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E2-CUTIES

# Local Energy Communities in Denmark: inspiration & good practices

## Energy Community Middelgrunden

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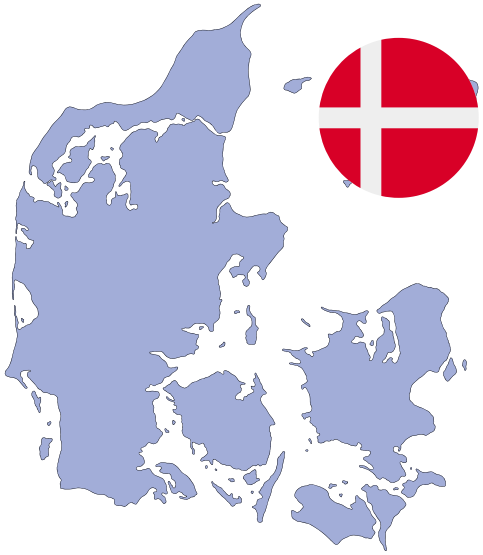
# Denmark: What happens when a nation embraces collective energy systems?



In April 2026, partners of the European project E2-CUTIES gathered in Copenhagen to explore one simple but powerful question:
**How are the pioneers of citizen-led energy doing? And what role do Danish municipalities typically play in these initiatives?**

Over three days of site visits and exchanges, one thing became clear: the strength of Denmark's energy system is not a single technology. It is the way technologies and infrastructure are thought of as a common good.
Where energy is owned by people, private and public organisations sharing the same space. The result is not only a widespread backing of decentralised solar projects and a faster energy transition, but also an increased resilience and wellbeing of local communities.

What stood out most from talks with Danish energy communities was not the sophistication of the technologies used, but the mobilisation power of local champions. Their setup was often initiated by strong-willed individuals who bring citizens, municipalities, and other local stakeholders together.

This reflects a deeper Danish context, where democracy is deeply anchored in society, based on participation, equality of voices, and consensus-building. Denmark has a long tradition of active civil society engagement and grassroots movements, where citizens are used to being collectively organised and taking part in decision-making processes. At the same time, the country is characterised by very high levels of trust between citizens and public institutions, which facilitates cooperation and reduces barriers to collective action.

This democratic and trust-based culture is closely linked to Denmark's long history of cooperative solutions across sectors, including agriculture, housing, and energy. Community ownership has played a major role in the development of renewable energy, with a significant share of wind capacity historically owned by citizens and cooperatives. These traditions create a strong foundation for local energy communities, where inclusion of different stakeholders, including minorities, is seen as a strength, and where collaboration between public authorities and citizens is the norm rather than the exception.

**This paper provides an overview of some Danish experiences: the energy communities of Skårup, Avedøre and Middelgrunden.**

These initiatives can broaden the perspective of municipal teams who wish to explore other avenues for a collective approach to production and sharing of energy and heat.

# Denmark: setting the scene

## Energy production

Denmark, this small country in the North of Europe, home to over 6 million people, is frequently mentioned as one of the sustainability pioneers. The country has international recognition for its well-thought mobility concepts, innovative architecture and urban planning and is admired for its widespread cooperative energy model.

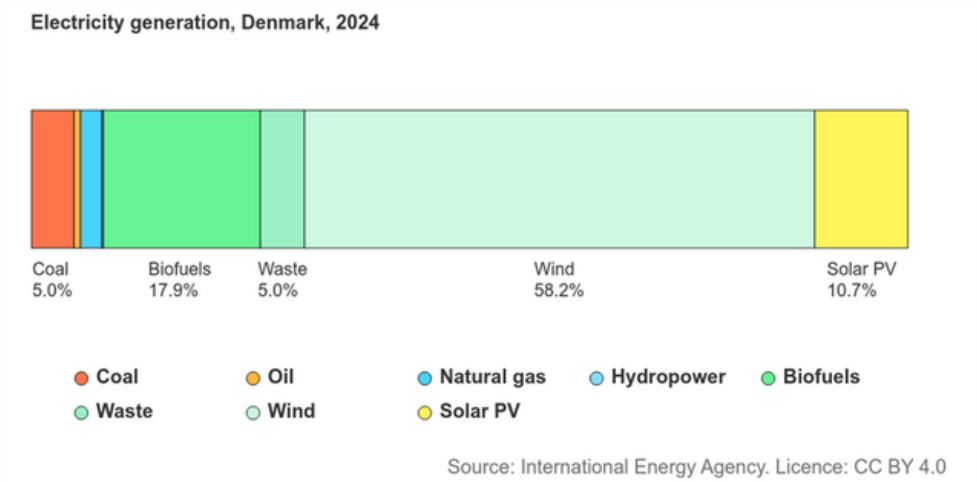
According to the Danish organisation Energifaellesskaber, energy communities in Denmark shared a total of 200 MWh of renewable electricity among their members during the year 2025. Three energy communities are the main contributors to this result: Avedøre, Skårup and Middelgrunden.

Collective ownership in the form of cooperatives is deeply rooted in Denmark. For several decades, many banks, dairies, housing and food shops have been run as cooperatives.

In 2026, almost 70% of all households are connected to the district heating grid (biomass, waste, solar, heat pumps, geothermal). Inspired by the example of the Middelgrunden offshore wind farm, other energy cooperatives soon sprang up in the country.

Denmark's renewable energy success has been strongly linked to citizen ownership, cooperative traditions, and mechanisms that give local communities a direct stake in projects, even though public acceptance challenges, especially around onshore wind, still remain.

Citizen participation is also encouraged as Denmark aims for exiting fossil fuels in the energy supply by 2050. The country has been one of the most proactive jurisdictions in preparing for the future of its gas network, guided by ambitions to phase out gas heating in households by 2035, and achieving a 100% green gas supply by 2030. With 58,2 % of wind and 10,7% of solar PV, Denmark produced most of its electricity by means of renewable energy sources in 2024.



# Danish electricity system and ownership structure

- The transmission lines are owned by the Danish state (TSO)
- The distribution network is owned by 37 companies, of which 27 are cooperatives (consumer-owned) and 10 are municipally-owned (smaller entities– some of them are merging with cooperatives)
- Danish cooperatives are consumer-based, whereby consumers can join voluntarily
- Municipalities have significant authority over local energy planning, particularly about heating (district heating is mandatory in certain areas):
  - Mandatory local heating planning
  - Ban or restriction on gas use in certain areas
  - Significant municipal involvement in district heating

# Legal framework

**Main public bodies of Danish energy market**

- Regulation and supervision: Danish energy agency (DEA) and the Danish Utility Regulator (DUR)
- Ministry in charge: Climate, Energy and Utilities

**Main laws regulating energy communities**

- Promotion of Renewable Energy Act
- Electricity supply Act
- Heat Supply Act

In 2021, the country gave additional institutional weight to energy communities by embedding renewable energy communities (REC) in its Act on promotion of renewables. Energy sharing is not specified and sharing rules are not fully clear yet. In the same year, the EU-based definitions of RECs and CECs (Citizen Energy Communities) were added to the Electricity Supply Act. In practice, Danish citizens and experts commonly do not make the distinction between those two energy community forms. They mostly refer to as Energifaelleskaber (energy communities).

Changes in European and national legislation have introduced a clearer framework for energy communities, which differ from traditional energy cooperatives primarily in the scope of activities they can undertake rather than in their legal form.

Traditional cooperatives, such as the Middelgrunden Wind Cooperative, typically produce electricity or heat and sell it to the wider energy market, often at national or regional level.

By contrast, energy communities can participate across multiple parts of the energy system, including the generation, consumption, sharing, storage, and sale of energy. A key innovation is their ability to facilitate the collective sharing of locally produced electricity among members through the distribution network, subject to applicable grid tariffs and taxes. While both cooperatives and energy communities can adopt similar governance and ownership structures, energy communities generally have greater flexibility to engage in a wider range of energy market activities. Where heat supply is involved, however, specific national regulations may apply, requiring heat-related activities to be managed separately and under different financial rules. For this reason and to complement its services, district heating companies tend to collaborate and make agreements with the local energy community.

**Options amongst a wide set of legal entities**

The Danish Commercial Companies Act provides for different forms of for-profit and non-profit legal entities. Cooperatives and associations are the most widely used form to involve partners at equal level playing field and acting in the economic interest of the members. They are in line with the EU Directives' regulation of openness and decision-making in the energy community. According to EBO Consult, associations in Denmark have a less institutional character than a cooperative company and can therefore be regarded as a more "layman's" model of organisation. Both legal forms are considered a commercial actor. Cooperatives are most common when it comes to collectively owned energy infrastructure. Associations may allow for a mix of collectively and individually owned assets.

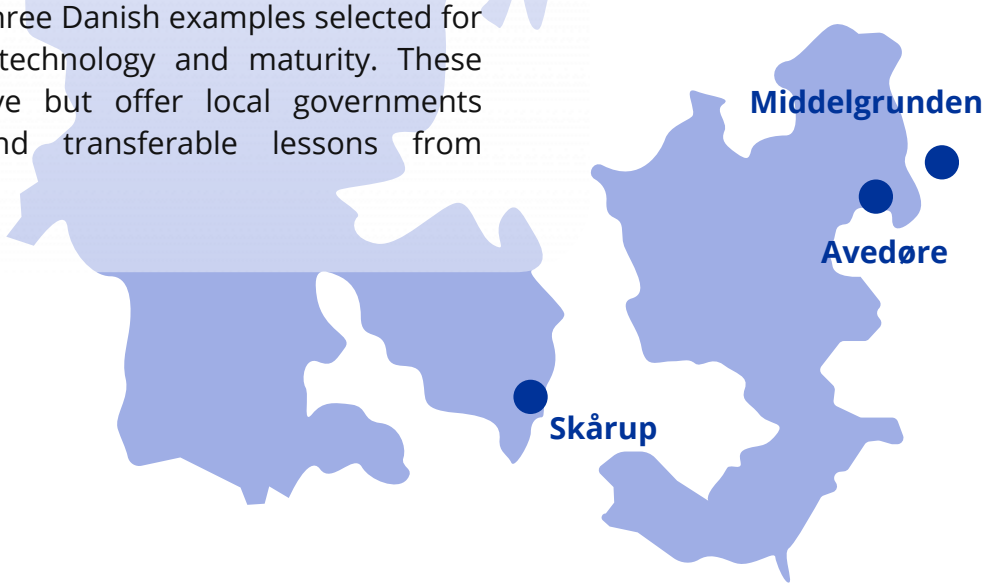
## Important intermediaries for energy communities

Several entities play a significant role in rolling out energy communities in Denmark.

- EBO Consult: a company providing support in operation and management of DH and energy communities
- Energy Communities DK (Energifjaellers): a non-profit organisation improving the legal framework and providing information around energy communities to different stakeholders
- Some Danish banks offer (low- or zero-interest) loans to citizens (lacking upfront capital) for buying shares in renewable

## Danish Energy Communities at Work: Spotlight on three energy schemes with citizen and municipal involvement

To illustrate how energy cooperatives can take shape in practice, we zoom in on three Danish examples selected for their diversity in scale, technology and maturity. These cases are not exhaustive but offer local governments concrete inspiration and transferable lessons from different contexts.

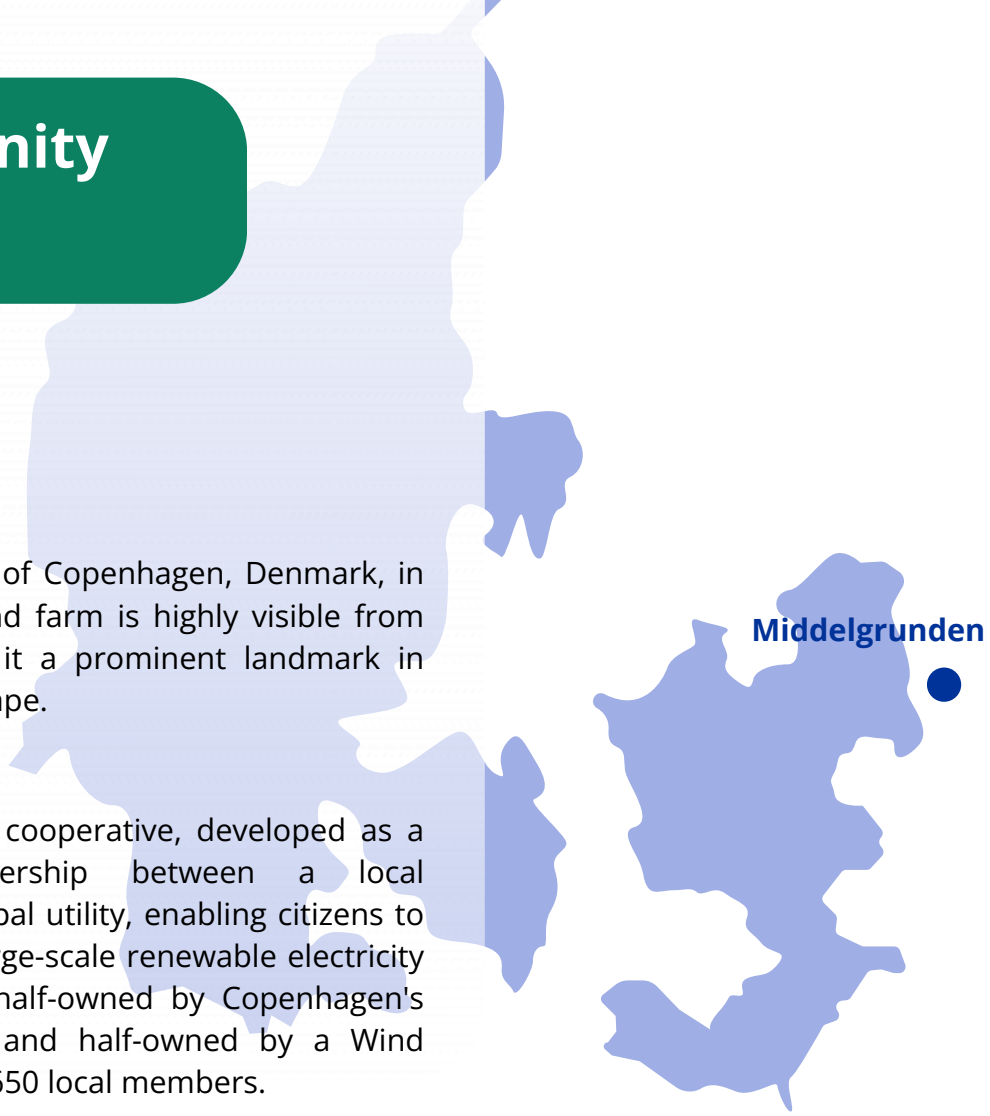


# Energy Community Middelgrunden

## Overview

**LOCATION**

Offshore, just off the coast of Copenhagen, Denmark, in the Øresund strait. The wind farm is highly visible from the city shoreline, making it a prominent landmark in Copenhagen's urban landscape.




**TYPE OF INITIATIVE**

A citizen-led offshore wind cooperative, developed as a 50-50 public–civic partnership between a local cooperative and the municipal utility, enabling citizens to co-own and benefit from large-scale renewable electricity generation: the project is half-owned by Copenhagen's municipal utility company and half-owned by a Wind Turbine Cooperative with 8,650 local members.

## Main Activities

The Middelgrunden project focuses on the promotion and production of renewable electricity through offshore wind energy, operating a wind farm of 20 turbines (2 MW each) located on the sea near Copenhagen. Electricity is fed into the grid. Beyond energy production, the long-standing initiative plays a key role in citizen engagement and public acceptance of renewable energy, acting as a flagship example of community ownership at scale.

# Timeline and key milestones

**1970s** Sweden builds a nuclear power plant near the Danish border intended to supply electricity to Copenhagen. Strong opposition in Copenhagen to nuclear energy sparks interest in alternative solutions.

**1990s** Discussions on offshore wind energy begin as a response to this opposition and the search for renewable alternatives.

**Mid-1990s** First design for Middelgrunden proposes 27 wind turbines in three rows. Although efficient, the design is rejected due to its visual impact, with opposition from the city's "beautification" association: an official body that advises on building permits and urban development projects, helping ensure that new constructions are aesthetically pleasing, well integrated into the city, and respectful of the local urban environment.

**1997** The Middelgrunden cooperative is established. An architect is brought in to redesign the project, resulting in a new layout of 20 turbines arranged in a wide arc along the coastline, which gains approval from the official "beautification" association.

**2000** Construction of the offshore foundations begins.

**2001–2002** The wind farm is completed in just over a year. The project becomes a symbol of local pride, attracting more than 10,000 visitors shortly after completion.

**2020s** The original permit period approaches its end; technical assessments show that the structures remain sound and can continue operating.

**2025** The Danish Energy Agency approves an extension allowing the wind farm to operate for another 25 years, effectively doubling its lifetime to around 50 years.

**Today & future** Repowering with larger turbines is constrained by the nearby airport, so the focus is on lifetime extension, maintenance, and continued operation of the existing assets.

# Municipal Governance

## The Role of the Municipality

The municipality plays an important enabling and mediating role, primarily as the owner of the utility company. Initially, the utility opposed citizen participation ('Over my dead body, if there will be an offshore windfarm, it will be owned by the utility company.'). But the cooperative successfully mobilised political support, including backing from the Mayor. This led to a joint ownership model, where the cooperative and the utility each own 10 turbines. The municipality thus ensures institutional backing, legitimacy, and integration into the broader energy system, while allowing citizen ownership to coexist.

## Municipal departments coordination

Coordination goes beyond municipal departments here: As the cooperative operates offshore, it is a cooperation between the state, the municipal utility and the citizen cooperative.


# Public-civic partnership

## Decision-making structure

Middelgrunden is a strong and iconic example of a public–civic partnership, combining:

- a citizen cooperative
- a municipal utility company

Ownership is split 50/50, creating a balanced model where:

- citizens have real ownership
- the utility ensures technical and operational reliability

The cooperative is governed by a board of 9 members, elected by members. Efforts have been made to ensure generational renewal, including:

- allowing young people to test board roles temporarily
- currently 4 of 9 board members are under 40

This reflects a governance model that combines democratic participation with long-term sustainability of leadership.

### Community Energy Plans and Future Milestones

The project did not emerge from a formal energy plan, but from:

- bottom-up citizen mobilisation to make it possible for citizens in a big city to participate in local renewable energy projects (at that time 84% af Copenhageners supported the idea of involving citizens)
- opposition to nuclear energy
- strong local political engagement

The vision evolved iteratively, particularly through:

- redesigning the project to address visual concerns
- aligning citizen ambition with municipal priorities
- support from well-known citizens and NGOs

### Managing Community Involvement

Community involvement is driven through ownership and identity, with citizens able to participate by purchasing shares in the cooperative. 42,500 shares (550 EUR each) were made available, although early uptake was slow due to financial uncertainty. Engagement was successfully boosted through support from well-known cultural figures (actors, singers). They helped to build trust and visibility. Over time, involvement has been sustained not only through financial returns, but through a strong sense of collective pride and ownership, with the project seen as “our wind farm” by Copenhagen residents.

> “After 11 months, we had sold 42,500 shares for 550 EUR each. The agreement made with banks that citizens could take a loan with the share as guarantee for the bank (without guaranteed interest) to pay their investment helped a lot in that.”
>
> **Erik Christiansen, Chairperson**

# Inclusion

### Barriers to participation

Participation is open to citizens, but in practice requires:

- financial capacity to invest
- willingness to accept relatively low financial returns

Efforts have been made by engaging younger generations in governance through a possibility of testing a seat at the board for a short while

### Strategies to reach underrepresented groups

Strategies focused on:

- public campaigning and visibility
- involvement of trusted public figures
- creating a strong emotional connection to the project

More recently:

- targeted efforts to involve younger people in governance

# Integrated energy system

The project functions as a standalone electricity generation asset, feeding into the grid. Compared to today's systems, it reflects an earlier phase of the energy transition focused on deployment rather than integration.

At the time of development (early 2000s), technology choices were driven by:

- feasibility of offshore wind
- public acceptance (visual design was critical)
- available technology at the time (2 MW turbines)

A key constraint today is:

- proximity to Copenhagen airport, limiting turbine height and size
- preventing repowering with larger modern turbines

Rather than upgrading, the focus is now on:

- maintaining existing infrastructure
- extending operational lifetime (potentially another 25 years)

> "25 more concession years were recently given due to big citizen participation. This will make it the first wind farm ever to stay and operate for 50 years."
>
> **Erik Christiansen, Chairperson**

## Main takeaway

**Middelgrunden shows that strong citizen ownership, combined with good design and political support, can turn large-scale renewable energy infrastructure into a source of local pride rather than opposition.**

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