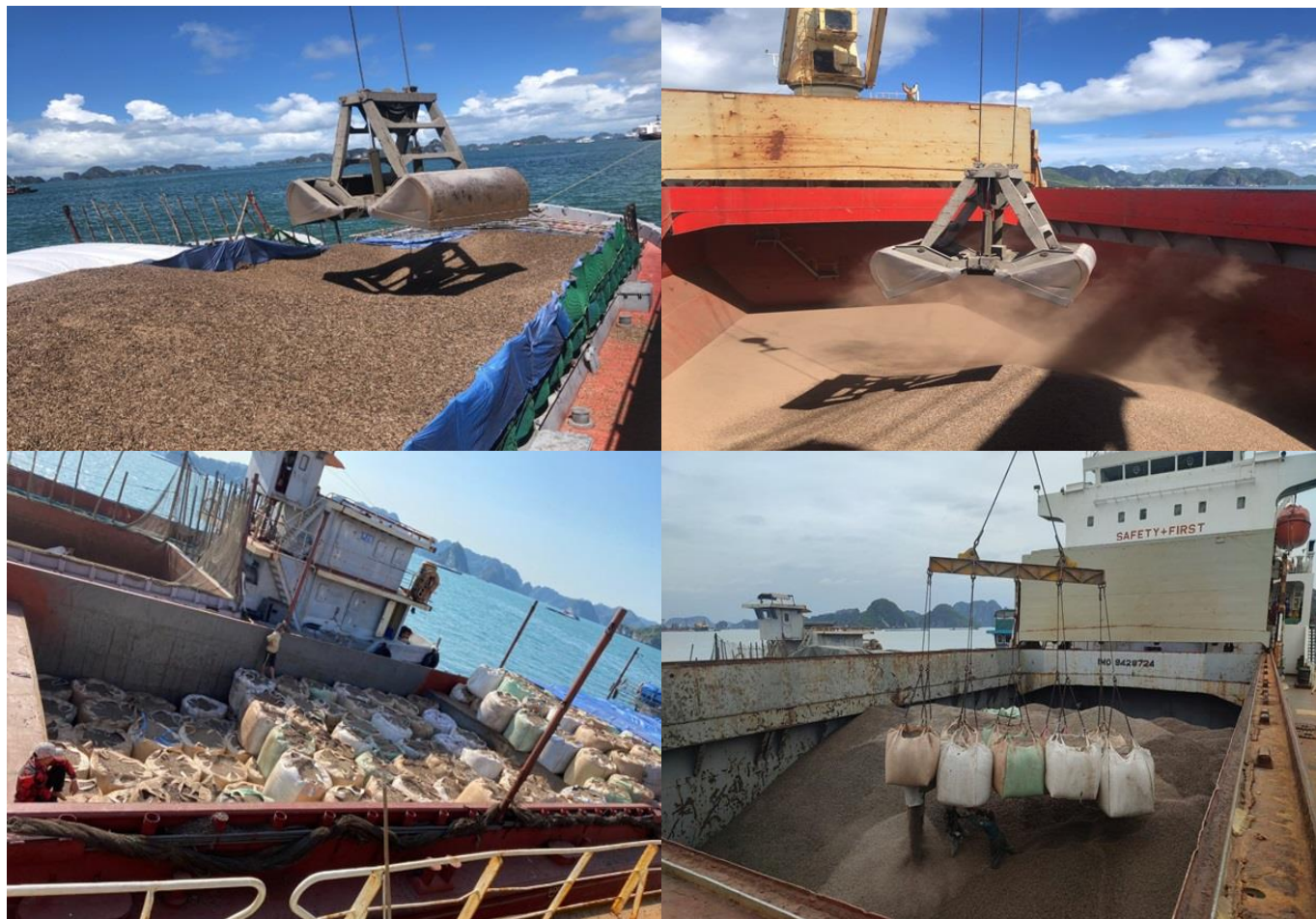


ベトナム産 燃料用木質ペレット



株式会社アローフィールド

〒662-0015 兵庫県西宮市甲陽園本庄町5-16

☎ 0798-75-1100

✉ biomass@arrowfield.co.jp

<http://www.arrowfield.co.jp/>

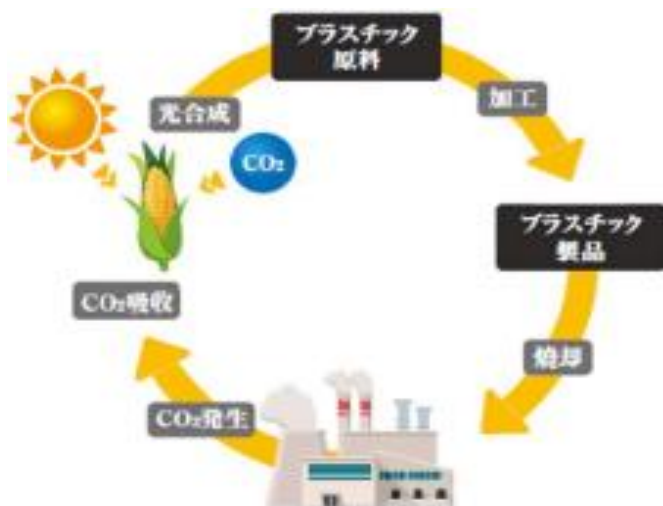
概要

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1. 木質ペレットとカーボンニュートラル

木質ペレットは、木質チップよりも熱量が高く、燃焼効率に優れています。カーボンニュートラルで低環境負荷のバイオマスとして近年注目が高まっています。



カーボンニュートラル概念図

木質ペレットは、石油などの化石燃料と比べ、地球温暖化の原因となる二酸化炭素の排出量が大幅に少ない燃料です。もちろん、木質ペレットも化石燃料同様、燃焼時には二酸化炭素を排出しますが、それは、材料の木材が成長過程の光合成で吸収した量と同じで、差し引きゼロ、いわゆる「カーボンニュートラル」になります。



2. ベトナム産の燃料用木質ペレット

現在、弊社とベトナムにある複数の製造メーカーと業務提携契約を締結しており、弊社は各社と一体となって事業展開しております。

◆ アカシアのペレットを燃料用に安定供給いたします。

製品の安定供給・自然保護の為、管理された植林地からの原料を確保しています。

◆ 品質：SGS等の検査機関での外注検査、及び社内でも検査機器等を使用して品質管理をしています。

◆ 用途：発電所ボイラー用・バイオマス燃料用（直径8mm）

◆ 生産工場：ベトナム、FSC®/COC認証工場

◆ 出荷国:ベトナム



木質ペレット生産工程



3. L社の概要

- 会社名：L社（略称）
- 住所：VUNG TAU、VIETNAM
- 設立：2018年
- 資本金：300億ドン
（約120万ドル）
- 主な事業内容：木材加工品、木質チップ、
木質ペレットの製造販売、
物流関連
- 木質ペレット製造工地域：TUYEN QUANG 省
THANH HOA 省



工場

AN HOA 工場



生産能力
120.000 MT/年



Add:
TUYEN QUANG 省



総面積
3HA



NGHI SON 工場



生産能力
180.000 MT/年



Add:
THANH HOA 省



総面積
5HA



木質ペレット仕様

On analysis of the sample, the following results as lab reports No. QML19-11028 R0, HPM19-07140 R0 were obtained:

Test parameters	Test methods	Units	Results
Durability (arb)	ISO 17831-1:2015		97.41 (Nine seven decimal four one)
Total moisture (arb)	ISO 18134-2:2017		8.38 (Eight decimal three eight)
Ash (adb)	ISO 18122:2015		1.58 (One decimal five eight)
Sulphur (adb)	ISO 16994:2016		0.032 (Zero decimal zero three two)
Gross calorific value (arb)	ISO 18125:2015	kcal/kg	4286 (Four two eight six)
Hydrogen (Exclude H in moisture) (arb)			5.36 (Five decimal three six)
Hydrogen (Include H in moisture) (adb)	ISO 16948:2015	%	6.29 (Six decimal two nine)
Hydrogen (Exclude H in moisture) (db)			5.85 (Five decimal eight five)

Test parameters	Test methods	Units	Results
Net calorific value (arb)	ISO 18125:2015	kcal/kg	3976 (Three nine seven six)
Nitrogen (adb)	ISO 16948:2015	%	0.31 (Zero decimal three one)
Bulk density (db)	ISO 17828:2015	kg/m ³	518 (Five one eight)
Bulk density (arb)			566 (Five six six)
Fines <3.15 mm	ISO 18846:2016		0.82 (Zero decimal eight two)
Chlorine (Cl) in BIOF (adb)	ISO 16994:2016 & ISO 10304-1:2007	ppm	148.45 (One four eight decimal four five)
Chlorine (Cl) in BIOF (db)			161.80 (One six one decimal eight zero)
Chlorine (Cl) in BIOF (arb)			148.24 (One four eight decimal two four)
Si in Ash (db)	ISO 16967:2015	%	2.08 (Two decimal zero eight)
Si in BIOF (adb)			0.033 (Zero decimal zero three three)
Si in BIOF (arb)			0.033 (Zero decimal zero three three)
Si in BIOF (db)			0.036 (Zero decimal zero three six)
SiO ₂ in Ash (db)			4.45 (Four decimal four five)
SiO ₂ in BIOF (adb)			0.070 (Zero decimal zero seven zero)
SiO ₂ in BIOF (arb)			0.070 (Zero decimal zero seven zero)
SiO ₂ in BIOF (db)			0.077 (Zero decimal zero seven seven)

REMARK:

1. The results are shown in this document refer only to the sample(s) received and tested and not intended to be representative of any lot, cargo or shipment.
2. This document cannot be reproduced except in full, without prior approval of the Company.
3. arb = As Received Basis; adb = Air Dry Basis; db = Dry Basis.





BUREAU
VERITAS

Bureau Veritas Certification

L JOINT STOCK COMPANY

BA RIA - VUNG TAU PROVINCE, VIETNAM

Bureau Veritas Certification Holding SAS certifies that the company has implemented a FSCTM product groups control system according to the Forest Stewardship CouncilTM certification system, in the above location and complies with the requirements of Standard:

FSC Chain of Custody Certification standard, Ref.: FSC-STD- V 3.0

Additional FSC standard(s): FSC CoC Controlled Wood standard, Ref.: FSC-STD- V3.1

For its activities concerning:

MANUFACTURING AND TRADING OF WOOD CHIP CERTIFIED FSC MIX, FSC 100% AND FSC CONTROLLED WOOD*

*Updated list of products & species on the FSC database (info.fsc.org)

Type of certification: Single

Original certification date:	19-05-2021
Date of certification decision:	19-05-2021
Expiration date:	18-05-2026
FSC Certificate code:	BV-COC- /BV-CW-
BV Certificate No. / Version:	
Contract No:	
Issue date:	19-05-2021



The mark of responsible forestry

Signed on behalf of Bureau Veritas Certification Holding

The validity of this certification shall be verified on: info.fsc.org This certificate itself does not constitute evidence that a particular product supplied by the certificate holder is FSC-certified or FSC Controlled Wood. Products offered, shipped or sold by the certificate holder can only be considered covered by the scope of this certificate when the required FSC claim is clearly stated on sales and delivery documents.

Accredited office: Bureau Veritas Certification Holding – 8, cours du Triangle - 92800 Puteaux - France: www.bureauveritas.com

Certification decision office: Bureau Veritas Certification China, F22, Tower B, Beijing Global, Trade Center, 36 North, Third Ring Road East, Dongcheng District, Beijing 100013, China

Contracting office: Bureau Veritas Certification Viet Nam

A list of the products or services that are included in the scope of the certificate may be obtained on request to Bureau Veritas Certification. This certificate remains the property of Bureau Veritas Certification, all copies or reproductions and the certificate itself shall be returned or destroyed on Bureau Veritas certification request. All certificates not in English are for reference only



4. KF社の概要

- 会社名：KF社（略称）
- 住所：HO CHI MINH、VIETNAM
- 設立：2021年
- 資本金：1,000億ドン
（約410万ドル）
- 主な事業内容：木質チップ、木質ペレットの製造販売
- 木質ペレット製造工場地域：THAI NGUYEN 省、
PHU THO 省、QUANG NINH 省、BINH PHUOC 省



QUANG NINH 工場



BINH PHUOC 工場



THAI NGUYEN 工場



PHU THO 工場



木質ペレット仕様

お客様の求めるスペックに沿って木質ペレット製造可能です。

TEST PARAMETERS	TEST METHODS	UNIT	WOOD PELLETS SPECIFICATIONS			
Moisture	ISO 18134:2017	%	≤10			
Ash	ISO 18122:2015		A≤1	1.01≤A≤1.5	1.51≤A≤2	2.01≤A≤3
Net calorific value	ISO 18125:2017	kWh/Kg	≥4,000			
Sulfur	ISO 16994:2016	%	≤0.05			
Nitrogen	ISO 19648:2015		≤1.0			
Bulk density	ISO 17828:2015	Kg/m ³	600≤BD≤750			
Length	ISO 17829:2015	mm	3.15<L≤40			
Diameter			6 or 8 (+/- 1)			
Durability	ISO 17831-1:2015	%	≥97.5			
Fines < 3.15mm	ISO 18846:2016		≤1.0			
As	ISO 16994:2016	Mg/Kg	≤1.0			
Cd	ISO 16968:2015		≤0.50			
Cr			≤10			
Co			≤10			
Pb			≤10			
Hg			ISO 15237:2016	≤0.1		



Test parameters	Test methods	Units	Results
Total moisture (arb)	ISO 18134-4:2017	%	6.3 (Six decimal three)
Moisture in analysis sample (adb)	ISO 18134-2:2017		8.53 (Eight decimal five three)
Ash (arb)	ISO 18122:2015		2.01 (Two decimal zero one)
Ash (adb)			2.03 (Two decimal zero three)
Ash (db)			2.21 (Two decimal two one)
Net calorific value @ constant pressure (arb)	ISO 18125:2017	kWh/Kg	3973 (Three nine seven three)
Net calorific value @ constant pressure (adb)			4009 (Four zero zero nine)
Net calorific value @ constant pressure (db)			4437 (Four four three seven)

Test parameters	Test methods	Units	Results
Sulfur (arb)	ISO 16994:2016	%	0.022 (Zero decimal zero two two)
Sulfur (adb)			0.023 (Zero decimal zero two three)
Sulfur (db)			0.025 (Zero decimal zero two five)
Nitrogen (arb)	ISO 19648:2015	%	0.20 (Zero decimal two)
Nitrogen (adb)			0.21 (Zero decimal two one)
Nitrogen (db)			0.22 (Zero decimal two two)
Ash Melting Behaviour Deformation Temperature Hemisphere Temperature Flow Temperature	CEN/TS 15370-1:2006	Deg.C	1200 (One two zero zero)
			1220 (One two two zero)
			1240 (One two four zero)
Bulk density (arb)	ISO 17828:2015	Kg/m ³	628 (Six two eight)
Bulk density (db)			570 (Five seven zero)
Length (arb)	ISO 17829:2015	%	25.42 (Two five decimal four two)
Diameter (arb)			8.18 (Eight decimal one eight)
Durability (arb)	ISO 17831-1:2015	%	98.35 (Nine eight decimal three five)
Fines < 3.15mm (*) (arb)	ISO 18846:2016		0.62 (Zero decimal six two)
As in BIOF MDL=2 (arb)	ISO 16994:2016	Mg/kg	ND
As in BIOF MDL=2 (adb)			ND
As in BIOF MDL=2 (db)			ND
Cd in BIOF MDL=1 (adb)	ISO 16968:2015		ND
Cd in BIOF MDL=1 (arb)			ND
Cd in BIOF MDL=1 (db)			ND





CERTIFICATE

TÜV
AUSTRIA

Herewith the certification body

TÜV AUSTRIA

Being an accredited certification Body for FSC® CHAIN OF CUSTODY certification, confirms that

JOINT STOCK COMPANY

VIETNAM

Certificate Type: Single

for the audit scope: Purchase of "FSC 100%" Roundwood (logs); FSC 100%, FSC Mix, FSC Controlled Wood of Wood chips; Sawdust; Wood shavings. Manufacture and Sales of "FSC 100%, FSC Mix, FSC Controlled Wood" Wood pellets. Transfer System.

Meet the requirements set out in the

Version 3.1, February 2021

Certificate Registration Number:

Maria Agapitou
Head of Management Systems
& Products Certification Division

Date of issue of certificate: 2023-02-15

Issue number: 1

Certificate valid until: 2028-02-14

The validity of this certificate shall be verified on www.fsc-info.org

TÜV AUSTRIA HELLAS
429, Mesogeion Ave.
GR-153 43 Athens, Greece
www.tuvaustriahellas.gr
GEMI No.:

Athens, 2023-02-15



The mark of
responsible forestry

asi
assurance
services
international

The certificate remains property of TÜV AUSTRIA HELLAS. All copies shall be returned or destroyed if requested.

This certificate itself does not constitute evidence that a particular product supplied by the certificate holder is FSC®-certified. Products offered, shipped or sold by the certificate holder can only be considered covered by the scope of this certificate when the required FSC® claim is clearly stated on invoices and shipping documents.

CePRK466_A9e

Veröffentlichung nur mit Erlaubnis des TÜV AUSTRIA. The reproduction of this document is subject to the approval by TÜV AUSTRIA.

ZERTIFIKAT | CERTIFICATE | CERTIFICAT | CERTIFICADO | СЕРТИФИКАТ | شهادة | 证书 | 인증서

ARROWFIELD Co., Ltd.

株式会社アローフィールド



5. HP社の概要

- 会社名：HP社（略称）

※元YEN BAI省の国営企業で、
2017年に民営化しました。

- 住所：YEN BAI、VIETNAM

- 設立：2017年

- 資本金：1,000 億ドン
(約410万ドル)

- 主な事業：木材加工品、木質チップ、
木質ペレットの製造販売

- 木質ペレット製造工地域：YEN BAI 省、
NGHE AN 省、THANH HOA 省



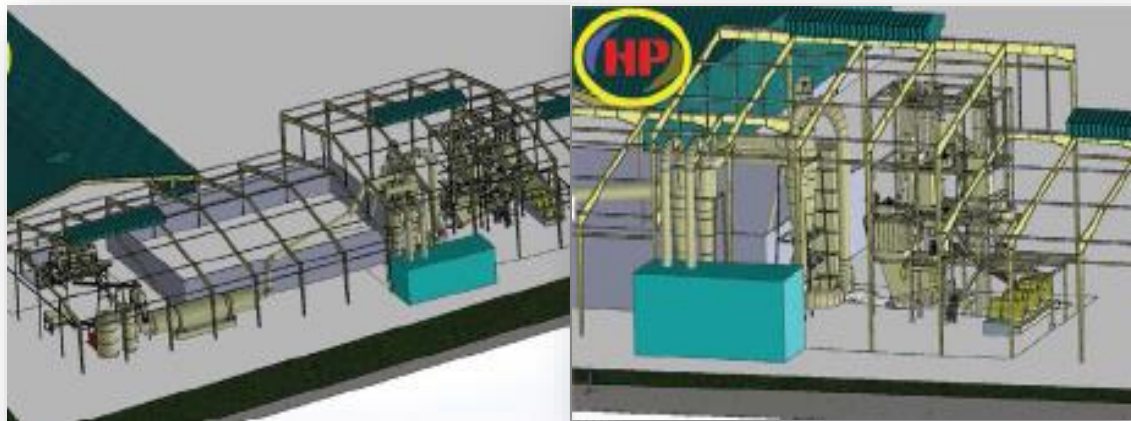
HP社の木質ペレット工場



第一工場



第二工場



第三工場





FSC認証証明書



CERTIFICATE

This group certificate is to certify that

**FORESTRY
JOINT STOCK COMPANY**

Certificate register: GFA-FM/COC	
Date of issue	28.11.2022 - Date of expiry* 27.11.2027
Issue number	1 - Version 1

with the group members according to the group member list published in the FSC database has been assessed by GFA Certification GmbH according to the following standards:

- FSC-National Standard (VIETNAM), version FSC-STD/ version 2.0

The company is therefore entitled to use the FSC trademark for the below mentioned products and/or services**:

Forest management and trade of round wood



The mark of responsible forestry



Jörn Ackermann, Managing Director
GFA Certification GmbH • Alton Teichweg 15 • 22081 Hamburg • Germany
Telefon: +49 40 5247431 0 • Fax: +49 40 5247431 999 • www.gfa-cert.com

* The validity of this certificate is subject to observations, the company maintaining it according to the standard, and others as well as annual forest management plans and an updated forest management plan. The company has to submit the plan to the authority. The certificate is subject to annual audits. The certificate is valid for a period of 5 years. The certificate holder is responsible for the validity of the certificate and the information provided in the certificate. The certificate holder is responsible for the validity of the certificate and the information provided in the certificate.



FORESTRY JOINT STOCK COMPANY

Yen Binh District, Yen Bai Province, -
VIETNAM

Bureau Veritas Certification Holding (BVCH) certifies that the company has implemented a responsible forest management according to the Forest Stewardship Council™ principles and criteria defined in the following standard(s):

Standard

FSC-STD-VN-0

FSC Forest Management Group standard, Ref.: FSC-STD-

For its activities concerning:

**FOREST MANAGEMENT OF THE FMU(S) LOCATED IN YEN BINH DISTRICT,
YEN BAI PROVINCE, VIETNAM***

* Updated and full list of products, species available and/or group members on the FSC database (www.info.fsc.org)

Original certification date: 22-10-2022
 Certification start date: 22-10-2022
 Expiration date: 21-10-2027
 FSC Certificate code:
 Certificate No. / Version:
 Contract No.:
 Issue Date: 24-10-2022


Nicolas MEY
 Signed on behalf of BVCH

The validity of this certification shall be verified on: info.fsc.org. This certificate itself does not constitute assurance that a particular product supplied by the certificate holder is FSC certified or FSC Controlled Wood. Products offered, ordered or sold by the certificate holder can only be considered covered by the scope of this certificate when the relevant FSC claim is clearly stated on sales and delivery documents.

Bureau Veritas Certification Holding - 8, cours du Triangle - 93850 Puteaux - France - www.bureauveritas.com

PLM FSC FM - Bureau Veritas Polska Sp. z o.o., ul. Mysłowska 4, 02-758 Warszawa, Poland

Coordinating office: Bureau Veritas Certification Viet Nam

A list of the products or services that are included in the scope of the certificate may be obtained on request to Bureau Veritas Certification. This certificate remains the property of Bureau Veritas Certification; all copies or reproductions and the certificate itself shall be returned or destroyed on Bureau Veritas certification request. All certificates exist in English and are for reference only.

FSC Certificate FM Group Multi-use rev.2.2





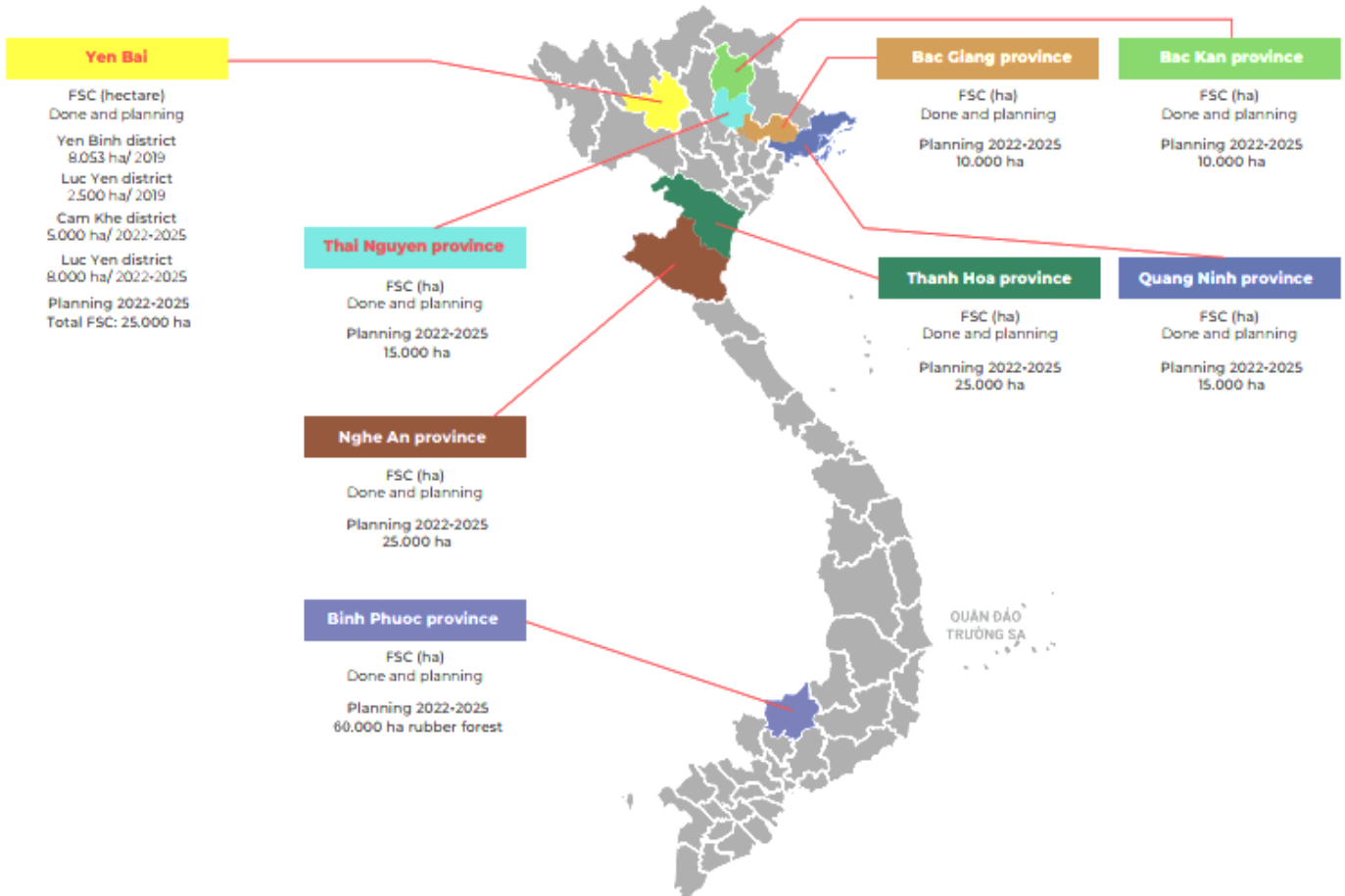


FSC FORESTS IN YEN BAI PROVINCE

GFA FSC Mr. GC	SGS FSC Ms. NTNC
<p>FSC Yen Binh District</p> <ul style="list-style-type: none"> • Mr. NXT - Head of FSC Board; Vice Chairman of Yen Binh People's Committee • Mr. NTD - Deputy Head of FSC Standing Committee; County Chief of Ranger • Ms. NTT - General Director of HP Forestry; Deputy Head of FSC Board 	<p>FSC Cam Khe District</p> <ul style="list-style-type: none"> • Mr. NCL - Head of FSC Board; Vice Chairman of Cam Khe People's Committee • Mr. HTV - Deputy Head of FSC Standing Committee; County Chief of Ranger • Ms. NTT - General Director of Hoa Phat Forestry; Deputy Head of FSC Board
<p>FSC Tran Yen District</p> <ul style="list-style-type: none"> • Mr. NDM - Head of FSC Board; Vice Chairman of Tran Yen People's Committee • Ms. NTT - General Director of HP Forestry; Deputy Head of FSC Board 	<p>FSC Luc Yen District</p> <ul style="list-style-type: none"> • Mr. DNT - Head of FSC Board; Vice Chairman of Luc Yen People's Committee • Mr. TQT - Deputy Head of FSC Standing Committee; Head of Agriculture & Rural Development Dept. • Ms. NTT - General Director of HP Forestry; Deputy Head of FSC Board



Current state of HP's FSC/FM Forest



木質ペレット仕様

On analysis of the sample, the following results as lab reports No. QML19-11028 R0, HPM19-07140 R0 were obtained:

Test parameters	Test methods	Units	Results
Durability (arb)	ISO 17831-1:2015		97.41 (Nine seven decimal four one)
Total moisture (arb)	ISO 18134-2:2017		8.38 (Eight decimal three eight)
Ash (adb)	ISO 18122:2015		1.58 (One decimal five eight)
Sulphur (adb)	ISO 16994:2016		0.032 (Zero decimal zero three two)
Gross calorific value (arb)	ISO 18125:2015	kcal/kg	4286 (Four two eight six)
Hydrogen (Exclude H in moisture) (arb)			5.36 (Five decimal three six)
Hydrogen (Include H in moisture) (adb)	ISO 16948:2015	%	6.29 (Six decimal two nine)
Hydrogen (Exclude H in moisture) (db)			5.85 (Five decimal eight five)

Test parameters	Test methods	Units	Results
Net calorific value (arb)	ISO 18125:2015	kcal/kg	3976 (Three nine seven six)
Nitrogen (adb)	ISO 16948:2015	%	0.31 (Zero decimal three one)
Bulk density (db)	ISO 17828:2015	kg/m ³	518 (Five one eight)
Bulk density (arb)			566 (Five six six)
Fines <3.15 mm	ISO 18846:2016		0.82 (Zero decimal eight two)
Chlorine (Cl) in BIOF (adb)	ISO 16994:2016 & ISO 10304-1:2007	ppm	148.45 (One four eight decimal four five)
Chlorine (Cl) in BIOF (db)			161.80 (One six one decimal eight zero)
Chlorine (Cl) in BIOF (arb)			148.24 (One four eight decimal two four)
Si in Ash (db)	ISO 16967:2015	%	2.08 (Two decimal zero eight)
Si in BIOF (adb)			0.033 (Zero decimal zero three three)
Si in BIOF (arb)			0.033 (Zero decimal zero three three)
Si in BIOF (db)			0.036 (Zero decimal zero three six)
SiO ₂ in Ash (db)			4.45 (Four decimal four five)
SiO ₂ in BIOF (adb)			0.070 (Zero decimal zero seven zero)
SiO ₂ in BIOF (arb)			0.070 (Zero decimal zero seven zero)
SiO ₂ in BIOF (db)			0.077 (Zero decimal zero seven seven)

REMARK:

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2. This document cannot be reproduced except in full, without prior approval of the Company.
3. arb = As Received Basis; adb = Air Dry Basis; db = Dry Basis.



HP社の輸出市場

現在、HPは木質ペレットを日本、マレーシア、韓国などの海外市場に輸出しています。近い将来、他の地域にも拡大し、ベトナムの林産品ブランドを世界に広めることを目標としています。



6. CAO BANG 省との事業提携

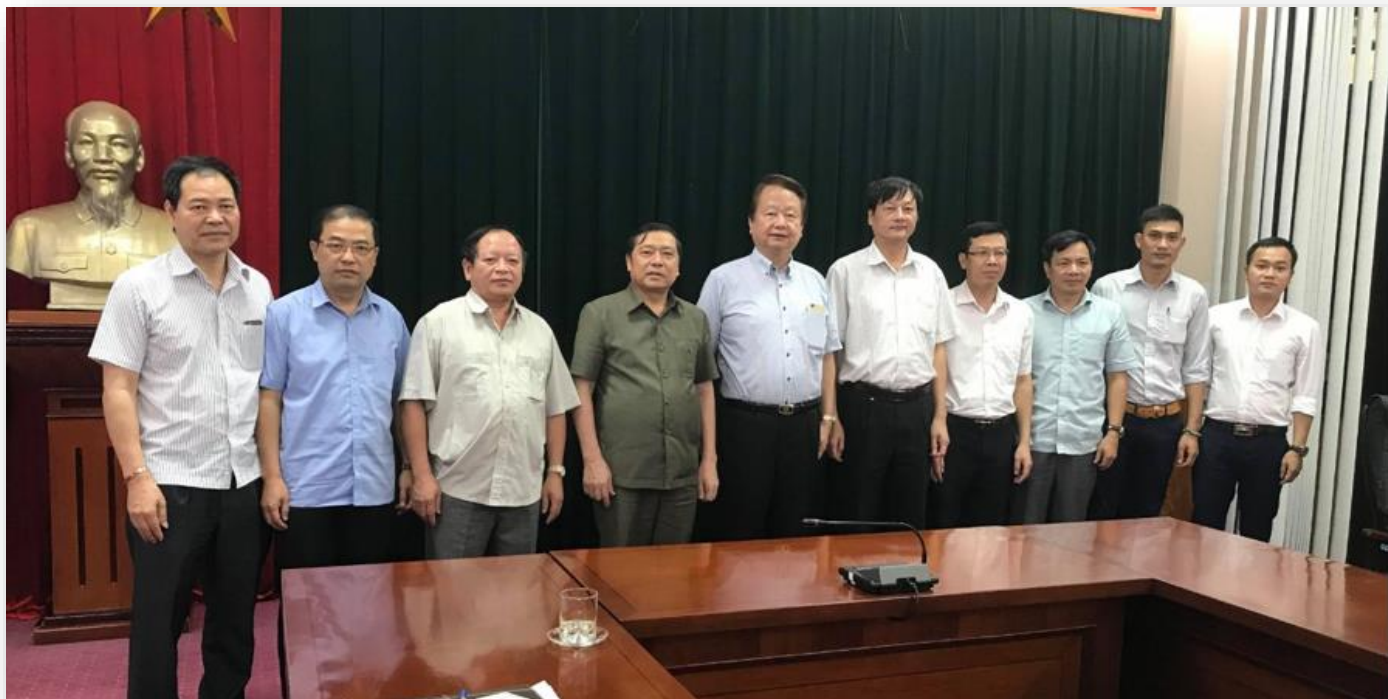
ベトナムでは、各地域の省庁決裁権を有した首長のもとで行政がなされており、海外企業がベトナム進出をするには、地域行政との協力が事業推進上必要不可欠となります。

弊社は、Cao Bang省の首長の書記長と友人関係にあり、木質チップの輸出事業では、書記長自ら「省を挙げての推奨事業にしたい」と強く協力を希望され、覚書の締結について、現在対応検討中です。

物流については陸路でのトラック輸送となり、台数および積載量の増強で対応できるものの、コスト面で少々苦しい面があります。

CAO BANG 省は、良質な森林資源を有しており、林業には並々ならぬ努力をされています。

木質チップ輸出の新規事業について、省として森林の持続性・合法性に取り組んでいます。

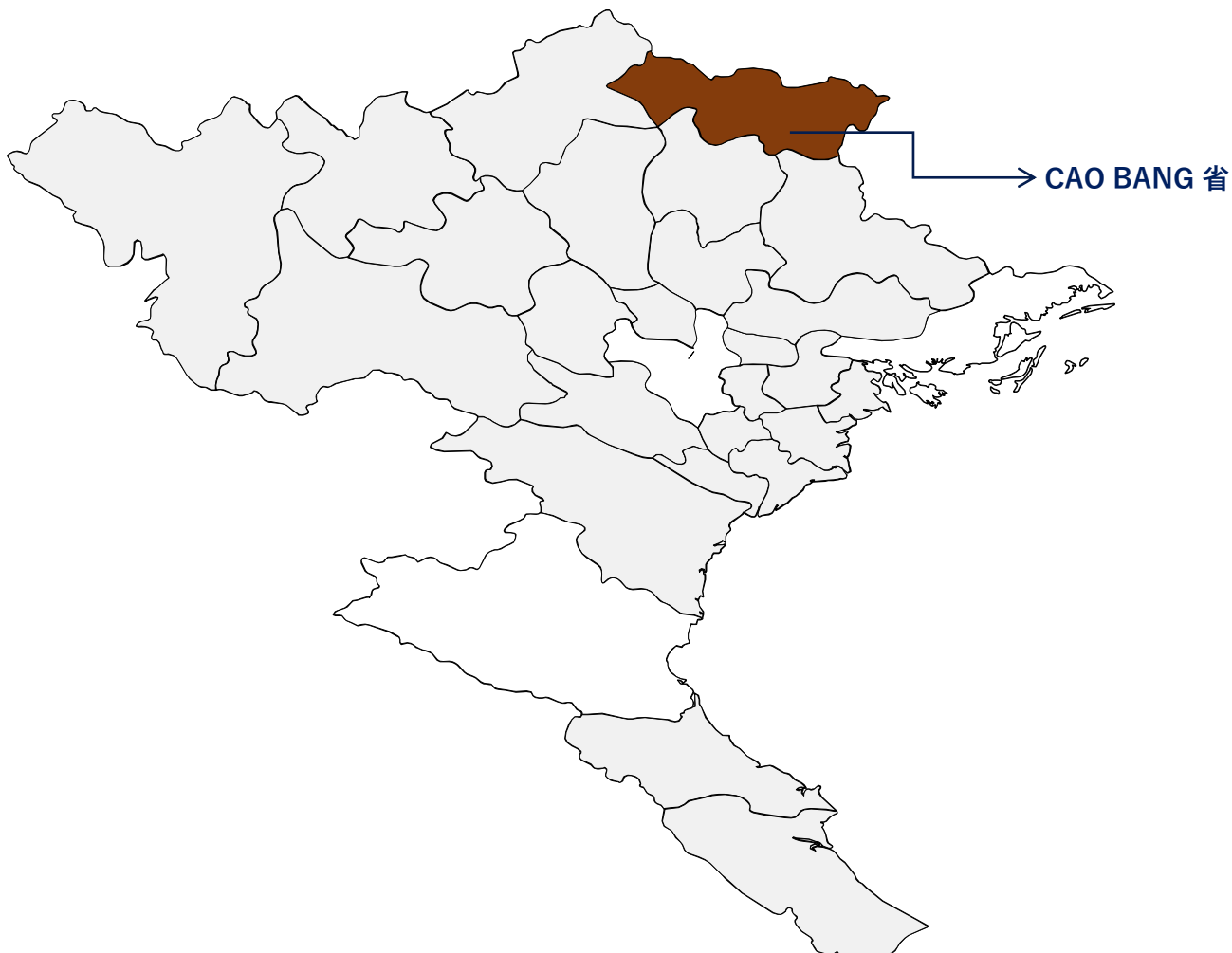


CAO BANG 省の概要

- 面積: 67万ha (林業90%・農業10%)
- 人口: 515,200人 (2014年)
- 中国との国境にある省 (ベトナム最北部)
- 年間予算: 450億円
- 造林計画5,000ha
- ユーカリ植林計画1,000ha
- 他余剰地10,000ha
- 二つの製材工場があり、
小規模で木質チップの製造中
- 200万トン/年程度の生産可能
- ハイフォン港までトラック
輸送のみ船・列車輸送不可)

林業の概要 (90%を占め残りは農業)

- 林業・農業ともに農薬の使用はしない
- アカシア植林17,000ha



ベトナムにてPHUC首相と会談後の記念撮影（2023年1月18日に退任）



2018年4月9日



ARROWFIELD Co., Ltd.
株式会社アローフィールド



7. その他の活動について

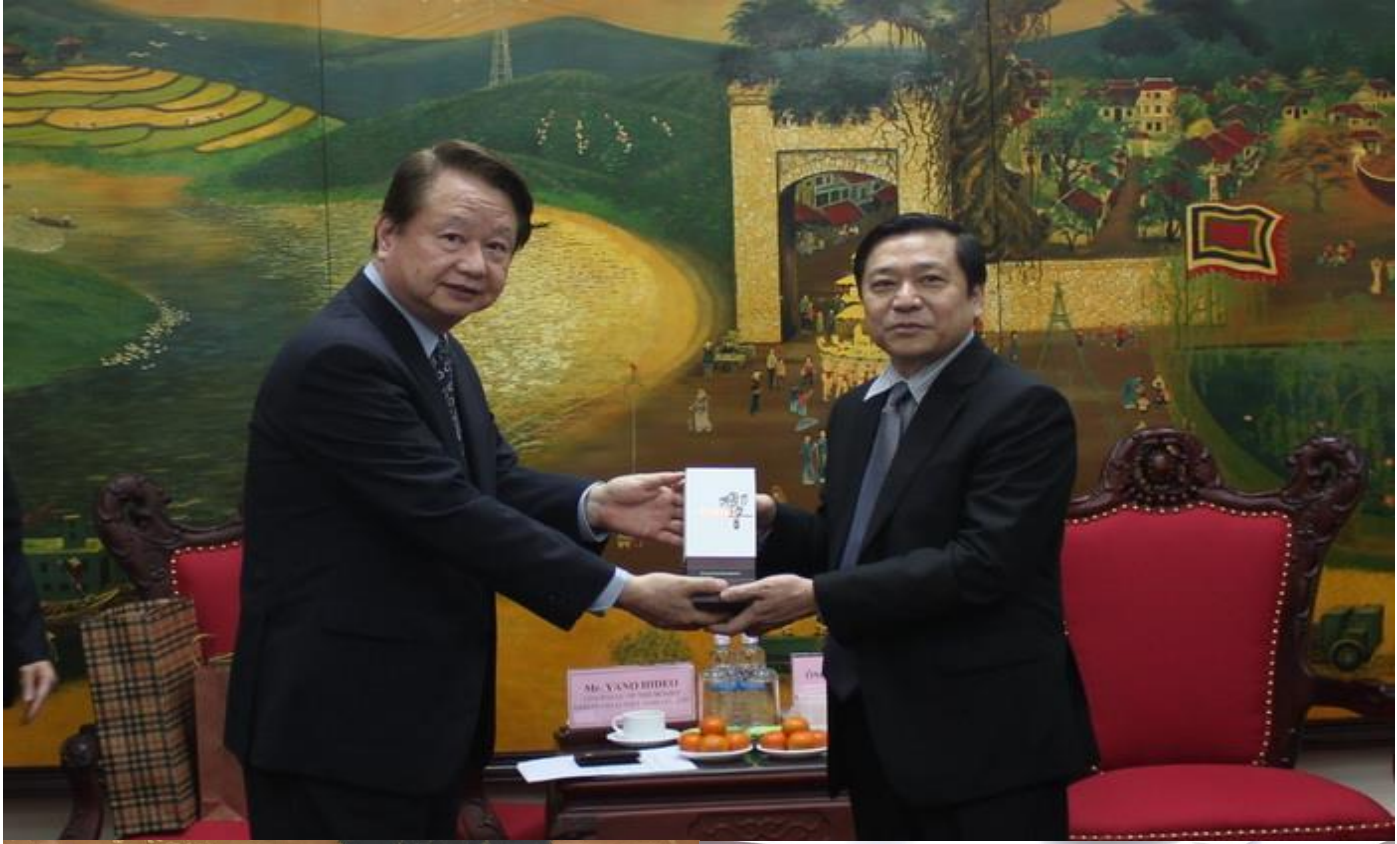
農民協会と協力覚書締結式2017年6月25日

HỘI NÔNG DÂN VIỆT NAM



農民協会と協力

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8. お問い合わせ

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