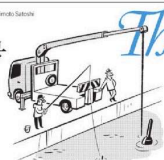


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The Asahi Shimbun

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「マレーシア」
捨てる油が
お金にかわる独自アプリで家庭からも回収
松本真弥 Matsumoto Shinya 経済部

マレーシアの首都クアラルンプール郊外にあるショッピングセンターのフードコート。バナナの葉で三角形に包まれた郷土料理ナシレマやホットドッグなどを提供する17店舗が並び、地元客でにぎわう。店ごとに仕切られたキッチンには、従業員フェイス・イムブロン(27)のスマートフォンにアプリの通知が届いた。「request successful(受け付け完了)」

ほどなく陽気なキャラクターの絵が描かれた小型タンクローリーが、フードコートのテラス席が並ぶ車寄せに到着した。料理に使われた廃食油が詰まったコンテナを、作業員たちが車のそばまで運ぶ。車のタンクにホースでつながった吸引器をコンテナに突っ込み、バキュームカーの要領で廃食油をタンクに移していく。作業完了の証拠として空のコンテナの写真を撮り、ものの15分で作業は終了。タンクローリーは次の店に向け、走り去っていった。

フードコート運営会社オペレーションマネジャーのナズミ・アフエンディ(37)は「ゴミになるはずの廃食油がお金にかわり、運営費用の一部に回せる。こんなに良いことはないね」と満足げだ。

フードコートの各店舗から出る油を集めると、月間で2〜3トンにのぼる。全量回収業者に買い取ってもらっていて、月6000〜9000リンギット(約19万〜28万円)の収入になるという。捨てられていた油がなぜこれだけの金額で買い取ってもらえるのか。

回収を手がけるファットホープス・エナジー社の創業者で最高経営責任者(CEO)のピネシュ・シンハ(35)は「回収した廃食油は石油元売り業者に販売しているが、元売りはそれをSAF(持続可能な航空燃料)などの原料にしている。SAFの需要の高まりで廃食油の量は全然足りていない。いまの100倍に回収量を増やしても、残さず売り切れる」と説明する。

SAF需要の高まりの背景にあるのは、航空業界の脱炭素の規制だ。国連の専門機関「国際民間航空機関(ICAO)」は国際線に対して新たな規制を導入し、今年1月から二酸化炭素(CO₂)の排出量を2019年比で15%削減することを義務づけた。対象は欧米諸国や日本など先進国が中心だが、27年からはブラジル、中国、インドといった新興国にも拡大する。自動車のよけに電気や水素燃料で飛ぶ航空機はまだ実用化されておらず、これまでの機体にはそのまま使えるSAFに航空各社が熱視線を注いでいる状況だ。

SAFの需要の高まりが、原材料となる廃食油の争奪戦を世界で引き起こしている。日本の全国油脂事業協同組合連合会によると、廃食油の取引市場はないため国ごとに価格の差が大きい。現在の世界での取引価格は1トンあたり12万〜18万円台に達している。2年前の2倍以上の水準だという。高値で売れる廃食油を集めようと、日本では銀座などの繁華街で店先に置かれた廃食油のりー斗缶が並べられ、海外では新品のバームオイルが廃食油として売られる有様だ。

そんな争奪戦の「勝ち組」といえるファット社。廃食油の回収網は、マレーシア国内に加えシンガポール、インドネシア、ブルネイ、タイ、フィリピンの40拠点到達している。回収量はコロナ禍だった20年をピーク、前年比8〜10%のペースで伸びている。

シンハが事業を始めたのは07年。「当時は廃食油なんて見向きもされなかった。当

SAFとは？
Sustainable
Aviation Fuel(持続可能な航空燃料)
の原文をそのまま略称。

植物由来の炭素は栽培の過程でCO₂を吸収するため、石油から作られるジェット燃料と比べてライフサイクルでCO₂を削減できる。機体を改造せずに使える。ジェット燃料と混ぜて使っても燃費性能に影響はない。

燃料の基準を定めるのは、国際民間航空機関(ICAO)が定めた「CORSIA」という脱炭素の枠組みだ。ICAOは国際線の2050年カーボンニュートラル目標に掲げている。

世界のCO₂排出量のうち航空業界が占めるのは2〜3%だが、航空需要は増加傾向が見え、何れも手を打たなければ排出量は倍以上になるとの試算もある。

ICAOによると、20年のSAF生産量は6.3万トンで、従来のジェット燃料の0.03%にとどまる一方、需要は30年に約8800万トン、50年には約6億5000万トンと急増が見込まれている。

廃食油で航空機を飛ばせ

6億5000万kl

30年後には
10,000倍以上!?
[2020年の
SAF生産量と
今後の需要見込み]

出典:ICAOなど

6.3万kl

2020

2030

2040

2050

0億kl

年

温室効果ガスの排出を減らそうと、航空業界がSAF(持続可能な航空燃料)の導入を進めている。その原料となるのが、料理に使った後の油だ。廃食油が航空機を飛ばす時代。航空業界にとって脱炭素の「切り札」とされるSAFの原料争奪戦はヒートアップしている。(文中敬称略)

SAFはバイオ燃料に
生まれ変わる廃食油
photo:Satyagrah欧州連合「EU」では2050年に
SAF 70%使用の義務化

時、自動車向けのバイオ燃料の原料は、バーム油、大豆が主流だった。廃食油の処理技術はまだ確立されておらず、既存の自動車や飛行機のエンジンに使えるかどうかははっきりしていなかった。

起業のきっかけは、10代の子供に見た英BBCの人気テレビ番組「トップ・ギア」。自動車を使った様々な実験にチャレンジする番組で、あるとき自動車で廃食油を入れて英国内を走行する企画が放映された。それを見たシンハは、父親から譲ってもらった20年もの三菱パジェロに、廃食油とディーゼル燃料を混ぜ給油すると、無事走った。不純物が原因か数日後にその車が壊れたため、道過(みち) 技術を高めることにした。家族や友人にも頼まれるようになり、「これはビジネスになるのでは」と感じた。

英国留学から帰国後、シンハは友人たちと事業を始めた。自らトラックを運転して朝から街を回って廃食油を集め、夕方に戻ったあとは夜通し道過などの処理作業にあたり、処理を終えたものを業者に売った。当初は自転車操業だったが、赤字だったのは創業1年目だけで、以降は成長を続けている。



フードコートで出た廃食油を回収する作業員
いま事業拡大の原動力になっているのが、自社開発のアプリだ。ファット社はマクドナルドやケンタッキーフライドチキンなどの店舗だけでなく、屋台や家庭からも廃食油を回収している。回収量が多い事業者からはアプリを通して回収依頼を受け付け、タンクローリーで引き取りに行く。個人事業主や家庭には、ファット社の拠点に持っていき、置いてあるタンクに自分で移してもらって、回収量はアプリで管理する。廃食油の買い取り価格はバーム油の市場価格と連動しているため、売る方ももらえる金額が分かりやすく納得感がある。目をつけた日系企業が、アプリシステムの提供を求めたこともあったという。

シンハは力を込める。「かつて原油が原料だったように、エネルギー源は置き換わっている。人口密度の高い東南アジアでは、廃食油が重要な資源の一つだ」

そんな廃食油を、航空機を飛ばすSAFに生まれ変わらせているところがある。シンガポールに飛んだ。●

HOME > Special feature > SAF Fly an aircraft with waste cooking oil > Can aviation fuel made from rice straw reduce air pollution? Progressing development in India, increasing presence of SAF



SAF Fly an aircraft with waste cooking oil

World Now

Update date:2024.03.21 release date:2024.03.21

Can aviation fuel made from rice straw reduce air pollution? Progressing development in India, increasing presence of SAF



Raw material for biofuels stored at the research and development facility of Indian biotechnology company Praj Industries. Armond Natu, the person in charge, holds soybean residue in his hands. There were bamboo, wheat straw, and rice straw in the background (Photo by Tetsuo Kogure, Pune, western India, November 23, 2023)

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領域・分野を超えて多彩なデータやテクノロジーを掛け合わせるトランスシミュレーション技術が注目されています。その可能性を聞きました。

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On May 19, 2023, an AirAsia flight departed from Pune in western India and landed at New Delhi Airport.

"I am very happy to have witnessed this historic moment." The person who greeted us was Hardeep Singh Puri (72), Minister of Petroleum and Natural Gas. It was India's first passenger flight using its homegrown SAF.

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The research and development facility of Indian biotechnology company Praji Industries has a plant that developed India's first domestically produced SAF. Silver piping visible through the glass, November 23, 2023, Pune, western India (Photo by Tetsuo Kogure)

SAF was developed and produced by the biotechnology company Praji Industries. At the company's research and development facility in Pune, director Ahmad Natsu, 39, showed off a pilot plant for SAF production. "We produced ethanol for SAF here." I was only allowed to look through the glass, but inside, the pipes lined up all glowed silver.

The company started developing SAF in 2015. The flight used SAF mixed with aviation fuel refined by Indian Oil, the national oil distributor.



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Pramod Chaudhary, chairman of Indian biotechnology company Praji Industries. Looking forward to the potential of India's SAF production = November 23, 2023, Pune, western India, photo by Tetsuo Kogure

Chairman Pramod Chaudhary (74) said, ``In addition to domestic demand, India is located between Europe and Far East Asia, and we expect it to become a refueling point (for international flights)." We are also receiving a series of inquiries from overseas oil companies, aircraft manufacturers, and airlines.

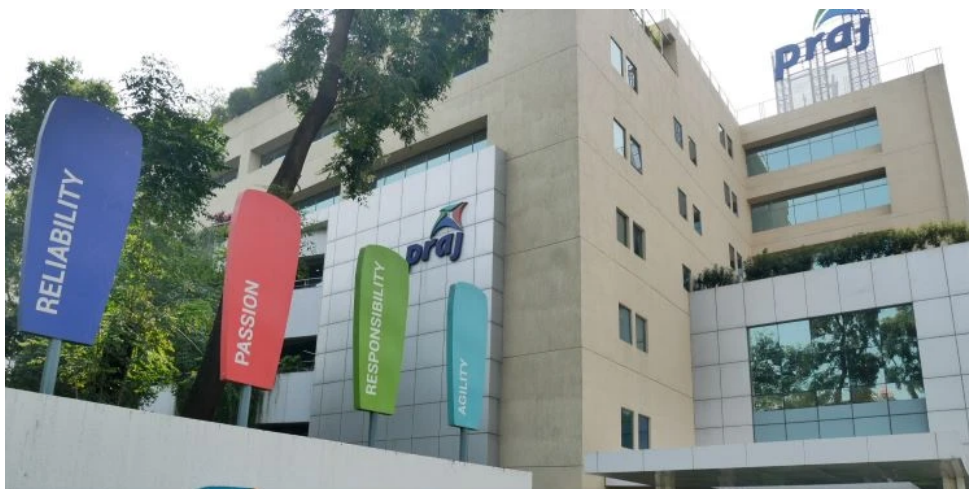
World's 3rd largest aviation market Sugarcane-derived fuel is a promising fuel

According to a report by India Brand Equity Fund (IBEF), a government-run research organization, India's aviation market has grown to become the third largest in the world after the United States and China.

The number of airports will increase from 50 in 2000 to 148 by 2023. In 2021, Indian airlines owned 712 aircraft, more than tripling over the past 20 years. The number of passengers in 2022 will be 327 million. It is more than three times the size of Japan, and is expected to increase to 480 million people by 2036.

Meanwhile, in November 2023, the government announced a goal to introduce SAF-blended aviation fuel in 2027. Initially, preparations will begin with international flights. Movement in the industry is also accelerating, with major aviation company SpiceJet moving forward with SAF development with another company.

Potential raw materials for SAF include molasses and squeezed juice derived from sugarcane. It is produced during the sugar manufacturing process and was previously discarded.



Headquarters of Indian biotechnology company Praj Industries. Developing business in more than 100 countries around the world, including Japan (Photo by Tetsuo Kogure, Pune, western India, November 23, 2023)

According to Praji, rice straw is also a candidate. In India, rice is incinerated after it is harvested, contributing to air pollution. The company has already established a factory to make ethanol fuel for automobiles, which is mixed with gasoline, from Indian oil and rice straw. Two other state-run oil distributors are also pursuing similar projects.

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システムインテグレーターの伊藤忠テクノソリューションズ（CTC）。未来の予測が難しい時代、子どもたちに届けたいメッセージを聞きました。

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"Farmers will also be proud when they see the airplane (if it becomes the raw material for SAF)," Chaudhary said.

The company, which operates in more than 100 countries including Japan, has tested 11,500 samples of biofuel feedstocks such as ethanol, isobutanol, compressed biogas and biodiesel.

They range from sugarcane, grains and starch, agricultural residue biomass (biological resources), and animal fats and oils.

There are differences in the raw materials that are easily available depending on the region, such as rice in Japan and wheat in Europe. We respond to a variety of needs in order to resolve issues ranging from raw material procurement to production. Among the samples Natu showed me at the research facility was waste cooking oil.

Turning street food frying oil into biofuel, the issue is the supply chain

There is also a company in India that produces biofuels using waste cooking oil. One of the pioneering companies is Unicon Fibro Chemicals.

"It's waste cooking oil collected from restaurants and hotels." At a factory in the western Indian town of Mahad, director Siddhartha Pradhan, 40, shows a cloudy brown liquid. As he brought his face closer to the beaker, he could smell burnt, fried food.



At the factory of Indian biofuel maker Unicon Fibro Chemicals, director Siddhartha Pradhan points to the dark brown used cooking oil that is used as a raw material. During the purification process that uses catalysts and solvents, impurities are separated (beaker in the middle) and a yellow, translucent bioester is extracted (beaker in the foreground) on November 21, 2023, in Mahad, western India. , photographed by Tetsuo Kogure

When purified by adding solvents and catalysts, a clear yellow liquid is separated. This is the methyl ester that becomes biodiesel.

The company originally refined oil for the production of polyester and nylon. However, in 2008, when the price of crude oil, the raw material, exceeded \$100 per barrel, the company began searching for a new business. In 2013, Pradhan, the founder's son, came up with the idea of producing biofuel using waste oil.



A factory of Unicon Fibro Chemicals, an Indian biofuel manufacturer. In India, it is a pioneer in using waste cooking oil as raw material. (Photo by Tetsuo Kogure, Mahad, western India, November 21, 2023)

The company developed its own manufacturing method, and when it started in 2015, its annual production volume increased from 1,000 kiloliters to 3,000 kiloliters. It sells to national oil distributors.

Pradhan is interested in SAF, even though it requires separate production equipment. The key is obtaining raw materials.

"In India, there is little awareness of waste oil. Only a small amount is used." The company currently purchases from about 10 companies, including restaurants and fast food restaurants, but says it is difficult to expand its supply network to the overwhelming number of street food stalls and cafeterias.

I visited a corner of Mumbai where ordinary people's restaurants gather. A classic Indian snack is fried to a fragrant aroma in a deep iron pot.

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Shuvashi Gupta (40) runs a popular shop that sells ``1,000 samosas a day," which are fried curry-flavored potatoes wrapped in batter. What to do with oil that is used repeatedly? When asked about it, Mr. Gupta said, "They are disposing of it." When I told him that it could be reused as biofuel, he simply said, ``I'm not interested."



A popular snack restaurant in Mumbai, western India. The standard samosas are fried one after another. just. It is said that there are few examples of waste cooking oil from privately run cafeterias being turned into biofuel raw material. (Photo by Tetsuo Kogure, November 22, 2023)

The government aims to achieve net zero greenhouse gas emissions by 2070. Biofuels, including SAF, are one of the pillars.

Prime Minister Narendra Modi launched the Global Biofuels Alliance in September 2023 when he chaired the G20 Summit (a summit of 20 major countries and regions). The 19 member countries include G20 countries such as the United States and Brazil, as well as people from the Global South such as Bangladesh and Mauritius.

It is clear that he is confident and wants to play a leadership role in spreading biofuels even in countries that do not have their own technology or equipment.

Circumstances that do not mean “increasing EVs will reduce CO2 ”

Bibha Dhawan (63), executive director of the Energy and Resources Institute (TERI) in New Delhi, points out the unique circumstances surrounding biofuels in India.



Bibha Dhawan, executive director of the Energy and Resources Institute (TERI), New Delhi, November 24, 2023. Photo by Tetsuo Kogure.

Unlike Europe, America and China, electric vehicles (EVs) account for only about 1%

According to government statistics, approximately 75% of electricity generation comes from fossil fuels. "The location where CO₂ is emitted will simply be moved from Delhi (a large city) where EVs run to the location where electricity is generated (to charge EV batteries)."

In other words, using biofuel in cars is more effective in reducing CO₂ emissions for the time being. The government has set a goal of increasing the proportion of bioethanol mixed in gasoline to 20% by fiscal 2025. This situation is the foundation for the growth of India's SAF business.

Tetsuo Kogure

Asahi Shimbun GLOBE Deputy Editor-in-Chief

From April 2017 to July 2021, he served as Asahi Shimbun's Sydney bureau chief, covering Australia, New Zealand, and other Pacific island countries. From 2006 to 2009, he covered South Asia for the New Delhi bureau. Current Deputy Editor-in-Chief of GLOBE. Born in 1973. Born in Gunma Prefecture.

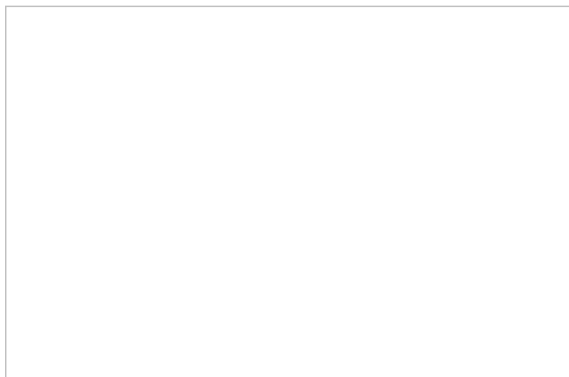
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