



# 小型オンサイト バイオガス発電システムによる 循環社会の実現に向けて (先進的な再生可能エネルギー活用モデル)

For realization of a recycling society with  
a small On-site biogas power generation system  
(Advanced renewable energy utilization model)



2019年7月30日

**アイシン精機株式会社**  
イノベーションセンター  
河合泰典

July 30, 2019  
AISIN SEIKI Co.,Ltd.  
Innovation Center  
Yasunori Kawai



# 1. 目次 Contents

1. **アイシン精機(株)について**  
About AISIN SEIKI CO., LTD.
2. **背景**  
Background
3. **システムの目指すサイズ**  
The size of the system
4. **オンサイト小型バイオガス発電システム**  
On-site small biogas power generation system
5. **他の自然再生可能エネルギーとの比較**  
Comparison with other natural renewable energy
6. **事業化への取り組み**  
Approach to commercialization
7. **まとめ**  
Summary



# 1. アイシン精機(株)について About AISIN SEIKI CO., LTD.

**社名：アイシン精機株式会社**

Company name: AISIN SEIKI Co., Ltd.

**設立：1965年8月31日**

Established: Aug. 31, 1965

**本社：愛知県刈谷市朝日町2-1**

Head office: 2-1 Asahi-machi, Kariya, Aichi 448-8650, Japan

**連結子会社：216社（国内：82社、海外：134社）**

Consolidated subsidiaries: 216 (82 in Japan, 134 overseas)

**事業内容：自動車部品（パワートレイン、走行安全、車体、情報電子）、  
エネルギー・住生活関連製品などの製造・販売**

Businesses: Manufacture and sales of automotive parts (Powertrain, Chassis & Vehicle Safety System, Body, ICT & Electronics), lifestyle- and energy-related products (sewing machines, beds, gas heat pump products, etc.), and wellness-related products



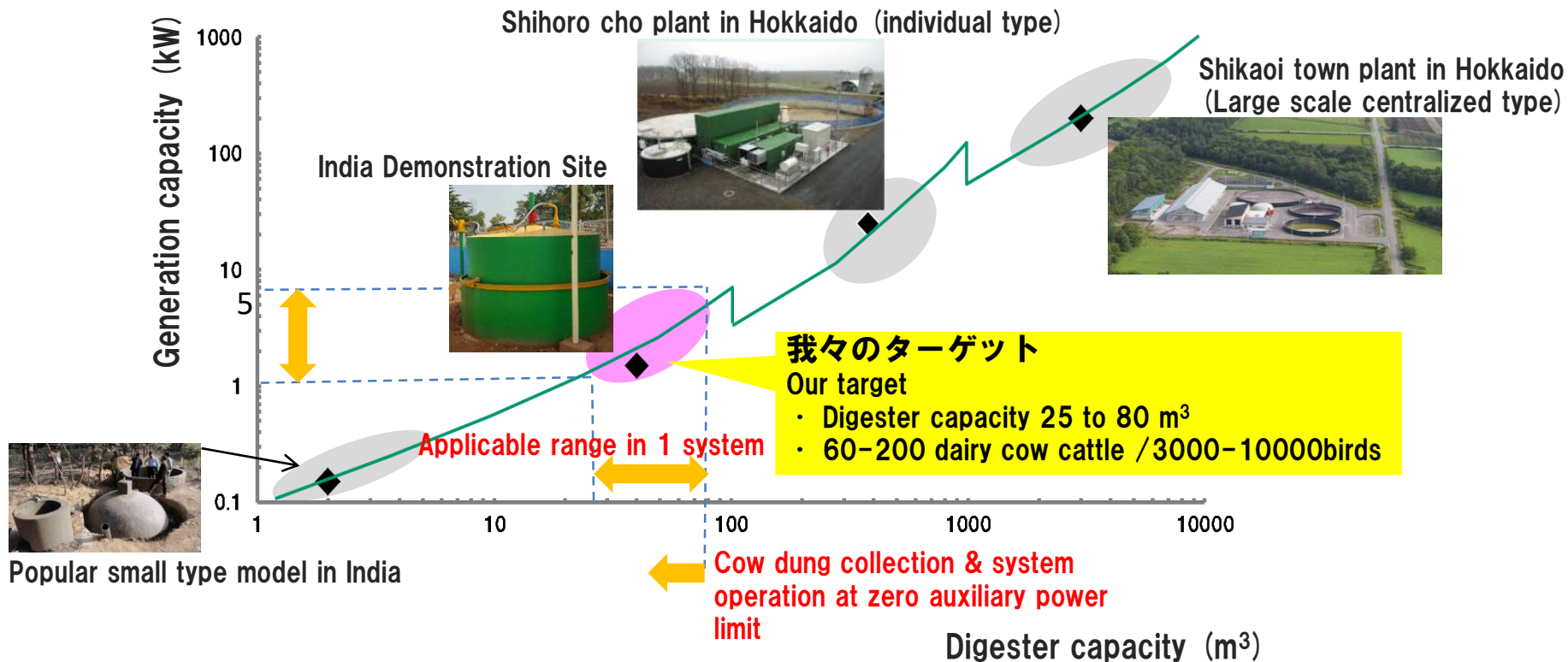


## 2. 背景 Background

- **新興国のエネルギー事情および環境問題は悪い状態が継続**
  - **特に、インドのCO<sub>2</sub>排出量は世界3位、PM2.5は世界最悪**
  - **インドは3億頭以上の牛を有する世界1位の酪農国家**
  - **インド政府は深刻な大気汚染を解決するため、太陽光発電や風力発電と共に、バイオガス発電システムの普及促進**
- 
- The bad state continues energy situation of the energy circumstances and the environmental problem.
  - In particular, India's CO<sub>2</sub> emissions are the third largest in the world, and the atmospheric concentration of PM2.5 is the worst in the world.
  - India is a dairy farming state of the 1st place of world with more than 300 million cows.
  - To settle serious air pollution, Indian government spread promotion of a biogas electrical generating system as well as photovoltaic generation and wind power generation.

### 3. システムの目指すサイズ The size of the system

- We set up the system for each dairy farmer and decrease the additional burden as much as possible as well as participate in areas where it will make a noticeable effect.

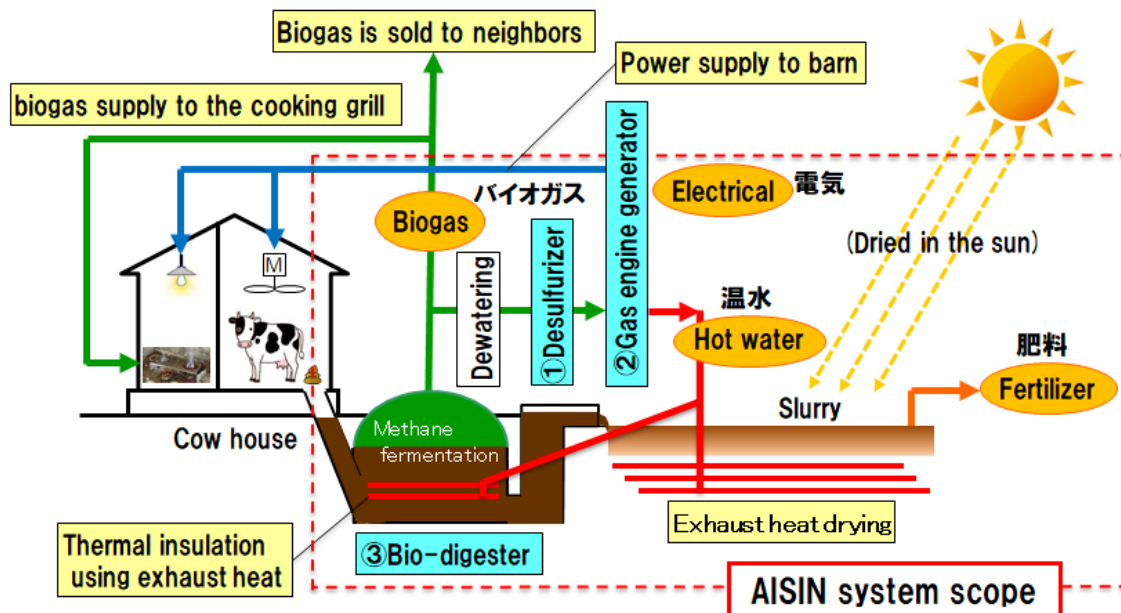




## 4. オンサイト小型バイオガス発電システム

### On-site small biogas power generation system

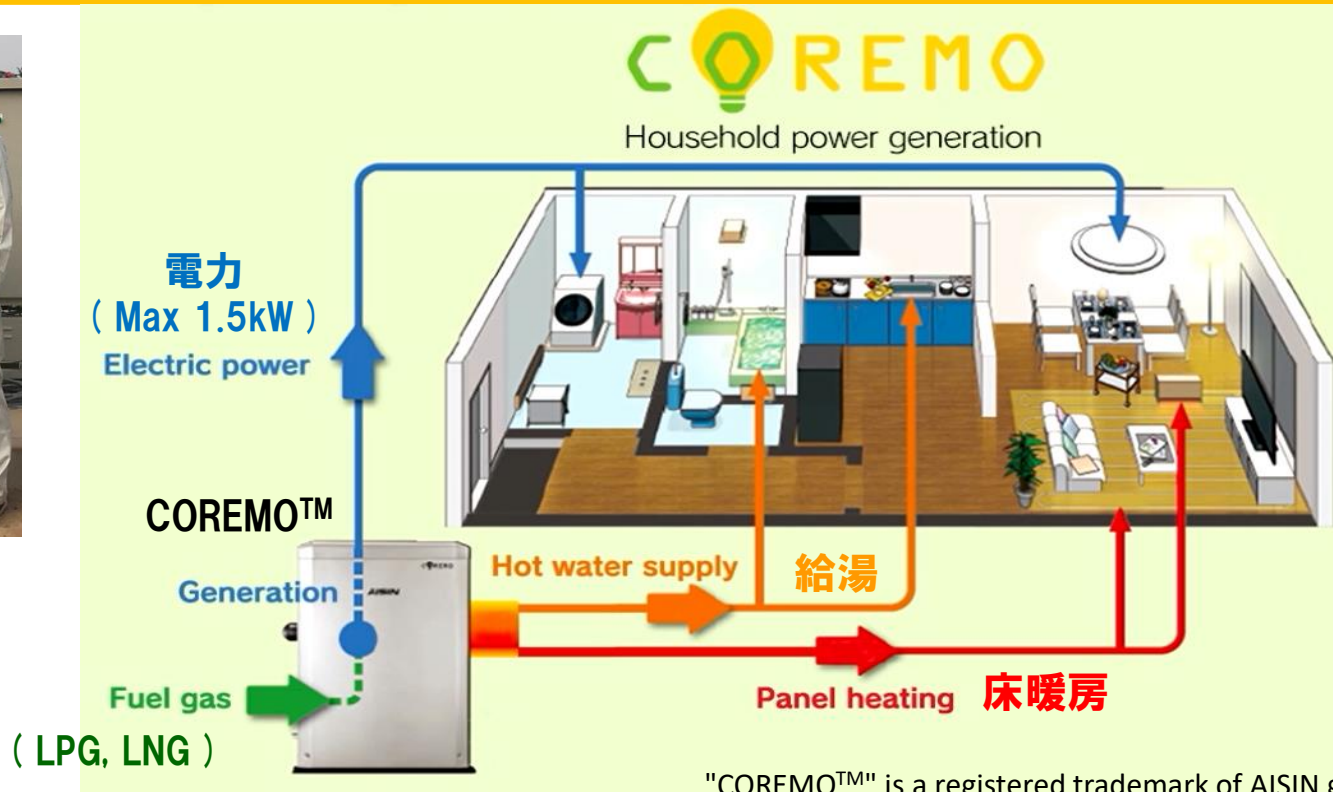
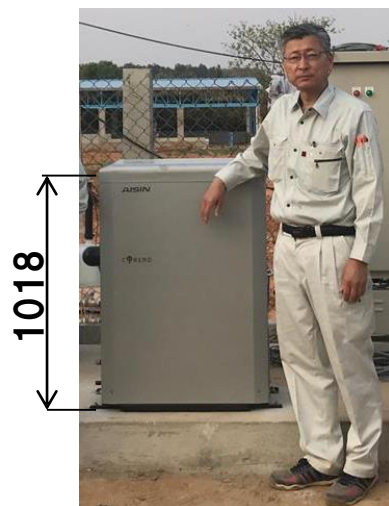
- Production of electricity and fuel gas in on-site small system.
- Economical because of zero use of power and expense to collect & transport raw materials.
- Both electricity generation unit price and fuel gas production unit price become cheap due to local production area and consumption of the energy.
- Manure can be produced from slurry after methane fermentation.



## 4. オンサイト小型バイオガス発電システム

### On-site small biogas electrical generating system

- AISIN's gas engine generator is based on a cogeneration system "COREMO™".
- The features of "COREMO™" are small size and quiet. Maximum 1.5kW power generation.



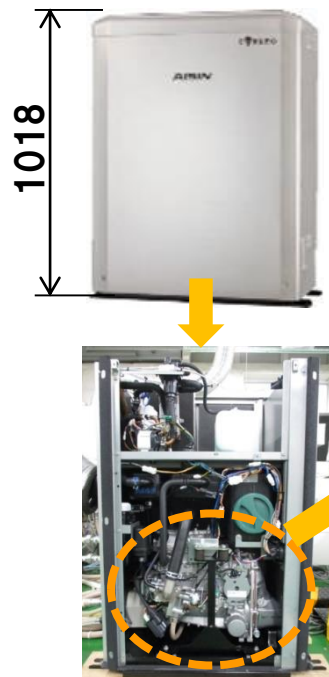
"COREMO™" is a registered trademark of AISIN generator.



## 4. オンサイト小型バイオガス発電システム

On-site small biogas electrical generating system

- The world's only small air-cooled gas engine. Long engine life and maintenance interval.
- If we consider the overall interval time of AISIN engine in terms of automobile running distance then it can run about 1.8 million km.



COREMO™

アイシン  
水冷式ガスエンジン  
AISIN water cooled gas engine



Engine life: **32,000hr**  
Maintenance interval: **8,000hr**

競合他社  
空冷式ガスエンジン  
Conventional air cooled gas engine



Engine life: 2,000hr  
Maintenance interval: 500hr

"COREMO™" is a registered trademark of AISIN generator.





## 5. 他の自然再生可能エネルギーとの比較

### Comparison with other natural renewable energy

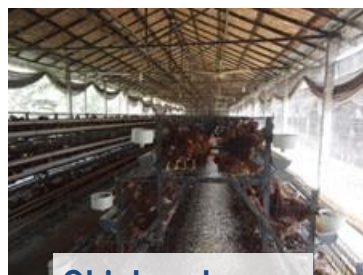
- Continuous power generation for 24 hours is possible at rated output.
- Biogas electricity generation system can supply two energy of electricity and the fuel gas.

	Cost	Produced energy	Notice
太陽光 Solar	<b>総費用</b> Total cost 	<b>総発電量</b> 	<ul style="list-style-type: none"> <li>• The annual daylight hours in India are 2,700 hours.</li> <li>• There is an output change caused by the weather.</li> <li>• Cannot generate electricity in the night.</li> </ul>
風力 Wind			<ul style="list-style-type: none"> <li>• The generation electricity changes under the influence of wind</li> </ul>
バイオガス Biogas	<b>total cost</b> 	<b>Biogas</b> 	<ul style="list-style-type: none"> <li>• Continuous power generation for 24 hours is possible at rated output.</li> <li>• Stable electricity is provided.</li> </ul>

## 6. 事業化への取り組み Approach to commercialization

### バングラデシュ実証試験 Demonstration test in Bangladesh

- Start a proof examination at the poultry farm in northern Dhaka at April, 2014.
- This system can support by 1 system with electricity load (1.5kW) for one chicken house of 3,000 chicken. This system generates electricity daily for over 5 years.



Chicken house



Bio-digester



Desulfurizer

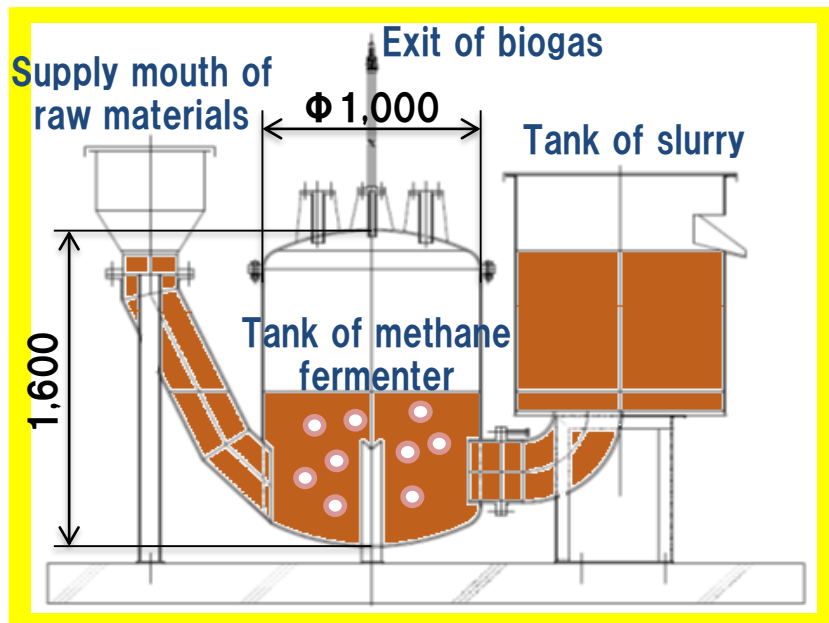
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## 6. 事業化への取り組み Approach to commercialization

### 国内要素技術開発 Domestic elemental technology development

- From November, 2015. Installed a small biogas digester experimental device in Japan. Carry out a methane fermentation examination and disposal of digestive juice technology development.

#### バイオガス発酵設備 Biogas fermented equipment

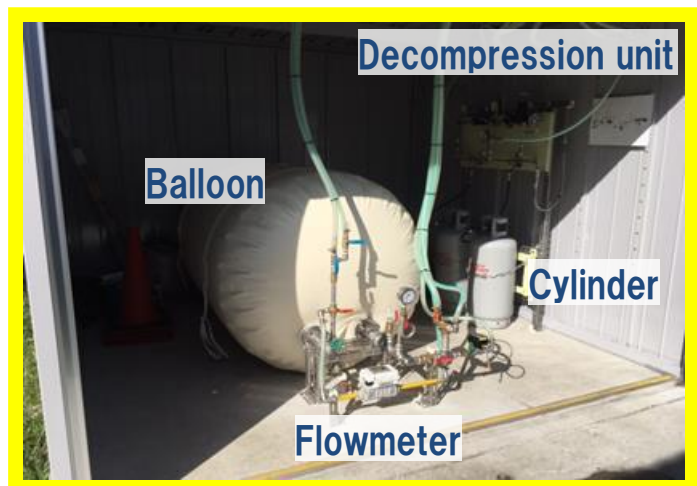


## 6. 事業化への取り組み Approach to commercialization

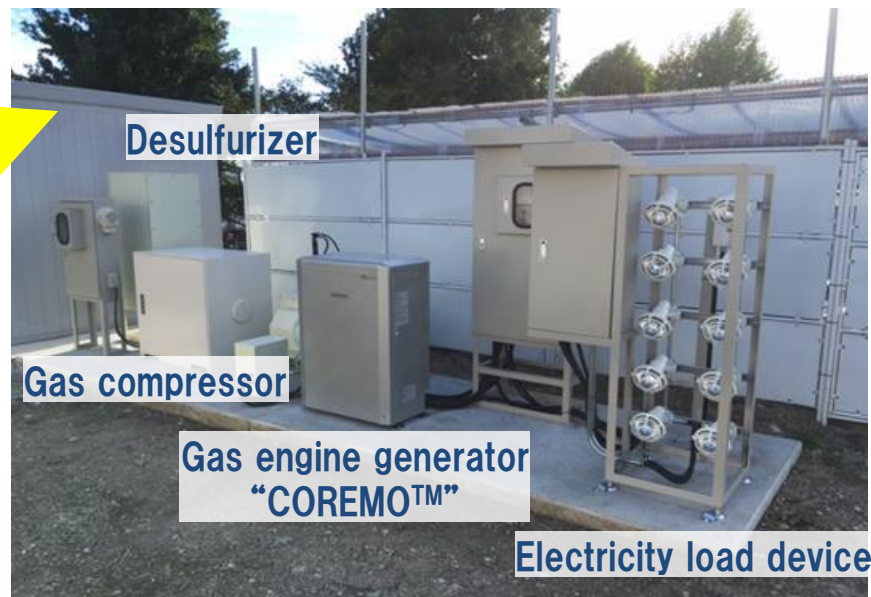
### 国内要素技術開発 Domestic elemental technology development

- Produced gas stores within the balloon.
- Produced gas stores within the cylinder by low pressure in a gas tank. (1MPa or less)

バイオガス貯蔵設備  
Biogas storage facility



発電・消費設備  
Power generation and consumption equipment



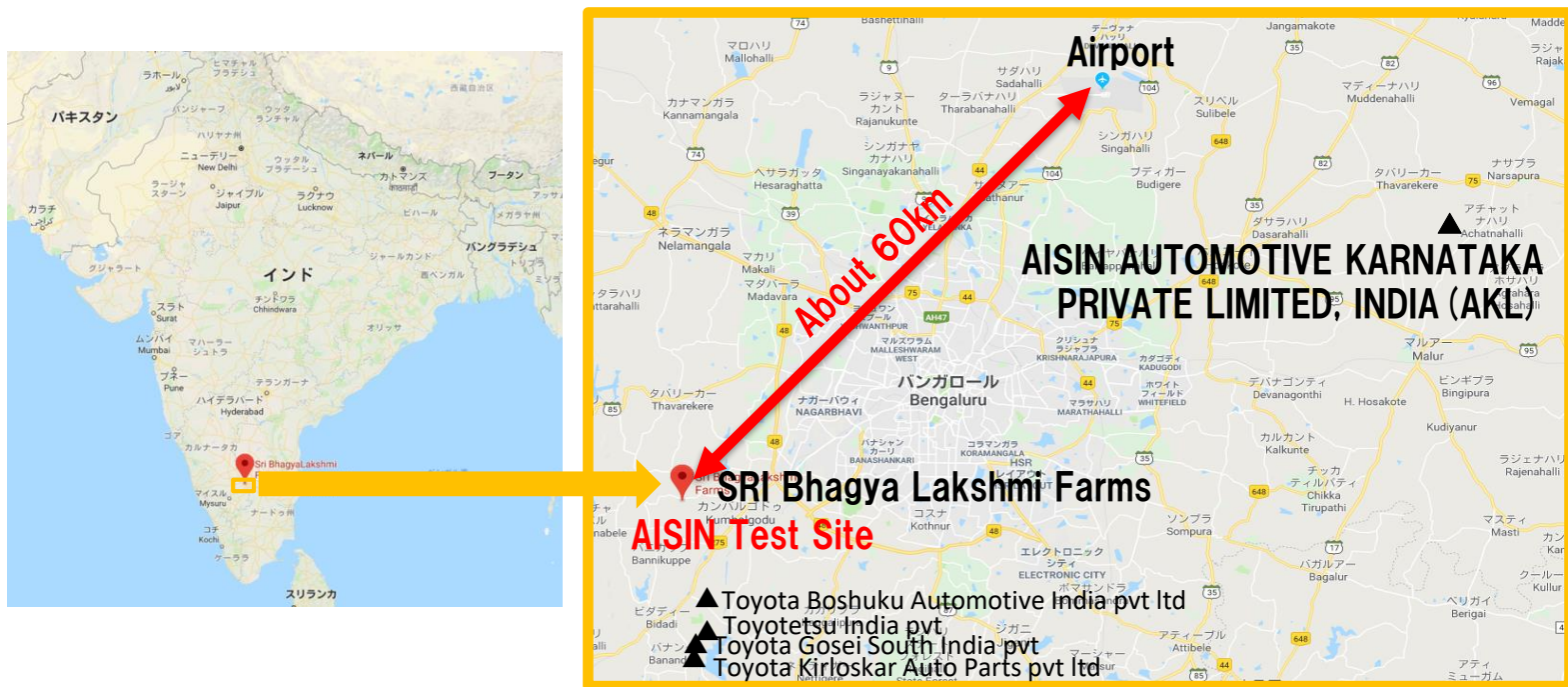
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## 6. 事業化への取り組み Approach to commercialization

### インド実証試験サイト India Test Site

- Our system was installed in SRI Bhagya Lakshmi Farms which is located in southwest of Bngalore South India in 2017.
- There are AKL and some factories of Toyota group around the site.





## 6. 事業化への取り組み Approach to commercialization

### インド実証試験サイト India Test Site

- Methane fermentation is possible with almost no accessory power.
- Power supply of up to 3 kW with two Gas engine generator “COREMO™” .
- CO<sub>2</sub> reduction amount : 4.3 ton/year.

▶ Video



- Raw material input cow dung : 1ton/day water : 1ton/day
- HRT : 30days (recycle slurry : 2~4m<sup>3</sup>/day)
- Biogas production : 40m<sup>3</sup>/day
- Methane concentration : 57~63% Gas pressure : 3~5kPa
- Fertilizer production : 90ton/year

“COREMO™” is a registered trademark of AISIN generator.



## 7. まとめ Summary

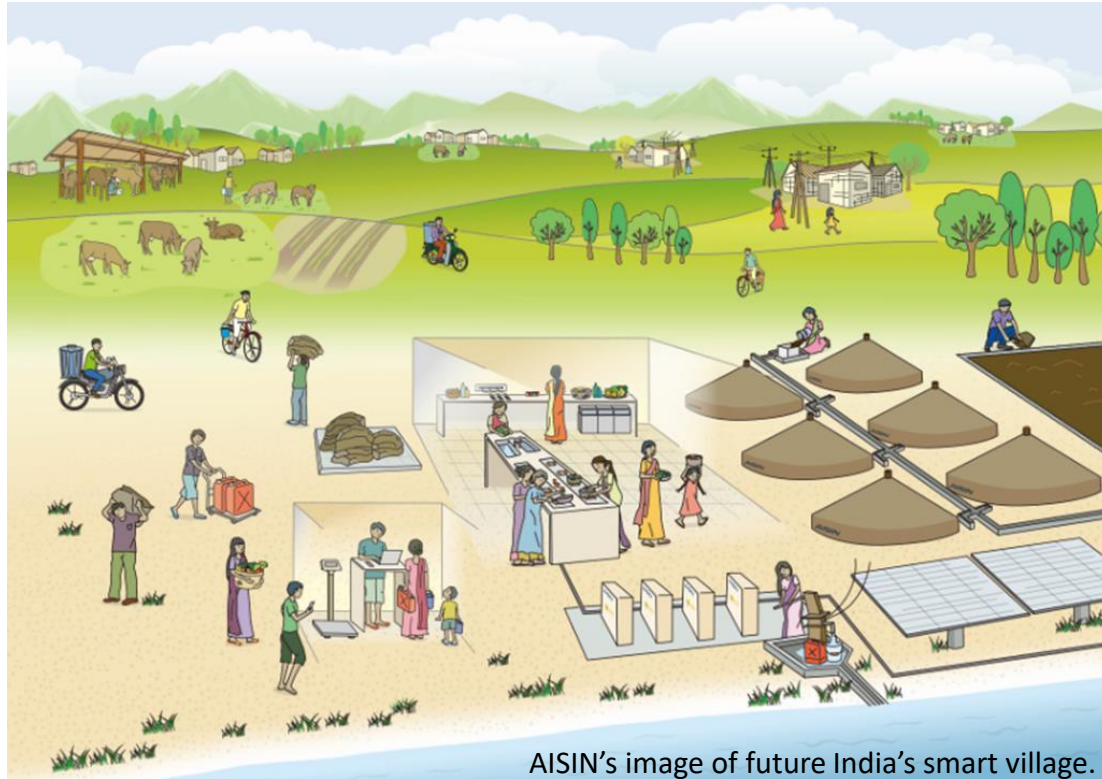
- インド地方部の電力インフラ整備を補完
- 発電における化石燃料の使用低減によるCO<sub>2</sub>排出量削減
- 余剰ガスの調理燃料使用による調理時間短縮および女性の社会進出促進
- メタン発酵後のスラリーの液肥利用による酪農家の収入を増やす
- 本システムの活用で循環型社会が実現する
- 現在、本発表内容をベースにNEDO助成事業※として継承し取り組み中  
持続可能な国際社会の構築に貢献したい

※NEDO助成事業名：「オンサイト小型バイオガス発電システムの要素技術開発事業」

「バイオガス発電によるエネルギー地産地消システム実証事業（インド）」 計2件

- Supplement the electricity infrastructure maintenance of rural area in India.
- Reducing CO<sub>2</sub> emissions by reducing the use of fossil fuels in power generation.
- Reduce cooking time by using cooking fuel for surplus gas and promote women's social advancement.
- Increase the income of dairy farmers by using liquid manure of slurry after methane fermentation.
- Recycling society is realized by using this system.
- Currently, based on the contents of this announcement, we are taking over as an NEDO support project.

**ご清聴ありがとうございました。**  
**Thank you for your attention.**



AISIN's image of future India's smart village.