- External advice from experienced forest management consultants with indepth knowledge and experience on plantation management and feedstock handling may be a viable way to manage risks along the supply chain;
- No CHP project yet developed and operated in Vietnam feeding on wooden biomass material;
- The PROLIGNIS project can serve as a pilot project to demonstrate the benefits of using wooden biomass material in a sustainable way;
- CHP projects in Vietnam are to be developed at the highest sustainability level to stimulate a broad recognition for wood fuel based CHP among policy makers, financing institutions and the public in general.



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