

Samsø, la isla sostenible de Dinamarca





INTRODUCCIÓN

OBJETIVOS

PROYECTO

ENERGÍAS RENOVABLES

FACTORES DE ÉXITO

CONCLUSIONES

Country: Denmark
 Communities: 22 villages
 Largest City: Tranebjerg, population 900
 Location: Bay of Kattegat, in the North Sea
 Population: 4,300 inhabitants, called Samsingers
 Area: 43.2 square miles, roughly the size of Nantucket
 Agriculture: Famous for it's potatoes and strawberries

Island Profile

SAMSO

The Energy Self-Sufficient Island

Samsø lives up to the origins of its name in a whole new way. The Danish word "samle" means "to gather" and "ø" means "island". From the 8th to the 11th centuries the island was used as a meeting place for Vikings. Now it's become a gathering place for visionaries who want to learn how communities can be self-sufficient and carbon neutral.

Community Contributors

Samsø's success is due to it's high level of community involvement. Not only are the power generating facilities community owned, but business and individuals have taken the initiative to make energy efficiency a top priority in their lives. These examples illustrate how hard the Samsingers are willing to work towards living in harmony with nature.



Solar Panels

Many homes have installed solar panels on their property to harness the power of the sun.

Reduced Energy Use

Samsingers are very conscious of their effort to reduce their consumption of electricity and have made their homes more energy efficient.

Geothermal Heating

Some homes have installed geothermal heaters which pump warmer air from deep within the ground.



Milk Production

At the time of milking, cow's milk has a temperature of about 100°F and must be cooled immediately to 37°F. Some dairy farmers have installed a heat transfer system to prevent the warmth from the milk from dissipating into the air, and instead harnessing it to help heat their homes.

Biomass Generators

Farms and small industries have installed boilers fueled by straw or wood chips specially treated to eliminate carbon emissions.



Biofuel

Farmers have adapted their tractors to consume ethanol or other fuels distilled from locally grown plants, like canola.

Bicycles

Samsø encourages cycling through a network of bike-friendly streets and pathways.

Electric Cars

Due to the small size of the island and limited distances traveled, rechargeable electric vehicles are ideal on Samsø.



Before the switch

A visit to the picturesque Danish island of Samsø (Anglicized: Samsø) may look like a step back in time. But look more closely, and you'll see that Samsø is a model for the future. Samsø is a remarkable island that uses 100% renewable energy. It's the largest carbon-neutral settlement on earth. An inspired and self-determined community made the commitment to make a difference in the world. Perhaps the most amazing part of the story is how they totally transformed their energy use in less than a decade. In the mid 1990's, Samsø was entirely dependent on oil and coal. Oil was used to heat the homes. Electricity was imported from the mainland by underwater cable, most of which was generated by burning coal. On average, each Samsinger was dumping 11 tons of carbon dioxide into the atmosphere annually due to their energy imports.



How they did it

In 1997, Samsø won a national government competition and started to change all that. Straw fired power plants were built to harness an abundant island resource. Wind farms were constructed on-shore and off that generated an abundance of electricity. Solar panels converted the sun's rays into energy. High efficiency wood chip boilers and geothermal pumps heated homes. Farmers even creatively capitalized the cooling of cow's milk as an energy source. Today the island is totally energy self-sufficient and it's become a model community for renewable energy, exporting it's surplus energy back to the mainland. The profits are reinvested into new energy projects.



The energy sources

WIND TURBINES

Centerpiece of the system. 100% of Samsø's electricity comes from wind power.

SOLAR & BIOMASS

The supporting players. 75% of Samsø's heat comes from solar power and biomass energy.

STRAW FIRED PLANTS

3 plants fueled with Wheat and Rye Straw (creative use to abundant resources on the island)
 Output: All combined heat 894 households

Highlight: The generators are especially efficient because they produce both heat and electricity.

Wind Turbines

11 On-Shore (189 feet high)
 Output: 1 turbine generates enough electricity to power 630 houses

10 Off-Shore (338 feet high)
 Output: All ten generate the equivalent annual energy of 690,000 gallons of oil

SOLAR

1 field with 9500 square foot of solar panel
 Features: Panels heat the water to 158°F, which is combined with the high efficiency fuel of a wood chip fired boiler, and then piped into local homes for heating.

1993

Samsø is 100% reliant on petroleum and coal. First straw fired plant is constructed.

1997

Island wins the government-sponsored contest to wean themselves from fossil fuels by 2008.

2000

11 land-based wind turbines are constructed.

2001

Solar panel and wood chip boiler plant is constructed.

2002

Second straw fired plant is constructed. Construction begins on 10 off-shore wind turbines which are operational within 6 months.

2003

The island becomes energy self-sufficient utilizing only renewable sources. Samsø starts to generate 10% more power than it consumes.

2005

Third straw-fired plant is constructed.

2007

Island is 100% carbon neutral with zero greenhouse gases produced.

Timeline

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ENFOQUE

Samsø

Earth's Only Energy Self-Sufficient Island

A visit to the picturesque Danish island of Samsø (English: Samsø) may look like a step back in time. But look closer, closely, and you'll see that Samsø is a model for the future. Samsø is a sustainable island that uses earth, renewable energy. It's the largest carbon-neutral settlement on earth, an inspired and well-documented community made the commitment to make a difference in the world. Perhaps the most amazing part of the story is how they totally transformed their energy use in less than a decade.

Samsø lives up to the origins of its name in a whole new way. The Danish word "samsø" means "to gather" and "ø" means "island". From the 80s to the early 2000s the island was used as a testing phase for things. Now it's become a gathering place for communities who want to learn how communities can be self-sufficient and carbon neutral.

In the real world, Samsø was entirely dependent on oil and coal. Oil was used to heat the houses. Electricity was generated from the outdated 1960s-era power plants, most of which was generated by burning coal. On average, each household was dumping 40 tons of carbon dioxide into the atmosphere annually due to their energy habits.

In 1991, Samsø won a national government competition and started to change all that. Three wind power plants were built to harness an abundant island resource. Wind farms were constructed and solar panels that generated an abundance of electricity. Solar panels converted the sun's rays into energy. High efficiency wind chips, boilers and geothermal pumps heated Samsø. Farmers also creatively capitalized the cooling of water wells as an energy source. Today the island is totally energy self-sufficient and it's become a model community for renewable energy worldwide.

When It All Happened

- 1992** Samsø is voted "most beautiful island in the world" by the Danish people.
- 1997** Wind starts the environmental movement on Samsø by building the first wind turbine.
- 2000** A heat pump is used to heat the island's houses.
- 2001** The island becomes carbon neutral.
- 2002** The island becomes the first in the world to use 100% renewable energy.
- 2003** The island becomes the first in the world to use 100% renewable energy.
- 2005** The island becomes the first in the world to use 100% renewable energy.
- 2007** Samsø is voted "most beautiful island in the world" by the Danish people.

Where The Energy Comes From

75% of Samsø's heat comes from solar panels and biomass energy.

100% of Samsø's electricity comes from wind power.

Where The Energy Goes

Wind Turbines

Contribution of the system:

- 100% of Samsø's electricity comes from wind power.
- 100% of Samsø's electricity comes from wind power.

Solar & Biomass

The supporting players:

- 100% of Samsø's electricity comes from wind power.
- 100% of Samsø's electricity comes from wind power.

How The Community Helps

Samsø is known for its high level of community involvement. But only on the power generating facilities community-owned, low-income and self-help have taken the initiative to make things efficient a step further in their lives. These examples illustrate how Samsø's citizens are willing to work towards living in harmony with nature.

Homes

- Reduced Energy Use:** Homeowners have installed energy-efficient windows, doors, and roofs. They have also installed energy-efficient light bulbs and appliances.
- Solar Panels:** Homeowners have installed solar panels on their roofs to generate electricity. They have also installed solar water heaters to heat their water.
- Geothermal Heating:** Homeowners have installed geothermal heating systems to heat their homes. They have also installed geothermal cooling systems to cool their homes.

Business

- Business Generators:** Businesses have installed solar panels on their roofs to generate electricity. They have also installed solar water heaters to heat their water.
- Milk Production:** Farmers have installed solar panels on their roofs to generate electricity. They have also installed solar water heaters to heat their water.

Transportation

- Electric Cars:** Homeowners have installed electric car charging stations in their homes. They have also installed electric car charging stations in public places.
- Biofuel:** Homeowners have installed biofuel heating systems to heat their homes. They have also installed biofuel heating systems in public places.
- Bicycles:** Homeowners have installed bicycle racks in their homes. They have also installed bicycle racks in public places.

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DISEÑO



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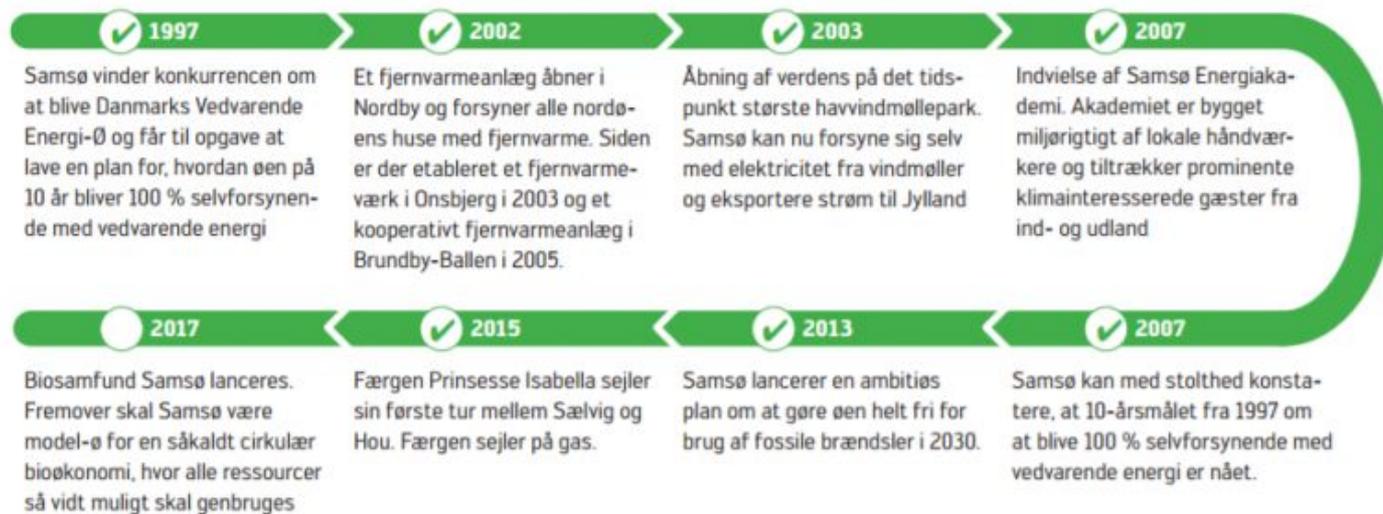
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PROCESO



The first island to become completely energy self-sufficient in 10 years?

11 ONSHORE WIND TURBINES

1 turbine generates enough electricity to power **630 houses**.

The turbines transmit electricity to the mainland when more electricity than the island can consume is generated.



OFFSHORE WIND TURBINES

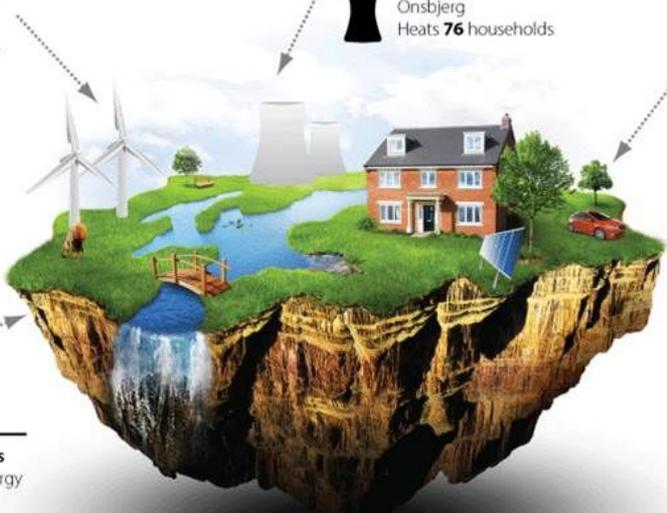
10 103m high offshore wind turbines constructed in 2003 produce more energy than the island uses for transport

3 x STRAW FIRED PLANTS

 Tranebjerg
Heats **263** households

 Ballen / Brundy
Heats **232** households

 Onsbjerg
Heats **76** households

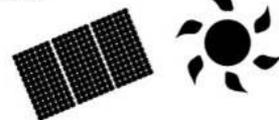


SAMSO: ISLAND FACTS

Area: 114 km²
Population: 4,000
Investment: DKK 368 million

SOLAR PLANT

One of the heating plants receives heat from **2500 m²** of solar panels. This is combined with a **900 KW** wood chip fired boiler.



EXCESS ENERGY

Excess electricity produced from offshore wind farms is invested in new energy projects.



11 1MW onshore wind turbines

generate 28,000 MWh, that's more electricity than the island's total consumption and the equivalent of 690,000 gallons of oil.



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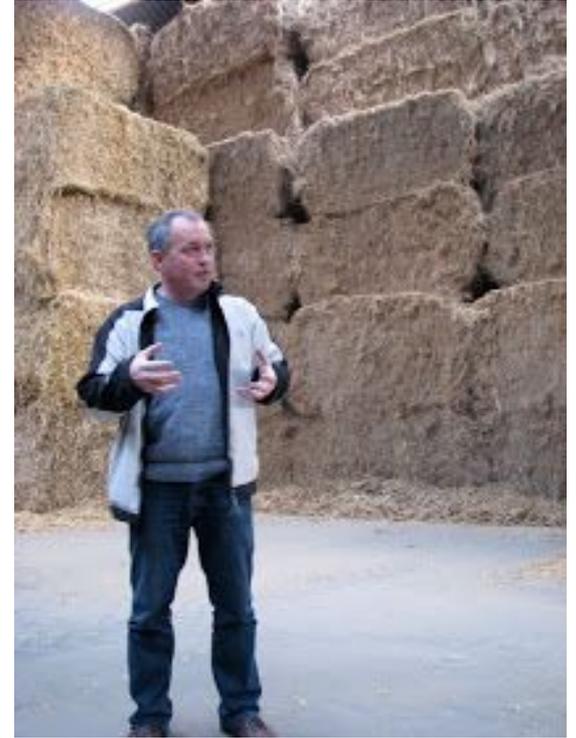
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Samsø Energy Academy



Aislamiento de la casa de Samsø



Experimento de hidrógeno

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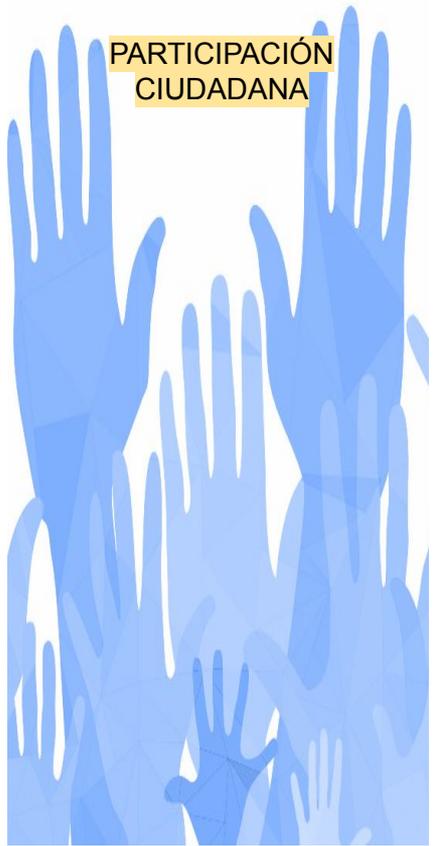
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FACTORES INTERNOS



PARTICIPACIÓN CIUDADANA



ACUERDOS ESCRITOS



PROPIEDAD DE LOS CIUDADANOS EN EL PROYECTO



COMPROMISO DE LAS AUTORIDADES ENERGÉTICAS



EXPERIENCIA Y CONOCIMIENTO

FACTORES EXTERNOS



FINANCIACIÓN

- Una de las principales lecciones aprendidas es el enfoque **participación de los ciudadanos**.
- Los resultados del proyecto se comunicaron tanto a la población local como al mundo en general. El éxito del proyecto también se puede ver en el **creciente interés por el turismo de energías renovables**. Algunos de los cambios introducidos por el proyecto han sido sostenibles y duraderos.
- Aunque el proyecto ha logrado sus principales objetivos, la **energía renovable** será un **elemento importante** en Samsø.